Basel 2: FSA view on long-run PDs, Variable scalars & Stress testing

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Risk Model Review
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IRB Mortgage Modelling

- **IRB Waiver Approval Process**
  - Waiver approval process
  - Number of applications and decisions
- **Long-run PD**
  - Point-in-Time Vs Through-the-Cycle
- **Variable Scalar Approaches**
  - Converting estimates from Point-in-Time to Through-the-Cycle
- **Stress Testing**
  - Translate stress scenario into IRB parameters
  - Use of stress testing outputs in Pillar 2

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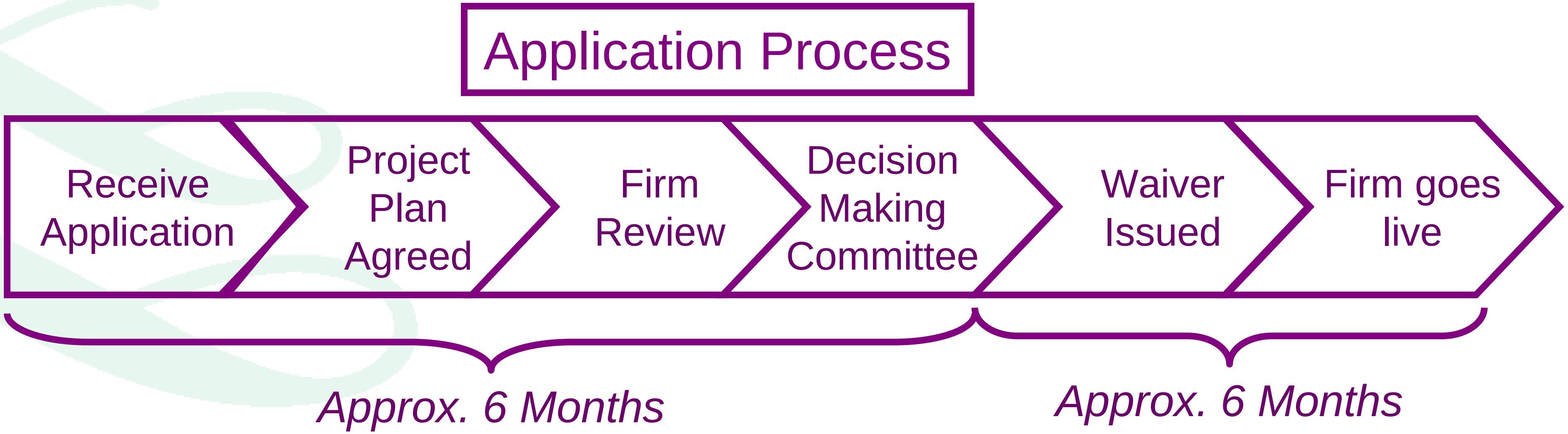
IRB Waiver Approval Process



- 31 applications received to date: 27 for Credit Risk (IRB), 4 for Operational Risk (AMA)
- Recently completed assessment of large wave of IRB applications from the clearing banks, the principal investment banks and other firms
- 4 firms are currently using Basel 2 to calculate capital…and more will start using this permission from Jan 2008

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Long-run PD

FSA

Long-run PD Requirement:

- A firm must estimate PDs by grade from long-run averages of 1 year default rates (*BIPRU 4.6.24*)
- The long-run average must include default rates from a representative mix of good and bad years for the economy (*CEBS 383*)
- PDs must be forward-looking (CEBS 381)…simple extrapolation from historical data is only starting point

In Practice:

i. Firms segment their portfolio into grades using underlying rating system (i.e. scorecards in case of retail)
ii. Calculate historic annual default rates for each grade
iii. With average of historic default rates in (ii) giving the historic grade level PD
iv. Make necessary forward-looking adjustments

