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Economic Policy Uncertainty and the Yield Curve

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This paper

How does monetary and government policy uncertainty (MPU, GPU) affect the nominal yield curve?

Monetary RBC model:

- ☐ Money in the utility
- ☐ Fed controls money supply with three targets: long-run nominal money growth, inflation target and long-run economic growth
- ☐ Stochastic volatility of real ("government") and nominal ("monetary policy") shocks

Empirical results:

- ☐ Baker-Bloom-Davis uncertainty indices to measure MPU, GPU
- ☐ Higher GPU reduces short rate (IRF) and increases yield volatility (volatility hump)
- ☐ MPU has no contemporaneous effect on yields or volatilities, but predicts bond excess returns

Comments

i. Paper's question is important but the model cannot answer it
ii. Empirical relationship between yield curve level, volatility, premia ... and uncertainty proxies
iii. Interaction between fiscal and monetary policy uncertainty?

i. Model

Setup

- Money in the utility (MUI):

$$U(X_t) = \int_0^\infty e^{-\beta t} \frac{X_t^{1-\gamma}}{1-\gamma} dt, \quad X_t = C_t (M_t^d)^\xi \tag{1}$$

- Real sector:

$$\begin{aligned} \frac{dY_t}{Y_t} &= (\mu_Y + q_A A_t)dt + \sigma_Y \sqrt{g_t} dW_t^Y \\ dA_t &= (\kappa_A(\theta_A - A_t) + \lambda g_t)dt + \sigma_A \sqrt{g_t} dW_t^A \\ dg_t &= \kappa_g(\theta_g - g_t)dt + \sigma_g \sqrt{g_t} W_t^g \end{aligned}$$

- Monetary policy:

$$\begin{aligned} \frac{dM_t^s}{M_t^s} &= \mu_M dt + \eta_1 \left(\frac{dK_t}{K_t} - \bar{k} dt\right) + \eta_2 \left(\frac{dp_t}{p_t} - \bar{\pi} dt\right) + \sigma_M \sqrt{m_t} dW_t^M \\ dm_t &= \kappa_m(\theta_m - m_t)dt + \sigma_m \sqrt{m_t} dW_t^m \end{aligned}$$

- State variables: productivity A_t and stochastic volatilities g_t, m_t

Model comments

A model of policy uncertainty without the government and (essentially) without the Fed?

- Nothing in the model allows to interpret g_t as GPU; g_t is just stochastic volatility of TFP; some suggestions:
  - Gov policies have uncertain effect on firm productivity (effect though drift)
  - Gov has preferences over policy choices ($\neq$ agents)
  - Could be interpreted as uncertainty about tax policy
- Monetary policy in the model is neutral (essentially–nonseparable MIU):
  - No nominal rigidities; monetary RBC models have counterfactual implications (e.g. optimal monetary policy with zero nominal rate rule)
  - Unclear interpretation of the reduced-form process m_t
- Need meaningful interaction between fiscal and monetary policy:
  - Government debt valuation equation
  - (Nominal/imperfectly indexed fiscal system)

Some yield-curve implications

- Nominal yield curve is affine function of state variables

$$y_t^\tau = B_0(\tau) + B_A(\tau)A_t + B_g(\tau)g_t + B_m(\tau)m_t$$

- Level of yields spans volatility states: usual feature of macro-finance models with stochastic volatility
- Instantaneous volatility of yields is affine in volatility states

$$v_t^\tau = B_g^v(\tau)g_t + B_m^v(\tau)m_t$$

... and so is the term premium

ii. Empirics

My priors

- Stochastic volatility has negligible effect on the level of interest rates (order of magnitude of measurement error)
- Relatedly, link between term premia and interest rate volatility is tenuous
- Hump in yield volatility induced by volatility of short-rate expectations which could comove with monetary policy uncertainty

Decomposing yield curve volatility

- Yield = expected short rate (ER) + term premium (TP) + convexity
- Yield variance can be decomposed as (Cieslak and Povala, 2015, JF):

$$v_t^{\tau} = \underbrace{v_t^{ER,\tau}}_{\text{ER var}} + \underbrace{v_t^{TP,\tau}}_{\text{TP var}} + \underbrace{2v_t^{ER,TP,\tau}}_{\text{ER,TP cov}} + \underbrace{v_t^{C,\tau}}_{\text{“vol-of-vol”}}$$

