Financial Services Authority

Internal ratings-based probability of default models for income-producing real estate portfolios

– Guidance Consultation

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Internal ratings-based probability of default models for income-producing real estate portfolios

1 EXECUTIVE SUMMARY

1. We consider income-producing real estate (IPRE) to be a particularly difficult asset class to build effective rating systems that are compliant with the requirements of the internal ratings based (IRB) approach. This paper reflects our interpretation of the requirements in relation to rating systems used to determine probability of default for IPRE assets.

2. Although this paper focuses on the IPRE asset class, we note that, since the source of the requirements discussed is the BIPRU[1] text, there are inevitably some areas where comments could be construed as being relevant for other rating systems. Although we believe compliant rating systems across different asset classes should share certain qualities (e.g. appropriate calibration and strong validation), comments in this paper only concern the IPRE asset class.

3. **Following on from the consultation, our intention is:**

   a) **to clarify our interpretation of the BIPRU text's requirements most relevant to this asset class. Our reviews to date suggest that many firms find it challenging to construct an internal PD model that, in our view constitutes a compliant IRB rating system; and**

   b) **alert industry that, where material non-compliance is identified and cannot be remediated in a timely fashion for new applications and model changes, we are likely to require either a transition to, or a continuation of, a compliant approach for calculating regulatory capital. In most cases we anticipate this to be the slotting approach.**

[1] The Prudential Sourcebook for Banks, Building Societies and Investment Firms.

2 INTRODUCTION AND CONTEXT

4. We have observed that among wholesale portfolios, income-producing real estate appears to be one of the most difficult, yet material, asset classes to build well-calibrated and appropriately discriminating rating systems for.

5. Our reviews have covered a large number of firms and portfolios but have been undertaken over several years. Therefore, a number of these reviews took place before the financial crisis and recession which has, for many firms, been accompanied by a material increase in default rates.

6. Due to the normal timescales involved in updating and/or reviewing models we have yet to undertake reviews where this recent data has been fully incorporated into the parameter estimation and/or framework of the models.

7. In addition to formal model reviews we have undertaken bilateral discussions with some firms so we can better understand the strengths and weaknesses of their chosen modelling approaches.

8. Sections 4 – 6 of this paper, which considers only probability of default (PD) models, outline some of our observations and areas of common concern across different rating systems.

9. **Where models are found to be materially non-compliant we would expect mitigating action, to address areas of non-compliance, to be performed on a timely basis. If compliance cannot be achieved using an IRB PD rating system, we would expect a compliant approach to be applied for calculating regulatory capital.**

10. **When assessing models against the BIRPU requirements, firms will be expected to decide whether their model is compliant and not whether it is the nearest they can get to compliance given the constraints imposed on their model development (e.g. lack of data or resource constraints).**

3 SUGGESTED NEXT STEPS AND TIMETABLE

11. This paper is released for consultation for a period of two weeks. The deadline for comments is 29 October 2010. Following comments obtained during the consultation we will amend the paper and release a final version which industry can rely on in guiding their development of these models. We are aiming to release the final version to the December Credit Risk Standing Group (CRSG) meeting.

12. We would then envisage that firms would be better placed to judge whether we would view new applications or model change requests favourably. Without prejudicing or pre-judging individual applications, our previous work in this area means we currently believe many firms will, despite their best efforts, struggle to develop models that comply with BIPRU criteria. We believe this is a natural consequence of the intrinsic difficulty of the task coupled with the constraints (e.g. data and resource) firms face.

13. The remainder of the paper outlines our observations and areas of concerns. Section 4 outlines what we believe the key risk drivers to be in this asset class, Section 5 discusses calibration of models and validation is considered in Section 6.

4 RISK DISCRIMINATION

4.1 DRIVERS OF RISK

14. We note that, in contrast to general corporate lending where the view of the relative importance of drivers tends to be similar for many institutions, there is a wide variation in the importance attached to individual drivers across the sample of models we have reviewed or discussed.

15. As models aim to capture the relationship between the characteristics of the borrower and their propensity to default the divergence of views, across credit experts and deals, this may represent a considerable challenge to building IRB models for this asset class. This is particularly true for relatively low default portfolios where the empirical evidence is unlikely to form a robust foundation for model building.

16. As IRB rating systems are required to capture all relevant information (4.3.48R) when assigning grades, key risk drivers should be captured. Some risks we perceive as important and believe should be included in the models (or alternatively have been shown to be immaterial on the portfolio in question c.f. 4.3.81R) are discussed below.

4.2 RISK ASSOCIATED WITH CASH FLOWS

17. Typically the cash flows servicing the deal result from rental incomes arising from the property. Where the rental incomes become inadequate to service the deal a cash shortfall and default may occur.

