

MEMORANDUM FOR FSO Committee

FROM Financial Policy (Author: Charles Lilly)

MEETING DATE 19 October 2018

SUBJECT **Design options for an output floor for IRB banks**

FOR YOUR Decision

It is recommended that the Committee:

1. **Note** that an output floor between credit risk capital outcomes under the IRB and standardised approach will be a key feature of our revised capital framework, alongside robust dual reporting, and restrictions on some aspects of IRB modelling. The output floor seeks to reduce unjustified gaps in capital outcomes both across IRB banks, and when compared to standardised banks.
2. **Note** that an output floor will also feature in the revised Basel III and APRA capital frameworks, set at 72.5% of total RWAs under a fully standardised approach. While we agree with the motivation for the Basel Committee's floor, we see the calibration as largely a political outcome and neither a starting point for, nor binding on, the New Zealand framework.
3. **Note** that results from our Quantitative Impact Study (QIS) indicate the four IRB banks' current credit risk RWAs sit between 67^{RBNZ s105} and 86^{RBNZ s105} percent of the RWA outcomes they would report under a fully standardised approach.
4. **Note** that, despite the shortcomings we see in the IRB approach, QIS results demonstrate that the current standardised approach has its own weaknesses, in terms of having very limited risk differentiation in practice. We intend to improve the risk sensitivity of the standardised approach over time, following APRA changes in 2019.
5. **Note** that we do not see a strong argument for embedding a 'payoff' in the calibration of the IRB approach vis-à-vis the standardised approach on the basis of the improved risk management that theoretically accompanies it, nor due to differences in the underlying portfolios of the IRB and standardised banks in New Zealand.
6. **Note** that the three broad options for the level of granularity of an output floor we have assessed – at the individual exposure, asset class, or whole of portfolio level – each have their strengths and weaknesses. We see significant shortcomings with an approach that would set a floor on an individual exposure basis. On balance we favour a total exposure approach, alongside a potentially higher setting for the framework's existing IRB scalar. In our view, this combination best meets the review's objectives of simplicity, international comparability, and retention of a risk-based approach to setting capital.
7. **Agree** to set the output floor between IRB and standardised credit risk RWA at the **total exposure** level, and to retain (and potentially increase) the IRB scalar. If so, we will return to the Committee with detailed calibration options in November.

Purpose and background

1. This paper sets out design considerations and recommended options for consultation on the design of an output floor for internal ratings based (IRB) banks in the revised capital framework.
2. Following the ‘denominator’ consultation paper, the Bank made the in-principle decision to retain the IRB approach in our capital framework. This decision recognised the additional risk sensitivity the IRB approach can offer, but acknowledged the opacity and complexity of IRB models, and the significant but unjustified gap in outcomes relative to the standardised approach.
3. Alongside dual reporting (disclosure of IRB and standardised outcomes), and removal of the IRB approach for some credit portfolios, the Bank decided it would impose a floor on the risk-weighted assets (RWA) for credit risk produced by the IRB approach, set at a proportion of the equivalent standardised RWA outcome.
4. An output floor will serve multiple purposes in mitigating the risks associated with retaining the IRB approach in the framework:
 - a. Reduce unjustified gaps in capital requirement outcomes between the IRB and standardised approaches, and between IRB banks, particularly in portfolios where models have little “value add”, or where exposures are largely homogenous across banks.
 - b. Ease our discomfort with the decline in some risk weights we have observed over time, which do not appear fully justified based on a declining risk.
 - c. Build in a more systematic way of limiting excessive variation in risk weights across the IRB banks by compressing the range of possible outcomes for broadly comparable exposures. The supervisory overlays and model calibrations we have used in the past have been ad hoc and reactive, and some have lost their effectiveness over time.

Context: changes to the Basel and APRA frameworks

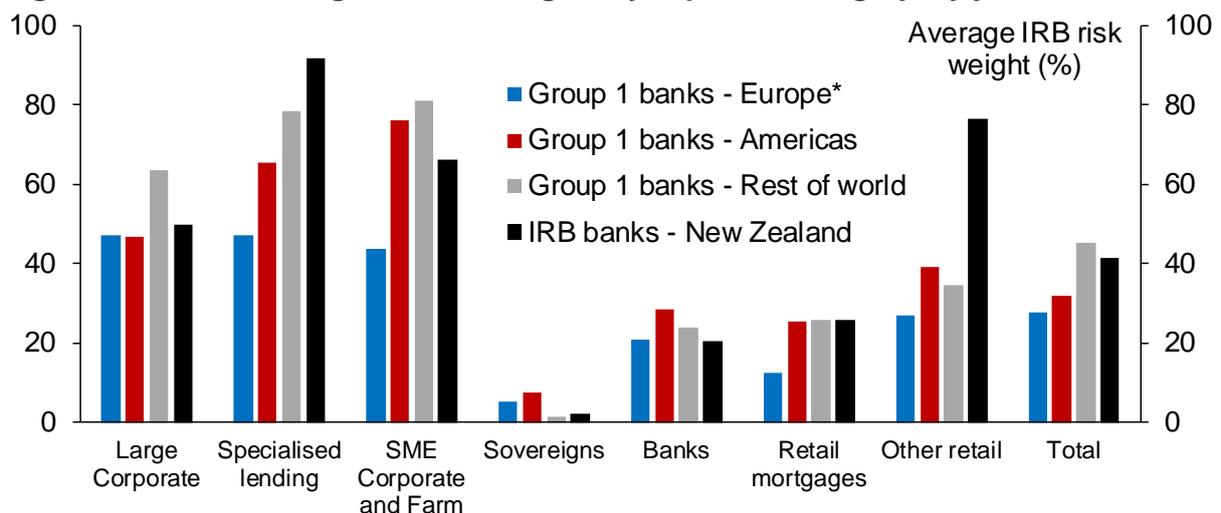
5. Since 2012 the Basel Committee has worked on a package of changes to improve the robustness and credibility of the calculation of RWAs. The finalised Basel III framework, released in December 2017, includes an output floor for internal models banks, alongside additional constraints on the IRB approach.¹ As with our proposed floor, the Basel floor seeks to reduce excessive variability in RWA outcomes between internal models and standardised banks, and will also replace an existing but outdated floor in the framework tied to Basel I outcomes.²

¹ Changes to framework also make the standardised approach more risk-sensitive, and a new methodology for determining operational risk capital will replace the current standardised and modelled approaches.