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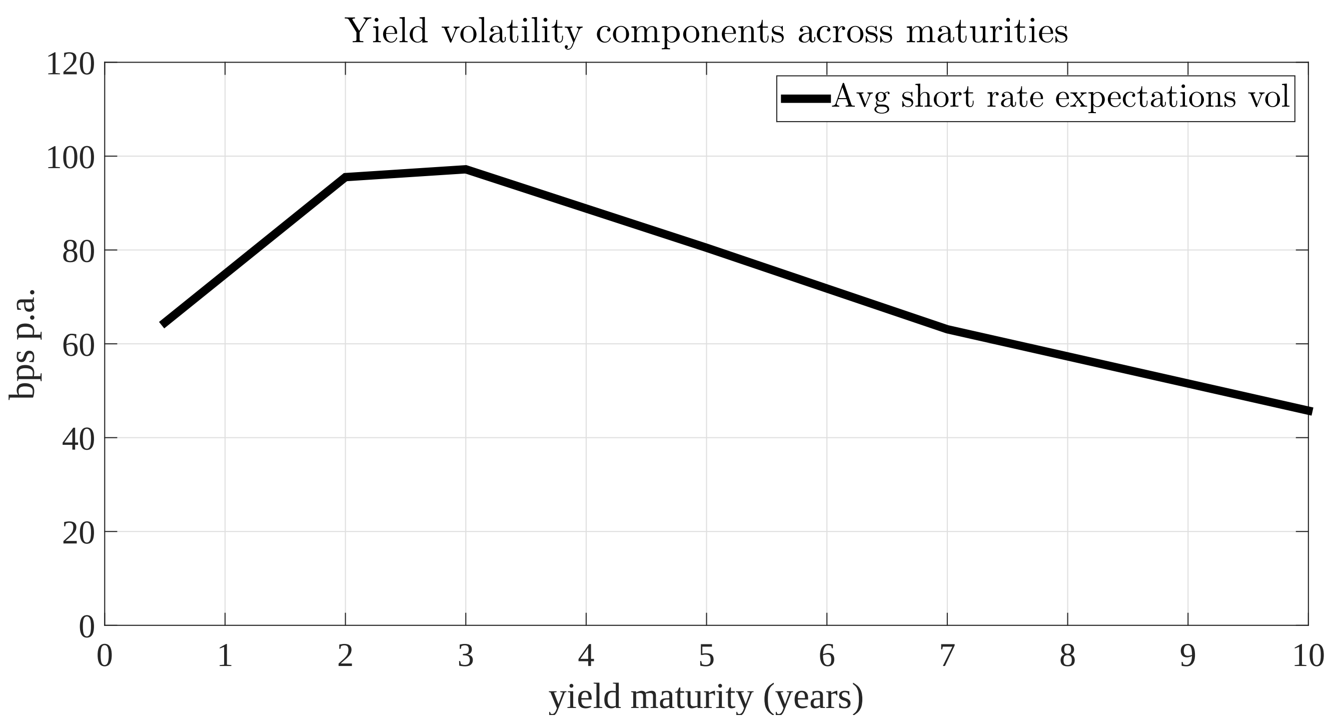

