

# Third time lucky?

**A review of the Reserve Bank of New Zealand's April 2019 bank capital ratio information paper**

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## 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:

1. The economics of financial regulation
2. Advanced capital adequacy modelling
3. Stress testing for large and small financial institutions
4. Regulatory compliance for financial institutions
5. General economics.

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# Third time lucky?

*'A well-run bank needs no capital. No amount of capital will rescue a badly run bank' Walter Baghot*

## Part one: Introduction

On 3 April 2019 the Reserve Bank of New Zealand released another bank capital review background paper. This was the third<sup>1</sup> in a series that offered differing explanations of the analysis behind the Bank's decision to substantially increase bank capital.

We suspect that the latest paper is, in part, a response to the criticisms raised in our paper 'The 30 billion dollar whim' (TBW). In particular, the Bank may have been sensitive to the suggestion that the capital increase was decided on a whim. Faced with a choice between a 1:100 probability of a 'banking crisis', which wouldn't have required a capital increase, and 1:200, the Governor, went for 1:200, because it was 'more conservative'. The Bank now wants to show that there really was more to it than that, even if the thinking and analysis wasn't written in a formal paper that went to decision makers at the time. At 60 pages the current information paper may be the consultation paper that the Bank wished it had written in the first place.

The fact that the Bank has had to produce a third paper, in itself, points to problems with the Bank's policy making processes. The time from the concept of the 'risk tolerance' approach being approved, to a decision on the numbers, was only a matter of weeks and the analysis was never subject to external review. There were serious holes in the analysis which forced the Bank to do a lot of back-filling, but rather than improving, the quality of the analysis has got worse.

The purpose of this paper to assess the quality of the analysis and advice that the Bank is now saying it relied on. Our response is not an easy read. The Bank's

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<sup>1</sup> On 14 April 2019 the Bank replaced the 3 April paper with a new version, but did not announce that it had done so. We have not checked how the new version differed from the original other than noting that a sign in one of the equations had been changed, as was explained in a footnote.

information paper is lengthy, covers a lot of ground, and is sometimes convoluted and inconsistent. In some places the standard of the documentation is poor. It takes time to untangle what is said, and, importantly, to sometimes comment on what is not said.

Some of our analysis will only be accessible to risk wonks, but hopefully a wider audience can understand the gist of what is being argued in most of the paper. The paper is also directed at the Reserve Bank and will be a component of our consultation submission.

In its introduction the Bank describes the purposes of the information paper:

- To outline the analytical framework that underpins the banks analysis
- Show how this framework leads directly to the policy objective that has been defined by the Reserve bank
- Describes the information and analysis that has been considered by the Bank in the context of the recent capital proposal

Amongst other things, the new information paper offers a defense of the 'risk tolerance' framework; introduces the wider social costs of financial crises as a key driver; tries to buttress the case for the high GDP cost of financial crises; and provides yet another explanation of its inputs into the New Zealand modeling that purports to support the 1:200 target. Importantly it presents, for the first time, the results of a New Zealand optimal capital model. So the Bank is no longer solely reliant on overseas modelling results to support its claim that the 16 percent capital ratio meets the 'efficiency' test.

However, the Bank still didn't seriously engage on the following critical issues.

- The need to adjust for the difference between New Zealand and foreign capital calculations when using foreign data on the relationship between capital and the probability of a banking crisis.
- The need to consider the use of the Open Bank Resolution (OBR) option, which is a partial substitute for capital, as part of the capital review process.
- The need to consider the impact of foreign ownership of New Zealand banks on the probability of a crisis.
- The need to take into account foreign ownership on the cost of additional capital. The Bank has only considered the impact of interest rate increases on economic output. It has ignored the fact that there will be a transfer to foreign owners because of higher lending rates/or lower deposit rates.

- The need to explain the gap between its assessment of the ‘soundness’ of the New Zealand financial system and that implied by the rating agencies’ assessments and the Basel advanced model results.
- The need to explain why the Bank now considers the New Zealand financial system is unsound, when it had determined that it was sound in fifteen years of financial stability reviews.

This review of the Bank’s paper primarily looks at the following issues.

Part three: Why was there a need to review the level of bank capital?

Part four: The definition of a banking crisis.

Part five: The risk tolerance framework

Part six: The social costs of banking crises

Part seven: The Bank’s optimal capital model

Part eight: The Banks inputs into its optimal capital model

Part nine: Capital policy and fiscal risk

Part ten: Comparing New Zealand and foreign bank capital ratios

Our key conclusions are set out in the next section.

## Part two: Key Conclusions

### 1. Capital increases unnecessary

The Bank has failed to support its case for a substantial capital increase in the information document. The best evidence and logical analysis shows reasonably strongly that increasing banks’ capital ratios will reduce welfare. We stand by our previous assessment that the costs could be very large. Estimates of the net present value costs in the tens of billions would not be alarmist.

### 2. Risk tolerance approach a backward step

The risk tolerance approach is not an advance in thinking about bank capital ratios. It tends to muddle the issues and can, conceptually, result in suboptimal decision making. Other supervisors have similar mandates to the Reserve Bank’s, but none have attempted to quantify it, and define ‘soundness’ in terms of the probability of a financial or banking crisis. Bank

crisis is too subjective a notion to be a useful hard metric for bank capital policy. The Bank is trying to solve 'a problem' of its own making. On any reasonable assessment the banking system is sound. We do not need the Reserve Bank to 'make New Zealand sound again'.

### **3. Modelling analysis is embarrassingly bad**

There has been a corrosion of the quality of the Bank's policy analysis. Some of the analysis of the inputs into the capital model is an embarrassment for New Zealand and a risk to the Bank's credibility. APRA, which can understand the analytics, must be worried about the quality of the analytics decision making in an institution they may have to work with if there is a financial crisis some time in the future.

### **4. Bank missed a double counting in the capital requirement**

The Bank missed the fact that they have already increased bank capital by 20 per cent by requiring advanced bank capital to be 90 percent of that required under the standardised approach. Even if the Bank's analytical modeling of the optimal capital ratio was robust (which it definitely is not) it should be wound back by about a third to correct for this double counting.

### **5. Impact of foreign ownership continues to be ignored**

The Bank has continued to ignore foreign ownership of the New Zealand banking system. It has ignored: the possibility that Australian owned subsidiaries will be sometimes supported by their parents, reducing the probability of a crisis; that there is little point in a subsidiary having a higher capital ratio than its parent; and the cost to New Zealand of increased profits to foreign owners.

### **6. Economic cost of crisis substantially overstated**

The direct economic costs of banking crises have been grossly overstated. The Bank's preferred estimate appears to be 63 percent of GDP. A more realistic assessment of the marginal cost of a banking crisis, for New Zealand as opposed to the underlying economic shock, would be no more than 10 percent of GDP.

### **7. Misrepresentation of the social costs of crises**

The Bank has grossly misrepresented the literature it extensively quoted from, on the social costs and longevity of banking crises. The World Bank and the UN did not say that financial crisis have long lasting effects as the Bank claimed. The relevant message from the papers the Bank quoted from

is that the social costs in any economic downturn are substantially mitigated in countries, which, like New Zealand, have robust social safety nets. We found no evidence of long lasting 'wider social costs' in some relevant New Zealand data. Suicide rates, divorce rates and crime rates did not deteriorate during the GFC recession.

#### **8. Fiscal risks benefits overstated**

Higher capital will have a limited impact on governments' fiscal risks, which are already limited and manageable. Higher capital may not reduce governments' gross fiscal costs at all if a government feels obliged to top up a banks' capital to the new higher level after a crisis. Anything less could mean the banking system would continue to be 'unsound'.

## **Part three: Why review the level of bank capital now?**

One of the questions asked at a public seminar on the TBW was 'why was the Bank reviewing the level of bank capital'. This was a good question. There didn't appear to be an obvious problem.

- New Zealand had adopted Basel III and bank capital ratios have already increased substantially since the global financial crisis.
- There seems to be no obvious move by the international regulatory community towards a further increase in tier one capital ratios.
- Supervisors are now using stress test as the primary tool to assess banks' capital adequacy and implicitly their 'soundness', and in New Zealand, banks have 'passed' some vigorous stress tests;
- The banks' capital ratios are in line with the 'optimal' capital ratio of 13 percent presented in the Reserve Bank' Regulatory Impact statement that supported the adoption of the Basel III requirements
- On a like-for-like comparison New Zealand bank's capital ratios are, at the least, broadly in line with international comparators.

So what is new, and what is the problem now?

The Bank's response on this point has been that they have new information. By that they presumably meant new analytical evidence in the 'literature'. While the Australian proposal to adopt Basel a 'conventional' approach on Total Loss

Absorbing Capital (TLAC) is new, the Bank did not seem to be aware of APRA's proposals and did not engage with the TLAC issue in the capital review.

There has been a host of new studies since 2012 (in particular a number of analysts produced optimal capital estimates with widely varying results), but the sum of it does not obviously point to the need for higher capital ratios for New Zealand banks.<sup>2</sup> The Bank has focused on a few studies that seemed to support higher capital (on close inspection we found that they didn't), but equally there were many others studies that pointed in the other direction. In particular there was the post 2012 empirical work that suggested that the Modigliani Millar (MM) offset was much less than complete, and that the cost of higher capital could be much higher than the Bank had previously assumed. The TUATARA model assumed an 85 percent MM offset, and that capital was relatively cheap.

However, the 'cheap capital' perspective was still in place when the initial consultation document was released in March 2017. The Bank said that its starting point was the 'big capital' approach, which was premised of a big MM offset effect. At some subsequent point in the process, however, that view seems to have changed, and the Bank has settled on a 50 percent offset assumption. That could have been the end of the capital ratio part of the review, because it is much harder to justify a large capital increase with that assumption.

But by that stage the process had its own momentum and the ambition for much higher capital requirements was not tempered. It is hard at the end of a lengthy review process to come to the conclusion that there is just not enough robust evidence to justify a change. So something had to be done and the mission was to find a rationale for higher capital. Evidence and perspectives suggested a different approach were probably not seriously considered, or brushed aside. Undue evidence was placed on a few academic papers, which focused on cross-country statistical analysis using very simple macro-models, which should have been taken with a grain of salt. The Bank appears to have only a very limited familiarity with the broader 'literature' on banks experiences in the GFC, and in earlier banking crises. Only one official report (on HBOS) is referenced in the literature survey. The Bank does not really understand what happened and why.

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<sup>2</sup> For example the Bank's review of the literature missed the following paper BANK CAPITAL REDUX: SOLVENCY, LIQUIDITY, AND CRISIS Òscar Jordà Björn Richter Moritz Schularick Alan M. Taylor NBER Working Paper 23287. It concludes

Higher capital ratios are unlikely to prevent a financial crisis. This is empirically true both for the entire history of advanced economies between 1870 and 2013 and for the post-WW2 period, and holds both within and between countries. We reach this startling conclusion using newly collected data on the liability side of banks' balance sheets in 17 countries. A solvency indicator, the capital ratio has no value as a crisis predictor



What is remarkable here is that what is now presented as the 'problem', that the New Zealand banking system is 'unsound', only emerged at the very end of a process that proceeded, albeit in fits and starts, for more than three years. The solution (a 16 percent CET1 capital ratio) was found a matter of weeks later. But this is a 'problem' of the Bank's own making. No one else thought that the New Zealand banking system was 'unsound'.

Another motivator could be the Bank's 'light handed' approach to supervision. If capital rather than 'hands-on supervision is the Bank's primary instrument, it may feel needs to be especially conservative with the one instrument that it does control.

It is probably time to review this approach. In practice the Bank has become increasing 'heavy handed', and our the analysis of the Bank's capital proposals strongly suggest, the Bank's 'more capital good' approach, can be very expensive, and is probably much less effective than good regulation in preventing crises. The Bank's approach also impacts negatively on rating agency assessments. Standard and Poor's has a low assessment of the New Zealand institutional framework (compared to Australia's), because S&P does not rate the Reserve Bank as a supervisor.

