

How much capital is enough—a review of Reserve Bank Tier 1 capital proposals

A report prepared for the New Zealand Bankers Association

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Glossary

Abbreviation	Stands for
AT1 capital	Additional Tier 1 capital. AT1 capital, which includes preference shares, is assessed by the Reserve Bank as the second highest quality of capital behind CET1. It is meant to absorb losses in going concern via conversion, write-down, write-off, or cancelling coupon payments.
Capital	Part of a bank's funding that allows it to absorb financial losses while remaining solvent.
Capital ratio	A bank's capital divided by its RWA.
CET1 capital	Common Equity Tier 1 capital. CET1 is assessed by the Reserve Bank as the highest quality of capital. It includes shareholders' investment (ordinary shares and retained earnings). Also defined as accounting equity after application of regulatory adjustments.
Reserve Bank	The Reserve Bank of New Zealand
Risk-weighted assets (RWA)	Risk-weighted assets (RWA)—an assessment of a bank's financial position taking into account the risk profile of that financial position by applying weights determined by the Reserve Bank
Tier 1 capital	The sum of CET1 capital and AT1 capital. This capital is meant to minimise the probability of default by absorbing losses while the bank operates as a going concern.
Tier 2 capital	Tier 2 capital includes undisclosed funds that do not appear on a bank's financial statements, revaluation reserves, hybrid capital instruments, subordinated term debt—also known as junior debt securities—and general loan-loss, or uncollected, reserves. This capital is meant to absorb losses given that the bank defaults or had entered resolution.

Executive summary

1. The Reserve Bank proposes to increase the amount of capital required to be held by New Zealand banks. Higher capital ratios are intended to make banks more resilient, and thereby reduce the risk of economic and social harm that would result from a banking crisis.
2. The Reserve Bank describes the likely costs of its proposal as “minimal” and is articulate about the economic and social cost in the event of a banking crisis. But our analysis suggests that the costs would be far from minimal; the costs New Zealand society would pay by requiring banks to maintain higher capital ratios would greatly exceed the benefits of reduced risk of a banking crisis. Adopting the core central assumptions published by the Reserve Bank, we estimate that the expected economic costs of the policy would exceed the expected economic benefits by about \$1.8 billion per annum.
3. These quantitative estimates of net economic cost should be treated with caution given the uncertainty in the assumptions and underlying data. Some of these uncertainties could significantly increase the estimate of net economic cost, while others would reduce the estimate, but none would reverse the result and produce a net economic benefit for the Reserve Bank’s central estimates. The expected large net economic cost of the proposal should raise questions as to whether the proposals are optimal for New Zealand and whether there are alternative instruments that could achieve the gains at less cost.
4. The Reserve Bank’s analysis does not articulate clearly what it believes is wrong with the status quo which justifies the change. Its analysis is framed largely around the external shocks that may bring on a crisis, whereas New Zealand’s experience is that failures in banks and other financial institutions are typically the result—or at least substantially contributed to—by poor governance and management. Policies to resolve bank failures should take this into account, which leads us to scepticism that reliance on a large fraction of CET1 in Tier 1 will enable the Reserve Bank to stand back more than it otherwise might.
5. The Reserve Bank advances its risk appetite framework as the basis for its conclusion that the benchmark should be a probability of a system failure no greater than one in 200 years. However, the analysis provided to date does not explain how the Reserve Bank arrived at a capital ratio of 16 per cent, as opposed to a capital ratio closer to capital levels currently held by the banks (which are significantly higher than the existing regulatory minimum). Its published analysis does not account for the high degree of sensitivity of judgements about the optimal capital ratio to small changes in assumptions and the wide range of uncertainty around any specific number.
6. The way in which the proposed regulation has evolved in a series of steps has narrowed the scope of engagement with the banks. It has diminished consideration of options that might offer a more balanced application of regulatory instruments, might provide for more recognition of the variations in circumstances of the banks and acknowledge the interaction with Australian regulatory regimes.
7. The Reserve Bank approached its analysis by resolving the requirements for stability first, before considering the efficiency criteria, even though the Reserve Bank of New Zealand Act does not prioritise the twin requirements for stability and efficiency. This method is likely to have

significantly affected the result. The very substantial increase in equity capital requirements comes across as a one-size-fits-all solution, which could be precluding a more variegated response. Given the higher cost of equity over hybrid instruments, the increase in the required capital ratio would have a material effect on the cost-benefit calculation on the hybrid decision.

8. Taking a wider perspective, the Reserve Bank has evolved over time a more rigorous approach to regulating banks than was envisaged when its Act was passed in 1989 and which gave it a high degree of independence. As a result, the Reserve Bank seems subject to fewer checks and balances and oversight by ministers, ministries and the courts than some other classes of commercial regulation, including those conducted by other independent bodies.
9. Our key conclusions are that:
 - The sequence of decision-making has constrained the consultation in ways that are tilted against setting a target capital ratio and then considering the lowest cost way to achieve this allowing for variations in choices of regulatory instrument and circumstances of individual banks. As a result, the proposal seems unnecessarily narrow and inflexible.
 - The costs of the proposal are very likely under-estimated and are large relative to the benefits.
 - By comparison with other countries—allowing for the hazards of these comparisons—the key issue seems to be the cost arising from the narrow focus on equity capital rather than the level of the ratio, although that is arguably on the high end of the range.
 - We are puzzled why the Reserve Bank is committed to the Open Bank Resolution (OBR) when it can be argued that hybrid capital is a superior bail in device.
 - The lack of close attention to a comparison of the proposal with the APRA framework both in terms of concept and operations seems an omission, even though we accept that the policy must work for all the registered banks regardless of their parentage.

Introduction

Our assignment and approach

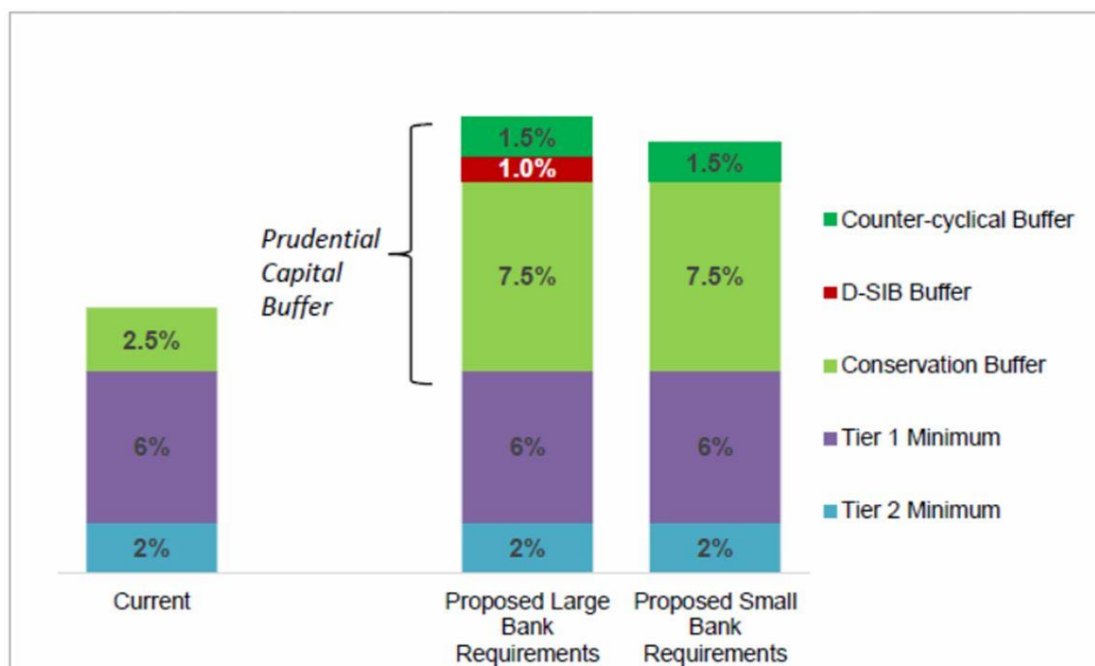
10. We have been asked by the New Zealand Bankers Association to review the key proposals set out by the Reserve Bank of New Zealand in its consultation paper 'Capital Review Paper 4 – How much capital is enough?' (consultation paper). Our brief was to review the proposals, and the approach taken by the Reserve Bank in developing those proposals, through the lens of good public policy development and economic theory.
11. In preparing this report, we reviewed the background papers released by the Reserve Bank,¹ the literature cited in those papers, and considered other relevant studies. We also undertook structured interviews of 7 New Zealand banks. These banks included wholly-owned subsidiaries and locally owned cooperative banks.
12. The opinions expressed in this report are our conclusions and may not necessarily reflect the views of either the New Zealand Bankers Association or its member banks.

The Reserve Bank proposals

13. The Reserve Bank is consulting on whether to require a Tier 1 capital requirement of:
 - 16 per cent of risk-weighted assets for systemically important banks
 - 15 per cent of risk-weighted assets for non-systemically important banks.
14. The additional capital would be required to come from equity capital. Figure 1 compares the current capital ratio requirement with the proposed requirements.

¹ Available here: <https://www.rbnz.govt.nz/regulation-and-supervision/banks/capital-review-proposals-information-release>

Figure 1 Comparison of current and proposed capital ratio requirements (as percentage of risk-weighted assets)



(Reserve Bank of New Zealand, 2019a, p. 8)

Structure of our report

15. The body of our report is structured into three main sections:
 - Section 2 considers the role and functions of the Reserve Bank and its approach to developing the proposals in the context of approaches taken elsewhere.
 - Section 3 evaluates the economic costs caused by the proposed increase in capital requirements.
 - Section 4 assesses the economic benefits of more resilient banks.
16. In a final section, we set out our main conclusions.
17. Appendices A to E set out the calculations referred to in the body of the report.

The role of the Reserve Bank and its approach to developing the proposals

Evolution of the role of the Reserve Bank

18. In reflecting on the approach the Reserve Bank is taking to develop and advance its proposed increase in equity capital ratios, it is useful to take a step back for a broader perspective on the role and functions of the Reserve Bank in its oversight and regulation of the banks.
19. In its development of this proposal, the Reserve Bank is still essentially operating in the modes it developed under the Reserve Bank Act 1989. That Act was conceived primarily to do three things:
 - Firstly, to bring down New Zealand's underlying rate of inflation that had persisted in the mid-teens for many years.
 - Secondly, to ensure the integrity of financial markets with a focus on ensuring the soundness of the banking system, rather than necessarily of every bank within it.
 - Thirdly, to provide for a degree of independence that would prohibit the kind of poorly conceived interventions in financial markets that occurred in the early 1980s resulting in large losses passed into the public finances
20. The high degree of independence of the Reserve Bank was therefore primarily created for the conduct of monetary policy targeted on medium-term inflation rates. In the years since, the Reserve Bank has increased its regulatory functions to become far more detailed and extensive in response to the evolution of banking and financial markets. As a consequence, it has taken on roles much more like other regulators of commercial affairs, while maintaining very different institutional arrangements and culture.

