MACROECONOMIC CONSEQUENCES OF THE REAL-FINANCIAL NEXUS: SPILLOVERS BETWEEN CHINA AND THE U.S.

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Introduction

- There is a confluence between the economic rise of China and global economic interdependence
- Eight years since the GFC there is more preoccupation about spillovers from domestic monetary policies especially

Spillovers

- In the early 2000s it was China exporting lower prices leading to lower inflation in advanced economies (in addition to inflation control mandates)
  - Interpreted broadly as being negative in advanced economies
- By the start of the 2nd decade of the 2000s it was the US (and now the Eurozone) exporting ultra-low interest rates
  - Interpreted as negative in emerging market economies
- Adding to these worries is the preoccupation with a possible 'hard landing' in China
  - "…data published for August were certainly on the weak side….money supply growth was subdued, an there was a sharp fall in energy consumption….There is no doubt that the property sector is undergoing a sharp correction,…" (Davies, **FT**, 23/9/2014)

Implications?

- Empirically assessing these types of spillovers necessitates explicit recognition of
  - Real and financial shocks both matter
    - We can no longer assume a world without credit frictions
    - "Probably the biggest shift…in response to the crisis has been toward work on the interaction between financial markets and the macroeconomy." (Romer 2014 *NBER Reporter*)
  - Models must deal with spillovers in a sensible manner

This Paper

- Empirically examines the macroeconomic interdependence between China and the US
  - Real and financial factors jointly play a role
  - China and US shock, in principle, are permitted to jointly influence each other
- Essentially, a study of the global transmission of shocks

Challenges

- Potentially a large number of candidate variables but a short time span
  - Requires technique(s) that maximize use of available time series with minimal loss of degrees of freedom
- Some questions about quality of China's data
  - Fears more about size than overt manipulation of statistics, especially since the Asian Financial Crisis (e.g., Holz 2013, 2013a; Sinclair 2012, Mehrotra & Pääkkönen 2011, Wu 2011)
- China is an 'unusual' economy (Dollar & Jones 2014)
  - Can the US and China be examined on the same footing?
  - How idiosyncratic should the (individual country) models be?

Literature Review

- Global impact of China on inflation
  - Bailliu & Blagrave (2010), Eickmeier & Kühnlenz (2013)
  - Not as much as advertized
- The nature of the monetary transmission mechanism in China: how similar/different relative to advanced economies?
  - Policy strategy subject to many changes & evolution
  - Ma, Xiandong and Xi (2011), Xu and Chen (2012), Köner and Ehmts (2013), Dong and Chong (2013), Girardin et.al. (2013)

Literature Review (Cont'd)

- Monetary Policy viewed through policy rules
  - Ubiquitous for advanced economies
  - Problematic for China
  - Burdekin & Siklos (2008), Koivu et. al. (2009), Mehrotra & Sanchez (2010), Liu and Zhang (2010), and more…
- The role of asset prices in monetary policy in China?
  - Focus mainly on housing prices but a link seems to exist with additional factors (we would call them macro prudential today) also in play
  - Liang and Cao (2007), Zhang et. al. (2011), Xu and Chen (2012),
  - In contrast, and until recently, the focus in advanced economies was on the connection between equity prices and monetary policy

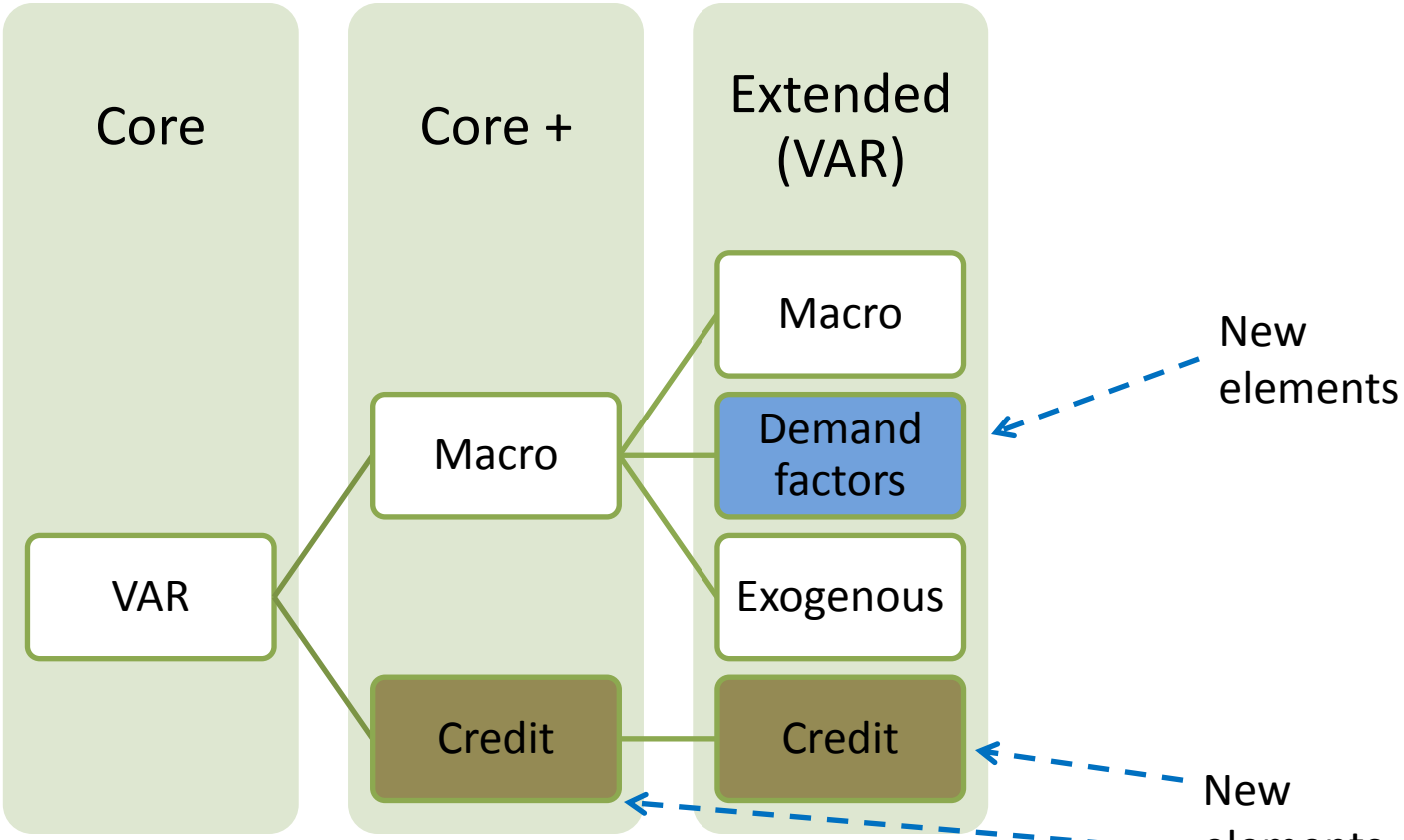
Literature Review (Cont'd)

- Other Chinese characteristics?
  - Multiple instruments versus a single instrument (at least until lately)
  - Exchange rate system (managed versus float) & foreign exchange reserve accumulation (exorbitant privilege)
  - Financial repression (capital controls)
  - Very strong real economic growth (versus Great Moderation, at least until 2007)