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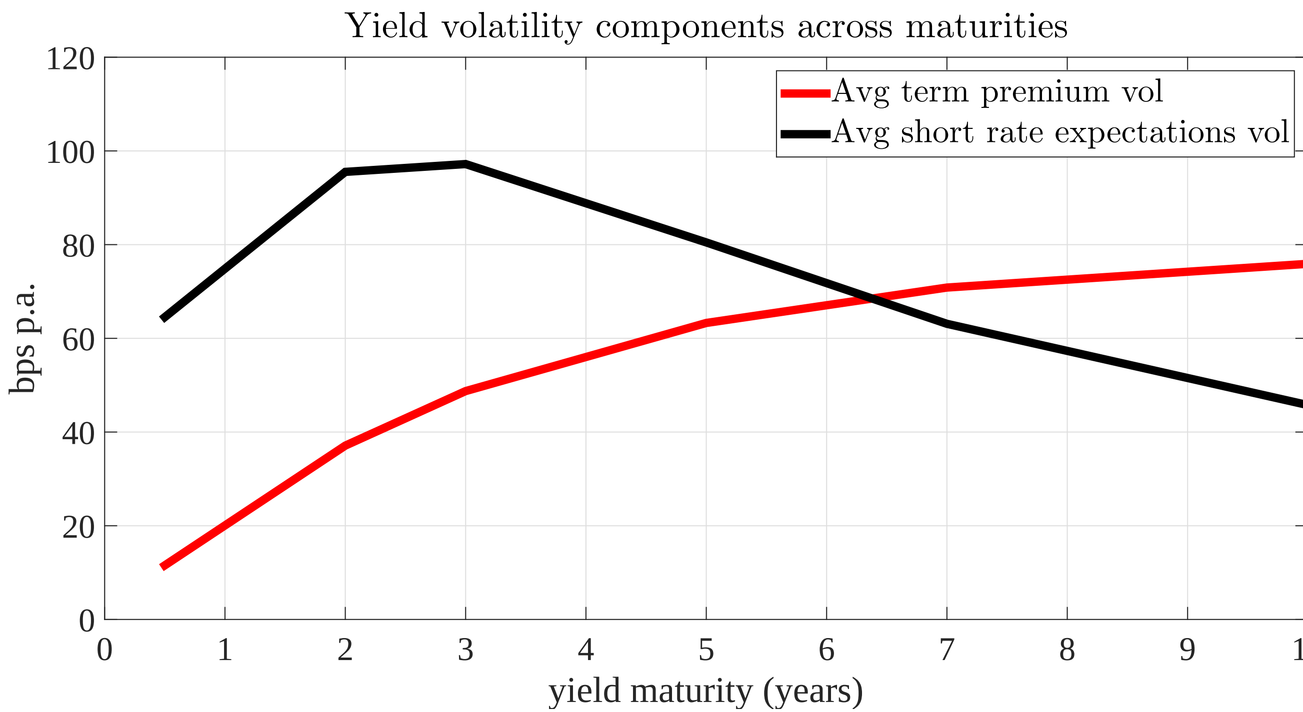
