A Discussion of **"Benchmark Interest Rates when the Government is Risky"**

by Patrick Augustin, Mikhail Chernov, Lukas Schmid, and Dongho Song

Wenhao Li

USC Marshall

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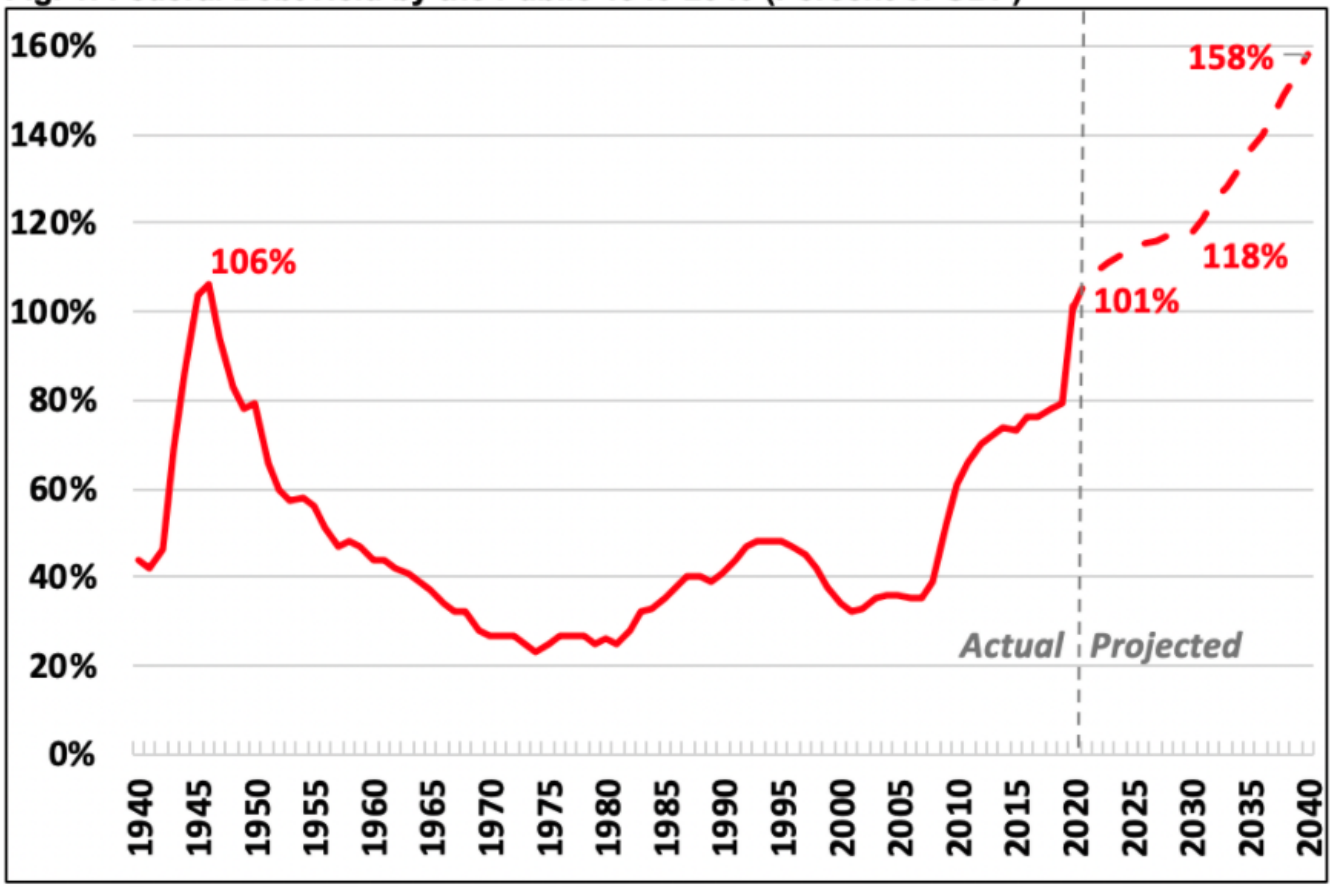
The Explosion of Government Debt

Fig. 1: Federal Debt Held by the Public 1940-2040 (Percent of GDP)



Source: Congressional Budget Office (1940-2020 figures), CRFB calculations (2021-2040 figures).

