

# The 30 billion dollar whim

**A review of the Reserve Bank  
consultation paper: ‘How much capital  
is enough’**

## About Tailrisk economics

Tailrisk economics is a Wellington economics consultancy. It specialises in the economics of low probability, high impact events including financial crises and natural disasters. Tailrisk economics also provides consulting services on:

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General economics.

Principal Ian Harrison (B.C.A. Hons. V.U.W., Master of Public Policy SAIS Johns Hopkins) has worked with the Reserve Bank of New Zealand, the World Bank, the International Monetary Fund and the Bank for International Settlements. In his time at the Reserve Bank Ian played a central role in developing an analytical approach to financial system risk issues.

Contact: Ian Harrison – Principal Tailrisk economics

e-mail:harrisonian52@gmail.com

Ph: 022 175 3669

# The 30 billion dollar whim

## A review of the Reserve Bank consultation paper 'How much capital is enough'

***"We are going to build a great big beautiful capital wall - and Australia is going to pay for it"***

### Part one: Introduction

On 14 December 2018<sup>1</sup> the Reserve Bank of New Zealand released a discussion document 'How much capital is enough', which proposes an increase in the minimum common equity tier one (CET1) capital ratio to 16 percent. As banks will need to hold a buffer over that minimum, the practical effect will be to increase the banks' average capital ratio from the current level of around 11 percent to around 18 percent, a seven percentage point increase<sup>2</sup>. There will also be an increase in capital calculation floors and adjustment ratios that will further increase required capital.

The justification for the higher capital ratio is based on what is represented as a new approach to setting the regulatory capital ratios - 'the risk appetite framework'. The Reserve Bank says that this follows from a consideration of the words in part 68 of the Reserve Bank Act, which reads:

*The powers conferred on the Governor-General, the Minister, and the Bank by this Part shall be exercised for the purposes of—*

*(a) promoting the maintenance of a sound and efficient financial system*

The Bank argues that the financial system is 'sound' if *'there is enough capital in the system as a whole to cover losses that are so large that they might only occur very*

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<sup>1</sup> On 25 January 2019 the Reserve Bank issued an updated version of the consultation paper but there do not appear to be any changes that would affect the analysis in this paper.

<sup>2</sup> The bank may be able to reduce some of their current tier one capital that no longer counts for regulatory purposes but some of it will be 'stranded'. We have assumed that half will be recalled so the net effect of the policy changes will be a 6 percentage point capital increase.

*infrequently*'. Infrequently is quantified as a one in 200 probability. It is claimed that regulatory capital of 16 percent is required to reduce the probability to this level. The capital implication of word 'efficient' in the Act is considered separately. It is considered in more conventional terms, requiring a balancing of the costs of the higher capital and the benefits from having higher capital.

If the 'soundness' and 'efficiency' analyses generate different answers, then the soundness criteria rules, and some inefficiency should be tolerated for the sake of an appropriate level of soundness.

But, happily, according to the Bank, there is no such conflict – there are improvements from both a soundness and efficiency perspective, so there is a 'win-win' situation.

The costs of the policy receive little attention. It is admitted that the higher capital requirements could make it more expensive for New Zealanders to borrow, but the Bank claims that the impact will be 'minimal' and that they have taken it into account. However, even on the Bank's own assessment of 8.2 basis points<sup>3</sup> for each percentage point increase in the capital ratio, the cost to New Zealand will not be minimal. It is likely to cost around \$1.5 billion per year, and possibly more. The present value of the cost of the policy could reasonably be assessed at **\$30 billion**.

A medium size business with a loan of \$5 million could be paying \$50,000 additional interest a year. A homeowner with a \$400,000 mortgage could be paying an additional \$1,000 or more a year. The Reserve Bank has not taken borrowers direct costs into account. The 'soundness' test which is driving the policy explicitly excludes any consideration of cost. The foreign cost benefit analyses, which the bank seems to have relied on in its 'efficiency' assessment, also ignore borrowers' increased costs.

\$30 billion is a lot of money, and Australia is not going to pay for it. It could fund for, example: huge improvements in the national roading system; \$10,000 subsidies for three million electric cars; or, if you are quite determined to waste the money, a 1000 km wall on the southern US border. Given competing claims on scarce resources the capital increase should only proceed if you are reasonably sure that the benefits will well exceed the costs. The burden of that proof should sit with the Reserve Bank.

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<sup>3</sup> This is the number that appears in the decision document. A figure of 6 basis points appears in the consultation document but there is no explanation for the difference. Assuming a 5-percentage point increase and \$430 billion of bank lending the annual cost is \$1763 million.

The central question that is addressed in this paper is whether the benefits, ('being more resilient to economic shocks') are worth more than \$30 billion. Our assessment is that very clearly, they are not. New Zealand could secure nearly all of the benefits of higher capital by increasing tier two capital, as the Australians are proposing to do, at about one fifth of the cost of the Reserve Bank's proposal. The Reserve Bank does not appear to have considered this option.

The key driver behind the 16 percent capital ratio proposal is the Bank's assessment that the banking system is 'unsound' because the risk of failure is worse than 1:200, which is at odds with rating agencies and informed analysts' assessments. However, the Bank now says it has alternative facts.

The Bank trumpets the breadth and dept of their analysis supporting their decision. One of the purposes of this paper is to 'fact check' the Reserve Bank's claims. We have made 'Pinocchio'<sup>4</sup> assessments of the Bank's more public statements on the capital adequacy proposals in an [accompanying paper](#).

This paper proceeds as follows. Part two sets out the key conclusions from our analysis. Part three looks at the logic of the 'risk appetite' approach, and considers the evidence presented by the Bank that a 16 percent minimum capital ratio is necessary to reduce the probability of a 'crisis' to one in two hundred years.

Part four examines the evidence on the 'efficient' level of capital, and in particular it revisits the Reserve Bank's analysis presented in its 2013 Regulatory Impact Statement on the application of the Basel III rules to New Zealand. This analysis suggested that the optimal (tier one) capital ratio was 13 percent, which is about where the banking system is now. Part five looks at the Reserve Bank's discussions of its stress test results, and what this tells us about the soundness of the New Zealand banking system. The next part takes a closer look at the benefits, in the New Zealand context, of increasing CET1 capital from 11 to 18 percent, focusing on the costs of financial crises. Part seven briefly considers the Australian approach of increasing tier two capital.

The Reserve Bank also says that it is inclined to introduce a new minimum capital requirement based on the leverage ratio. Here the Bank has made a 180 degree turn from its initial position. When a leverage ratio was proposed by the Basel Committee just after the GFC, the Bank made a submission opposing its introduction. It then declined to apply it to New Zealand banks when it became part of the Basel framework. The Reserve Bank was supported in this (privately) by APRA, who also

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<sup>4</sup> The Pinocchio assessments broadly follow the Washington Post fact Checker methodology. The assessment document is available at [tailrisk.co.nz](http://tailrisk.co.nz)

opposed the leverage ratio, but had to go along because they were a member of the Basel Committee. Put briefly and bluntly, the leverage ratio is a silly idea. It will achieve nothing, but might confuse members of the public and analysts if they were to look at it. We will set out the arguments in a subsequent paper.

## Part two: Key conclusions

### 1. The 'risk tolerance' approach is a backward step that ignores a consideration of both the costs and benefits of the policy

The soundness test is based on an arbitrarily chosen probability of bank failure that ignores the cost of meeting the target. The Bank has ignored its own cost benefit model which did take the probability of bank failure, the costs of a failure, the interest rate costs of higher capital and societal risk aversion into account.

### 2. Bank decision based on fabricated evidence

The Bank's decision to pursue a 1:200 failure target was purportedly based on evidence from a version of the Basel advanced model. It was manipulated to produce the right answer. Initially, a 1:100 target was proposed, but when this couldn't generate a capital increase, the target was switched to 1:200 at the last minute.

The Bank's model inputs were not credible. It was assumed that all loans were higher risk business loans and that the probability of loan default, a key model input, was more than two and a half times the estimates the Reserve Bank has approved banks to use in their capital modelling.

The Bank's analysis was embarrassingly bad, so it attempted to cover this up with a subsequent information paper that was written after the decision was made, and after the Consultation paper was released. It reached the same conclusion on the required level of capital, but only by assuming a 1:333 failure probability, and by using model inputs that were still not credible.

### 3. A 1:200 target can be met with a capital ratio of around 8 percent

If the Basel model were rerun using credible inputs it would probably show that a 1:200 failure rate can be met with a capital ratio of around 8 percent.

**4. The policy will be costly**

The Bank has down played the interest rate impact of the policy, saying any increases will be 'minimal'. Based on its own assessment of the interest rate impact, the annual cost will be about \$1.5-2 billion a year. The present value of the cost of the policy could be in excess of \$30 billion.

A homeowner with a \$400,000 mortgage could be paying an additional \$1,000 a year. A business with a \$5 million loan could be paying an additional \$50,000.

**5. The Bank's assessment that the banking system is currently unsound is at odds with rating agency assessments and borders on the irresponsible**

The rating agencies' assessment of the four major banks is AA-, suggesting a failure rate of 1:1250. The Bank is now saying that, at current capital ratios, the banking system is 'unsound' because the failure rate is worse than 1:200. Or in other words the New Zealand banking system is not too far from 'junk' status. The international evidence does not support the Bank's contention that the probability of a crisis is worse than 1:200. The Bank has ignored the fact that banks will need to hold an operating margin over the regulatory minimum, and has not adjusted New Zealand capital ratios to international standards to make a fair like-for-like comparison.

**6. The Bank's analysis ignores the fact that the banking system is mostly foreign owned**

Foreign ownership increases the cost of higher capital because the borrowing cost increases flow to foreign owners. Foreign owners will support their subsidiaries in certain circumstances, which reduces the probability of a bank failure. There is little point in having a higher CET1 ratio than Australia, because if a parent fails then it is highly likely that the subsidiary will also fail, because of the contagion effect. A New Zealand subsidiary might still appear to have plenty capital, but depositors will run and the Reserve Bank and government will have to intervene.

**7. The Australian option of increasing tier two capital has been ignored**

APRA is proposing to increase bank capital by five percentage points, but will allow banks to use tier two capital to meet the higher target. This provides the same benefits, in a crisis, as CET1 capital, but at about one fifth of the cost. New Zealanders will be required to spend an additional \$1.2 billion a year in interest costs for almost no benefit in terms of more resilience to a severe crisis.

#### **8. The benefits of higher capital are modest**

Most of the costs of a banking failure are due to borrowing decisions made before the downturn. This will impose costs regardless of the amount of capital held. With current levels of bank capital failures will be rare, with the main cost likely to be a government capital injection. The experience with most banking crises, in countries most like New Zealand, is that governments have recovered most of their costs when the bank shares are subsequently sold.

#### **9. The Bank is mis-selling insurance**

The Bank is selling a form of insurance to the New Zealand public, but it is vague about the premium costs and has exaggerated the benefits. The premium is the \$1.5-2 billion. The benefit would be around a 10 percent reduction in the economic cost of a financial crisis, with an expected return of a few tens of millions.

An informed, rational public would not buy this policy.

