Z methodology

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Here's a LinkedIn post that summarizes the entire process from Z scores to calculating unconditional PDs:

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Understanding Z Scores and Converting to Unconditional PDs in IFRS 9

In credit risk modeling, accurately forecasting default probabilities is crucial for compliance and financial stability. Here's a streamlined approach using Z scores to convert conditional PDs to unconditional PDs:

1. Compute Z Scores:

- Formula: $WCDR = N\left(k - \frac{\sqrt{\rho}\cdot Z}{\sqrt{1-\rho}}\right)$ - Rearrange to Solve for Z:

$$Z = \frac{k - PITscore \cdot \sqrt{1-\rho}}{\sqrt{\rho}}$$

- Where: - ρ is the correlation. - k is the mean PIT score multiplied by $\sqrt{1-\rho}$. - σ is the standard deviation of the PIT score.

2. Regress Z Scores with Macroeconomic Variables:

- Perform regression analysis to find the relationship between Z scores and macroeconomic variables. - This helps identify which macroeconomic factors influence default probabilities.

3. Forecast Macroeconomic Variables:

- Obtain forecasts for the relevant macroeconomic variables for the remaining loan period.

4. Forecast Z Values:

- Use the regression results and macroeconomic forecasts to estimate Z values for the remaining loan tenor.

5. Calculate PIT Scores:

- Formula: $PITscore = k - \frac{\sqrt{\rho}\cdot Z}{\sqrt{1-\rho}}$ - Convert PIT scores to PIT Probability of Default (PD).

6. Convert Conditional to Unconditional PDs:

- 1-Year PD:

$$PD(1) = Probabilityofdefaultwithinthenext12months$$

- 2-Year PD:

$$PD(2) = PD(1) + (1 - PD(1)) \times \frac{PD(2|S)}{1 - PD(1)}$$

- Where $PD(2|S)$ is the conditional probability of default in the second year given survival in the first year.

- Lifetime PD (for a 5-year term):

$$PD(5) = 1-(1-PD(1))\times(1-PD(2|S))\times(1-PD(3|S))\times(1-PD(4|S))\times(1-PD(5|S))$$

- Where $PD(t|S)$ is the conditional probability of default in year t, given survival up to year $t-1$.

This approach ensures accurate and realistic forecasting of default probabilities, accounting for the evolving borrower pool over time. By converting conditional PDs to unconditional PDs, we can better align with IFRS 9 requirements and manage credit risk effectively.

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Feel free to adjust or add any specific details based on your audience or focus!]

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6. Convert Conditional to Unconditional PDs:

- 1-Year PD:

$$PD(1) = Probability of default within the next 12 months$$

- 2-Year PD:

$$PD(2) = PD(1) + (1 - PD(1)) \times \frac{PD(2|S)}{1 - PD(1)}$$

- Where $PD(2|S)$ is the conditional probability of default in the second year given survival in the first year.

- Lifetime PD (for a 5-year term):

$$PD(5) = 1-(1-PD(1))\times(1-PD(2|S))\times(1-PD(3|S))\times(1-PD(4|S))\times(1-PD(5|S))$$

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