Methodology

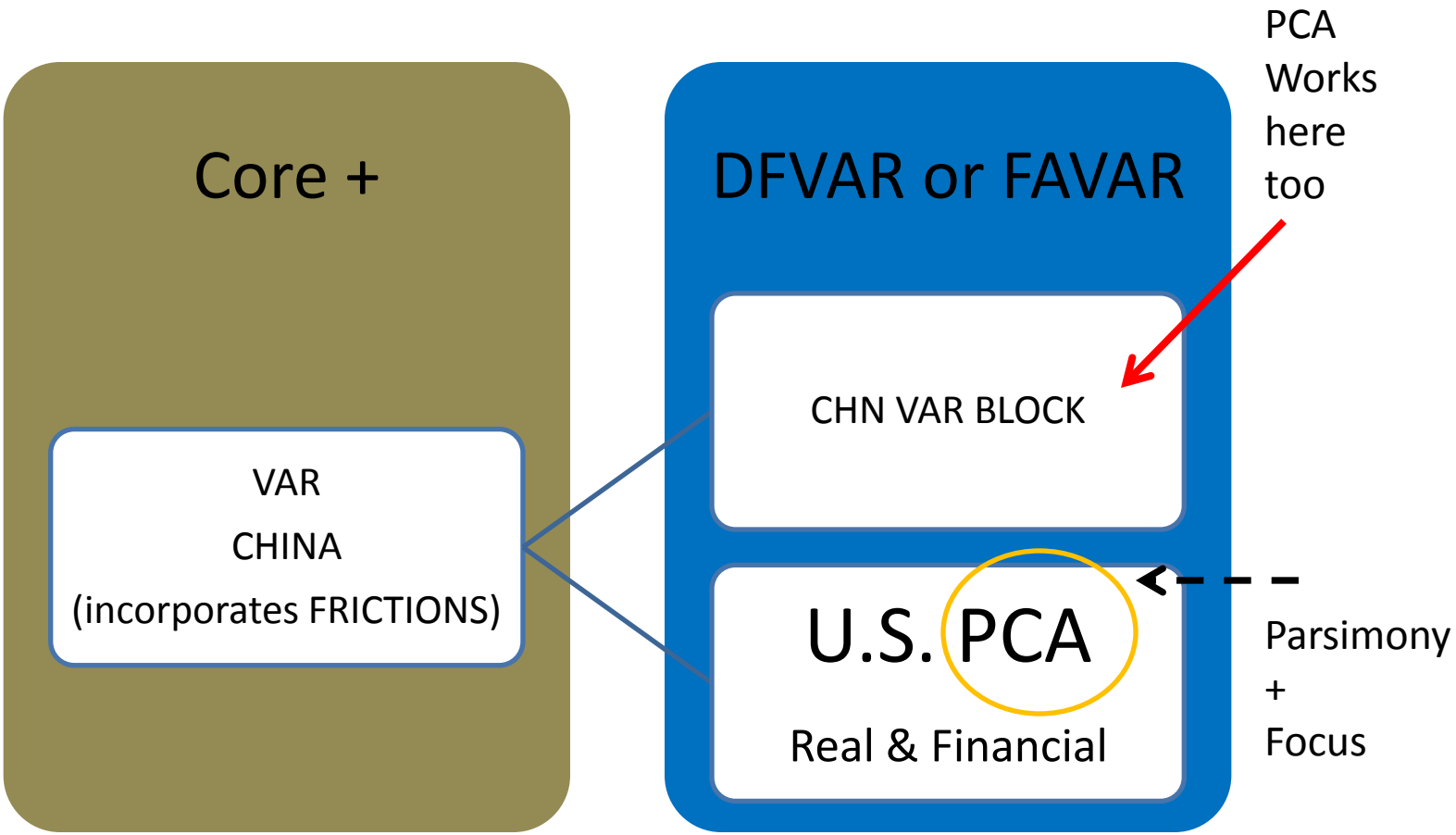
- There exist alternatives to one employed in this paper
  - GVAR, VECM, SVARs, …
- What I am using is neither the best nor the worst but the most reasonable – I hope – under the circumstances and given earlier challenges discussed and the state of the literature dealing with monetary policy/macroeconomic influences in and on China

Methodology: Outline, Part I

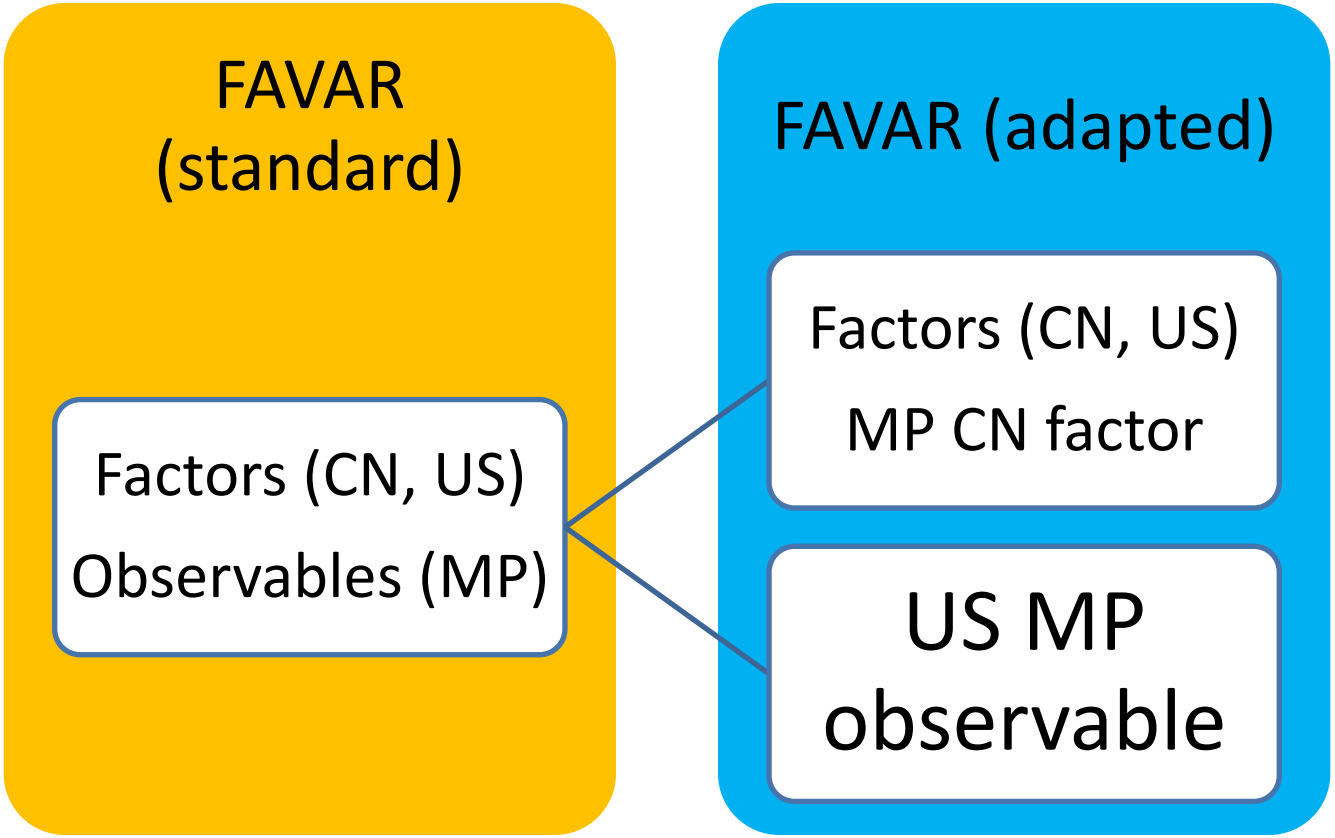


Governing principle: PARSIMONY

Methodology: Outline, Part II



Methodology: Outline, Part III



Data

- Quarterly, 1999.1-2014.1, before differencing or transformations
- Sources:
  - IFS
  - FRED II
  - CEIC