Checks and balances on regulatory powers

21. A consequence of the evolution of the Reserve Bank's functions is that it develops regulatory strategies, makes specific proposals, sequences its decisions, conducts consultations, carries out social cost-benefit analyses of its own proposals and prepares Regulatory Impact Statements about them. The whole process seems subject to fewer checks and balances and oversight by ministers, ministries and the courts than some other classes of commercial regulation, including those conducted by other independent bodies.
22. For example, the Electricity Authority develops regulatory proposals through independently chaired industry working parties whose reports are peer reviewed and formal hearings in which submissions are publicly exposed. It is not unusual for its decisions and methodologies to be challenged in the courts. By contrast, the Reserve Bank's engagement with the banking industry is less transparent and less formal, while its papers are less subject to formal peer review and its decisions and methods have never been the subject of court action. The Reserve Bank is

historically the banks' banker and its oversight of risks in the banks reflects this perspective in part. It is not a conventional commercial regulator.

23. The institutional arrangements by which bank regulations are developed are, in some respects, somewhat unusual in relation to conventional practices of commercial regulation elsewhere. While we acknowledge that there are central banks elsewhere with similar arrangements, perhaps the point has been reached that, while the case for the independence of monetary policy, within the Policy Targets Agreement, remains, questions arise about how appropriate it is for the regulation of the banking industry to be based in this degree of independence.
24. A broader consideration of the Reserve Bank's regulatory functions goes well beyond the scope of the terms of reference for this report. The regulation of banks is a complex undertaking which necessarily is always work in progress, so there rarely is a time when it is useful or even administratively and politically feasible to take a broader look across the whole territory. But, in the background to the current consultation, the roles and functions of the Reserve Bank are being considered in the second phase of the present government's review of the Reserve Bank. This is a propitious time to take a broader look at the configuration and conduct of these regulatory instruments.

Consultative processes and analytical methods

25. The Reserve Bank has provided ample opportunity for consultations and submissions on its proposals. However, some who we have interviewed for this project see the proposed capital regulation as something the bank is already heavily committed to and so are focusing their submissions on other matters. This concerns us, as the Reserve Bank's own papers ask submitters to respond to a collection of sensible questions. However, the way in which the proposal has emerged in the sequence of decisions does mean it has a head of steam, which seems clear from the Reserve Bank's papers.
26. We view with some concern that the Reserve Bank proposes to do a Cost-Benefit Analysis (CBA) and the Regulatory Impact Statement at the end of the process. In balancing the benefits of higher capital levels against the costs, the Reserve Bank positions itself as an agent of society; it seeks to "take into account the concerns and views of all stakeholders in a reasonable way" (Reserve Bank of New Zealand, 2019a, p. 12). A core analytical method used by policy analysts assessing whether a proposal would provide an overall benefit to society is CBA. A CBA has desirable properties for helping policy-advisers appraise and compare different options against a benchmark of national welfare as it:
 - is generally the preferred (and often required) method for evaluating the impact on communities of public policy decisions, which means there are published guidelines for how to identify economic costs and benefits²

² See for example, the New Zealand Treasury, (2015) '*Guide to Social Cost Benefit Analysis*', available at <http://www.treasury.govt.nz/publications/guidance/planning/costbenefitanalysis/guide>

- is founded on a branch of economics known as ‘welfare economics’, which considers how to evaluate public decisions impacting the economic interests of more than one person;³ this means there is a reservoir of academic research and learning to draw upon
 - provides a way of organising information in a consistent and systematic way, and for making the best use of available information (The New Zealand Treasury, 2015, p. 3).
27. However, rather than undertake a cost-benefit assessment of its proposal ahead of its consultation, the Reserve Bank will carry out a cost-benefit assessment when it prepares a Regulatory Impact Statement of its final decisions (Reserve Bank of New Zealand, 2019b, p. 4). This sequencing risks:
- submitters not having an opportunity to respond to the full set of costs and benefits as will be assessed by the Reserve Bank in reaching its final decisions
 - the information contained in the consultation paper and supporting materials not being organised in a consistent and systematic way, as would be required for a CBA
 - a perception, or reality, that the CBA will be used in a pragmatic way to support the preferred decision rather than as a ‘rational’ decision-making tool (Denham & Dodson, 2018).
28. Is it credible that the Reserve Bank could conclude at the end of its processes that its proposal doesn’t stand up? In some other regulated industries, concern by participants that the authorities were in effect biased towards an outcome before the consultation process is complete could raise the prospect of judicial review.

Sequencing and prioritising the issues

29. Partitioning a complex multi-faceted policy into components to be sequenced and prioritised for attention is a practical necessity. However, the way in which the components are defined and sequenced influences the overall outcome. The order in which the Reserve Bank has sequenced its consideration of various interrelated bank regulations in recent years illustrates this point. Each step along the way has influenced the agenda for the next step and constrained the choices at each further step. These decisions have become heavily path-dependent and influenced by the sequence in which the issues have been addressed.
30. We have some concern that putting decisions about the Open Bank Resolution (OBR) and the use of hybrid capital instruments well before a broader discussion about options for the use of capital ratios alongside other regulatory instruments, has narrowed and prejudged the scope of the current proposal. The Reserve Bank’s papers leave open the questions of regulations regarding Tier 2 capital and the possibility of deposit insurance lurks in the wings. High-level

³ As differentiated from the economic theory of decision-making by individual consumers and enterprise owners, see for example Broadway, R. W., and N. Bruce, *Welfare Economics*, Blackwell, Cambridge, Mass., 1984.

decisions are being made while leaving open important questions of implementation that are affecting people's views about those higher-level proposals.

31. The sequencing of the issues is having the effect of limiting the scope of the current consultation to a singular proposal for a capital ratio involving only equity capital. The policy decision in principle to exclude hybrid instruments from Tier 1 was taken when the capital ratio was lower than is now being proposed. Given the higher cost of equity over hybrid instruments the increase in the required capital ratio has a material effect on the cost-benefit calculation of the hybrid decision. The question of whether the hybrid decision would pass a cost-benefit test in the light of the latest proposal should be central to the Reserve Bank's ongoing consideration of its proposal.
32. The way the process has been conducted has diminished consideration of options that might offer a more balanced application of regulatory instruments available to the Reserve Bank. Had it kept options for the use of hybrids, 'bail in' and more reliance on Tier 2 and Pillar II for longer, a better and more efficient matching of instruments to objectives might have been feasible. Also, critical details about implementation and interaction with the regulatory requirements might have been given more attention. Our interviews reveal that the impact on competitive neutrality between different banks would be dependent on the details of implementation of the proposals that have yet to be explained. An example emerging from our interviews concerns the level of detail in the proposed scaling up of the IRB ratios.

Articulating the policy problem

33. A standard question in public policy analysis of proposals to regulate private markets is to ask what are the market failures that drive a wedge between private and social evaluation of costs and benefits. The standard response in respect of banks is that a high proportion of their liabilities can be called up immediately. Banks need capital to address the mismatch in the duration of their assets and liabilities but a bank that fully hedged all its liabilities, particularly with capital, would not really be a bank—it could not take deposits. As liquidity applies to all banks as a group, a run on any one of them can trigger a run on the others, even if those other banks are financially sound. It is not in the public interest that this be allowed to happen and so governments intervene when systemically important banks are threatening to become insolvent. Sometimes, they will even intervene to bail out badly managed fringe financial institutions such as the South Canterbury Finance. People who own, manage and govern banks therefore know that governments will intervene if things go seriously wrong, which creates a moral hazard and which justifies the prudential regulation of banks to protect taxpayers and the society at large.
34. The Reserve Bank augments this moral hazard problem with a view that people value stability more than the owners and managers of banks do and would be willing to forfeit output (income) to further avoid uncertainty or disruption. The level of regulatory capital held by banks might therefore need to be higher than that which would maximise output, if that additional capital provides the benefit of reduced uncertainty or disruption.

35. Standard frameworks of public policy analysis operate at the margin beyond the status quo, which axiomatically is judged to be inferior, according to some chosen criteria, to some potential future state or states, that could be achieved by reconfiguring the available policy instruments—or inventing new ones. The Reserve Bank’s analysis does not articulate clearly what it believes is wrong with the status quo which justifies the change. The clear implication of its proposal is that it believes the status quo breaches reasonable criteria for stability in the banking system. It is probable that its proposal will cause a permanent upward adjustment in interest rates and some tightening of lending criteria in riskier areas of the economy, particularly for small business and agriculture. So, the authorities will likely be pressured to be clearer about why these negative consequences of the proposal are clearly outweighed by the benefits that flow from addressing what is wrong with the status quo. The size of the required capital injection is large and has an opportunity cost similarly large. These costs are large enough to matter in the economy on a continuing basis so the benefits need to be clear and understood in the same terms.

Rigidity of the capital ratio proposals

36. The very substantial increase in equity capital requirements comes across as a one-size-fits-all solution, which could be precluding a more variegated response in which those ratios could be shored up or substituted by other regulatory instruments that have comparative advantage for some issues or lower costs. This point can be illustrated by reference to the figures in the Reserve Bank papers that support the narrative behind the proposals with stylised graphs, which effectively conflate stability with capital ratios, which by implication is CET1. By contrast the APRA, in line with many other Basel countries, puts weight on various buffers and layers of complementary financial instruments, which are not only cheaper but also serve a variety of purposes, for example loss absorption in going concern and loss absorption in gone concern.

Focus on use of equity

37. The Reserve Bank proposals focus on the use of equity, the most costly form of capital. The Reserve Bank considered alternative forms of capital earlier in its decision process, but its sequencing does not provide for an assessment of the costs and benefits in the context of its current proposal to significantly increase capital requirements.
38. The second Capital Review paper presented a case against contingent convertible capital instruments (CoCos) (Reserve Bank of New Zealand, 2017). The Reserve Bank relies on three arguments:
- loss-absorbing effectiveness (that is, a suggested lack thereof)
 - fiscal risks
 - regime complexity.

Given the economic costs of the Reserve Bank’s capital proposals (assessed in the following section of this report), only the first of these issues is relevant to this report; the other two factors relate to design issues that countries permitting CoCos appear to have solved, albeit at a cost of additional supervisory resourcing.