#### **10. New Zealand banks already well capitalised compared to international norms**

A recent PricewaterhouseCoopers report argued that if New Zealand bank capital ratios were calculated using international measurement standards they would be 6 percentage points higher, placing New Zealand in the upper ranks of well capitalised banking systems. The Reserve Bank criticised some details in the report, but has not produced its own assessment as Australia's APRA has done.

#### **11. The Bank has forgotten about the OBR**

The Open Bank Resolution (OBR) bank failure mechanism, was originally conceived as a substitute for higher capital to reduce fiscal risk, and to reduce the costs of a bank failure. While banks are been required to spend almost \$1 billion on outsourcing policies to support the OBR, it does not appear in the capital review at all - despite the Governor's arguments that the main justification for capital increases is to reduce fiscal risk.



## Part three: The risk appetite framework

### The soundness test

The distinctive feature of the soundness test in the risk appetite framework is that it does not require a consideration of the costs and benefits of bank capital. A probability of crisis is chosen, and as long as it can be reasonably described as 'sound', it will do. The Bank just happen to have chosen 1:200, but they could just as reasonably have chosen, say, 1:100, or a higher number. Different numbers will delivering very different minimum capital results. The word 'sound' does not naturally link to any particular probability.

The arbitrariness of the Bank's choice of 1:200 is obvious. In the risk appetite paper<sup>5</sup> that went to the Banking Steering Group for decision, a ratio of 1:100 was suggested, with 1:200 appearing as an alternative, but just in a footnote. In the event 1:200 was chosen<sup>6</sup> apparently on the Governor's whim, because it was more 'conservative' than 1:100. This is obviously true, but that does not get us very far. A probability of 1:1000 or 1:1000,000 are both more conservative than 1:100 but that does not mean that they should be adopted. There is no evidence of any analysis on the relative costs and benefits of the 1:100 and 1:200 options. With a 1:100 target the tier one capital ratio, even on the Bank's modelling, would have been 12-13 percent, suggesting no change in policy settings. Which is probably why the 1:100 target was dropped at the last minute.

### The efficiency test

Under the 'efficiency' test, however, the Bank should consider all of the risks, costs and benefits (which involves a consideration of the probability and costs of avoided crises) of different capital levels, which, in principle, should lead it to the right answer. The separate 'soundness' test adds nothing to the exercise, because the probability of a financial crisis is already considered under efficiency.

### Soundness trumps efficiency

However, because the soundness test 'trumps' the efficiency test if the latter delivers a lower result, it is only the soundness test that matters. Efficiency only comes into play if it delivers a higher ratio, and the Bank is not making that claim.

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<sup>5</sup> Susan Guthrie 'Risk Appetite framework used to set capital requirements' Paper to FSG. 30 October 2018

<sup>6</sup> Susan Guthrie 'Capital ratio calibration' Memorandum for Financial Oversight Committee

The Reserve Bank's 'risk appetite' approach simply doesn't make sense. Why would anyone make a decision based on a balancing of cost, benefits and risk, then ignore all that in favor of an arbitrarily chosen probability of having a crisis?

What is interesting here is just how late the 'risk appetite' framework was in making an appearance. After more than two years of consideration of the regulatory capital ratio, it first appears on 7 November 2018<sup>7</sup>, a little more than a month before the consultation paper was released. As for the paper, we won't get into the detail here, but we found it a combination of muddle, unsubstantiated assertions and vacuity. The following statement illustrates the point.

*"Soundness" and "efficiency" have a reasonably clear meaning in everyday language – if it was applied to the family car it would mean it doesn't break down and filling the tank fits easily within the weekly budget*

A family car that doesn't break down too often and doesn't use too much petrol could cost anywhere from \$5,000 to \$60,000. The 'sound and efficient' metric doesn't help in making the purchase decision. It ignores the vital cost element – as in practice does the Reserve Bank's risk tolerance framework.

It appears that the risk tolerance framework is someone's, late, 'bright idea', and that the staff have then scrambled to wrap some 'intellectual substance' and 'analytical and empirical' support around it.

### **New Zealand banking system is currently unsound?**

If we accept the Bank's assertion that a regulatory capital ratio of 16 percent, and an actual ratio of closer to 18 percent<sup>8</sup> is required to deliver 'soundness', then it follows that the New Zealand banking system, with a CET1 ratio of around 11 percent is currently unsound.

As recently as November 2018, in its Financial Stability report the Bank said (repeating its public assessments in all of its RSR reviews) that the system was sound. But now, apparently, on the basis of the analysis presented in the consultation document the Bank has come to a different view. The system is unsound.

The Bank does not say what the current probability of a crisis is with the current level of capital, but assuming that it is, say, 1:125, this would equate to a credit rating of somewhere between BBB and BBB<sup>-9</sup>. However, based on the AA- credit

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<sup>7</sup> 'Risk appetite framework used to set capital requirements' paper to FSO.

<sup>8</sup> We have assumed that banks will maintain an operating margin over the minimum of 2 percentage points.

<sup>9</sup> Widdowson D. Wood A. 2008 'A users guide to credit ratings'

ratings of the four large banks, New Zealand had a AA- system with an implied failure rate of 1:1250. Of course the banks' stand alone ratings are lower, and it would be legitimate to 'deduct' the implied support from the New Zealand government, but the implied support from the Australian parents is obviously relevant to an assessment of financial strength of the system. Stripping out the New Zealand government support might give us an A rating, with a implied failure rate of 1:750, stil well ahead of the Bank's assessment.

The Reserve Bank Governor attempted to address this issue in a recent speech<sup>10</sup>

*Banks also hold more capital than their regulatory minimums, to achieve a credit rating to do business. The ratings agencies are fallible however, given they operate with as much 'art' as 'science'.*

*Bank failures also happen more often and can be more devastating than bank owners – and credit ratings agencies – tend to remember.*

The inference here is that rating agencies' default probability assessments are understated because they have forgotten about historic defaults is simply untrue. Say what you will about the agencies' rating methodologies, but they are assiduous about long-term data collection. They haven't forgotten past history.

The question is, who is right. Is the New Zealand banking system uncomfortably close to 'junk' status, as the Bank seems to be suggesting, or are the rating agencies more or less right in their assessments?

The Bank provided two sets of evidence to support its new perspective on banking system risk. The first is evidence from the international 'literature' on the probability of financial crises. The second is, evidence from its 'portfolio modelling' of New Zealand bank risk.

### **The international evidence**

The Bank concluded that on the basis of the international studies it has reviewed that:

*'there is a consistency in the findings that suggest that Tier 1 capital equal to or exceeding 16 percent of RWA is needed to limit the probability of a crisis to 1 in 200 years or thereabouts'.*

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RBNZ Bulletin Vol. 71 No. 3

<sup>10</sup> Address to Business NZ CEO forum 30 November 2018

We have reviewed these studies in detail, first making two adjustments to the measurement of capital in our assessments.

***Actual capital not regulatory minimum***

All of the studies cited consider the actual level of bank capital, not the regulatory minimum, so we have to adjust the proposed minimum to the actual amount of capital banks are likely to hold. If we assume that banks will hold a 2 percentage point operating buffer over the minimum, then this implies an 18 percent actual ratio is required to meet the 1:200 standard.

***Adjust New Zealand capital to international standards***

We have to compare like-with-like when applying the international default evidence to New Zealand. So we need to adjust the reported New Zealand capital ratios to international capital measurement standards when looking at foreign studies based on historical capital ratios.

A recent comprehensive study by PricewaterhouseCoopers (PWC)<sup>11</sup> argued that if New Zealand banks' capital ratios were restated using international measurement conventions, they would be 6 percentage points higher. The Reserve Bank<sup>12</sup> went to considerable effort to discredit the PWC analysis, on matters of detail, but, unlike APRA, they did not produce their own 'official' version to put the technical arguments to rest. One of the points the Bank made in their review was that PWC conducted a comparative exercise for Australia that produced an adjustment figure that was one percentage point higher than the APRA estimate. To account for possible upward bias in the PWC adjustment estimate we have reduced it by two percentage point to four percentage points.

The Reserve Bank also argued that some of the higher capital accounts higher risk characteristics of the New Zealand financial system that are not captured by the Basel risk measurement framework. The Bank has often made this claim but has never substantiated it with any analysis. On the empirical and analytical evidence it does not appear to be true.

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<sup>11</sup> PricewaterhouseCoopers "International comparability of the capital ratios of New Zealand's major banks" October 2017

<sup>12</sup> 'International comparison of capital ratios (PwC report)'. Information paper 6 December 2017. '2017PwC (NZ) study'. Information paper with more details. 8 May 2018.

Taking the two adjustments together the appropriate test of the 1:200 standard against the international evidence, is a 22 percent capital ratio.

***The Basel Committee on Banking supervision (BCBS) evidence***

The first set of evidence the Bank used is from the 2010 BCBS report, later adjusted by the Bank of England to put the numbers on a tier one capital basis. The adjusted BOE numbers are presented in table one.

The estimates do not go up to the 22 percent ratio, but if we extrapolate the downward trend, it is reasonably clear that the probability at 22 percent is well below the 0.5 percent level needed to support the Bank’s argument.

**Table 1 : BCBS crisis probability estimates**

| <b>Tier one capital</b> | <b>Probability of crisis %</b> |
|-------------------------|--------------------------------|
| 8                       | 8.3                            |
| 11                      | 2.9                            |
| 14                      | 1.2                            |
| 16                      | 0.8                            |

A second point is that the numbers presented by the BOE are not actually Basel Committee estimates. Rather, they are an average of seven different studies. We went back to the original studies and adjusted them, individually, to a tier one basis. The highest reported capital ratios were 15 percent, which translates to 18 percent of tier one capital. The results were as follows.

**Table 2: Individual studies reported in BCBS 2010 appendix. 18 percent capital ratio**

| <b>Study</b>      | <b>Prob. Crisis percent</b> |
|-------------------|-----------------------------|
| FSA               | 0.5                         |
| Bank of Japan (1) | 0                           |
| Bank Japan (2)    | 0.1                         |
| “bottom up”       | 0                           |
| BOE               | 0                           |
| BIS               | 0.7                         |
| Bank of Canada    | 0                           |
|                   |                             |

The average at the 18 percent capital ratio is less than 0.2. At a 22 percent ratio, the number would be lower again, say, less than 0.1 percent. The failure rates are roughly in line with the implied rates from the credit ratings of the New Zealand banking system.

Our conclusion here is that using the appropriate test, and looking at the actual studies, the results from the seven models are not even close to 0.5 percent failure rates that would support the Bank's claims.

***The Bank of England (BOE) modelling***

The BOE's used a bottom-up model <sup>13</sup>(using individual bank loss data) and a top-down model (which estimates the relationship between financial crises and country banking system capital ratios) Their results are as follows. On the BOE's reported numbers they clearly do not provide support for a 0.5 crisis rate at a 22 percent capital ratio.