Time Series I

- **CHINA (CORE)**
  - Real GDP growth
  - Consumer price inflation
  - Commodity prices
  - Real exchange rate
  - Monetary base
- **USA (CORE)**
  - Real GDP growth
  - PCE inflation
  - WTI inflation
  - Fed funds rate

Time Series II

- **CHINA (CORE+)**
  - **CORE**
  - Required reserve ratio
  - Credit funds – financial institutions
- **USA (CORE+)**
  - **CORE**
  - SLOS
  - Volume of commercial loans

Time Series III

- **CHINA (EXOGENOUS)**
  - Business climate index
  - Property prices
  - **GDP growth forecasts**
  - Share prices
  - Energy consumption
  - Current account/GDP ratio
  - Policy uncertainty
  - Foreign exchange reserves
- **USA (EXOGENOUS)**
  - **Real GDP growth forecasts**
  - Term spread
  - Financial conditions index
  - Policy uncertainty
  - Housing prices

Evidence: CORE VAR for China

- Choleski, analytic s.e., usually 2 to 3 lags (SC, FPE)
  - Strong persistence in real GDP growth, dies off after 6 quarters
  - Inflation and real GDP growth are positively related but short duration, 3 quarters
  - Real exchange rate appreciation reduces real GDP growth over 3 quarters
  - Base growth has negligible impact, as does commodity prices
    - …but base growth produces a modest rise in inflation over 6 quarters
    - …and responds to inflation shocks, also over 6 quarters (i.e., a +VE inflation shock produces a FALL in base growth)

Evidence: CORE + for China

- Much sharper (and larger) response of real GDP growth to an inflation shock
- No response to RRR but a large and persistent response to CREDIT growth
- RRR responds to CREDIT (+vely) and to inflation (+vely)
- BUT
  - a RRR shock *raises* inflation (a Chinese *price puzzle?*)
  - A CREDIT shock also leads to a rise in inflation
  - No discernible link between RRR and Base growth

Figure 1a Selected Impulse Response Functions: China, Benchmark Model

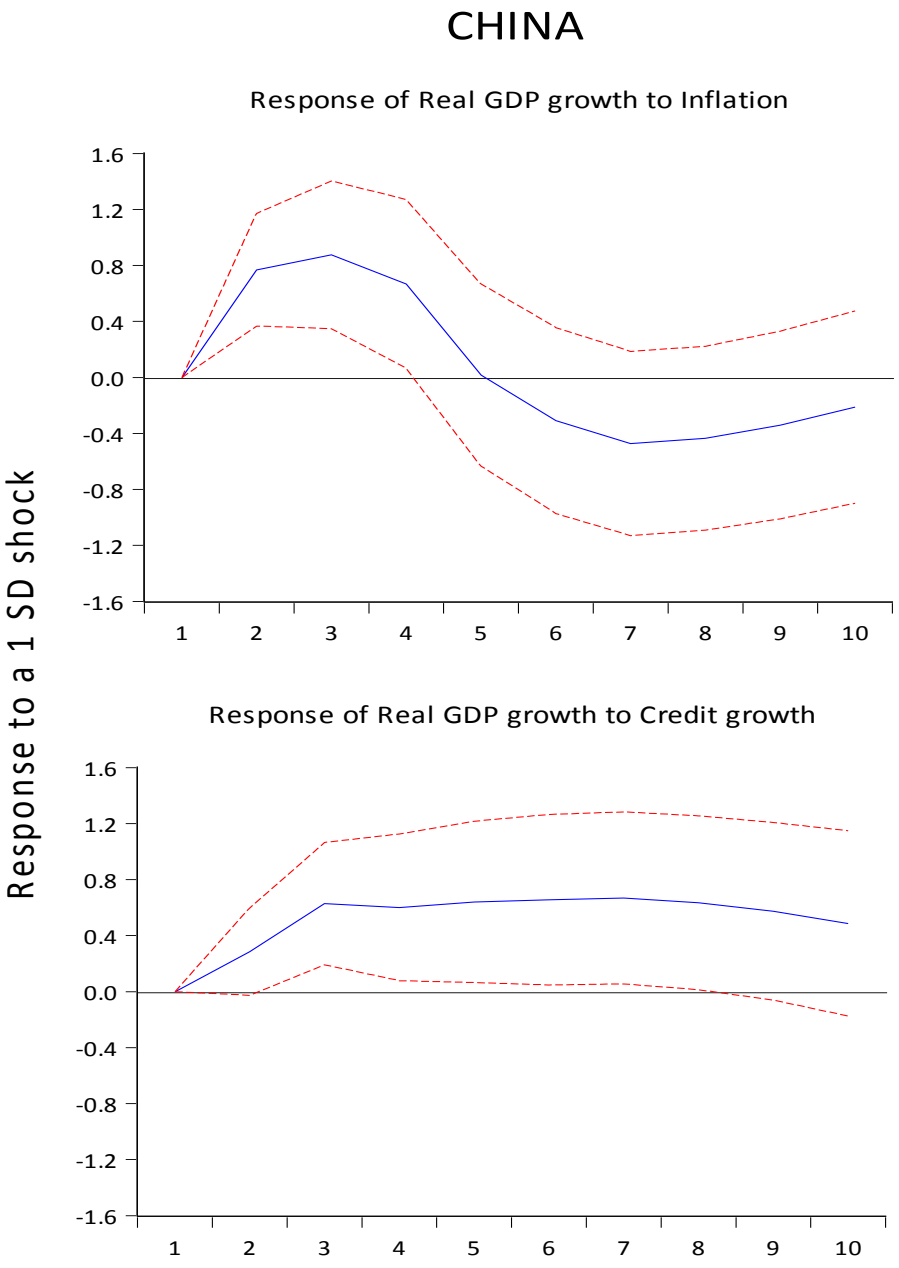


Figure 1b Selected Impulse Response Functions: China, Benchmark Model (cont'd)

