Through-the-cycle PD modelling

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Through the cycle modelling

- ## Long-run PD
  - Point-in-Time Vs Through-the-Cycle

- ## Variable Scalar Approaches
  - Pre December 2008
  - Post December 2008

- ## Next Steps
  - Monitoring
  - Non-Mortgage Retail
  - Segmentation
  - Re-Brand

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Long-run PD

FSA.

Long-run PD Requirement:

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

In Practice:

1. Firms segment their portfolio into grades using underlying rating system (i.e. scorecards in case of retail)
2. Calculate historic annual default rates for each grade
3. With average of historic default rates in (ii) giving the historic grade level PD
4. 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:

1. **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*

2. **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

- Long-run PD by grade does NOT change in either system as a result of a downturn

- A change in the distribution of the portfolio across the grades is a ratings migration…which causes capital volatility

- 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?

- The capital of Firms with Point-in-time rating systems will be procyclical

Long-run PD

- At the time of Basel 2 implementation (2007) retail had several practical challenges in complying with the long-run average; including:
  - *Rating systems 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 (at the time) was over 15 years ago…Since then portfolios have changed, questioning the relevance of data from this time.*
- Retail modelling has focused on building models that rank-order
- With models requiring regular recalibration
- Estimating default rates is difficult…as impacted by factors which do not significantly change rank-ordering:
  - *Economic cycle*
  - *Market structure changes*
  - *Firms own credit policy changes*

Should modelling approaches explicitly designed for PD estimation be considered?

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Variable Scalars – Pre December 2008

- Some Firms tried to comply with the long-run PD requirement by using the more 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:

  1. *Estimate long-run average portfolio default rate back until early 1990s (e.g. 6%)*
  2. *Calculate portfolio level default rate given by rating system developed on recent data (e.g. 2%)*
  3. *Divide long-run default rate by recent default rate to give scalar (e.g. 6% / 2% = 3)*
  4. *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 Scalars – Pre December 2008

- After consideration, the FSA concluded that a "variable scalar" approach was acceptable in principle…but that firms must demonstrate how their approach addressed the following four principles:

    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 FSA conclusions were published in a November 2006 CRSG paper…which **articulated our concerns that firms would:**

    - *Permanently tie their capital requirements to the performance of their historic portfolio*

    - *Fail to meet the required standards*

Variable Scalars – Pre December 2008

- The challenges in complying with the long-run average requirements are also relevant to a variable scalar approach

- Firms found it extremely challenging to develop a variable scalar approach for their retail assets…no retail firm developed a compliant approach prior to 2009

- As our thinking developed we published a second CRSG Paper (September 2007)…saying that the most promising approach was based on:

  – *Segmenting portfolio by non-cyclical risk drivers*

  – *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

Variable Scalars – Post December 2008

- As we entered the current economic downturn there was concern over the procyclicality of IRB capital requirements…with the following scenario being envisaged:

  1. *Deterioration in credit quality*

  2. *Leads to grade migration…and higher capital (at a time when capital is expensive)*

  3. *To preserve capital and mitigate further capital increases…firms reduce lending*

  4. *Reduced lending by firms leads to further economic slow down…and further deterioration in credit quality*

- Variable scalars is an approach that dampens the movement in PD estimates due to economic effects…giving more stable capital

- The FSA were asked during the December 2008 CFO meetings to review our approach to variable scalars

- FSA published review in February 2009…outlining our preferred variable scalar approach

- Firms following this approach will be able to develop variable scalars for most asset classes

Variable Scalars – Post December 2008

- The February 2009 paper is consistent with previous CRSG papers…and is based on:

  - *Segmenting portfolio by key non-cyclical risk drivers*

  - *Estimating long-run PD for each segment*

  - *Where segment level data is not available, use of portfolio/industry level data to estimate long-run PD can be considered*

  - *FSA four variable scalar principles are still relevant…but firms will be expected to work towards full compliance, rather than be compliant at first use*

- key differences from previous variable scalar papers:

  - *Accept use of portfolio/industry level data to estimate segment level default rates…although conservatism must be applied*