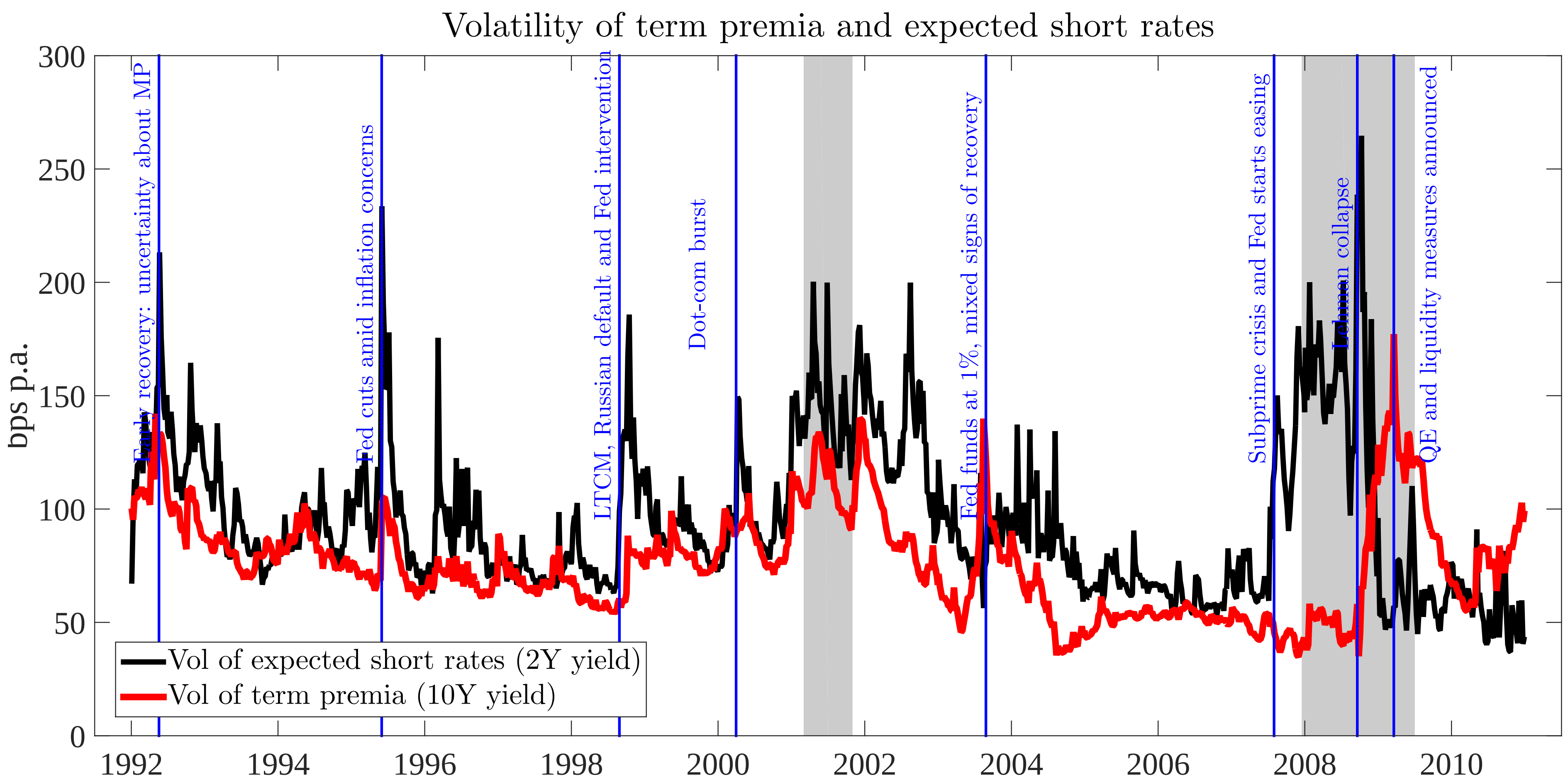
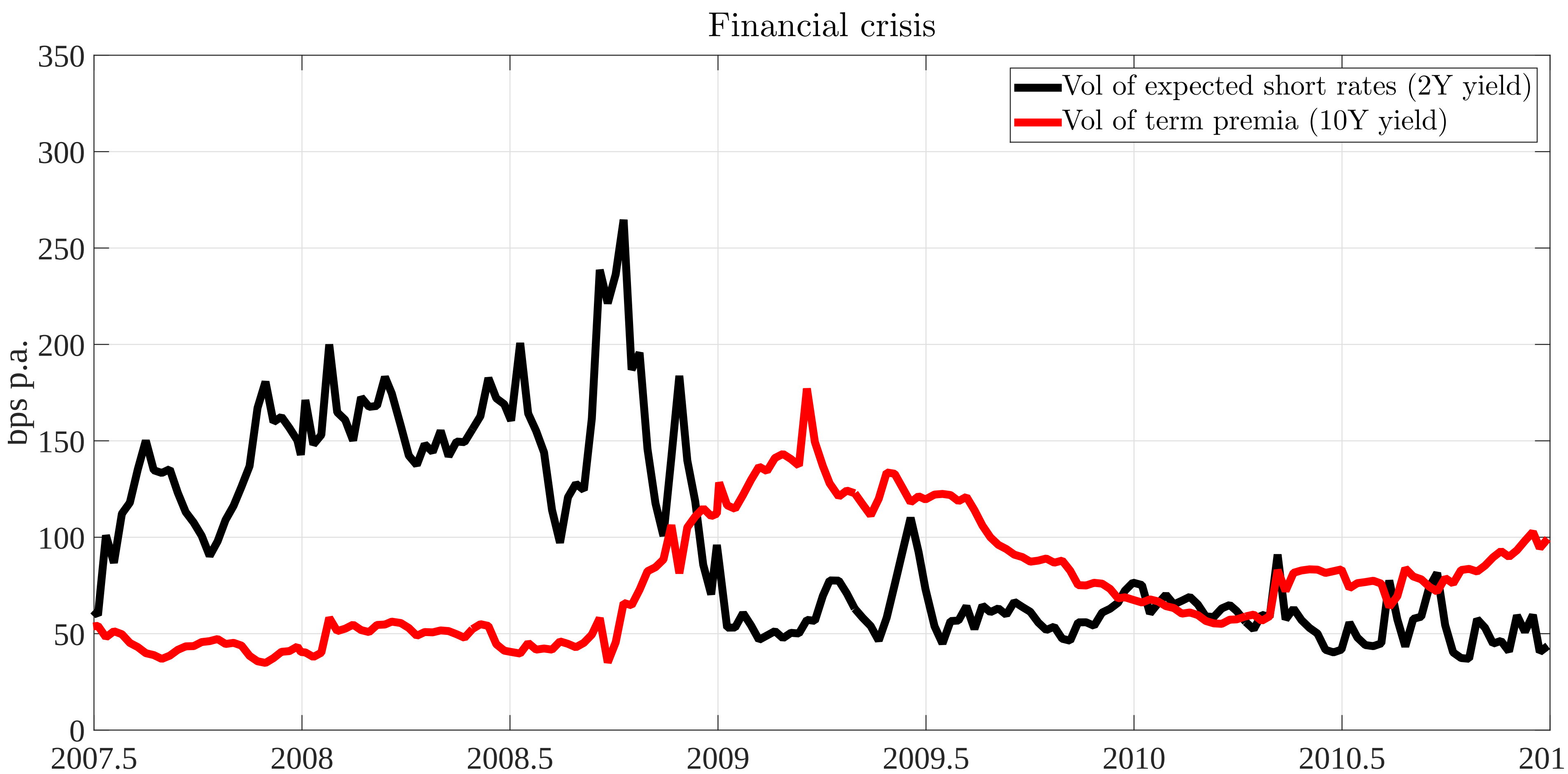