Overview

- This paper: consider the default possibility of U.S. government when pricing Treasuries and interest rate swaps.
  - Explain the negative swap spread puzzle after 2008.
- A distinct view for no-arbitrage violations.
  - Bank balance-sheet costs induced by regulatory burdens (Du, Tepper, and Verdelhan 2018; Du, Hebert, and Huber 2019).
  - Demand imbalances + limits to arbitrage (Klingler and Sundaresan 2019; Jermann 2020)
  - The arbitrage is risky and needs proper risk adjustment (this paper)
- Incorporate richer elements to the term-structure literature
  - Generate highly accurate Treasury yield curves.

Overview

- This paper is built on previous papers by the authors
  - Chernov, Schmid, and Schneider (2020, JF): government default and CDS pricing.
  - Augustin, Chernov, Schmid, and Song (2020, JFE), Augustin, Chernov and Song (2020, JFE), Augustin (2018 JME), Song (2017 RFS).
  - Recent working paper by Augustin, Chernov, Schmid, and Song, on pricing "arbitrage violations" in currencies.

The Swap Spread "Arbitrage"

- Buy a Treasury security finance by repo at t_0 (earning $n \cdot y_{t_0}^n$ - $\sum_{t=t_0}^{t_0+n} r_t$).
- Enter the floating leg of a swap contract (say OIS) – receive floating rates, pay fixed rates (earning $\sum_{t=t_0}^{t_0+n} f_t - n \cdot OIS_{t_0}^n$)
- No initial or terminal principal cash flows.
- Floating spread

$$S_t = f_t - r_t, t_0 \leq t \leq t_0 + n$$

  and swap spread

$$SS_t = OIS_{t_0}^n - y_{t_0}^n, t_0 \leq t \leq t_0 + n$$

- What makes the strategy attractive to hedge funds is that the floating spread S_t has historically been very stable over time. Think of $S_t = S_{t_0}$ for $t_0 \leq t \leq t_0 + n$. Therefore, $S_{t_0} = SS_{t_0}$ by "no arbitrage".

Mechanisms of This Paper

- Main mechanism: government bonds have default risks. Need to consider

$$y^n_{t_0} = y^n_{t_0}(\text{no default}) + CDS^n_{t_0}$$

- Additional adjustments:
  - Treasuries have convenience yield premium. OIS requires collateral. Thus we need

$$y^n_{t_0} = y^n_{t_0}(\text{no default or convenience}) + CDS^n_{t_0} - \text{convenience yield}_t$$

$$OIS^n_{t_0} = OIS^n_{t_0}(\text{no collateral}) + \text{collateral adjustment}_t$$

  - Regain an "adjusted arbitrage":