Historic Annual Default Rate

Grade	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Average PD*
1	*1.0%*	*1.5%*	*2.3%*	*1.8%*	*1.7%*
2	*2.0%*	*2.3%*	*3.0%*	*2.8%*	*2.5%*
3	*3.0%*	*3.4%*	*4.1%*	*3.9%*	*3.6%*

Long-run PD

- The choice of drivers in the rating system could lead to two distinct PD modelling approaches:

i. **Point-in-time:** An assessment of borrower risk at that particular “point-in-time”…borrower will move up or down grades in line with the economic cycle
   - *A rating system containing cyclical variables would tend to be point-in-time…as the grade a borrower is assigned to will be dependent on the economic conditions*

ii. **Through-the-cycle:** long run assessment of the risk associated with a borrower which does not change with the economic cycle…the borrower grade will not change due to economic conditions
   - *A rating system containing non-cyclical variables would tend to be through-the-cycle….as the grade a borrower is assigned to will NOT be dependent on the economic conditions*

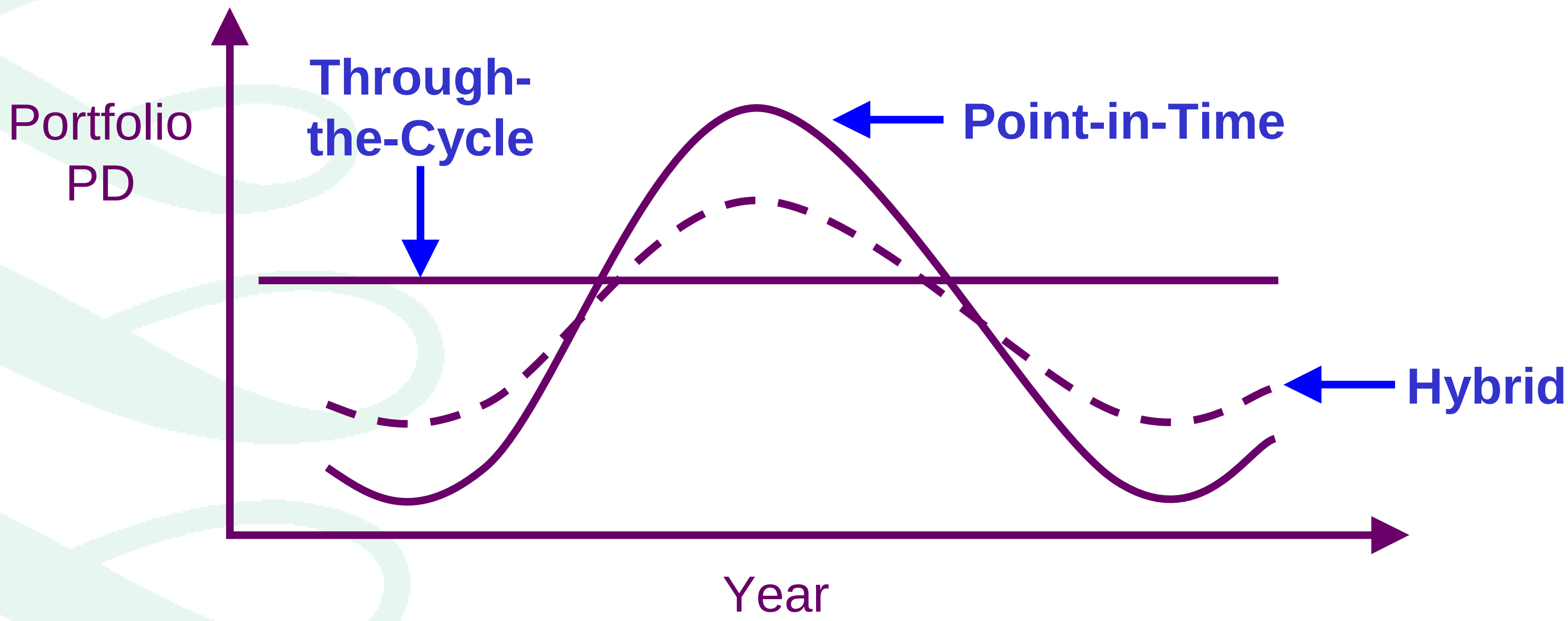
- In practice most rating systems will contain both cyclical and non-cyclical drivers giving a hybrid between point-in-time and through-the-cycle