A more conventional approach, which would include onsite inspections, need not be costly. APRA already is the substantive regulator in this respect, because it does conduct onsite inspections of the subsidiaries of the Australian banks. It would simply be a matter of upgrading and formalising that relationship, and extending the approach to other banks, having regard to the lower systemic risk posed by smaller banks.

And finally there is the general tendency of regulators to overstate the importance of their 'mission'. Bureaucratic incentives lean to an excessively risk adverse approach. In a relatively small institution like the Reserve Bank, which has almost no external constraints on its decision making, the prejudices and predilections of a few individuals can disproportionately affect outcomes.

## **Part four: What is a banking crisis?**

The centrepiece of the Bank's risk tolerance framework is the concept of a 'banking crisis'. The policy objective is to reduce the probability that a banking crisis occurs to 1:200. But if a 'banking crisis' cannot be defined with some precision then it is not possible to calculate the risk that it will occur. This obviously begs the question, what is a 'banking crisis'? Crisis means different things to different people, and researchers have used different definitions over the years. On this point the Bank just says that the term banking crisis is 'defined in the literature', citing work by IMF analysts Laeven and Valcena (2012) and a paper by Romer and Romer (2015) as sources.

The Laeven and Valcena definition has been widely adopted by researchers and is used, in part, because it comes with a readily accessible list of crises. A stress event, then, becomes a banking crisis if it is on the IMF list.

The citation of the Romer and Romer paper gives the impression that it is somehow supportive of the idea that there is an academic consensus on what constitutes a crisis. This is almost the opposite of what that paper has to say. Romer and Romer's contribution is that research using the Laeven definition leads to erroneous results because a crisis either occurs, with significant consequences, or it does not, with no consequences. Using a more finely differentiated measure of financial stress (a 1-15 index) they demonstrate that some of the conclusions of the conventional analysis, for example that the effects of financial crises are long lasting, fall away. The value of the Romer and Romer contribution is that it reminds us that a 'banking crisis', is not a discrete, easily identified event like a plane crash, but is a mostly subjectively determined point on a continuum of severity.

Returning to the Laeven and Valencia definition of a banking crisis, a 'banking crisis' occurs if three of the following conditions are met.

- 1) deposit freezes and/or bank holidays;
- 2) significant bank nationalisations;
- 3) bank restructuring fiscal costs (at least 3 percent of GDP);
- 4) extensive liquidity support (at least 5 percent of deposits and liabilities to nonresidents);
- 5) significant guarantees put in place; and
- 6) significant asset purchases (at least 5 percent of GDP);

Thus New Zealand did not have a banking crisis in the GFC because only two of the conditions (guarantees and liquidity support) were met.

Our first comment here is that there is the obvious one that there is an arbitrariness about the banking crisis tests. For example, if the number of

conditions had been set at two, then then both Australia and New Zealand would have had a 'banking crisis' in 2008. Second, the bank restructuring fiscal cost test, which is often the determinative trigger, again, has been set somewhat arbitrarily. Applied to New Zealand it means a \$9 billion government capital injection, with the prospect of getting most of it back when the shares are eventually sold. This would not be much of a crisis-like event for a New Zealand government starting from a very strong debt/GDP ratio position. If the Laaven fiscal trigger had been set not too much higher, then many identified GFC country crises would not have been crises.

Third, several of the triggers are in themselves, not particularly important in economic terms; do not generate significant costs, and are not necessarily reflective of a deep underlying problem. For example, the guarantee of banks by the New Zealand government, and liquidity support from the Reserve Bank in 2008, did not directly cost anything, and were a response to external circumstances, rather than concerns about the solvency of New Zealand banks.

Our fourth, and most important, point is that the 'banking crisis' metric is different in character, and is calibrated differently to the solvency test that is used in the Basel capital framework. The Basel framework is built around a test of capital adequacy against **credit losses** of eight percent of (risk weighted) loan exposures with a probability of 1:1000 of it being exceeded. As these things go this go, credit losses are a relatively objective test.

The 'banking crisis' metric, on the other hand, is based on indicators of official actions. There is a rough link between credit losses and government fiscal injections, but it is only rough, because a government might choose to inject capital for other reasons, than just actual credit losses. It might want to maintain confidence in the financial system, clean up long standing banking sector structural issues, or be seen to be acting decisively in a 'crisis' situation.

And the calibration of the trigger point is quite different. Government recapitalisations of three percent of GDP, can be a lesser percentage of banking system assets, so the trigger point is substantially lower than the trigger point in the Basel capital model. The upshot is that the Laaven definition is both more subjective (a predictor of official action) and captures a lot more events than the Basel solvency test would. So a banking system can have a 1:1000 probability of credit losses that will exceed its capital, and at the same time a 1:200 probability of having a 'banking crisis'. Neither is necessarily right or wrong, they are just using different frameworks and trigger points

However, the critical implication of the lower threshold of the 'banking crisis' metric is that the costs associated with events that triggering the crisis threshold are much lower than those that breach the Basel model threshold. The man in the street tends to think of a 'banking crisis' as something horrendous and almost beyond the ability of a government to manage. The case of Ireland comes to mind. The reality is that most of the banking crisis events in high income countries in the GFC, were, on the credit loss facts, (as measured by proxies such as non-performing loans) not especially fearsome, and the associated avoidable deadweight costs would have been corresponding moderate. This explains why the observed economic losses in the GFC recession was not materially higher in countries that had a banking crisis than in those that did not.

In some sense all supervisors wish to reduce the likelihood of financial or banking crises to 'acceptable' levels. But because the notion of a banking crisis is subjective, and the triggers as much political as economic, no other supervisor, that we are aware of, has tried to formalise that objective and quantify it. Certainly no other supervisory has used the metric to decide whether their banking system is sound or unsound. To do so would risk being unnecessarily alarmist, and overly mechanistic in the execution of their supervisory duties.

Instead supervisors have relied on the stress test as their primary public analytical test of bank 'soundness'. On that basis of the New Zealand bank stress test, the New Zealand banking system should similarly be regarded as sound.

The key problem with the Bank's analysis is that the Bank did not understand the difference between the 'banking crisis' definition and the Basel capital framework. It has tried to use the Basel model to generate banking crisis results. The Basel model, will deliver a 1:1000 outcome on reasonable input assumptions. But it can only be made to achieve a 1:200 outcome, by making extreme assumptions about the inputs. Unfortunately the Bank has gone down that particular rabbit hole, and has had to resort to some bizarre arguments to make the unworkable work, in an increasingly desperate attempt to shore up some unwise decision making.

## **Part five: The risk tolerance framework**

This is a lengthy and complex discussion. Some readers might want to just rely on our summary, which reads as follows.

The risk tolerance approach does not solve the problems posed by complex, uncertain and often apparently contradictory data and analysis. Mostly it just repackages existing concepts in ways that are difficult, at first sight, to reconcile with more conventional approaches. At the end of the day it is just complicating way of the Bank saying: we intuitively know that more capital is good, and we know what is good for you.

### **The risk tolerance explanation**

The Bank sets out a lengthy defense (about 13 pages) of its 'risk tolerance' framework. It is a much lengthier exposition than that set out in the paper 'Risk appetite framework used to set capital requirements' to the Financial system Oversight Committee, which sought approval for the new approach.

The argument starts with the observation that there are two strands in the literature. The first is the analytical approached in the Basel model which is calibrated to a 1:1000 standard, at a 8 percent capital ratio (the rating agency assessments which suggest a similar standard are not mentioned). The second strand is foreign statistically based studies that look at of the relationship between financial crises and capital. At face value, at least for the countries reviewed, some of these studies appear to show much higher bank failure rates.

*The results from the two strands of analysis often depart quite radically from each other. It is thus inevitable that one strand of research will receive priority over the other. Our proposed risk appetite framework is a response to that challenge. We propose to first establish a level of capital below which we won't go, based on our risk appetite, and then look to see whether there are opportunities to increase output and stability from this minimum capital level.*

What the Bank appears to be saying here is that there is a such a wide range of outcomes that the only way to cut through the apparently contradictory evidence is to take a radically new approach. Just set an arbitrary probability of crisis target.

What the Bank did not do is attempt to reconcile the two strands of the analysis. If it had it would have found that the apparently high rate of banking crises was in part an artifact of the short data periods in many studies, and the particular way the GFC played out, which in many respects was not relevant to New Zealand. And it did not, as discussed above understand that The Basel and banking crisis literature were using different conceptual frameworks and different calibrations.

Nor did the Bank stand back and ask the question. If we don't appear to have an obvious problem, and there are no obvious answers in the literature and in

statistical information, which have direct relevance to the New Zealand banking system, then perhaps we should not be doing anything, at least until we better understand the issues?

However, the Bank pressed on. With respect to the banking crisis target the discussion switches from the level of capital to the concept of 'soundness'.

*"We believe a reasonable interpretation of 'soundness' in the context of capital setting is to cap the probability of a crisis at 1% (or 0.5% if we wish to mirror approaches taken in insurance solvency modelling'.*

The discussion then moves to a description of the standard approach to optimal capital calculation in the literature, which establishes a relationship between the amount of capital and the probability of a banking crisis. The conventional approach is set out in their figure 1 which shows the optimal level of capital as the point where the marginal cost of capital is equal to the marginal benefit.

*Figure 1: Marginal costs and benefits of capital*

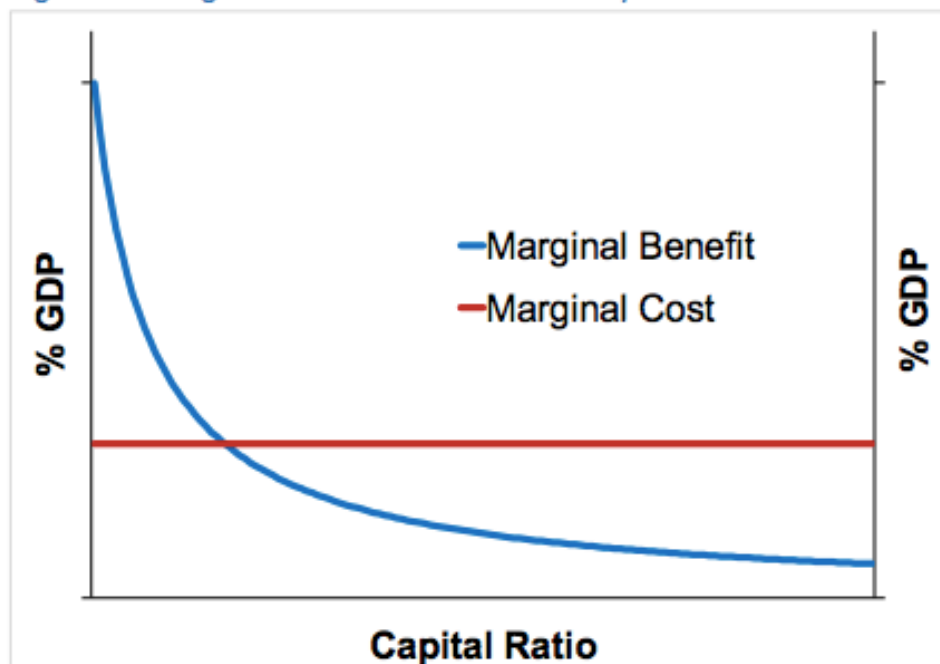
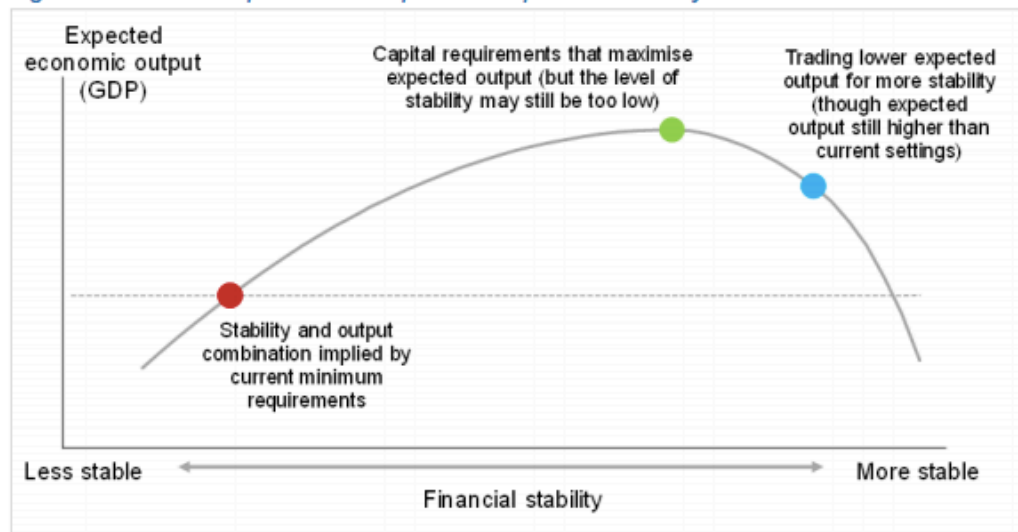


Figure 3: Relationship between expected output and stability



The Bank then reconfigures figure 1 relationship to produce its preferred depiction of the relationship in their figure 3 above. The level of capital is replaced by the words financial stability. The cost and benefit curve are replaced by a single net benefit curve, which is presented in aggregate rather than marginal terms. In itself this demonstrates nothing new. The Bank could just as easily have presented the issues in terms of the marginal cost and benefit curves. They could have placed a red dot, the current situation, as the Bank claims, to the left of the marginal cost and benefit intersection point, the green dot at the intersection and the blue dot at the right. Nor is the Bank's picture new. Several studies have presented their results in the same way.