  - *Accepting initial level of segmentation will not be optimal*

  - *Entry criteria has been lowered…but firms must continue development to achieve full compliance with four principles*

Variable Scalars – Post December 2008

- FSA see same key risks remaining:

  - *Given current data, robust estimation of long-run PDs is not possible*

  - *Firms cannot differentiate between movement in PDs due to economic or credit quality changes…Are scalars being used to remove PD increases due to credit quality deterioration?*

  - *Where portfolio level data is used to estimate segment level default rates…actual volatility of segment to stressed economic conditions will not be measured*

The February 2009 CRSG paper listed the work which needs to be done to mitigate these risks.

Variable Scalars – Post December 2008

- Since the start of 2009 the FSA has actively encouraged firms to adopt variable scalar approaches… and where discussed in the Turner Review
- Variable Scalar benefits (for illustration purposes only):
  - Simulation on a simple *mortgage* IRB model that has no cyclical damping:

    RWAs could move from 7.3% in benign times to 31.7% in a recession

    For a £10bn portfolio this is equates to a pillar 1 capital increase of £58m to £254m

  - Simulation on a simple *corporate* IRB model:

    RWAs could move from 34% in benign times to 40% in a recession

    For a £10bn portfolio this is equates to a pillar 1 capital increase of £272m to £320m

Variable Scalars – Post December 2008

- However firms taking a variable scalar approach must be aware that:
  - *Variable scalars may not give an immediate capital reduction (and could give an initial increase)…but will prevent significant increases as recession progresses*
  - *There are many moving parts to IRB capital calculations…completely stable capital will never be achieved*
  - *Recommended approach contains many conceptual and technical challenges…firms will need to commit analytical resource*
  - *Once implemented, firms will need to commit to on-going development*
- But we do believe that the benefits from implementing a variable scalar approach will compensate for the work required

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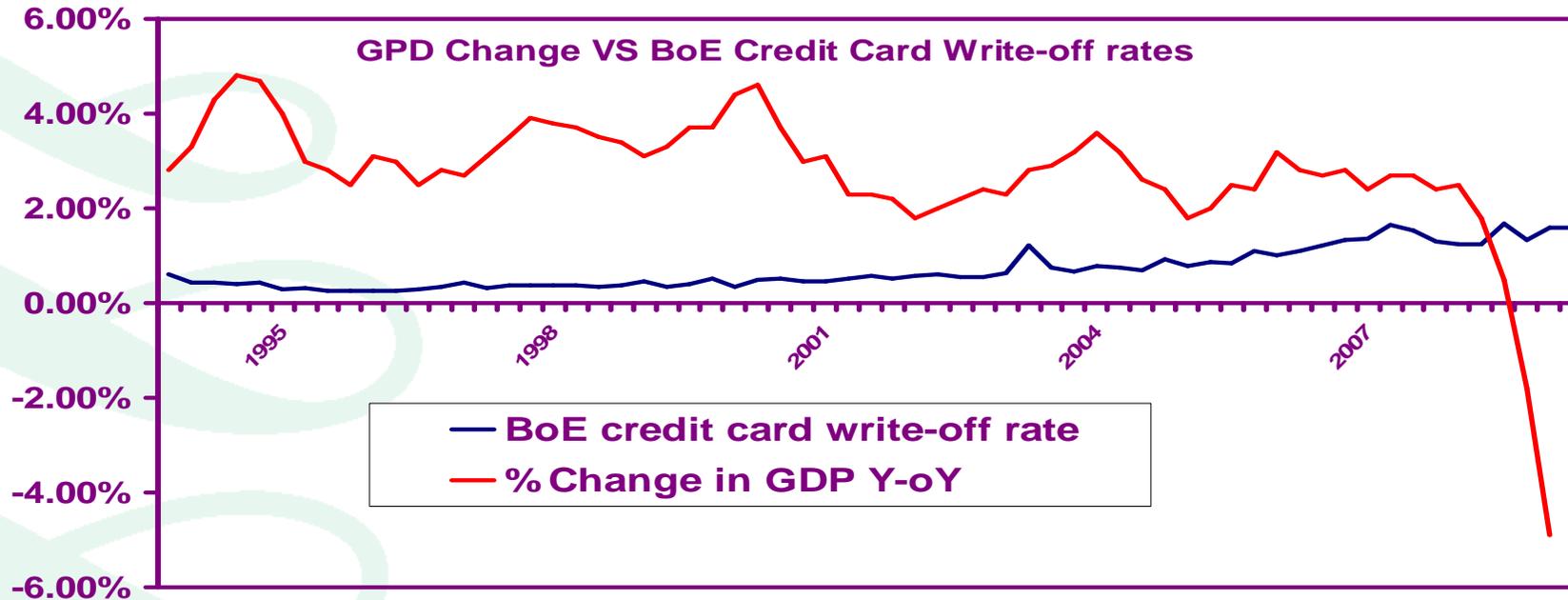 - Segmentation
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Next steps