Yield volatility dynamics



- Volatility of short rate expectations (ER volatility) increases ahead of recessions and in periods of distress in financial markets

Yield volatility dynamics in financial crisis



- During 2007/09 crisis, ER volatility high in mid-2007 until ZLB in Dec 2008; TP volatility low until Lehman collapse and rising persistently afterwards

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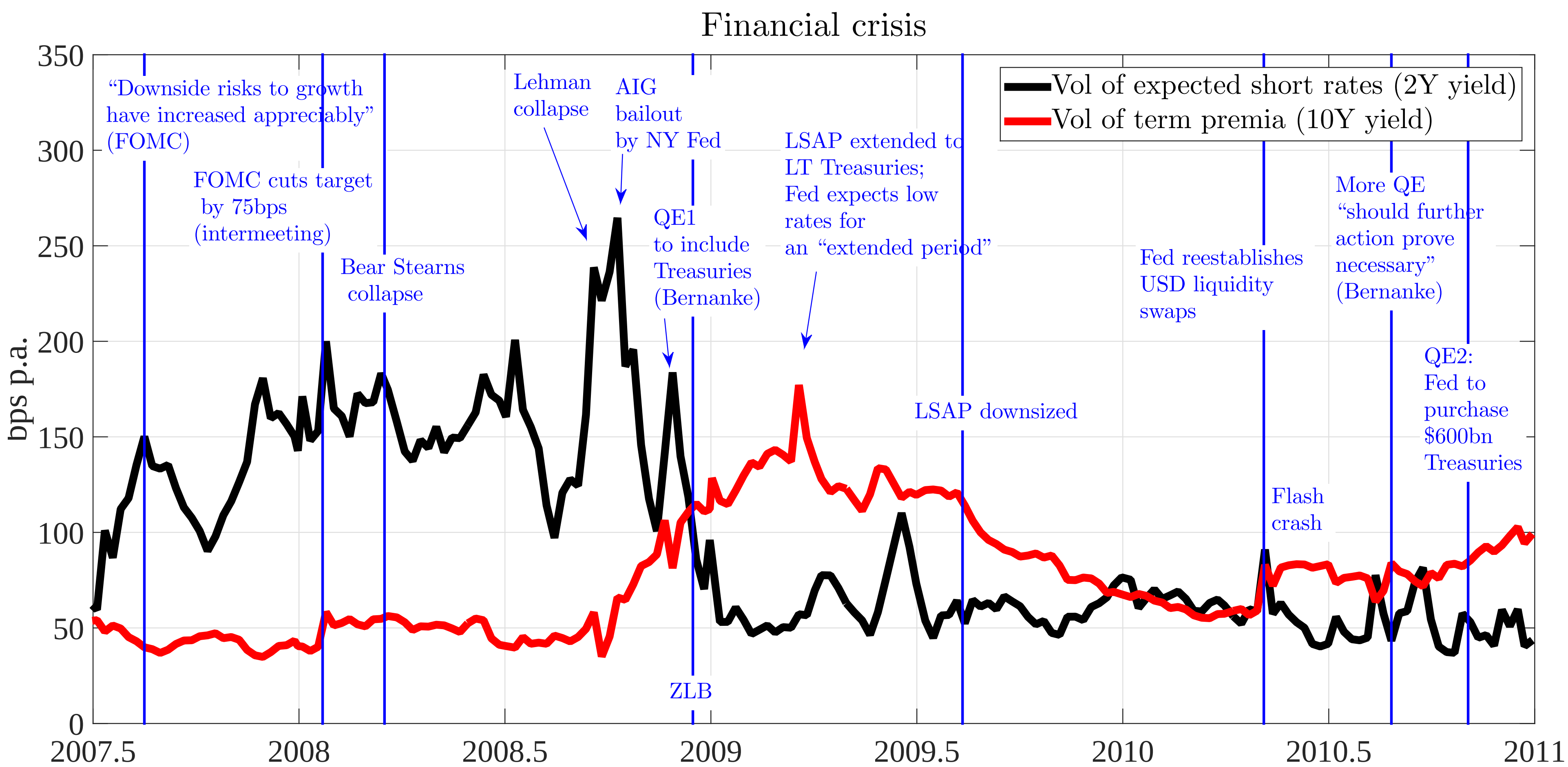

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Yield volatility and economic policy uncertainty

- Baker-Bloom-Davis proxies for policy uncertainty:
  - EPU = economic policy uncertainty news
  - MPU = monetary policy uncertainty news (results robust to adding inflation disagreement)
  - GPU = fiscal policy uncertainty news (+ government, tax expiration, taxes, fed-state-local purchases disagreement)

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- Contemporaneous projections:

	Yield volatility component:			
	Vol ER 2Y	Vol TP 10Y	Vol ER 2Y	Vol TP 10
EPU	**10.10**	**8.81**		
	(2.45)	**(3.18)**		
MPU			20.68	-0.92
			(4.37)	(-0.24)
GPU			-9.82	10.06
			(-1.55)	(1.94)
const	97.14	77.33	96.37	78.12
	(16.26)	(21.44)	(18.44)	(20.22)
N (months)	228	228	228	228
adj. R^2	0.09	0.14	0.19	0.12

1992–2010, RHS in z-scores, LHS in bps p.a.