18. The strength and reliability of the rental cash flows are typically determined by several factors such as lease structures, the number and creditworthiness of tenants, the likely length of any void that results when tenants leave or default, and the likely rental income from a potential new tenant, etc. In turn these aspects will be impacted by the economic environment, geographical location and property type.

19. For this reason aspects such as strength of cash flow, creditworthiness of tenants and building quality (i.e. the collateral) are usually considered to be the main drivers. These factors will not be distinct and a degree of correlation is inevitable, for example the strength of cash flow in a particular case may primarily result due to the presence of a well-rated tenant on a long term contract.

20. We therefore anticipate that models would typically incorporate aspects such as tenant creditworthiness (which could be related to an IRB rating if the firm grades the tenant in question), lease structures and building characteristics as key drivers. However the relative importance of each of these aspects (and several other factors) is likely to vary considerably from deal to deal and encapsulating this accurately across an entire portfolio can be difficult.

4.3 REFINANCE RISK

21. Refinancing risk relates to situations where the current deal expires and the borrower is relying on refinancing the property to repay some, or all, of the outstanding balance. For example this is very likely to occur where a property has been purchased using a bullet loan and the payments in the intervening period have been interest only.

22. Unlike many other facets of credit risk, the refinancing risk only crystallises at deal expiry. Depending on the magnitude of the refinancing risk this can lead to a material increase in default risk when the principle repayment becomes due.

23. Refinance risk is likely to be more pronounced in deals with a weak exit position. For example an existing deal with a high Loan to Value (LTV) ratio may be especially vulnerable to deteriorating yields (as this impacts the valuation meaning, the deal cannot be refinanced due to LTV constraints). Alternatively extending the deal may be a poor prospect as most leases are near expiry and re-letting prospects are weak.

24. Firms may find themselves in a situation where an income-producing real estate loan on their book matures and the borrower cannot find another bank willing to refinance the property. Under those conditions the firm may face the choice of either refinancing the loan themselves (essentially offering an extension of maturity) or choosing not to do so, causing a default on the original loan.

25. With respect to this situation one of the unlikeliness to pay indicators in a compliant definition of default is a distressed restructure trigger as outlined in 4.3.63R(5). Further to this 4.3.66G states ‘An obligation should be considered a distressed restructuring under BIPRU 4.3.63R(5) if an independent third party, with expertise in the relevant area, would not be prepared to provide financing on substantially the same terms and conditions.’

26. Therefore if the firm chooses to refinance the loan and the deal characteristics are within the firm’s lending criteria (assuming these are within industry norms) and the usual credit approval process is followed, we would view this as business-as-usual lending.

27. Alternatively where refinancing is carried out but the deal falls outside the standard lending criteria, we would expect this to be fully and clearly considered in the credit and portfolio management processes and, where appropriate, a Basel default should be registered (c.f. paragraph 25).

28. Where deals are defaulted due to the distressed restructure unlikeliness to pay indicator the firm’s usual credit policy for a return to satisfactory status should be followed. Typically it would be expected that deals refinanced outside the usual underwriting standards are riskier than those underwritten within them, and this should be reflected in the rating process, via an override if necessary.

29. We would expect firms to be able to state the materiality (in number, exposure at default and risk weighted assets) of deals where refinancing has been performed outside the usual lending criteria.

30. Appropriately, incorporating refinance risk is linked to model philosophy (throughout this paper we use this term to refer to where the resultant ratings from the rating system sit on the point in time/through the cycle continuum) and the time horizon of the PD estimate.

31. For a purely 'point in time' model where the deal expiry (and thus potential need to refinance) occurs beyond the time horizon of the estimate, the impact of refinance risk on the PD should be zero. Note that in this case some consideration of refinance risk should still be made in capital planning and risk management processes (e.g. in Pillar 2 and stress testing frameworks). In these instances firms must be explicit about where the re-finance risk is being accounted for in their credit risk capital requirements.

32. Once the deal expiry date falls within the time horizon the impact of refinance risk, based on the expected economic environment and its associated impact on industry underwriting conditions at the deal expiry, should be fully incorporated in the resulting PD estimate.

33. For through the cycle models the concepts of model philosophy and time horizon of the estimate may become intertwined in practice. Typically an expected characteristic of a 'through the cycle' rating is that it remains static over time, unless there is a fundamental change in the view of the risk associated with that credit.

34. For a rating to remain static over time would require refinance risk to be reflected in the initial rating irrespective of when it is expected to crystallise. More usually the differences in the behaviour of 'point in time' and 'through the cycle' ratings are associated with changes in the economic environment, which need not be the case here (the 'point in time' rating may increase dramatically when the risk enters the time horizon of the estimate even where economic conditions remain unchanged).

35. In practice many models may be hybrid in nature and exhibit characteristics of both 'point in time' and 'through the cycle' models to varying degrees. Therefore appropriate encapsulation of time dependent risks in the PD estimates will need careful consideration of the rating system's underlying model philosophy.

