Stress testing credit risk and interest rate risk for commercial lending portfolios

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Agenda

- ➤ Credit risk and interest rate risk for corporates and commercial real estate loans.

- ➤ What historical time series tell us and what are can be in the model.

- ➤ Can our models capture behaviors that have not been observed in the history.

Credit and interest rate risks are correlated

- ➢ Credit risk and interest rate risk for corporates and commercial real estate loans
  - ▪ When interest rate increases, a firm must generate higher return to remain profitable and to avoid insolvency or default.
  - ▪ Interest rate levels depend on the macroeconomic environments and policy.
  - ▪ We are interested in the credit quality of the firms that are constituents of the bank's lending portfolios.

- ➢ For stress test purposes can historical data provide a good base of modelling
  - ▪ Commercial loans and commercial real estate loans.
  - ▪ Expected loss often measured by components of PD, LGD and EAD.
  - ▪ Historical data either not long enough history or lack of default data.

  - ▪ Even if have sufficient historical data the assumptions behind data may not be clear or repeatable.

What historical time series tell us

➢ 10 year treasure rates represents long term interest rates, relatively long history

  ▪ Modelling losses usually not use the whole time series but most recent time periods.

  ▪ Current trend may at a different stage of interest rates longer trend.

What historical time series tells us

- ➢ Short term, mid-term and long term interest rates are highly correlated
  - ▪ They often move toward similar direction.
 - ▪ Short term rates have relatively higher volatility.

What historical time series tells us

➢ Corporate rates move at the similar direction with interest rates
  ▪ Will have similar issues as where we are at the interest rate cycle.

Shaded areas indicate US recessions - 2014 research.stlouisfed.org

What historical time series tells us

- ➢ The differences between 10-year treasury rates and corporate yields often used as indication of credit risk (less of liquidity and others factors)
  - ▪ Most recent financial crisis at the peak of recent historical period since 1953.
  - ▪ Current stage of such credit risk is at higher side of the history.
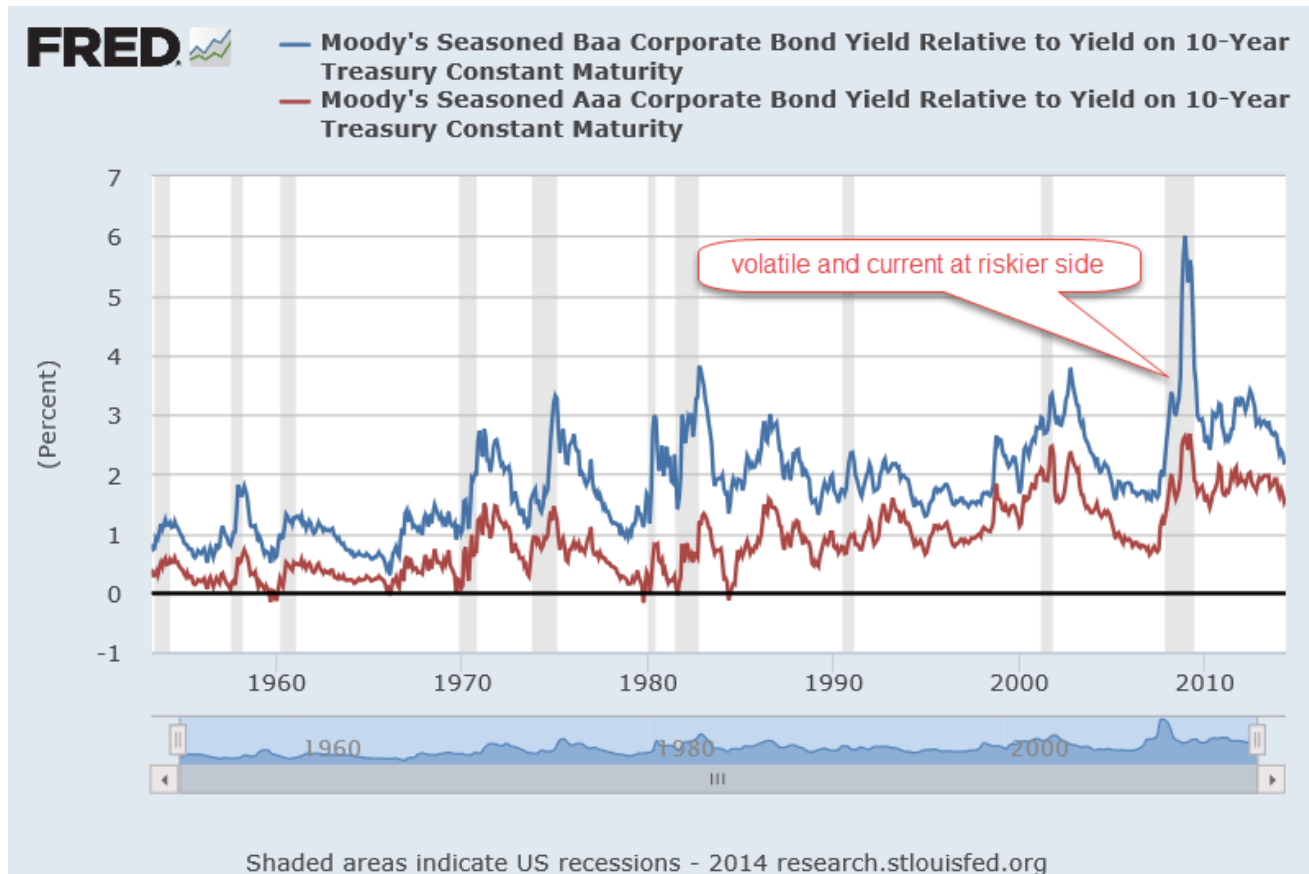
What historical time series tells us