Long-run PD

Point-in-Time	Through-the-Cycle
As you enter a downturn, there is migration to lower rating grades But the actual default rates in each grade remain unchanged	As you enter a downturn, there is no migration to lower rating grades But the actual default rates in each grade increases
Result: a decrease in borrower credit quality increases the capital requirement	**Result:** capital requirement theoretically unchanged

- Long-run PD by grade does NOT change in either system as a result of the downturn
- A change in the distribution of the portfolio across the grades is a ratings migration…which causes capital volatility

Long-run PD



- The movement in Point-in-Time portfolio PD is a result of grade migration…NOT changes in grade level PD
- A firm's desire to have point-in-time or through-the-cycle capital should guide their approach to modelling long-run PD…how will changes in economic conditions effect your rating system?

Long-run PD – Challenges for Retail

- Before Basel 2 the concept of managing portfolios using long-run default rates was not prevalent within retail firms
- Firms had traditionally assessed risk using recent data and the rating systems being adapted for Basel 2 are based on recent data
- This led to several practical challenges in complying with the long-run average. Theses challenges included:
  - *Rating system used newly acquired data sources for which historic default rates are unknown (e.g. bureau data)*
  - *Data had not been stored in a way which enabled the historic default rates by grade to be calculated (e.g. data not at account level)*
  - *Last UK recession occurred over 15 years ago…Since then retail portfolios have changed markedly, questioning the relevance of data from this time.*
- Using a combination of reasoned analysis and conservatism retail firms have estimate long-run PDs by grade…Delivering a compliant rating system

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Variable Scalar Approaches

- Some Firms tried to comply with the long-run PD requirement by using more readably available historic **portfolio level** default experience
- The recent grade default rates were "mapped" to the average long-run portfolio default rate via the use of a "scalar". The following is a typical "**non-compliant**" example of how this was done:
    i. *Estimate long-run average portfolio default rate back until early 1990s (e.g. 6%)*
    ii. *Calculate portfolio level default rate given by rating system developed on recent data (e.g. 2%)*
    iii. *Divide long-run default rate by recent default rate to give scalar (e.g. 6% / 2% = 3)*
    iv. *Multiply rating system default rates by this scalar…ensuring that final portfolio level PD equals the portfolio long-run average (e.g. 6%)*
- This scalar approach was taking an initial point-in-time/hybrid rating system (e.g. the scorecards) and delivering the output of a through-the-cycle rating system (i.e. the portfolio PD is always 6%)

Variable Scalar Approaches

- After much consideration within the FSA, we concluded that a “variable scalar” approach was acceptable in principle…however this was subject to the following caveats:
    i. *The firm can articulate how they see the scalar will varying with the economic cycle*
    ii. *The firm must be using the approach to obtain a through-the-cycle rating system…and NOT simply to comply with the long-run average requirement*
    iii. *The firm must overcome the considerable conceptual and technical challenges in a way that ensures their current level of risk, and future changes in this level of risk are accounted for*
    iv. *The firm completes an additional 1-in-25 stress test using the default rates of the underlying (i.e. point-in-time/hybrid) rating system*
- The FSA conclusions were published in a November 2006 CRSG paper
- **The CRSG paper also articulated our concerns that firms taking the variable scalar approach would:**
    - *Permanently tie their capital requirements to the performance of their historic portfolios*
    - *Fail to meet the required standards*