² Basel II, introduced from 2008, included a transitional floor that required banks to maintain capital levels equivalent to at least 80% of outcomes under Basel I. The Basel I floor has not been implemented consistently across jurisdictions, is potentially distortionary given the comparatively low

6. The Basel III floor covers all risk types and categories where internal models remain available (credit, counterparty, securitisation, and market risks), and requires banks to calculate their capital ratios applying a floor on RWA equal to 72.5% of total RWA produced using only the standardised approaches, phased in by 2027.
7. Alongside the revised floor, a scalar of 1.06 for the IRB approach will be removed from the Basel framework. The scalar, which is also in our framework, requires RWA outcomes from the IRB approach to be multiplied by a factor of 1.06; no scalar applies to standardised RWA. The scalar dates back to the adoption of Basel II in 2006, and was designed as a safety buffer to partly offset the decline in IRB banks' minimum capital requirements projected to result from the then-new framework.
8. The Basel Committee's floor does not have a scientific basis. 72.5% was chosen following months of negotiations, largely to satisfy the concerns of European members, whose banks would be most adversely affected given the comparatively low risk weight outcomes their models produce (figure 1).³

Figure 1: Current average IRB risk weights by exposure category, by jurisdiction



Source: Basel III monitoring report, December 2017, QIS returns

* Group 1 banks: internationally-active banks with >€3b in Tier 1 capital in Basel Committee member jurisdictions

9. Overall, the finalised Basel III framework and calibration was designed to produce no average change in minimum required capital for the banks participating in the Basel QIS. This outcome was achieved through a combination of the calibration of the floor at 72.5%, reductions in some risk weight outcomes under the finalised standardised approach, and a reversal of some of the Committee's initially proposed constraints on the IRB approach.

risk sensitivity of Basel I, and is increasingly seen as out of date given Basel I standards are no longer maintained globally. The Bank removed the Basel I transitional floor from our framework in 2011.

³ e.g., "It's a negotiation led by central banks," French Finance Minister Bruno Le Maire said in Luxembourg on Tuesday. "Our position is clear. We will have new discussions in Washington," he said, reiterating the French insistence that the new Basel rules shouldn't result in "major increases on capital requirements". <https://www.bloomberg.com/news/articles/2017-10-10/global-bank-capital-rules-near-completion-10-years-after-crisis>

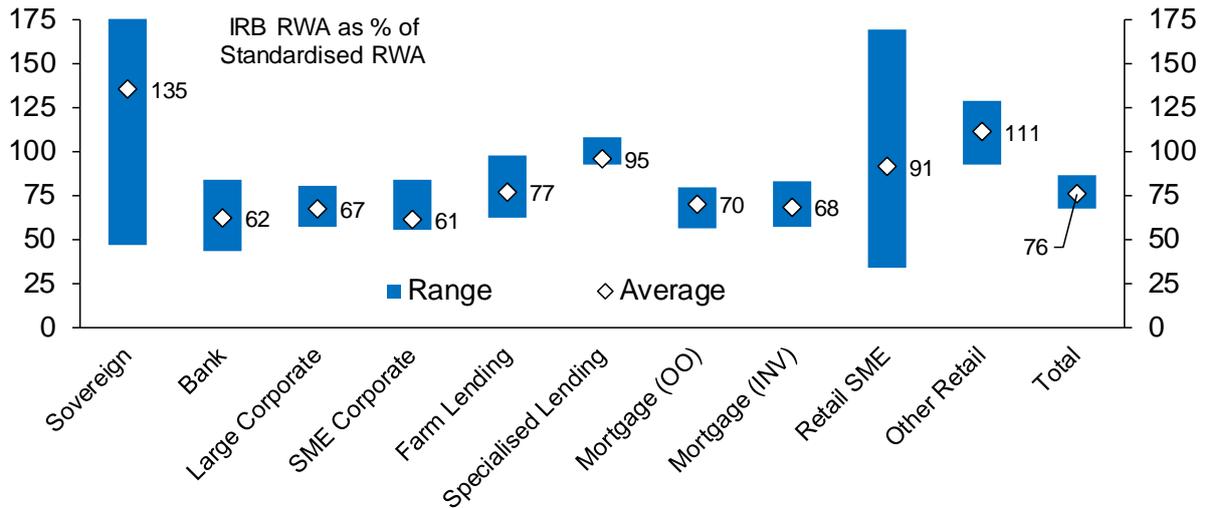
10. APRA announced it will impose the Basel III floor at 72.5% from 2022. To close a gap between IRB and standardised outcomes that may remain, APRA has floated retaining the concept of an IRB scalar in the framework described above (currently set at 1.06). It has said that it will calibrate the overall framework to ensure that average risk weight outcomes do not create “unwarranted competitive distortions” between the two approaches, but has not yet determined a calibration for the scalar.
11. Internal model banks in the USA are subject to a floor on total RWA equal to 100% of the US Basel III Standardized RWA. The US standardized approach is similar to Basel I (e.g. 50% mortgage risk weight, no separate operational risk capital).
12. Aside from the USA, we are not aware of other Basel Committee member countries planning to impose a floor at a different level to the 72.5% calibration. This would likely prompt criticism from other Committee members given the stated aims of the framework changes (reducing unwarranted variability and a lack of international comparability).
13. Our assessment of the Basel III changes is that the floor’s calibration is largely a political outcome, and while a relevant benchmark, need not be considered as either the starting point for the calibration of the New Zealand framework, nor binding on our ability to require a different floor.

Points to consider for designing a floor linked to standardised outcomes

14. Figure 2 and Table 1 below give an overview of the current IRB approach compared to outcomes were the four banks applying only the standardised approach. Banks’ current IRB RWA sits between 67% ^{RBNZ s105} and 86% ^{RBNZ s105} of standardised RWA, with an aggregate average of 76%. There is significant variability in some portfolios, including some where IRB results in higher RWA than the standardised approach.

^{RBNZ s105}



Figure 2: IRB RWA as a percentage of standardised RWA, by asset class

Source: RBNZ QIS returns (2018)

Table 1: IRB RWA as a percentage of standardised RWA, by asset class, by bank

RBNZ s105

15. In the following sections we discuss several points in relation to the design of an output floor:

- How the IRB and standardised approaches differentiate risk.
- Whether incentives to become accredited for IRB should be built into the framework's calibration.
- Whether standardised is the relevant benchmark for calibration.
- Our approach to supervising the IRB framework.
- Technical points for comparing outcomes between the two approaches.