**Table 3: BOE probability of a crisis**

| Tier 1 capital ratio | Bottom up prob % | Top-down prob % | Topdown leverage ratio |
|----------------------|------------------|-----------------|------------------------|
| 8                    | 0.5              | 1.8             | 3                      |
| 11                   | 0.4              | 0.6             | 3                      |
| 14                   | 0.3              | 0.5             | 5                      |
| 16                   | 0.3              | 0.4             | 6                      |
|                      |                  |                 |                        |

And there are issues with the analysis. Due to data constraints the estimation period for the bottom-up model was very short (from 1993 to about 2013), a period that captured the most turbulent period in post war banking. If the data period was stretched back to, say, 1970 and forward to 2018, the measured probability of a crisis would likely fall quite sharply. Similarly, for the top-down model (see the discussion of the Firestone model below). The top-down model was estimated using the leverage ratio and then converted to a tier one ratio using the UK average tier one/leverage ratio ratio of 2.63. If the New Zealand ratio of about 2 had been applied to the results, tier one ratio corresponding to a leverage ratio of 6 percent would have been 12 percent, a difference of 4 percentage points from the BOE's 16

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<sup>13</sup> Financial Stability Paper No. 35 – December 2015 Measuring the macroeconomic costs and benefits of higher UK bank capital requirements Martin Brooke, Oliver Bush, Robert Edwards, Jas Ellis, Bill Francis, Rashmi Harimohan, Katharine Neiss and Caspar Sieger

percent. This demonstrates that our 4 percentage point adjustment for measurement differences was almost exactly right in this case.

There is clearly no support for increasing capital ratios in the BOE analysis. It suggests that New Zealand banks are already solidly meeting a 1:200 target.

### ***The IMF analysis<sup>14</sup>***

The IMF paper does not make an assessment of the relationship between the probability of a crisis and capital ratios, so it is not altogether clear why the Bank presented it. Presumably it was an opportunity to present the IMF table on non-performing loans together with some additional high nonperforming loan rates, which we have reproduced below.

All the IMF analysis is, is a listing of the peak non-performing ratios for countries that have experienced financial crises. It assumed that the loss rate on non-performing loans is 50 percent, which is a crude estimate which will overstate loss rates in most crises. For example, we checked the Italian non-performing loan rate <sup>15</sup>. It was 9.5 percent in 2009, not the 18 percent presented by the IMF. The Italian banking system was modestly profitable in 2009 and did not record a disastrous loss implied by the IMF methodology.

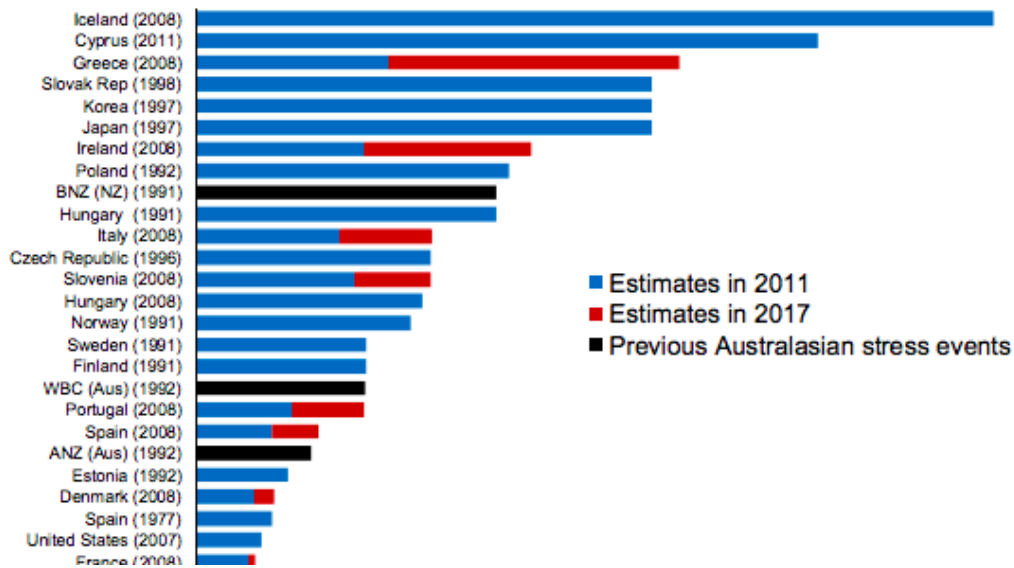
The IMF then arbitrarily assumed that the 85th percentile has some special significance and that the 'optimal' capital ratio is therefore 15 percent.

### **Figure 1 Non performing loan rates in financial crises**

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<sup>14</sup> Benefits and Costs of Bank Capital Jihad Dagher, Giovanni Dell'Ariccia, Luc Laeven, Lev Ratnovski, and Hui Tong SDN 16/04

<sup>15</sup> Banco d'Italia Financial Stability Report No. 1 2010



The implied assumption behind the IMF analysis is that because the banks in some countries had a high level of losses at a particular point in their history, this outcome is relevant to banking systems everywhere, at all times. This doesn't make much sense.

Take the case of Korea, which sits near the 85th percentile. Korean banks did incur heavy losses in the Asian crisis because:

- Korea had a crony-capitalist system, rife with corruption.
- Banks were lending to business groups (Chaboels) with debt to equity ratios of 500 percent.
- Many loans were in US dollars which were taken out when the Korean currency was fixed to the dollar at an overvalued exchange rate (sharply increasing the value of loans when the currency eventually devalued).

None of these circumstances are relevant to New Zealand. The Korean experience (and most of the other high loss experiences) is not necessarily some kind of relevant cautionary tale of what could happen to New Zealand, that justify a regulatory capital ratio of 16 percent.

Similarly the Icelandic, Greek, Cypriot and Irish experiences<sup>16</sup> generally have little or no relevance to present day New Zealand.

<sup>16</sup> The Irish banking disaster was primarily driven by very loose commercial property lending. The loss on this lending was €40 billion on a portfolio of €70 billion, compared to Irish housing loan losses that peaked at €10 billion before subsequent recoveries. The report 'The Irish Banking Crisis Regulatory and Financial Stability Policy 2003-2008 A Report to the Minister for Finance by the Governor of the Central Bank' sets out some of the main reasons for the losses: High LVR limits (80 percent), which were frequently exceeded; statements of net worth accepted at face value; no assessment of impact of lending on property supply; a political imperative to expand the banking system. These factors were not present in New Zealand in 2008 so the losses were moderate. They are not present today.



The Bank also took the opportunity to present some evidence that is closer to home, inserting the maximum nonperforming loan ratios for two Australian banks (the ANZ at about 10 percent and Westpac at 15 percent) and the BNZ at around 25 percent (all in the early 1990s), in the IMF table. The inference again, presumably, is that big losses are possible, and that if it happened once in recent times, then it can happen again. However, the actual Australian loss outcomes were less scary and show that simply assuming that 50 percent of peak non-performing loans translates into losses is a poor way to estimate bank losses. Marianne Gizycki and Philip Lowe<sup>17</sup> report that total losses by privately owned Australian banks through the recession amounted to 16 percent of bank capital at the starting point in 1989, when capital ratios were substantially lower than they are now.

The Reserve Bank's claim that the BNZ's non-performing loans ratio reached 25 percent appears to be overstated. According to the BNZ 1991 annual report the number is more like 17 percent. Over half of those bad loans were in Australia. The New Zealand peak bad loan rate was more like 10 percent.

The BNZ story is well known to bankers, if not to the Reserve Bank. The BNZ had a heavy exposure to property and investment company lending in the midst of a building boom that resulted in a massive oversupply of commercial property space and a subsequent collapse in prices. The BNZ rushed into Australia and got involved with a large number of bad deals to boost their lending. There was little or nothing in the way of robust underwriting standards and effective credit controls and reporting. In its 1989 annual report the BNZ Chair reported *"little regard was paid to effective monitoring of the exposures to each sector, a situation compounded by suspect judgments and a serious lapse in security administration"* and *"the rapid growth of the BNZ in recent years has unfortunately been accompanied by some undisciplined corporate lending practices"*

This is not the situation in the New Zealand banking sector today. Commercial property lending is only about 8 percent of total lending; there is no evidence of a commercial property overbuilding boom; and New Zealand banks are not flinging their money at very marginal Australian lending propositions. The Australian banks' subsidiaries are subject to parental and APRA oversight. It is worth noting too that bank capital ratios were much lower than they are today. After its first capital injection the BNZ proudly stated that its tier one risk adjusted capital ratio was 5 percent.

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<sup>17</sup> 'The Australian Financial System in the 1990s' Marianne Gizycki and Philip Lowe<sup>17</sup>

The relatively moderate losses in the GFC attests to the effective change in New Zealand underwriting standards and risk culture. Total nonperforming loans peaked at 2 per cent of lending and no bank recorded a loss in any year. Over the two peak years of the recession total credit losses amounted to 1.2 percent of lending, one of the lowest rates in the OECD.

***Federal Reserve Board (Firestone et al., 2017)<sup>18</sup>***

The Bank describe the substance of Firestone bottom up approach as follows.

*The authors concluded that when Tier 1 capital was 8 percent of RWA the probability of a financial crisis was 3.8 percent. The authors estimated that, in order to reduce the probability of a crisis to 1 percent or less, Tier 1 capital would need to be 17 percent of RWA or more.*

The first part of the statement is not accurate. The authors did not conclude that the probability of a crisis, with risk weight of 8 percent was 3.8 percent. They actually assumed this result to line up with an estimate they claim was reported by Laeven and Valcena<sup>19</sup>, and used it to calibrate their model. All of the results for the higher risk weights follow from this calibration.

Laeven and Valcena did not calculate a crisis rate of 3.8 percent. Rather, in the cited paper, they listed all identified financial crises over 1970-2011. Firestone calculated the default rate using only the period from 1989 to 2011, leaving out the earlier more benign years. We calculated a crisis rate of around 1.5 percent for advanced economies, based on the data in the latest, 2018, Laeven paper. We think that the longer data period is more appropriate guide to future failure rates as it captures a more conservative banking period as well as the higher risk strategies that lead to high loss rates in the GFC.

If a 1.5 percent financial crisis probability calibration had been used in the Firestone model the calculated numbers for different capital ratios would have been lower. It is not possible to say by how much without a rerun of their model, but the difference would probably have been quite significant given the difference between a 3.8 percent and a 1.5 percent calibration.

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<sup>18</sup> 'An Empirical Economic Assessment of the Costs and Benefits of Bank Capital in the US' Simon Firestone, Amy Lorenc and Ben Ranish 2017. US Federal Reserve Board

<sup>19</sup> Laeven L., and F. Valencia (2012), "Systemic banking crises database: An update", International Monetary Fund Working Paper No. 12/163.

The second step in the Firestone model is to adjust for enhancements in liquidity management regulations and improved resolvability post the GFC. These estimates are the most appropriate to the New Zealand system where similar improvements have been made. The results are set out in table four below which shows the probabilities from both the bottom up and top down models.

The top-down approach is a standard regression on the relationship between financial crises, capital and other risk drivers. Two models were specified but in specification 1, capital was not statistically significant and the results should be ignored. Capital was (weakly) statistically significant in specification 2.

