REDmoney seminars

Stress testing Credit, Market and Operational risk

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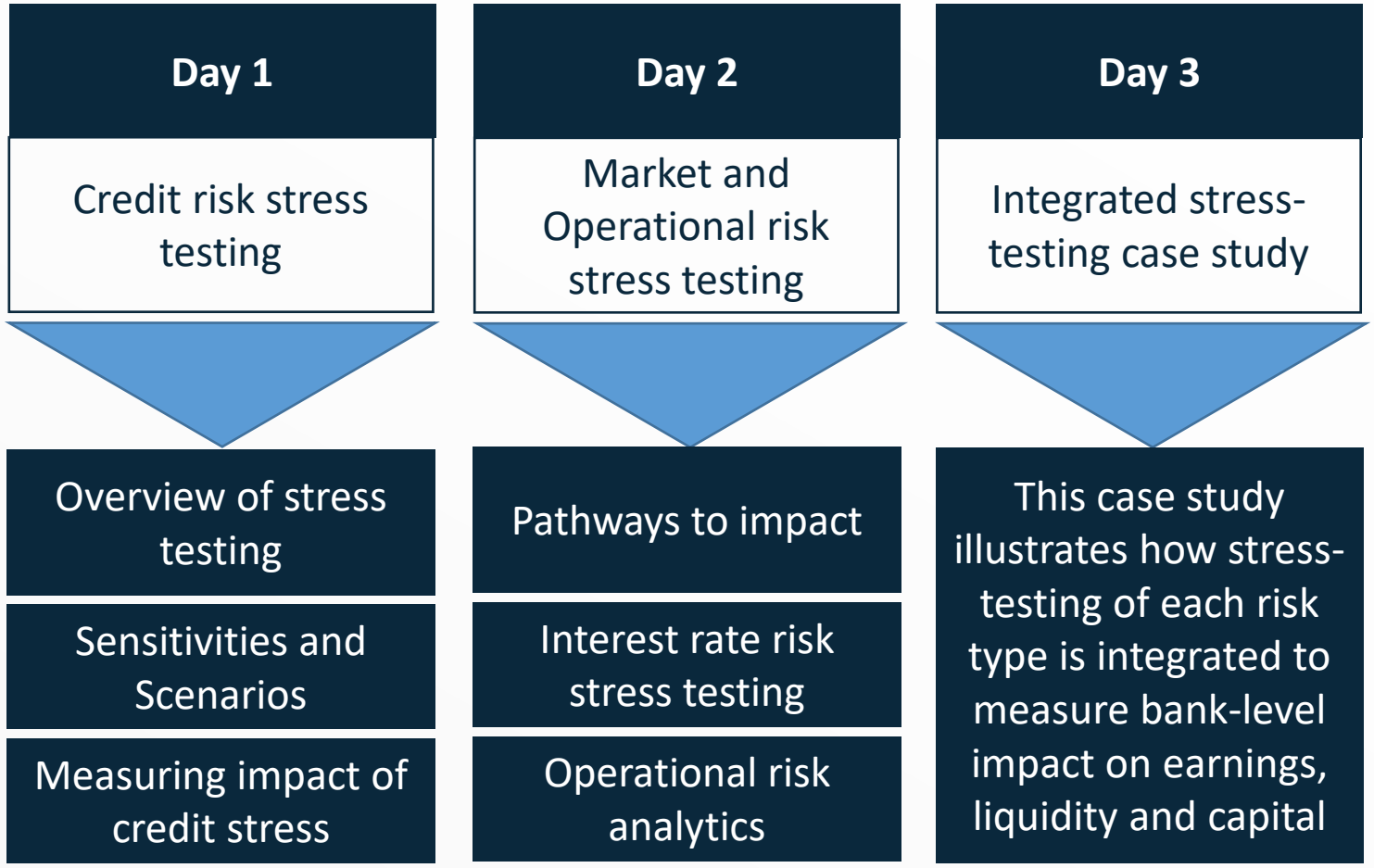
What is This Course About ?



Case study: Integrated Stress test

What is this part about?

- Integration of credit, market and operational risk within an enterprise risk management framework
- Example of how integrated stress testing is put together

How is risk integrated in stress testing?

Method

- To create an integrated stress test which appropriately combines credit, market, and operational risk, the bank uses the *same* stress scenarios to calculate the financial impact due to each risk
- The method needs to incorporate the financial impact of
  - Macroeconomic factors, e.g., GDP, unemployment, interest rates, HPI
  - Market factors, e.g., equity prices, FX rates etc.
  - Bank-specific factors, i.e., operational risk events
- Furthermore, *interactions* between risk factors and exposures must be evaluated to ensure financial transmission channels are *consistent* in the way that scenarios impact all relevant aspects of business

The process

- Macroeconomic
- Market
- Bank-specific

i.e., how does each risk factor impact the bank?