36. Where refinance risk is material the default risk may peak sharply at deal expiry. Therefore where a PD estimate from a given time horizon is compared with, or inferred from, an estimate over a different time horizon, it needs careful consideration.

4.4 INTEREST RATE RISK

37. This risk is a specific driver of the more general risk associated with cash flows outlined above and addresses how the propensity of a deal to default is affected by changes in interest rates. A change in interest rates can lead to an increase (or decrease) in the cash flows required to service the deal.

38. Deals that are fully hedged are sheltered from the direct impact of changes in interest rates. Therefore, all else being equal, these deals are often considered to be lower risk than unhedged, or partially hedged, deals.

39. Appropriately capturing this risk for a range of different economic conditions may be challenging for some models, as its magnitude may change markedly over time. For example, in an environment where interest rates are low, and are likely to remain so over the timescale of the rating, the degree of interest rate risk (IRR) may be minimal, even on unhedged deals. Conversely, if interest rates are likely to increase materially, the IRR may materially impact the risk assessment. Therefore, accurately capturing this risk across a range of economic conditions will be necessary for long-term model performance.

40. Most firms' models that we are aware of include drivers linked to interest rates. However, as many models were built on data corresponding to a benign economic environment, this data is unlikely to include many defaults that the IRR has triggered. Therefore, expert judgement and/or external data are likely to be needed to assess how IRR should be included in models in an appropriate way to reflect future performance.

41. An impact of IRR is that we would anticipate a hedged transaction to have a different level of risk associated with it than an unhedged one even if all other characteristics are similar. Not all models have a structure that reflect this – although we note that in some circumstances this may reflect the characteristics of the deals in the portfolio rather than a weakness in the model (i.e. if all deals are hedged then no discriminative power will be gained from including such a driver).

42. At the time of writing interest rates are at record low levels. Therefore, defaults seen in the present environment will not be driven by IRR. However, accurately measuring, and where appropriate, mitigating this risk, is necessary as rates will change in the future.

43. As the magnitude of IRR can change materially over time, appropriately capturing this risk is, in common with refinance risk, intimately linked with the time horizon of the estimate and model philosophy.

44. For example, we would expect that IRR for a purely 'point in time' model, would be driven by the present value of the interest rate and potential changes over the time horizon of the estimate. Conversely, a purely 'through the cycle' model would reflect this risk averaged over an economic cycle, and would not be materially impacted by the present value of interest rates.

45. Furthermore, the IRR might be negligible on a one-year time horizon, yet highly material over a longer time period (e.g. the life of the loan). Therefore, any comparison of these two estimates, or inference of one from the other, needs careful consideration.

5 CALIBRATION

46. We observe there are substantial challenges in appropriately calibrating IRB models. Depending on the modelling techniques used, many issues faced in determining an accurate calibration in this asset class are similar to other wholesale asset classes. However, in this case, the difficulties may be exacerbated by the characteristics associated with income-producing real estate (e.g. high levels of cyclicality in default rates, no obvious external source of historic default data).

47. In addition to the one-year time horizon (of whatever model philosophy) measure of default risk required for regulatory capital purposes, another output of an income-producing real estate model is a 'life of loan' PD.

48. For many income-producing real estate portfolios – especially those whose default risk profile may change materially over time – we understand that a 'life of loan' (or other time horizon) PD may be more appropriate for risk management and decision-making process than the one-year estimate (c.f. 4.2.8G). Indeed, where a one-year estimate that does not reflect a refinance risk until the final year of the deal is used to make business decisions, we would expect a clear statement of how longer term risks were considered in risk management (e.g. through stress testing or Pillar 2 frameworks).

49. Where different metrics are used for risk management and regulatory capital calculation, the relationship between the two estimates must be clear and appropriate for compliance with the use test (4.2.6R).

5.1 DEFAULTS AVAILABLE

50. Even where a reasonable amount of internal default data is available there are still obstacles to overcome when calibrating IRB models. Often a major issue relates to data quality. In wholesale modelling it is not unusual to encounter data quality issues about identification and capturing historical defaults. Even where default capture has been strong there will be complications about a historic definition of default that is not Basel compliant. Other complications may include a material change in the portfolio composition and/or characteristics over time making historic data of questionable relevance.

51. Another difficulty is likely to be that the available internal default series does not span an entire economic cycle. In common with other asset classes, we do not believe the current downturn has yet been fully reflected in the data. Therefore we do not view the inclusion of recent data as fully complying with the requirements in this regard (4.4.24R).

52. We believe models should be calibrated with reference to an estimate of long run default rate that includes the early 90s (or a comparable downturn if the model is applied to a non-UK market).