- To-date the FSA has approved number of portfolios across a small number of firms to use variable scalar approaches

- Maintain momentum of firms in developing new approaches….and improving existing approaches

- Ensure firms get clear understanding of FSA standards…entry criteria have been lowered, but:

  - *Firms still need a robust measure of long-run performance (i.e. known issue with retail unsecured)*

  - *Firms are expected to continue to develop their approaches…leading to full-compliance over-time*

  - *Firms' approaches should consider an element of segmentation*

- FSA is actively engaged with all firms to provide on-going assessment as approaches are developed…minimise "project risk"

Next steps - Monitoring

- DMC approval conditions have all required further development of variable scalar management information
  - *Segmentation will not incorporate all credit risk drivers*
  - *Must monitor for credit risk changes at segment level*
  - *If segment level arrears rates change…is this due to the cycle or credit quality?*
  - *Long-run PDs…how do you measure the accuracy of something that never equals actual default rates?*

- Senior management must be engaged
  - *Will require senior committees to make complex decisions based on complex information*
  - *Element of judgement will always have to be applied*
  - *Will need to demonstrate on-going validation is robust and subject to rigorous challenge*
  - *How do you keep focus in benign periods when "nothing interesting happens"?*

- FSA concerned that evidence will have to be "overwhelming" before firms will change initial choice of long-run default rates

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Next steps – Non-mortgage Retail

GPD Change VS BoE Credit Card Write-off rates

Legend:
- **BoE credit card write-off rate** (blue line)
- **% Change in GDP Y-oY** (red line)

Y-axis: 6.00%, 4.00%, 2.00%, 0.00%, -2.00%, -4.00%, -6.00%

X-axis years: 1995, 1998, 2001, 2004, 2007

- Significant structural changes in market have affected historic write-off rates… increased market penetration, change in insolvency laws, change in customer attitude to credit and change in firm under writing criteria

- Historic portfolio performance does not give meaningful guide to future performance…the average write-off rate is trending upwards

- FSA is recommending that, given current data available, analytical resource is focused on developing variable scalar approaches for other assets classes

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Next steps - Segmentation

- The segmentation we have seen to-date is limited:
  - *Based on available historic variables*
  - *Level of information now used for application scorecard development is not available historically*
  - *Segmentation analysis done on short time period of data…potentially not optimal segments over the cycle*

- Within the next couple of years…firms should be able to:
  - *Redevelop segmentation using data from good and bad economic periods*
  - *Consider all variables available for application scorecards in segmentation…caveat on bureau scores (are they consistent overtime?)*
  - *Re-estimate long-run PDs using segment level default experience from good and bad economic periods*

  …In fact build a through the cycle model

Next steps - Rebrand

- Call through the cycle modelling…FSA focus is on:
  - *Data quality*
  - *Segmentation*
  - *Long-run historic performance information*
  - *Judgement applied*
- Firms do use scalar to adjust PiT PDs to given segment long-run average…enable account level capital calculations
- But main influence on overall portfolio PD level is the segment long-run PDs
- So the term "variable scalar" is misleading

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