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Spillover Effects of U.S. Monetary Policy and Policy Uncertainty on Chinese Economy

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Motivation

Background

- U.S. unconventional monetary policy
  - zero lower bound
  - LSAP
  - QEs
  - tapering
- impact on emerging market, especially China
- China is likely to pass U.S. as world's leading economic power

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Motivation

Questions

- How do U.S. monetary policy and policy uncertainty shocks affect China, especially during and after the Great Recession?
    - What's the transmission channel?
    - Which one is more important?
    - Is there any structural change in the past few years?

What Do We Do?

- Factor-Augmented VAR
- U.S. monetary policy
- U.S. policy uncertainty
- both before and at the ZLB

Main Results

- At the ZLB,
  - U.S. monetary policy shocks do have significant impact on Chinese monetary policy and real economy
  - U.S. policy uncertainty shocks are less important
- Comparing the cases before and at the ZLB,
  - Dynamics of Chinese macro variables are different under the same shocks
  - Relative importance of the two shocks changes
  - Indicate structural changes in both U.S. policy transmission and Chinese economy

FAVAR – Bernanke et al(2005, QJE)

$$\begin{pmatrix} F_t \\ Y_t \end{pmatrix} = \Phi(L) \begin{pmatrix} F_{t-1} \\ Y_{t-1} \end{pmatrix} + \nu_t, \tag{1}$$

$$X_t = \Lambda^f F_t + \Lambda^y Y_t + e_t. \tag{2}$$

F_t: factors ($T \times K$),
X_t: macro variables ($T \times N$, $N > K$),
Y_t: policy indicators.

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Model

Why FAVAR?

- Overcomes some shortcomings of structural VAR:
  - use more information
  - no arbitrary choice of a specific data series
  - impulse responses for all variables

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Data

Data

- 162 Chinese macroeconomic series (real activity variables, policy variables, price variables)
- U.S. policy rate: Wu-Xia shadow rate (Wu and Xia (2014))
- U.S. policy uncertainty: news-based measure (Baker, Bloom and Davis (2013))
- sample period: 2000M1:2014M2

Ajustment

- New Year effect (except policy variables) (Fernald et al (2013))
- seasonal adjustment (US Census Bureau X13 Software)
- EM algorithm for missing values (Stock and Watson (2002, JEBS))
- fast/slow moving variable (asset price vs. wages)
- Transformation for stationarity: no transformation, first difference, logarithm, first log difference (Bernanke et al(2005, QJE), Stock and Watson (2002, JEBS))

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Estimation

Estimation and Identification – Bernanke et al(2005, QJE)

- factors are constructed to be orthogonal to policy rate and uncertainty
  - pc_t: principal components of all series, pc_t^s: principal components for slow-moving series
  - run the regression:

$$pc_t = b_{pc} pc_t^s + b_{pc}^Y Y_t + \eta_t^{pc}$$

  - factors are constructed to be

$$F_t = pc_t - \widehat{b}_{pc}^Y Y_t$$

Estimation and Identification – Bernanke et al(2005, QJE)

- estimate the observation equation by OLS (2 lags)
- estimate the transition equation by OLS
- identification is achieved through recursive assumption
- two subsamples: 2000M1 - 2008M9, 2008M12 - 2014M2

R^2

Variables	Full Name	R^2	
		before ZLB	at ZLB
SSEI	Shanghai Stock Exchange Composite Index	0.928	0.639
PE ratio (SSE All)	PE ratio (SSE All Stocks)	0.871	0.806
PE ratio (SSE A)	PE ratio (SSE A-Shares)	0.872	0.806
PE ratio (SSE Fin)	PE ratio (SSE Finence)	0.736	0.835
PE ratio (SSE RE)	PE ratio (SSE Real Estate)	0.860	0.807
PE ratio (SSE Const)	PE ratio (SSE Construction)	0.904	0.778
PE ratio (SSE Manu)	PE ratio (SSE Manufacturing)	0.902	0.694
Loan	The Total Amount of Loans	0.087	0.502
Loan Rate (1yr)	Nominal Loan Rate (1 Year)	0.943	0.882
HH DR (1yr)	Household Saving Deposit Rate (1 Year)	0.932	0.903
SHIBOR (1d)	SHIBOR (1 Day)	0.995	0.602
Bond Index (Inter Bank ST)	Inter-Bank Short Term Government Bond Index	0.921	0.604
FES (USD 1yr)	Foreign Exchange Swap (USD 1 Year)	0.995	0.142
CPI	CPI	0.769	0.740
InvestRE	Investment in Real Estate	0.948	0.921
NHS	New Housing Start	0.632	0.479
Comm Bldg Sales	Commodity Building Sales	0.533	0.279
PMI Manufacturing	Purchase Management Index (Manufacturing)	0.995	0.649
PMI new orders	Purchase Management Index (New Orders)	0.995	0.624
Auto Sales (DM)	Automobile Sales (Domestically Made)	0.467	0.527
Macro index	Macroeconomic Index	0.505	0.715