However, the Bank puts considerable weight on what it thinks are its 'advantages' of its new picture.

*We have opted to illustrate the policy problem as outlined in Figure 3 for several reasons:*

- We believe it is more accessible to non-specialist audiences than the conventional marginal-based exposition. We wanted to have a genuine conversation with the public about capital policy, so we can reflect their risk preferences, and this required an accessible description of the policy problem.*
- This illustration shows a wider range of what believe are potentially justifiable outcomes than the conventional treatment. It becomes clear that having capital beyond the expected output maximising level would deliver more stability and this may ultimately be preferable (it depends on society's attitude towards risk).*

How you depict a graphical representation of the issue is not fundamentally important, and largely a matter of taste. However, the Bank's preferred approach

may have the advantage, from its perspective, of downplaying the cost side of the issue. It is netted off, so it is not visible.

The claim that the representation is more accessible to non-specialist audience is somewhat fanciful. As is the claim that there will be a 'genuine conversation with the public so their risk preferences can be reflected in the outcome'. How the Bank's picture will help illicit the public's risk preferences is beyond us. In reality the general public, will, to the extent they engage with the process at all, be relying on where the Bank has placed the dots, and will be swayed by often misleading Bank rhetoric.

We doubt that any non-specialist will truly understand what the Bank is doing. They may, however, be influenced by the way the Bank has packaged and promoted its policy. It is a 'win-win'. We get more stability at no cost. Who could be opposed to that? The problem is that the win-win is pure assertion, and the Bank airbrushes out the very real costs.

### **Risk aversion**

We then get on to a discussion of risk aversion. The Bank establishes that people are generally risk adverse, which is uncontroversial. So obviously you would want to take account of risk aversion in your model.

The foreign optimal capital models that the Bank surveyed and relied on, to some extent, in its earlier analysis, do not take account of risk aversion, though some allude to the issue. The Bank's solution was the risk tolerance approach: to establish the risk level below which you will not go, to deal with risk, and then deal with the efficiency issue with models that ignores risk.

The issue here is that if risk aversion should be included in the analysis, why didn't the Bank use its TUATARA model that explicitly takes risk aversion into account. That model assumed that risk aversion could be captured by doubling the value of output saved when capital is increased and found that this increased the optimal capital ratio by about 2.5 percentage points.

We suspect the reason is that having made a formal decision not to use the model back in 2016 (on the rather spurious grounds that it produced a range of results with different assumptions), the Bank forgot about it. When it was pointed out in the TBW that there might be a better way to address the risk aversion issue, using the TUATARA approach, than arbitrarily selecting a probability of crisis threshold, they had become too invested in their risk tolerance approach, with its attractive,



from a public relations perspective, win-win outcome, and didn't want to resile from their position.

To justify this position there is a discussion that seeks to cast doubt on the TUATARA approach.

*Incorporating risk aversion in the analysis via utility curves requires making assumption about what value people place on avoiding a loss rather than making a gain. The evidence that might inform this assumption can be quite conflicting.*

In support the Bank cites a paper by O'Donoghue<sup>3</sup>. This paper is just a high level theoretical discussion that argues that you don't necessarily need an expected utility approach to justify placing a higher weight on adverse outcomes.

From a policy perspective we don't have to be too precious about the theoretical underpinnings of the TUATARA approach. All you need is a rationale for placing a higher value on losses in a downturn (whether your conceptual foundation is expected utility or some model from behavioral economics doesn't really matter) and some basis for setting the weighting. The TUATARA model used observed behaviour in the life insurance market to double weight downturn losses.

The Bank then goes on.

*However the Reserve Bank is an agency with delegated authority (and obligations) to make such decisions on behalf of the public.*

*We adopted a pragmatic position, acknowledging the importance of risk aversion but not adopting the utility curve approach. On the one hand, the evidence strongly suggests that society is not indifferent to risk, so it seems important to accommodate the possibility that society may prefer capital levels that deliver a great deal of stability even if it means some sacrifice of expected output.*

*On the other hand, we accept the point that any modelled representation of society's preferences depends on assumptions (the accuracy of which may be impossible to verify ex ante) and the results will be very sensitive to the assumptions made.*

*The approach adopted by the Reserve Bank incorporates society's risk tolerance in a simple way. We represent the costs and benefits of capital objectively (without any weightings) and incorporate risk aversion by aiming to cap the probability of a crisis at some predetermined level.*

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<sup>3</sup> O'Donoghue, Ted and Jason Somerville (2018) Modelling Risk Aversion in Economics. Journal of Economic Perspectives Vol. 32 No. 2 Spring 2018.

Essentially what the Bank is saying is that an arbitrarily chosen target by the Governor is to be preferred to an attempt to incorporate an estimate of the public's preferences. But what we really have here are the Governor's preferences, and there is no reason to assume that this leads to a reasonable result. The Governor will not be bearing the costs of his decisions, and has every incentive to be overly conservative. High capital ratios possibly buy a quieter life, and in the event something does happen the Governor can say that he took appropriate action in anticipation. And of course one of the highest capital ratios in the world gives the Governor bragging rights ('mine is bigger than yours') in supervisory circles.

The Bank then summarises the advantages of its approach.

*In our view the approach is transparent, simple, pragmatic and consistent with the risk aversion literature.*

It is only transparent in the sense that the arbitrary target is announced. But it is extremely difficult to map the relationship between the target and the policy outcome. It is certainly not really simple. The Bank spends 13 pages just trying to explain the basic concepts. It is pragmatic in the sense that any arbitrary decision is pragmatic.

But the approach is not certainly not consistent with the risk aversion literature. No literature supports plucking a number out of the air based on nothing more than a statement that 1:200 is more conservative than 1:100.

The Bank then moves on.

*The approach is to set a two-part policy goal. The first element of the policy goal is to set bank capital requirements with the aim of achieving a banking system that retains the market's confidence in the face of large unexpected shocks (delivering 'soundness').*

Here the Bank is setting a very subjective target. The large unexpected shock is not specified, and the requirement that the market's confidence be maintained is a hugely subjective test. It will depend on the surrounding circumstances on how much capital will be 'enough'.

But the Bank then backs off

*At a minimum, maintaining the market's confidence means the banking system remains solvent.*

This test is more objective, but it will definitely not meet the ‘maintaining market confidence’ test. A bank that has lost all but one percentage point of its capital will almost certainly fail. In practice what the Bank has set up is the bank solvency test identical to that in the Basel Capital model. But it then uses the model to test the ‘banking crisis’ trigger, which almost certainly requires a decent buffer. A buffer could be put in, but then the model outputs would be substantially driven by the size of the buffer, and really wouldn’t be data driven. The problem is that how big a buffer will maintain confidence and avoid a ‘banking crisis’ is anyone’s guess. It is not readily amenable to estimation. In the event the Bank decided to take the zero buffer route, and doesn’t explain why it shifted from the two percentage point buffer it used in its January 25 paper.

The Bank then moves to the efficiency objective.

*The second element of the policy goal relates to ‘efficiency’. If, at the level of bank capital implied by the soundness objective, stability can be increased further with no loss of expected output, then bank capital can be increased beyond what society’s risk tolerance would require. This second ‘leg’ of the policy goal is akin to delivering a constrained maximisation of expected output - expected output is being maximised but this is conditional on achieving the stability objective.*

The Bank’s constrained optimization approach gets to the nub of the theoretical issue on risk aversion. In general, a constrained optimisation will underperform an unconstrained optimisation, if the constraint is arbitrary and unnecessary.

If the ‘soundness’ constraint is set high then it will be higher than the optimal level that takes account of risk aversion. Equally, if the soundness target is set lower, and capital is set by ‘efficient’ level of capital, this capital level could be too low, because the ‘efficient’ level of capital does not take account of risk aversion at all.

Finally, the Bank doesn’t seem to apply the risk tolerance model in practice. To explaining why the 1:200 target was switched for the initial 1:100 there is the following statement.<sup>4</sup>

*An additional factor in the decision to adopt 1/200 was the preliminary finding from the early modelling work. This indicated that, for the range of input values being considered,*

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<sup>4</sup> The Bank was obviously embarrassed by the lack of evidence of any substantive analysis supporting the change from a 1:100 to 1:200. The only information was the following footnote in a November 2018 document. ‘We considered two values for the cap on the probability of a crisis – 0.5% and 1% - but in the final analysis opted for the more conservative option 0.5%’ The analysis they refer to may be just an attempt at backfilling.

*adopting a risk tolerance of 1/100 would typically lead to an inefficient result (i.e. adopting a lower risk tolerance than 1/100 would likely lead to both greater stability and increased expected output).*

If the Bank had stuck with its framework, the predetermined soundness target would have been left at 1:100, but the capital ratio would still be set at 16 percent on the basis (from their modeling) that it maximized expected output. The capital policy decision would have been the same, but it would just be a 'win' result rather than a win-win. The Bank doesn't seem to understand its own framework.

### **Other supporting arguments for the risk tolerance approach**

First, there is the use of probability targets in other regulatory models.

The general insurers capital framework has a solvency test of 1:200. But this is a solvency target, not an 'insurance industry crisis target', whatever that might mean.

The Basel model solvency test of 1:1000 is also mentioned. It is difficult to see why this test justifies the need for a conceptually different capital test based on the probability of a banking crisis. Banks already have one risk metric, which if desired can be pressed into service to demonstrate that the system is currently sound. Introducing a second quantitative test is unnecessarily and leads to confusion.

And then there are the results of a comparative exercise.

*It is also important to note that a comparative exercise was undertaken in order to assess the impact of incorporating risk aversion in the policy goal. This was a review of the high level findings in the literature where the policy goal was defined simply in terms of maximising expected output. A summary of the findings is provided in Section 2.4 below.*

It is difficult to see how this comparative exercise could help. Just looking at a set of models that don't account for risk aversion, and for the reasons outlining in TMW, can't be easily applied to New Zealand, says nothing about the impact of incorporating risk aversion into the modelling.

## Part six: The social costs of banking crises

The Bank runs the line that the social cost of financial crises provides an additional and compelling argument for taking a more strongly risk averse approach to bank capital requirements.

