Incremental Risk Charge (IRC)

Summary

- Market Risk Types
- IRC Definition
- IRC Scope
- IRC Main Features
- Default and Migration Simulation
- Constant level of risk
- Implementation

Market Risk Types

- General market risk
- Idiosyncratic or specific risk: such as equity specific risk and debt specific risk
- Even risk (e.g., default or migration): IRC is intended to capture even risk

IRC

IRC Definition

- The incremental risk charge (IRC) is a new regulatory requirement from the Basel Committee in response to the financial crisis.
- IRC supplements existing Value-at-Risk (VaR) and captures the loss due to default and migration events at a **99.9%** confidence level over a **one-year** capital horizon.

IRC Scope

- Debt instruments are subject to IRC.
- Credit products, including structured credit, are included in IRC.

IRC Main Features

- Liquidity is explicitly modeled in IRC through liquidity horizon and constant level of risk.
- Constant level of risk assumption
  - Hold portfolio constant over liquidity horizon
  - Rebalance any default, downgraded, or upgraded positions at the beginning of each liquidity horizon
  - Roll over any matured positions at the beginning of each horizon
- Default and migration need to be simulated for one-year horizon.
- Concentration measures the degree of a portfolio diversification.

  For example, if a significant number of issuers belong to a certain category, the portfolio is a concentrated one.

Default and Migration Simulation

- Default and credit migration is commonly modeled by an asset model:

$$z_i = \beta_i \phi + \sqrt{1-\beta_i^2}\,\varepsilon_i$$

where

ϕ is the systematic risk;

ε_i is the idiosyncratic risk for issuer/obligor *i*;

β_i *is* the weighted correlation that systematic risk factor affects issuer/obligor *i*;

z_i is thhe normalized asset return or creditworthiness indicator for issuer/obligor *i*.

Default and Migration Simulation (Cont'd)

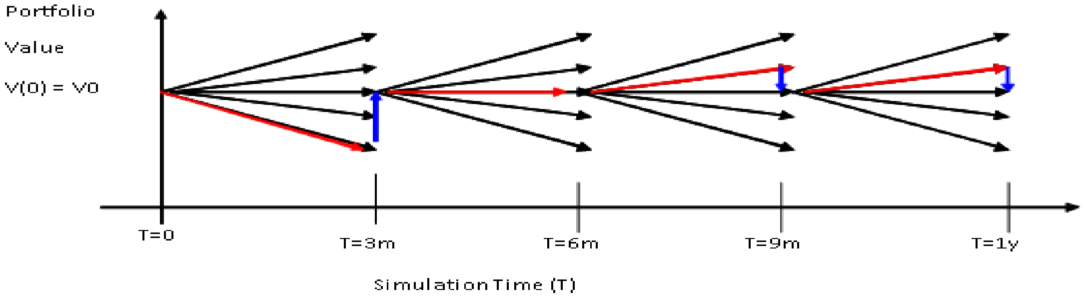
- Determination of default and credit migration
  - Given historical default and transition probabilities (also called default transition matrix), the thresholds of default and credit migration can be computed.
  - For example, we can compute various rating thresholds for a BBB issuer as Z_{BBB}^{D} , Z_{BBB}^{CCC}, Z_{BBB}^{B}, Z_{BBB}^{BB}, z_{BBB}^{BBB}, Z_{BBB}^{A}, Z_{BBB}^{AA}, Z_{BBB}^{AAA}
  - If the simulated and normalized asset value z_i is between Z_{BBB}^{A} and Z_{BBB}^{AA}, it means the issuer is migrated from BBB to AA, verse vice.
  - Similarly if the simulated asset value z_i is smaller than Z_{BBB}^{D} , the issuer defaults

Constant level of risk

- The constant level of risk reflects recognition by regulators that securities/derivatives held in the trading book are generally much more liquid than those in the banking book.
- We interpret constant level of risk as constant loss distribution, i.e.,
  - The same loss distribution over each liquidity horizon
  - The same rating over each liquidity horizon
  - The same risk metrics over each liquidity horizon
- For example, the liquidity horizon for a portfolio is 3 months. That means the bank holds its portfolio components constant for 3 months and then rebalances it by replacing any default or downgraded or upgraded positions so that the portfolio is returned to the initial level of risk.

Constant level of risk (Cont'd)

- The process is repeated four times to arrive at 1-year shown as



- In Monte Carlo context, this can be modeled by drawing 4 times from the single-period loss distribution measured over the liquidity horizon.
- The advantages of this assumption
  - Avoid the complexity of rebalancing and roll-over
  - Reduce computation significantly

Implementation

- Find all debt and credit deals.
- Banks can assign a liquidity horizon to each deal under conservative assumption. The liquidity horizon has a floor of 3 months
- Divide deals into portfolios based on liquidity horizons.
- Assuming that a portfolio has 3-months liquidity horizon, compute 3-month loss distribution as follows
  - Simulate default and migration at 3 months
  - If default: $DefaultLoss_{i,3m} = Exposure_{i,3m} * LGD_i$
  - If rating change: $MigrationLoss_{i,3m} = MTM_{i,3m,newRating} - MTM_{i,0,oldRating}$
  - Total loss: $loss_{3m} = \sum_i DefaultLoss_{i,3m} + \sum_j MigrationLoss_{j,3m}$
  - Repeat for all scenarios to generate 3 month loss distribution

Implementation (Cont'd)

- Based on the constant level of risk assumption, the 3-6 months, 6-9 months and 9-12 months loss distributions are just the copy of 0-3 months lost distribution.
- The 1-year loss distribution is the convolution of 4 copies of the first 3-month loss distribution.
- IRC = 99.9% quantile of the 1-year loss distribution

Thanks!

You can find more online details at

https://finpricing.com/lib/CdCreditSpreadCurve.html