Outline

- after 2008M12 (ZLB is binding in the U.S.)
  - IRFs to U.S. monetary policy shock
  - IRFs to U.S. policy uncertainty shock
- before 2008M12 (ZLB is not binding in the U.S.)
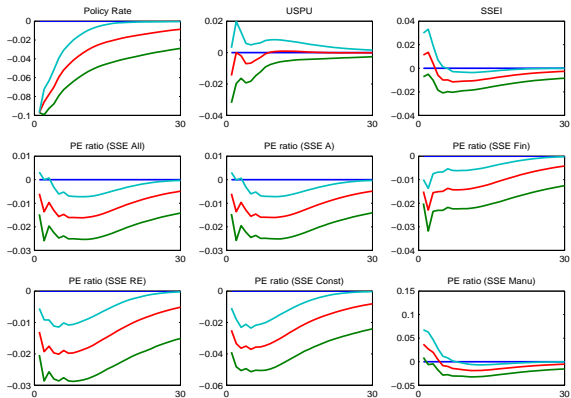 - IRFs to U.S. monetary policy shock

IRFs to USMP Shock at the ZLB
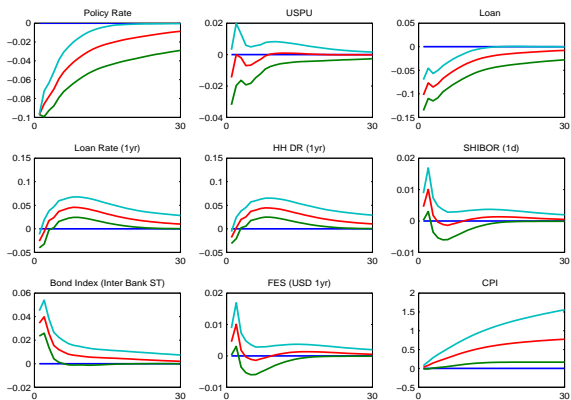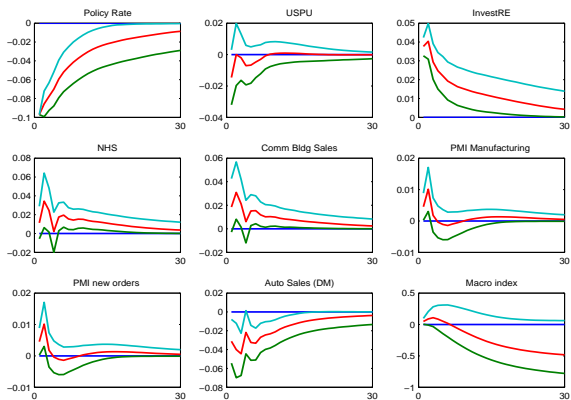
U.S. Monetary Policy Shock at ZLB

IRFs to USMP Shock at the ZLB

U.S. Monetary Policy Shock at ZLB

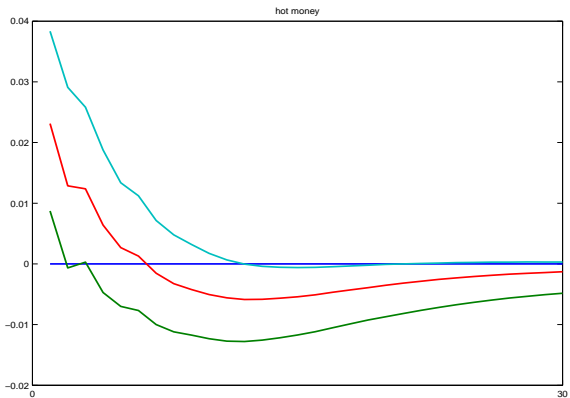# IRFs to USMP Shock at the ZLB

U.S. Monetary Policy Shock at ZLB

Is It Interest Rate Channel?

Impulse Responses of the Interest Rates at the ZLB

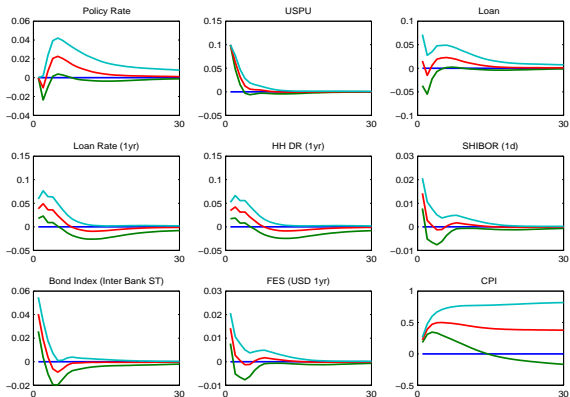# Is It "Hot Money"?