53. External data may be required to include information from the 90s downturn. However, in common with internal data, the accuracy and appropriateness of this data to the current portfolio should be demonstrated. In general we would expect the appropriate analysis of definition of default and representativeness (i.e. degree of similarity between the internal portfolio and the source of the external data) to be conducted.

54. Where significant estimation error or uncertainty arises from the data used, and assumptions made during the calibration process, a margin of conservatism should be incorporated in the estimate in line with the BIPRU requirements (4.3.88R).

55. In addition to the long run default rate, another key factor when determining the appropriate calibration level is model philosophy. We are not in a position to comment on the behaviour of income-producing real estate models with regard to model philosophy and their performance over time. In other asset classes we have, for some models, observed that the view on model philosophy has altered significantly following changes in economic environment (i.e. the view taken at the time of model build has been amended), showing the difficulty in accurately determining this characteristic of a rating system.

56. We envisage that a view of model philosophy for a recently constructed or recalibrated model should be able to draw on richer data than from when the models were developed on data exclusively corresponding to a benign economic environment. We would expect this data to support a strong understanding, and articulation, of model philosophy (4.3.87G).

5.2 LOW DEFAULT PORTFOLIOS

57. There are specific requirements relating to calibration of models rating Low Default Portfolios (LDPs), defined in BIPRU as those where internal default experience is less than 20 defaults, where reliable estimates cannot be derived from external default sources (4.3.95R).

58. Where a firm's experience is less than 20 defaults these rules will apply to income producing real estate portfolios as they are typically not rated by external agencies and there is no obvious external source of direct default data suitable for calibrating models.

59. LDP techniques are typically applied as a last resort, where relevant default data is particularly scarce. Since the number of defaults occurring in this asset class has increased markedly in the last few years, we would anticipate most firms to have sufficient internal data to make using these techniques unnecessary. Therefore we believe it is likely that the number of portfolios calibrated using the LDP techniques will, in practice, be fairly limited.

60. Previously we have observed that where firms have generated statistically determined PDs that a widespread feature, in common with other asset classes where similar approaches are taken, is that the parameters used are often those taken from the literature with little, or no justification of how appropriate they are to the portfolios in question.

61. Although we acknowledge the inherent difficulty in estimating correlation parameters, we do not believe it is appropriate to apply the same parameters across a range of portfolios without consideration. We note that previous experience has shown the property sector to be highly cyclical and we would expect this to be considered and fully reflected in the parameter estimates.

62. A compliant low default portfolio calibration requires not only the determination of a statistical PD based on the available data but also the recognition of the possibility of further adjustments (4.3.95R(4) & (5)). Although adjustments could be appropriate

for a number of different factors we believe that, in practice, the most common, material and difficult factors which will require consideration will relate to:

a) changes in the composition of the portfolio over time;

b) the likely differences between the data used and the long run behaviour; and

c) incorporating the model philosophy to make a meaningful comparison of the statistically determined and model produced PDs – this may be related to point (b).

63. In addressing point (b) the text regarding the determination of a long run default rate above is also relevant. As with non-LDP cases, the issue of model philosophy must be addressed as a comparison of, for example, a 'point in time' estimate of portfolio PD and a 'through the cycle' LDP PD will not necessarily be meaningful.

64. Changes in the portfolio composition over time must also be considered since, at the extreme, there is a danger of determining a statistical PD which has little relevance to the portfolio in question. However it is often difficult to determine unambiguously a change in risk profile in a low default portfolio where any available risk discrimination is inevitably largely subjective.

65. Nonetheless any relevant data available pertaining to portfolio size and risk profile should be considered and any differences, or evidence supporting the view of a constant profile over time, should be clearly articulated.

66. Differences in portfolio composition in the future, as well as those in the past, can be important. In low default portfolios it is possible to construct portfolio level PD estimates which are dominated by a few very high risk cases.

67. For example consider a situation where an appropriate, cycle adjusted, statistically determined portfolio average default rate was shown to be 0.3% and model approval was conditional on the estimates producing a portfolio average PD at, or above, this level.

68. If the portfolio contained 100 obligors we show two possible distributions of obligor ratings for a given rating scale below.

Grade	1	2	3	4	5	6	7	8
PD	0.05%	0.20%	0.40%	1.0%	2.0%	4.0%	8.0%	15.0%
Portfolio 1	25	30	30	10	5			
Portfolio 2	90	7					1	2

69. Both distributions result in a portfolio average PD in excess of 0.3% (the average PD is 0.39% for portfolio 1 and 0.44% for portfolio 2). However in portfolio 2 the portfolio level PD is dominated by a few cases in a way that may impact ongoing compliance.

70. Firstly the large concentration in a single risk grade would need to be appropriately justified to comply with BIPRU 4.4.9R and secondly the portfolio average may be

volatile meaning the portfolio PD can easily fall below the minimum required value of 0.3%.

