Discussion of "Interest Rate Uncertainty and Economic Fluctuations" by Drew Creal and Cynthia Wu

Michael Bauer

Federal Reserve Bank of San Francisco

April 24, 2015
7th Annual Volatility Institute Conference at NYU Stern

The views expressed here are those of the authors and do not necessarily represent the views of others in the Federal Reserve System.

What this paper does

- Specify and estimate new type of macro-finance term structure model (MTSM)
  - Unspanned macro risks
  - Unspanned stochastic volatility
  - Estimate using MCMC and particle filter
- Document effects of interest rate uncertainty on inflation and unemployment
  - Short-term uncertainty decreases inflation and increases unemployment
  - Long-term uncertainty raises inflation
  - Effects of short-term uncertainty particularly pronounced during Great Recession

How this paper fits into the DTSM literature (1)

- DTSMs with spanned stochastic volatility
  - Cox, Ingersoll, Ross (1985) and a large subsequent literature
  - Volatility factors also affect bond prices (markets complete)
  - Volatility is spanned by yields
- Unspanned stochastic volatility
  - Collin-Dufresne and Goldstein (2002), Collin-Dufresne, Goldstein, Jones (2009), Joslin (2014)
  - Volatility factors do not price bonds (markets incomplete)
  - Likelihood function not known in closed form
  - Creal and Wu (2015) develop an efficient EM estimation method (for both spanned and unspanned vol)
- This paper: two USV factors

How this paper fits into the DTSM literature (2)

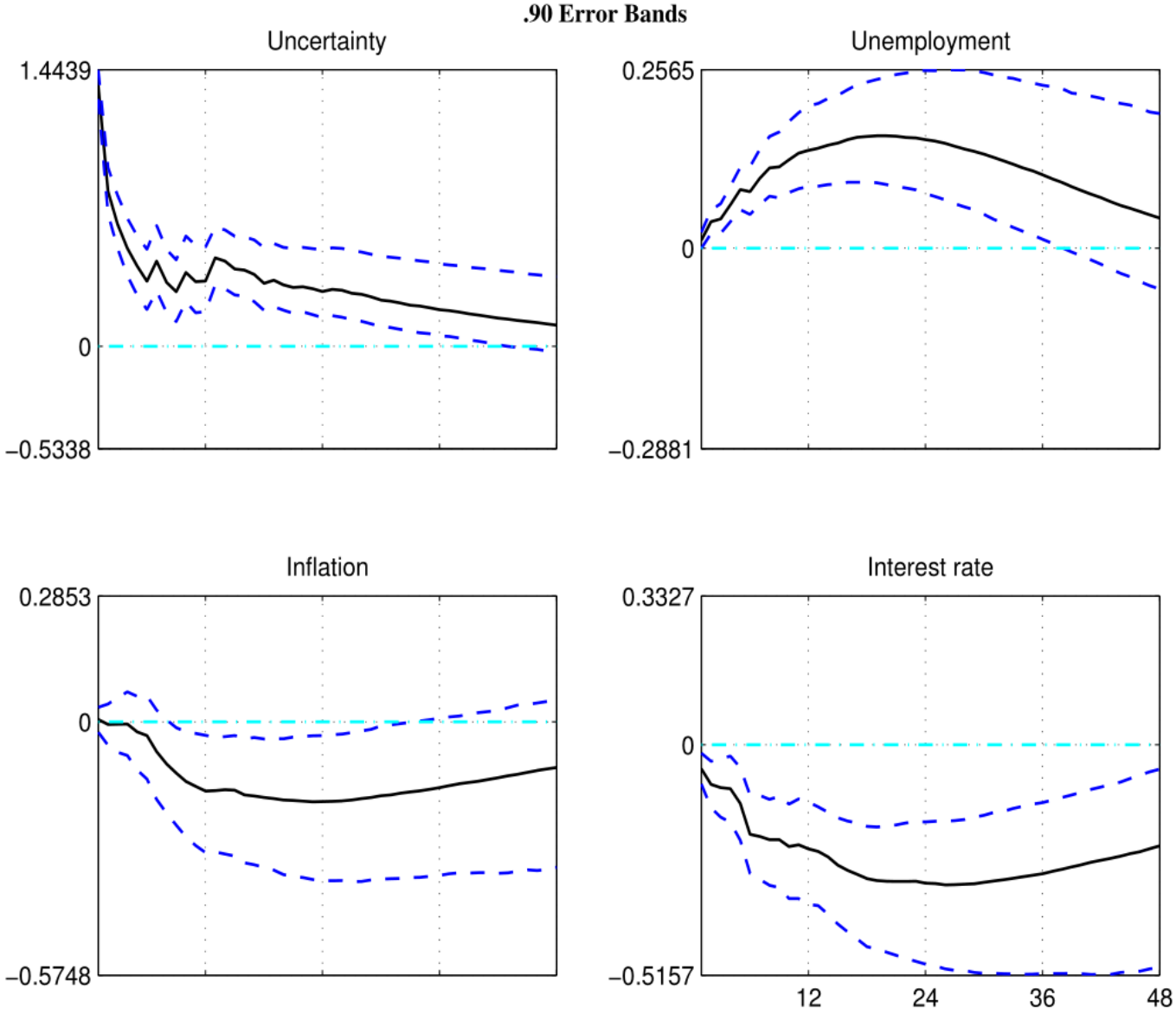
- Conventional macro-finance models
  - Ang and Piazzesi (2003) and a large subsequent literature
  - Macro factors affect bond prices (markets complete)
  - Macro factors are spanned by (model-implied) yields
- Unspanned macro risks – Joslin, Priebsch, Singleton (2014)
  - Macro variables appear to predict bond returns
  - Argue that spanned models impose counterfactual restrictions
  - Propose model in which macro variables are unspanned
- Ongoing debate about "spanning puzzle"
  - Bauer and Rudebusch (2015): spanned models not at odds with data, virtually identical implications as unspanned models
  - Is the evidence on unspanned macro risks robust?
  - Are yields disconnected from macro variables, and if yes, why?
- This paper: two unspanned macro factors