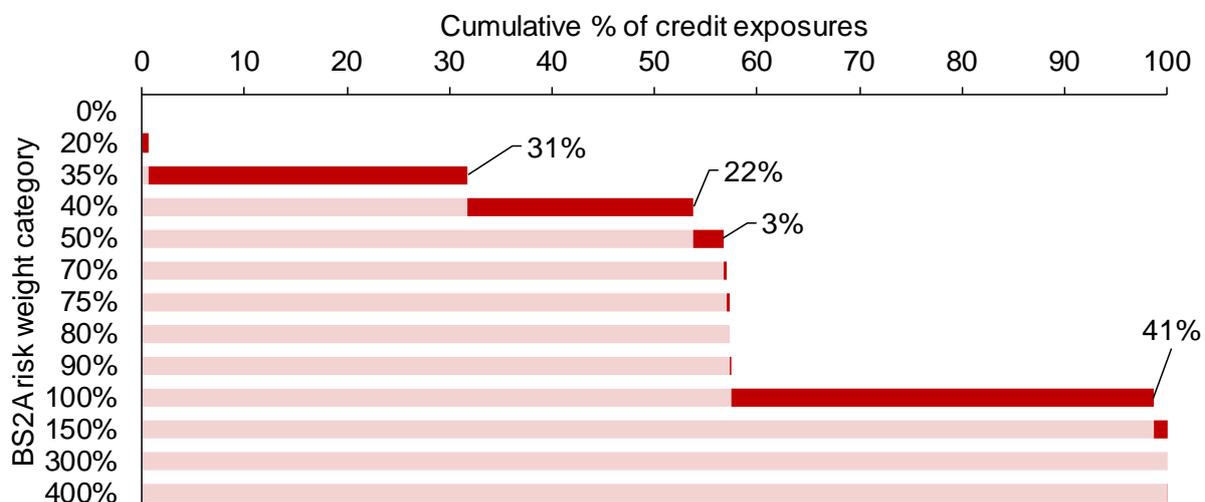
A: The current standardised approach is a broad-brush, one-size-fits-all solution with limited accounting for different risk profiles, but the IRB approach can produce spurious and unjustified risk differentiation

16. A principle for the capital review is that "capital requirements should be set in relation to the risk of banks' exposures". The potential benefit of improved risk differentiation and capital allocation was the key factor in FSO's decision to retain IRB in the

framework. In designing and calibrating an output floor, an important judgement is how much risk differentiation from IRB models is preserved, against imposing a more binding floor to the standardised approach.

17. The standardised approach's relative simplicity comes at the expense of better taking into account the underlying credit risk of banks' portfolios (to the extent this can be objectively measured). Capital is allocated based on broad risk categories – e.g. sovereigns, banks, externally rated claims, mortgages, and all other credit exposures. While there is some differentiation of risk weights for residential mortgages, by LVR and borrower type, and for externally rated exposures, most of banks' other exposures receive a 100% risk weight irrespective of the underlying risk. In effect, the standardised approach operates as a quasi-leverage ratio given New Zealand banks' portfolios, with concessional treatments for mortgages and exposures with external ratings.
18. To put some numbers on this, the QIS results show 83% of the IRB banks' total credit exposures would receive either a 35%, 40% or 100% risk weight under the standardised approach. These represent the owner-occupier mortgage LVR<80, investor mortgage LVR<80, and unrated/other asset categories respectively. Once Sovereign and Bank exposures are excluded (since we have already decided to remove the IRB approach for these asset classes), 94% of remaining IRB credit exposures would be in the 35%, 40% or 100% risk weight categories (figure 3).

Figure 3: Distribution of IRB banks' credit exposures by BS2A risk weight, excluding Sovereign and Bank exposures



Source: RBNZ QIS returns (2018)

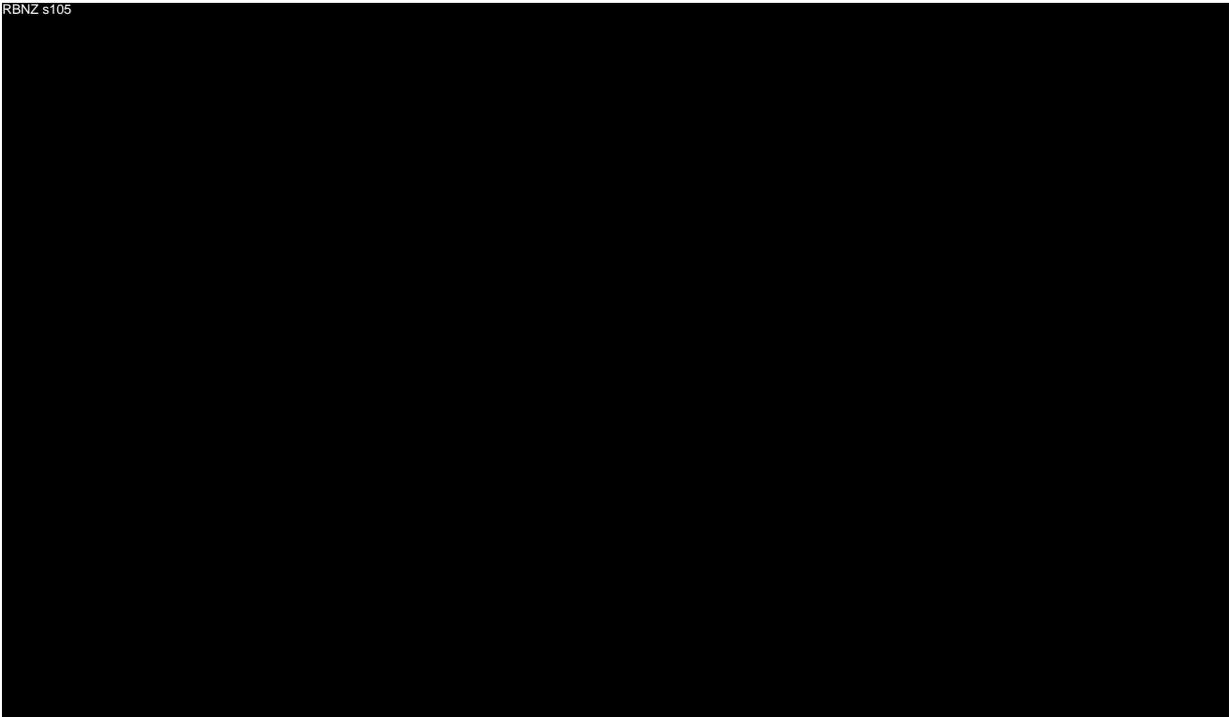
19. As one example of the limitations of the current standardised approach, there is limited or no recognition of the effect of most common types of collateral in mitigating credit risk. For mortgages, security coverage beyond 20% of the loan (<80% LVR) has no effect on the risk weight. For corporate exposures, including commercial property, only financial collateral (e.g. cash on deposit), guarantees from highly rated entities (e.g. sovereigns or banks), or credit derivatives are recognised as forms of credit risk mitigation. In practice this means that the level of security coverage (or

other dimensions of risk) of a standardised bank's lending is often irrelevant when determining their capital requirements.