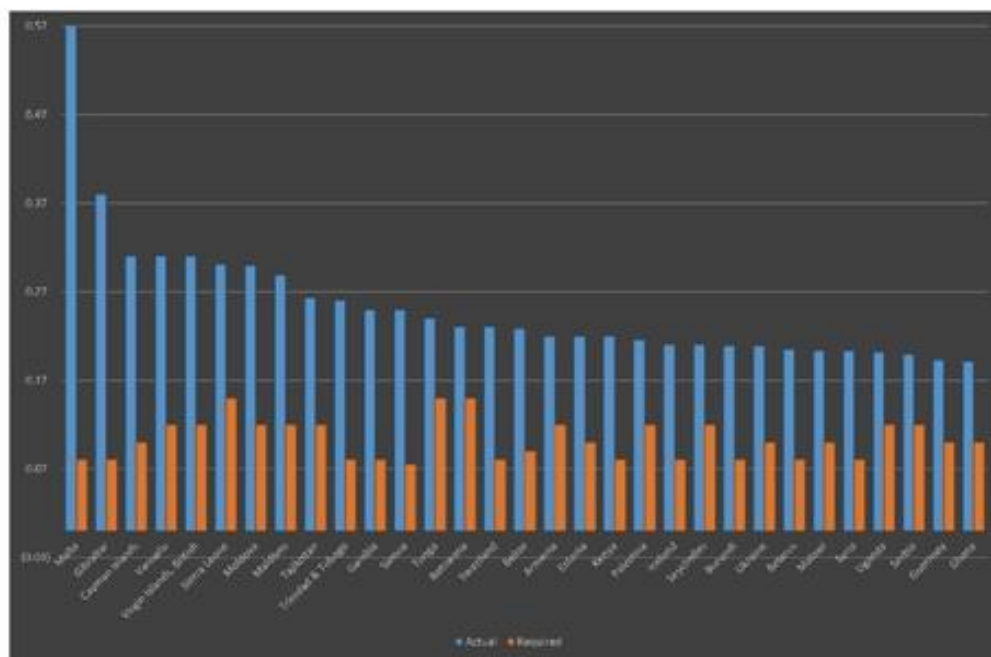
39. Research by Annelies Renders and Martien Lubberink offers evidence that CoCos do work. These instruments absorb losses in going concern banks (Lubberink & Renders, 2018). During the years 2009 – 2013, for example, European banks seamlessly converted €41.55bn of European bank hybrid capital into €32.44bn of equity.
40. Our concern is that the Reserve Bank does not appear to weigh its concerns with CoCos against the economic costs of achieving its stability and efficiency objectives, and whether CoCos might achieve its objectives at less economic cost.

Balancing capital requirements with supervision

41. The Reserve Bank proposal focuses on specifying Tier 1 capital ratios that are visible to investors and depositors. These are Pillar 1 requirements, and cover three specific risks: credit risk, market risk, and operational risk.
42. Banks are also exposed to other risks, notably the risk of a poor governance. To cover these, often bank-specific, risks, bank supervisors and regulators rely on Pillar 2 requirements. Pillar 2 requirements are set in the Supervisory Review and Evaluation Process (SREP). This process is a dialogue between the supervisor and the bank, where both agree on a capital level that covers relevant risks. By definition, this capital requirement is bank-specific.⁴
43. Traditionally, Pillar 2 requirements have been largely unobservable. However, the Pillar 2 requirements are significant. Figure 2 shows the differences between reported capital ratios and required (Pillar 1) capital ratios for selected countries. The inference from the chart is that the Pillar 2 requirements largely explains the gap between reported and required capital ratios, beyond some buffer to avoid breaching the Pillar 1 requirements.

⁴ See the 2016 European Central Bank SREP methodology booklet available at: https://www.bankingsupervision.europa.eu/ecb/pub/pdf/srep_methodology_booklet_2016.en.pdf

Figure 2 Reported capital ratios versus required capital ratios



Source: World Bank

44. By contrast, the Reserve Bank proposals would predominantly rely on Pillar 1 requirements. These are publicly known. Hence, investors and depositors will know when a bank approaches a breach of its Pillar 1 requirements, potentially limiting the opportunities for the Reserve Bank to work discretely with a bank to resolve capital adequacy concerns.
45. There are clearly complex trade-offs and policy considerations between using visible and hidden thresholds. We do not express a view on those trade-offs here. Our concern is that the Reserve Bank's assessment of these trade-offs is not apparent in its consultation paper, nor whether it might achieve its sustainability and efficiency objectives at a lower economic cost through a combination of Pillar 1 and Pillar 2 requirements, rather than focusing on Pillar 1.
46. It is possible that the Reserve Bank proposals have an aim of making prudential supervision of the banks more straightforward and to obviate the need for more detailed supervision of the banks that other instruments or complementary regulations might require. The Reserve Bank does not have the quantum of supervisory capacity that can be found in other countries. However, while capital ratios have the advantage of providing for events that were not anticipated, it seems unlikely that either different ratios, or the proposed ratios comprising cheaper capital instruments, are so inferior to what is being proposed that they are not worth evaluating as alternatives. International practices would suggest that it is not an open and shut case. Also, it would be a mistake to see the costs to the Reserve Bank of supervisory arrangements as significant in a cost-benefit calculation by contrast to the wider effects on financial markets.

47. From the perspective of the Reserve Bank, equity capital as the only qualifying instrument for Tier 1 has the advantage of providing an automatic stability buffer, in the sense that no party needs to make the decision that would be necessary if some of the Tier 1 were convertible instruments in the event of a crisis. The APRA policy is that the decision to convert will be made by the APRA, which requires that it has close oversight of the banks in order to be prepared and competent to make such a decision. Applying this policy in New Zealand would require the Reserve Bank to be more engaged in supervision than it may have inclination or capacity to be. But, because pure equity imposes higher capital costs on the banks that will be partially passed on to customers, there is a trade-off here to consider.
48. The incentives on bank boards are also relevant to this issue. Given that boards of directors are typically reluctant to declare their companies insolvent there is an argument that, if the responsibility for triggering conversion of hybrid debt lies with the board, a bank crisis might be made more severe than if the Reserve Bank controlled the trigger. If hybrid capital were permitted in Tier 1 the Reserve Bank may need to follow the APRA policy in this regard.
49. That said, we are sceptical that avoiding hybrids gives the Reserve Bank justification to do less oversight of the banks than it otherwise would either in normal circumstances or in times of stress. Any bank approaching a solvency crisis would already have the Reserve Bank taking a close interest in what is happening and would already be engaged closely with the board. This would be the case even if the Tier 1 capital is all common equity. If the share price of a bank is declining because it, or one of its subsidiaries, has deteriorating solvency indicators, then market analysts and stock market transparency will publicise this. The Reserve Bank will have to say or do something to show it has the situation covered. The Reserve Bank is—as it states in the proposal—the agent of the public in these matters, and hence we are not convinced that insisting on common equity gives it more freedom to stand back from a bank for which there is even a hint of stress. At that juncture, the Reserve Bank would be under pressure to explain itself and the OBR policy in particular. If the situation deteriorated to the point where it were considering whether to trigger the OBR, which would be no easier and possibly more challenging than triggering the conversion of hybrids, the Minister of Finance would probably already have had to provide some comfort to the markets.
50. We have some concerns that the OBR is being assumed to provide a 'bail in', whereas it seems to us highly unlikely that any government would allow all depositors in a major bank to take a haircut. Depositors would have a right to argue that the Reserve Bank should have seen this coming and that as the government's designated regulator of the banks, the government should take the hit rather than the depositors. Depositors are poorly placed to monitor the performance of their banks in contrast to the regulators who have better information and a duty of care to the depositors. Requiring banks to hold additional Tier 1 capital would seem unlikely to be the most efficient method for managing these risks.
51. Further, it seems inconsistent that the Reserve Bank favours, through the OBR, a bail in from everyone including the depositors, when the implication of its decision not to recognise hybrids amounts to rejection of a bail in from the holders of hybrid instruments. These instruments should ideally be held by professional institutional investors, who are far better placed to monitor bank risks than retail investors in hybrids. Institutional investors and regulators are

- both better placed than depositors to monitor the risks of banks. If the Reserve Bank does reconsider its views on the use of hybrid instruments, then the regulation of the marketing of these would be an important issue. From our perspective, the OBR seems to be allocating risks to the wrong people, who are poorly placed to manage them and is politically unrealistic.
52. The analysis of risks leading to the choice of the 1 in 200 year target appears implicitly to envision banks as occasionally subjected to broader economic shocks that threaten their viability. However, bank failures in New Zealand have occurred as a consequence of bad decisions grounded in poor management and governance. The Reserve Bank is close enough to sense problems at a bank and will intervene more deeply in the affairs of such a bank even if its capital ratios are not currently threatened. There are limits to the extent to which insisting on more capital allows the Reserve Bank to take its eyes off the ball.
 53. The Reserve Bank proposal provides for a buffer that is expected to provide flexibility in the application of the capital ratio requirements as a bank under stress can dip into the buffer zone provided it stays above the minimum requirement. From our interviews, it seems unlikely that Banks will see it this way. Banking is a business based on confidence, so directors and financial markets will want to see their bank clear of the buffer zone.
 54. In reality the proposal is likely to prove less flexible than intended. Smaller banks without large parents have limited or no access to equity markets, while cooperative banks have no formal equity. For them, the implementation of the regulation will need to be done in a way that permits them to grow their balance sheets nonetheless.
 55. The essential difference between a mutual or cooperative and a company is in the rights of control and who carries the residual claims. In a company this is the ordinary shareholders, which is why they have the ultimate right of control over appointing directors to enhance and protect the value of their shares. In a mutual these rights rest with the members. A mutual bank is owned by the members, who are usually the depositors, but their rights are not defined by the size of their deposit. They make their surpluses available to the members in various ways but, unlike a company, these surpluses are not necessarily distributed back to the members like a dividend on share capital in proportion to the size of the member's financial participation.
 56. We have been informed that the Reserve Bank is being helpful to the mutual banks in discussions about how these banks can access the capital needed to meet the proposed increases in regulatory capital ratios. They will likely need to access capital externally, but cannot offer investors ordinary shares. Treating an outside investor just like a depositor would be a hard sell as the investor would have highly attenuated rights over board appointments and the distribution of surpluses. Also, to be available in the event of insolvency, it would have to be available to pay the bank's liabilities. The cost of such capital would be high and the instrument would be classified as a hybrid. So, just as with the OBR, we perceive the Reserve Bank as being hostile to hybrid instruments for Tier 1, but is in effect accepting them in other aspects of the overall regulatory framework.
 57. A difference we perceive between the respective approaches of the APRA and the Reserve Bank is that the former is more focused on what to do when a bank is threatened with insolvency, while the latter is more focused on ensuring such an occurrence is extremely rare. This is a

significant policy difference, but even allowing for this preference by the Reserve Bank, we see merit in the APRA concept of Total Loss Absorptive Capacity (TLAC), which facilitates more open discussion about what is the best way to achieve a specified level of TLAC in view of the trade-offs and practical points raised above. This approach offers a pathway to an outcome that is less constrained by the sequencing of decisions about components of the overall framework.