Variable Scalar Approaches

- The challenges referred to in caveat (ii) on the previous slide were listed as the following four “practical challenges” of developing a through-the-cycle rating system via the use of scalars:
  1. *All scalar calculations must take account of changes in default risks that are not purely related to changes in the economic cycle…e.g. how does the scalar calculation differentiate between increased risk due to lending practices and increased risk due economic conditions*
  2. *Firms must be able to accurately measure the long-run default rate of their current portfolio…i.e. measure the performance of the current portfolio (within a constant market structure) under different economic conditions*
  3. *Firms must use a data series of appropriate length in order to establish long-run default risk*
  4. *Firms must ensure that the scalar is appropriate for all borrowers within the portfolio*
- The long-run average default rate of a portfolio can only truly be measured by observing the default rates of the same portfolio with a constant market structure under different economic conditions

Variable Scalar Approaches

- The challenges in complying with the long-run average requirements are also relevant to a variable scalar approach
- Our experience is that retail firms have found it extremely challenging to develop a variable scalar approach…and work is still needed
- Our thinking is still developing…however, at this time, the most promising approach is based on:
  - –*Segmenting portfolio by underlying drivers of default risk*
  - –*Estimating separate long-run default rates for each segment*
- In practice this amounts to building a through-the-cycle rating system which estimates the average long-run default rates for homogenous risk segments of the portfolio
- Our latest thinking on the variable scalar approach has been sent to CRSG members for discussion at the September 2007 meeting:

  "Use of variable scaling factors to derive long run probabilities of default for retail portfolios"

Variable Scalar Approaches

September 2007 CRSG paper:

- Firms must try to incorporate all non-cyclical drivers of risk within portfolio segmentation…this will maximise the accuracy of the system
- The inclusion of non-cyclical drivers will lead to variable portfolio default rates…and variable capital
- Drivers should capture both borrowers' **willingness** (*e.g. LTV*) and **ability** (*e.g. Debt-to-Income*) to pay
- The drivers must reflect the firm's risk processes and lending policy…and not selected purely based on statistical criteria
- The firms can expect the FSA to provide a robust challenge to not only the drivers chosen, but also those excluded
- The initial choice of long-run default rates is key…As this will underpin the PD of the entire portfolio for some years to come
- The firm will need a governance process in place to provide a judgemental overlay

Variable Scalar Approaches

September 2007 CRSG paper *cont.*:

- On a regular (at least an annual) basis a governance process will need to decide whether:
  - *Realised default rates have changed a result of cyclical factors and the scalar has changed accordingly*
  - *New information suggests that both the PiT and long-run PDs need to be changed*
  - *New information suggests that the basis of the segmentation needs to be amended*
- The firm will have to demonstrate that the information available is appropriate for making the decisions outlined above
- As for Retail business, the decisions seem likely to affect only the firm's capital requirements and not the day-to-day running of its business…the FSA is sceptical of firms' ability to adequately maintain this governance process
  – *We will be looking for a high level of reassurance and commitment from firms' senior management in this regard*

Variable Scalar Approaches

September 2007 CRSG paper *cont.*:

- The high level conclusion from the paper is that a firm who wishes to use a variable scalar approach, and whose PiT models are acceptable, will be allowed to do so provided:
  - *i. It is able to meet principle 2 and 3 of the original CRSG paper (Nov 2006)*
  - *ii. It is able to produce a well thought out "road map" , supported by senior management, as to how principles 1 and 4 will be met to achieve full compliance with the FSA standards by end 2009*
  - *iii. The PDs from the variable scalar approach will not be allowed to fall below the PDs from the underlying PiT models until it is deemed by the FSA to be in full compliance*