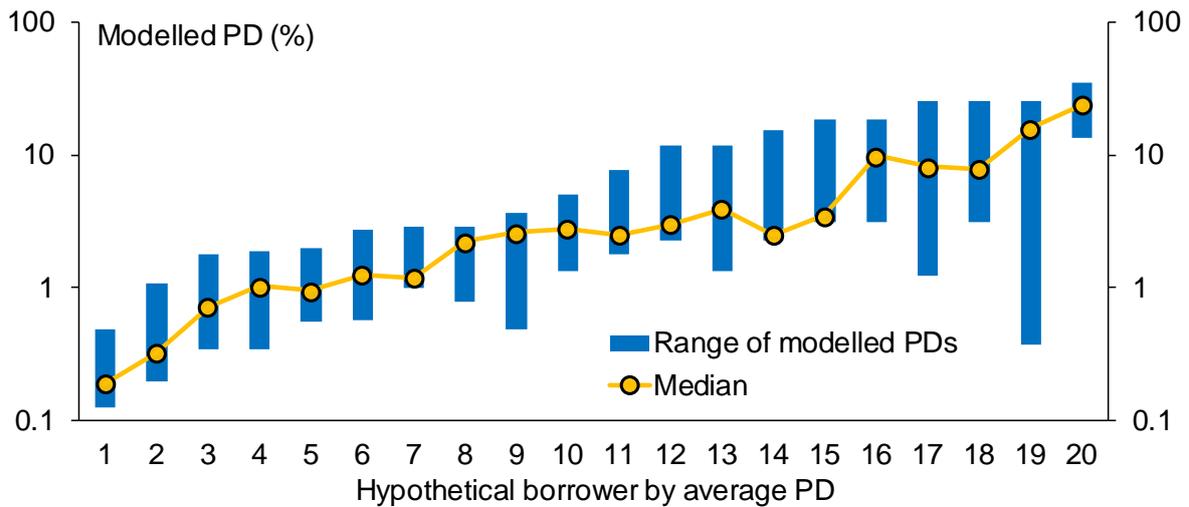
20. Figures 4 and 5 contrast the outcomes of the standardised and IRB approaches for farm lending and mortgages. Since none of its exposures are externally rated, all of Rabobank's farm lending receives a 100% risk weight. 94% of Kiwibank's mortgage lending receives a risk weight of either 35% (owner-occupied) or 40% (investor), as the proportion in the higher risk weight buckets (mortgages >80% LVR) has fallen in recent years. For the IRB banks, risk weights are sensitive to information such as the borrowers' financial position (e.g. serviceability) and the level and types of security held. This results in a wide spreading of risk weights, with most IRB exposures falling below the standardised outcome, and a tail of very high risk exposures receiving higher risk weights than would be possible under the standardised approach.

Figures 4 and 5: Distribution of portfolios by current risk weight (five largest farm lending and mortgage banks)

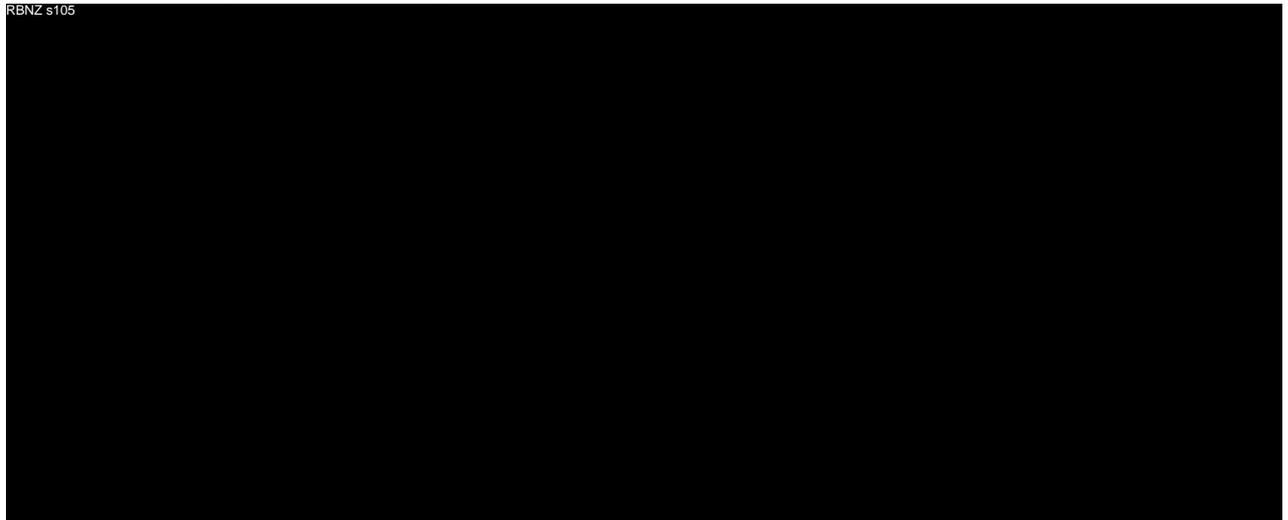
RBNZ s105



21. But while the wide range of risk weight outcomes under the IRB approach potentially allows for more sensitive allocation of capital to risk, such an outcome relies on the models being able to discriminate between low and high risk borrowers, and being accurately and conservatively calibrated. Similar to results in overseas studies, the dairy benchmarking project showed that, on average, banks' models came to similar views on which of the hypothetical borrowers were riskier than others (figure 6). However, there were material differences in capital outcomes, predominantly driven by modelling and calibration differences (i.e. assigning higher or lower PDs and LGDs on average than peers). Across the range of IRB portfolios we observe wide variations in risk weight outcomes, with outliers in key portfolios, which we are unable to explain on the basis of differing underlying risk (figure 7).

Figure 6: Modelled probability of default in dairy benchmarking exercise (log scale)

Source: Dairy benchmarking data returns

Figure 7: Average IRB risk weight by portfolio

Source: RBNZ QIS returns (2018)

22. It is also important to stress that, while the current standardised approach has its limitations, and FSO decided to retain our current standardised approach for the time being after the “denominator” consultation, our intention is to improve over time the degree of risk differentiation it provides. Under APRA’s proposed implementation of the Basel III standardised approach there would be several new risk weight categories, including commercial real estate (70-110%), SME (85%), and retail non-real estate exposures (100-125%). We will assess the merits of adopting these or other modifications over 2019, once APRA has finalised its decisions.

23. All told, while neither of the two approaches currently available to banks offers a fully satisfactory way of generating a risk-based capital ratio, this is to some extent an impossible goal. The point of the above analysis is to highlight that tightly binding floors to the current standardised approach would both create problems (weakening the framework’s risk sensitivity) at the same time as solving others (reducing

excessive variation in overall outcomes), and that this should be factored into how we go about designing a floor for the New Zealand framework.