Stability and efficiency

58. The Reserve Bank has sequenced its analysis by putting its consideration of stability ahead of and separate from its consideration of the other requirement in its legislation—to consider efficiency. The Act does not guide them about the balance to be struck so, while we would not question the Reserve Bank’s view that a high level of comfort about the stability of the system is essential, the question arises as to whether the pragmatic decision to set a stability target in place in isolation first, then turn to efficiency has unnecessarily biased the analysis of the optimal capital ratio. The question of whether there is a further increase of the capital ratio above the 16 per cent target for stability purposes that improves both stability and efficiency is addressed in the negative. But the analysis does not illuminate whether a lower capital ratio or one with a different composition might have produced a reduction in cost with little or any loss of stability. The stylised graph at figure 1, (Reserve Bank of New Zealand, 2019b), shows a steeply falling benefit curve which under reasonable assumptions would intersect the cost curve at a point where the benefit curve is very flat. While this can be said to support the proposal—at least more than if the intersection was at a point where the benefit curve was more steeply sloped—the reality is that the level of uncertainty is very high about just where these curves (and hence their intersection) are located and how stable these positions are.
59. The analysis in the Reserve Bank papers does not help much on this point. The Reserve Bank appropriately intends to choose a capital ratio in the flat section of the benefit curve where diminishing returns in terms of the stability objective have set in. Given the uncertainty about the location and stability of the cost and benefit curves the Reserve Bank has chosen a point it apparently believes is well into the range of diminishing returns. But within this range a small change in the position of the cost curve can result in a large change in the associated capital ratio associated with the stability target. This suggests that there is a bound of uncertainty around the target ratio so that the analysis could support other conclusions within this range.
60. The proposal claims only that the chosen ratio is within a range based in the three approaches it has taken, but there is not much from which to evaluate the consequences of moving the target within the range. The fact that the search for a ‘win-win’ ratio above the chosen target could not find one makes it probable that a similar analysis at a somewhat lower target would produce the same conclusion. There is just not enough information about the trade-off between stability and efficiency and how stable it is, to know where some point that could be described as ‘optimal’ is located within ‘stability-efficiency space’.
61. In the remainder of this report we assess the economic costs and benefits of the Reserve Bank proposals.

Assessing the economic costs

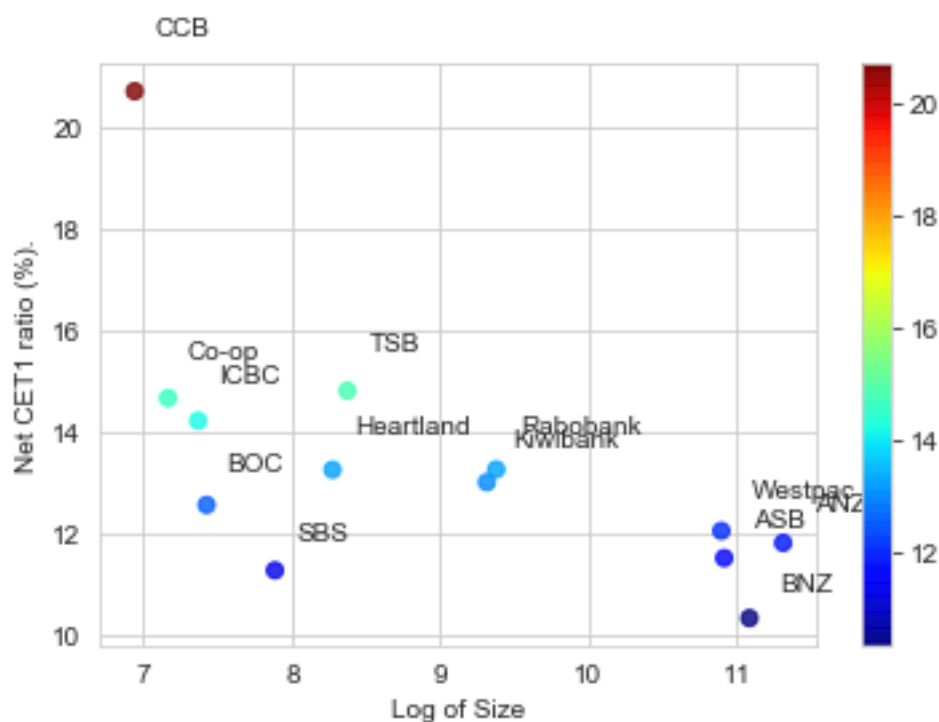
Weighing of costs and benefits

62. The Reserve Bank (correctly) characterises its task in setting capital ratios as “balancing the benefits of higher capital levels, in terms of improved financial stability, against potential costs, such as economic output that may be foregone from imposing excessively high requirements” (Reserve Bank of New Zealand, 2019a, p. 2). We would add to this characterisation that the task should also involve considering whether some of the expected benefits could be achieved using lower-cost instruments, as discussed above.
63. In this chapter, and the chapter that follows, we review the Reserve Bank’s assessment of the costs and benefits consistent with a CBA method. We show that the costs identified by the Reserve Bank would not be minimal and that its assessment missed out some important societal impacts. We review the expected benefits using the same conceptual approach. The result is, that on the basis of the information released by the Reserve Bank, the societal costs of its proposals would substantially exceed the benefits.

Quantity of additional capital

64. To assess the potential cost of the Reserve Bank proposals, an estimate is needed of the quantity of additional capital banks would hold as a result of the change in regulatory requirements—that is, the quantity of capital in addition to the amount banks would hold in any event to cover their assessment of lending risk and to satisfy credit rating agencies and other stakeholders.
65. The Reserve Bank proposals would increase the regulatory minimum for Tier 1 capital from 8.5 per cent of risk-weighted capital to 16 per cent (for large banks) and to 15 per cent of risk-weighted capital for smaller banks, an increase in the regulatory minimum of 6.5 to 7.5 percentage points (see Figure 1 above). However, all banks currently hold more capital than required by the regulatory minimum, with the ratios reported by individual banks varying considerably. The CET1 measure is the relevant measure as the Reserve Bank proposed to require that the regulatory requirements be met by ordinary capital. Figure 3 shows the CET1 capital ratios reported by the New Zealand banks.

Figure 3 CET1 capital ratios reported by New Zealand banks



Source: Reserve Bank Financial Strength Dashboard

66. All banks we interviewed stated that they would continue to hold a buffer above the minimum capital ratio set by the Reserve Bank. Most banks consider that the prospect of adverse publicity and reputational damage, should a bank dip below the requirements (even if the regulatory regime provides for an escalating supervisory response), would result in their boards setting a buffer above the regulatory requirements.⁵ Management would set a margin above the board determined minimum.
67. The banks we interviewed were still evaluating the size of the buffer they would maintain, but most said a buffer of 1.0 to 2.0 percentage points would be needed to cater for economic shocks and avoid breaching the regulatory requirements (or seeking emergency capital from its shareholders). Also, any bank seeking to grow its total lending will need capital in advance of that growth and hence a larger buffer on top of whatever buffer it would set in a no-growth situation.
68. In its explanatory paper, the Reserve Bank assumed a voluntary buffer equivalent to 0.5 per cent of total exposure at default (EAD) (Reserve Bank of New Zealand, 2019b, p. 42). This assumption equates to approximately 1.0 per cent of risk weighted assets, the lower end of the range the

⁵ Some small banks indicated that depending upon how the Reserve Bank reports the capital held by banks, they may need to hold Tier 1 capital levels equivalent to the larger banks to avoid the impression that they are not meeting the Reserve Bank requirements. This incentive would result in a slightly larger average increase in the additional capital held by banks than our estimate.

banks advised us they were likely to maintain. The Reserve Bank observes that banks can be expected to take a view on the appropriate voluntary buffer (Reserve Bank of New Zealand, 2019a, p. 12), but does not provide an explanation for its assumption of 0.5 percentage points of EAD. We adopt a mid-point assumption that banks would maintain a buffer of 1.5 percentage points of risk weighted assets.

69. On the basis of this assumption, and the estimates of CET1 capital provided by the Reserve Bank in its explanatory paper (Reserve Bank of New Zealand, 2019b, p. 43), we estimate that the Reserve Bank proposals would require an aggregate increase in bank capital of 4.3 per cent of unweighted assets. This calculation uses the same measure of unweighted assets (total exposure at default) as used by the Reserve Bank. Our calculation of this working assumption is shown in appendix A. Our estimate is higher by 0.3 percentage points than the Reserve Bank estimate of 4 per cent contained in its explanatory paper (Reserve Bank of New Zealand, 2019b, pp. 37, 43). This difference is due to the variance in assumption as to the likely size of the buffer over the regulatory minimum that banks would hold under the new proposals.
70. An increase in the quantity of capital held by banks would have:
 - direct economic costs, because of the higher real interest rates incurred by borrowers; and
 - indirect economic costs as:
 - higher real interest rates impact on investment and other economic decisions
 - firms change business models and organisational forms in response to the change in regulatory requirements.
71. We review these economic impacts before turning to consider the estimated benefit from the reduced risk of a banking crisis.

The direct economic costs of additional capital

Increased capital requirement is an economic cost

72. In its non-technical summary, the Reserve Bank acknowledges that increased capital requirements “could make it more expensive for New Zealanders to borrow money from a bank” (Reserve Bank of New Zealand, 2019a, p. 5). However, the body of the consultation paper, and the subsequently released Capital Review Background Paper (Reserve Bank of New Zealand, 2019b), focus on balancing the benefits of greater financial system stability with the indirect cost, or flow-on effect, from the loss of economic output due to higher bank credit costs. There is no explicit discussion in these Reserve Bank papers of the additional amount paid by borrowers as an economic cost.
73. The inference appears to be that the Reserve Bank considers the direct cost, of higher payments made by borrowers, to be a transfer payment. In cost-benefit assessments it is usual practice to ignore transfer payments because the benefits to the recipients are assumed to offset the costs to the payers (The New Zealand Treasury, 2015, p. 10). The argument in this case is, presumably,

that additional payments by borrowers would be passed on to the providers of the capital and therefore should be viewed as a transfer payment.