**Table 4: Firestone crisis probabilities**

| Tier 1 RWA | Bottom-up model % | Top-down Spec 2 % |
|------------|-------------------|-------------------|
| 8          | 2.6               | 4.7               |
| 11         | 1.3               | 2.3               |
| 14         | 1.0               | 1.1               |
| 17         | 0.7               | 0.5               |
| 21         | 0.5               | 0.2               |
| 25         | 0.5               | 0.1               |

The relevant capital ratio for the 1:200 test is between 21 and 25 percent. The reported bottom-up result was 0.5 percent but as discussed above it would have been materially lower, using a default probability from a longer historical data period. The top-down result, at between 0.1 and 0.2 percent, clearly didn't support the 0.5 percent test.

***Summary of historical experience cited by the Bank.***

**1. BCBS**

Only one of seven studies support the 0.5 percent crisis rate.

**2. Bank of England**

Clearly doesn't support 0.5 percent crisis rate.

**3. IMF**

No information on the crisis rate.

**4. Firestone**

The bottom-up estimates were exaggerated by the short data period and do not provide credible support for a 0.5 percent crisis rate. The top-down approach clearly does not provide support.

### **New Zealand evidence**

We should not lose sight of the fact that we are dealing with New Zealand banks here, and that it is New Zealand evidence that it is most relevant. Taking a 100 year perspective, New Zealand has experienced many economic shocks that would have lead to bank failures in many other jurisdictions. Reddell and Sleeman discussed<sup>20</sup> six such events in a 2008 Bulletin article and if we add the GFC that makes seven. Through that time there was one bank failure, the BNZ, (which actually failed twice, but to the same event). It is difficult to count the number of banks (there were twelve trustee savings banks though much of the 100 years) in New Zealand times the number of years they have been operating, but if we assume an average of say 16 that gives us 1600 bank years, or a failure rate of 1:1600.

Of course, caution should be exercised when applying this number to a forward looking risk assessment of the New Zealand banking system. There have been many economic, institutional, legal and behavioral changes over 100 years. But equally, caution should be exercised when applying the international evidence to New Zealand, where those differences from modern day New Zealand are just as pronounced, and probably more so. Several of the countries that whose experience is captured in the data are poor comparators for New Zealand and there is always a risk in using foreign outcomes, when the history and institutional environment is poorly understood by the Bank's analysts.

### **Portfolio modelling of New Zealand bank risk**

The Bank says:

*In order to incorporate the New Zealand context in our analysis, and as a complement to our review of overseas findings, we used a portfolio risk model. We used the model to explore what level of Tier 1 capital might be sufficient to ensure the sector retained the confidence of the market after a large shock.*

But on the results, we are just told

*Based on our range of input values for PD, LGD and correlation R, our conclusion from our risk analysis is that Tier 1 capital equal to 16 percent of RWA is sufficient to cover credit-*

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<sup>20</sup> Some perspectives on past recessions Michael Reddell and Cath Sleeman  
RBNZ Bulletin Vol. 71. No. 2. June 2008

*related losses (after taking account of provisions) and operational and market trading-related risk. In other words, a Tier 1 capital ratio of 16 percent of RWA is needed to ensure our banking sector retains creditor confidence after enduring an extreme shock*

This is a vague statement, which could mean anything. It depends on what they mean by “ensuring our banking system retains creditor confidence after an extreme shock”, and, of course, what inputs were fed into the model.

The consultation document was also very vague about the structure and outputs of the model.

- No working paper is presented in the bibliography.
- They do not explain what model input values were used to generate the 16 percent capital ratio requirement.
- There is no information on where the critical correlation coefficient inputs came from.

The Bank has belatedly disclosed a relevant technical paper<sup>21</sup>. It is dated 25 January 2019, so it did not exist when the consultation document was released. A reader might think that this was the writeup of the analysis the Bank relied on to make its decision on the 1:200 target and the related capital requirement. But this is not so.

The analysis that really provided the basis for the 16 percent capital ratio decision was presented in a decision paper to the Financial Oversight Committee dated 13 November 2018. The results, which seemed to support the 16 percent capital ratio, were clearly fabricated. Mostly implausible assumptions were fed into what was probably the wrong Basel IRB model to get the ‘right’ result. In particular, the average probability of default was assumed to be 2.8 per cent, when the average PD used by banks in their capital models is 1.1 percent. The Reserve Bank has accepted those estimates as appropriately conservative. However, to the Bank’s decision making committee, which is not close to the numbers, and knows little about bank risk, the analysis would have looked sophisticated and plausible. They would have had no idea that they were being duped.

On reflection the Bank obviously thought that the original analysis was embarrassingly bad and that they would need something better to put out for public consumption, when the inevitable OIA requests came. Hence the later paper. The hope, presumably, was that no one would spot the real analysis amongst the host of papers the Bank released.

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<sup>21</sup> Explanatory note on portfolio risk modelling in the New Zealand Context 25 January 2019

As the 25 January paper is the Bank’s best shot at explaining themselves, we have analysed it here.

In the paper there is a table, reproduced below, that sets out some results. The 16 percent capital ratio was derived from the column on the left – Initial setting.

**Table 5: Model inputs and outputs**

| Model input           | Initial setting | Lower PD | Lower LGD | Lower R | Lower CL | Higher PD | Higher LGD | Higher R | Higher CL |
|-----------------------|-----------------|----------|-----------|---------|----------|-----------|------------|----------|-----------|
| PD (%)                | 1.5             | 1.2      | 1.5       | 1.5     | 1.5      | 2.0       | 1.5        | 1.5      | 1.5       |
| LGD (%)               | 35              | 35       | 30        | 35      | 35       | 35        | 40         | 35       | 35        |
| R (%)                 | 28              | 28       | 28        | 24      | 28       | 28        | 28         | 32       | 28        |
| Confidence level (%)  | 99.7            | 99.7     | 99.7      | 99.7    | 99.5     | 99.7      | 99.7       | 99.7     | 99.9      |
| Failure threshold (%) | 2               | 2        | 2         | 2       | 2        | 2         | 2          | 2        | 2         |
| Capital ratio (%)     | 15.5            | 13.9     | 13.7      | 13.7    | 13.6     | 17.9      | 17.3       | 17.5     | 19.9      |

There are some obvious problems with the Bank’s analysis.

*IRB Model appears to have been inappropriately selected to generate higher capital requirements*

The Bank initially said that they used a variant of the Basel IRB model, but did not provide more detail in the Consultation paper. In the Explanatory paper we are told that they used the corporate loan model. But on the Bank’s data presented in table 5 these loans account for only 11 percent of total lending. It makes little sense to assume all bank loans are corporate loans. One of the advantages, we presume, from the Bank’s perspective, is that the corporate model has a couple of moving parts that can be inappropriately tweaked, if the objective is to cheat in order to increase the measured capital requirement.

*1:200 event not modelled*

The confidence interval reported in their table 4 is 99.7%, which means that the Bank was modelling a 1:333 year event, not a 1:200 event. If a 1:200 event had been

modelled all of the calculated capital ratios would have been materially lower. The Bank's excuse is that the outcomes are uncertain and that using a 1:333 probability somehow accounts for this. The uncertainty is analysed through their sensitivity analysis. The use of a higher confidence interval is not legitimate.

Note that in the analysis presented to FSO they used the 1:200 calibration with no mention of a different calibration being necessary to account for 'uncertainty'.

#### *Single representative asset approach not appropriate*

The Bank uses a single representative asset approach that does not suit the Basel modelling framework. There are several models depending on the risk characteristics of the subportfolios. The correlation coefficients range from 0.04 to 0.24. It is difficult then to assess the appropriateness of the Bank's aggregate numbers without breaking them down into the component estimates.

Further, the aggregated approach does not work when estimating the probability of default (PD) from historical data because there have been such large changes in portfolios structures over their data period. To illustrate the point assume that historically a bank had 85 percent of its portfolio in high risk commercial property and business loans, with a measured probability of default of 5 percent, and 15 percent in low risk housing loans with a default probability of 0.4 percent. Its average PD is 4.31 percent. The bank then changes its portfolio structure to 60 percent housing loans, and 40 percent high risk loans. Its average default rate falls to 2.24 percent. The bank would not describe its current average PD as 4.31 percent based on its historical portfolio experience.

#### *Operating margin forgotten*

Again the bank has forgotten to allow for an operating margin above the regulatory minimum. The model works on actual capital, not on the regulatory minimum. Assuming an operating margin of two percentage point would, by itself, reduce the capital requirement by that amount.

The following are more specific comments on the model inputs.

#### *Probability of default: Mean estimate 1.5 percent*

The Bank could have used the advanced bank PDs, which, as noted above, it has already approved as being reasonable and conservative representations of long run default rates (these are set out in their table 3 reproduced below). All it would have to do is adjust the reported housing PD of 0.89 percent, which is not a bank driven estimate and which substantially overstates the 'true' long run PD. A number more like 0.4 percent, which would still account for some as yet unobserved large housing shock, would be more appropriate. A reasonable portfolio average would be 0.8-0.9

percent. The reported advanced bank portfolio average PD of 1.1 percent was one of the inputs they 'considered', but this is diluted by their consideration of four other sets of 'information'. All of them are poor proxies for a long run PD estimate. They are:

1. Impaired assets to total loans - 2.0% estimate.

- It significantly overstates PD rates because nonperforming assets were held in portfolio for years in the early 1990s.
- It is dominated by the BNZ 1989-93 experience, which, as discussed above has limited relevance for a forward looking assessment.
- Average default experiences over 1989-93 will not be applicable now because portfolio structures have changed radically from that period. For example housing loans BNZ's were about 15 percent of the loan portfolio in 1991, but about 60 percent in 2018.

2. Impaired asset expenses: 0.3 to 0.4%.

- Again, this estimate is dominated by BNZ experience.
- There is an inference that the impaired asset expense can be converted to a PD estimate by dividing it by an assumed LGD of 20 percent to give a PD of 1.5 to 2 percent. But the reported impaired asset expenses are dominated by commercial lending with significantly higher LGDs, so the implied default rates would be much lower (more like 0.8-1percent) than the Bank implies.

3. Impaired and past due assets to total assets: 1.4 percent

This doesn't provide any more information than 1. It just uses a different denominator.

4. Stress tests 2.7-2.8 percent

An average default rate over a stress test scenario is not a long run average PD estimate, which will also include default rates from benign periods. The stress test number appears to be there just to introduce a high number into the mix.

Note that a PD of 2.8 percent was used in the modelling that was presented to the FSO. This was clearly a gross overstatement and one of the embarrassments that the Bank attempted to cover up by reworking the analysis.

*LGD: mean estimate 35 percent*

There are two data sources.

- The weighted average advanced bank reported LGD of 29 percent.
- The stress test outcomes for 2014 and 2017 of 37 and 31 percent respectively. The 2017 result is more relevant as it accounts for a more up to



date portfolio structure, but even taking the straight average this gives an estimate of only 32 percent. A mean estimate of 30 percent is more appropriate.

The FSO modelling assumed a 40 percent LGD based on the same information.