B. Do banks need to be compensated for their investment in advanced risk management systems with lower capital requirements under the IRB approach?

24. How much of a regulatory 'payoff' should IRB banks receive for investing in their risk management systems? One argument for embedding a capital benefit in the relative calibrations of the IRB and standardised approaches is that banks need incentives to incur the substantial costs of meeting the accreditation requirements of IRB.

25. On these costs, we are aware that ^{RBNZ s105} [REDACTED] According to shareholder presentations, Bendigo and Adelaide Bank in Australia costed its five year advanced accreditation project at AU\$84m+, or 0.13% of assets. ^{RBNZ s105} [REDACTED]

26. But development of compliant models and a capital calculation engine alone account for only a portion of the total project costs of IRB accreditation, with much of the required investment being in information management systems, such as for the collection of customer data. Use of IRB models also entails some ongoing costs, such as the maintenance of model development and validation capability, and reporting requirements.

27. Across all the range of required capabilities for operating as an IRB bank, we consider most of these represent investments that banks would still make in the absence of a 'payoff' for IRB accreditation, due to their numerous other uses and the private benefits banks will derive from them. For example, internal credit rating systems have an important role in pricing, provisioning, stress testing and portfolio monitoring, and are developed and maintained by both the IRB-accredited and standardised banks for these purposes. Banks need to collect and maintain good quality data for reasons other than compliance with IRB requirements – statistical/regulatory reporting, responsible lending obligations, participation in covered bond/RMBS programmes, and to enable sound risk management in general.⁴

28. Our assessment is that once all of these benefits are accounted for, the remaining investment required to meet the accreditation requirements is relatively low. Moreover, in the New Zealand context, it is highly likely the four Australian-owned banks would be facing these costs to meet their Group requirements irrespective of the capital adequacy framework in New Zealand. As such, we do not see a case for embedding compensation for investment in risk management in the calibration of the New Zealand IRB framework.

⁴ On this point, our experience with the Benchmarking project suggests that some IRB banks have not made the investments in better data systems that we expected as a *quid pro quo* of accrediting them.

C. *Differences in overall capital outcomes may reflect genuine risk-based differences between IRB and standardised banks' underlying portfolios*

29. Another argument to support embedding a difference in capital outcomes between the two frameworks is that their advanced risk management allows IRB banks to 'cherry pick' better quality customers than standardised banks operating in the same market. The implication is that capital requirements should reflect this lower risk profile, offset by higher requirements for the banks holding the remaining part of the market, to produce an overall acceptable level of system capital. Any 'gap' in outcomes between the two approaches reflects differences in underlying risk, and the framework shouldn't seek to 'level the playing field' through a distortionary output floor that punishes legitimate risk differentiation.
30. For example, evidence from the UK suggests that IRB banks there have focussed their mortgage lending towards low LVR borrowers, in light of the comparatively lower capital required than the standardised approach. This has left a concentration of high-LVR loans with standardised banks, who generally have less sophisticated risk management.⁵ Moreover, there is little evidence to suggest that the various standardised risk categories have been calibrated based on underlying risks (for example, given they don't take into account common types of collateral). As such, it's not obvious why they should be considered a starting benchmark for IRB outcomes, which are at least produced using an internally consistent framework for measuring credit risk (in principle at least, if not in practice).
31. However, our recent analysis of mortgage origination standards has found only moderate or no average difference between standardised and IRB banks in New Zealand, reflective of the largely commoditised nature of the market.⁶ Similarly, the RBNZ s105 portfolio performed similarly to the IRB banks, and their NPL ratio for agricultural loans has been within the range of the IRB banks in recent years, albeit towards the high end.
32. More generally, with 88% of system lending it seems unlikely that the IRB banks can consistently pick above average quality borrowers in the markets in which they operate. In the markets where IRB banks compete most with standardised banks we do not observe large differences in underlying riskiness of portfolios, making a gap in outcomes hard to justify on the basis of underlying risk. In other markets, IRB banks hold nearly all of the system's assets so in a sense we only need worry that the IRB approach produces risk weights and system capital at our desired level (whether we achieve that via floors or other means).

D. *Our supervisory approach suggests a role for more binding floors than other jurisdictions*

33. The Bank's supervision of the IRB approach is less intensive than envisioned by Basel II's Supervisory Review Process (Pillar 2). While we have focussed our

⁵ Bank of England Staff Working Paper 639, *Specialisation in mortgage risk under Basel II*.

⁶ See 2017 Hypothetical Borrower Exercise (#7301955) and a 2017 FSO paper (#6992188).

attention on ‘deep dives’ into the operation of models for core portfolios (e.g. through the Benchmarking project), the Bank does not proactively monitor all banks’ models’ performance and regularly require recalibrations in the same way as other supervisors do, such as APRA. Our approach is relatively reactive, either focussing on models when brought to us through the change submission process, or in response to issues with specific banks that come up from time to time. In part, this reflects the additional layer of oversight that APRA provides where the NZ banks use Group models.

34. We have paid less attention to ‘non-core’ areas of the framework than might have been the case under alternative supervisory models. Notwithstanding APRA’s oversight in some areas, there can still be quite a wide dispersion of outcomes in some smaller portfolios (see figure 7 above), and we aren’t in a good position to say whether these reflect portfolio or modelling differences. Similarly, we aren’t certain that all IRB banks are consistently applying the framework in all areas.⁷ Partly these issues will be addressed through reducing the scope of portfolios and parameters that can be modelled, and partly through clarifications in the new Handbook. But we also see a role for more binding floors than the Basel calibration to narrow gaps in outcomes for less prominent portfolios where the IRB approach remains available.

E. Different methodologies mean that ‘risk weights’ are not directly comparable between the IRB and standardised approaches

35. One last technical point to make is that direct comparisons of RWA or ‘risk weight’ outcomes between the two methods are potentially misleading due to the different way each approach accounts for risk. Since RWA under the IRB approach only covers unexpected losses,⁸ during periods of low impairment we estimate that \$100 in RWA under the IRB approach is worth roughly \$103 in RWA under the standardised approach, in terms of required CET1 capital.⁹ There are also differences in how exposure amounts are measured between the two approaches, with IRB generally producing assessments around 8% higher than standardised.
36. Considering these two effects, we estimate that the four IRB banks’ current average IRB risk weight of 42% would increase to 46% on a ‘standardised-equivalent’ basis. This compares to an average risk weight of 59%, were they to report on a fully standardised basis. We will factor this difference in methodologies into our recommended calibration of the floor.

⁷ For example, we know there are differences in IRB banks’ treatment of residentially-secured loans to SMEs, and in the application of the supervisory slotting approach for commercial property exposures.