*There is a large literature about the economic and social impacts of deep and prolonged recessions (such as are likely to arise in the event of a banking crises). A common theme in the literature is the harm to mental and physical health, family cohesion and community connectedness caused by the economic stress induced by a severe downturn – through unemployment, falling incomes, reduced savings and/or declining asset values. There is evidence of these impacts in both developed and developing countries although local circumstances can act to mitigate the effects.*

And

*It is worth considering examples of the available evidence in some detail, as this can provide insights into why agencies such as the World Health Organisation, the World Bank and the United Nations see the societal impacts of financial crises as being long-lived. The breakup of families, ill-health, reduced spending on healthcare and nutrition and societal unrest can all be expected to have enduring effects on society as a whole. The breakup of families, ill-health, reduced spending on healthcare and nutrition and societal unrest can all be expected to have enduring effects on society as a whole. There is evidence of these impacts in both developed and developing countries.*

The claim that the UN, the World Health Organisation and the World Bank believe that financial crises have long lasting effects on advanced countries with good social safety nets is **highly misleading**. The Reserve Bank has relied on just two documents: the UN's 2011 report on the GFC , and a background paper for the World Bank's 2014 World Development Report to make its argument. In fact neither report made any judgment about the longevity of the social effects of economic downturns, let alone financial crisis downturns, in high income countries.

Indeed one of the key takeouts was that the social effects, in countries with robust social safety nets, is quite limited. For the greater part, the reports were concerned with the effect of the GFC on developing countries which do not have these safety nets. The UN report has over 200 references, but only a handful refer to social impacts in advanced countries in financial crises.

However, the Bank then goes on makes liberal use of quotes from the reports to advance its case for New Zealand, when it was clear that the literature was substantially referring to less developed countries.

The Bank also mentions a WHO report for support. Here is what the WHO actually said.

*Economic downturns result in smaller changes in the mental health of the population in countries with strong social safety nets (Fig. 4) (54). European data indicate that inequality in health does not necessarily widen during a recession in countries with good formal socialprotection. In Finland and Sweden (their banking crises) during a period of deep economic recession and a large increase in unemployment, inequality in health remained broadly unchanged and suicide rates diminished*

The Bank concludes its discussion with.

*We believe these impacts are likely to lead society to be relatively intolerant of banking crises. However, one aim of the consultation is to generate a public conversation, and prompt feedback, about this important issue.*

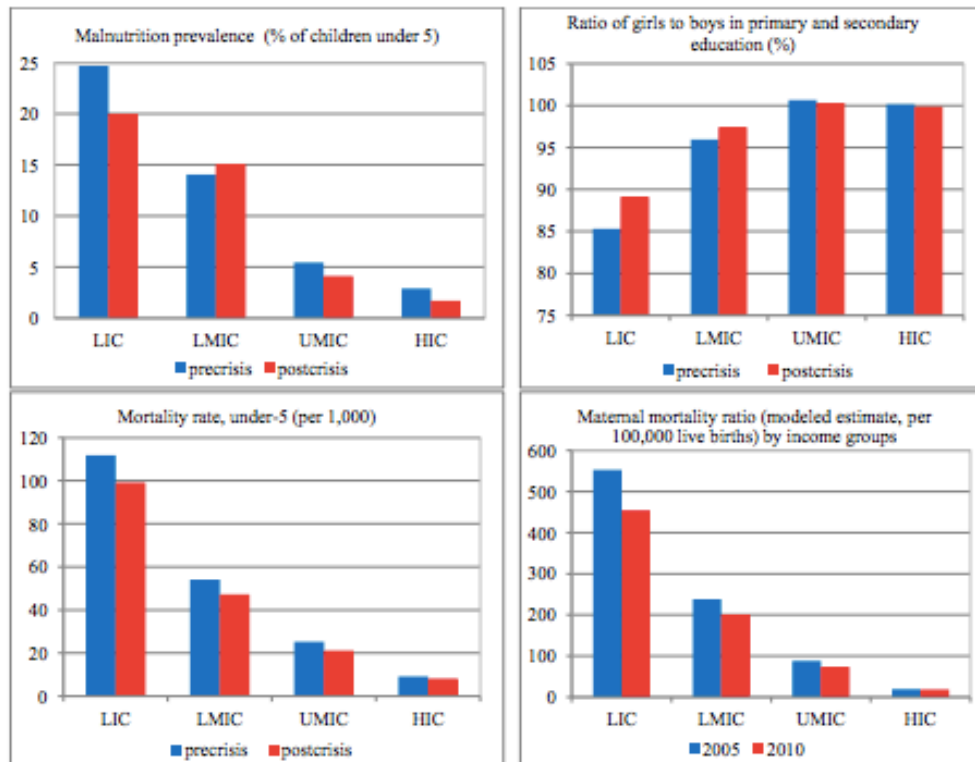
In the Bank's long list of documents consulted in appendix A there is another World Bank report<sup>5</sup>. The Bank did not cite it in its information paper, but it does claim to have read it. It has the following figure which summarises the impact of the GFC on key development indicators for a range of country groups. The high income industrial country group is on the right of each graph. In each case the indicators either improved or were stable over the GFC. The report concludes.

*Financial crises affect human development indicators but outcomes have not been uniform across countries. **In advanced economies no deterioration has been identified in health and education indicators as a consequence of financial crises** (our emphasis). Well-functioning credit markets, well-established social protection programs, and a low opportunity-cost of attending school could explain this outcome.*

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<sup>5</sup> Otker-Robe, Inci and Anca Maria Podpiera (2014) The social impact of financial crises, evidence from the global financial crisis. The World Bank Policy Research Working Paper 6703.

Figure 9. Development indicators before and after the crisis by income group



Source: Authors' computations, based on World Bank's World Development Indicators database.

We also looked at four indicators of social wellbeing for New Zealand over the GFC. Although New Zealand did not, on the IMF definition, have a banking crisis, the downturn was just as severe, as it was, on average, for those countries that are identified as having a crisis.

Our findings were:

Life expectancy: No impact on the upward trend in life expectancy.

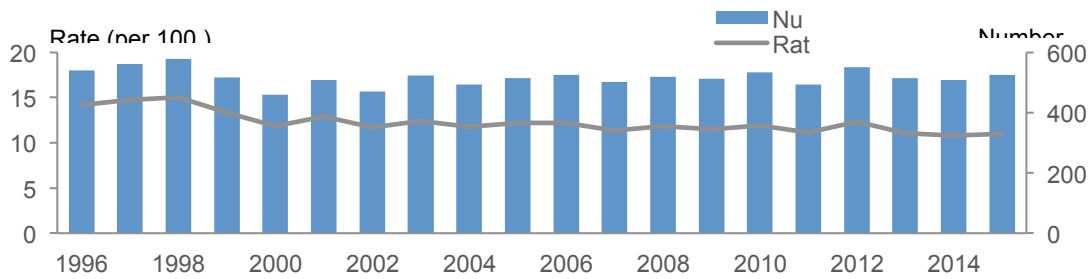
Suicide rate: No impact. The relevant figure is shown below.

Divorce rate : Rate per 1000 of existing marriages 11.27 in 2008, 9.72 in 2011.

Crime: Theft and related offenses 141,000 in 2008, 137,000 in 2010.

While there are other social indicators that we have not considered, on this brief survey there is no obvious evidence that the recession had a serious impact on broader wellbeing measures and certainly none that the social effects of the recession was long lasting.

### New Zealand suicide rates



Certainly recessions are undesirable for their direct economic impact. As discussed above people don't like unstable incomes, but that is picked up by allowing for risk aversion in the analysis. There is no case for being additionally conservative because of social factors. The Bank's argument is based on a misrepresentation of the evidence. It has attempted to play the 'wellbeing' card, but, extending the analogy, has cheated, using an altered card.

## Part seven: The Reserve Banks 'efficient' level of capital model

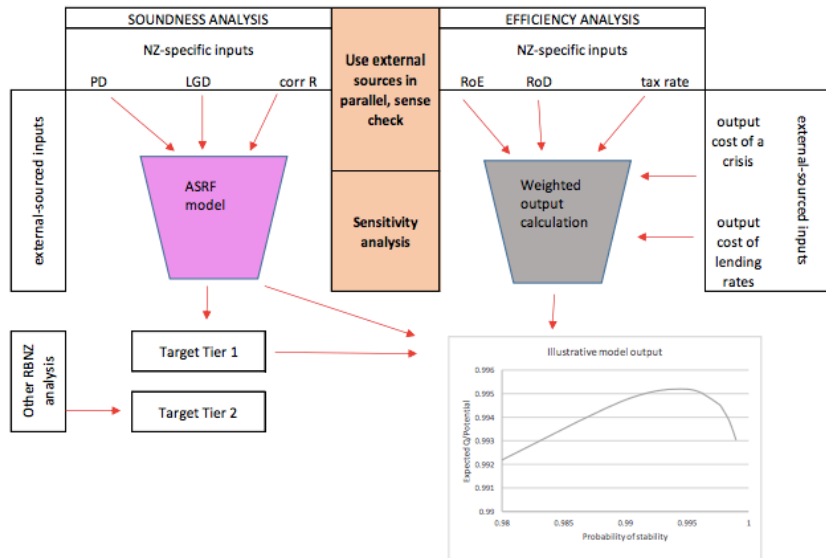
In TMW we criticised the Bank for basing their assessment of the 'efficiency' of the New Zealand banking system solely on the argument that the capital ratio of 16 was between 7-26 percent ratios observed in the international literature. We pointed out that this raised all sorts of issues, including the problem of the applicability of models that were using different measures of capital to New Zealand banks. On our assessment none of the international models pointed to the need to increase the capital ratio for New Zealand banks.

The Bank has now produced its own New Zealand optimal capital model and sets out some results. This new development gets less attention in the paper than it deserves, probably because the Bank is trying to keep up the pretence that they had done the full analysis all along, and that the results contributed to the decision making. All they are doing now is just releasing some of the detail. Or so they would like the reader to believe.

The structure of the model is conventional and is depicted in the Bank's figure 13.



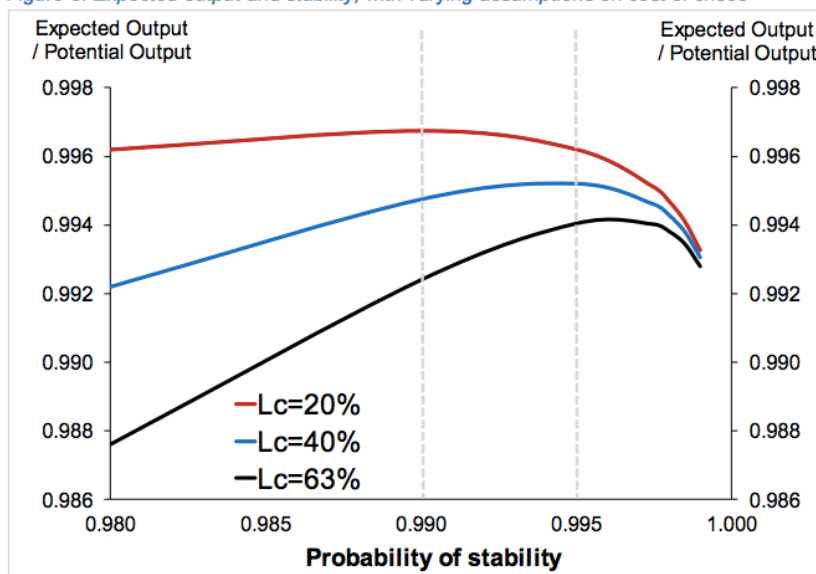
Figure 13: Illustrating the flow of information and analysis



### Some results

In their figure 5. reproduced below, the Bank sets out some results. But these are not immediately clear, because the horizontal axis is not depicted in terms of the variable of interest, the CET1 capital ratio. Looking at the outputs the black line reaches a maximum (the most efficient level) beyond the 0.995 level (1:200 probability of crisis). We are just left to draw the conclusion that the efficient level of capital is above the sound level and to assume that a 16 percent capital ratio is consistent with the efficient point.

Figure 5: Expected output and stability, with varying assumptions on cost of crises



What is clear from the figure is that altering just one of the assumptions (the cost of crisis) has a material impact on the 'optimal' probability of crisis (and hence on the optimal capital ratio.) It changes to around 0.990. If we go to the Bank's table 2 we see that this is equivalent to a 1.9 percent fall in the required (leverage) capital ratio.