*Correlation coefficient: Mean estimate 0.28*

From the January paper we are told that the correlation was derived from the Bank's TUATARA<sup>22 23</sup> model which was built in 2011 as a cost benefit model that would have particular regard to key structural features of the New Zealand banking system (in particular its substantial foreign ownership). The correlation coefficient was a 'made-up' number designed to fatten the tail (by a factor of 10) of the Basel model, which assumes that default rates follow a normal distribution. While it was appropriate to make some adjustment to the Basel model, the TUATARA estimate did not have any empirical or analytical support and is overstated. While this might be acceptable in a the original 'proof of concept' cost benefit model, we would expect the Bank's current modelling, which is driving a 30 billion dollar plus decision to be backed by much more substantive analysis, and properly documented.

From the Bank's consultation paper, and the information provided to the FSO, it is clear that the modeller(s) did not understand what the Basel correlation coefficient is. They thought that it was (presumably in the context of estimating housing loan capital) an estimate of the statistical correlation between GDP and house prices. It is not. It is a measure of how defaults within a housing portfolio are correlated. The higher this correlation the more loans will fail together and the higher the capital requirement. It is difficult to estimate empirically<sup>24</sup>, but it cannot be read off a GDP/house price correlation. However, on the basis of an GDP/house price correlation presented to them, the FSO Committee was probably lead to believe that the Basel calibrations were nowhere near conservative enough for New Zealand conditions.

**Table 6 : RBNZ IRB bank estimate table**

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<sup>22</sup> TUATARA is an acronym that stood for 'Teaching Uninformed Australians To Assess Risk Appropriately'. This is unfair to Australians. The reader might wish to substitute, according to circumstance and taste: Americans, Authorities, Amateurs, Assess or Adrian.

<sup>23</sup> Disclosure: the author of this paper built The TUATARA model.

<sup>24</sup> There was an empirical estimate of .025 before the Basel housing model was calibrated, but this was based on pre-GFC data. A figure of 0.15 was adopted on the basis of some reverse engineering of Federal Reserve Board housing loss modeling with a margin for conservatism thrown in.

**Table 3: New Zealand IRB model estimates (average of four IRB banks, March 2018)**

| IRB asset class          | Average PD (%) | Average LGD (%) | % of total EAD |
|--------------------------|----------------|-----------------|----------------|
| Sovereign                | 0.02           | 14              | 5              |
| Banks and PSEs           | 0.04           | 53              | 5              |
| Corporate (large)        | 0.62           | 47              | 10             |
| Corporate (small)        | 1.68           | 35              | 6              |
| Corporate (farm lending) | 2.27           | 32              | 10             |
| Commercial property      | 1.08           | 22              | 7              |
| Residential mortgage     | 0.89           | 20              | 47             |
| Retail – SME             | 2.14           | 41              | 2              |
| Retail – credit cards    | 1.27           | 77              | 3              |
| Retail – other           | 4.91           | 88              | 1              |
| Weighted average         | 1.1            | 29              |                |

Source: RBNZ Quantitative Impact Study (2018)

### Re-estimating the model

We do not have access to the full suite of Basel IRB models that would allow us to rerun the model using reasonable input estimates. However, the Bank did a sensitivity analysis that provides some guidance. The lowest set of inputs (PD =1.0 percent; LGD =30 percent; correlation = 0.24), might be a reasonable best estimate. These assumptions generate a capital ratio of 10-11 percent at a probability of 1:333, suggesting a ratio of around 8 percent might be about right for a 1:200 probability. It could be lower again if the Bank manipulated the corporate model to produce higher results.

### Sensitivity analysis

The information paper reported on a sensitivity analysis which showed how the capital requirement respond to changes in the model inputs. The technical issue here is that they used a uniform distribution to estimate the ‘true’ distributions of the inputs. This is an extreme assumption, which assumes that the highest and lowest inputs have the same probability as the best estimate. The uniform distribution assumption has the effect of blowing out the tails of the distribution, making it appear that there is a relatively high risk that the ‘true’ capital requirement could be significantly higher than the mean estimate. A distribution that is more centred around the best estimates should have been used.

### A back filling exercise

The Bank’s modelling exercise looks to be an obvious ‘backfilling’ exercise. A decision had been made to have 16 percent CET1 regulatory minimum, and this had to be consistent with a 1:200 failure rate. But there was no New Zealand evidence to

support it, so they ignored what relevant New Zealand evidence that was available, and trumped up some to suit their story.

We understand that The Reserve Bank has briefed bank risk managers on their modelling, and have said they will be providing more information in March. The bankers were told that the Reserve Bank was not interested in the the banks' views on the model inputs because the Bank was going to use inputs which are 'good for New Zealand'. This is admitting that they will ignore any facts or analytical evidence that doesn't suit. Apparently, the Reserve Bank is operating in a post-fact world. If the bank says an input is 'good for New Zealand' then it is a fact.

The portfolio risk modelling 'analysis' should not be taken seriously and should be withdrawn by the Bank, before they further embarrass themselves. The exercise modelling exercise was a sham and they might as well admit that the 16 percent ratio is mostly based on gut feel, or, perhaps, a revelation from the tree god.

## **Part four: Stress testing evidence**

On the face of it the Reserve Bank's stress testing results do not support higher capital ratios. The banks get through a pretty severe stress test with a substantial capital buffer in hand. The Bank's response, in the consultation paper and elsewhere, is to downplay these results, suggesting that the outcomes are really too optimistic, and that losses could be much worse.

Our view is that the Bank's concerns are overstated, and that they have artificially boosted some outcomes to paint a more negative picture. A fair assessment of the 2017 stress tests is that the more likely outcomes are actually significantly more favorable than the results presented in the consultation document. Our assessment is based on the description of the stress test in two 2018 RBNZ Bulletin articles <sup>25</sup>.

Some of the more obvious issues are as follows.

### *Dairy lending losses overstated*

It is assumed that the dairy payout falls to \$4.90. No information is given on the magnitude of the assumed commodity price and exchange rate falls that should have driven this result. However, we are told that the exchange rate fall, that is used to generate losses from a counterparty failure, is 'substantial'.

On plausible assumptions on the size of the dairy commodity price and exchange rate shock, it is likely that the dairy payout shock would be much less than assumed,

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<sup>25</sup> Dunstan and Lilly

or even be positive. The Bank probably did the numbers, which would have shown these kinds of results. Which is probably why the key commodity and exchange rate assumptions were not presented.

#### *Bank mitigating actions not taken into account*

In the 2017 stress tests banks estimated that mitigating actions would improve their capital positions by 1.1 percent. While the Bank presented this information in the stress test write-up, it was not part of the ‘headline’ results that are presented in the consultation document. Most of the banks’ actions are plausible and should have been used, at least in part, to give a balanced picture of the stress test outcomes.

#### *Increase in risk weights partially unnecessary.*

An increase in risk weights decreased capital by 1.5 percent. The main reason is that banks using the advanced capital models are marking their collateral to market, which pushes loans into higher risk weight classes as asset prices fall. This ‘procyclicality’ is an undesirable and mostly unnecessary characteristic of a capital adequacy regime. It appears to be partially mitigated in the Basel framework by the simple expedient of applying a minimum advanced/standardized capital ratio of 72.5 percent. If the measured ratio is, say, 50 percent and this increases to 65 percent in a cyclical downturn then this has no impact on the actual capital requirement, which is still determined by 72.5 percent.<sup>26</sup> The New Zealand regime could, and should, be set up to reduce the systemic price effect. It already does so, in part, on the upside of the cycle. Banks cannot mark the value of their housing collateral to market as prices increase.

#### *Operational risk loss is implausible*

It is assumed that banks will be subject to a successful class action suit (costing 0.6 percent of capital) because of inappropriate lending, and that this will impact on capital in the third year of the stress test. The prospect of a successful suit in New Zealand, which does not have a class action friendly legal environment, is a stretch (what for – advising home buyers that house prices never fall or that they will never become unemployed?), but the likelihood that it will impact in the third year must be close to nil. A case would take years to get organised and court action would drag on for more years.

#### *Housing default rate is 12 percent*

This looks to be implausible given the severity of the house price and unemployment shocks, which are the main drivers of housing mortgage defaults. This was forced on the stress test to increase the loss rate and is not a fair mean estimate.

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<sup>26</sup> There will still be a cyclical element in the Standardised model

### *Capital deductions*

Capital deductions reduce capital by 0.8 percentage points. This is a material number, but there is no explanation in the Bank's bulletin article of what this deduction is for, and how it is related to the stress test scenario.

Taking these first five factors together could reduce the measured impact on the capital ratio by nearly four percentage points.

|                                 |     |
|---------------------------------|-----|
| Dairy lending (say)             | 1.0 |
| Capital ratio measurement (say) | 0.5 |
| Bank mitigations (say)          | 0.8 |
| Operational risk                | 0.6 |
| Housing                         | 1.0 |
| <br>                            |     |
| Total                           | 3.9 |

In any event the stress testers did not think their results supported a 16 percent regulatory capital ratio. In a report to FSO dated 28 August 2017 on the implications of the stress tests for capital requirements, they advised an increase in the CET1 capital ratio to 12-13.5 percent (a 12.75 percent midpoint). And that was before they were aware of the 11 percent increase in capital that the new capital floors would impose. That would bring their required rate back to about the level banks will hold after the floors take effect.

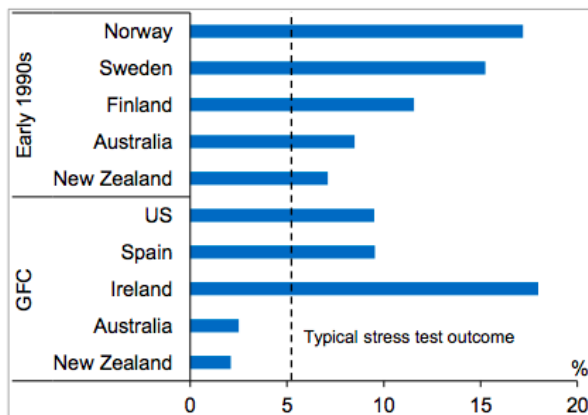
### **Losses in other jurisdictions**

In the stress test section the Bank sets out a figure, reproduced below, with the cumulative bad debt charges in several other jurisdictions, in particular the countries affected by the Nordic crisis in the early 1990s. Again, the figure is there to give the impression that in reality things could turn out much worse than the stress tests suggest. This figure is misleading.

- It excludes several countries, which according to the IMF definition had a 'financial crisis', but did not experience such high bad debt charges.
- Most importantly, the comparison does not account for the difference in portfolio composition between the Nordic countries that feature prominently in the table, and current New Zealand bank portfolios. The Nordic banks' lending was much more heavily concentrated in sectors affected by the steep fall in commercial property prices. They also had poor risk management systems. Despite sharp falls in residential property prices (equivalent or worse than the New Zealand 2017 stress test assumption)

mortgage losses were low – 1 to 2 percent of loans. The losses were concentrated in the commercial sector.

Figure 6: Cumulative bad debt charge during historical crises (percent of initial assets)



Source: Dunstan (2018), RBNZ

The Bank's response to this is argued in a recent bulletin article<sup>27</sup> on the stress test results.

