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Monetary policy, hot money and housing price growth across Chinese cities

Xiaoyu Huang[a], Tao Jin[b,c] and Ji Zhang[b]

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A STRA T

We use a dynamic hierarchical factor model to identify the national, regional and local factors of the city-level housing price growth in China. During the zero-lower-bound (ZLB) episode in the U.S., local factors account for 78% of variations in the month-on-month city-level housing price growth. However, as the time horizon extends, the national factor gets a larger variance share, reaching 51% in a half-year horizon. This indicates that the city-level housing price growth in China is more of a national phenomenon in the long run. We then use a VAR model to investigate the driving forces of the national factor and find that monetary policy and hot money shocks affect the national housing price growth significantly. A tightening monetary policy shock has a significant negative impact on the national factor, which lasts for more than 2 years. An increase in hot money inflows causes a significant but transitory rise in the national factor. Moreover, we find that the quantitative easing measure adopted by the U.S. Fed is behind the surge of capital inflows into China.

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I. Introduction

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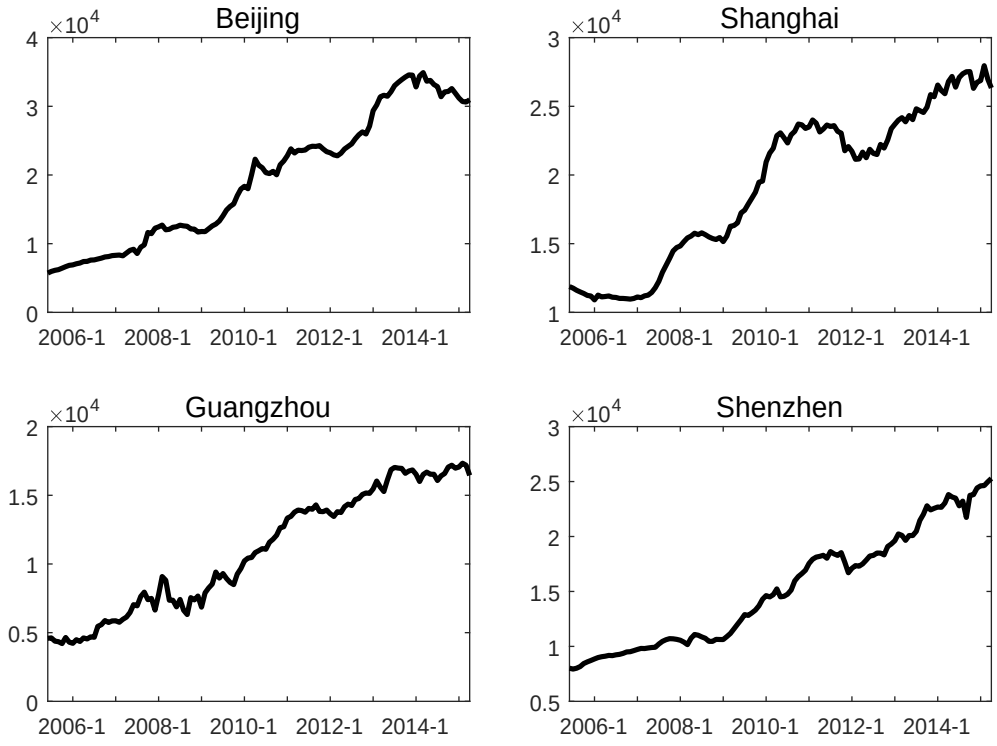

Figure 1. _ _si pic s i i i, i, _ z _ d z . : s p p i d is J. 2 5 ɹpi 2 5. _ _si pic s c d 2 5C Y d s s d_s d. v