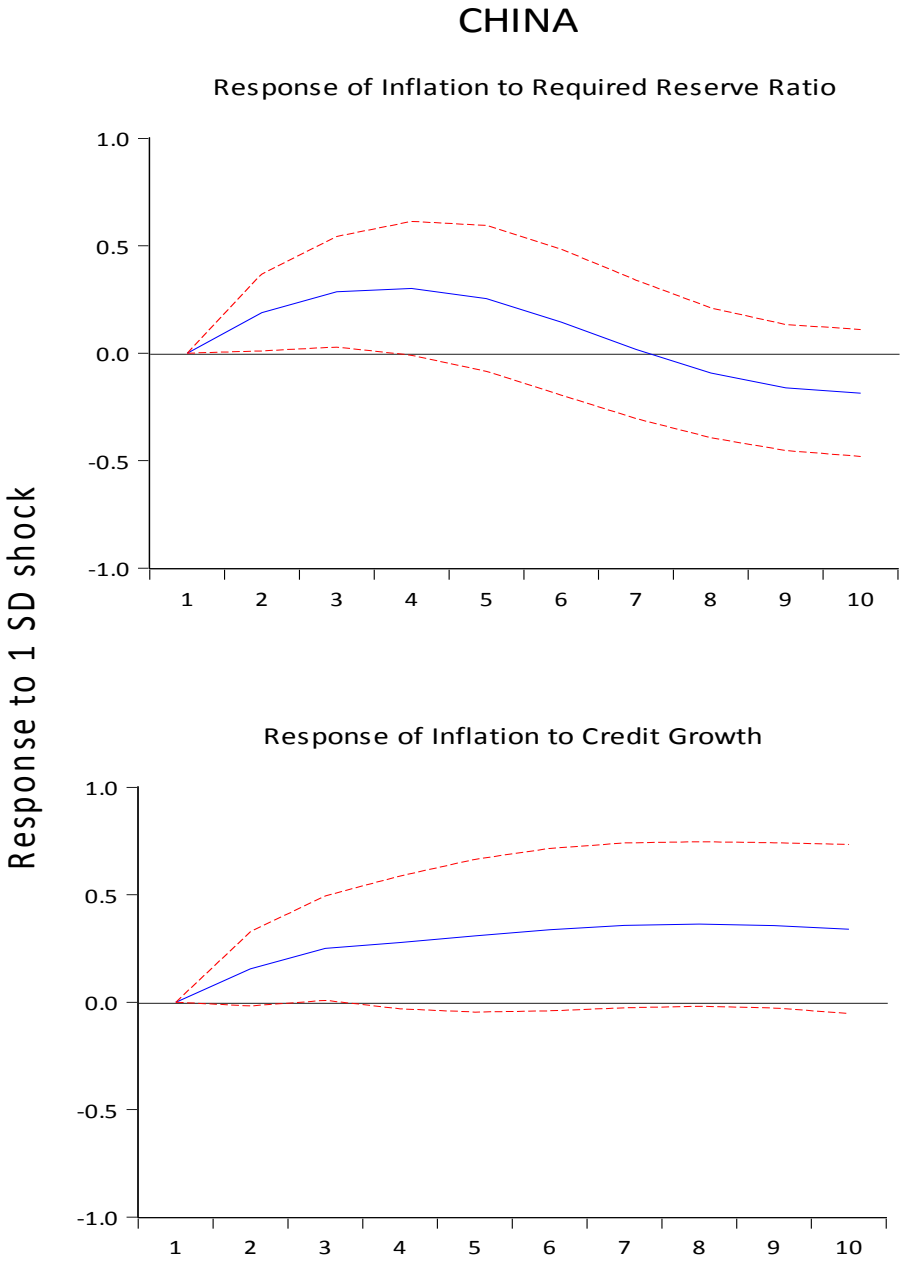
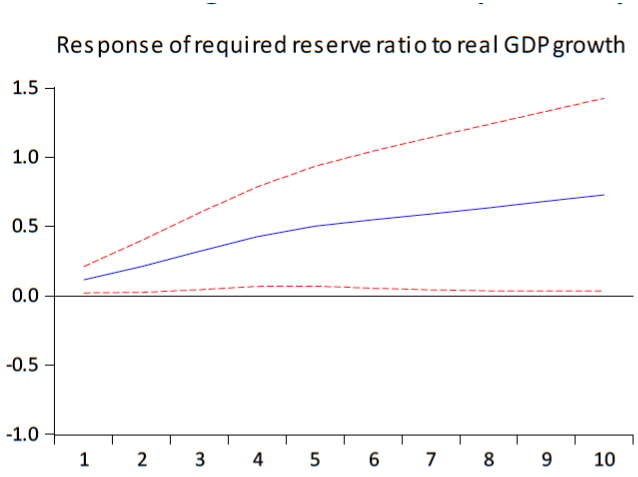
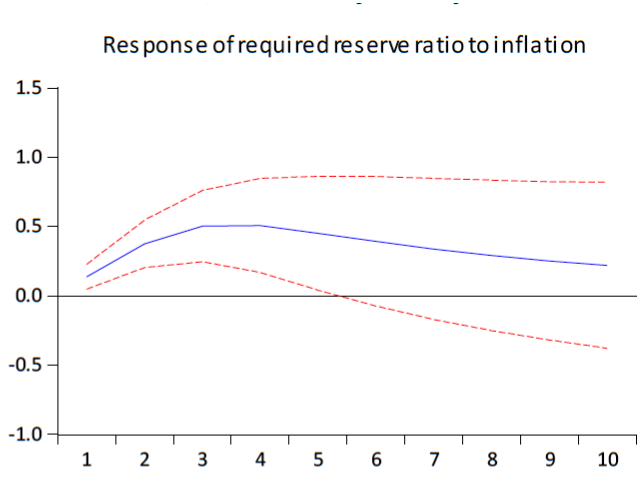
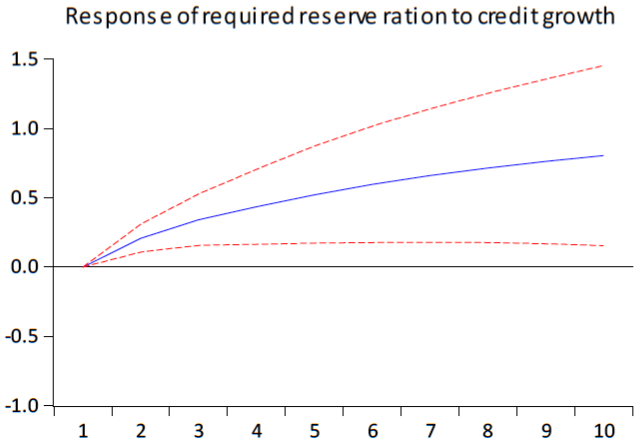