*Historical experience and insights from stress tests suggest three key areas of upside risk to losses. First, residential mortgage losses could be higher than expected. Although banks' loss estimates are consistent with historical evidence prior to the GFC (Kragh-Sorenson and Solheim, 2014), household debt levels have increased significantly in recent decades and some countries experienced much higher loss rates on household loans during the GFC.*

The most relevant country experience here is Denmark. House prices fell by nearly 30 percent in the GFC, and there was a sharp downturn in economic activity. But the losses on residential mortgage lending came to only about 0.8 percent over 4-5 years.<sup>28</sup> Notably, Denmark had the highest household debt to income ratio in the world at that time, and still does now. At around 250 percent it is substantially higher than New Zealand's current ratio of 160 percent. Two of the key reasons for Denmark's low loss rates: relatively high buyer equity; and creditor friendly laws, are shared by New Zealand.

There have been heavy losses on residential mortgages in a few other developed countries, but for reasons not shared by New Zealand. The US has a number of institutional and behavioral features that predisposed them to higher loss rates, particularly in the subprime sector. Icelandic banks incurred heavy losses in part

<sup>27</sup> Dunstan A. 2018 'The Reserve Bank's philosophy and approach to stress testing' Vol. 81 No.8

<sup>28</sup> Jesper Berg Morten Bækmand Nielsen James Vickery 'Peas in a Pod? Comparing the U.S. and Danish Mortgage Finance Systems' Federal Reserve Bank of New York Staff Report No. 848

because homeowners were borrowing in foreign currencies and got caught when the currency was sharply devalued.

Then there is the Irish experience, which is a frequent driver of the Reserve Bank's concerns about the New Zealand mortgage market. Our review of the provisioning experience by the major Irish mortgage lending banks showed that the accumulated losses over 5 years from 2008 were about 8 percent of the starting loan balances, but this fell to 6 percent with write backs as the property market recovered. The Irish losses can be explained by:

- A 55 percent fall in property prices. The losses would have been substantially lower with the 35 percent fall assumed in the New Zealand stress tests as the Irish banks' provisioning was driven by the fall in the housing price index. The 55 percent fall, was in part, collateral damage from the speculative property boom. New housing builds outstripped demand and helped drive house prices down.
- Underwriting standards were very low, with borrowers being able to access 100 percent plus mortgages in some cases.
- A court decision meant that Irish banks could not foreclose on defaulting homeowners. This drove up default rates as, and losses as borrowers, who were underwater on their investments, did the rational thing and stopped paying. They could live mortgage free and had a free option on a house price recovery.

None of these risk factors apply in the New Zealand market.

The Australian experience is also reported, and again it has limited relevance. It is affected by heavy losses by the State banks, but privately owned banks had much lower loss rates. The banks' portfolios at the time had a limited exposure to housing, which did not incur material losses; and even the private banks had weak risk management systems by current standards.

## **Part five: The optimal capital literature**

The Bank's analysis of the 'efficient' level of bank capital, which considers both the benefits and costs of higher capital, is cursory, in part because it does not really matter. The capital ratio is set under the soundness test, so the costs and benefits of

the policy becomes irrelevant. The only purpose of the analysis, apparently, was to claim another 'win' so the Reserve Bank would have its 'win-win' policy.

The discussion starts by drawing attention to the fact that the optimal capital models in the international literature does not account for risk aversion, with the inference that the optimal capital ratios would be higher if risk aversion were taken into account. It is true that the foreign models do not account for risk aversion, but this makes it even more difficult to understand why the Bank ignored its own TUATARA model, which explicitly accounts for risk aversion in a structured manner.

The discussion then turns to some of the key inputs in the models including the cost of a crisis, and the increase in borrowing costs and their subsequent impact on economic output. The increase in borrowing costs is put at 6 basis point per percentage point increase in capital, but this inconsistent with the 8.2 percent increase presented in a more detailed discussion in the FSO decision paper. The cost of a crisis is put at 63 percent of GDP. This was the BCBS 2010 mid-estimate from all studies, which was boosted in some by the inclusion of high developing country costs, and to an extent by the permanent shock assumption. There was no discussion of why the BCBS midpoint was selected over other later analyses, which suggest that the earlier estimates presented an overblown account of the cost of crises.

However, this was all just padding. The preferred inputs did not really go anywhere. The Bank simply presented the results of an array of optimal capital studies without any attempt to assess or amend them on the basis of their key inputs, still less adjust for the differences in capital measurement between New Zealand and foreign countries or allowing for an operating margin as discussed above.

But they then go on to conclude

*..the results of our modelling work, and our read of the international literature, suggest that the Tier 1 capital ratio of 16 percent that we think will meet our desired soundness objective is within the bounds of an optimal capital ratio, taking into account New Zealand conditions. In our view, at a Tier 1 capital ratio of 16 percent there would be little room to increase stability further without some impact on expected output.*

This is not saying very much because the bounds they presented were very broad (7 to 26 percent). Even then it appears not even one of the studies lends much support for a 16 percent CET1 capital ratio.

If we look at the nine model results and assess them against a 22 percent capital ratio test, to take account of the operating margin and setting the New Zealand rate



to the international measurement standard, eight of the models do not support the Bank's proposal. This leaves just the Firestone results which ranged from 13 to 26 percent. However, the higher result relied on a cost of crisis estimate of 100 percent, substantially above the Bank's preferred number of 63 percent. Switching to the latter ratio would likely have generated a capital ratio below 20 percent, so the Firestone support for the Reserve Bank's policy falls away.

The Bank also says that they complemented the international studies by conducting their own modelling exercise. This was the TUATARA model which was used to support the Bank's Basel III decisions with an estimated optimal tier I capital ratio of 13 percent. The Bank went to some effort to review and formalise the model in 2016, but then they did nothing with it. It played no part in their decision making on the 'efficient' level of capital. They claimed that this was because of uncertainty due to the 'wide range of plausible outcomes depending on model assumptions and inputs'.

This is disingenuous. All models will produce a range of outputs if their assumptions are changed. The international models reviewed, and used by the Bank also present a range of outcomes with different assumptions. It appears that the real reason the model wasn't used was that certain elements in the Bank were on a mission to increase bank capital and they thought that the TUATARA model would not be helpful to that end.

**Table 7 : Bank's Summary of Optimal capital results**

| Study                            | Optimal capital ratio (CET1 unless otherwise noted)   |   |
|----------------------------------|---|---|
|                                  | Range   | Notes   |
| <b>BCBS (2010)</b>               | 10% (crises have no permanent effect)<br>13% (crises have moderate permanent effects on GDP)  | Uses tangible common equity as proxy for CET1 |
| <b>Schanz et al. (2011)</b>      | 10% to 15%  | Uses pre-Basel III definition of capital      |
| <b>Miles et al. (2012)</b>       | 18% to 20% (crises have some permanent effects on GDP growth)<br>16% to 18% (crises have no permanent effects on GDP growth)  |   |
| <b>Yan et al. (2012)</b>         | 10%   |   |
| <b>Junge &amp; Kugler (2012)</b> | Up to twice the Basel III minima  |   |
| <b>Mendecino et al. (2015)</b>   | 12% to 16% (Total capital ratio)  |   |
| <b>Brooke et al. (2015)</b>      | 10% to 14% (baseline result)<br>7% to 11% (costs of crises are temporary)<br>15% to 19% (improved resolution arrangements and other UK prudential reforms are ineffective)<br>7% to 11% (transition to higher capital is moderately costly) |   |
| <b>Cline (2016)</b>              | 7% to 8% (leverage ratio)<br>12% to 14% (Tier 1 ratio)  |   |
| <b>Firestone et al. (2017)</b>   | 13% to 26% (Tier 1 ratio)   |   |

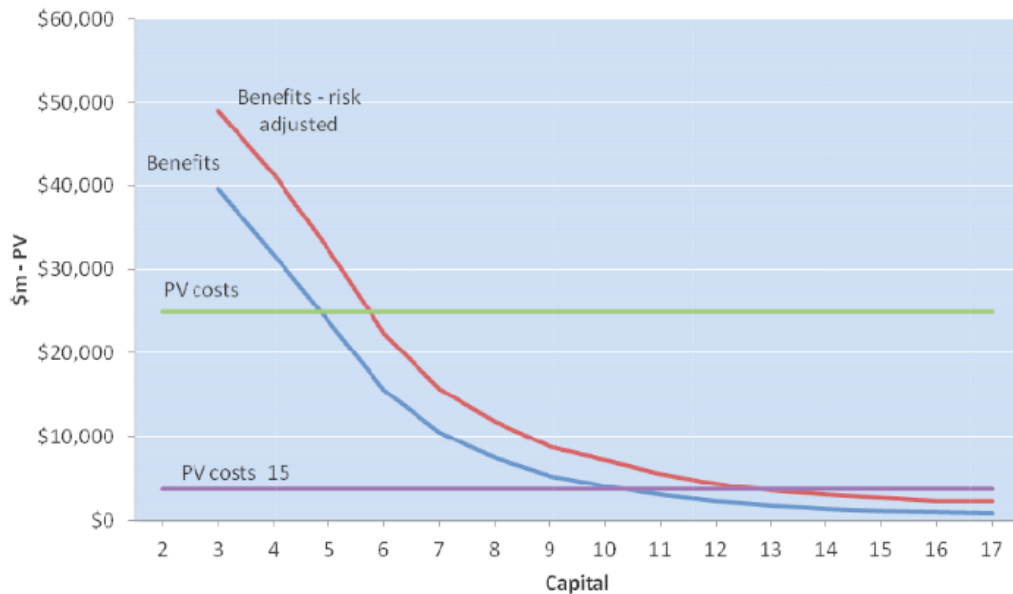
### The TUATARA model

Here it is useful to briefly look at the TUATARA model.

The model follows the same basic framework of the other models considered by the Bank. The cost of additional capital is a function of the effect of the additional capital on lending rates. The benefits are a function of the reduction in the expected cost of financial crises. This in turn, is a function of the probability that there will be a financial crisis and the cost of a crisis, should it occur. In this framework the capital ratio is successively increased to the point where the marginal benefits from the lower cost of capital equals the cost of capital. This is the optimal capital ratio.

The following figure taken from the Reserve Bank's Regulatory Impact Statement shows some of the key TUATARA outputs.

### Figure 2 TUATARA model outputs



The red line shows the benefits of additional capital, and the purple line the costs. The optimal level of capital is where they intersect at about a 13 percent tier one capital ratio. The shape of the benefit curve is typical of all the models. They start off high and then tail off quite sharply. While the optimal capital level is 13 percent in the TUATARA model there is little additional benefit (the difference between the red and purple lines) in moving from 11 to 13 percent. Similarly, if the red line was positioned higher (say by increasing the assumption on the cost of a crisis), the optimal capital ratio would increase but there would be limited benefit.

The different shapes of the benefit costs and benefit lines have something to say about decision making under uncertainty. If we underestimate the benefits and set the capital ratio too low, then the losses are small. If, however, we assume that the costs are low because there is little interest rate effect (as this particular model setting does), but it turns out that the interest rate effect is much higher, then the cost of the mistake is much greater than a benefit mistake.

The TUATARA model differed from the foreign models the Bank has examined in the following key respects.