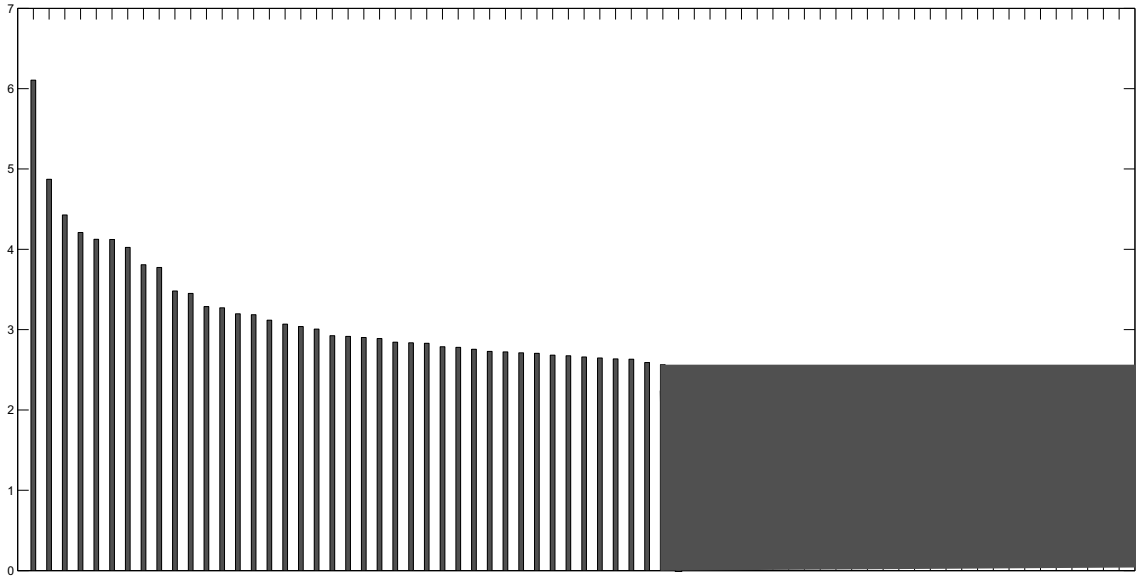

Figure 2. _ _si pic i c s c ss ci i s. : F c ci , ic b i dic s i i s i s s _si pic d_ i J. 2 5–ɹpi 2 5. ɹ _si pic s c v d 2 5C Y d s s d_s d. iz i c sp ds v v _ .

global savings glut

global savings glut

[2] ... i ... s c s c pi c b i s: $uc = ph[(\ -t)i - \pi_h^e + \delta]$, *ph* is ... i p. c s p ic ... si c pi , *i* is ..., π_h^e is p c d pp ci i ... si p ic s, d δ is d p ci i ... si .

global savings glut

II. The dynamic hierarchical factor model

b t H_t^{bs}

N

T

N B

N_b

b

S_b

t

n

s b

$$Z_t^{bsn} = \Lambda_H^{bsn}(L)H_t^{bs} + e_{Z_t^{bsn}};$$

$$H_t^{bs} = \Lambda_G^{bs}(L)G_t^b + e_{H_t^{bs}};$$

$$G_t^b = \Lambda_F^b(L)F_t + e_{G_t^b};$$

Tm [( )] TJT 1 0 0 1 -0.5472 -2.4353 E18[( )] &175 Tr

$$_{F_k}(L)F_{kt} = \in_{F_{kt}}$$

Z_t^{bsn}

n s

H

Table 1.

$$\Lambda_H^{bsn}(L)\Lambda_G^{bs}(L)e_{G_t^b}$$

Other macroeconomic data

$$\Lambda_H^{bsn}(L)e_{H_t^{bs}}$$

$$e_{Z_t^{bsn}}$$

IV. Empirical results

The comovement of housing price growth

$$\Lambda_H^{bsn}(L)\Lambda_G^{bs}(L)\Lambda_F^{b}(L)F_t$$

[5] ‘ - - s .s pic si 7 cii s’ p s i s. b c c. i Fi . d pic s s s d . s d - - c c. d d .

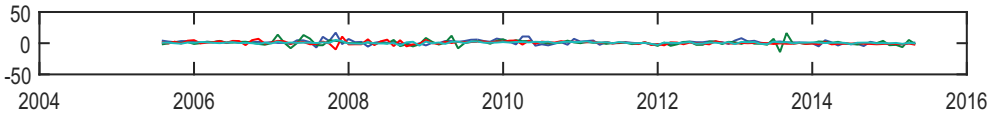

Figure 3. F c s di s. : pc s s si pic s 7 ci i s J 2 5 jp i 2 5. c s p b i , i , p i ci d idi s c ic c s c ci 's si pic , c sp di $\Lambda_H^{bsn}(L)\Lambda_G^{bs}(L)\Lambda_F^{b}(L)F_t$, $\Lambda_H^{bsn}(L)\Lambda_G^{bs}(L)e_{G_t^b}$, $\Lambda_H^{bsn}(L)e_{H_t^{bs}}$ d $e_{Z_t^{bsn}}$ i Hq i s (–(_, sp ci . b s ic s i p i s.