### **Problems with presentation of the results**

- There are no results for the Bank's best estimates. As discussed below the Bank avoids identifying its best estimates. Presenting an array of outcomes makes it difficult to trace the link between the analysis and the policy outcomes.
- The results are all presented in terms of the leverage capital ratios, not the policy variable of interest the CET1 ratio.
- It seems clear that the analysis was conducted without taking into account the increase in capital due to the requirement that advanced bank capital be 90 percent of the standardised model capital. This will increase the starting leverage ratio by around 20 percent and reduce the benefit of marginal increases in capital. The Bank has effectively counted this increase twice
- The presentation of results is selective. In particular, there is no presentation of the results for the scenario with all of the Bank's lowest estimates. By any reasonable assessment they should be the Bank's best estimates and of the most interesting to the reader. The Bank of course will say that their approach considered all of the outcomes, so they did 'take them into account'. This is just unartful obfuscation.

## **Part eight: The inputs into the Bank's optimal capital model**

This part deals with the core of the analytical work that drives the Bank's conclusions.

There are three main inputs into their model

1. The cost of capital

We do not have a major issue with the Bank's core assumption on the MM offset that drives the interest rate increases. We do, however, have a fundamental issue with the Bank's failure to account for the increased

profits of foreign banks. This omission means that the cost of capital is understated by at least half. We do not further discuss cost of capital issues in this paper. The reader should go to the TBW paper for more analysis.

2. The relationship between capital and the probability of a crisis.

This is generated by the Basel model which, in turn, has three inputs:

- The probability of default (PD)
- The loss given default (LGD)
- The autocorrelation input (R)

3. The cost of a banking crisis

### **The probability of a crisis**

In any economic model the quality of the outputs depends on the robustness of the model inputs. It is a case of garbage in – garbage out. In the TBW we basically concluded that the analysis backing the Bank's outputs in the 25 January paper were, in effect, 'garbage' – just a back filling exercise to produce the right result.

The Bank has responded to our criticisms by producing some new inputs, justified by some new arguments, which if anything, are worse than those set out in the January 25 information paper.

The Bank explains that it made the following key judgements in setting the ranges for inputs

- Basing the 'PD' input on NPL ratios and/or impairment rates;
- Using a simple average of historical New Zealand bank impairment data, not a value weighted average;
- Referencing overseas experience when reviewing possible 'PD' input values; and
- Reflecting observed relationships between house values and output, and contrasting New Zealand with overseas countries, when setting a range of values for correlation R.

There are two other key issues that are not seriously addressed

- The decision to ignore advanced modelling bank's (and regulatory) inputs into the models that generate their capital requirements. The Bank has approved these inputs as being conservative best estimates. What they are now seen to be saying now is that the banks' estimates and its own previous judgments are wrong, and wrong by very large margins. The Bank needs to explain why.

- They do not provide best estimates for the input values. They say:

*Our approach was not to derive a single 'best estimate' of the relationship between capital and the probability of a crisis – and, in particular, the capital needed to cap the probability of a crisis at 1/200 - but to identify a range of reasonable estimates.*

This is not really a justification. It is conventional practice to produce and justify a best estimate, and then investigate the sensitivity of the result to different input assumptions. The Bank's approach allows it to fudge the connection between its calculations and conclusions. The conclusions are just 'informed' by the analysis, which could mean anything. This is not consistent with the Bank's professed commitment to transparency and accountability. If and when the Bank gets around to producing a cost benefit analysis they will have to settle on their best estimates. They should have done it already.

We now discuss the three model input estimates.

### **Probability of default**

Here the Bank attempts to justify its use of non-performing and impairment rates rather than actual probability of default estimate. The Bank has good data from the advanced banks on their historical default rates (the average PD is about 1.2 percent in the bank disclosure documents), so why would it use non-performing loans, which as calculated by the Bank, overstate default rates by a factor of more two.

#### *Banks' data does not include crisis events*

The Bank's first argument is that the New Zealand banks' historical PD data does not include a 'banking crisis'. So it is necessary to go to foreign data where there have been crises, and the most relevant data that is readily available is nonperforming loan data.

This argument doesn't stand up to scrutiny.

- The PD data produced by the banks does include information from the GFC, and to a varying extent, the 1989-92 recession. While these recessions are not identified as 'crises' on the IMF definition, they were just as severe as the downturns in countries that did experience a crisis. The Cline (2016)<sup>6</sup> data shows that the aggregate output loss in New

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<sup>6</sup> Cline W. (2016) 'Benefits and Costs of Higher Capital Requirements for Banks.' Peterson Institute for International Economics Working Paper Series, 16(6).

Zealand over the GFC (23 percent) was less than the average for the crisis countries (19 percent).

- Including an, as yet unobserved, severe loss event does not make much difference to average longrun PD estimates. To illustrate, consider a New Zealand housing portfolio that has an average PD of 0.50 percent, mainly driven by the GFC recession (default rates in normal times are very low). Now assume that there is some unobserved extreme (say 1:100 ) event that results in a default rate of 10 percentage points. Allowing for this event increases the average default rate to about 0.6 percent. As the banks' calculations all included a conservative overlay, they already implicitly account for unobserved severe events.

#### *Multiple counting of defaults*

The Bank does attempt to address the criticisms in the TMW that the nonperforming loan approach can count a fault multiple times.

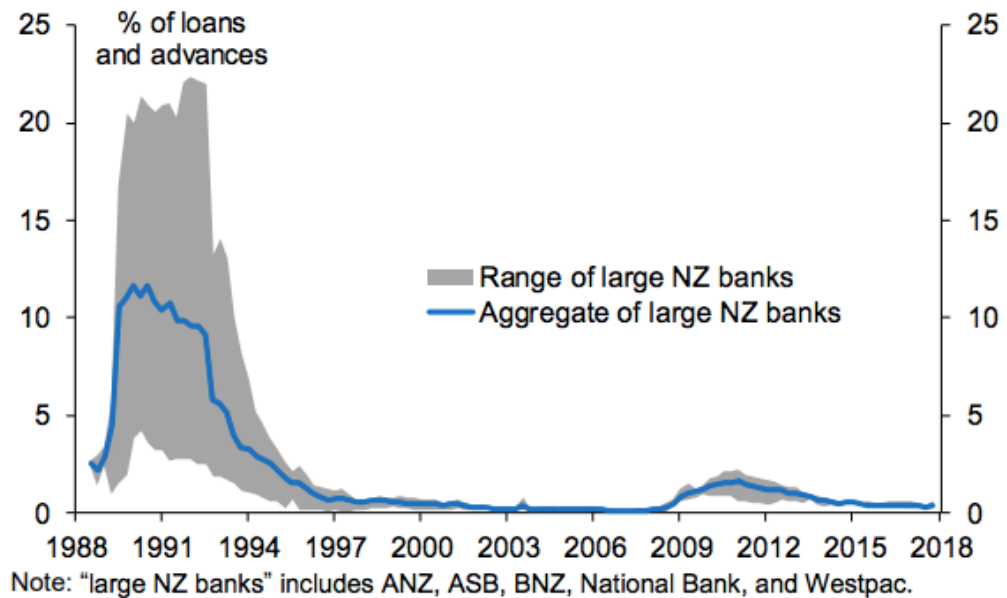
*We are aware that the NPL ratio may overstate the likelihood a loan will go bad in a given year – because a loan may sit unresolved for more than a year and thus count twice. We responded to this problem by using, at the top of our range of 'PD' input values, the average historical NPL or impairment ratio (based on whatever series we were looking at) and, for the bottom of the range, 50% of the historical average (this would be appropriate if all loans classified as non-performing took two years to resolve, rather than one). We believe this is a conservative assumption, because similarly some loans may enter and leave the NPL pool within the year.*

The Bank's adjustment simply doesn't work. Below is the figure for impaired loans taken from the Bank's previous information paper. It is obvious that the data is dominated by the BNZ's experience in the late 1980s, and that the nonperforming loans stayed in the portfolio for several years. Almost all were there for four years because it was not until 1993 that they started to fall. The banking system average of the number of years defaulted loans stayed on the books, for the entire period, would have been probably higher than three – though it is hard to say just by eyeballing the graph. Which is why any researcher would use the banks' actual default rate estimates. While defaulted loans may enter and exit the nonperforming category within one year, the default rates in benign times are very low so this factor will have a limited impact on the historical average.

We can roughly assess from the data that non-performing loans overstate the default rate by a factor of around three. The Bank divides by a factor of two for its bottom of the range estimate, but not at all for the top of the range (it doesn't say what it does with its intermediate estimates). As both the high and

low estimates receive the same weight in their analysis, the effective reduction is to divide by 1.5, half the rate required to match the default rate. This is not the conservative treatment the Bank claims. They have, on average probably overstated the default rate by a factor of two.

**Figure 1: Impaired assets as a share of gross loans and advances, large New Zealand banks**

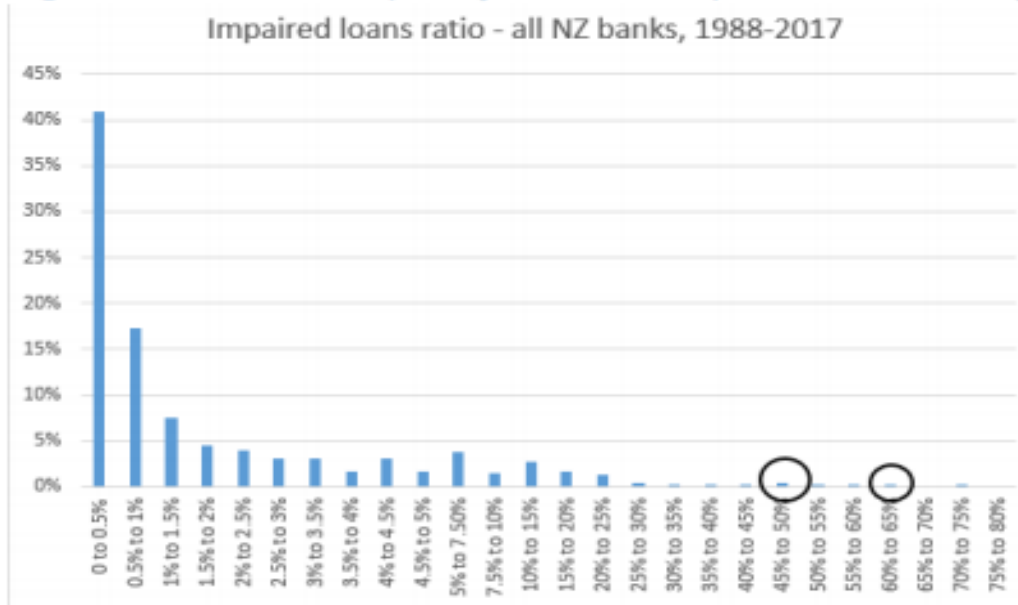


All this is a bit obvious, which probably explains why the Bank dropped the above figure from its April 3 effort, and replaced it with their figure A, reproduced below.

Figure A shows the impaired asset ratios for all banks. Of course it suffers from the same multiple counting problem as the earlier effort, but the Bank goes one step further to boost the PD estimate. The estimate is disproportionately affected by the impairment rates of a few small banks in the 1980s, because the data is unweighted. These small banks were new entrants, and made many highly risky loans in an attempt to enter the market. They withdrew after a few years after incurring disastrous losses. Looking at the data there are observations at 70-75 percent, more than 60-65 percent, and so on. The great bulk of the observations are quite low – more than 50 percent below 1 percent, reflecting the experiences of the incumbent banks. Even if you believe that the disastrous experiences of long gone banks are relevant to assessing the future risk profile of New Zealand's current main banks, you would not weight those experiences as equal. But that is what the Bank has done.

Figure A shows the relative frequency of annual impairment ratios.

*Figure 14: Relative frequency of annual impaired loans ratio (all NZ banks)*



The Bank's defences of its methodology are that:

1. *Large samples are better than small samples.*

This argument does not, of course, apply if the observations are not from the same population. And it is clear that the 'long gone' small banks differed fundamentally from today's main banks in loan composition, risk culture and risk management frameworks. While the small banks were given banking licenses at the time, they would not receive a banking license today with the business models they had in the 1980s.