71. In the event that one of the highest risk exposures left the portfolio the mean PD would fall to 0.29% slightly below the 0.3% value. In the event all three high-risk exposures left the portfolio (and all else remained the same) the portfolio level PD would fall to a small fraction of the determined statistical value (0.06% against 0.30%).

72. Even in the case where the relationships were maintained, the portfolio management processes may have fairly low levels of exposure associated with them. Therefore a view may be taken that in such circumstances the obligor weighted average PD does not, in isolation, offer a sufficient comparison for model performance and other metrics, such as the exposure weighted PD, should be considered.

73. As with the non-LDP models we would expect all the adjustments applied to be fully justified and supported by the appropriate sensitivity analysis (4.4.25R).

74. Finally we would note that where new data indicates that the estimates of PDs are too low the model will require recalibration. Although true of all asset classes we believe that material changes to PD estimates are most likely to occur in sectors known to be highly cyclical and where estimates are based on techniques which are sensitive to a small number of defaults (although this should be counteracted to some extent if the adjustments discussed above are appropriate).

5.3 CONSTRUCTED THEORETICALLY

75. Although elements of the BIPRU text suggest a supposition that models will be constructed on data, some models, such as Monte-Carlo cashflow simulation models, are built from a theoretical basis and produce PD estimates without reference to any empirical default data.

76. If used for regulatory capital calculation purposes these estimates should still meet the usual requirements – e.g. the parameter reflects a one-year PD estimate with a well-understood model philosophy. Importantly even if empirical data was not used to determine the PD estimate it should, where available, be used to back-test the estimates.

77. We believe most models of this type will be able to produce one-year estimates of PD that correspond closely to 'point in time' estimates. This allows for robust back-testing as such estimates can be meaningfully compared with realised default rates.

78. We would consider that performing robust back-testing of this nature and demonstrating that the results meet pre-defined and stringent standards must be a requirement for model approval, both internally and by us where default data has not been used directly in the model calibration process.

79. Where estimates are determined from a theoretical basis the assumptions undertaken in the model build process are likely to materially impact the resulting PDs. For

example, there is likely to be an element of judgement applied when selecting the value or distribution associated with particular parameters.

80. As with all the material assumptions, we would expect these choices to be clearly justified in the model documentation and to have been subject to independent review. The justification for all assumptions should be supported by analysis covering the sensitivity of the model outputs to changes in the assumptions (4.4.25R).

81. Where the firm has less than 20 defaults in their internal dataset, the requirement to perform a statistical low default portfolio calibration as discussed in the previous section still holds.

6 VALIDATION

82. As with any asset classes we view the requirements relating to robust validation, (e.g. the demonstration of the accuracy and discriminatory ability of rating systems), as of primary importance.

83. Where strong performance in terms of rank ordering and calibration can be demonstrated over a substantial timescale, this provides the best possible foundation for model approval.

6.1 DISCRIMINATION

84. IRB firms are required to have internal standards that their models are expected to meet and these must include consideration of discriminative power (4.3.30R(3)). Therefore a suitable set of internal standards should ensure a model can rank order risk at the time of its approval. Similarly, properly applied standards and monitoring should ensure that discriminatory power is maintained.

85. Where a reasonable number of defaults are available, identifying appropriate tests and required standards is relatively straightforward. Although this situation can be more difficult for low default portfolios, we note that other, more subjective, discriminative metrics can be determined, (e.g. comparison against judgement of credit professionals). However, the inability of such metrics to offer strong objective evidence of discriminatory ability is one reason why conservative calibrations are required for LDPs.

86. Similarly this is why where such comparisons are performed for portfolios where default data is available, they should be in addition to, rather than instead of, more objective discriminatory measures.

87. The values of the rank ordering metrics may change markedly with time and/or the economic environment and where this leads to a considerable deterioration in observed model power, BIPRU requires that this is not just monitored and reported but, where triggers are breached, acted upon.

88. We expect all firms to robustly apply their internal standards as required by BIPRU. In addition to identifying poorly performing models, standards clearly indicate those

being asked to approve models of the level of accuracy that can be achieved, and the confidence that the model developers can have in the estimated model accuracy. Where a firm does not have sufficient data to accurately measure a model against their standards, this should be seen as strong indication by the model approvers of a firm's confidence in a model, and to question its suitability for calculating capital.

89. Simply being the best available model for a particular institution at that time should not be a reason for approving poorly performing models that fail to reach minimum standards.

90. We are aware of models which provide objective rank order metrics in excess of 70% for certain portfolios. Although these metrics are portfolio dependent and change over time we would consider a value of 50% as a reasonable benchmark for Gini or Accuracy Ratio metrics in income producing real estate portfolios – c.f. 4.3.34G(3).

6.2 ACCURACY OF CALIBRATION

91. The accuracy of the outputs is one of the most important aspects of any model. Therefore, where sufficient data exists, comparing the observed and predicted default rates is a crucial piece of information for model assessment.