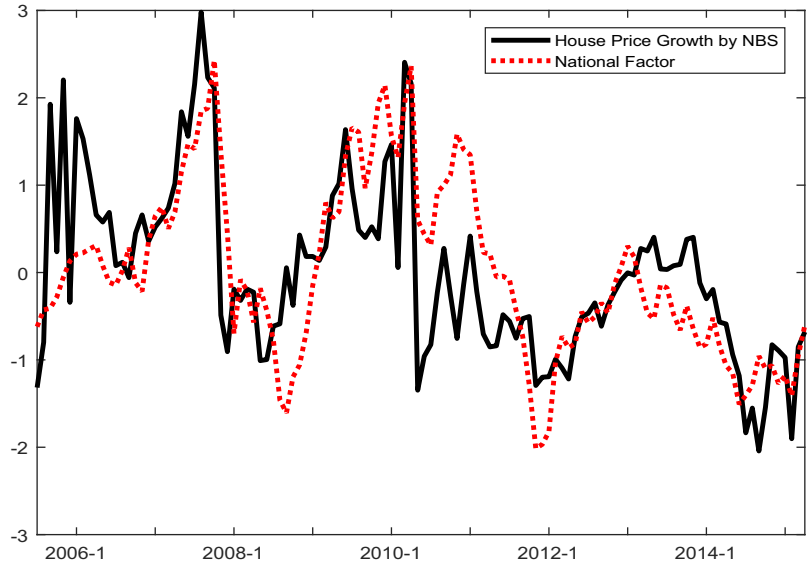

Figure 4. Hsi d i c d ' - - s s pic s i 7 ci i s'.. : d d s d c is i c s i d d ic i c ic c d . b c c is ' - - s s pic s i 7 ci i s' s d b C i . c i i s i s i s s d s d - - . s i s iz d z d i ic .

Variance decomposition

$$Z^{bsn}$$

$$F \quad e_{G^b} \quad e_{H^{bs}} \qquad e_{Z^{bsn}}$$

$$\begin{aligned} Var(Z^{bsn}) = {} & \gamma_F^{bsn} vec(Var(F)) + \gamma_G^{bsn} vec(Var(e_{G^b})) \\ & + \gamma_H^{bsn} vec(Var(e_{H^{bs}})) \\ & + vec(Var(e_{Z^{bsn}})) \end{aligned}$$

$$\gamma_F^{bsn} \quad \gamma_G^{bsn} \quad \gamma_H^{bsn}$$

$$\Lambda_H^{bsn}(L) \quad \Lambda_G^{bs}(L) \qquad \Lambda_F^{b}(L)$$

$$Share_N \quad Share_R \qquad Share_L$$

$$Share_N = \frac{\gamma_F^{bsn} vec(Var(F))}{Var(Z^{bsn})};$$

$$Share_R = \frac{\gamma_G^{bsn} vec(Var(e_{G^b}))}{Var(Z^{bsn})};$$

$$\begin{aligned} Share_L &= Share_{H^{bs}} + Share_{Z^{bsn}} \\ &= \frac{\gamma_H^{bsn} vec(Var(e_{H^{bs}}))}{Var(Z^{bsn})} + \frac{vec(Var(e_{Z^{bsn}}))}{Var(Z^{bsn})}: \end{aligned}$$

$Share_N$

$Share_N$

%

%

[6] s. dis s d is p . F i s c , , , d . (2 8 d sp s s C i s c . . p ic s c s d p ic . c i s c s ibi di d ics i p i ds b d d . ds i L i i d s, ic s. ss is c s . c . c s b i C i s c d i s issi c is . . p ic .

Table 2. Vi c d c p si i ci - si p ic : s p (2 5M7–2 5M .

is (cs	ics (b-b cs	i Fc	i Fc	Lc Fc s
C s J	ii	. (. . (.	.5 (.	
	i i	. 9 (. . (.	.9 (.	
	b i	. 7 (. 6 . (.	.82 (. 6	
	d	. 8 (. 5 . (.	.92 (. 6	
E	J v	. 9 (. . (.	.8 (. 5	
Is C s J	i	.28 (. . (.	.68 (.	
	Ji s	. 2 (. 2 . 2 (.	.86 (. 2	
	i	. (. . 2 (. 2	.86 (. 6	
	J v	. 8 (. 8 . 2 (.	.8 (. 8	
	F i	. 9 (. 7 . (.	.89 (. 8	
C s J	d	. 5 (. . (.	.95 (.	
	i	. (. . (.	.99 (.	
	J v	. 5 (. . (.	.9 (.	
Midd - c	i	. 9 (. . (.	.86 (.	
Y i v	i	. (. . (.	.98 (.	
		. 7 (. 7 . (. 5	.88 (.	
	l	. 2 (. . 7 (. 7	.8 (. 9	
	M i			
	J v	. 7 (. . (. 2	.88 (. 6	
Midd - c	b i	. 2 (. . (.	.87 (.	
Y z i v		. 5 (. 7 . 2 (.	.8 (. 8	
	Ji i	. (. . (.	.86 (.	
	J i	. (. . (.	.97 (.	
	J	. (. 5 . (.	.88 (. 5	
s J	Ji v	.2 (. . 2 (.	.78 (.	
	Li i	. 9 (. 6 . (.	.9 (. 7	
	i i	. 9 (. . (.	.9 (.	
	J v i	. (. 5 . (.	.86 (. 6	
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	iz	. (. . (.	.96 (. 5	
	C qi	.27 (. . 6 (.	.66 (.	
	ic	. 9 (. . 2 (. 2	.89 (.	
	Y	. (. 6 . (.	.82 (.2	
	J v	. (. 8 . (. 2	.8 (.	
s J	i i	. (. . 2 (.	.8 (.	
	i i	. (. . (.	. (.	
	i i	.25 (. .7 (.	. 2 (.	
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i J v	J v	. 8 (. .22 (.29	.7 (.	
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: is b ps i cd c psii - d ci - si p ic i s p id (J 2 5–J pi 2 5. F c (s b- b c , ' i F c ', ' i F c ', d ' c F c s's d i c s s s csi i i s ci - si p ic i c sp di s. b si b c s s d dd i is i c s s.