74. However, the additional payments by borrowers that will result from the Reserve Bank proposals are not a transfer to the owners of capital; they are payments that reflect the opportunity cost of that capital—the cost to society from the use of that capital in the banking sector. The providers of that additional capital do not receive a transfer from borrowers over and above the risk adjusted return they would receive from employing that capital elsewhere.
75. The change in the *quantum* of equity held by New Zealand banks can be ignored for simplicity in a cost benefit assessment, as off-setting the increase in the quantity of equity would be a reduction in the quantity of bank debt; a change in the capital ratio would not in of itself change the quantity of funds committed to the banking sector, just the mix of debt and equity. However, the increased costs society incurs to achieve the increase in equity is a measure of the economic cost of maintaining that higher level of equity.
76. For example, a household facing higher mortgage rate costs would incur a loss of welfare—this is the direct price households would pay under the Reserve Bank proposals for the lower risk of a banking crisis. The additional payments by households would not be a transfer payment; it would not be offset by higher payments to the owners of equity, as the owners of equity would expect to receive a return commensurate with the risk of that investment, whether invested in the bank or in an alternative asset.
77. The increase in payments by borrowers is not a perfect measure of the direct economic cost of the additional capital because one reason equity is typically costlier than debt is the tax shield for debt, and tax payments are a transfer. In the analysis that follows, we assess the quantum of the direct economic cost as a result of higher bank credit costs, but acknowledge that a dollar value estimate derived from those additional charges will likely be an over-estimate of the direct economic costs because of the tax impacts.

The additional cost of bank credit

78. In its consultation paper, the Reserve Bank says “a reasonable point estimate is that a one percentage point increase in a bank system’s Tier 1 capital ratio from current levels may lead to a 6 basis point increase in the price of bank credit once Modigliani-Miller effects are taken into account” (Reserve Bank of New Zealand, 2019a, p. 28). This sentence appears to be poorly phrased. In a decision paper provided to its Financial System Oversight Committee dated November 2018 (Reserve Bank of New Zealand, 2018, p. 7), the Reserve Bank clarified that:

We estimate that 100 basis points increase in the Tier 1 ratio would increase the weighted average cost of capital by 6.6 basis points with a flow-through effect on lending rates (which we estimate would increase by 8.2 bps).

79. In its subsequent explanatory paper, the Reserve Bank stated that: “The estimated impact is an increase in lending rates of 8.1 basis points” (Reserve Bank of New Zealand, 2019b, p. 36). The Reserve Bank does not explain the small adjustment from 8.2 basis points to 8.1 basis points. As the explanatory paper contains the most recent comment from the Reserve Bank, we presume

that the Reserve Bank's current estimate is each additional percentage point increase in Tier 1 capital (as a percentage of unweighted assets) would increase the cost of bank credit by 8.1 basis points. On the basis of this assumption, and our working assumption of an increase of 4.3 percentage points in Tier 1 capital (as a percentage of EAD), we estimate the Reserve Bank proposals would result in an additional cost of bank credit to New Zealand borrowers of about \$1.6 billion per annum. Our calculation is shown in appendix B.

80. The Reserve Bank does not appear to take this direct economic cost of its proposals into account. To the extent this increase in costs to borrowers includes tax effects it likely overstates the direct economic cost of the Reserve Bank proposals, as discussed above. However, there are also strong reasons for concluding that the Reserve Bank may well have underestimated the increase in bank credit charges. These reasons are discussed below.

Reserve Bank estimate of the increased cost of credit

81. In our estimate of the direct economic cost of the Reserve Bank's proposals, we utilised the Reserve Bank's estimate of the increased cost of credit emanating from its proposals, that is, 8.1 basis points. However, as we now explain, the true increase in the cost of credit, and hence in the direct economic cost, could be considerably higher.

The Modigliani-Miller offset—the literature

82. As a bank increases its Tier 1 capital, it becomes a less risky investment for both its equity and debt investors. Hence, in theory, some or all of the additional cost of funding would be offset by a fall in the required return on investment—this offset is referred to as the “Modigliani-Miller offset”.⁶ The Reserve Bank reviewed a range of recent studies and concluded that around half of the increase in funding costs would be offset by a lower required return on a bank's capital and non-capital funding (Reserve Bank of New Zealand, 2019a, p. 27). On the basis of this assumption, the Reserve Bank concludes that a reasonable point estimate is that a one percentage point increase in a banking system's Tier 1 capital ratio from current levels may lead to an 8.1 basis point increase the price of bank credit once Modigliani-Miller effects are taking into account (Reserve Bank of New Zealand, 2018, p. 7).
83. One of the difficulties in assessing the implications of the literature for New Zealand is that the studies utilise a wide range of capital ratio measures. Some use total capital in the numerator, others use Tier 1 capital, and still others use CET1 capital. Some use total assets in the denominator while others use risk-weighted assets. As a result, inferring a Modigliani-Miller offset appropriate to New Zealand requires some (fairly heroic) adjustments of the estimates appearing in the research literature.

⁶ The American economists, (Modigliani & Miller, 1958), in what has often been described as the most important paper ever written in corporate finance, showed that a firm's total cost of capital in a perfect market is independent of its mix of debt and equity funding.

84. A further complicating factor is that the definition of particular types of capital sometimes change over time. For example, in the literature we have reviewed, Tier 1 capital often includes convertible instruments. Hence, a 1 percentage point increase in 'capital' in the typical study the Reserve Bank is relying on might correspond to significantly less than a 1 percentage point increase in equity capital. If so, this could have a substantial effect on the estimated elasticity. For example, if convertible instruments made up 50% of 'capital' in a study, then a 1 percentage point increase in 'capital' would correspond to only a 0.5 percentage point increase in the Reserve Bank's definition of capital and so the implied elasticity would rise from 8 basis points to 16 basis points.
85. In summary, we do not dispute the Reserve Bank summary of the literature it has reviewed, but given the uncertainties outlined above, stress that its estimate of 8.1 basis points from the literature comes with a very large margin of error.

Constraints on funding of New Zealand banks

86. We interviewed a number of New Zealand banks that are wholly owned subsidiaries of offshore parents, as well as domestically owned banks. These banks all raised concerns that the capital raising options available to them would not provide the Modigliani-Miller offset assumed by the Reserve Bank.
87. With regard to debt funding, the New Zealand subsidiaries of offshore parents advised us that their debt costs are a margin above the rates available to their parents; the banks say it would be unrealistic to assume that the cost of debt for a New Zealand subsidiary would fall below the cost of debt available to the parent. We agree with this argument in principle.
88. However, it seems the Reserve Bank has not assumed that the Modigliani-Miller offset would impact on the cost of debt. In its explanatory paper (released subsequent to many of our interviews), the Reserve Bank explains that "our calculation assumes all of the increase in average funding costs is captured in lending rates, with no impact on borrowing costs" (Reserve Bank of New Zealand, 2019b, p. 36). Such an assumption would be consistent with several of the studies referred to by the Reserve Bank which set the Modigliani-Miller effect on the cost of debt to zero by assumption (for example (Cline, 2016), and (Miles, Yang, & Marcheggiano, 2012)).
89. In relation to the cost of equity, the New Zealand subsidiaries all referred to the internal capital allocation rules of their parent entity. The central theme is that investors cannot buy shares just in the New Zealand subsidiary, only in the overall group. The New Zealand subsidiaries range from being a very small part of the parent group to close to 25 per cent. Any risk reduction might therefore have only a small effect on the group's cost of equity for several major New Zealand banks. As a result, the parent could be expected to continue to set the same required return for the New Zealand subsidiary as for the other parts of the group in its internal capital allocation decisions. As one bank put it to us "the parent sets the return it requires to make capital available, and if that return cannot be achieved, reallocates the capital to other activities within the group."

90. In concept, the arguments presented by the banks suggest imperfect capital allocation—a one size fits all internal capital allocation rather than fine tuning for relative risk. However, it is not unusual for businesses to apply heuristics in business decision-making. There are many real-world examples of economic decision-making where the benefits of fine-grained analysis do not warrant the costs involved. The Reserve Bank does not appear to consider the implications of real-world capital allocation decisions in assessing the likely cost of its proposals.
91. The argument by the banks is that, in practice, the New Zealand subsidiaries would experience little if no change in the cost of equity provided by their parent entities; that is, the Modigliani-Miller offset would be minimal or possibly zero. If that were the case, the impact on lending rates might be up to twice that estimated by the Reserve Bank; that is 16 basis points rather than 8 basis points for each percentage point change in capital requirements (perhaps less where the New Zealand subsidiary is a larger part of the parent group).
92. The difficulty of applying estimates of the Modigliani-Miller effect from the literature, and the practicalities of raising capital for New Zealand based banks, would caution against relying on an estimate of 8 basis points for each percentage point change in capital requirements. The impact on the direct economic cost of the Reserve Bank proposals of changes in this assumption would be very significant. For example, if the cost of bank credit were to increase by 16 basis points, rather than 8 basis points, the direct economic costs would increase from \$1.6 billion to \$3.1 billion per annum for the additional 4.3 percentage points of capital (see appendix B).

Indirect economic costs

93. In addition to the direct economic cost of higher bank credit costs as a result of the change in capital requirements, there would be flow-on, or indirect economic costs as:
 - higher real interest rates impact on investment and other economic decisions
 - firms change business models and organisational forms in response to the change in regulatory requirements.
94. We consider each component of indirect economic cost in turn.

Reduced economic activity from higher real interest rates

95. As lending rates rise, firms borrowing capital would find it is no longer profitable to borrow as much, and therefore would invest less in plant and equipment. With less capital formation, total output would reach levels lower than otherwise. The economic effect of a permanent (for as long as the regulatory requirement for higher capital is in force) increase in real interest rates is therefore to reduce the steady-state level of GDP.
96. The Reserve Bank does not make its own assessment of the effect on economic output from a permanent increase in real lending rates. It reviews the literature for studies on the increase in capital requirements on steady-state, or permanent, GDP. This approach implicitly accepts the elasticity of steady-state GDP to a higher cost of bank credit assumed in the overseas studies as

applicable to New Zealand. In its consultation paper, the Reserve Bank states (Reserve Bank of New Zealand, 2019a, p. 28):

By lowering credit availability at a given price, from the studies we have surveyed we consider a percentage point increase in the Tier 1 capital ratio could lead to a 3 basis point decline in the steady-state level of GDP.