92. In the case of purely 'point in time' ratings the analysis of actual and predicted default rates is relatively straightforward as the two should be reasonably aligned irrespective of the economic conditions. Conversely, comparing observed default rates with 'through the cycle' or hybrid PD estimates is more complicated. Although the expected direction of any discrepancy can be clear, the expected, and acceptable, magnitude of difference may not be (e.g. in a downturn the observed default rate could be expected to be above the 'through the cycle' PD estimate; however determining the expected degree of divergence is not easy). This is especially true for asset classes with default rates that are highly volatile over time.

93. Determining the degree of divergence between the PD estimates and the observed default rate should be consistent with the calibration technique applied. Therefore although the observed default rate need not match the PD estimate, it should be shown to be reasonable given the rating system's model philosophy and calibration approach (i.e. we would expect that if the model were to be calibrated today using the same technique, but with more recent data, similar PDs would result).

94. In common with other validation techniques a valid demonstration of performance will only result if the analysis uses default data taken from a different period than that used to calibrate the model (i.e. out-of-time validation). As the PD estimate assigned should be appropriate at an individual as well as a portfolio level, comparative analysis of the actual and expected outcomes must be performed at a grade level.

95. Given the change in the economic environment over the last few years we would anticipate that an internal time series of default data which spans a range of conditions is available. Therefore back-testing should be performed to demonstrate that the model is suitably accurate and/or conservative across time (4.3.35R).

96. We would also remind firms of the text in BIPRU 4.3.39G regarding the use of stress testing and scenario analysis as a tool for calibration of models.

6.3 STABILITY

97. Another aspect that must be considered in assessing a model's performance is a stability metric (i.e. how likely ratings are to change over a particular time horizon) as required under BIPRU paragraph 4.3.30R(2). Typically when determining the trigger level for any such metric, the model philosophy would be considered since 'point in time' ratings are expected to be more volatile than 'through the cycle' ones, especially during periods of change in the macroeconomic conditions.

98. However, one feature of income producing real estate portfolios is the possibility that deals will need to be rated considerably more often than the usual annual review cycle. BIPRU requires a rating to be updated when material information becomes available (4.4.16R) which in this asset class can occur for several reasons, (e.g. when a tenant defaults, a void is filled, covenants are breached or the refinance risk enters the time horizon of the PD estimate).

99. We would therefore expect firms to evidence that credit processes ensure information on events such as those listed above, or any other that would impact the assessment of the risk, is received by the firm in a timely manner and that the ratings assigned to the deals are updated on a short timescale upon receipt of such information.

100. Therefore it is possible that considerable movement in ratings may be observed irrespective of the model philosophy, particularly in times of stress in the market, and this should be considered when determining the appropriate trigger levels.

101. Although not related to the validation of the rating system, it is worth noting that another consequence of this potential volatility in ratings relates to the cyclicality of the capital requirements.

102. Capital stability is one advantage associated with the use of 'through the cycle' ratings. However, such an approach does not completely remove the volatility especially in asset classes, such as income-producing real estate, where the inherent view of the risk of the deal may often change.

103. The events which may negatively impact ratings and lead to an increase in capital requirements, such as tenant default, are increasingly likely in an economic downturn and therefore a degree of cyclicality in capital requirements for income producing real estate portfolios may be inevitable irrespective of model philosophy (although this volatility would still be expected to be lower for through the cycle rating systems than point in time ones).

6.4 OTHER

104. Analysis complementary to the performance on the entire portfolio should also be considered. For example, where the portfolio can be divided using characteristics that are likely to behave differently over time, the performance on these sub-sections of

the portfolio should be investigated. Potential splits include property type (e.g. commercial, industrial, residential), whether deals are hedged or unhedged and whether loans are amortising or interest only.

105. However where portfolios, or sub-sections thereof, contain only a small number of cases (and/or defaults) such approaches may be infeasible and/or provide little information and would therefore not be required.

7 CONCLUSIONS & SUMMARY

106. We believe that the income-producing real estate asset class is a particularly challenging asset class to build compliant internal rating systems for. This is not a new observation from the regulatory community, as a similar conclusion led to the inclusion of the slotting approach in the Basel text.

107. There are several reasons why firms may favour an internally built model over other solutions for calculating regulatory capital, not least due to the poor, or non-existent, risk discrimination of the standardised and slotting approaches.

108. **Despite firms' best efforts, and considerable resource commitment, we have concerns that many internal models in this asset class will likely fall short of BIPRU compliance in the context of the approach contemplated in this note – even if they are perceived to be the best available current solution for a particular institution.**

109. For firms with models that they wish to use for regulatory capital calculations but which require our approval, the final version of this paper should provide useful information about whether an application would be likely to be successful.