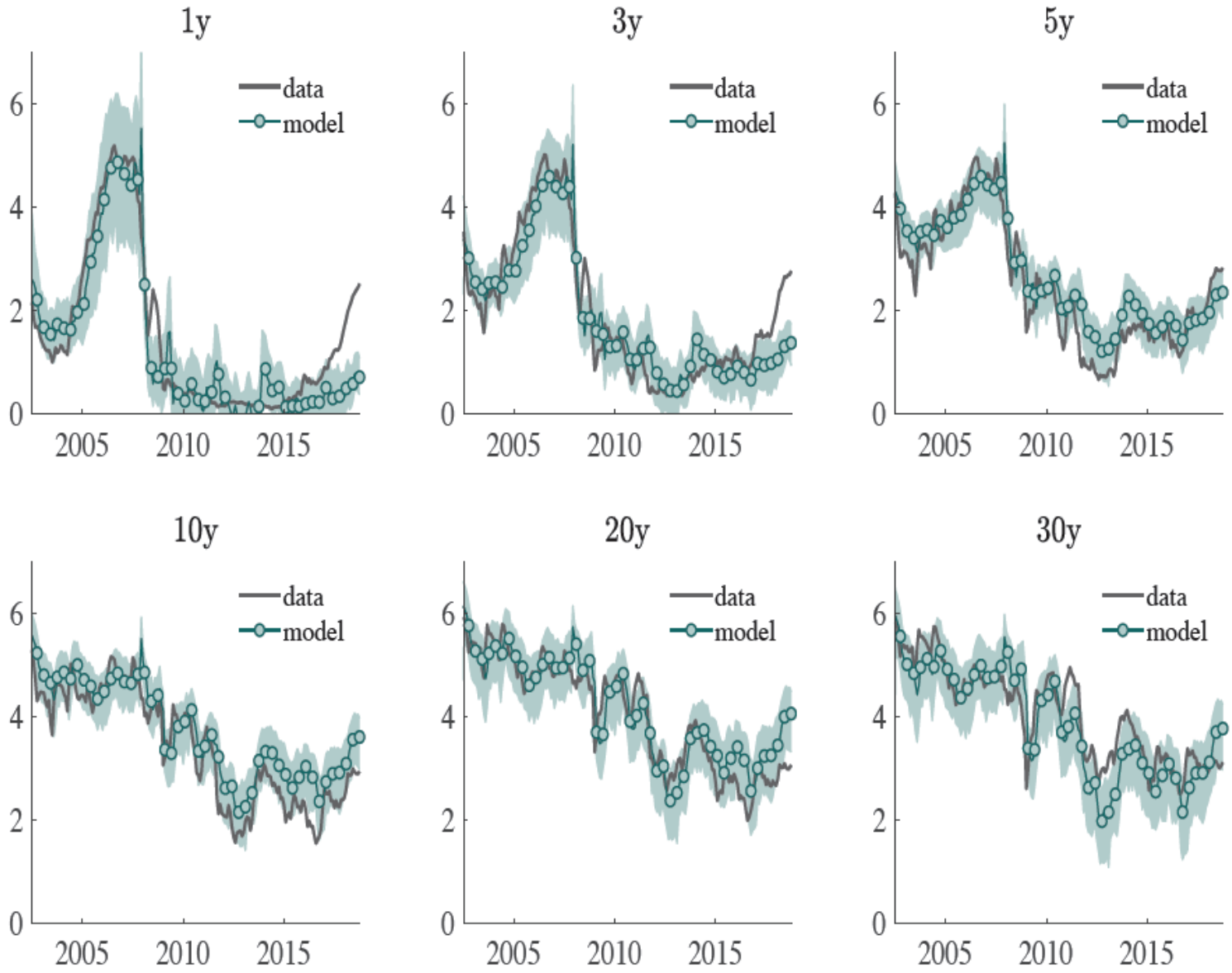
$$OIS^n_{t_0} - y^n_{t_0}$$

$$= f_{t_0} - r_{t_0} - CDS^n_{t_0} + \text{convenience yield}_t + \text{collateral adjustment}_t$$

Model Structure

- Real pricing kernel: consumption-based asset pricing with Epstein-Zin preferences.
- Nominal pricing kernel: inflation dynamics affected by factors.
  - Macro variables (output, government expenditure, past inflation), and two stochastic volatilities (hidden states).
- Government default: A reduced-form expression based on Chernov et al. (2020).
  - Include consumption, output, govt. spending, and two stochastic volatilities.
- Additional adjustments on interest rates:
  - Convenience yields on Treasuries.
  - Collateral costs of swaps.
- Twists before and after 2008: state-variables and default expressions estimated separately. Additional degrees of freedom.