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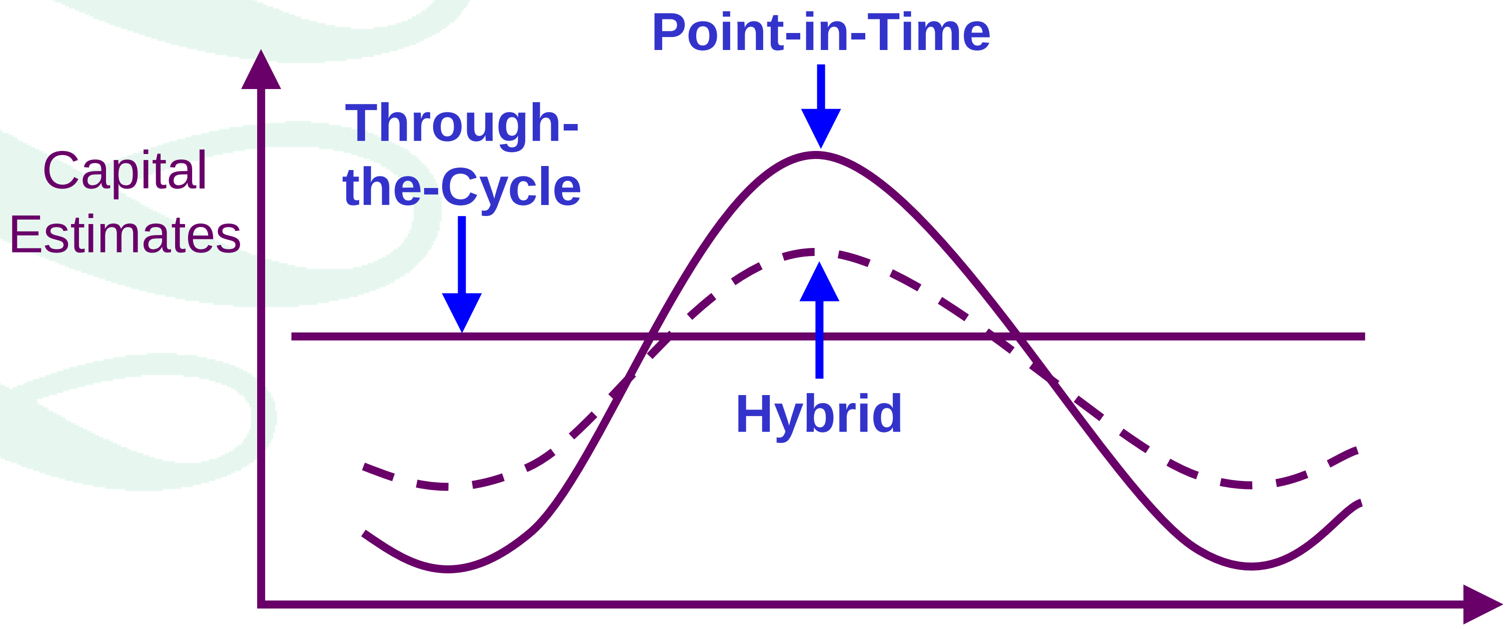
Stress Testing - Requirements

- Stress testing is an important component of Basel 2 framework…FSA sees effective stress testing as essential component of risk management
- A key element of the Basel 2 stress testing is to demonstrate an understanding of what a firm's Capital requirements will be in adverse economic conditions
  - *Under Basel 1 a firm's capital requirements were not strongly cyclical*
  - *Under Basel 2 a point-in-time rating system will give cyclical pillar 1 capital*
- Firm must identify "1 in 25" stress test scenario…and estimate the PD, LGD & EaD their rating system would given under these economic conditions. For example:
  - *What would be your credit score distribution under the 1 in 25 scenario?*
  - *Would you still be applying the current downturn LGD (incorporating house price fall) once house prices have already decreased by 10%?*
- Stress testing results are not independent of PD modelling approach
- The firm's ability to raise the additional capital needed under the stress test is assessed in pillar 2

Stress Testing – 1 in 25 Results

- Through-the-Cycle: Potentially no additional capital…same capital in all economic conditions
- Point-in-time: Capital level responds to economic conditions…portfolio migrates to highest risk grades attracting higher long-run PD



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