110. We would also expect models currently being used for regulatory capital calculation to meet with the key requirements. Therefore when finalised, this note should also guide firms who are already using income-producing real estate IRB models as to whether we would agree with the firm's assessment of the model's compliance.

111. From our perspective, the most important feature of any rating system is demonstrable performance on the firm's internal data over an extended time period. Where this is available we believe it will provide an excellent foundation for model approval.

112. In some instances where the slotting approach has been used by firms for their income-producing real estate exposures, we have concerns that the assets have been placed into inappropriate slots. We are considering how best to address these concerns generally and may communicate further with industry on this in due course.

113. Although this paper is focused on income-producing real estate models, we note that several issues also exist in development property portfolios. Furthermore, we believe that due to the characteristics of development property, this asset class is likely to represent an even more substantial challenge to construct compliant IRB models than for income-producing real estate.

8 APPENDIX – SUMMARY OF KEY POINTS

Issue	Section in paper	BIPRU ref	For Consideration
Risk Drivers	**4**		
Cash flows	4.2	4.3.48R, 4.3.51R, 4.3.74R	For a compliant rating system we expect that the firm should be able to demonstrate that: • The difference in deal ratings when tenant ratings are altered is intuitive; • The transformation of ratings into non-rent payment probability is intuitive. Even where tenants are rated by the firm the PD should not usually represent a direct read across to probability of non-payment due to, for example, model philosophy issues. Addressing this is likely to be a key area since we have seen many firms struggle with what divergence is expected between observed default rate and PD in different economic conditions in the mid corporate space; • Selection of parameter values and/or distributions, and their impact on deal ratings, is well supported and intuitive; • Impact on the deal rating is intuitive for such features as: type of building, geographical location and building quality; and • Where data is missing or unavailable the treatment is conservative.
Interest Rate Risk	4.3	4.3.48R, 4.3.51R, 4.3.74R	For a compliant rating system we expect that: • Interest rate risk should be included as a relevant risk driver (unless portfolio is exclusively hedged); • The way in which interest rate risk is included in the deal rating should be intuitive with respect to model philosophy. For example a point in time rating should consider the current interest rate and likely change over a 1-year time horizon. Whereas, a through the cycle model needs to consider the interest rate risk averaged over an economic cycle; and • The firm should be able to demonstrate that the model rates hedged and unhedged deals differently and that the magnitude of the difference in these ratings is intuitive.
Refinance Risk	4.4	4.3.48R, 4.3.51R, 4.3.63R, 4.3.66G, 4.3.74R	For a compliant rating system we expect that: • Refinance risk should be included as a relevant risk driver (unless portfolio contains only amortising loans). This should conform to a BIPRU compliant definition of default which is based on whether a third party would provide finance on materially similar conditions; • The firm should be able to demonstrate that the model rates interest only and amortising deals differently in the final year and that the magnitude of the difference in these ratings is intuitive; • Given the time horizon associated with IRB estimates (i.e. 12 months) the refinance risk could have a zero weight until the deal enters its final year for point in time models. In these cases the risk should be captured in stress testing and Pillar 2; and

Issue	Section in paper	BIPRU ref	For Consideration
			• The firm should be able to report by number, EAD and RWA cases that have been refinanced outside of the firm's usual lending criteria and show that the ratings for these cases are intuitive (we would expect these cases to be higher risk than most deals).
Calibration	**5**		
Long run default rate	5.1	4.3.51R, 4.3.76R, 4.3.85R, 4.3.88R	For a compliant rating system we expect that: • The firm should be able to demonstrate that the internal data series is the longest relevant and accurate data, on a BIPRU compliant definition of default, available; • The determination of long run default rate should include reference to 90s downturn. For most firms this will require the use of external data; • The relevance of any external data used should be analysed. The relationship between internal default data and the external data used should be considered over a multi-year period; and • Where uncertainty is introduced due to, for example, the quality of internal data or shortcomings in the relevance of external data a conservative adjustment to the estimates should be made.
Model philosophy	5.1	4.3.35R, 4.3.87G	For a compliant rating system we expect that: • Model philosophy should be clearly articulated and justified. Justification should include analysis of performance of assets, and the corresponding ratings assigned, over a change in economic conditions (i.e. as long as period as possible); • In addition to encapsulating this information in a coherent way in the calibration, the impact of capturing risks such as IRR and refinance risk should be clearly documented.
Low Default Portfolios (where relevant)	5.2	4.3.95R	Where the rating system corresponds to a low default portfolio we expect that the firm should be able to demonstrate that the framework applied adequately considers: • Economic environment of data used; • Changes in portfolio composition over time; • Parameter choices; and • Model philosophy.
Validation	**6**		
Discrimination	6.1	4.3.30R, 4.3.34G, 4.3.35R, 4.3.51R, 4.4.9R	For a compliant rating system we expect that: • Where defaults are available the Gini should be shown to have been at least 50% over a range of economic environments (i.e. longest period possible including most recent data); and • Any concentrations in ratings from the model should be demonstrated to be appropriate.
Actuals vs Expected	6.2	4.3.30R, 4.3.33R, 4.3.35R, 4.3.51R	For a compliant rating system we expect that: • Observed default rate vs PD should be considered at grade level and across a range of economic environments (i.e. as long as period as possible); • Unless the PD relates to a pure point in time estimate it