Table 3. Vi c d c p si i ci - si p ic : si c L p i di . . (2 9M –2 5M .

is (cs	ics (b-b cs	i Fc	i Fc	Lc Fc s
C s J	ii	.52 (. . (.	.5 (.	
	i i	. (. . (.	.89 (.	
	b i	.29 (. . 2 (.	.69 (.	
	d	. (. . (.	.88 (.	
E	J v	.25 (. 7 . 2 (.	.7 (. 8	
Is C s J	i	.26 (. . (.	.7 (.	
	Ji s	. (. . 2 (.	.8 (.	
	i	.2 (. 7 . (. 2	.77 (. 9	
	J v	.2 (. 5 . (.	.77 (. 5	
	F i	.27 (.28 . 2 (. 2	.7 (.	
C s J	d	. 5 (. . (.	.95 (.	
	i	. (. . (.	.99 (.	
	J v	. (. . (.	.88 (. 2	
Midd - c	i	. (. . 6 (.	.8 (.	
Y i v	i	. 9 (. . (.	.87 (.	
		. 8 (. 5 . (.	.88 (. 9	
	l	. (. . 6 (. 7	.8 (. 7	
	M i			
	J v	. (. 2 . 5 (.	.85 (.	
Midd - c	b i	.2 (.26 . 2 (. 2	.78 (.28	
Y z i v		. 8 (. . (.	.8 (.	
	Ji i	. (. . (.	.85 (.	
	J i	. 2 (. . (.	.87 (. 5	
	J	. 6 (. . (.	.8 (.	
s J	Ji v	. (.2 . (.	.5 (.2	
	Li i	. 5 (. . (.	.8 (.	
	i i	. (. . (.	.88 (.	
	J v i	.2 (. 5 . (.	.75 (. 6	
s J		.2 (. . 2 (.	.78 (. 5	
	iz	. 5 (. . (.	.9 (.	
	C qi	. 8 (. . (.	. 7 (.	
	ic	. (. 9 . (. 2	.85 (.2	
	Y	.27 (. . 2 (.	.7 (. 7	
	J v	.2 (. 5 . 2 (.	.75 (. 6	
s J	i i	. 5 (. . 7 (.	.88 (.	
	i i	. (. . (.	. (.	
	i i	. (.56 (.	. (.	
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i J v	J v	. 2 (. 7 . 6 (.2	.72 (.	
		. 8 (. . (.	.78 (. 9	

: is b ps i cd c psii - d ci - si p ic i s.bs p p id (J 2 9–J pi 2 5. s b 2.

