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

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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
  - 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
    - $\text{corr}(\text{VOL}_{ST}, \text{DISP}_{ST}) = 0.47$, $\text{corr}(\text{VOL}_{LT}, \text{DISP}_{LT}) = 0.30$
- Interest rate volatility
  - Implied volatility: MOVE, CBOE SRVX, Treasury Implied Volatility (Mueller, Vedolin, Yen, 2013)
    - $\text{corr}(\text{VOL}_{ST}, \text{TIV}) = 0.41$, $\text{corr}(\text{VOL}_{LT}, \text{TIV}) = 0.61$
  - Realized volatility (using daily yield changes)
    - $\text{corr}(\text{VOL}_{ST}, R_{5y}) = 0.59$, $\text{corr}(\text{VOL}_{LT}, R_{5y}) = 0.70$
- 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

![Graph showing loadings and contributions of first two principal components.]

- Loadings
  - Vol−level: 93.9%
  - Vol−slope: 5.6%
  - Yield−level: 99.2%
  - Yield−slope: 0.8%
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