- ➢ Interest rates, credit spreads and commercial real estate delinquencies
  - ▪ Clearly the credit spreads not accurately explain the CRE loss rates.
  - ▪ Large lags observed for commercial real estate delinquency rates.

Modelling challenges: CRE

- ➢ For CRE portfolios, the interest rates can be captured via macro variables that matters to real estate properties

  - ▪ Loan-to-value ratio.

  - ▪ Debt service coverage ratio.

  - ▪ Net operating incomes.

  - ▪ Capitalization rates, etc.

- ➢ Methodologies can be

  - ▪ Leverage Basel through-the-cycle models with inputs calibrated to scenario specific model parameters to capture property specific characteristics.

  - ▪ Regression models at aggregated levels.

  - ▪ Combined with property allocations given loss rates.

Modelling challenges: C&I

- ➢ For commercial and industrials, the loss rate are normally calibrated by components of PD, LGD, and EAD
    - ▪ Unlike CRE, the regression model usually shown the interest rates are a non-significant driver statistically.
    - ▪ The data series are usually not long enough to capture different interest rate cycles, or simply cannot response to the increase of interest rates in the projection.

    - ▪ To signifying the interest rate, the coefficients can be measured at different confidence level to increase the weights which are statistically meaningful.

    - ▪ Unit sensitivities obtained in historical model calibration to be applied in the loss rate projection, more like sensitivities used in market risk.
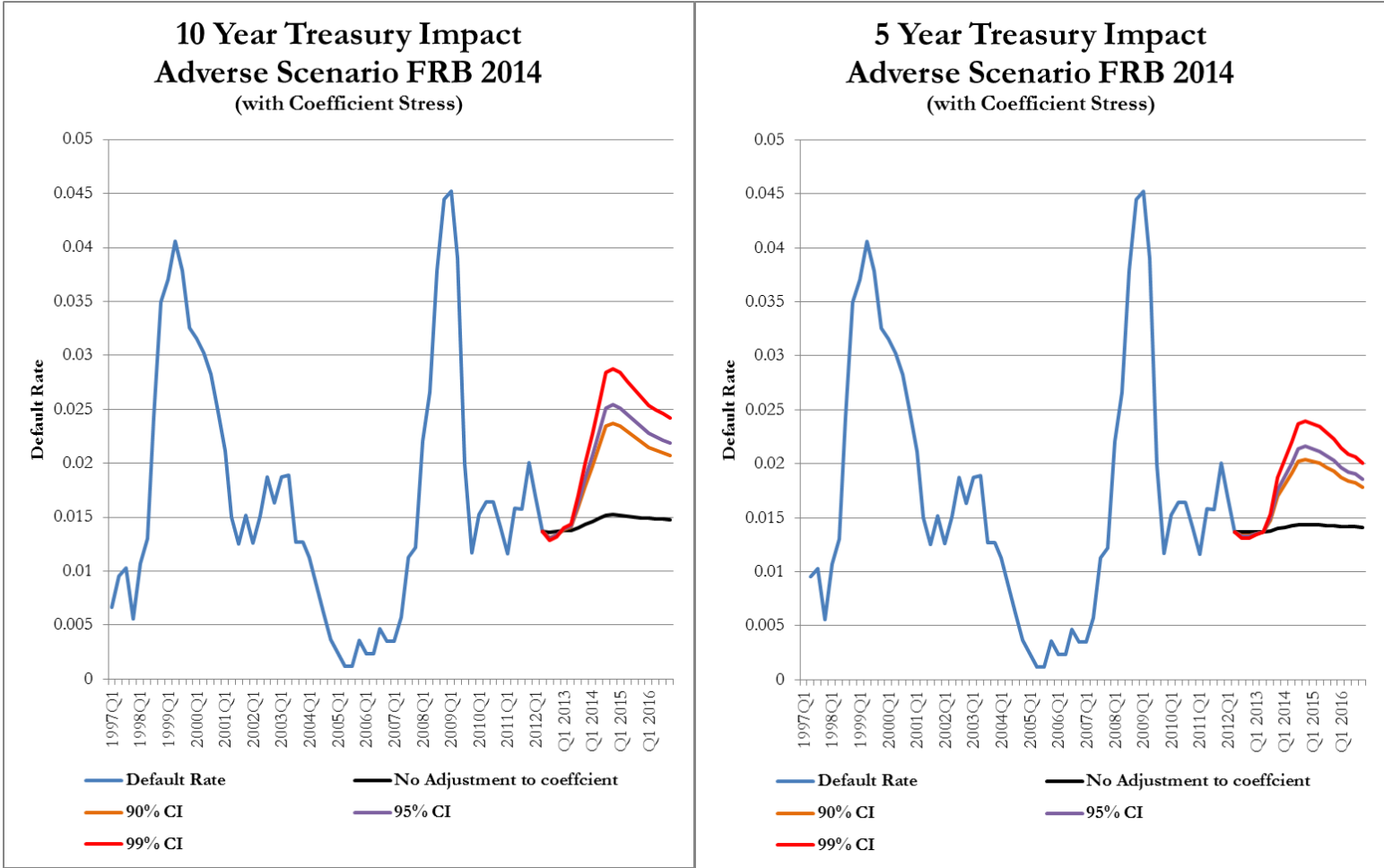
➢ Interest rates with lagged default rates
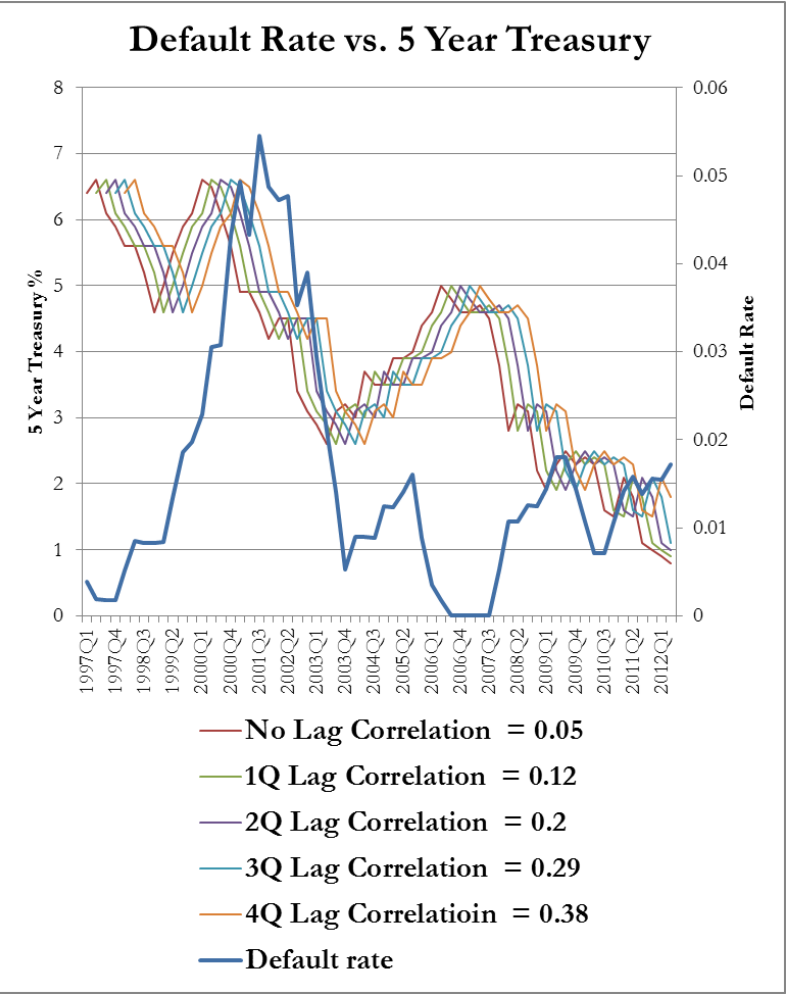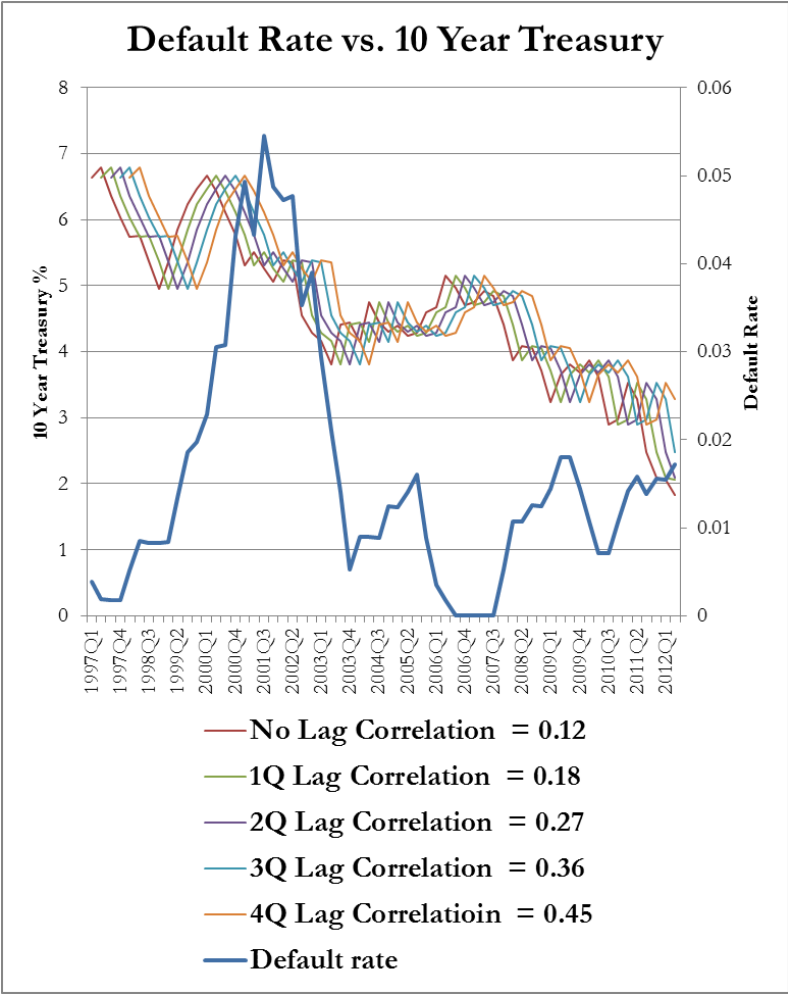
Modelling challenges: C&I

➢ Interest rate coefficient sensitivities with confidence levels with a different sector

Interest rates of the world: non-U.S.

> Long-term interest rates:
> - Can interest rate a measure of sovereign risks?
> - What would be the risk free rates?