

---

---

To: Credit Risk Standing Group                      Date: 30 October 2006

From: Credit Risk Policy                              cc:

Subject: **Use of long run Probabilities of Default, counter-cyclical scaling factors, and the interaction of these with economic cycle stress testing**

---

## Introduction

1. A number of firms employ or are planning to adopt methodologies that transform the PD estimates produced by point in time (PiT) models to 'long run average PDs', based on the relationship between long term and relatively current default rates for the portfolio, or a subset thereof. This is as opposed to estimating a long run average default rate for each grade or pool, which is what is envisaged for the IRB approach.
2. Depending on exactly how this is carried out, there are a number of implications. However, a typical approach is to apply a scaling factor which varies with the state of the cycle. As a simple example, if the current average portfolio default rate is 0.4% and the long run average portfolio default rate is 1.2%, each PiT PD would be scaled up by a factor of 3. But in a recession, where the current default rate is 2.4%, PDs would be scaled down, again aimed at the portfolio average of 1.2%, by amending the factor to 0.5%.<sup>1</sup>
3. A major consequence of, and to varying degrees the motivation for, this mechanism is to reduce/eliminate cyclicity in capital requirements which would otherwise result from the use of the underlying PiT estimates.
4. We are seeing the proposed use of this technique most commonly in residential mortgages portfolios.
5. The purpose of this note is to inform the industry how the FSA intends to react to such approaches in the IRB waiver application process, including how it will interpret the resulting impact upon the stress testing requirements.

## Background

6. At the heart of the IRB framework is the idea that regulatory capital requirements should be determined by the default risk (as well as the other risk parameters) in a firm's portfolios; and more specifically that exposures with similar default risk be allocated to the same rating grade, with the input to the IRB formula being the annual

---

<sup>1</sup> We should emphasise that this is a deliberately simplified example of how such an approach might operate in order to illustrate the "varying scalar" concept, and is not meant to deliver a precise description of how such approaches should or do operate in practice.

---

default rate expected to be incurred in that grade over the long run. Correct initial allocation to a grade, as well as appropriate movement between grades thereafter, is an essential building block of a risk-sensitive framework.

7. However not all rating approaches seek to measure risk in the same way. Moreover the choice of rating approach has implications for the level and volatility of capital requirements under the IRB approach. In particular, as will be familiar to CRSG members, in the IRB-world regulators have coined the term “rating philosophy” to describe where a rating system sits on the spectrum between the stylised extremes of:-
  - a) Point in Time (PiT): in which firms seek to explicitly estimate default risk over a fixed period, typically one year. A consequence of the use of such an approach is that the increased default risk in a downturn<sup>2</sup> results in a general tendency for migration to lower grades. When combined with the fixed estimate of the long run default rate for the grade, the result is higher IRB capital requirements ; and
  - b) Through The Cycle (TTC): in which firms seek to take cyclical volatility out of the estimation of default risk, by assessing a borrower’s performance across the business cycle. Such ratings do not therefore react to changes in the cycle when it occurs, so there is no consequent volatility in capital requirements.
8. Of course the actual number of defaults for a portfolio are the same under both approaches as the choice of rating system does not change the underlying default risk. Under a stylised TTC system, changes in default rates due to movements in the cycle is reflected in volatility of actual defaults in each grade around the long run average. Whereas under a stylised PiT system, subject to noise, the default rate in each grade should not vary over time as changes in default risk (whether for cyclical or other reasons) should automatically result in migration of exposures to other grades. (Under a TTC system, non-cyclical changes in a borrower’s risk will of course result in it moving to a different grade.)
9. What we generally observe in practice for wholesale borrowers are rating systems whose "rating philosophy" is between these two stylised extremes and which we have referred to as "hybrids". In such a system, a downturn results in both net migration to lower grades (albeit less than in a PiT system) and an increase in observed default rates in each grade (albeit less than in a TTC system). The resulting challenge for a firm is therefore to identify where its rating systems are on this spectrum, as this is necessary for both:-
  - a) Validation purposes – in particular comparing observed defaults against those that should have been expected given the actual circumstances pertaining in the period in question; and

---

<sup>2</sup> To avoid over-complication, and in light of the more direct regulatory concern about the resulting consequences, this note tends to focus on what happens in a downturn. In general there are also symmetrical effects in the favourable part of the cycle, such as migration to better grades and thus lower Pillar 1 capital requirements under a PiT rating philosophy.