2. *The rules will apply to small banks as well as large*

This is desperate stuff. It does not explain why those long departed banks' experiences receive an weighting equal to today's main banks

3. *If the small banks impairments rates were exposure weighted they would not have a material impact on the overall estimate*

Precisely. In other words if the Bank used a more respectable statistical technique by weighting the data their 'data scam' would not work.

The Bank does set out one of the arguments against its methodology.

*Given New Zealand is a banking system that has long been dominated by just four or five banks, it might be tempting to confine the historical sample to simply the large banks. Small banks, it could be said, have had very different portfolios than large banks and*

*therefore their loss experience is of little relevance when assessing the capital needs of systemic banks.*

That is precisely our view. Further the Bank's approach is fundamentally inconsistent with its modelling approach. The banking system is modelled as a single bank, using aggregate information about the entire banking system. It necessarily follows that that it is the aggregate weighted non-performing or impaired loans ratios that matter, not an unweighted average of individual bank numbers. And it is inconsistent too, with their use of international data. This is based on national data, which is also a weighted average of the country experience.

The Bank's responses to the challenge it sets is are as follows

*Firstly, there is the obvious point. We are setting capital policy for the long term and for an unknown future. Portfolio composition among the large banks today is not necessarily a reliable guide to the portfolios that will be held in the distant future.*

The obvious flaw in this argument is that as a bank's loan portfolio changes to a riskier asset composition, as the Bank implies, then its average risk weight will change – offsetting that risk. It is not necessary to increase the capital ratio ahead of time.

While we do not know the actual portfolio composition of the small banks that incurred the disastrous losses, we do not know that they focussed on high risk property development and investment company loans. Today only 0.4 percent of bank lending is in commercial property development, and the risks are carefully limited by much more restrictive loan requirements than were in effect in the 1980s. It is nonsense to suggest that the main banks will suddenly switch their business models. If they do change course in the decades to come the Bank can respond if it believes that the risk weights are not picking up all of the additional risk. Supervision is not a one shot game where the rules have to be set now and never changed regardless of evolving circumstances.

*Secondly, many factors impact on loan performance, not simply loan type. Governance qualities, macroeconomic vulnerabilities and correlations between borrowers are relevant for all banks. These factors impact on all banks and thus, in order to best capture the effects of these factors, it seems reasonable to include small banks in any sample.*

The Bank seems to be arguing against itself here. It is precisely because the old small banks were so different that they shouldn't be included in today's assessment.



What the Bank seems to be suggesting here is that the factors that drove the small bank defaults are more or less random, because they cannot be identified ex ante. Hence any bank in the future, and in particular the main banks, can be struck down by the same problems. Without warning and without the supervisor or anyone else noticing they could:

- Abandon their risk management systems
- Hire inexperienced staff
- Be subject to no parental oversight
- Makes massive expansions into the most risky lending categories
- Be subject to adverse selection when they attempt to massively expand their lending portfolios.
- Have no supervision

We think not.

### **Using data from countries that have experienced banking crises**

The second limb to the Bank's new PD estimate analysis is the use of foreign data. This is a bit incongruous as the point of the Bank's modelling exercise was to look at the New Zealand evidence. The Bank explains as follows.

*The absence of a banking crisis in New Zealand's history makes the issue of settling on a range of values for the 'PD' input particularly problematic. We had to be open to using data drawn from other countries' histories. While every accounting measure can be assumed to have had varying definitions through time and across jurisdictions the definition of 'non-performing' appears to be quite comparable across countries and to have been relatively stable through time. In contrast, the real-world meaning of 'default' could potentially vary more widely, making PDs a less reliable loss indicator in a cross-country context.*

The Banks produces absolutely no evidence that nonperforming loans are more stable, across time and countries, than actual actual PDs. Indeed the opposite is more likely to be true. PDs are a Basel advanced model input and there are rules for its consistent measurement. In addition the Bank uses impaired assets for its New Zealand assessment, which is a different and more subjective measure than non-performing loans.

The Bank then goes on to reference the IMF table it used in the consultaion document. It argues.

*The peak impairment rates for the BNZ and two stressed Australian banks are included in Figure B for comparison purposes. The impairment experience of these banks was on par with the average experience (indicated by peak NPL ratios) of banks in countries that have experienced crises. The impairment data for New Zealand banks is thus a suitable data set to use for model inputs.*

This is (yet again) nonsense. Comparing the worst performing bank in New Zealand back in 1990 against system averages for other countries does not establish any equivalence. If there were to be a comparison it should be the relative system performance in the GFC when the economies were subject to similar economic shocks. This obviously shows that New Zealand banks performed much better (a peak NPL ratio of about two percent) than the banking crises countries. The argument that the IMF table somehow justifies the use of non-performing loans simply doesn't work.

And then the Bank adds the 'precedent' argument.

*There are precedents for using cross-country NPL ratios to derive loan loss rates (the NPL ratio is multiplied by an assumed LGD value to arrive at a loss estimate). A recent example is a report published by the IMF in 2016*

There are precedents for many things in the thousands of articles or studies on regulatory issues, but that does not make them right. As we argued in TBW, the IMF paper was a lazy piece of analysis with a methodology, which in most cases, will substantially overstate the loss rates it purports to measure.

The Bank's next step is the comparison with some international evidence on non-performing loan rates.

*Table A below shows historical average NPL ratios for countries with GNI per capita above US\$15,000 in 2017 (a Reserve Bank criteria for comparability with New Zealand) that have been identified by the IMF as having experienced banking crises. Omitting Greece and Cyprus, the median NPL ratio sits between 2.9 percent and 3.3 percent and the average is 3.8 percent.*

The Bank concludes that the international evidence supports their New Zealand analysis, buttressing its case.

Oddly the Bank didn't exclude Canada and Australia, which haven't had a financial crises, from the table. But they also included several countries (Norway, Sweden and Finland) that did not have a crisis over the data period (1998-2017). And why did the Bank exclude Greece and Cyprus, if they truly believed in larger samples. The Bank's answer would probably be that they were not suitable comparators, because they had many economic and banking structural issues that are not relevant to New Zealand.

But the same argument could be made for excluding many of the countries in table A. Certainly the former communist countries, and Uruguay. And then there is Iceland (an exercise in banking madness that was run like New Zealand finance companies prior to the GFC); Italy (it is well known that problems with the Italian

legal system means that defaulted loans can sit in bank portfolios for many years, and that any average level of non-performing loans will be a poor proxy for default rates); and Ireland (again a case of identifiable banking madness, and gross, partially politically driven, regulatory failures, not just bad luck).

If we take the fuller sample, excluding the non-crisis countries would produce an average non-performing rate of 6.9 percent. On the other hand, if we take a more sensible view of what is a relevant comparator, the average nonperforming loan ratio (of those countries that had a crisis) would be 2 percent. Halving that to take account of the multiple counting of non-performing loans, gives us a default rate of 1 percent, which is about the same as the New Zealand banks' estimated rate.

The main point here is overseas evidence can be manipulated to demonstrate almost anything. They are not a good substitute for actual New Zealand evidence and in particular banks' PD evidence.

### **Loss Given Default (LGD)**

The new evidence in this information paper is that "the minimum prescribed (LGD) value (which applies just to high LVR farm loans) is 42.5 percent." In the Banks view "this analysis is supportive of LGD inputs in the vicinity of 40 percent".

This, yet again, is nonsense. High LVR farm loans account for around 1.3 percent of total lending. The Bank then goes on to say that this estimate is supported by LGD results from the stress tests (31 percent in 2017 and 37 percent in 2014) As the Bank has previously explained, the lower LGD was largely explained by a change in the structure of banks loan portfolio, and is the relevant result. A LGD of 31 percent doesn't support an estimate of 40 percent, though it does support the lower range estimate of 30 percent. The Bank presents no evidence at all to support the 50 percent assumption.

### **Correlation coefficient R**

There is a discussion that purports to support a range of inputs (0.2 to 0.4) for the correlation coefficient, R. Almost all of it is wrong, irrelevant or misleading.

The starting point should be the Basel model estimates, which are less than 0.2 on average, so the Bank has to make a solid case for using much higher coefficient numbers.

The Bank's discussion is entirely limited to the housing loan portfolio. While housing loans are about 60 percent of bank lending, they account for about one

third of the risk. Thus the Bank has nothing to say about the correlation coefficient for two third of banks' risk.

The Banks discussion of the housing loan R coefficient is as follows.

*Borrowers' income is, in the Basel III case, assumed to be the determinant of the likelihood of borrower default. However, equally, the value of the borrowers' assets could be a driver of default. Based on the limited data available, the correlation between asset values and output in New Zealand seems relatively high. The ASRF model allows the capital implications of high correlation between asset values and GDP to be explored.*

Borrower income is not assumed to be the determinant of default in the Basel III model. This is an empirical issue driven by the banks' models.

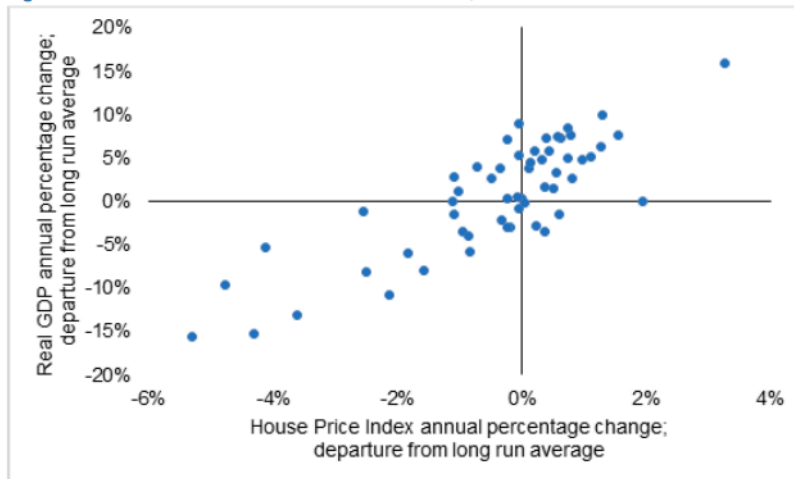
More to the point this inaccurate observation is not relevant to estimates of the correlation coefficients in the Basel model.  $R$  It is a measure of autocorrelation, the extent to which exposures within the portfolio are correlated with each other. While a high correlation between GDP and house prices will increase  $R$ , there are many other factors in play. In particular, simple models that attempt to derive a correlation coefficient from the volatility of business assets don't work with housing portfolios, because housing defaults are a complex function of both the value of the house and the borrowers income, not just the value of the house.

The Bank proceeds as follows.

*In New Zealand house prices and GDP appear to be highly correlated. Figure C presents a simple plotting of the annual percentage change in GDP (real, relative to trend) against the annual percent change in house prices (relative to trend). The statistical correlation between the two series is 0.63. The statistical correlation does not translate directly into the 'R' input needed for an ASRF model, but an approximation to  $R$  can be achieved by squaring the statistical correlation (i.e. this data generates an  $R$  input value of 0.39).*

*The data used in this calculation is quarterly observations of 12-month changes. Repeating this exercise for other countries, suggest the correlation between asset values and output in New Zealand might be particularly high. Some studies suggest that the correlation between asset values and output (and by inference, borrowers with each other) increases noticeably during crises. Despite a banking crisis in the data (sic), the correlation evident in New Zealand data is higher than in the UK and Ireland, for example, two countries that have experienced banking crises.*

Figure C16: NZ House Price Index and Real GDP, 1990-2018



Source: Stats NZ, RBNZ

The impression the Bank is trying to leave here is that this evidence somehow justifies the use of R assumptions that are much higher than those imposed in the Basel models. Its range of R inputs is 0.2, 0.3 and 0.4. The Bank also attempts to lend its methodology an air of authority with a couple of references from the 'literature'.

The first reference<sup>7</sup> is an early paper (2003) that discusses various elements of the Basel model, which was still under development at that time. Asset correlations of assets with S&P credit ratings were estimated (the estimates were under 0.10). There was no discussion of the housing correlation at all.