Issue	Section in paper	BIPRU ref	For Consideration
			(or the observed default rate) should be transformed such that comparison is meaningful. This transformation should be consistent with the model philosophy and calibration technique applied; and • The tolerances for the degree of divergence, and associated actions for what should happen when they are not met, should be pre-defined.

Other	6.3	4.3.30R, 4.3.35R, 4.3.87G	For a compliant rating system we expect that:
			
			• Appropriate stability metrics should be considered across a range of economic environments (i.e. longest period possible including most recent data);
			• The tolerances for the degree of divergence, and associated actions for what should happen when they are not met, should be pre-defined; and
			• Subsections of portfolios by characteristics affecting risk profile, and therefore potentially model performance, should be investigated. Subsections to consider could include:
			  • Loan type (amortising/interest only);
			  • Degree of hedging;
			  • Building type; and
			  • Other factors such as non-SPV lending in a predominately SPV lending book or vice versa.

Other Aspects			
Model Scope	N/A	4.2.2R	Where more than one model is used the rationale, and the associated boundary issues, should be clearly articulated and justified. The criteria for assigning an asset to a rating model should be objective and clear.
Regular updating of property valuation	N/A	4.4.18R	The firm must have in place a process to ensure valuations of the property are appropriate and up to date.
Use of all available information	N/A	4.3.48R	Where relevant the firm should make reference to information available from the Investment Property Databank. Where this data is utilised at a broad level when more granular data is available this should be fully justified with appropriate analysis.
Regularity of ratings	5.3	4.4.16R, 4.4.18R	The rating histories should demonstrate that deals are re-rated every time material information becomes available. For example where the deal enters its final year (and refinance risk becomes relevant) or a tenant defaults, is replaced or has their rating changed.
Use Test	4	4.2.6R, 4.2.8G	The firm should be able demonstrate, and justify, the relationship between the IRB estimates and those used to run the business. Note that the IRB estimates should be one year estimates which may not be well aligned to managing the business (e.g. the potential for refinance risk or significant interest rate risk over the life time of the deal may not be captured).
Management Information	N/A	4.3.14R, 4.3.30R	Management Information covering all aspects required by BIPRU should be produced and reviewed regularly by senior management. The tolerances for the degree of divergence, and associated actions for what should happen when they are not met, should be pre-defined.
Pillar 1 Stress Test	N/A	4.3.39R,	Impact on PDs and RWAs should be consistent with model

Issue	Section in paper	BIPRU ref	For Consideration
		4.3.40R, 4.3.42G	philosophy (although note that ratings should be affected by events such as tenant defaults even if they are TTC). Impairment projections should be justified with reference to past internal data.
Documentation	N/A	4.3.19R, 4.3.21R, 4.3.24R, 4.3.81R	All the relevant above points should be covered in a comprehensive and clear way. Any changes as a result of independent challenge or review work should be clear.

ANNEX – CBA

114. This guidance does not introduce new rules but rather aims to provide additional transparency about the minimum standards inherent in the existing requirements. The benefits of this guidance are to minimise the risk that models used to calculate regulatory capital do not reach the minimum standards, such that we meet our legal responsibility and firms avoid under capitalisation of their IPRE exposures.

115. We believe that this guidance does not imply any costs to firms that are additional to those already envisaged in the consultation that accompanied the relevant BIPRU text (c.f. section 16 of CP05/3 and section 21 of CP06/3 Strengthening Capital Standards 2). Rather, firms are in the process of complying with our regulations. Although any IRB firm could be impacted in practice we believe there are a relatively limited number of firms currently utilising an IRB solution who will subsequently adopt the supervisory slotting approach. Based on indicative risk weights and estimates of outputs of the supervisory slotting criteria from information received as ongoing regulatory activities we estimate that capital impact across industry would be in the region of £1bn – £3bn.

116. We envisage that costs associated with IT and training costs would not be incremental as IRB firms regularly review and change their models. IRB firms will be well versed in implementing models and as the supervisory slotting approach represents a simplistic model we anticipate costs would be minimal in any event.

The Financial Services Authority
25 The North Colonnade Canary Wharf London E14 5HS
Telephone: +44 (0)20 7066 1000 Fax: +44 (0)20 7066 1099
Website: http://www.fsa.gov.uk
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