*Explicitly takes account of risk aversion*

It does this by increasing the value of the avoided costs of crises. The bigger the crises, the bigger this affect. The impact of the risk aversion affect can be seen in the figure above. The blue line shows the benefits without the risk aversion effect and the red line with it. The impact is to increase the optimal capital ratio from 10.5 to 13 percent. The explanation for the risk aversion calibration in the RIS is as follows.

*To account for this effect (risk aversion), we have multiplied the expected dollar benefits of the GDP and fiscal savings by a factor that is intended to proxy society's risk aversion. The factor varies from just over one for small expected shocks, to more than two for the large shocks that enhanced capital ratios are designed to provide protection against. The ratios were calculated using an expected utility model that assumes a relatively high degree of risk aversion reflecting society's wish to reduce the risk of socially and economically disruptive events. The higher ratios are also consistent with the revealed preference in the New Zealand life insurance market, which covers low probability but high impact events. Average premiums are over twice expected payouts to policyholders.*

#### *Accounts for the direct cost of capital increases on lenders*

In the foreign models the increase in the lending rate is not a cost directly. Rather it has a negative impact on GDP, which is then counted as a cost. This is the **output** effect of a capital increase. The reason why the higher lending cost to borrowers is not counted is that the banks are assumed to be domestically owned, so the cost to borrowers is offset by increased bank profits. From a national perspective the higher interest cost is a transfer, there is no net cost. This assumption does **not** hold in New Zealand, where most of the banking system is foreign owned. The **transfer** effect should be counted as a cost. The effect is significant because the interest rate transfer effect is higher than the output effect in most models. Typically, the output and transfer effects together are two and a half times the output effect. This means that capital is much more expensive in New Zealand than in foreign jurisdictions and, other things being equal, the optimal capital level will be lower.

However, by looking at just the foreign models in their 'efficiency' assessment the Bank has completely missed the transfer effect. Around \$1.5 billion in increased interest costs to borrowers has been ignored.

If the foreign models were adjusted for the transfer effect to be fit for purpose for New Zealand then their optimal capital estimates would have been materially lower than the reported numbers.

#### *Modigliani Miller effect strong*

The model was calibrated with a strong, 85 percent, Modigliani Miller (MM) offset effect (the MM offset accounts for a fall in the required return on capital because banks with a higher capital ratio are safer). This meant that there was only a small interest rate effect and the costs were corresponding low. It is now generally agreed that this was too optimistic. The Reserve Bank's view, based only on the international evidence is that the offset is around 50 percent.

However, that figure could be lower given New Zealand specific circumstances.

A recent (December 2016) Centre for International Finance and Regulation paper<sup>29</sup> (which the Bank did not consider) estimated the MM offset for Australia. Using the leverage ratio measure of capital adequacy, no MM offset was found. Taking a market value approach to measure capital, it found that the MM offset was 25 to 30 percent.

The study did not offer any explanation as to why the offset effect was lower than the international average, and so much lower than the theoretical effect. A possible reason is that the Australian system is dominated by four very similar banks who believe in the 'fixed cost of capital' theory, and who have the market power to enforce it.

A further test of the MM offset effect in Australia was the 'natural experiment' of the increase in residential mortgage capital. The Reserve Bank of Australia noted, in its October 2016 Financial Stability Report, that housing loan interest rates had increased by 15-20 basis points in response to the capital increase, but that there had been some subsequent discounting.

If there was no MM-offset then the expected rate increase would have been around 12-13 basis points, suggesting that the initial increases were beyond those required to maintain a target return on capital, and that the subsequent discounting may have been a return to a zero MM offset effect.

If the offset effect is weak in Australia, the same outcome would apply in New Zealand, but more so. The system is dominated by subsidiaries of the Australian big four banks, which from a capital pricing perspective, are just operating divisions of larger organisations. They are distant from the market forces that, theoretically, could drive down the required rate of return on capital. The big four banks already face limited competition from New Zealand banks and small international competitors. That competition will be further reduced by the Bank's capital increases, as the smaller banks are mostly capital constrained.

It would be reasonable to apply a lower MM offset to New Zealand than the international evidence would suggest. A twenty-five percent offset could be appropriate.

The upshot, whether a 50 percent or 25 percent offset is used, is that using the TUATARA model, as currently calibrated, the optimal capital ratio would fall to under 9 percent.

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<sup>29</sup> Linh Nguyen & James Cummings December 2016 'Impact of Higher Capital requirements on bank funding costs: Australian evidence' CIFR WP No. 132.

The TUATARA model was obviously not the last word in optimal capital modeling for New Zealand. It was built, rather hurriedly, over seven years ago. The model inputs could be recalibrated, and the model itself could be enhanced. But, however that was done it is unlikely that it could provide very convincing evidence to support that the large increase in capital as the Reserve Bank is contemplating. Which is probably why the Bank ignored it.

## **Part six: What difference will higher capital make to the cost and frequency of financial crises in New Zealand?**

In this part we consider, in more detail, the evidence on the cost of financial crises and look at question of what difference the increase in bank capital will make in a severe New Zealand crisis.

### **How costly are financial crises?**

The Reserve Bank's position on this question is that financial crises are very costly, with long lasting effects, so it is almost self-evident that reducing the probability of crises with more capital is a good thing.

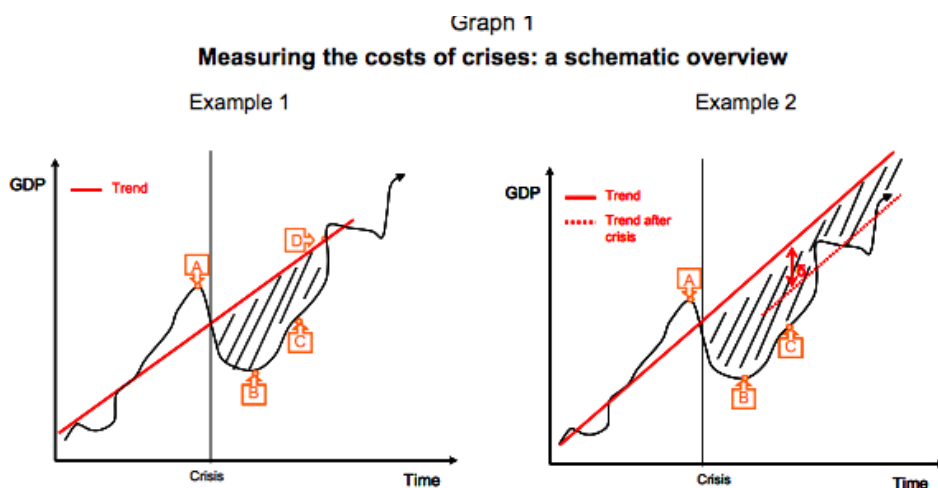
First a word on what is a financial crisis. It is a fuzzy concept, but a convention for their identification has emerged based the definition developed by the IMF's Laeven and Valencia.

A systemic crisis is defined as a national event that meets at least 3 of 6 criteria. Some of these are determined somewhat subjectively, and some have a quantitative trigger. The most important criteria are: widespread liquidity support; government guarantees, and fiscal support. The trigger point for the latter is 3 per cent of GDP. So a crisis is not necessarily the massive economic shock experienced by Ireland. It is helpful to keep this in mind when think about the cost of crises.

There have been a very wide range of estimates of the cost of crises (from under 10 to 400 percent of GDP) reported by various analysts. The key points of difference in the estimates, are first, whether the costs of the crisis are temporary, relating to the loss in GDP over a defined period of the recession associated with the crisis, or whether financial crises, leave a permanent scar that reduces the level of GDP for all time, or for a very long time. The second issue is the extent to which the GDP losses in the recessions associated with the crisis can be attributed to the banking crisis as such, and the extent they relate to underlying economic events.

### Permanent versus temporary effect

The difference between the permanent and temporary effect of a financial crisis is illustrated by the following stylised diagrams that were presented in the BCBS report. Example 1 in their Graph 1 shows the cost of a temporary shock. Output eventually catches up with the pre-crisis trend and the GDP loss is the marked area under the trend GDP line. In example 2, the rate of growth returns to its pre-crisis level, but the new GDP trend is below the previous trend growth. This difference is treated as permanent, and the permanent cost of the crisis is the present value of the difference. This assumption can generate some big cost of crisis numbers. For example, if the shortfall is 5 percent of GDP, and a discount rate of 4 percent is used the present value of the permanent effect of the crisis is 125 percent of GDP.



The permanent loss approach is open to some obvious criticisms.

First, it is highly dependent on the assumed pre-crisis trend growth rate. However, that trend will have been biased upwards by the pre-crisis ‘excesses’ that will have been building for a number of years. The observed lower level of post crisis GDP might be a return to something closer to more normal levels.

Second, while might be reasonable to assume that some ‘scarring’ effects from a

crisis, there is no compelling reason to expect that the scars will last for ever. If that were the case, a country's history of financial crises might be the dominant cause of its current level of GDP. US GDP would still be bearing the scars of the depression and of multiple crises back in the 19<sup>th</sup> and early 20<sup>th</sup> century. The Dutch economy would still be bearing the scars of tulip mania.

There is also a tendency to overstate the temporary effect of a financial crisis.

Prior to the GFC many OECD countries, had a credit and property price boom, and when they busted, or petered out, it was inevitable that there would be some impact on GDP, regardless of the banks' capital ratios, or whether or not there was a domestic systemic financial crisis.

A recent paper<sup>30</sup>, carefully considered some of the issues in identifying the effects of crises on GDP, adjusting for some of the methodological problems that tended to overstate their effects in earlier studies. Cline then compared GDP losses, over 5 years, for the countries that were identified as having experienced a systemic banking crisis, with a group that (including New Zealand) that did not. The former had a GDP loss of 23 percent. The latter 21 percent. There was just a just a two percentage point difference.

### **The net fiscal costs of crises**

The Governor's speech, cited above, focused on the fiscal cost of crises, arguing that they could be very large and that the increased capital would help mitigate the government's fiscal risk. There have been some large gross fiscal costs in some banking crises but for the most part they have been recovered.

The following table on the gross and net fiscal costs is taken from Laeven and Valencia IMF crisis database. The peak nonperforming loan data gives a sense of the scale of the crises. The average gross fiscal cost was 11.3 percent of GDP, but the average net cost was 5.8 percent. Most of the cost was driven by a few outliers. Excluding Greece, Ireland and Korea the net average comes to 2.7 percent<sup>31</sup>. The best comparators for New Zealand would be the Scandinavian duo of Sweden and Norway, who nationalised their main banks in their 1990's crises<sup>32</sup>. These banks had

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<sup>30</sup> William R. Cline 2016 'Benefits and Costs of Higher Capital Requirements for Banks' Petersen Institute WP 16-2016

<sup>31</sup> The UK cost was presented as 3.8 percent but the cost was probably lower. Mor "Bank Rescues of 2007-09: outcomes and cost" House of Commons Library 2018, estimated the cost to be about 1 percent of GDP.

<sup>32</sup> In Finland's case the losses were concentrated in the savings bank sector, which had transformed itself into something of an investment banking role, amongst other things making risky foreign loans and taking over



strong underlying franchises, which were eventually reflected in the selling prices, limiting the governments' net losses to close to zero.