The second<sup>8</sup> paper estimates correlation coefficient using Nordea Bank data. The housing correlation coefficient was estimated, by backing in it out of actual loss experiences, but unfortunately the actual results are blanked out in the online version of the paper we were able to access.

A third, very recent paper,<sup>9</sup> from the Bank of England, was not cited by the Bank, but it is referenced in the Bank's Appendix A. It reviewed the full literature on the estimation of the housing lending correlation. There is no suggestion, anywhere in the literature, that the housing correlation can be read off a GDP/house price correlation. A new methodology, assuming a fat tail default distribution, was

<sup>7</sup> Hamerle, Alfred, Thilo Liebig and Daniel Rosch (2003) Credit Risk Factor Modeling and the Basel II IRB Approach. Deutsche Bundesbank Discussion Paper Series 2 No. 02/2003

<sup>8</sup> Martin, Lionel (2013). 'Analysis of the IRB asset correlation coefficient with an application to a credit portfolio' Uppsala University Project Report 2013:28

<sup>9</sup> Neumann, Tobias (2018) Mortgages: estimating default correlation and forecasting default risk. Staff working paper No. 708. Feb 2018

developed and applied to the US and the UK. The conclusion is that the results are consistent with the Basel model estimate of 0.15

*Issues with the correlation estimates*

While a strong relationship with house prices and GDP may influence the housing correlation coefficient, the Bank does not make a very convincing case that New Zealand house prices are more sensitive to GDP than house prices in other countries.

- The wrong correlation is estimated. The relationship of interest is the correlation between **nominal** house prices and GDP, not the relationship between deviations of **real** house prices from their trend and GDP. Banks are at material risk of loss when the nominal house price falls below the value of the loan, not when real prices depart from trend.
- The relationship identified is economically inconsequential. A departure of GDP from trend of around 15 percent is associated with real house price deviations of only four to six percent.

**Table C: Correlation and 'R' estimates for NZ and other countries**

	1990-2007	1990 to 2017	Full sample	Sq root
NZ	0.52	0.63	0.63	0.39
UK	0.37	0.62	0.47 (1976-2018)	0.22
Canada	0.24	0.26	0.31 (1971-2018)	0.1
Norway	0.40	0.44 (1993-2018)	0.44	0.15
Ireland		2006-2018	0.44	0.19

*Comparison with overseas countries may have been contrived*

There is no explanation of why the sample of comparator countries was selected. There must be a suspicion of cherry-picking. In addition the data doesn't really show that New Zealand has a higher housing price correlation, even on the Bank's flawed measure. Two of the calculations, Norway and Ireland, are not directly comparable. The Norway estimate leaves off the 1990-92 years when house prices were falling. The Irish data only starts from 2006, leaving out the prior run up in prices, which would have affected the results. Over the same time period, the UK correlation is the nearly the same as New Zealand's

### *The Bank got the math wrong*

The Bank says that the square root of the New Zealand correlation of 0.64 is 0.39. The square root of 0.64 is actually 0.8. What the Bank may have intended to say is that the square of 0.64 is 0.39.

### **Conclusion**

The Bank's analysis of the model input values is, almost from start to finish, nonsense, an increasingly desperate attempt at backfilling. This game has put the Bank's reputation at risk. Bank risk analysts are appalled at what they are seeing. The Bank may not particularly care, because they are playing to a different audience: politicians, the general public and the media, who don't understand the subject area. But people who do understand the analysis will eventually read it and their assessments will leech out, putting New Zealand's international reputation at risk. APRA is probably aghast. They may have to deal with the Reserve Bank in a stress situation.

### **Broader implications**

If the Bank really believes it is right on the numbers, then it should share their conclusions with the Australians, and take them through their analysis. Australia has not had a financial crisis, so the logic of the Bank's analysis, and some of the numbers, should apply to Australian banks. In particular banks' PD estimates should be replaced by estimates derived from impaired loan ratios that include unweighted data from the now defunct Australian state banks.

### **The economic cost of crises**

Although the Bank doesn't like to be pinned to a point estimate of any of the variables in their model, it is fairly clear that there is a strong preference for an economic impact effect of 63 percent of GDP. This just happened to be the median of the estimates in the studies reviewed by the Basel Committee in their original 2010 cost benefit analysis. The Bank picked it up because it was the easiest thing to do. The Bank also uses assumptions of 20 and 40 percent of GDP, but there is no discussion on how those figures were derived. It appears that they were just made up.

The Bank identifies what it sees as the key issues in estimating the cost of a financial crisis.

### *Whether the output effect is assumed to be temporary or permanent*

The temporary approach looks at the shortfall of GDP from a non-crisis growth path counterfactual, from the start of the crisis to the finish.

The permanent approach compares the absolute difference in post crisis output with the pre-crisis growth path. If there is a difference it is assumed to be permanent. With this model the effects of tulipmania, for example, are still being felt by the Dutch today.

The permanent impact assumption can generate very high GDP losses. A measured reduction in output from its potential, of say, 3 percentage points and a discount rate of 3 percent generates a GDP loss of 100 percent of GDP. Conceptually this approach is a bit of a nonsense. Economies do get over shocks eventually. . But it appealed to some researchers who were on a mission to justify bank capital increases post the GFC.

*The base the loss is measured from*

The Bank agrees that the methodologies used in many of the earlier studies overstated the losses.

*If it is the most recent level of output, and that was unsustainable (for example, fuelled by under-priced credit), the loss may be over-estimated.*

And the Bank's solution is:

*This is acknowledged in our framing of the policy problem as we have chosen potential output (which we interpret to mean non-inflationary steady state output) given current interest rates (not actual output) as the benchmark against which to measure the output impacts of capital.*

The Bank may have acknowledged the problem but it does not address it when selecting its preferred GDP estimate. Its preferred estimate of 63 percent of GDP is mainly based on earlier studies that used inflated pre-crisis growth rates that boosted their estimates. Some of these studies also included low income countries, which are not relevant to New Zealand.

*The marginal impact of the financial crisis*

*A third issue relates to what, if any, of the output loss would have occurred even in the absence of a financial crisis.*

And again there appears to be a solution.

*This issue is addressed in the literature by using statistical techniques to separate out the effects of many factors on realised output.*

Here the Bank cites Romer and Romer (2015) as a supporting source. How they could do that with a straight face is beyond us. The thrust of that paper, as



discussed above, was that the conventional way of thinking about crises as something that either occurs or it doesn't, substantially overstates the impact of financial crises.

The truth is that it is almost impossible to reliably disentangle the effect of the banking crisis from the underlying shock. Cline addressed the issue and concluded that the 'problem' had not been solved. Very few of the GDP loss estimates in the literature make any attempt to account for underlying drivers of the recessions associated with banking crises. They just assume that all the GDP losses are due to the banking component of the GDP downturn. Thus all of these estimates are biased upwards.

The best evidence on the matter is probably Cline's empirical evidence on the GDP shock in countries that had a financial crisis in the GFC and those that didn't. As noted above, there was no major difference. If one believes that the effects of a crisis dissipate over five years or so (which is likely except for the most extreme of crises). If they are longlasting, then the difference according to Cline is about 10 percent of GDP.

This accords with common sense, for countries like New Zealand. Financial crises have underlying causes which will have real consequences that will be felt regardless of whether the IMF crisis definition is triggered or not. A property boom that generates over-building will naturally be followed by a slump in GDP as the excess stock of property is absorbed. The demand and supply for loans will naturally fall as borrowers become less optimistic and bankers become more cautious. More capital is not some kind of magic that makes those effects go away.

The Bank gives the impression that all of the technical problems have been resolved in the literature and that it is relying on some robust estimates. This is misleading.

The Bank then it throws in its lot with the 'longlasting impacts' school, citing a passage from the Firestone (2017) the lead author of the Federal Reserve's 2017 optimal capital paper.

*We share the view of the authors of the following quote, namely that the empirical results appear to suggest the output effects are long-lasting.*

*"Other studies leave the duration of a crises' effects open as an empirical question, and generally find support for long lasting effects. Furceri and Mourougane (2012), analyze OECD countries and compare actual output after a crisis with a measure of potential input. They estimate autoregressive equations and the implied impulse response functions, finding an average permanent reduction in GDP of 2 percent. Cerra and Saxena (2008),*

*analyzing data from over 120 countries, find evidence that effects of a financial crisis on GDP are barely reduced by one percentage point after ten years, remaining at a level of six percent. These studies provide evidence for robust long-lasting effects. We assume that financial crises have persistent effects in the rest of the analysis.”*

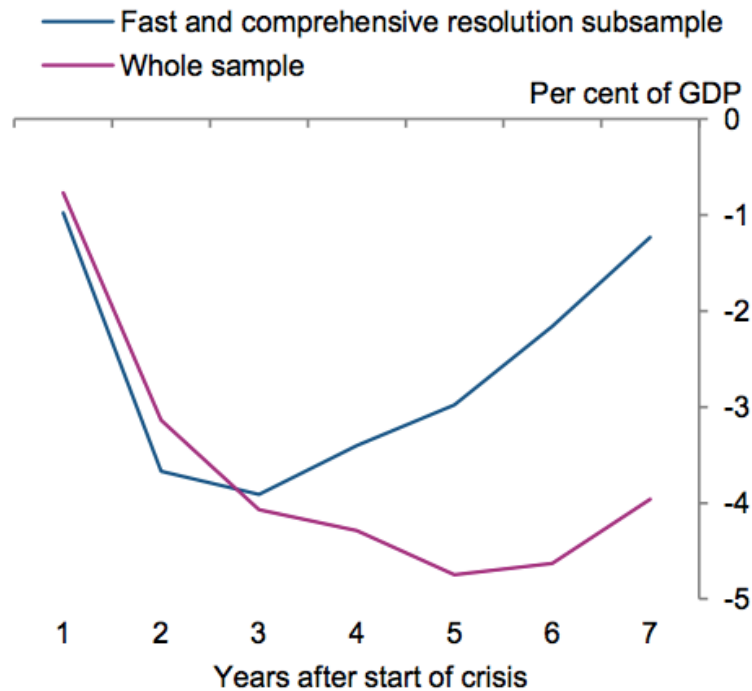
*Firestone (2017)*

The Bank makes several references to the Firestone paper for support at different points in their discussion, and it may be one of the few papers that they actually read. However, Firestone did not do any original research on the long-run effects of a crisis. Instead the long run effects analysis relied entirely on the Mourourange paper cited above. This paper, which effectively relied on a sample of just seven crises (their data period did not include the effects of the GFC), found a permanent long run impact of about 2 percent of GDP. It also analysed the ‘big five’ crises of Spain (1977 crisis), Japan, Finland, Sweden and Norway, and found a permanent impact of 4 percent. Notably Korea was left out of the analysis. Korea had the most severe crisis, in terms of banking system losses, of all countries considered, but it experienced a very rapid recovery. After three years it was back on its precrisis growth path. If it had been included in the data set (it was an OECD country at the time), Mourourange’s conclusions probably would have collapsed.

In any event a sample of just seven crisis events, all with different recovery paths, and a range of other things going on, which could not have been captured by the model (a simple VAR model of GDP and its lags), provides a very weak basis to draw general conclusions about how crises really work. The other study cited by Firestone mainly related to lower income countries and would have been dominated by the likes of Argentina. They did produce an estimate for industrial countries and found a significant effect, but that was based on a sample of just two countries.

Even ‘respectable’ analysts can be open to massaging the numbers to get a decent output cost effect. The following figure, which is taken from the 2015 Bank of England cost benefit study, shows the crisis output path, for a group of banking crisis countries, over the 7 years from the start of the crisis. It is clear from the figure that recovery was almost complete, and would have been complete by years eight or nine. However, it was assumed that there would be a permanent effect of over 1 percent of GDP. With some low discount rate assumptions, the effect of this assumption was to more than double the estimated GDP costs of a banking crisis from about 20 percent to 43 percent.

**Chart 6 Impact of banking crises on the profile of GDP**



Source: Bank calculations.

#### *The discount rate*

*Overseas studies each have to apply a discount rate. These tend to be lower than what is currently required of public projects (other than accommodation and office buildings) by the NZ Treasury, for example. This suggests that the output cost of a crisis reported in these studies would be less if the costs had been discounted using the rate currently prescribed by the NZ Treasury.*

Again having recognised the issue the Bank does nothing about it.