Term Structure Fitting

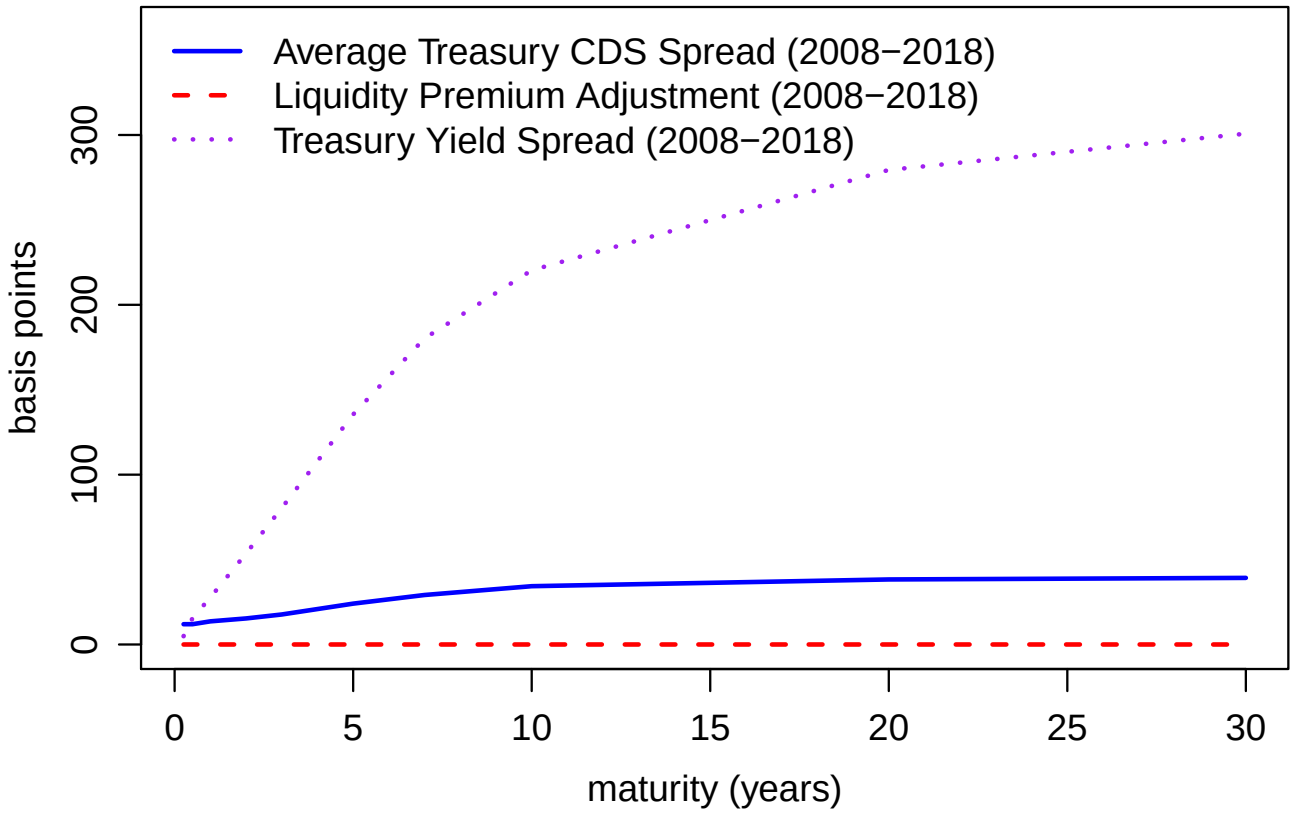


Generating an upward-sloping yield curve

- Consumption kernel: downward-sloping real term structure.
  - Long-term real bonds are hedges against consumption drops.
- Inflation: low inflation in recessions and nominal bonds as better hedges.
  - Correlation between yearly CPI-urban inflation and real consumption growth is 0.18 for 2002-2020.
  - Correlation between yearly **core** CPI-urban inflation and real consumption growth is -0.01 for 2002-2018, but 0.05 for 2002-2020.
  - In richer models, the cyclical properties may vary over time (Song 2017) and inflation could be bad news for future consumption (Piazzesi and Schneider 20016)
- Additional kicks.
  1. Upward-sloping CDS term structure.
  2. Treasury liquidity premium at short-maturities.

Generating an upward-sloping yield curve

- Additional kicks are small: still needs a negative correlation of consumption and inflation.
  - An "inflation puzzle" that is common to equilibrium asset pricing.
  - Indeed, the implied correlation from the estimated model is -0.08.



On the pricing of CDS

- A committee determines whether a credit event has occurred. Three factors:
  - Actual default: repudiation or restructuring of debts
  - Cost of CDS provision by intermediaries.
  - Technical default: congress debt ceiling impasse.