If the government was forced to nationalise one or more of New Zealand's big four banks then it may well come out ahead once the economy recovered. The New Zealand banks have strong underlying profitability, as have their parents.

**Table 8: Gross and net fiscal costs of banking crises**

|                  | <b>Peak<br/>Nonperforming<br/>loans %</b> | <b>Gross fiscal<br/>cost %GDP</b> | <b>Net fiscal cost<br/>%GDP</b> |
|------------------|---|-----------------------------------|---------------------------------|
| Austria 2008     | 4.1                                       | 5.3                               | 1.6                             |
| Belgium 2008     | NA  | 6.5                               | 0.5                             |
| Denmark 2008     | 6.0                                       | 5.9                               | 2.4                             |
| Finland 1991     | 13.0                                      | 12.8                              | 11.1                            |
| France 2008      | 4.5                                       | 1.3                               | 1.1                             |
| Germany 2008     | 3.7                                       | 2.7                               | 0.7                             |
| Greece 2008      | 37.1                                      | 28.7                              | 17.1                            |
| Iceland 2008     | 61.3                                      | 37.6                              | 3.3                             |
| Ireland 2008     | 25.7                                      | 37.6                              | 26.8                            |
| Italy 2008       | 18.0                                      | 0.7                               | 0.7                             |
| Japan 1997       | 35.0                                      | 8.5                               | 8.5                             |
| Korea 1997       | 35.0                                      | 31.3                              | 23.2                            |
| Luxembourg 2008  | 1.7                                       | 7.2                               | 5.0                             |
| Netherlands 2008 | 3.2                                       | 14.3                              | 5.1                             |
| Norway 1991      | 16.4                                      | 2.7                               | 0.6                             |
| Portugal 2008    | 12.9                                      | 11.1                              | 7.6                             |
| Spain 2008       | 9.4                                       | 5.4                               | 4.8                             |
| Sweden 1991      | 13.0                                      | 3.6                               | 0.2                             |
| Sweden 2008      | 2.0                                       | 0.2                               | 0                               |
| UK 2007          | 4.0                                       | 8.8                               | 3.8                             |
| US 2008          | 5.0                                       | 4.5                               | 0.6                             |
|                  |   |                                   |                                 |
| Average          |   | 11.3                              | 5.9                             |
|                  |   |                                   |                                 |

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domestic companies. They were very bad at it, and after their rescue, these operations were closed down. There was no franchise to sell to offset the losses.

The other fact to remember is that the Norwegian and Swedish banks were, by current standards, very weakly capitalised prior to their crises. Englund<sup>33</sup> reported that the Swedish CET1 leverage ratio was 2 percent. The main reason that commercial property loans with an LVR of less than 75 percent had a 25 percent risk weight. The capital backing a commercial property only had to be two percent of the loan value. If the Swedish and Norwegian banks were as well capitalised as New Zealand banks are now, then there would have been no net fiscal cost.

Of the three big fiscal cost outliers Korea is noteworthy because of its rapid recovery, after the crisis. After less than three years the economy was back on its previous growth path and the increase in public debt was very manageable.

Greece, of course, has a host of problems not relevant to the New Zealand situation (we have a sound fiscal position and a floating exchange rate), which again leaves just Ireland, with a net fiscal cost of 26.8 percent of GDP. As discussed above Ireland's banking problems where, in large part where due to incompetent bankers and supervisors and a permissive political environment. There is no evidence that New Zealand bankers are exhibiting the kinds of behaviours that drove the Irish disaster. New Zealand also has the advantage that our large banks are effectively supervised by APRA, which is competent.

### **What difference would an additional 5 percentage points of capital make in a severe financial crisis?**

The point we want to reiterate here that large financial crisis do not occur randomly, rather they are mostly initiated and driven by real economic processes. The costs of those processes will be incurred regardless of the amount of capital the banking system has. More capital is not some magic pill that makes all of the pain go away. The argument for higher capital, therefore, is that it reduces some of the follow-on effects that can exacerbate the initial shock, and it reduces the government's fiscal risk.

There are a number of follow-on effect channels. The first is a credit crunch, caused by a change in banks' credit policies. There are two main drivers here. First, banks will be experiencing credit losses which are outside their experience and will

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<sup>33</sup> The Swedish 1990s banking crisis A revisit in the light of recent experience' Peter Englund. Paper presented to the Riksbank Macroprudential Conference, Stockholm 23-24 June, 2015

naturally tend to pull back from advancing any more loans to problem areas. There will also be a natural shock on the demand side. Property developments will not proceed, and home buyers will become more cautious. It is unlikely that more capital will play much of a role in mitigating these effects.

The second is related to the prospect of breaching regulatory capital requirements. Banks will be more reluctant to lend if they see this as a risk, as their capital is being eroded, or they think it might be further eroded through future credit losses. The higher the level of capital the weaker this effect. The Bank's proposals are designed to be more permissive in this respect. The capital is intended to be used, so there could be a positive effect on the economy through this channel.

The third channel is some kind of general impact on business and consumer confidence. The higher the level of capital, the argument goes, the less overly cautious consumers and businesses will be. However as the Cline analysis discussed above suggests the positive effect through these channels is unlikely to be very large. Non-crisis countries, with sound banking systems did not fare much better than crisis countries through the GFC.

### **How would a real crisis play out?**

We assume here that New Zealand banks have an 18 percent CET1 capital ratio while Australian banks have 13 percent and an additional 5 percent of loss absorbing tier 2 capital.

There are three main possibilities

#### **1. A New Zealand specific crisis: 30 percent chance**

It is assumed that the economic shock is largely specific to New Zealand (say a complete and sudden collapse of the dairy industry that sparks a very large fall in house prices), but Australia is mostly unscathed. Here there is a high probability that Australian parents will provide their subsidiaries with more capital. As discussed above, the subsidiaries have solid franchises (probably worth as much as their accounting equity) worth preserving, and for reputational reasons an Australian bank would be reluctant to walk away from its subsidiary.

In this scenario it is not necessary to require the capital ahead of time, paying for the cost of capital, when the support would be provided just when it is needed.

#### **2. A trans-Tasman crisis: 65 percent chance**

In this scenario banks in both countries are under stress. At first sight the New Zealand subsidiary banks should be more robust against failure because they have more CET1 capital, but in a situation where the course of the recession and future losses are highly uncertain, they will also be highly dependent on the fate of the parent banks. If the parents fail there will be a strong contagion effect on their New Zealand subsidiaries and the additional capital will be of limited value. If the Australian banks require government intervention, then so will the New Zealand banks. So, it is likely that there will be a coordinated rescue effort.

In our scenario the banks are guaranteed and are recapitalised by their respective governments. The Australian loss absorbing capital will be 'bailed-in' so the effective capital position in both countries will be the same. The New Zealand government contribution will be less than it would have been without the proposed capital increase, but so will the Australian government's contribution. There is a fiscal savings in both cases.

The key takeouts here are: first if the objective is to reduce the probability of government intervention, then additional CET1 capital in New Zealand is of limited value. The fate of the New Zealand subsidiaries will largely be determined by the fate of their parents. Second, tier two capital is just as effective in mitigating fiscal risk as CET1 capital. But it comes at around one fifth of the price. A \$1.2 billion a year savings.

### 3. New Zealand goes it alone with the OBR: 5- 10 percent chance?

The bank(s) would be placed in statutory management and would be effectively recapitalised by depositors.

This option is unlikely to be used. Australia is likely to (fiercely?) resist a New Zealand go it alone response, and the OBR is a high-risk strategy. It has never been tested and the mechanism for dealing with complex wholesale instruments in an OBR has never been built. There is a high probability that a government will go with the trans-Tasman government recapitalisation option, weighing the overall trans-Tasman relationship, and the likelihood the net cost of the recapitalisation will not be too high, the risk of the OBR alternative, against the immediate fiscal savings.

In essence, then, the decision to increase CET1 capital comes down to whether it is worthwhile to hold capital now that will reduce the possible cost to government in the event there is an acute crisis. There is a very limited reduction in the other costs of a crisis, which we put at 30 percent of GDP or around \$100 billion.

The cost of the capital increase is \$1.5 billion a year. The benefit is a maximum reduction in government's gross borrowing of under \$20 billion (the amount of the capital increase). Let us assume that half of this is recovered, for a net cost of \$10 billion. So the capital increase reduces the cost of the crisis by about 10 percent. If we assume (generously) that the probability of a very severe trans-Tasman crisis is, say, 1:300 the expected benefit is \$33 million.

So if the Bank's policy can be characterized as an insurance policy, the purchaser pays an annual premium of \$1.5 billion for a policy that reduces the cost of the bad outcome by 10 percent and has an expected payoff of \$33 million. Would any informed rational New Zealander buy such a policy? And would the Reserve Bank run afoul of conduct rules by selling it to the public?

## **Part seven: The Australian Option**

The obvious omission from the discussion paper is any consideration of the Total Loss Absorbing Capital (TLAC) approach taken by APRA<sup>34</sup> in their recently released discussion paper. APRA proposes a five percentage point increase in capital, which can be met from tier two capital. The increase only applies to domestically significant banks, which means that small banks are not affected. By contrast the Reserve Bank proposes that small New Zealand banks get only a one percentage point reduction from the large bank requirement.

The question is why hasn't the RBNZ taken the APRA route, or even discussed it. It would align the capital frameworks, which would probably make it easier to jointly manage a crisis, should one ever arise. At one-fifth the price, it would mean a savings of \$1200 million a year.

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<sup>34</sup> APRA November 2018 Increasing the loss-absorbing capacity of ADIs to support orderly resolution APRA November 2018

There is a general discussion of the TLAC approach in one of the policy documents released on 25 January.<sup>35</sup> The discussion came late very late, (11 October 2018) when the Reserve Bank should have been known what APRA was proposing, but there is no reference to it in the paper. Instead it was explained that they hadn't got around to considering TLAC, and they were, at this very late stage, considering it for the first time.

There is a discussion of the UK, and Swiss TLAC requirements, and then the discussion gets bogged down by conflating two logically separable issues: the arguments for requiring bail-in capital; and how failing subsidiaries in a banking group should be managed. The Bank seems to think that tier 2 TLAC capital can not be issued unless the failure co-ordination issue with Australia is resolved, which is obviously not the case. APRA has had no problems with proposing a TLAC requirement without 'solving' the trans-Tasman failure issue, or possibly even talking to the Reserve Bank about it.

An important consideration in the Reserve Bank's aversion to a TLAC approach, is that they would have to use internal resources to evaluate the capital instruments. A saving of \$1.2 billion should be sufficient to ensure that the Bank could hire at least one competent analyst, or outsource the evaluation to an experienced consultant.

The paper ends up by recommending that the Reserve Bank keeps a 'watching brief' on TLAC. There doesn't appear to be any understanding that TLAC, in the trans-Tasman, context is a very close substitute for CET1 capital, but is much less expensive, and that it should have been an integral part of the capital review at an early stage.

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<sup>35</sup> Susan Guthrie 'Total loss absorbing capacity' 11 October 2018 Memorandum to Financial Sector oversight Committee

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