#### **Conclusion**

The Bank presents three estimates of GDP costs: 20 percent, 40 percent and 63 percent, with a clear preference for the latter. Only the 20 percent estimate has any credibility in the New Zealand situation, and a lower figure, say 10 percent, could be the best estimate.

Higher estimates are more credible in overseas studies, when the issue is how much capital a globally significant bank should have. Stress to those banks can have global external effects. That is not a consideration when thinking about capital for New Zealand banks. In international terms they are small players

### **Summing up the results.**

The following is a summary of our assessment of the inputs into the capital model.

#### **Cost of capital**

The cost of capital should be at least doubled to account for the increased profits of foreign banks.

#### **Likelihood of a 'crisis'**

##### **PD**

The Bank's mid range assessment of 2.25 percent is based on nonsensical arguments. The banks' Basel model estimates of 1.2 percent should be used. This should be further reduced by an assessment of the impact of parental support.

##### **LGD**

The Bank's mid-range estimate of 40 percent is too high. A 30 percent estimate based on the stress test results and banks' Basel model estimates is more appropriate.

##### **R**

The Bank has not established any basis for using a correlation coefficient that is any higher than the Basel model of around 0.2.

#### **Costs of Crisis**

A reasonable estimate of the costs of downturns that can be mitigated by higher capital is quite low. An estimate of 10 percent would be appropriate.

Taken together these will generate a low optimal capital ratio.

## **Part nine: The fiscal cost of crises**

In TBW we drew attention to the fact that the fiscal costs of banking crises have not been, on average, particularly high. The average gross cost of historical crises in high-income countries was about 11 percent of GDP, and the net less than 5 percent. The median costs are lower, at 6 and 3 percent respectively. With today's higher capital ratios the net costs would have been significantly lower. In

addition, New Zealand banks have good franchise values, which will be reflected in an eventual sales price, so it is likely that the government will recover all of their capital injection. Nevertheless governments and the Treasury may be more concerned about the gross fiscal costs, as those costs will come when government borrowing is increasing due to the economic downturn.

The problem here is that an increased capital ratio may not help. This might seem counterintuitive, from a perspective that sees a financial crisis as a one-off game. Consider a banking system which has \$100 in loans and \$7 in capital, and the bank losses \$15. The Government pitches in \$8 so the depositors don't lose. If the capital is \$11 then the Government only has to contribute \$4. There is a fiscal savings of \$4.

But this assumes that the banking system will be closed down and the assets sold off. This is not an option. What will happen is that the banking system, or most of it, will be recapitalised so that it is 'sound'. Prior to the release of the Bank's consultation document, everyone (rating agencies, depositors, bankers etc.) thought the system was sound with capital of \$7. So the government would have to contribute \$15 to restore capital to \$7. Under the Bank's proposals, however, it will still have to contribute \$15 to restore system capital to \$11. If capital were only restored to \$7 the system would be 'unsound'. Having allowed the Reserve bank to draw its line in the sand on soundness, it would be difficult for a government to just meet the \$7 target, arguing perhaps the Bank's 2018 soundness assessment was just rhetoric designed to put more capital into the system. That is unlikely to work, so the effect of the Bank's proposals on the Governments fiscal risk, in this scenario, is nil.

## **Part ten: Banks' capital ratios in an international context**

The Reserve Bank did not discuss the issue of comparability of New Zealand and foreign bank capital ratios in its information release paper. It is a sensitive point. If the Bank were to admit that the foreign sourced data should be adjusted before applied to New Zealand, then many of the conclusions it has drawn from that research would have to be withdrawn.

However, the Bank has released, under the OIA a document titled Media Resource, where it set out the arguments for not making any adjustment. Because these document has not been in the public arena so far, we repeat the relevant parts of the 'Introductory and guidance' section, which presents the Bank's arguments.

### **The Bank's arguments for not making adjustments**

The first five points in the 'introduction and guidance' are some basic information about a risk weighted capital regime.

*6. In each jurisdiction the risk weights applying to a subclass of assets reflect the regulator's views about the potential losses the sub-class could generate for banks.*

This is mostly misleading. The risk weights are mostly driven by banks' advanced risk models. With the advanced models regulators did not impose their view on the risk weights as a matter of course.

*The risk weights used for a particular subclass of assets can vary from regulator to regulator because the circumstances in each country vary (objective factors) and because regulators vary in terms of how they view and respond to these risks (subjective factors).*

*In order to make accurate comparisons of the ability of banks in different jurisdictions to withstand shocks – their relative capitalisation in other words – it is necessary to remove the subjective element from the RWA calculated in each jurisdiction. This is inherently very difficult and the results of any such attempt cannot be relied upon with any confidence.*

What the Bank appears to be saying here is that there is 'objective' information about the risk of a loan, which is unknowable. In the advanced Basel model banks attempt to calculate the true risk, but this is just an estimate. The supervisor then comes along and sometimes adjusts the banks' estimates upwards, because there is something about the economy, that they know, that the Basel model and the banks' modeling has not picked up. To illustrate, assume that the true 'objective' risk weight is 50 percent in country A and 30 percent in country B, but the Basel model produces a risk weight of 30 percent in both countries. Supervisor A spots the problem and 'subjectively' imposes a risk weight of 60 percent. If we were to compare just the risk weights we would say that country A is requiring twice the capital for the same level of risk. However, if you look at the objective element the capital requirement is overstated by just 20 percent (a risk weight of 60 percent compared to the 'objective' 50 percent).

The problem with this story (particularly with respect to the large residential

mortgage portfolio) is that it does not describe what happened in New Zealand when the banks were first accredited<sup>10</sup> on their advanced models. The Reserve Bank required banks to use higher model inputs to boost the risk weights. This did not reflect an assessment that New Zealand was objectively intrinsically more risky than foreign jurisdictions in a way that should impact on risk weights. Rather it was due to a lack of confidence in the Basel model and in the very low risk weights it was producing. Other supervisors, at least initially, went along with the model outputs. The result was that New Zealand had much higher housing risk weights, for what was the same levels of risk than most overseas jurisdictions.

In recent years the Bank has run the argument that the higher New Zealand risk weights reflects New Zealand specific risk factors but it has never supported these assertions with any analytical work.

We note that the Bank does not respond here to the fact that APRA did not see the 'objective/ subjective distinction' as a sufficient impediment to conducting a comparative exercise.

The Bank then downgrades the relevance of the Basel risk weights and capital ratios.

*Reflecting the difficulties in separating the objective and subjective factors leading to a given RWA value in any country, ratings agency S&P has developed bespoke capital ratios that draw on bank balance sheet data (and other measures) to calculate risk measures (in contrasts to the official RWA values*

and

*Because of the inherent difficulty in separating objective and subjective factors impacting on official RWA values we do not actively monitor other countries official capital ratios. However we do monitor the relative position of NZ banks in ratings agencies studies.*

This lack of confidence in the Basel capital ratios does not sit well with the Bank's use of the overseas literature to support their case. Most of the evidence relies on Basel definitions of capital. If the Basel measure is unreliable then that evidence is also unreliable.

On the S&P capital ratios we are told.

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<sup>10</sup> The author of this paper was deeply involved in this process and knows what happened. The Bank's current analysts are unlikely to know.

*‘For example, our interpretation of the most recent S&P findings is that NZ banks are at the median of their peers.*

But on the detail.

*We acknowledge there is a genuine interest in comparing our proposal to the capital position in other countries, an interest which cannot easily be met because the S&P findings are copy- write protected.*

While copyright protection apparently stopped the Bank from being transparent about its assessment that New Zealand is at the median of its peers, it did not stop the Deputy Governor releasing, in a recent speech, a set of S&P capital ratios, by individual bank, that showed New Zealand towards the bottom of the pack. The Deputy Governor also said that the S&P ratios did not play much of a role in the capital review, which is probably true, but this does not really square with the statement that the RBNZ is now just actively monitoring S&P capital ratios.

The statement that New Zealand is at the median of its peers is significant. If the S&P capital ratio is a reasonably robust measure of relative risk and we are at the median, and if, according to the Bank the New Zealand banking system is ‘unsound’, then it follows that either half of the comparators are unsound, or the Bank is wrong on its soundness assessment.

### **Understanding S&P’s capital model**

Given the weight the Bank says (at least sometimes) it is now placing on the S&P capital model it is useful to understand how it works. Basically it is like the Basel standardised model, with some additional categories for some loan classes (such as property development loans), and fewer in others. It does not, for example, distinguish the risk weights of residential mortgages by LVR, whereas the Basel standardised model now does.

The distinguishing feature of the S&P model is that its risk weights are multiplied by a BICRA (banking industry country risk assessment) ratio. This ratio is meant to capture the country economic, industry and institutional factors that affect the relative riskiest of loans.

To illustrate, the residential risk weight, with a BICRA of 1 (the best possible) is 20 percent. With BICRA’s of 2, 3, and 4 the risk weights are 23, 29, and 37 percent



respectively. This assessment will not have regard to the LVR structure of the book<sup>11</sup> or of the actual loss performance of the loan book over time.

A country with a BICRA of 2, will have a higher capital ratio, say 16 percent, than New Zealand, which with a BICRA of 4 would have a capital ratio of 10 percent. With a BICRA of 4 New Zealand is in pretty poor company<sup>12</sup>. On the economic aspect of the BICRA we do even less well scoring a 5. So why are we rated so poorly?

The first point to note here is that the S&P capital model is a simple (perhaps in places simplistic) one-size-fits-all model that is designed to apply to a wide range of countries. For individual countries, it is a paint-by-numbers approach, which in some cases doesn't work very well. New Zealand appears to be one of those countries.

In terms of the BICRA scoring regime there are a number of drivers of our low score.

On economic imbalances New Zealand first gets hit on the private sector debt to GDP ratio. We are just over the trigger point of 150 percent of GDP. Then we get negative points on the growth of real house prices and private sector credit. This is a 'point-in-time' score, based on a four year rolling averages of those changes. This means that New Zealand's ratings will improve as slowing credit and house price growth numbers feed through the S&P assessment. We will probably revert to a BICRA of 3, which is where we started when the framework was introduced. That alone would increase the capital ratio, from the illustrative 10 percent presented above, to about 13 percent.

The other drivers are on the industry side. We score relatively poorly on the institutional environment, compared to Australia, primarily because S&P does not rate the Reserve Bank as a supervisor. The rest of the New Zealand's institutional environment would rate as very favourable from a risk perspective.

We also rate very unfavorably on systemwide funding because of banks' relatively high level foreign bank funding. For a country with its own floating currency and an independent central bank to deal with liquidity issues, this is not a material credit risk. But given the historical experiences of countries that did not share these

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<sup>11</sup> The LVR structure by country does enter, somewhat subjectively into the BICRA assessment but unless it clicks the country over to the next BICRA grade it will have no effect

<sup>12</sup> We are rated as a 4 with Estonia, Iceland, Israel, Kuwait, Malaysia, Mexico, Saudi Arabia and Taiwan. Most of what we think of as comparators rate as a 2. Australia is 3 but will revert to a 2 as the recent house price falls work through the model.

characteristics, and the number of S&P clients that do not have their own currency, S&P is overly sensitive to the bald New Zealand balance sheet numbers.

The other point to note here is that even with the capital ratio produced by the BICRA rating of 4, New Zealand banks pass the implicit stress test that was used to calibrate the risk weighting model, for an A rating. This means that the implied probability that all of the bank's capital will be exhausted in that test is about 1:750.

And this is without taking account of the implicit support from the Australian parent, which contributes to the final rating. The capital ratio only applies to the stand-alone bank assessment.

#### **New Zealand and Australia BICRA risk assessments**

	<b>New Zealand</b>	<b>Australia</b>
Economic resilience	Very low	Very low
Economic imbalances	Very high	Very high
Credit risk in the economy	Intermediate	low
Institutional framework	intermediate	low
Competitive dynamics	low	low
Systemwide funding	high	intermediate