U.S. Monetary Policy Shock at ZLB

Possible Channel

- U.S. monetary policy shock does not affect Chinese economy through market determined interest rate channel
- Responses of Chinese policy and international capital inflow are important
- U.S. MP $\Rightarrow$ capital inflow / people's expectations
  $$\begin{cases} \Rightarrow \text{Chinese policy rates} \\ \qquad\qquad \Downarrow \\ \Rightarrow \text{real economy} \end{cases}$$

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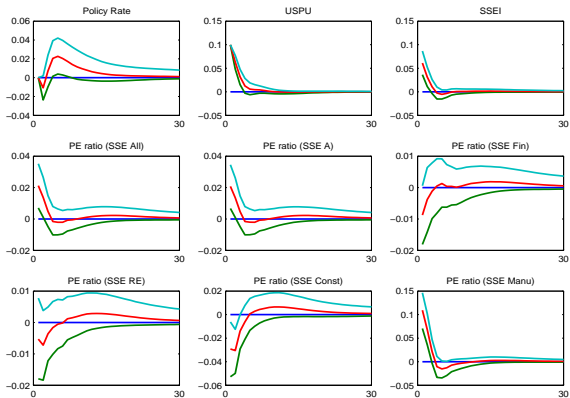000000

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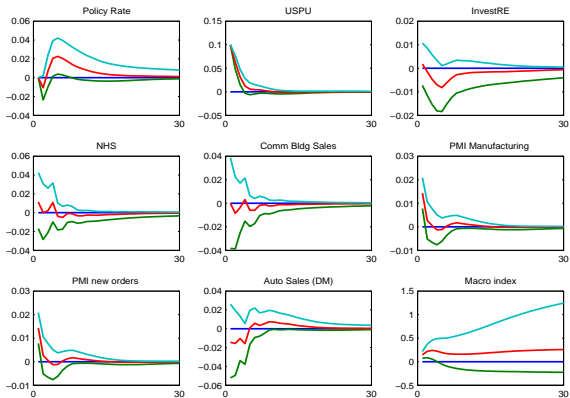
IRFs to USPU Shock at the ZLB

U.S. Policy Uncertainty Shock at ZLB

IRFs to USPU Shock at the ZLB

U.S. Policy Uncertainty Shock at ZLB

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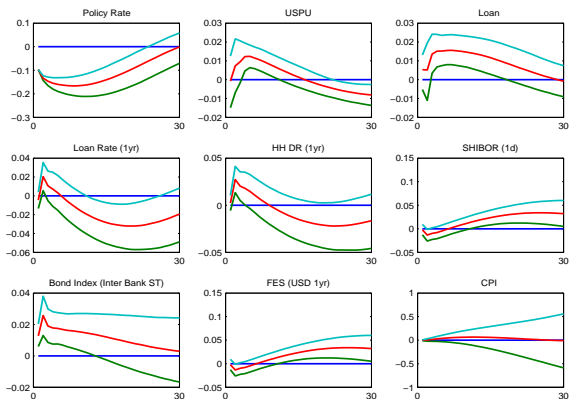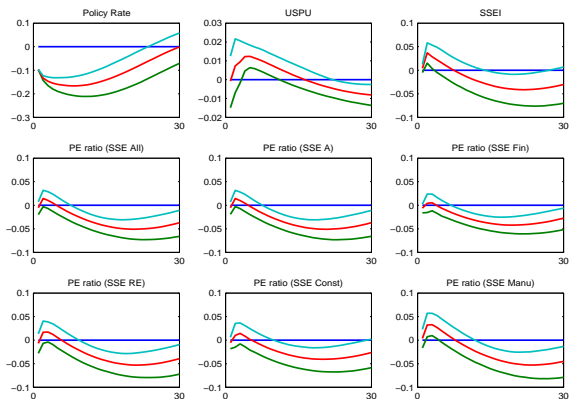oooooo

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IRFs to USMP Shock before the ZLB