Figure 2 Selected Impulse Response Functions: China, Monetary Policy







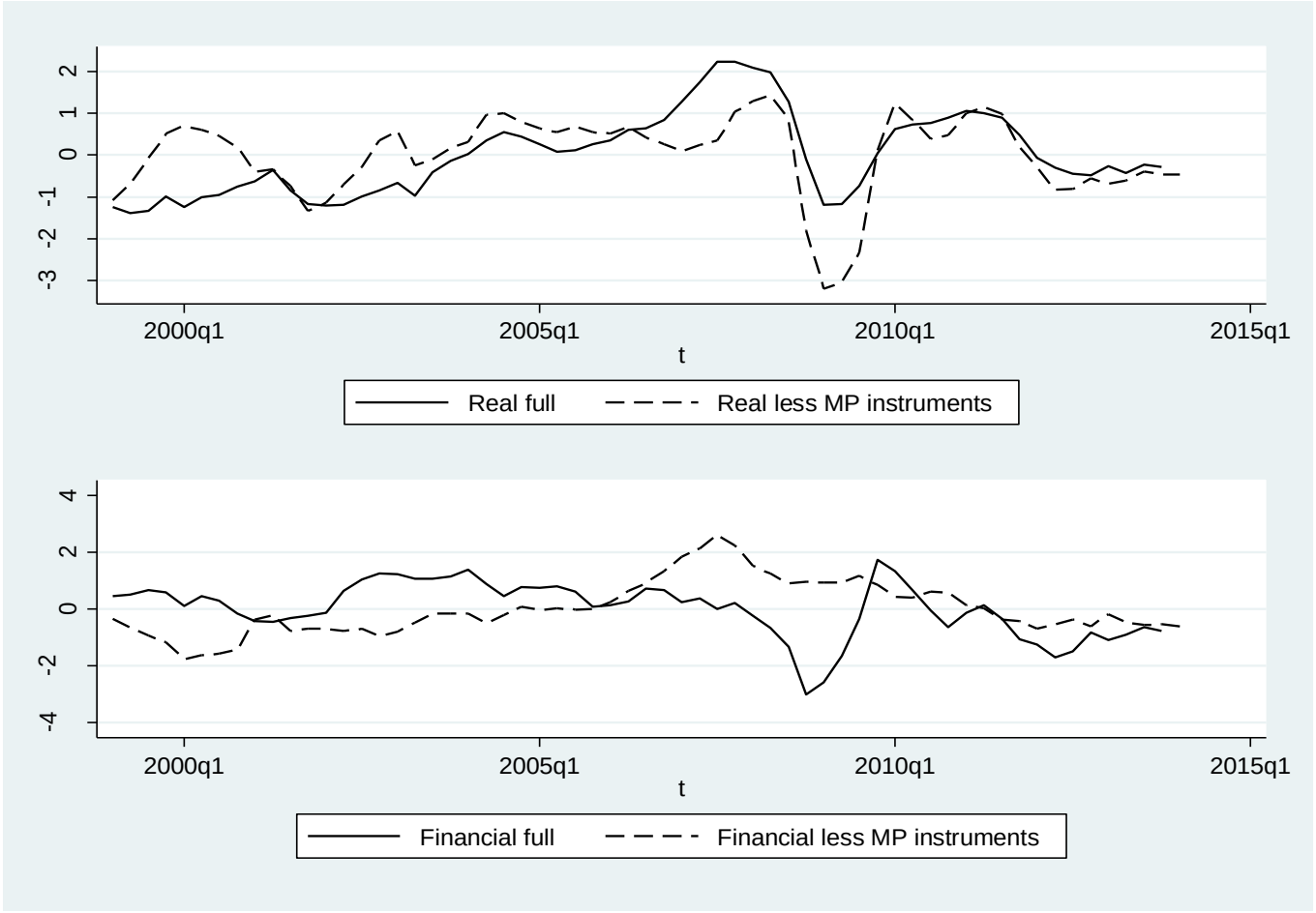
Bottom Line (so far)

- There are several signs that the transmission of MP to macro variables is not too dissimilar with advanced economies
  - Of course, the channels are not the same

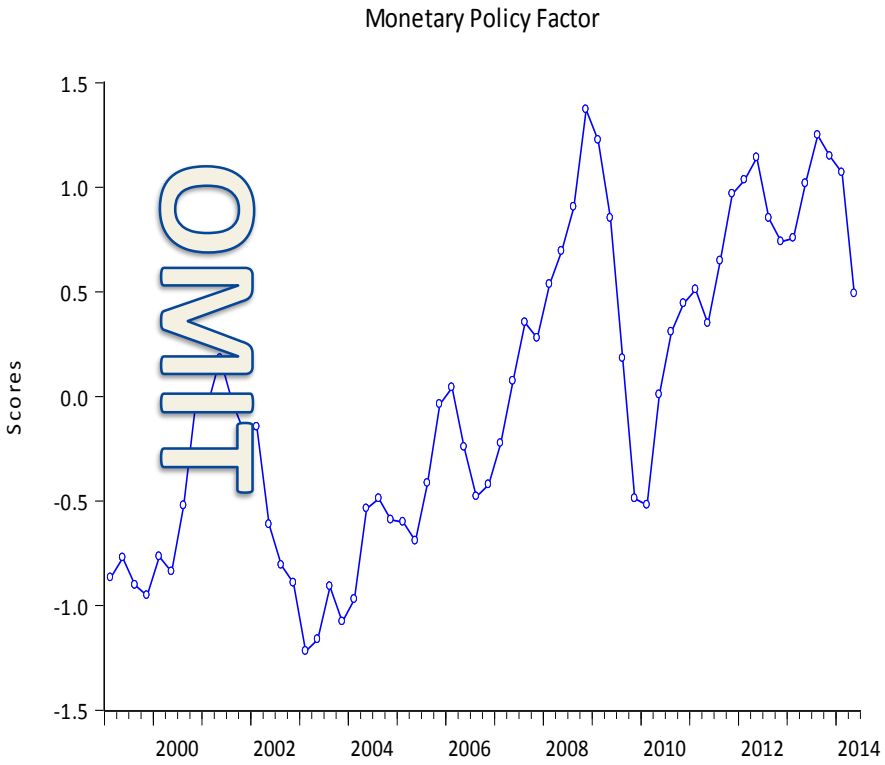
PC Analysis

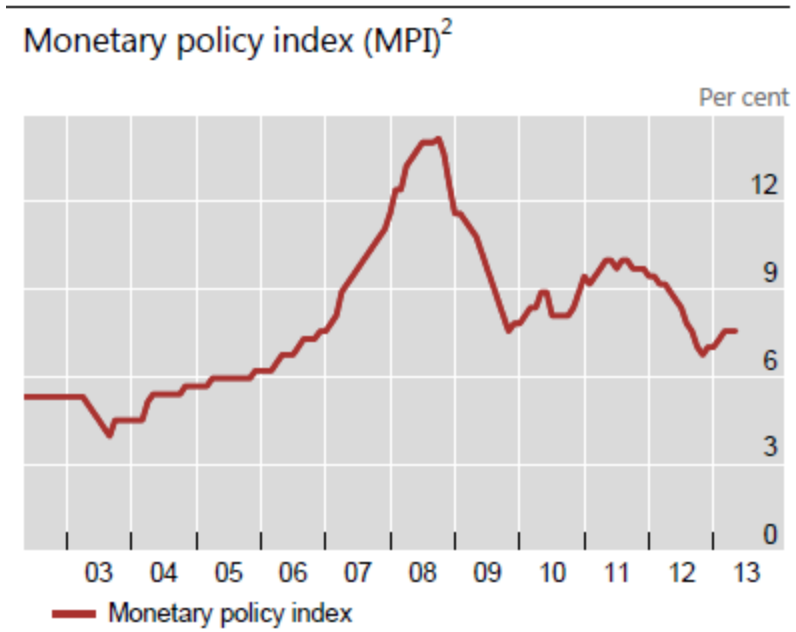
- # Factors restricted to 2: real and financial
  - Implications? There may be more factors but adding them requires both an economic explanation + a cost in terms of loss of degrees of freedom in estimation
  - There are subtle differences to the estimated factor scores when MP are excluded
    - Real factor fall in the GFC is larger when MP is excluded
    - Financial factor is tighter when MP is excluded
  - What about the MP for CHINA as a 'factor'? Not too dissimilar from the one proposed by Girardin et.al.(2013)