⁸ IRB RWA represent the unexpected component of credit losses (UL); expected loss (EL), to the extent it isn’t already covered by the bank’s provisions, is deducted from CET1 capital. In contrast, RWA under the standardised approach represents a ‘total loss’ concept, and CET1 capital accounts for expected losses only insofar as the bank has already raised provisions to cover them, reducing the bank’s equity. While the adoption of IFRS9 requires banks to provision for expected credit loss (ECL), the calculation of ECL does not follow a mandated formula and it is expected that ECL estimates will generally be lower than EL from IRB (e.g. due to use of point-in-time PD and LGD estimates for ECL).

⁹ Estimated by comparing BNZ’s total IRB credit RWAs to their total IRB credit RWAs plus 12.5 times the expected loss deduction. BNZ already uses IFRS9 so serves as our benchmark in this case.

Implementing an output floor

37. Three broad options have been considered for how to implement a floor between the IRB and standardised approaches:

Type of floor	What it means
Exposure-by-exposure	Banks calculate an IRB and standardised capital requirement for each counterparty/exposure. Banks take the maximum of the IRB outcome and X% of the standardised outcome and aggregate across all individual exposures to determine the RWA used in the capital ratio.
Asset class	Definitions of the asset classes in BS2B and BS2A would be aligned. Banks would calculate RWA for each asset class (e.g. farm lending) as the maximum of the IRB outcome and X% of the standardised outcome for that category. The resulting RWA for each asset class is aggregated to a final RWA that determines the capital ratio. We could apply different scalars to each category.
Total exposure	Banks perform two standalone calculations across the whole of their credit risk exposure: IRB RWA as per current practice, and RWA as if they were a fully standardised bank. Capital ratios would be determined using the maximum of IRB RWA and X% of the standardised RWA. This is the Basel Committee and APRA approach (with X=72.5).

38. As noted earlier, another lever in our toolkit is the **IRB scalar** – currently set at 1.06 – which multiplies all RWA calculated under the IRB approach by a fixed amount.¹⁰ The Basel III framework will remove this scalar, but APRA has stated it is likely to retain it in its framework at a yet-to-be-determined level, to narrow the gap to the standardised approach. If necessary, APRA has said it will potentially apply different scalars for residential mortgages and commercial property exposures.

39. A key assumption behind our analysis is that the dual reporting policy will mean the IRB banks have full, robust and standalone capital engines to determine their position under the New Zealand standardised approach. They would not be relying on so called ‘out-of-system’ adjustments to their existing calculations when determining their capital position under dual reporting, or for the purposes of applying the floor.

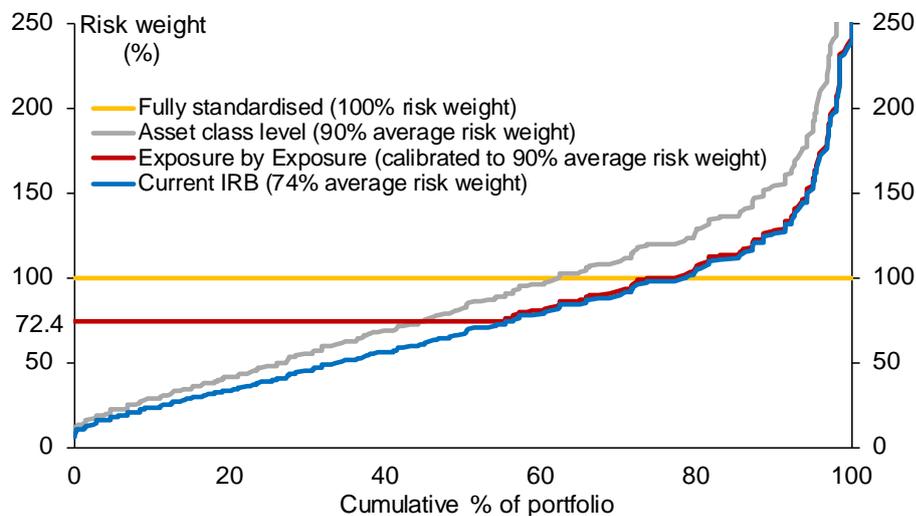
40. It should also be noted that RWA for operational risk, market risk, and credit valuation adjustment would be unaffected by the floor, as these risk categories are already (or will be, in the case of operational risk) calculated on a standardised basis by all locally incorporated banks. The same applies for portfolios that will be standardised (Sovereign, Bank).

¹⁰ In the BS2B implementation, the 1.06 scalar applies to all credit risk RWA calculated by IRB banks, including portfolios where the supervisory slotting approach or standardised approach are used. In the Basel II/APRA implementation, the scalar only applies to exposures that use the IRB equation to calculate RWA.

How does each floor affect the allocation of capital?

41. It is difficult to say with precision how adjusting both the relative and absolute capital requirements for different types of lending will affect banks' lending strategies, and how their portfolios would evolve over time in response to these changes. Binding calibrations of any of the three output floor options will tilt the balance of risk and return (at least, risk as assessed by the IRB models) in a way that could encourage banks to increase their concentration of higher risk exposures over time, or reduce lending to low risk borrowers, given the insensitivity of the standardised approach discussed above. Previous interventions in banks' models have on occasion prompted vociferous responses from affected banks, including suggestions that they will withdraw from the affected sectors because of the capital impost. To date, however, we haven't observed clear changes in their lending strategies after the fact. With all that said, we can at least assess from a static point of view how each type of floor alters banks' current capital requirements and capital allocation.
42. As an illustrative example, Figure 8 plots the distribution of the four IRB banks' farm lending exposures by current risk weight under IRB (blue line). At the moment, the four banks sit at an average risk weight of 74%. Suppose that our desired outcome is banks having 90% of the standardised capital requirement. This can be achieved by:
- an **exposure-by-exposure floor** (red line). Under this approach, a value for the floor is calculated (72.4% in this case) so that the average outcome for the portfolio is 90%. In effect, no exposure can be assigned a risk weight below 72.4%. An exposure-by-exposure floor puts a kink into the risk weight curve, increasing capital requirements for the lower end of the distribution, and leaving the higher end unchanged.
 - an **asset class floor** (grey line). Under this approach, the IRB outcome for the portfolio is effectively scaled up across the curve by a factor of 90/74 to produce the desired 90% average risk weight. The exact size of the scalar will depend on the desired portfolio outcome and the asset class's average IRB risk weight.

