Sensitivity of Interest Rates to News in the Treasury and Corporate Bond Markets

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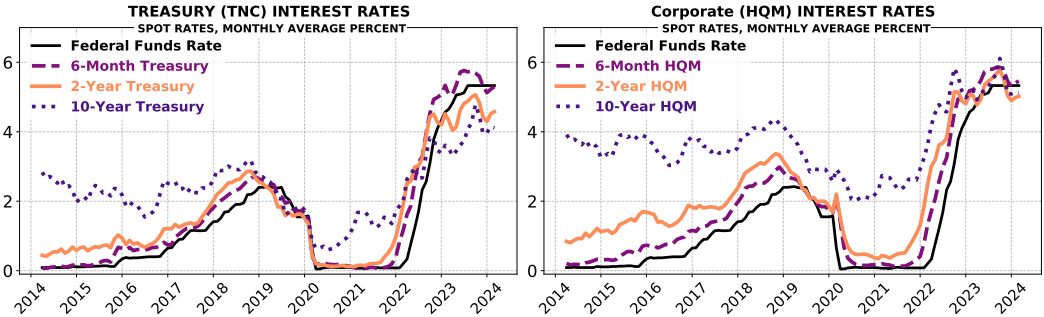
Roadmap

1. Motivation
2. Data Description
3. Sensitivity Estimation
4. Macroeconomic Implications
5. Conclusion

MOTIVATION

Motivation



- Significant rise in the level of interest rates across maturities and markets.
- How has the rising levels of interest rates impacted the sensitivity of interest rates (change in rates) to macro news surprises (forecast errors)?
- How does the sensitivity of rates interact with macroeconomic dynamics?

What I do in this paper

- Estimate Treasury and corporate interest rate responses to macroeconomic news.
  - Sensitivity is heterogeneous across news, but homogeneous across bond markets.
  - Rates around the 2-year maturity tend to be most sensitive.
- Estimate the interest rate sensitivity over time.
  - 6-month and 2-year rates are about twice as sensitive as they were in the past; 10-year rates are almost 3 times as sensitive.
- Study the feedback to the macro economy from rising sensitivity.
  - An unexpected rise of 1 standard deviation in the interest rate sensitivity lead to 1.5 percent decline in the industrial production 0.15 percent decline in the price level.

Data Description

- Treasury Interest Rates
  - Spot rates from Treasury Nominal Coupon-Issues (TNC) Yield Curve
  - Derived from off-the-run Treasury nominal notes and bonds, which refer to securities that are not latest offerings.
- Corporate Bond Interest Rates
  - Spot rates from High Quality Market (HQM) Corporate Bond Yield Curve
  - Par amount outstanding weighted average of AAA, AA, A quality bonds.
- Both are publicly available on the main Treasury website.
  - *https://home.treasury.gov/data/treasury-coupon-issues-and-corporate-bond-yield-curve/*

Data Description - Continued

- Macroeconomic News Releases (Jan. 1992 - Mar. 2024)
  - 12 macroeconomic news releases from Bloomberg and Informa Global Markets
  - Consumer price index (CPI), gross domestic product (GDP), initial jobless claims (UI), nonfarm payrolls (NP), capacity utilization (CU), consumer confidence (CONF), ISM manufacturing (ISM), leading indicators (LI), national home sales (NHS), producer price (PPI), retail sales ex. auto (RSA), unemployment rate (UR)
- Construct forecast errors.
  - Survey forecasts released just before every release.
  - Define surprise as forecast errors.

$$s_{t,i} = Y_{t,i}^{actual} - Y_{t,i}^{forecast}.$$

  - Standardize surprises

$$x_{t,i} = \frac{s_{t,i} - \mu_{t,i}^{s}}{\sigma_{t,i}^{s}}.$$

Sensitivity Estimation

Estimation Strategy - Swanson and Williams (2014)