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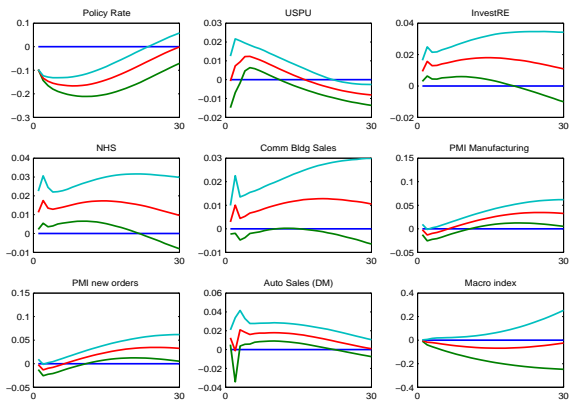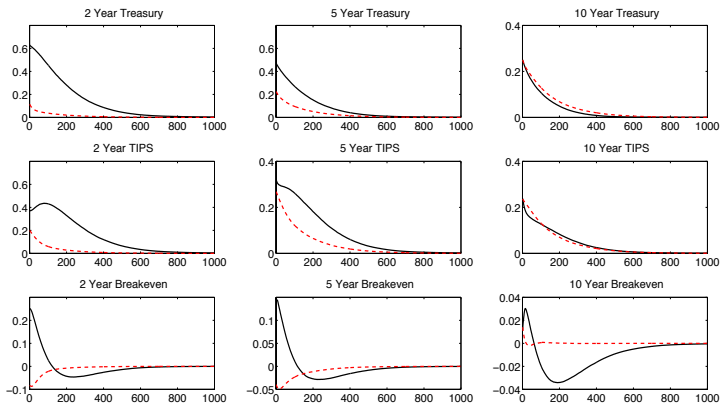00

IRFs

IRFs to USMP Shock before the ZLB

U.S. Monetary Policy Shock before ZLB

Why Different at and before the ZLB?

- change in U.S. monetary policy transmission
  - responses of policy rate
- change in Chinese economy
  - bonds market
  - liberalization of the interest rates
  - managed floating exchange rate

USMP and US Interest Rates (Zhang(2014))

Variance Decomposition

Variables	Variance Decomposition Ratio (MP/PU)							
	before ZLB				at ZLB			
	1m	2m	6m	12m	1m	2m	6m	12m
SSEI	0.087	0.129	0.032	89.780	0.462	0.354	9.251	58.813
PE ratio (SSE All)	0.000	0.003	0.029	9.973	0.042	88018	20.859	249.379
PE ratio (SSE A)	0.000	0.003	0.033	10.914	0.046	70479	20.749	253.409
PE ratio (SSE Fin)	0.016	0.000	0.055	164.872	5.991	11.672	108.486	209.800
PE ratio (SSE RE)	0.000	0.017	0.001	4.114	1.539	4.477	88.145	68.655
PE ratio (SSE Const)	0.005	0.047	0.000	35.081	0.891	4.278	994.457	30.264
PE ratio (SSE Manu)	0.007	0.057	0.016	0.217	0.593	2.551	1.281	254288
Loan	0.000	12.958	0.977	0.434	83.851	286.516	5.670	6.229
Loan Rate (1yr)	0.095	0.021	0.057	1.007	0.070	0.158	8.091	33.931
HH DR (1yr)	0.207	0.136	0.115	3.210	0.029	0.265	9.104	41.260
SHIBOR (1d)	0.010	0.003	0.005	0.238	1.343	0.482	6.980	0.653
Bond Index	0.532	15.728	58.577	122.821	5.789	1307.944	2.522	67.232
FES (USD 1yr)	0.010	0.003	0.005	0.238	1.342	0.477	7.000	0.649
CPI	0.003	1.994	10.303	0.485	0.098	0.513	241.168	12.285
InvestRE	0.171	0.402	1.488	11.697	652.787	57.601	15.390	51.016
NHS	0.184	0.524	2.181	56.772	4.615	3.149	60.259	62.506
Comm Bldg Sales	0.169	0.261	0.204	0.821	290.534	5.371	985.425	71.211
PMI Manufacturing	0.010	0.003	0.005	0.238	1.346	0.486	7.071	0.645
PMI new orders	0.010	0.003	0.005	0.238	1.347	0.490	7.062	0.647
Auto Sales (DM)	0.761	0.066	1.601	0.402	6.584	46721.652	143.343	9.218
Macro index	81.930	0.001	0.018	0.033	1.442	311.628	2.459	340.906

Results

- At the ZLB,
  - U.S. monetary policy shocks do have significant impact on Chinese real economy
  - The impact transmits not through market interest rate channel
  - Possible transmission mechanism: hot money and people's

    expectations $\left\{\begin{array}{l} \Rightarrow \text{ Chinese policy rates} \\ \qquad\qquad \Downarrow \\ \Rightarrow \text{ real economy} \end{array}\right.$

  - U.S. policy uncertainty shocks are less important
- Comparing the cases before and at the ZLB,
  - Dynamics of Chinese macro variables are different under the same shocks
  - Relative importance of the two shocks changes
  - Indicate structural changes in both U.S. policy transmission and Chinese economy

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THANK YOU!