---

- b) Stress-testing purposes – estimating the ratings migration likely to occur in a given stress testing scenario.
10. Although the above terminology and description are most relevant to wholesale portfolios, the same principles can also be applied to retail portfolios. In particular, the approach can be used if a firm is either:-
- a) Sub-dividing its exposures into homogenous pools, and then estimating the long run default rate for such pools; or
  - b) Considering each individual score produced by a PD scorecard to constitute an individual grade, and then estimating the long run default rate for each score.
11. In each of these two cases, as with the wholesale portfolios, a firm needs to understand its rating philosophy to be able to estimate how changes in the overall portfolio default rate are going to be reflected in a combination of migration between pools and/or scores, and in volatility in the likely default rate around the long run average. Even scorecards that are designed to be Point in Time may not deliver a constant default rate across the cycle to the extent that scores are partially derived from information that is relatively cycle insensitive.
12. The issues of allowable philosophies for rating systems, the consequent need for stress testing and possible additional capital requirements have for years been a source of discussion between the FSA and the industry. In summary, the FSA's approach is to be liberal as regards firms' choice of the ratings philosophy, but to expect the consequence of their decisions to be reflected in the stress testing process which looks at how the IRB requirement might rise in a "once in 25 years" downturn. As indicated above, understanding the rating philosophy is a necessary part of this process.

### **Scalar methodology**

13. We should emphasise that there are variants on what is done in each case, and that the term "variable scaling factor" may not indeed be used by firms. Whilst acknowledging these differences, we do however use this terminology in this note to describe a process, the distinctive features of which are that a firm:-
- a) Has an underlying borrower rating system that has a particular rating philosophy;
  - b) As opposed to basing its IRB capital requirements on the sum of exposures in each grade/pool/score in the underlying rating system, multiplied by the (fixed) estimate of the long run average default rate for each grade/pool/score, the firm intends to vary the PDs used in the IRB calculation based on the relationship between long run and relatively short term default rates for the portfolio or a part thereof;
  - c) The effect of this mechanism is to convert the original rating system into one with Through The Cycle characteristics in terms of the stability with the cycle of the resulting IRB capital requirements.
-

14. An important feature of such approaches is the way in which the scaling factor (or equivalent) varies over time. At this stage we would observe that a number of firms proposing to use such scalar approaches have not given sufficient thought to how this will operate. So, for example, a scalar that does not have an appropriate variation mechanism may merely serve to produce higher Pillar 1 capital requirements in the short term, and without preventing these from rising as the cycle deteriorates.

#### **FSA view on such approaches**

15. **The FSA affirms that it is acceptable in principle for UK firms to use methodologies of the type outlined in this note, in lieu of direct estimation of long run averages for the grade/pool/score of the underlying rating system. This is based on the conclusion that this process is seeking to reproduce the results of a TTC rating system which is itself considered acceptable. However this is subject to two important caveats:-**
  - a) **A firm must be able to overcome the considerable conceptual and technical challenges involved in order to carry out these adjustments in a way that properly takes account of their current levels of default risk and changes over time. In particular there is a danger of permanently tying their capital requirements to measures of their default risk in the past. The FSA will take a sceptical questioning approach to firms' proposals in this regard. Based on our experience to date, we are not convinced that all firms will be able to meet the required standard;**
  - b) **A firm's stress testing must include a "once in 25 years" stress test based on the PDs of the underlying rating system, in addition to the stress test based on the parameters used in the Pillar 1 capital calculation.**
16. These two issues are explained in more detail below.

#### **Practical challenges**

17. **Firstly, both the initial calculation of and subsequent changes to the scalar must be able to take account of changes in default risk that are not purely related to the changes in the cycle.**
  18. Most of the approaches that we have seen to date reverse out cyclical fluctuations but also those fluctuations associated with changes in non-systemic risk, i.e. changes in credit quality due to factors other than the current economic environment. It should be emphasised that the endorsement of TTC approaches is based on the assumption that risk measures will react to fluctuations in the riskiness of a firm's portfolio, as opposed to leaving the capital requirement unchanged, but that these approaches can distinguish between the element of the risk that is cyclical and that which is not. Otherwise we would have capital requirements which were set with regard to a firm's historic default experience and do not react to ongoing changes in the composition and riskiness of its portfolio. This is a fundamental issue, as there is a risk of undermining the basis of the IRB approach, turning it instead into what amounts to a quasi standardised approach which is calibrated on the basis of a firm's historic default experience, and not sensitive to the riskiness of its current portfolio or future changes.
-