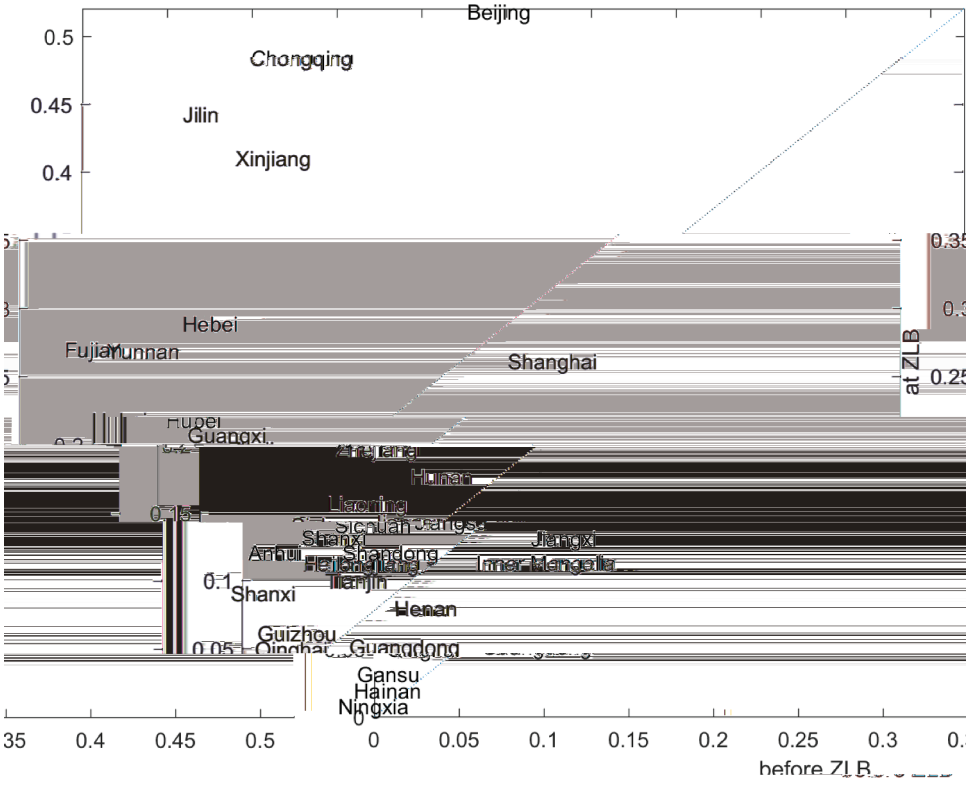

Figure 5. i c - i c s i c . : is , disp s c p i c i d $Share_N$ (i Eq. i v v L v p i d (2 9M -2 5M ic is, d p i d b v L (2 5M7 C2 8M 2 iz is. v

Variance shares of extending horizons

$$Var(Z_h^{bsn}) = y_{F_h}^{bsn} vec(Var(F_h)) + y_{G_h}^{bsn} vec(Var(e_{G_h^b})) + y_{H_h}^{bsn} vec(Var(e_{H_h^{bs}})) + vec(Var(e_{Z_h^{bsn}}))$$

F_h $e_{G_h^b}$ $e_{H_h^{bs}}$

$e_{Z_h^{bsn}}$ $h -$

F e_{G^b} $e_{H^{bs}}$ $e_{Z^{bsn}}$

Z_h^{bsn} $h -$

n s b

Z^{bsn}

Z_h^{bsn} h

h

Z_h^{bsn}

$$Share_N^h = \frac{y_{F_h}^{bsn} vec(Var(F_h))}{Var(Z_h^{bsn})};$$

F_h $e_{G_h^b}$ $e_{H_h^{bs}}$

$e_{Z_h^{bsn}}$

$$Share_R^h = \frac{y_{G_h}^{bsn} vec(Var(e_{G_h^b}))}{Var(Z_h^{bsn})};$$

$$Share_L^h = Share_{H_h^{bs}} + Share_{Z_h^{bsn}} = \frac{\gamma_{H_h}^{bsn} vec(Var(e_{H_h^{bs}}))}{Var(Z_h^{bsn})} + \frac{vec(Var(e_{Z_h^{bsn}}))}{Var(Z_h^{bsn})}:$$