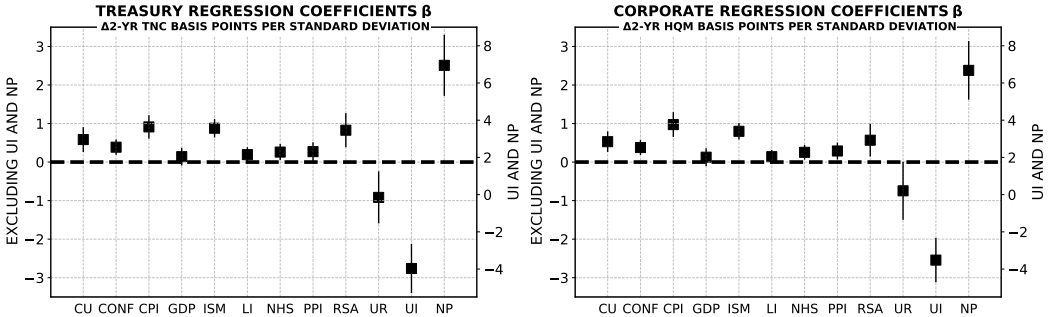
- First stage estimates relative sensitivities to different news releases over time.

$$\Delta y_t = \gamma^i + \delta^i \beta X_t + \varepsilon_t,$$

  - Δy_t is the one-day change in the spot rate in basis points.
  - δ^i and γ^i take on different values in each calendar year, i=1992,...,2024.
  - β measures the impact of one standard deviation calculated from the entire sample of surprise on Δy_t.
  - $X_t = [x_{t,1}, ..., x_{t,N}]$ is the vector of surprise components of macroeconomic data releases.

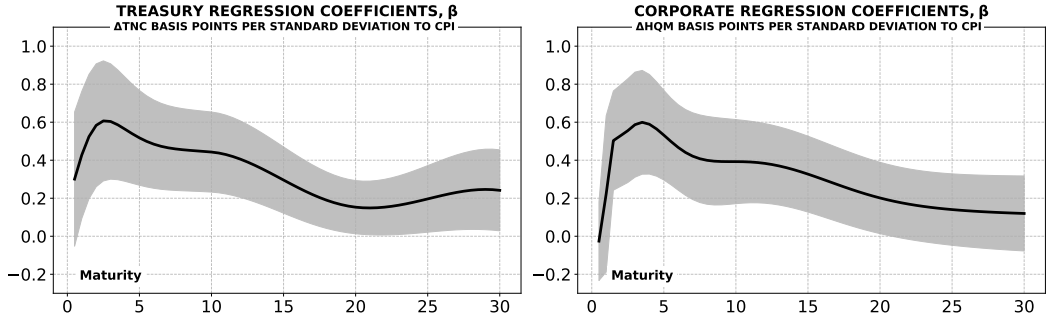
- Constrain the average of δ^i between 1992 and 2000 to be 1 to establish the baseline.

First Stage Results ($\hat{\beta}$) - 2-year Maturity & All Releases



- Statistically significant across most macroeconomic news releases.
- One standard deviation of positive surprise in the initial jobless claims (UI) cause the 2-year TNC (HQM) spot rate to fall by 4.00 (3.52) basis points.

First Stage Results ($\hat{\beta}$) - All Maturities & CPI Release



Note: Shaded areas denote 95 percent confidence intervals.

- Response of TNC and HQM interest rates to news peak around 2-year maturity.
- HQM spot rate at 0.5 maturity do not respond to news.
- Sensitivity of the 20-year TNC is slightly hump-shaped as in the TNC yield curve.
  - 20-year hump in the TNC yield curve reflects the illiquid nature of the security.