19. This is, of course, a general issue that will apply if the number of riskier borrowers is higher now than it was 2, 5 or 10 years ago. One concrete example (in a mortgage book) that can be put forward is if a firm sets its acquisition strategy to attract more first time buyers, generally considered more risky, and thereby altering the risk profile of the book; it would also need to consider the impact of this on the long run average PD for the book. Other examples are changes in customer behaviour (e.g. increase in IVA's), or the degree to which a book is seasoned.
20. **Secondly, a firm must be able to accurately measure the long run default risk of its portfolio even if there were no changes in the business written.**
21. The underlying issue here is what is the source of the scaling factor? So, for example, the use of industry data implies consistency between the firm's portfolio and that of the industry as a whole over the period. As another example, in the UK mortgage industry, the commonly available industry data is based on arrears rates/accounts in default at the end of a period, and not the number of accounts that have defaulted during a period. The assumption that any data source is providing an appropriate proxy needs to be demonstrated and any necessary adjustments made.
22. **Thirdly, a firm must use a data series of appropriate length in order to establish the long run default risk.**
23. In the context of the mortgage industry, the main issue is how long a firm goes back into and before the early 90s experience. In practice this results in the scaling factor, and thus the long run PDs and the capital requirements, first rising and then falling the longer one goes back into the past to derive the average. It is also the case that the further we go back in time, the less the relevance of the historic experience to the current portfolio as the population and the market will have changed so much. We can observe that practice varies between firms as to the length of the data time series considered. But this choice will result in differences in capital requirements for no change in the underlying risk.
24. **Fourthly, a firm must be able to demonstrate the appropriateness of the scaling factor being used across a portfolio/**
25. Typically we observe the same scaling factor being used for all borrowers. However it may be more appropriate to vary the scaling factor for different borrowers; for example in accordance with their riskiness.
26. There are likely to be other technical issues that we have not as yet identified. More generally we would also repeat the need for firms to understand how the scaling factor will vary over time in order to achieve the effect that it intends.

### **Stress Testing**

27. To the extent that applying variable scalars in the way set out in this paper succeeds in neutralising the impact of ratings migration in a downturn, the result of the normal stress test set out in BIPRU 4.3.38 will tend to zero. This is because, regardless of whatever PiT PD estimate any stress test might produce, the firm would be entitled to scale the inputs back under their PD methodology in order to keep the long run portfolio average PD unchanged, as this is how it would be calculating its Pillar 1
-

capital requirement. This implies that any gross stress test would show that its capital requirement remains unchanged, regardless of where we are in the economic cycle.

28. Some caveats should be made to the previous paragraph. PD ratings migration is not the only cause of procyclical capital requirements. Both LGD and EAD, and the impact on defaulted loans, are also relevant. Moreover, depending on the way in the scalars are adjusted, there will be at least an interim period in which the PD element is affecting capital requirements. In practice firms will need to factor all of these impacts into their stress tests.
  29. As indicated above, a firm using a varying scalar type approach that converts the output of its underlying rating system will also need to carry out an additional "once in 25 years" stress test based on the PDs of the underlying rating system. This is for the following reasons:-
    - a) To enable the FSA to make consistent comparisons between firms;
    - b) As a test of firms' abilities to measure the cyclical features of their rating systems, given doubts over their ability to produce proper TTC PD estimates. Estimation of the impact of the stress test is more exacting than that of the long run average, as it focuses on the worst part of the cycle. However both the estimation of long run PDs and cyclical-related stress tests are outputs of a process that require the same understanding of how actual and estimated defaults vary with the cycle. Firms are likely to be able to do both well, or neither;
    - c) To give firms the opportunity to review, at the low point of the cycle, the appropriateness of their PDs being based on figures that are lower than they are actually experiencing.
  30. While not forming part of the "gross-net" stress test discussions required by GENPRU/BIPRU, the stress parameters emerging from this test should inform considerations of the firm's scaling methodology, and inform Pillar 2 discussions of the firm's overall risk profile and ability to weather a recession.
-