Figure 3a Real and Financial Factors, China



Comparison





Inflation and China's monetary policy reaction function: 2002–2013

Eric Girardin, Sandrine Lunven and Guonan Ma[1]

Figure 3b Monetary Policy Factor, China

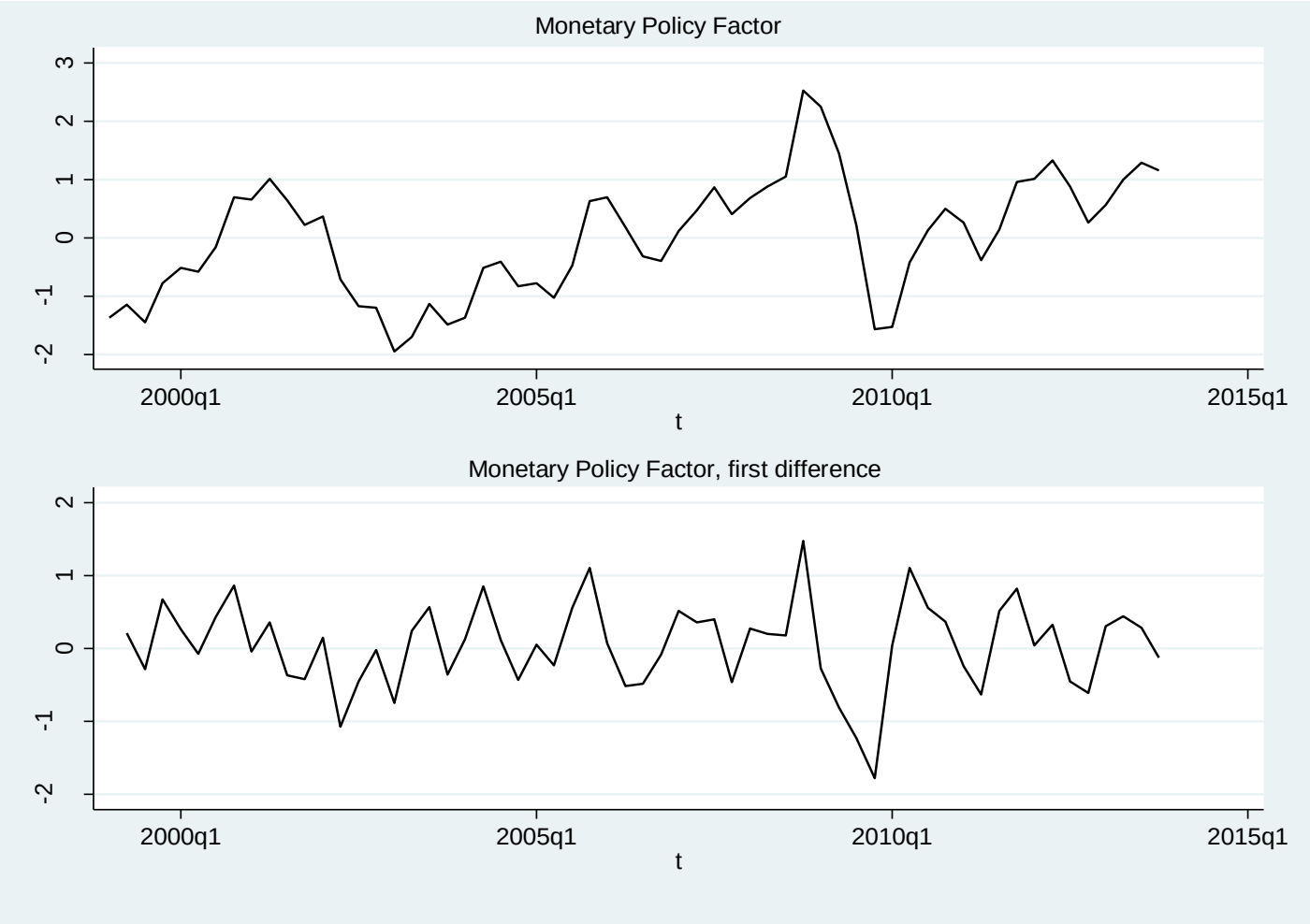


Figure 4 Real and Financial Factors of China: Observed and Counterfactual

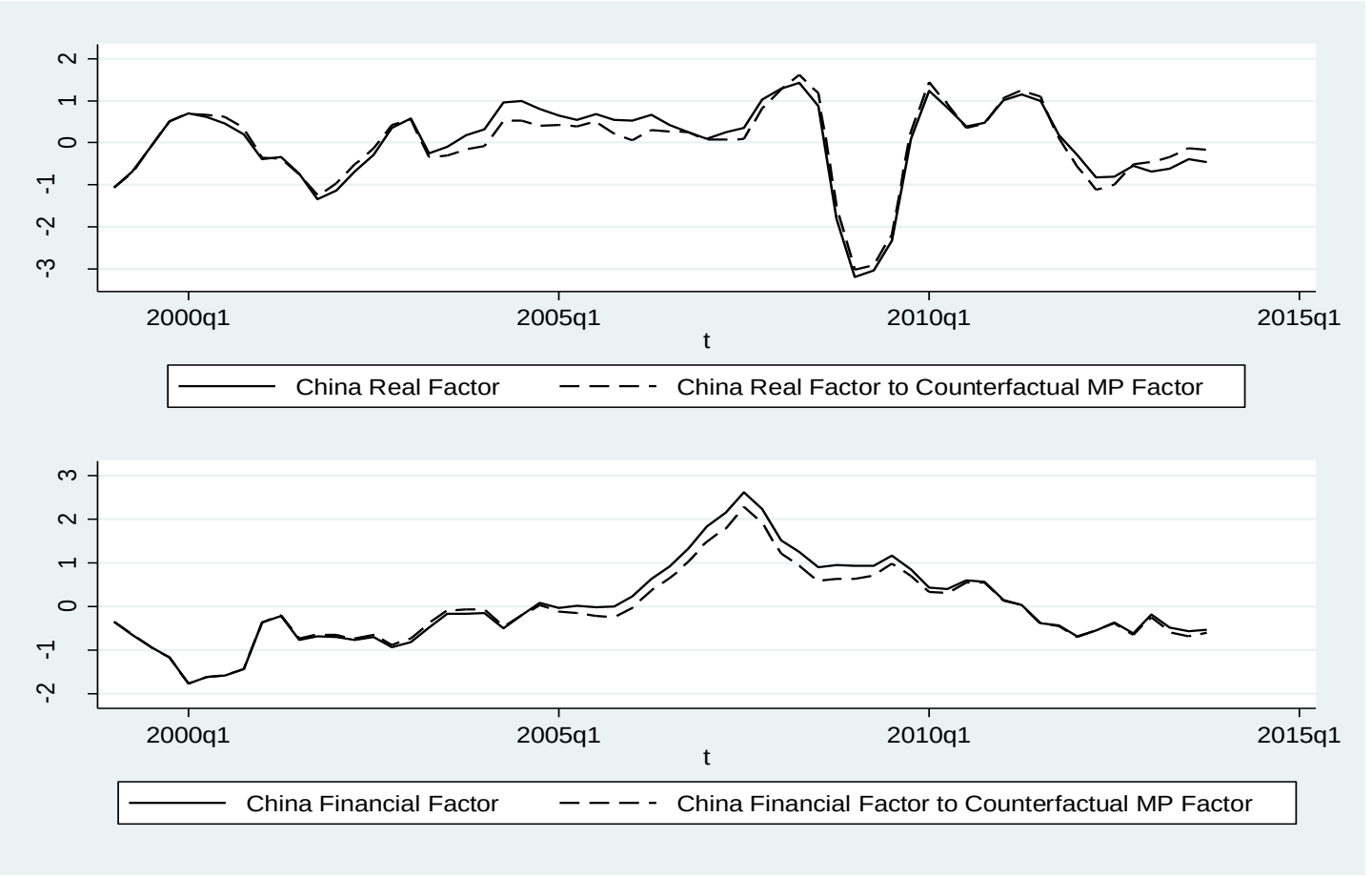


Table 1 Spillovers from the U.S. to China, Selected Estimates from FAVAR