$$Share_N^h \quad Share_R^h \quad Share_L^h$$

$$h -$$

$$h$$

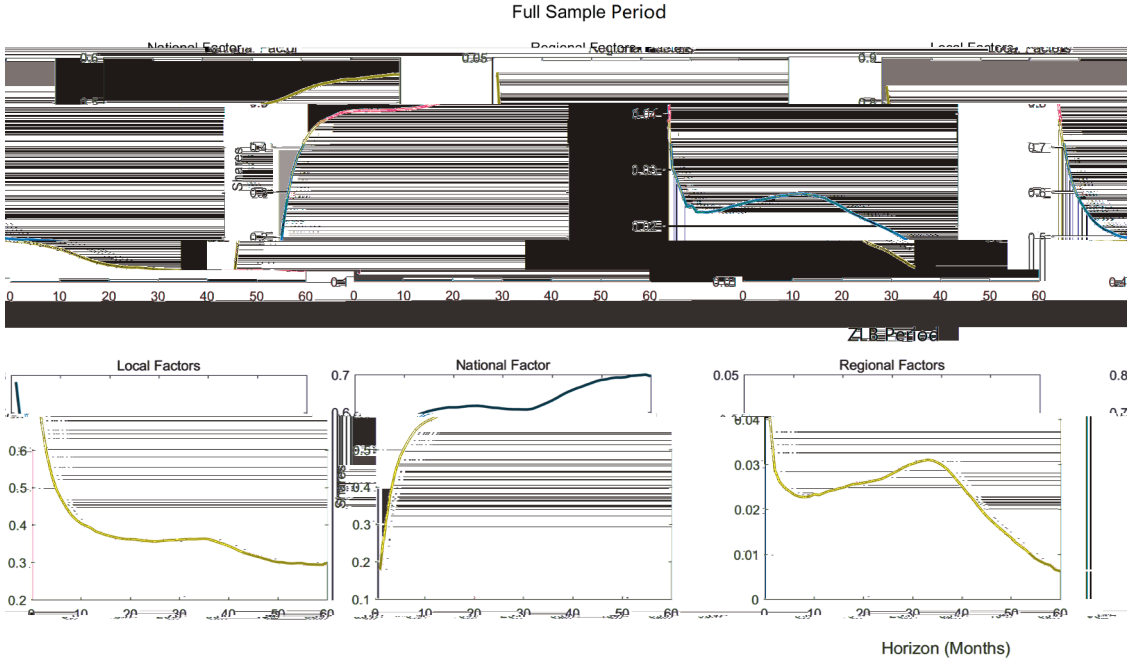

Figure 6. V i c d c p si i ci - si p ic i s iz s. : is disp s s s di c si i i si ci - si p ic i s iz s (–6 s. pp p c sp ds s p p i d J. 2 5 jp 2 5, i p c sp ds L p i d J 2 9 jp i 2 5.

What is behind the comovement of housing prices?

Impulse response

$$Y_t = C + A(L)Y_{t-} + u_t;\ u_t\ ,\ N(\ ;\ );$$

Y_t $\times$ C u_t

$A(L)$ L

Y_t

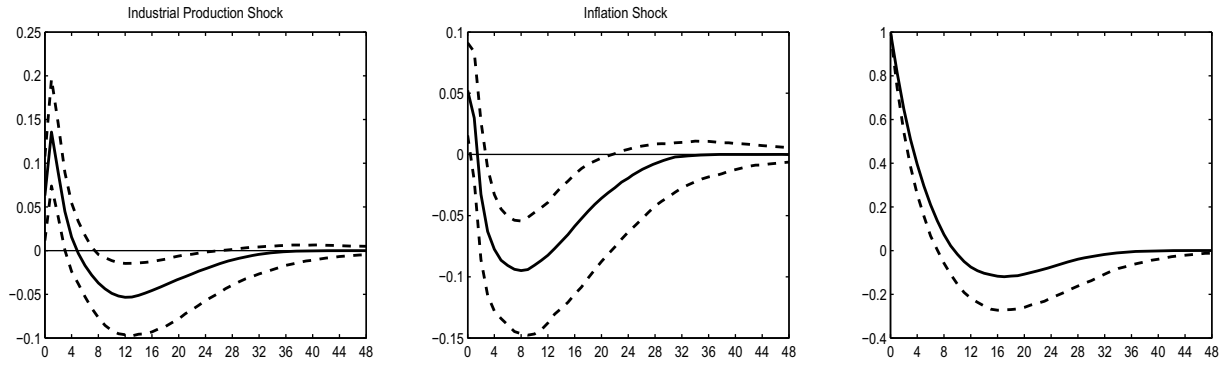

Figure 7. I p s sp s s i c i s s c s: 2 9M –2 5M . : b si p s d pic i p s sp s s i c p si i id s i p d c i , C I, i c , , d I C p si l d s c s 5,. 2 - q 9.7VMV