Figure 8: Farm lending risk weight distribution under different types of floor



Source: Capital Satellite survey, RBNZ estimates

43. A **‘total exposure’** floor can be considered a variant on the asset class floor. Effectively, the asset classes where a bank’s IRB calculation produces relatively higher outcomes compared to standardised would be able to offset the upward scaling of asset classes where the IRB approach produces relatively lower outcomes. This offsetting effect means that a 90% ‘total exposure’ floor would likely result in less overall RWA than setting a 90% floor at each asset class level. However, it is simple to compensate for this difference with a higher calibration for the ‘total exposure’ floor to produce the same desired overall RWA under either approach.
44. A benefit of the ‘total exposure’ approach is that we do not need to work out the right level for individual asset class floors upfront. We would mostly allow each banks’ IRB models to determine the relative capital allocated to each asset class, based on the banks’ internal assessment of relative risk, but could still obtain the same desired level of total capital as the more prescriptive approaches. While differences in risk weight outcomes for IRB banks may persist within asset classes, in aggregate any such differences would be balanced out given the four banks have broadly similar proportions of their total credit exposures in each asset class.
45. Adjusting the **IRB scalar** is neutral with respect to the relative capital assigned to individual loans or across asset classes, as effectively all capital requirements for all exposures change by the same amount. Changes to the IRB scalar have the same practical outcome as adjusting IRB banks’ capital ratios. However, because it applies at the same rate to all exposures, adjustments to the IRB scalar wouldn’t close current gaps in risk weight outcomes between the IRB banks.

Issues with an exposure-by-exposure floor

46. An exposure-by-exposure floor could have the effect of penalising portfolios where IRB models produce more risk discrimination, particularly portfolios with a high concentration of loans above and below the level at which the floor is set.
47. For example, consider the hypothetical portfolios in Table 2, each comprising two loans: one portfolio’s loans have 60% and 80% risk weights, and the other’s loans both have 70% risk weights. If the exposure-by-exposure floor is set at 75%, the first portfolio would require more capital, despite it initially being assessed as having the same average level of risk as the second portfolio:

Table 2: Illustrative impact of an exposure-by-exposure floor

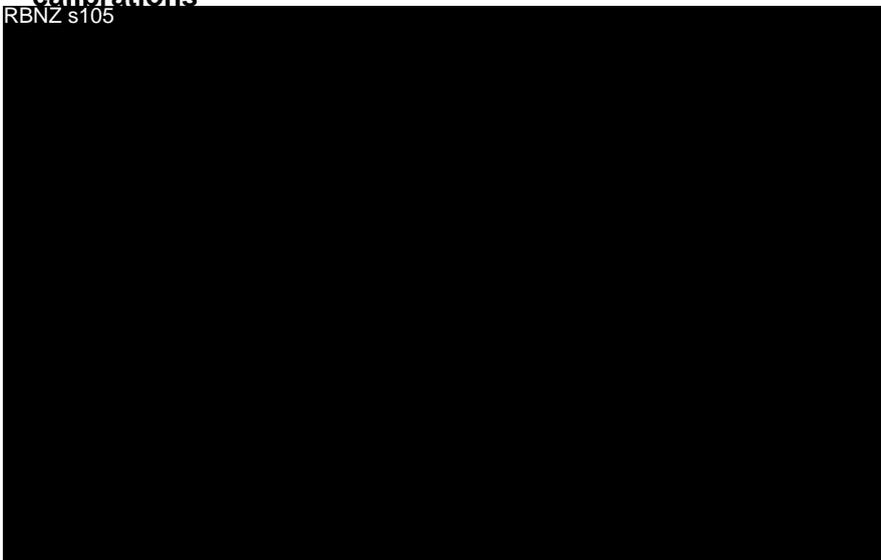
	Loan 1	Loan 2	Total RWA	Minimum RW% (floor)	Total RWA post-floor
Portfolio 1	\$100 at 60%	\$100 at 80%	\$140	75%	\$155
Portfolio 2	\$100 at 70%	\$100 at 70%	\$140	75%	\$150

48. This property of an exposure-by-exposure floor could encourage banks to build models that concentrate capital outcomes around a narrower range that is currently the case, to lessen the impact of the floor for a given level of underlying risk.

Additionally, banks could seek to game an exposure-by-exposure floor by adjusting their calculation approach for borrowers with multiple facilities. For example, pooling two associated but separate mortgage facilities (a low risk P&I component, and a high risk revolving component) into a single exposure for the capital calculation could reduce the total capital required, without any change in the underlying risk. Part of the problem here is that banks currently have a degree of discretion about how they interpret “exposure”. Defining “exposure” prescriptively would not be a straightforward exercise.

49. Banks’ existing models produce different amounts of ‘risk spreading’, i.e., the degree to which borrowers are sorted into low and high-risk categories around the mean for the portfolio. The insensitivity of an exposure-by-exposure floor means it could have an unintended impact on banks’ current portfolios. Figure 9 illustrates the degree of risk weight uplift we would see in banks’ mortgage portfolios, based on two variants of an exposure-by-exposure floor. Banks whose current models have a lower degree of risk spreading ^{RBNZ s105} have less of an uplift in their average risk weight than those with a higher degree of risk spreading ^{RBNZ s105}. Though its current outcome is comparable with ^{RBNZ s105} risk weight under an exposure-by-exposure floor would rise substantially above these two peers’ outcomes because of the higher degree of risk discrimination ^{RBNZ s105} model produces. Another outcome is that, because ^{RBNZ s105} high risk loans are still, on average, assigned lower risk weights than peer banks’ high risk loans, after applying the floor a gap between ^{RBNZ s105} and peers persists.

Figure 9: Average mortgage risk weights under different exposure-by-exposure floor calibrations



50. Furthermore, as the distribution of exposures within IRB banks’ portfolios moves over time, the required exposure-by-exposure floor to produce the desired outcome relative to the standardised approach could also shift. In other words, calibrating an exposure-by-exposure floor to produce 90% of standardised capital at one point in time would not ensure that same calibration produces 90% of standardised capital at a future date.