Estimation Strategy - Swanson and Williams (2014)

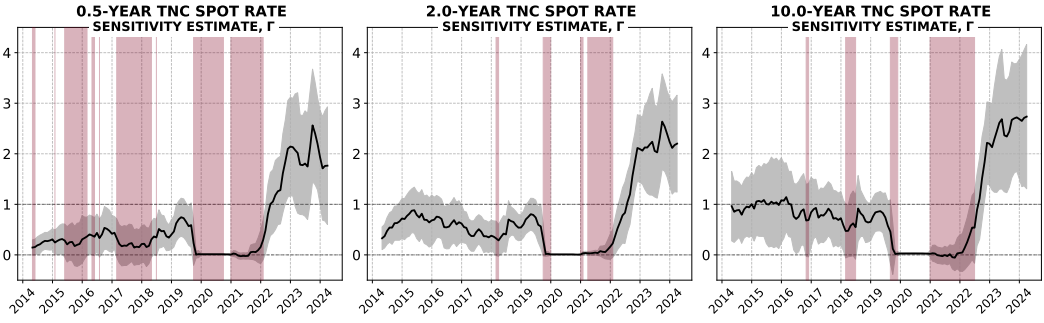
- Second stage estimates the following rolling regression

$$\Delta y_t = \alpha^\tau + \Gamma^\tau \hat{X}_t + \varepsilon_t^\tau,$$

  where $\hat{X}_t = \hat{\beta} X_t$.

- Main identifying assumption:
  - *Relative* magnitudes of β are constant (can test ex-post).
  - *Overall* magnitude of β changes over time (measure of sensitivity, Γ^τ).

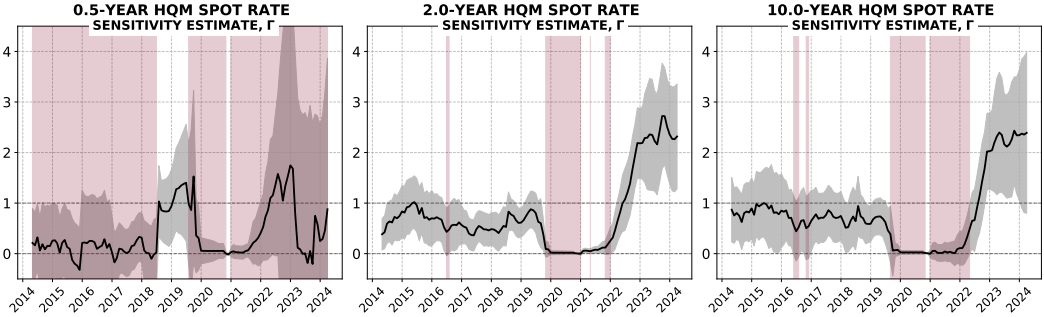
Estimated Sensitivity ($\hat{\Gamma}$)- Selected TNC Maturities



Note: Grey-shaded areas denote 95 percent confidence bands, red-shaded areas denote insensitive regimes.

- A value of 2 means the spot rate is twice as sensitive as it was compared to the average value between 1992 and 2000.
- Sharper and more persistent rise in the 10-year sensitivity.

Estimated Sensitivity ($\hat{\Gamma}$)- Selected HQM Maturities



Note: Grey-shaded areas denote 95 percent confidence bands, red-shaded areas denote insensitive regimes.

- 6-month corporate rate is generally insensitive to news.
- Heightened sensitivity in the 2-year and 10-year maturities.