Historical decomposition

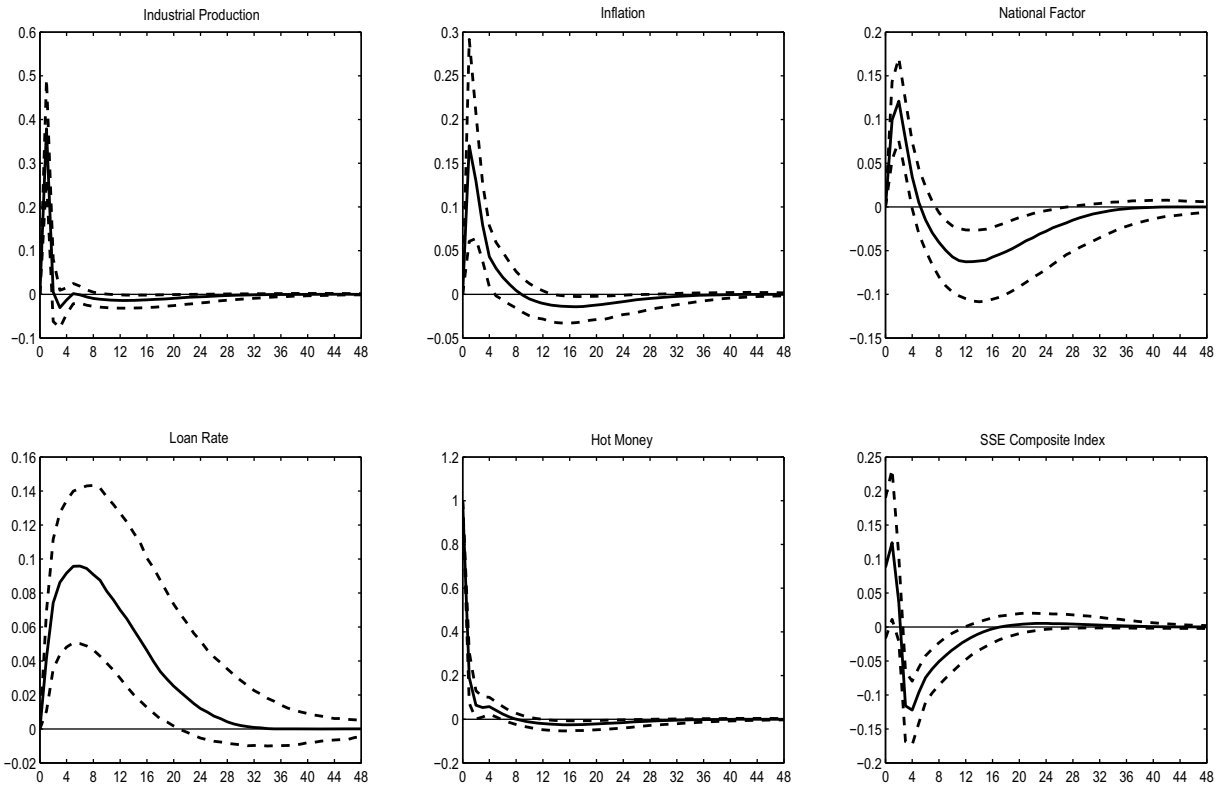

Figure 8. I p s sp s s i s ib s p si i s c : 2 9M –2 5M . : b si p s d pic i p s sp s s id s i p d c i , C l, i c , , d I C p si l d p si s c 8 s. d s d i s i dic 68 b s p c d c b ds, d s id i s b s p di . s c siz q s s d dd i i s s d s d . b s ic s i s d dd i i s c sp di ib s.

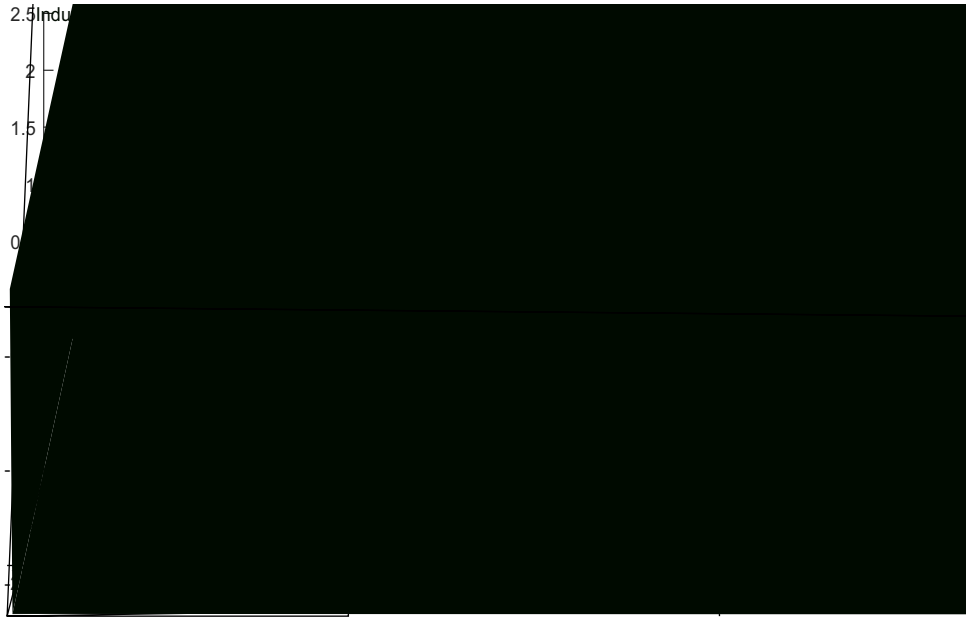

Figure 9. is ic d c p si i i c : 2 9M –2 5M . : b c c. is i c si p ic , ic is iz d z d i i c. b s i s c s p s c ib. i s i s p s s c s i c . b s ic s i s d dd i i s.