97. The reference to a 3 basis point decline appears to be an error. In its explanatory paper, the Reserve Bank presents (in its table 7) an estimate that a one percentage point change in the leverage ratio would reduce GDP by 8 basis points (Reserve Bank of New Zealand, 2019b, p. 37), but provides no explanation for how it arrived at this value. In its decision paper of November 2018, the Reserve Bank advised its Financial System Oversight Committee that it assumed a decrease of 8.8 basis points for each percentage point increase in bank capital (Reserve Bank of New Zealand, 2018, p. 8). The Reserve Bank explained that it had not done its own macroeconomic modelling, but had used an estimate obtained by the Federal Reserve for the United States economy.
98. The structural differences between New Zealand and the United States economies mean it is dangerous to be overly reliant on a United States assessment of the likely effects. In appendix C, we undertake our own assessment of the impact of the Reserve Bank's capital proposals on GDP using the methodology of Miles et al. (2012) applied to New Zealand conditions.
99. Applying New Zealand specific parameters produce much higher estimates of the reduction in the steady-state GDP from a permanent increase in real interest rates than the 8.8 basis points estimated by the Reserve Bank. Using alternative, plausible, scenarios we obtain estimates of 17 basis points to 40 basis points loss in steady state GDP for each percentage point increase in capital (Table 3, appendix C).
100. The range of estimates arrived at from applying New Zealand parameters, and their sensitivity to the dataset they are estimated from (see appendix C), indicate these estimates are subject to considerable uncertainty. However, all of the estimates derived from New Zealand parameters are significantly higher than—at least double—the values assumed by the Reserve Bank from applying elasticities derived from the United States economy. The presumption must be that had the Reserve Bank undertaken its own assessment of the effect of its proposals on New Zealand economic output (rather than rely on United States relationships) it may have concluded the costs were substantially higher than the effects advised to its Financial System Oversight Committee.
101. Assessing the likely effect of the proposals in New Zealand (instead of assuming the effects from the literature and overseas studies) could materially affect an assessment of the costs of the proposals relative to the benefits:
 - Taking the Reserve Bank assumption of an 8.8 basis point reduction in steady-state GDP (given an 8.1 basis point increase in the cost of bank credit), and our estimate of a 4.3 percentage points increase in Tier 1 capital, would result in a loss in economic output of about \$1.1 billion per annum. The calculation of this cost estimate is shown in appendix D.

- Applying the *lowest* New Zealand parameter estimates (as shown in appendix C) would double this cost estimate to \$2.1 billion per annum.
- If the Modigliani-Miller effect is less than the Reserve Bank assumes (for example, because of funding constraints) and as a result of the cost of credit increases are higher than the Reserve Bank assumes, then these economic cost estimates would increase proportionately; for example, if the Modigliani-Miller effect were close to zero, and the cost of bank credit were to increase by 16 basis points then the economic cost estimates presented in the bullet points above would double again.

102. These estimates of lost economic output are additional to the estimates of the direct welfare loss to borrowers discussed above (paragraphs 72 to 92 above). The proposals may also lead to changes in business models, competition between banks, and disproportionate effects on particular customer segments.

Impact on business models and organisational forms

103. A change in the regulatory minimum capital requirements for New Zealand banks can be expected to alter the incentives and efficient organisation of banking in New Zealand. The Reserve Bank appears not to have considered these changes in incentives on the broader efficiency of the banking system (beyond reducing the risk of a bank failure). All of the banks we interviewed identified changes that would occur to the services they provide or the business models they employ to deliver those services.

Risk of disintermediation

104. All of the banks we interviewed stressed that the higher cost of bank credit that would result from the Reserve Bank proposals would not be spread evenly across their lending portfolio. Those borrowers with a higher risk weighting would face a disproportionate increase in the cost of credit, and possibly a reduction in the credit available to them. All of the banks we interviewed expected the agricultural and small business sector to face higher than average increases in bank credit charges.

105. The Reserve Bank also considers that some of the cost of additional capital would be met by banks paying depositors less (Reserve Bank of New Zealand, 2019b, p. 36). Some depositors, especially retired people, are sensitive to changes in cash-flows. These customers may look for alternative investments should lower deposit rates not meet their cash-flow needs.

106. The potential for disproportionate impacts raises the prospect of a fringe of customer groups not being satisfied by products available from the banking sector, or facing increased costs, and hence the risk of disintermediation; that is, the risk that some of these customers might seek services outside of the banking sector. In the past, entities such as finance companies have emerged offering higher deposit rates than banks and providing finance to entities unable or unwilling to obtain funds from the banking sector. The Reserve Bank consultation paper does not assess this risk.

Tilting the field for competition

107. The Reserve Bank papers do not evaluate whether its proposals would tilt the field for competition, and if so, what effect that might have on the efficiency of banking services offered to New Zealanders. Several banks observed, for instance, that large New Zealand corporates would be able to access funding directly from offshore entities that were not subject to the same capital requirements as New Zealand banks.
108. Similarly, the existing arrangements allow some banks to apply risk weightings determined by internal models and require other banks to apply different weights determined by a standardised approach. The proposals would alter these arrangements, and change the amount of regulatory capital some banks would need to hold to provide banking services to the same customer group, relative to their competitors. Clearly such changes have implications for competition in the market for banking services. However, the Reserve Bank papers do not provide an assessment of whether the suite of changes it proposes would enhance or dull competition for the long-term benefit of New Zealanders.

Capital rationing

109. The Reserve Bank appears to assume that all effects on output operate via higher credit charges. There is no discussion in its consultation paper of the direct effects banks might apply, for example, by applying a higher loan threshold and thus reducing loan growth. Our interviews with the banks suggested this was a distinct possibility. Consistent with this view, there is a literature that estimates the effects of higher capital ratios on the *volume* of lending and lending growth. These estimates are invariably negative, statistically significant, and fairly substantial (see appendix E for a summary). Reductions in lending on this scale would have a deleterious effect on GDP.⁷
110. New Zealand mutual banks face particular problems in meeting additional capital requirements, because the capital of these banks has typically been built from retained earnings. Unless some form of hybrid capital instrument is acceptable to the Reserve Bank, the New Zealand mutual banks would necessarily have to curtail their growth objectives (relative to their growth objective in the absence of increased capital requirements). This outcome would appear to tilt the market against the cooperative organisational form. The Reserve Bank does not appear to consider how its proposals will impact on the choice of organisational form.

Summary of economic costs

111. An increase in the capital required to be held by New Zealand banks would make it more expensive for New Zealanders to borrow money from a bank. The Reserve Bank did not include

⁷ While some of the estimated decreases can be attributed to the impact of higher credit charges on loan demand, the size of these estimates relative to those implied by studies that focus on the credit charge route alone suggest that a substantial component is due to a reduction in loan supply.

in its consultation paper an estimate of these direct losses in economic welfare. We estimate these direct economic losses at around \$1.6 billion per annum as a result of the Reserve Bank proposal, if the cost of bank credit increases by 8.1 basis points for each additional percentage point of capital.⁸

112. These costs would increase proportionately if the Reserve Bank has underestimated the effect on the cost of bank credit. For example, if the Modigliani-Miller effect were close to zero (for example, because of funding constraints) the direct economic costs would increase to around \$3.1 billion per annum.
113. The permanent increase in real interest rates as a result of banks holding additional capital would also lead to reduced economic output.
 - Taking the Reserve Bank assumption of an 8.8 basis point reduction in steady-state GDP (given an 8.1 basis point increase in the cost of bank credit), and our estimate of a 4.3 percentage points increase in Tier 1 capital, would result in a loss in economic output of about \$1.1 billion per annum.
 - Applying the *lowest* New Zealand parameter estimates would double this cost estimate to \$2.1 billion per annum.
 - If the Modigliani-Miller were close to zero, and the cost of bank credit were to increase by 16 basis points, then these economic cost estimates would double again.
114. Hence, the economic costs would be at least \$1.6 billion plus \$1.1 billion, a total of \$2.7 billion per annum, on the Reserve Bank's own assumptions. The cost may be several times this level, once the assumptions are adjusted for New Zealand conditions. The proposals may also lead to changes in business models, competition between banks, and disproportionate effects on particular customer segments.
115. While we recognise that the costs may be a small percentage of GDP, we do not agree with the Reserve Bank characterisation of the costs of its proposal as "minimal" (Reserve Bank of New Zealand, 2019a, p. 5). The costs of the Reserve Bank proposal, using its assumptions, are very large and will continue to be incurred each year the policy remains in place.

⁸ As discussed above, to the extent this increase in costs to borrowers includes tax effects it likely overstates the direct economic cost of the Reserve Bank proposals.

Assessing the economic benefits

The benefits of more resilient banks

Reserve Bank's assumptions

116. By increasing the amount of capital banks would be required to hold, the Reserve Bank expects the banks will be more resilient to economic shocks and downturns. The Reserve Bank anticipates three categories of benefit from more resilient banks. By reducing the probability of a banking crisis (following an economic shock), the increased capital would lessen:
- the harm to mental and physical health, family cohesion and community connectedness caused by economic stress (unemployment, falling incomes, reduced savings and or declining asset values) (Reserve Bank of New Zealand, 2019b, p. 17)
 - instability; the Reserve Bank is persuaded by the literature that people value stability as well as economic output (Reserve Bank of New Zealand, 2019b, p. 10)⁹
 - the output losses that would result from bank failures (Reserve Bank of New Zealand, 2019b, p. 5).
117. The Reserve Bank does not attempt to provide a monetary value of the social harm from a severe downturn. Nor does it attempt to assess the willingness to pay for stability; rather, it asserts that the stability people value would likely be met if banks held sufficient capital to cover losses so large that they might only occur once in every 200 years (Reserve Bank of New Zealand, 2019a, p. 13). We agree that avoiding social harm and providing stability are policy objectives valued by society. However, as discussed below:
- the proposed increase to capital ratios appears to be a high cost instrument for advancing those policy objectives—the economic costs would greatly exceed the economic benefits
 - it is not clear how the Reserve Bank arrives at its capital ratios given its stability target.

Estimated avoided economic loss

118. Higher capital ratios are intended to make banks more resilient to economic shocks, and thereby avoid the economic and social harm that would result from a banking crisis. Estimating the economic benefit (the avoided economic loss) obtained by the higher capital ratios therefore requires estimates of two key parameters:

⁹ Hence, people may be willing to forego some output (income) to avoid uncertainty or abrupt disruption—this is why, for instance, people are often prepared to buy insurance when the premiums they pay will exceed the expected pay out under the policy.

- the economic output that would be lost should a banking crisis occur
- the reduction in the probability of a banking crisis if the banks hold more capital.

Economic cost of a banking crisis

119. The Reserve Bank provides a range, expressed as a percentage of GDP, of the output losses that might result from a banking crisis. This range stretches from 20 per cent of GDP to 90 percent. The Reserve Bank selects 63 per cent as its central case for illustrative purposes (Reserve Bank of New Zealand, 2019b, p. 32).
120. An economic disaster that might lead to economic loss of these magnitudes would be a rare event. The stereotype economic disaster of the Great Depression is estimated by one author to have reduced GDP per capita in the United States by 31 percent; in New Zealand the decline was 18 per cent (Barro, 2006, p. 828). The reason that the estimates relied upon by the Reserve Bank arrive at much larger potential loss is that they attempt to count not just the loss over the period of the crisis, but also the lost output out into the future (for example, because investments were not made during the crisis lowering future output). For example, (Cline, 2016) estimates a median output loss from banking crises in advanced countries over the period 1977 to 2015 at 23 per cent of GDP, measured over a 5 year period of the crisis. However, that median figure increases to 64 per cent once an estimate of losses into the future are included. The Macroeconomic Assessment Group of the Basel Committee on Banking Supervision, in an earlier study, arrived at a median total loss of 64 per cent of base GDP—this is the estimate adopted by the Reserve Bank as its central case.
121. We have some reservations about adopting a median figure from a broad study, as those results may be impacted by events in countries with very different regulatory arrangements to New Zealand (for example, Greece during the global financial crisis, or Finland in 1991). It is difficult too, in these studies, to distinguish between loss in output from an economic event which leads to a banking crisis (an increase in bank capital cannot stabilise an economy), from a banking crisis that leads to a loss in economic output. Having said that, the large range applied by the Reserve Bank, from 20 per cent to 90 per cent of GDP, allows for considerable uncertainty in its central case estimate of 64 per cent.