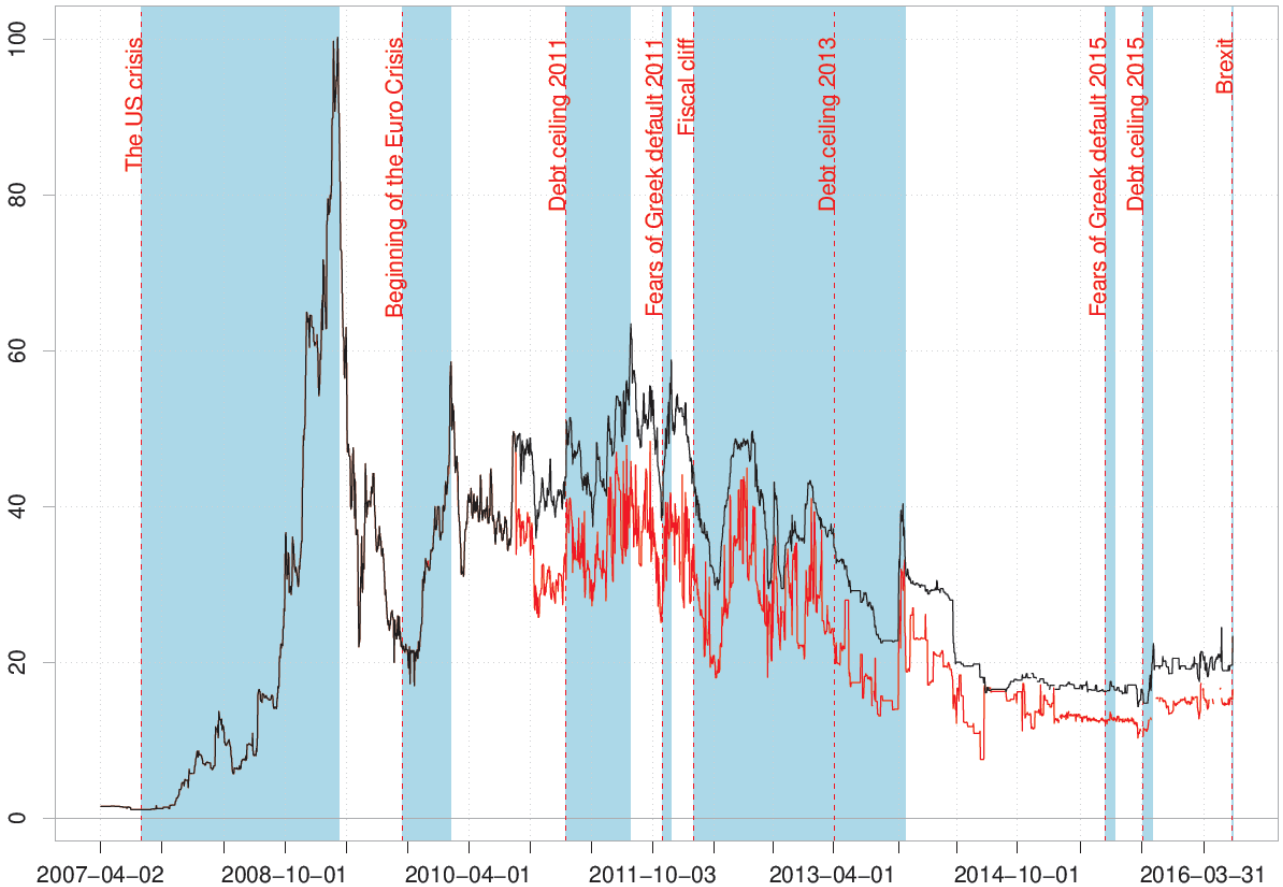
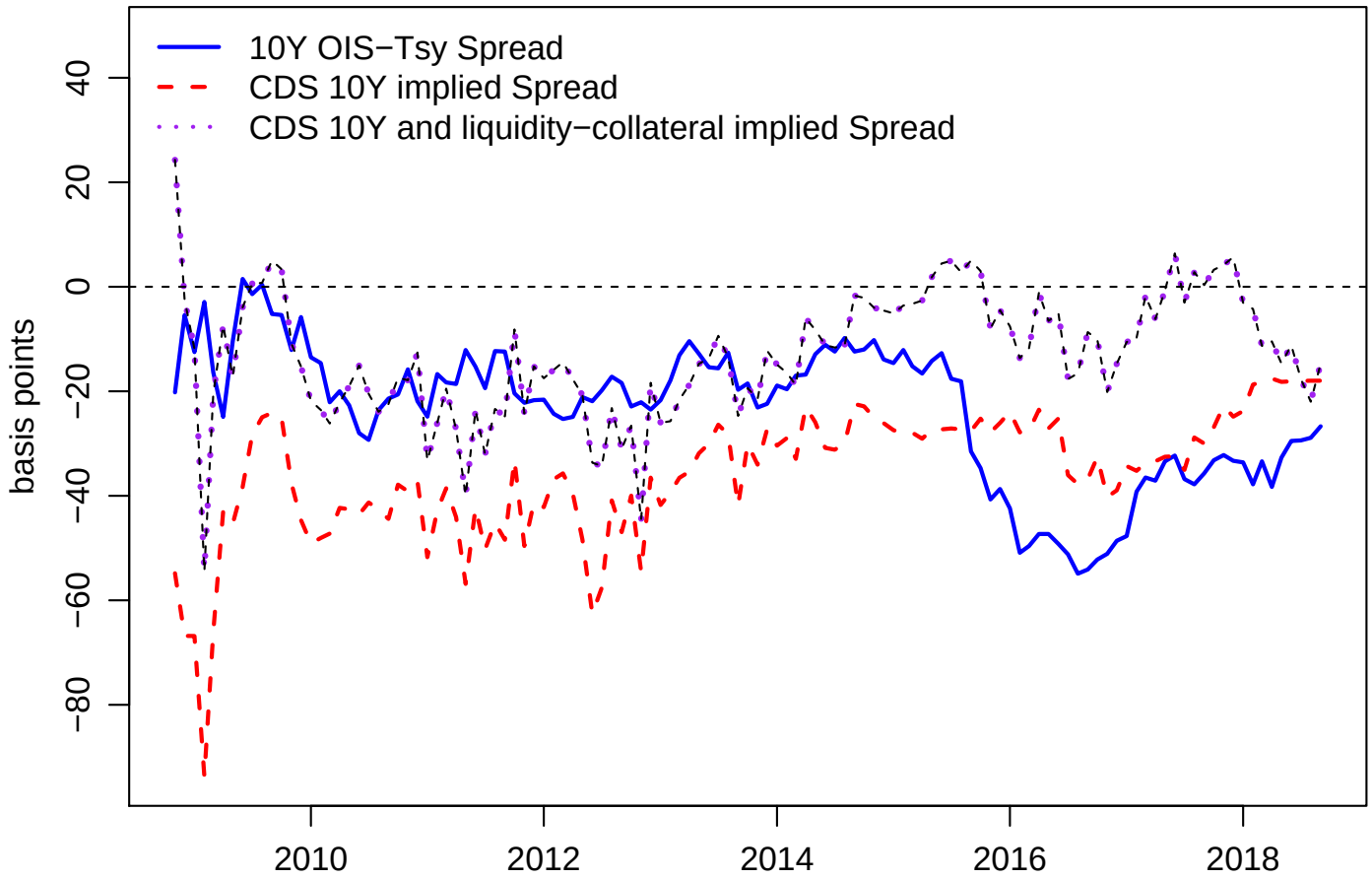


Figure from Chernov, Schmid, and Schneider 2020.

OIS-Treasury Swap Spread Pricing

- OIS rate = risk-free rate + collateral adjustment
- Tsy yield = risk-free rate − convenience yield + CDS spread
- OIS rate – Tsy yield = − CDS spread + collateral adjustment + convenience yield



Future Directions

- How to extract the default component of CDS after accounting for other explanations?
- Can we build on this paper to derive a benchmark equilibrium model for the term structure of Treasury yields?
  - Challenge by procyclical inflation in recent decades.
  - Simplify the mechanisms – dimension reduction.
  - Back-testing: does the model work in historical episodes? U.S. government was treated as highly likely to default in the "greenback" era.
- How does the possibility of government default relate to the U.S. Treasury valuation puzzle? (Jiang, Lustig, Nieuwerburgh, and Xiaolan 2020)