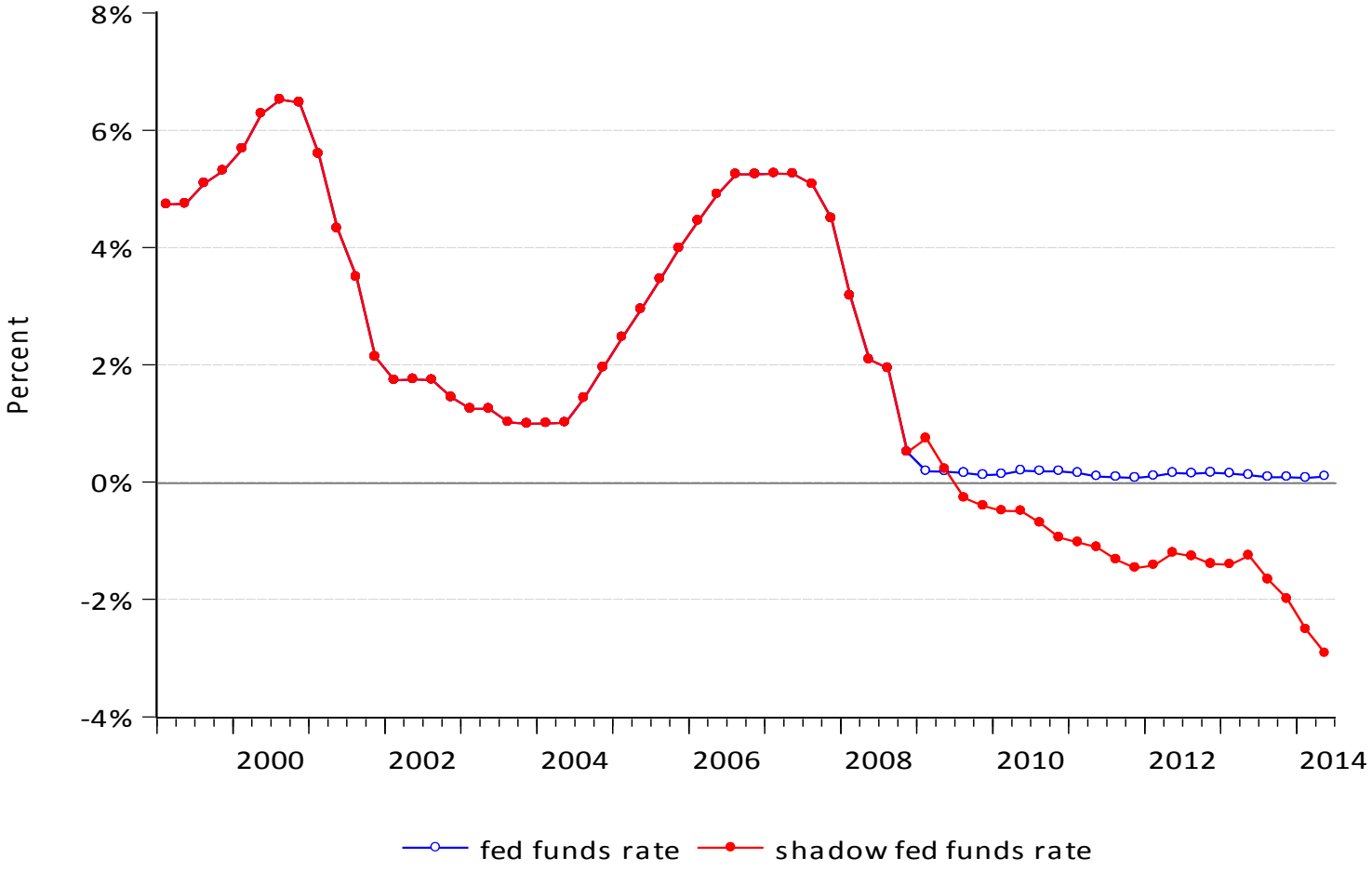
	Real GDP growth	Inflation	Real Exchange Rate
Real USA Factor (-1)	**0.95**	**0.48**	-0.72
	(0.25)	**(0.15)**	(0.54)
	[3.76109]	**[3.26595]**	[-1.31469]
Financial USA factor(-1)	0.34	0.11	**1.67**
	(0.34)	(0.20)	**(0.74)**
	[0.97931]	[0.55187]	**[2.27009]**

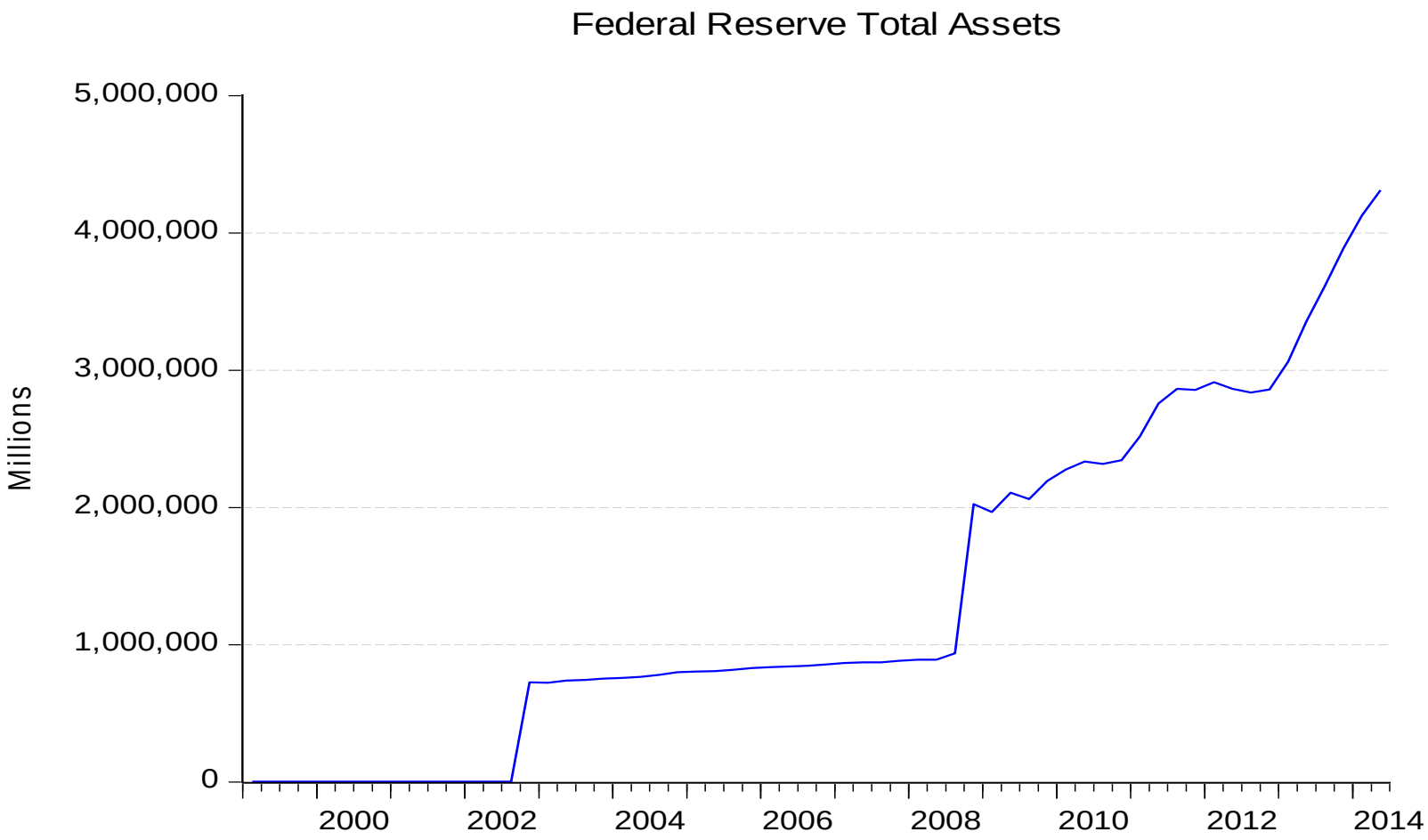
Table 2 Spillovers from U.S. Real and Financial Factors to China