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Yield volatility and term premia

Link between term premia and interest rate volatility is tenuous:

- Predictive regressions using auxiliary (not-in-the-yield-curve) regressors overfit term premium variation
- Such auxiliary factors often predict ex-post forecast errors about the short rate and identified monetary policy shocks (e.g. Kuttner surprises)
- Fitted excess returns $\neq$ time t expected returns

Yield volatility and term premia

- Predictive regressions of annual bond excess returns:

	rx2	rx5	rx10	urx2
Term premium (TP) *in* the yield curve				
TP ($\widehat{cf}_t$)	0.27	0.56	0.64	0.10
	(2.33)	(3.65)	(5.92)	(0.83)
R^2	0.11	0.25	0.42	0.01
TP + volatility				
TP ($\widehat{cf}_t$)	0.16	0.51	0.67	0.03
	(1.13)	(2.91)	(5.38)	(0.18)
Vol ER 2Y	**0.19**	0.11	-0.00	**0.23**
	(2.99)	(1.03)	(-0.04)	**(2.85)**
Vol TP 10Y	0.07	0.02	-0.05	-0.02
	(0.64)	(0.12)	(-0.48)	(-0.18)
adj. R^2	0.20	0.26	0.42	0.11
N (months)	228	228	228	228

1992–2011, NW std errors with 18 lags, RHS z-scores, LHS $rx^{(n)}/n$

- Term premium variation measured with cycle factor $\widehat{cf}_t$ from Cieslak and Povala (2015, RFS)
- Urx2 is the *unexpected* return, or negative of forecast error measured from the BCFF survey: $Urx^{(2)}_{t+1} \equiv E^s_t(y^{(1)}_{t+1}) - y^{(1)}_{t+1}$

Economic uncertainty proxies and term premia

- Repeat previous regressions with policy uncertainty proxies (GPU/MPU)

	rx2	rx5	rx10	urx2
GPU	-0.10	-0.07	-0.03	-0.08
	(-1.63)	(-0.76)	(-0.24)	(-1.22)
MPU	**0.20**	0.20	0.13	**0.20**
	(2.97)	(2.29)	(1.30)	**(3.10)**
adj. R^2	0.05	0.03	0.01	0.05
Controlling for TP variation				
TP ($\widehat{cf}_t$)	0.24	0.46	0.52	0.13
	(2.79)	(4.52)	(7.70)	(1.53)
GPU	-0.03	0.06	0.12	-0.05
	(-0.37)	(0.63)	(1.24)	(-0.53)
MPU	**0.14**	0.08	-0.00	**0.17**
	(2.03)	(1.06)	(-0.07)	**(2.29)**
adj. R^2	0.17	0.27	0.38	0.09
N (months)	318	318	318	318

1988-2015:6, NW std errors with 18 lags, RHS z-scores, LHS $rx^{(n)}/n$

- Similar to volatility, significance of MPU in predictive regressions comes from predictability of ex-post forecast errors; $\neq$ term premium interpretation
- Usual pattern: an auxiliary variable predicts returns mostly at the short end of the term structure

iii. Interactions: volatility, MPU, GPU

Link between monetary policy and volatility

Correlations: Post-Volcker, high interest rate volatility coincides with low interest rates

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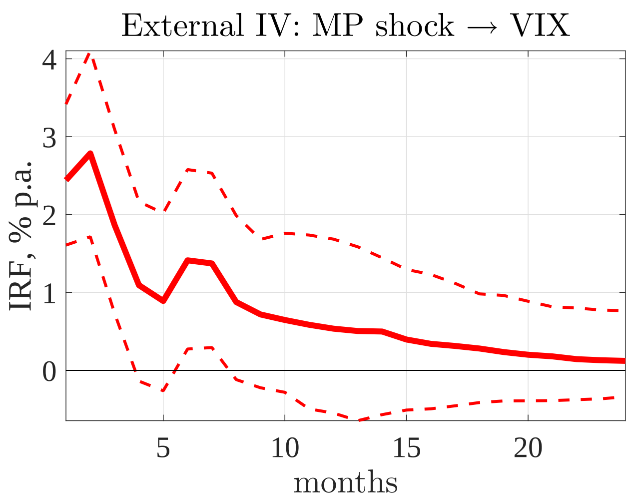