Operational aspects – Handbook implementation and disclosure

51. An **exposure-by-exposure** floor could be implemented through adding cross-references to the IRB module of the restructured handbook such that, at each point it specifies how a particular capital requirement for a type of counterparty is determined, banks would be instructed to calculate both the (floored) standardised outcome for that counterparty and transaction, and the IRB outcome, and take the maximum. It is likely a similar approach could be taken for **asset class** floor.¹¹ Under both options, it may be necessary to align the definitions of asset classes between the IRB and standardised modules to remove ambiguity about the mapping between the two documents, ensure consistent application across banks, and enable effective monitoring of compliance with the floor.
52. Under a **total exposure** floor there would be no need to substantially alter the handbook, given the modular structure it is moving towards. Banks would have two separate capital engines doing parallel capital calculations under each methodology, and use the higher of the final IRB or (floored) standardised total credit risk RWA when determining their compliance with minimum capital ratios. A benefit of the total exposure approach is that, by keeping the two methodologies separate, policy changes, e.g. driven by APRA considerations, to one approach would not necessarily require changes to the other. It may still, however, be worthwhile tidying up some definitions to ensure IRB banks consistently interpret BS2A when developing their dual reporting/output floor calculations.
53. A related issue is disclosure. Under the **total exposure** floor banks would continue to report their current IRB outcomes, and separately, outcomes under the standardised approach using the RWA template that standardised banks report in their disclosure statements. This is effectively what we plan to require under the dual reporting policy, to enable like-for-like comparisons of all banks using the same capital methodology.
54. For the **asset class** floor, we could also follow this approach, but it may not be enough to enable effective monitoring of compliance with the floor at the asset class level. In addition to the policy work to align asset classes between the IRB and standardised approaches, we may also want the IRB banks to disclose a templated reconciliation between the two outcomes (IRB RWA, and RWA after applying the floors) to verify their compliance with the floor at the asset class level. A mock-up of the type of reconciliation we would want is presented in table 3 below. This reconciliation may be useful, if not strictly necessary, for a total exposure floor as well.

¹¹ In most cases – mortgages, farm lending, corporate etc. – this should be relatively straightforward. However, there is a range of less prominent exposure types where it is not clear how all of the components would fit neatly between the two approaches. For example, IRB's top down approach for purchased corporate receivables, and the RWA charge for dilution risk for purchased receivables.

Table 3: Mock-up of reconciliation disclosure between BS2B and BS2A under an asset class floor

	BS2B calculation			BS2A calculation	RWA after floor
	IRB RWA	Standardised RWA	Total BS2B RWA	Total BS2A RWA	=MAX(BS2B, 80% of BS2A)
Sovereign		0	0	0	0
Bank		30	30	30	30
Farm lending	350		350	450	360
Other corporate	400		400	600	480
Specialised Lending	250		250	200	250
Residential mortgage (owner-occupier)	350		350	540	432
Residential mortgage (investment)	270		270	340	272
Retail SME	200		200	100	200
Other retail	320		320	200	320
Other	250		250	500	400
Total	2,390	30	2,420	2,960	2,744

55. We have not fully thought through how we would enable effective disclosure of an **exposure-by-exposure** based floor, but it would appear to be considerably more complex. On one level, to enable stakeholders to monitor compliance with the floor we would have to require banks to disclose dual IRB and standardised calculations for each individual loan. But assuming there is some aggregation involved for disclosure purposes, it would become less transparent for disclosure statement readers to understand where differences in pre- and post-floor total RWA are coming from.

56. The **IRB scalar** is already an established part of the framework, and changes to it could be implemented relatively simply by changing the number in IRB banks' Conditions of Registration. This would have no significant impact on current disclosure requirements, although we would want to make the change clear to external observers given the scalar is being phased out in other jurisdictions' implementation of the Basel framework.

Operational aspects – implementation by banks

57. Banks' submissions on the denominator consultation document stated a general preference for a total exposure approach as this would align with APRA's implementation of the floor, avoid unintentionally onerous or distortive outcomes that may occur with more granular floors, and align with the review's 'simplicity' objective.

58. Given FSO's decision that IRB banks will be dual reporting on a robust, fully standardised basis, we consider that the marginal implementation costs of a total exposure floor are likely to be lowest. Banks will already be producing a standardised RWA figure, so it would only be a matter of using either the existing IRB amount, or the scaled standardised amount, when calculating the capital ratio. For the more granular floors, banks would likely need to make adjustments to their current IRB capital engines, and/or out-of-system calculations, to determine the correct floored RWA outcome at the exposure/asset class level to feed into the capital ratio.

Recommendation

59. Table 4 overleaf summarises our assessment of the merits of each of the proposed approaches to setting an output floor.
60. On balance, we recommend that an output floor be set at a **total exposure** level, and that the **IRB scalar** be retained in the framework, potentially set at a higher rate than the current 1.06. Our justification is that:
- a. A total exposure floor is the simplest to implement, disclose and explain compared to the alternative options.
 - b. A total exposure floor gives more flexibility to make changes to either the IRB approach or the standardised approach in the future.
 - c. A total exposure floor is likely to be less costly given the decision that IRB banks will be required to dual report IRB and standardised outcomes.
 - d. It is consistent with the Basel III approach to setting an output floor.
 - e. It is consistent with APRA's proposed changes to its framework.
 - f. Making use of the IRB scalar limits the loss of risk differentiation within the IRB framework that would otherwise occur with more tightly binding floors, while still closing the overall gap in capital requirements relative to standardised banks.
61. Provided the Committee agrees with our analysis, we will come back with more detailed calibration options for setting the combination of the floor and the IRB scalar in November.
62. Further, related work to determine disclosure requirements under the dual reporting policy will also be necessary.

Table 4: Summary assessment of floor options

Basis for setting a floor	Benefits	Disadvantages	Other points to note
A. Total exposure	<ul style="list-style-type: none"> • Simplest approach to setting floor • Consistent with Basel / APRA • Does not require policy changes to standardised approach 	<ul style="list-style-type: none"> • Less likely to narrow range of IRB outcomes within asset classes, however it would still close gaps in aggregate given similar portfolio compositions 	
B. Asset class	<ul style="list-style-type: none"> • Allows for tailored calibration of floors for each asset class • More tightly narrows range of IRB outcomes within asset classes 	<ul style="list-style-type: none"> • Would require policy work to align definitions of asset classes in IRB and standardised approach 	<ul style="list-style-type: none"> • Additional disclosure would be desirable to provide a reconciliation between IRB and standardised
C. Exposure-by-exposure	<ul style="list-style-type: none"> • Most robust backstop against excessively low risk weights within asset classes 	<ul style="list-style-type: none"> • Would require policy work to align definitions of asset classes in IRB and standardised approach • Distorts risk differentiation by imposing risk-insensitive outcomes on low risk exposures, but leaving high risk exposures unaffected • Uneven impact across banks due to differences in IRB models' risk discrimination properties • Hard to explain and disclose outcomes 	<ul style="list-style-type: none"> • Within-asset class differences across IRB banks may persist
Additional option: higher IRB scalar	<ul style="list-style-type: none"> • Preserves relative risk discrimination within and across asset classes • Closes gap between IRB and standardised outcomes • Could be tailored for different asset classes 	<ul style="list-style-type: none"> • Doesn't narrow range of outcomes across IRB banks as it is a linear multiple of existing RWA 	<ul style="list-style-type: none"> • Finalisation of Basel III phases out the IRB scalar • APRA has stated it will retain the concept of a scalar, but has not announced calibration