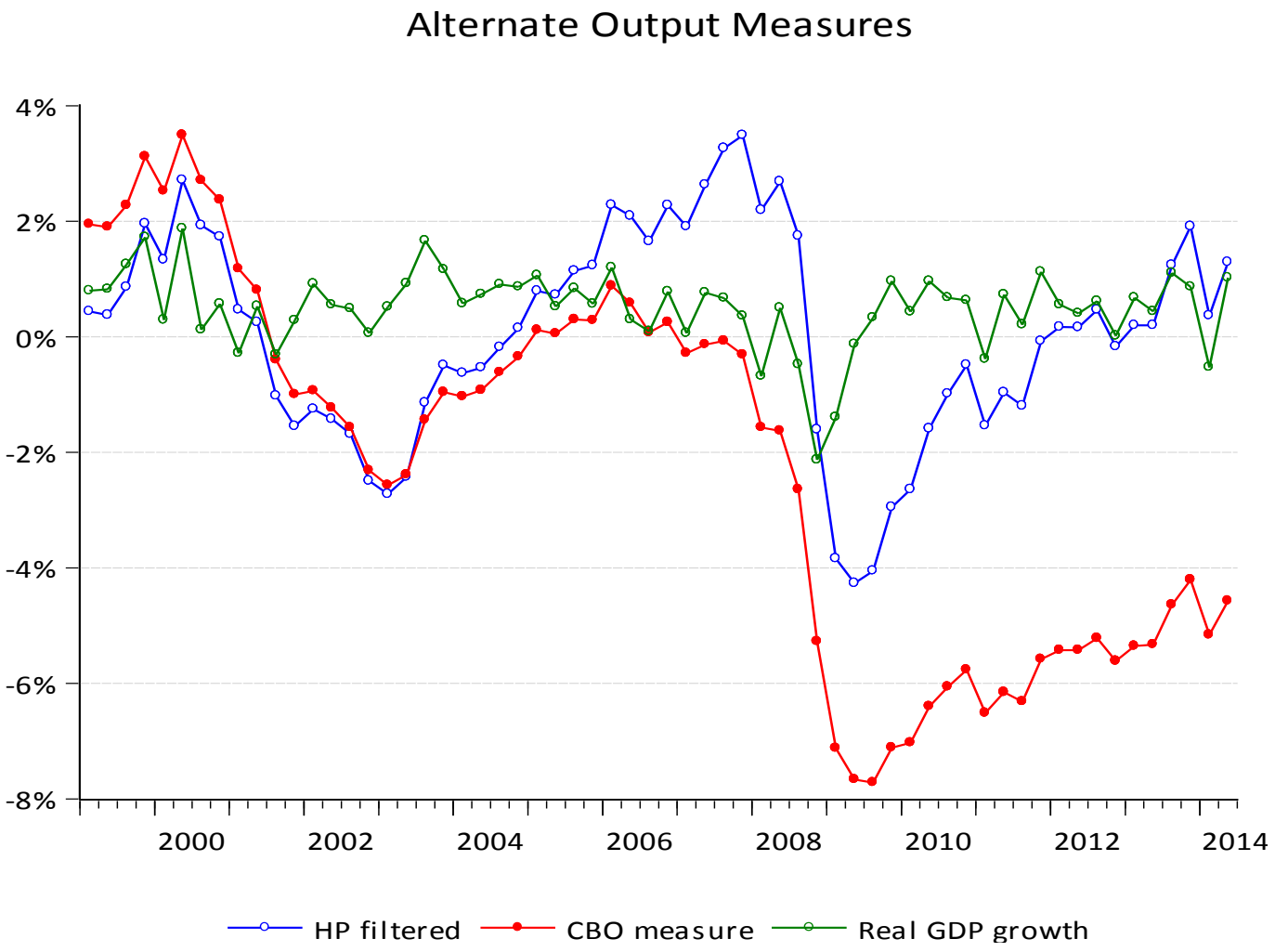
	Real Factor CHINA	Financial Factor CHINA
Real USA Factor (-1)	**0.15**	-0.06
	(0.09)	(0.13)
	[1.68170]	[-0.48105]
Real USA Factor (-2)	-0.11	0.03
	(0.09)	(0.13)
	[-1.22262]	[0.23146]
Financial USA Factor (-1)	**-0.16**	**-0.16**
	(0.06)	**(0.08)**
	[-2.58980]	**[-1.90981]**
Financial USA Factor (-2)	-0.02	-0.12
	(0.07)	(0.10)
	[-0.25785]	[-1.17070]

Supplementary Analysis

- CHN VAR
  - Try alternative definitions of output? (gap/break-adjusted)
  - Try alternative definitions of inflation (GDPD, Retail prices)?
  - Try to combine different interest rates?
  - Add inflation forecasts as demand variable
- US VAR
  - Try output gap(s): CBO vs HP vs break-adjusted
  - Try shadow FFR
  - Add total assets of the FED?
  - Add inflation forecast as demand variable


8%
6%
4%
2%
0%
-2%
-4%
Percent
2000
2002
2004
2006
2008
2010
2012
2014
fed funds rate
shadow fed funds rate


Federal Reserve Total Assets
Millions
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
2000
2002
2004
2006
2008
2010
2012
2014


Alternate Output Measures
4%
2%
0%
-2%
-4%
-6%
-8%
2000
2002
2004
2006
2008
2010
2012
2014
HP filtered
CBO measure
Real GDP growth