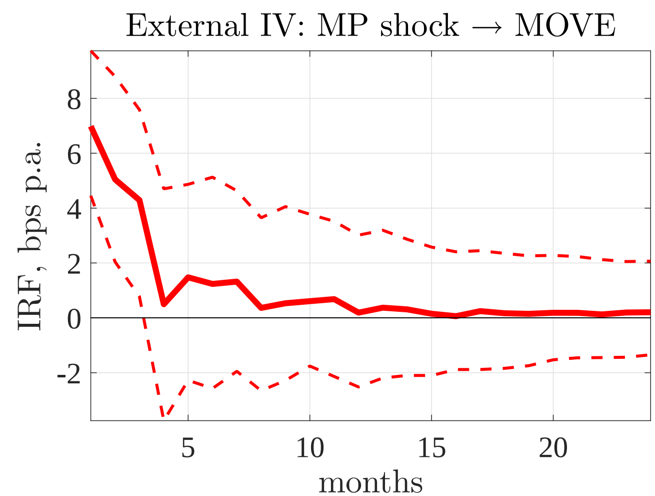

External IV approach a la Gertler-Karadi/Stock-Watson

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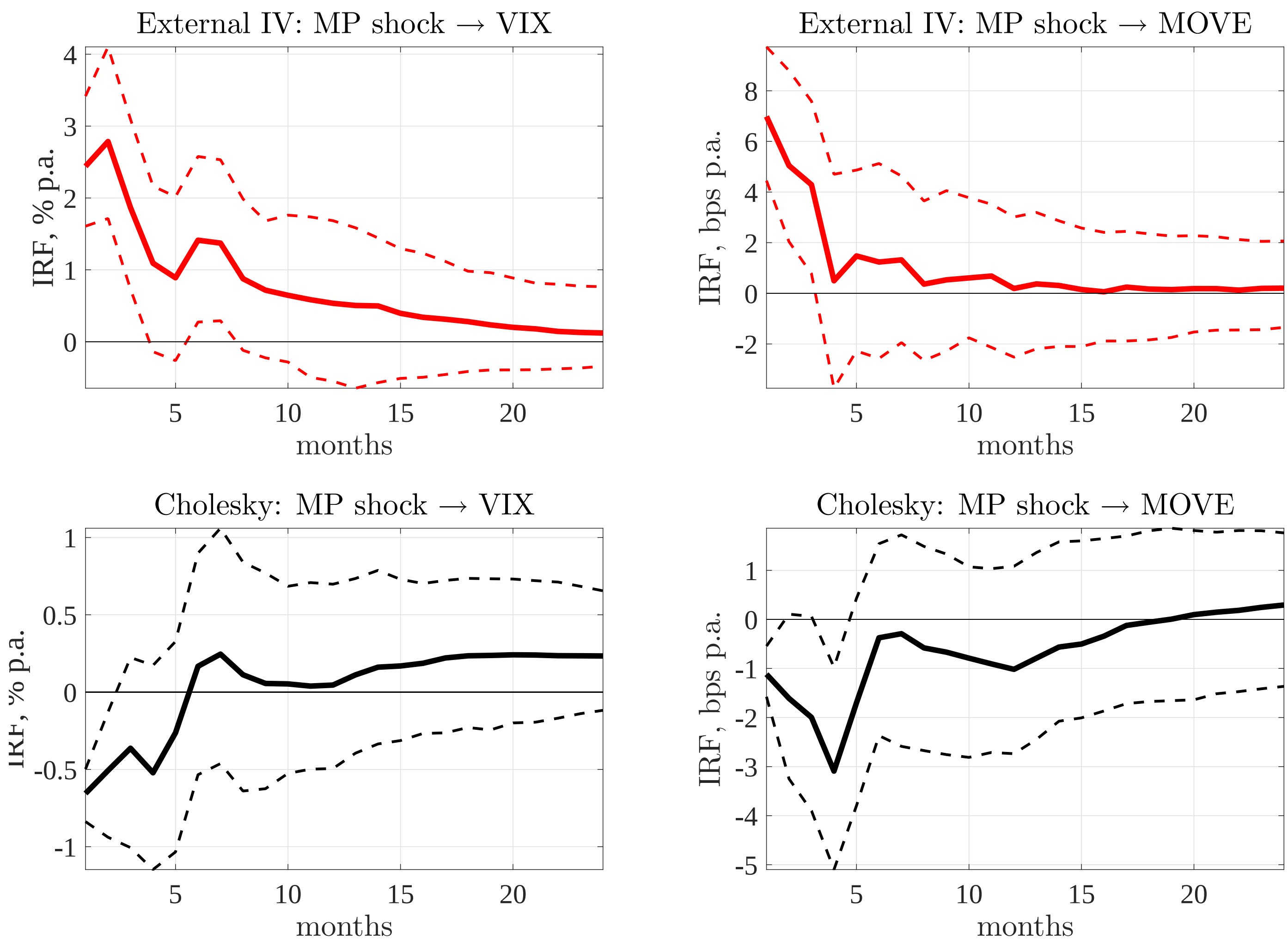