Forecast error variance decomposition

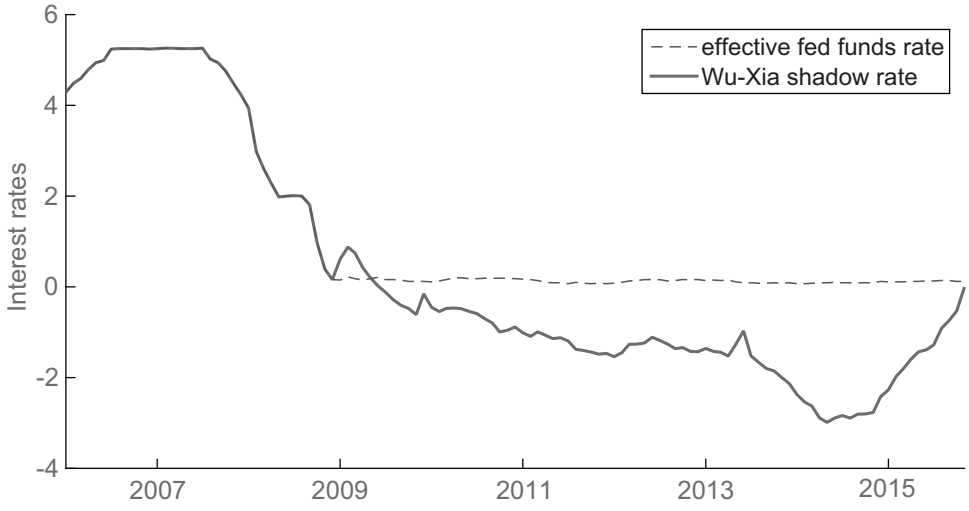

Figure 10. -A s d c p d i ci d ds . : s id i idic s s d c s c d b d d i (2 6, d d s d i is ci F d d , ic is b i d d s F d s s .

Y_t

Y_t

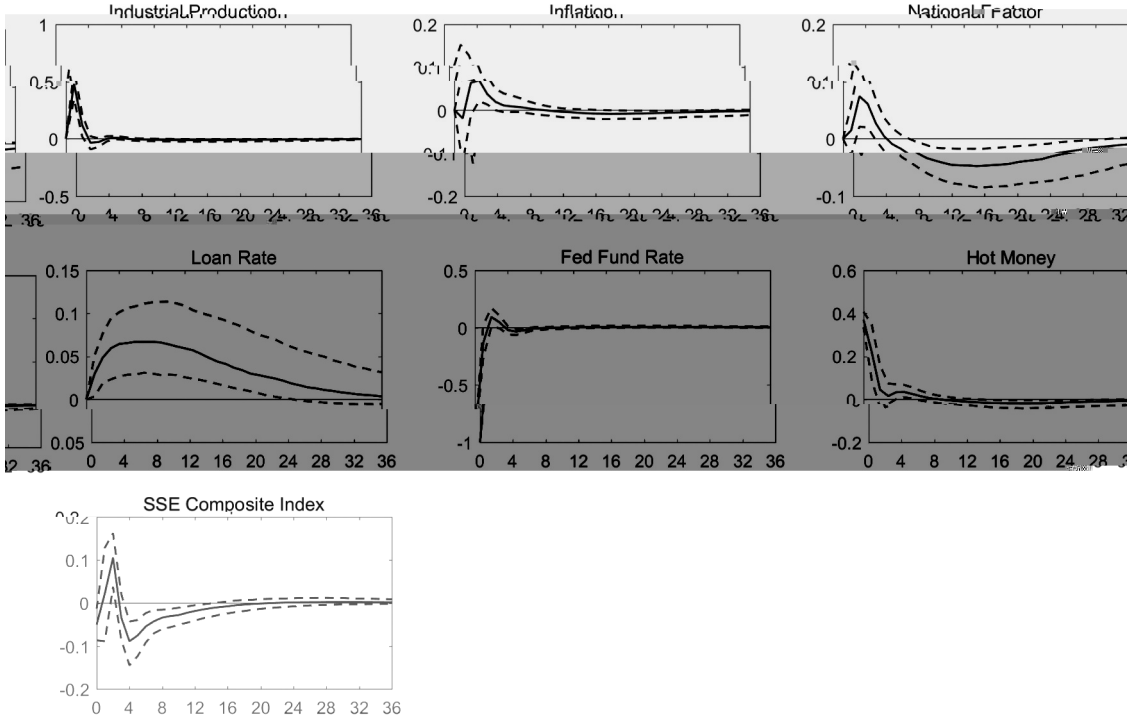

Figure 11. I p s sp s s i s i b s i s d s c : 2 9M –2 5M . E: b si p s d pic i p s sp s s I d s i p d c i , C I, i c , , d H C p si I d i s d s c 6 s. d s d i si dic 68 b s p c d c b ds, d s id i s b s p di . s c siz q s s d d d i i s di c s d . b s ic s i s d d d i i s c sp di i b s.

Acknowlegement

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