1. Measuring uncertainty vs. volatility

- "Measuring Risk and Uncertainty" (Bloom and Davis, 2015)
- Subjective uncertainty about future interest rates
  - Probabilities for future outcomes, e.g. Primary Dealer survey
  - Approximate with dispersion of survey forecasts
    - $corr(VOL_{ST}, DISP_{ST}) = 0.47$, $corr(VOL_{LT}, DISP_{LT}) = 0.30$
- Interest rate volatility
  - Implied volatility: MOVE, CBOE SRVX, Treasury Implied Volatility (Mueller, Vedolin, Yen, 2013)
    - $corr(VOL_{ST}, TIV) = 0.41$, $corr(VOL_{LT}, TIV) = 0.61$
  - Realized volatility (using daily yield changes)
    - $corr(VOL_{ST}, RV_{5y}) = 0.59$, $corr(VOL_{LT}, RV_{5y}) = 0.70$
  - GARCH
- Model delivers nice, smooth, plausible time series of volatility
- But does it really measure interest rate uncertainty?

2. Uncertainty shocks are aggregate demand shocks

SVAR in Leduc and Liu (2015), uncertainty from Michigan survey

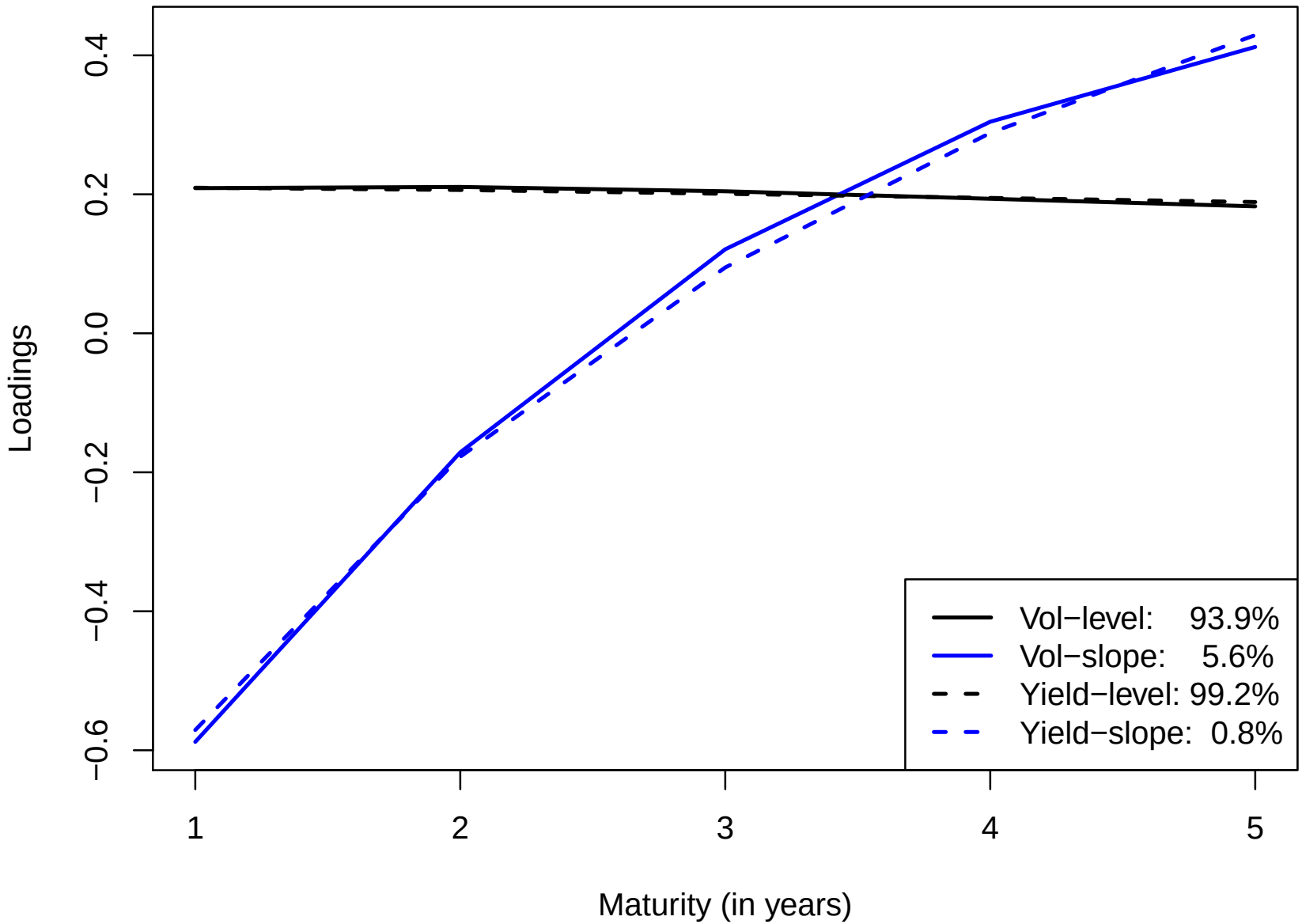


3. Short-term vs. long-term uncertainty?

- Volatility of three-month and five-year yields
- Model with $H = 2$ fits slightly better than with $H = 1$
- But is it reasonable to include both measures in an SVAR?
  - Correlation is 54%; conceptually measure the same thing
  - What does it mean to have two orthogonal uncertainty shocks?
  - Identification/ordering!?
- Leduc and Liu (2015) estimate two different VARs
  - Using VIX (short-term uncertainty)
  - Using survey-based measure (long-term uncertainty)
  - They find similar results – both act like AD shocks – although correlation of uncertainty measures is low
- Results would likely be more plausible and more convincing with just one volatility factor

A different way to construct two volatility factors

Monthly GSW Treasury yields, 1961 to 2013, yields and realized vols, loadings and contributions of first two principal components



4. A few more questions

- Time-varying impulse response functions
  - Why would we want $\varepsilon_{g,t} \neq 0$?
  - Is the time series model so non-standard that it gives rise to a new type of IRF analysis?
  - Is it really non-standard? In which way?
- Estimation
  - Novel methodology which is quite involved
  - Why can't we use the much simpler methodology of Creal and Wu (2015)? What's different? Why Bayesian?
- Interest rate levels vs. volatilities
  - What do IRFs for level and slope shocks look like?
  - How are policy shocks identified?

Summary

- Innovative model and estimation methodology
- New results about macro effects of uncertainty
- Could use more discussion about measurement of uncertainty
- One major concern: two separate volatility factors
  - Rotation arbitrary but relevant for macro results
  - Hard to identify two separate uncertainty shocks
- Important contribution to macro-finance literature