Change in probability of a banking crisis

122. As the Reserve Bank observes, the level of capital maintained to mitigate the risk of a banking crisis depends on risk appetite (it should also depend on whether other instruments could achieve the same or similar outcomes at less cost). In its decision paper for the Financial System Oversight Committee in November 2018, the Reserve Bank advised that if it sought to cap the risk of insolvency at 1 per cent, rather than 0.5 per cent, its target for Tier 1 capital would be 12 per cent and 13 per cent of RWA (Reserve Bank of New Zealand, 2018, p. 5). The Reserve Bank explains this estimate in appendix 4 of the same paper.
123. A Tier 1 capital target of 12 per cent to 13 per cent would place the target at approximately the existing levels of bank capital—the Reserve Bank reports that the current weighted average

ratio of Tier 1 capital to RWA in the New Zealand banking system is 12.2 per cent (Reserve Bank of New Zealand, 2019b, p. 2). This level is above the existing regulatory minimum.

124. Hence, the Reserve Bank estimates that the proposed increase in capital would reduce the risk of bank insolvency from the current level of 1 per cent to 0.5 per cent, a reduction in the probability of a banking crisis of 0.5 percentage points.¹⁰ Cline reports the same changes in probability of a banking crisis for changes in capital ratios of the same magnitude (Cline, 2016, p. 28).

Expected value of the avoided loss in economic output

125. Bringing together the estimated change in probability of a banking crisis from a higher capital ratio, with the Reserve Bank’s assumptions of the loss in economic output from a banking crisis, allows an approximate estimate of the dollar value of the annual economic benefit expected by the Reserve Bank. In any given year, the requirement for banks to hold additional capital over current levels would, under the Reserve Bank’s assumptions, reduce the risk of a banking crisis by 0.5 per cent compared to the risk that is being incurred under the current capital levels. The cost of a banking crises, were it to occur, would amount to a loss of economic output equivalent to 20 to 90 per cent of annual GDP. Hence, the expected annual economic benefit to New Zealand would be the reduction in the probability of the crisis multiplied by the expected cost of that crisis.

126. Table 1 calculates the expected annual economic benefit for the range of estimates of the magnitude of a banking crisis assumed by the Reserve Bank. It shows that, under the Reserve Bank’s central assumption that a banking crisis would cost the equivalent of 63 per cent of the base year GDP, a reduction in the probability of the crisis of 0.5 per cent would have an expected annual economic benefit (avoided economic loss) of \$900 million.

Table 1 Expected annual economic benefit from lower risk of banking crisis

Economic benefit - avoided lost economic output

Notes				
A	Annual GDP - steady state \$ billions	\$	286	
	Estimate of avoided economic cost from more resilient banks		Low avoided cost	Central estimate
B	Assumed economic loss if banking crisis occurs as % of steady state GDP		20%	63%
C = A x B	Dollar value of economic cost if banking crisis occurs \$ billion	\$	57.1	\$ 180.0
D	Change in probability of bank failure due to higher capital		0.50%	0.50%
E = D x C	Annual benefit from avoided economic cost - \$ millions	\$	286	\$ 900
				\$ 1,286

¹⁰ The reduction in risk may be higher than 0.5 per cent, if the banks retain a buffer over the new regulatory minimum as we anticipate.

127. These estimates of economic benefit are substantially less than the estimates of economic cost discussed above. Table 2 compares the expected annual economic benefit with the expected annual economic cost.

Table 2 Net economic benefit of proposal - Reserve Bank assumptions

	RB low- 20% GDP avoided	RB central- 63% GDP avoided	RB high- 90% GDP avoided
Economic benefit	\$ 286	\$ 900	\$ 1,286
Economic cost (8 bps)	\$ 2,670	\$ 2,670	\$ 2,670
Net economic benefit	-\$ 2,384	-\$ 1,770	-\$ 1,384

128. Hence, the policy would reduce net economic welfare by almost \$1.8 billion per annum using the Reserve Bank's central assumptions.

129. The estimates shown in Table 2 should be treated with caution given the uncertainty in the assumptions:

- in its consultation paper, the Reserve Bank presents relationships between capital ratios and the probability of a banking crises from the literature which suggest the proposals would result in a larger change in probability than the analysis contained in its decision paper (Reserve Bank of New Zealand, 2019a, p. 18). For example, the probabilities presented by the Reserve Bank in its table 3 would suggest a change in probability of about 1.43 per cent, which if applied in the calculation in table 2 above would reduce the central case economic loss from \$1.8 billion to about \$100 million per annum
- the estimates of economic loss are based on the Reserve Bank assumption of 1 percentage point increase in bank credit leading to an 8 basis point reduction in GDP; applying New Zealand parameters may at least double this estimate, increasing the deficit on the Reserve Bank's central case by an additional \$1 billion per annum
- the estimates of economic cost are based on the Reserve Bank assumptions as to the Modigliani-Miller effect; the economic cost would be substantially higher if internal capital allocation rules for New Zealand subsidiaries result in less of an offset
- it is not evident how the overseas studies referred to by the Reserve Bank in its discussion of probability should be adjusted for the New Zealand circumstances where over 88 per cent of the banking sector is comprised of subsidiaries of offshore parents (and hence the risk is the extent of support by the parent in a time of crisis)
- the estimates of economic cost exclude the impact of capital rationing and disintermediation, but likely include some double counting in the estimates of the direct economic cost of increased bank credit.

130. Some of these uncertainties would significantly increase the estimate of net economic cost, some would reduce that estimate, but none would reverse the result and produce a net economic benefit for the Reserve Bank's central estimates. The expected large net economic

cost of the proposal should raise questions as to whether the proposals are optimal for New Zealand and whether there are alternative instruments that could achieve the gains at less cost.

Literature suggests lower optimal ratio than 16 per cent

131. In Table 8 of its consultation paper, the Reserve Bank presents its summary of the optimal capital ratios estimated in the literature. (The Reserve Bank explains that it also did some modelling, but that modelling produced such a range it was not used to calculate an optimal ratio for New Zealand) (Reserve Bank of New Zealand, 2019a, pp. 28 -29).
132. If the numbers its table 8 are taken at face value, and an assumption is made that they are all equally valid, then the average is 13.6 per cent. Two of the studies do not actually estimate optimal capital ratios, and the estimate from Cline (2016) should really just be 12 per cent. Making these adjustments increases the average slightly to 13.75 per cent. But 13.75 per cent is still less than 16 per cent.
133. This point can also be illustrated by reference to the papers cited by the Reserve Bank in its table 8 (Reserve Bank of New Zealand, 2019a, p. 28). For example, Miles et al (2012) estimate an output-capital elasticity of 4.4 basis points for the United Kingdom (and hence an optimal capital ratio of, on average, 18 per cent), while Cline (2016) estimates the same elasticity to be 7.7 basis points for the United States (and hence an optimal capital ratio of 12 per cent). But both the 4.4 basis points and 7.7 basis points estimates are less than the elasticity the Reserve Bank estimates for NZ (8.8 basis points), and so the New Zealand optimal capital ratio must fall somewhere below the estimates of Miles et al and Cline. Thus, *the Reserve Bank's own figures suggest an optimal capital ratio of less than 12 per cent.*
134. Hence, it is not clear how the Reserve Bank arrives at an optimum capital ratio of 16 per cent from Table 8. As with the quantification of costs and benefits, the literature cited by the Reserve Bank appears to suggest a capital ratio lower than 16 per cent would be optimal.

Conclusion

135. A banking crisis, should one eventuate, would be very costly in terms of lost economic output (the Reserve Bank assumes an impact equivalent to 20 to 90 per cent of GDP) and social stresses. In setting capital ratios, the Reserve Bank says its task is to balance the benefits of higher capital ratios against the costs of higher bank credit charges.
136. The Reserve Bank describes the likely costs of its proposal as “minimal”. But our analysis suggests otherwise; that the costs would be far from minimal. Taking the Bank’s own assumptions on changes to credit costs, households and businesses would face direct economic welfare losses of the order of \$1.6 billion per annum; indirect economic effects from flow-on losses of economic output would add a further \$1.1 billion per annum. These costs would exceed by a substantial margin the expected benefit, at least on the central assumptions used by the Reserve Bank in its proposal. The net loss in economic welfare would be about \$1.8 billion per annum.
137. An entity acting in the best interests of society would not knowingly promote a policy that would impose significantly higher costs than its benefits, after suitable adjustments for risk aversion (that is, a premium to avoid disruption).
138. The Reserve Bank’s analysis does not articulate clearly what it believes is wrong with the status quo which justifies the change and why the negative consequences of the proposal are clearly outweighed by the benefits; cause and effect are not dealt with methodically in considering the benefits. The most recent paper focuses on the negative impacts of an economic disaster, with which few people would disagree, but bank failures are as likely to be caused by a severe recession as to be the cause of one. Further, the analysis is framed largely around the external shocks that may bring on a crisis, whereas New Zealand’s experience is that failures in banks and other financial institutions are typically the result—or at least substantially contributed to—by poor governance and management. Policies to resolve bank failures should take this into account, which leads us to scepticism that reliance on a large fraction of CET1 in Tier 1 will enable the Reserve Bank to stand back more than it otherwise might.
139. The Reserve Bank advances its risk appetite framework as the basis for its conclusion that the benchmark should be a probability of a system failure no greater than one in 200 years. It justifies this by reference to international norms, stress tests and attempts to model and cross-check some concept of the public’s ‘risk appetite’. However, the analysis provided to date does not explain how the Reserve Bank arrived at a capital ratio of 16 per cent, as opposed to a capital ratio closer to capital levels currently held by the banks (which are significantly higher than the existing regulatory minimum).
140. The way in which the proposed regulation has evolved in a series of steps has narrowed the scope of engagement with the banks and has diminished consideration of options that might offer a more balanced application of regulatory instruments, might provide for more recognition of the variations in circumstances of the banks, and the interaction with Australian regulatory regimes. The analysis does not account for the high degree of sensitivity of

CONCLUSION

judgements about the optimal capital ratio to small changes in assumptions and the wide range of uncertainty around any specific number.