External IV approach a la Gertler-Karadi/Stock-Watson

Contemporaneous regressions or agnostic VARs unable to identify causal relations

Potential channels though which MPU can affect GPU

- Trend inflation (perceived inflation target) uncertainty:
  - Money-like features of (long-term) Treasuries tied to trend inflation vol (size of level shocks)
  - Last two decades, negligible shocks to trend inflation, thus financing of government deficits at zero (negative) term premium
  - Additionally, if Treasuries serve as money, vol of trend inflation affects effective money supply in the economy

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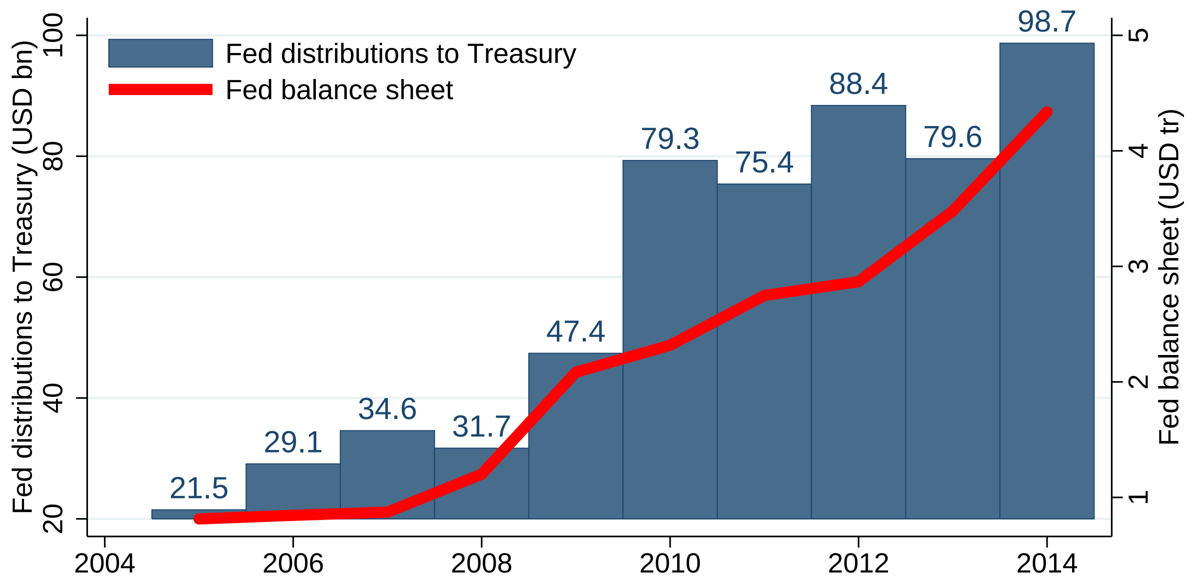
  - Last two decades, negligible shocks to trend inflation, thus financing of government deficits at zero (negative) term premium
  - Additionally, if Treasuries serve as money, vol of trend inflation affects effective money supply in the economy
- Fed balance sheet uncertainty:
  - Budget deficit 2014 = \$483bn; Fed transfer to Treasury = \$99bn
  - Total Fed transfers to Treasury 2009–2014 = \$469bn



Conclusions

- Need a model with nontrivial both government and the Fed to obtain tight predictions how policy uncertainty affects yield curve
- Important to understand whether/how uncertainty about Fed policy affects market volatility and how it interacts with fiscal uncertainty
- My empirical priors on the properties of interest rate vol have not changed:
  - Not spanned by the level of yields; thus not related to term premia
  - Short-rate expectations volatility correlates with proxies of monetary policy uncertainty; humped effect across maturities
  - Predictive regressions with auxiliary variables should not be interpreted as capturing variation term premia (expectation frictions at the short end of the yield curve)