Data sourcing, compilation and formatting for model input

- Stressed PDs and LGDs for credit risk
- Stressed volatilities and correlations for market risk
- Stressed operational risk losses

- P&L, balance sheet, liquidity, and capital adequacy

Example interactions and transmission channels

No.	Interactions	How do the interactions happen?
1	Interest rates and cost of borrowing	• Falling interest rates reduce the market rate component of funding cost but also widens the credit spread
2	Interest rates and size of loan portfolio	• Falling interest rates during a recession cause a contraction in the size of the loan portfolio due to run-off without replacement • Balance sheet contraction also arises because liabilities cannot be refinanced
3	Interest rates and NIM	• Impact of falling rates on NIM depends on whether a bank is overall asset or liability sensitive due to repricing characteristics • Falling interest rates will always cause spread compression
4	Interest rates and obligor credit risk	• Obligors with variable rate loans will benefit from rate falls • However, credit risk will still rise overall due to poorer credit quality in a recession, e.g., due to unemployment, and lower collateral values
5	Interest rates and bond prices	• Falling interest rates usually means higher bond prices • However, increased issuer credit risk and flight to quality (e.g., treasury bonds) causes severe downwards pricing pressure

Example interactions and transmission channels

No.	Interactions	How do the interactions happen?
6	Interest rates and prepayment	• Fixed rate mortgages typically prepay when rates fall as homeowners are able to find cheaper financing at new lower rates. This reduces reinvestment yields for the bank
7	Equity prices and credit risk	• Lower equity prices erode the collateral value of equities in share margin financing, thereby increasing credit risk
8	Interest rates and FX rates	• Falling interest rates reduce the yield on variable rate assets and reinvestment income, and weaken a country's currency • A weaker domestic currency increases the effective cost of foreign currency denominated borrowings
9	Credit risk and liquidity	• Central banks typically impose moratoriums/grace periods for loan repayments during a recession. This creates credit risk losses, and reduces available liquidity
10	Market risk and brokerage income	• Highly volatile bear markets remove buyers and sellers from the market, thereby reducing brokerage income
11	State stimulus and bonds	• Government bonds are also sold off as local states seek liquidity for stimulus

Example interactions and transmission channels

No.	Interactions	How do the interactions happen?
12	Fraud and unemployment	• A higher level of general unemployment usually creates greater incentives to commit fraud, thereby increasing operational risk
13	Transaction processing and unemployment	• Bank redundancies increase workloads on remaining staff, leading to a higher frequency of transaction processing errors, and operational risk
14	Mis-selling during a recession	• As banks compete for a smaller market, incentives to mis-sell products increase, thereby increasing operational risk due to a higher potential for compensation claims

Integrated risk case study: Description of the bank

- XYZ Bank is a credit institution mostly providing unsecured personal loans and secured home financing, i.e., mortgages, to retail customers
  - Unsecured personal loans have an initial maturity of 5-years, repay principal at maturity, and have a fixed interest rate of 8%. If obligors, default, the bank recovers 40% of the outstanding loan amount.
  - Mortgages have initial maturities of 10-years, have a fixed rate of 6%, and amortize on a straight-line basis. If homeowners default, the bank realizes 60% of the market value of the property collateral
- The bank also invests in domestic listed equities which trade in a deep and liquid secondary market
- Bank XYZ is 90% funded by fixed rate customer deposits with 6-month maturities

Integrated risk case study: Calculation methodology

1. The scenario macroeconomic environments are used to project new loans. In the bad case and worst case, total loans shrink, with the greatest reduction for the worst-case scenario
2. The maturity composition and amortization schedules for loans are derived:
   - at the start of FY-1
     - Personal loan portfolio consists of loans maturing after 4-years and 5-years
     - Mortgage portfolio consists of loans maturing after 9-years and 10-years
   - at start of FY-2
     - Personal loan maturities are after 3-years, 4-years, and 5-years
     - Mortgage loan maturities are after 8-years, 9-years and 10-years
   - at the start of FY-3
     - Personal loan maturities are after 2-years, 3-years, 4-years, and 5-years
     - Mortgage loan maturities are after 7-years, 8-years, 9-years, and 10-years

Integrated risk case study: Calculation methodology

3. Using the macroeconomic factor values in each scenario, 12m PDs are calculated for FY-1, FY-2, and FY-3
4. Then, 12m PDs are used to calculate lifetime PDs to determine for each loan whether a SICR has occurred *since initial recognition* using SICR criteria. The date of initial recognition for each loan is either FY-1, FY-2, or FY-3 depending on when the loan was originated.
5. Loans are then allocated to the appropriate stages:
   - For loans in Stage-1, the loan loss provision uses a 12m ECL
   - For loans in Stage-2 and Stage-3, the loan loss provision uses a lifetime ECL
6. To determine market risk losses, the bank calculates a a long-run average volatility for BAU, and the GFC 2007-9 for stress scenarios. An econometric model is used to assign volatilities to each FY in each scenario based on macroeconomic and market risk factors. Cumulative variance is calculated, and VaR losses are at a 95% confidence.

Integrated risk case study: Calculation methodology

7. Using the interest rate scenarios, the bank also calculates the impact on net income due to interest rate decreases. The overall impact on P&L due to interest rates is calculated recognizing 3 different effects:
   a. The rate sensitivity of assets and liabilities
      - Since the deposits mature within 12m, the bank is net liability sensitive
   b. The amount of assets and liabilities
      - The carrying value of assets and liabilities decrease over the projection
   c. NIM compression
8. The bank also calculates operational risk losses in each scenario using a combination of loss types
   - High frequency low impact – based on historic average loss and standard deviation
   - Low frequency high impact – based on a one-off event in the bad case and the worse case scenarios, with the loss in the worst case exceeding that in the bad case

Quiz: Other Stress Testing Approaches

Which of the following is true of stress testing?

A. Stress testing concerns implausible but exceptional events
B. Stress testing concerns plausible but ordinary events
C. Stress testing applies macroeconomic scenarios only
D. Stress testing applies macroeconomic, market, and bank specific scenarios
E. None of the above

Thank you!

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