141. The Reserve Bank's approach to the analysis resolves the requirements for stability first before considering the efficiency criteria even though the Reserve Bank of New Zealand Act does not prioritise the twin requirements for stability and efficiency. This method is likely to have significantly affected the result, given that the analysis provided shows that the point at which the benefit and cost curves cross, to arrive at the optimal capital requirement, looks quite unstable. The analysis concludes that there is no net benefit to increasing the capital requirement further above its chosen target, but it seems to us that this result might have been similar at a lower capital ratio had the method used permitted an examination of this possibility.
142. The very substantial increase in equity capital requirements comes across as a one-size-fits-all solution at a level of generality, which could be precluding a more variegated response in which those ratios could be shored up or substituted by other regulatory instruments that have comparative advantage for some issues or lower costs. Given the higher cost of equity over hybrid instruments the increase in the required capital ratio has a material effect on the cost-benefit calculation on the hybrid decision.
143. Taking a wider perspective, the Reserve Bank has evolved over time a more rigorous approach to regulating banks than was envisaged when its Act was passed in 1989 and which gave it a high degree of independence. This has led to some significantly different characteristics from other frameworks and practices of commercial regulation and justifies in our view attention to the justification for these differences in the second phase of the review of the Reserve Bank currently underway. The Reserve Bank seems subject to fewer checks and balances and oversight by ministers, ministries and the courts than some other classes of commercial regulation, including those conducted by other independent bodies. We are not proffering advice here about how and where that review should land, but only that the status quo poses some questions deserving attention.
144. Our key conclusions are that:
 1. The sequence of decision-making has constrained the consultation in ways that are tilted against setting a target capital ratio and then considering the lowest cost way to achieve this allowing for variations in choices of regulatory instrument and circumstances of individual banks. As a result, the proposal seems unnecessarily narrow and inflexible.
 2. The costs of the proposal are very likely under-estimated, and large relative to the expected benefits.
 3. By comparison with other countries—allowing for the hazards of these comparisons—the key issue seems to be the cost arising from the narrow focus on equity capital more than the level of the ratio, although that is arguably on the high end of the range.
 4. We are puzzled why the Reserve Bank is committed to the OBR when it can be argued that hybrid capital is a superior bail in device.
 5. The lack of close attention to a comparison of the proposal with the APRA framework both in terms of concept and operations seems an omission, even though we accept that the policy must work for all the registered banks regardless of their parentage.

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Appendix A: **Estimate of additional Tier 1 capital**

Increase in bank capital under Reserve Bank proposals

Reproducing RB estimate of 4 percentage points		\$bn
A	Current risk weighted assets - 31 March 2018	289.5
B	Current total assets - 31 March 2018	565.0
C	Current actual CET1	32.5
D	Proposed required CET1	52.5
E	RB estimated actual (assuming buffer of 0.5 of EAD)	55.5
F=E-C	Increase in CET1	23
G=F/A	Increase in CET1 as % of RWA	7.9%
H=F/B	Increase as % of total assets	4.1%

Increase in CET1 with 2 pps voluntary buffer

I=Ax2%	CET1 voluntary buffer of 2pps	5.8
J=I+D	Estimated total CET1 with 2pps voluntary buffer	58.3
K=J-C	Increase in CET1 - 2pps buffer	25.8
L=K/A	Increase in CET1 as % of RWA - 2pps buffer	8.9%
M=K/B	Increase as % of total assets - 2pps buffer	4.6%
N=(M+H)/2	Mid point estimate	4.3%

Assumption sources

A	Reserve Bank, Capital Review Paper 4, table 9.
B	Reserve Bank Financial Strength Dashboard
C,D,E	Reserve Bank, Capital Review Background paper, table 10

Appendix B: **Direct economic cost of increased cost of bank credit**

Direct economic cost of increased cost of bank credit - scenario 1

Notes	Component	Estimate
A	Increase in capital (percentage points)	4.3
B	Increase in cost of credit (for each % of capital)	0.081%
C=A x B	Increase cost of credit	0.350%
D	Gross bank loans - billions \$	453
E=CxD	Increased credit costs - millions \$	\$ 1,584

Assumption sources:

A: Authors estimate - see appendix A

B: Reserve Bank of New Zealand, 2019b, p. 36

D: Reserve Bank statistics <https://www.rbnz.govt.nz/statistics/s30-banks-assets-loans-by-sector>

Direct economic cost of increased cost of bank credit - scenario 2

Notes	Component	Estimate
A	Increase in capital (percentage points)	4.3
B	Increase in cost of credit (for each % of capital)	0.16%
C=A x B	Increase cost of credit	0.691%
D	Gross bank loans - billions \$	453
E=CxD	Increased credit costs - millions \$	\$ 3,129

Appendix C: **Steady-state impact on New Zealand GDP from increased cost of bank credit**

145. In assessing the likely steady-state or permanent GDP impact on changes to the capital requirements of banks, papers by (Cline, 2016), (Miles, Yang, & Marcheggiano, 2012), (Junge & Kugler, 2013) and (Schanz J, 2011) start with a constant elasticity of substitution production function and show that the elasticity of output with respect to the cost of capital can be written as:

$$\frac{dY}{dP_k} \frac{P_k}{Y} = -\sigma \frac{\alpha}{1-\alpha}$$

where σ is the elasticity of substitution between capital and labour, and α is the elasticity of output with respect to capital (which is equal to the income share of capital). Once the elasticity of output with respect to the cost of capital is estimated, a given change in the cost of capital can be translated into a GDP effect via:

$$\Delta\%GDP = \frac{dY}{dP_k} \frac{P_k}{Y} \cdot \Delta\%firmcc$$

Where $\Delta\%GDP$ is the percentage change in steady-state GDP and $\Delta\%firmcc$ is the proportionate increase in the cost of capital to firms.

146. To estimate the elasticity of output with respect to the cost of capital for New Zealand, two values are needed: σ , the elasticity of substitution between capital and labour, and, α , the elasticity of output with respect to capital. Steenkamp (2016) provides estimates of the elasticity of substitution between capital and labour for New Zealand under the assumption of a constant elasticity of substitution production function using annual data from 1996 to 2012. His estimates of σ are 0.86 in the general specification and 1.13 when assuming Hicks neutrality (which he notes is his preferred specification). When the model is estimated on quarterly data (1996Q1-2016Q2), the estimates of σ change to 1.407 in the general specification and 0.49 when assuming Hicks neutrality; the range of estimates, and their sensitivity to the dataset they are estimated on, indicate considerable uncertainty around σ .
147. Pinning down a value of α (the elasticity of output with respect to capital, which is equal to the income share of capital) is easier. Eyeballing figure 3 in Steenkamp (2016) suggests labour's share of output is just under 60 per cent and, by implication, capital's share is just over 40 per cent. This result is consistent with Conway (2015), who found that the labour share of income in the New Zealand economic has declined from a high of 65.9% in 1981 to 56.% in 2010.
148. To estimate the proportionate increase in cost of capital to firms ($\Delta\%firmcc$) requires assumptions about the:
- percentage of firm finance from bank lending
 - current cost of capital for New Zealand firms.

149. In a study referenced by the Reserve Bank, Miles et al. (2012) assume these two values are one third and 10 per cent respectively. A cost of capital estimate of 10% is unrealistically high in the current New Zealand environment. The New Zealand Treasury recommends a 6% discount rate to reflect the opportunity cost of capital in long-term investments.¹¹ In estimating the opportunity cost of capital, the Treasury assumes that the percentage of firm finance from debt is one third.¹²
150. If firms rely on bank debt for a third of their capital, and the cost of bank credit increases by 8.1 per cent (for each additional percentage point of capital held by the banks), then the overall cost of capital for New Zealand firms would likely rise by 2.7 basis points (one third of 8.1 basis points). Adopting the Treasury discount rate as an estimate of the opportunity cost of capital, a 2.7 basis points increase in the cost of capital translates into a 0.45% increase in the cost of capital for firms in proportional terms.
151. Table 3 provides a calculation, using the above formulas, of the reduction of steady-state GDP owing to the change in capital requirements under three scenarios. The scenarios reflect different assumptions about the elasticity of substitution between capital and labour.

Table 3 Impact on steady state GDP from an increase in bank credit costs

	Notes	Scenario 1	Scenario 2	Scenario 3
The elasticity of production with respect to capital (α)		0.44	0.44	0.44
Elasticity of substitution between capital and labour (σ)		0.49	0.86	1.13
Implied elasticity of output with respect to capital $\frac{dY}{dP_k} \frac{P_k}{Y}$	A	-0.39	-0.68	-0.89
Impact of a one percentage point increase in capital requirements on lending rates	B	8.1 basis points	8.1 basis points	8.1 basis points
Proportionate increase in firms' cost of capital	E	0.45%	0.45%	0.45%

¹¹ The estimate of the current rate (May 2018) is available here: <https://treasury.govt.nz/information-and-services/state-sector-leadership/guidance/financial-reporting-policies-and-guidance/discount-rates>.

¹² The methodology used by the Treasury to estimate the opportunity cost of capital is available here: <https://treasury.govt.nz/publications/guide/public-sector-discount-rates-cost-benefit-analysis-html>

Impact of a one percentage point increase in capital requirements on steady-state GDP impact (basis points)	A*E	-17	-30	-40
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Appendix D: **Value of loss in economic output from higher real interest rates**

Lost economic output - Reserve Bank cost assumptions			
Notes	Component	Estimate	
A	Increase in capital (percentage points)	4.3	
B	Lost output (for each % of capital)	0.088%	
C=A x B	Lost output % of GDP	0.380%	
D	GDP billions	\$ 285.7	
E	Lost economic output - millions \$	\$ 1,085	
Assumption sources:			
A: Authors estimate - see appendix A			
B: Reserve Bank of New Zealand, 2019a, p. 28			
D: Calculated as follows:			
f	Real (2009/10 dollars) GDP in year to March 2018	\$ 243	billion
g	Output gap for year to March 2018 (February 2019, Monetary Policy Statement)	0.2%	
h = f x (1-g)	Implies potential GDP	\$ 242.5	billion
i	GDP deflator	1.178	
j = h x i	GDP March 2018 dollars	\$ 285.7	billion

Appendix E: **Elasticity of lending to capital ratios**

Table 4 Estimates of the elasticity of lending volume to a 1 percentage point change in the risk-weighted capital ratio

Study	Estimate of elasticity
(Francis & Osborne, 2009)	-1.20
(Cosimano & Hakura, 2011)	-0.65
(Bridges, et al., 2014)	-3.50*
(Noss & Toffano, 2016)	-4.50
(Aiyar, Calomiris, & Wieladek, 2016)	-0.50

Source: See Noss and Toffano (2014, Table 7).

* Elasticity of lending growth, not volume.

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