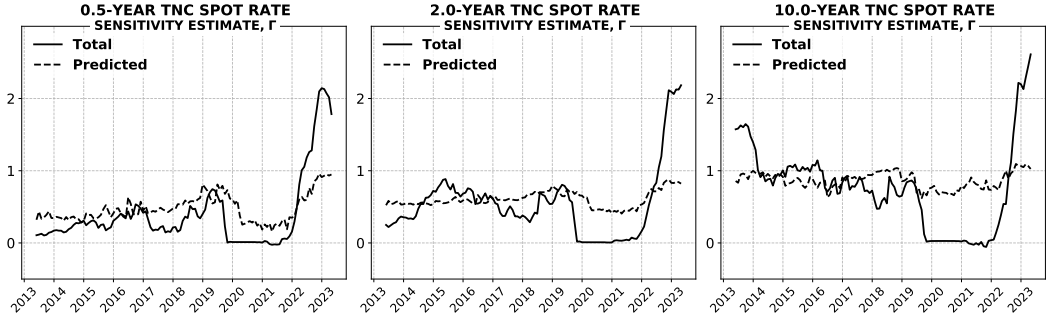
MACROECONOMIC IMPLICATIONS

Macroeconomic Implications

- How does the rise in interest rate sensitivity affect the broader economy?
- Issue: Sensitivity is a function of macroeconomic news.
- Solution: Back out "exogenous" or "unexpected" parts of sensitivity that the economy cannot observe until realized.
- Two main sources of sensitivity (Briggs and Pierdomenico (2024)):
  - Its own interest rate level, y_t.
  - Monetary policy uncertainty, MPU_t.
- First stage regression:

$$\Gamma_t = b_0 + b_1 y_t + b_2 MPU_t + b_3 t + \eta_t,$$

Macroeconomic Implications



- Sensitivity variance in recent years cannot be explained by rising rates or uncertainty.
- Long-term sensitivity is highly unpredictable.

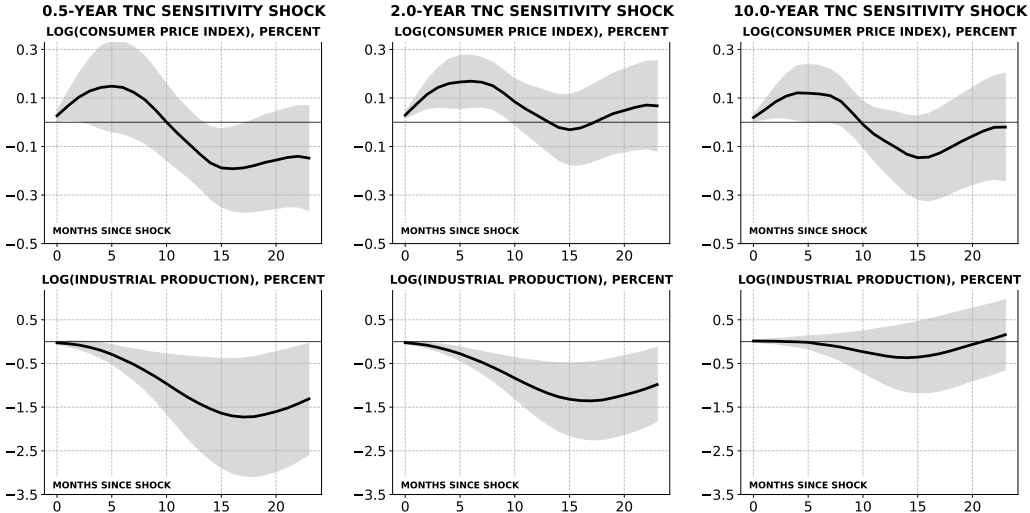
Macroeconomic Implications

- Interpret the residualized sensitivity, $\hat{\eta}_t$, as shocks.
- Estimate the impulse response of industrial productions (IP) and consumer price index (CPI) to the sensitivity shock using local projections.
- Second stage regression:

$$\log Y_{t+h} - \log Y_{t-1} = a_0^h + a_1^h \hat{\eta}_t + a_2^h L_t + e_{t+h}, \quad Y_t \in \{CPI_t, IP_t\},$$

where L_t is the lagged matrix of CPI and IP.

Sensitivity Shocks Are Recessionary and Depend on Maturity



Conclusion and Further Steps

- Interest rates in both corporate and Treasury bond markets have become more sensitive to news across most maturities.
- An unexpected rise in the sensitivity of interest rates can lead to persistent and quantitatively significant decline in the aggregate output.
- Next steps: Study monetary and fiscal policy effectiveness across sensitive and insensitive regimes.

Thank you!

References

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- Swanson, Eric T., and John C. Williams. 2014. ”Measuring the Effect of the Zero Lower Bound on Medium- and Longer-Term Interest Rates.” American Economic Review, 104 (10): 3154-85.
- TNC: *https://home.treasury.gov/data/treasury-coupon-issues-and-corporate-bond-yield-curves/treasury-coupon-issues*.
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