
Chinese Monetary Policy and the Dollar Peg

CESIFO VENICE SUMMER INSTITUTE

WORKSHOP ON THE ROLE OF CHINA IN THE GLOBAL ECONOMY

23 JULY 2010

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Outline

- Introduction.
- Overview of the Chinese monetary system and previous research.
- Econometric strategy and data.
- Econometric results.
- Discussion and conclusions.

Introduction

- Chinas dollar-peg stirs heated discussion:
 - Currency manipulation.
 - Beggar-thy-neighbour policies.
- Reformers argue Dollar peg:
 - Has negative effects on Chinas trading partners
 - Constrains Chinese monetary policy (e.g. Goldstein and Lardy, 2009).

Introduction

- Theoretical implications of fixed exchange rate peg on monetary policy (MP) clear.
- “Impossible trinity”: Country unable to simultaneously maintain:
 1. Open capital account,
 2. Fixed exchange rate,
 3. Independent monetary policy.
- China: Fixed exchange rate and capital controls:
 - Should enable monetary policy independence.

Introduction

- But validity of impossible trinity contested.
- Isolation property of floating exchange rates questioned.
 - Empirical evidence mixed (e.g., Obstfeld et al., 2005).
- Difficult practically to maintain effective capital controls:
 - Can be circumvented, are ineffective in achieving higher degree of monetary policy independence (e.g., Edwards, 1999).

Introduction

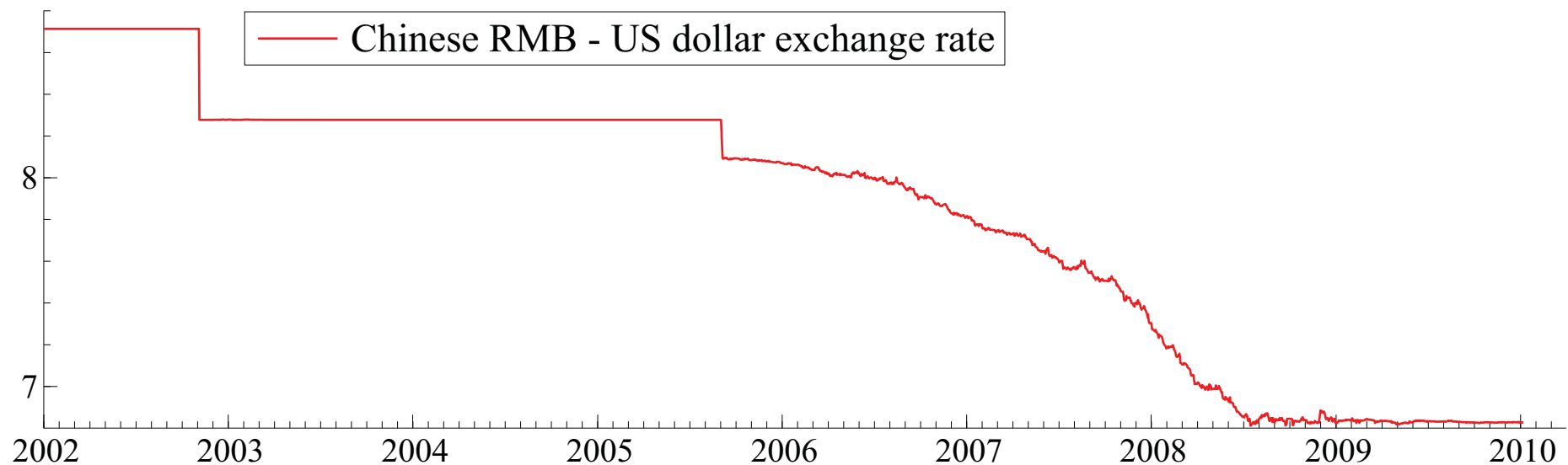
- This paper asks:
 1. How much monetary policy independence does Peoples Bank of China (PBC) enjoy?
 2. How effective has PBCs use of interest rate and other monetary instruments been for monetary policy?

Overview of the Chinese monetary system and previous research

- PBC monetary policy objective:
 - “Maintain stability of value of currency and thereby promote economic growth”
- PBC: Monetary policy instruments applied by PBC include:
 - Reserve requirement ratio,
 - Central bank base interest rate,
 - Rediscounting,
 - Central bank lending,
 - Open market operations,
 - Other policy instruments specified by the State Council.

Overview of the Chinese monetary system and previous research

- In practice China's monetary policy characterised by:
 - Fixed exchange rate,
 - Strict capital controls,
 - Selection of administrative and quantitative policy tools.



Overview of the Chinese monetary system and previous research

- Absence of major role for interest rates c.f. advanced economies (Koivu, 2009).
- Yi (2008): PBC interest-rate-system reform strengthened interest-rate role in monetary policy.
- Credit ceilings abolished 1998:
 - But transmission still relies on direct measures not prices (e.g. interest rates) (Nagai and Wang, 2007).

Overview of the Chinese monetary system and previous research

- Ma and McCauley (2007): Effectiveness of capital controls:
 - Conclude capital controls remain substantially binding.
 - Not watertight but allow China short-term monetary policy independence.
- Cheung et al. (2007): Link between US and Chinese interest rates.
 - Imperfect interest rate pass-thru: Weak effect of US interest rate on China.

Overview of the Chinese monetary system and previous research

- Koivu (2009): Forex capital inflows complicate conduct of domestic monetary policy.
- Glick and Hutchison (2009): Current account surpluses, large capital inflows:
 - Hence fixed exchange rate constrains monetary policy independence.
- Prasad (2008): Monetary policy limited by exchange rate regime:
 - Disuse of interest rates implies money growth controlled by blunter non-market instruments.

Econometric Strategy and Data

- Three aspects:
 1. Monetary policy independence?
 2. Monetary conditions?
 3. Monetary tools?
- Methodology: Cointegrated VAR approach (Johansen, 1996).
 - Seek stationary linear combinations of non-stationary data.
 - Can model endogeneity between variables.
 - Can test (weak) exogeneity of variables.
 - Intuitive bridge from macroeconomics to econometrics.
- But Chinese data very tough to model!
 - Still 'on a journey': Comments greatly valued.

Econometric Strategy and Data

- Vector autoregression:

$$X_t = \Pi_0 + \Pi_1 X_{t-1} + \cdots + \Pi_K X_{t-K} + \varepsilon_t, \quad \varepsilon_t \sim N(0, \sigma^2). \quad (1)$$

- Equilibrium-correction form:

$$\Delta X_t = \Pi X_{t-1} + \Gamma_1 \Delta X_{t-1} + \cdots + \Gamma_{K-1} \Delta X_{t-K+1} + \varepsilon_t. \quad (2)$$

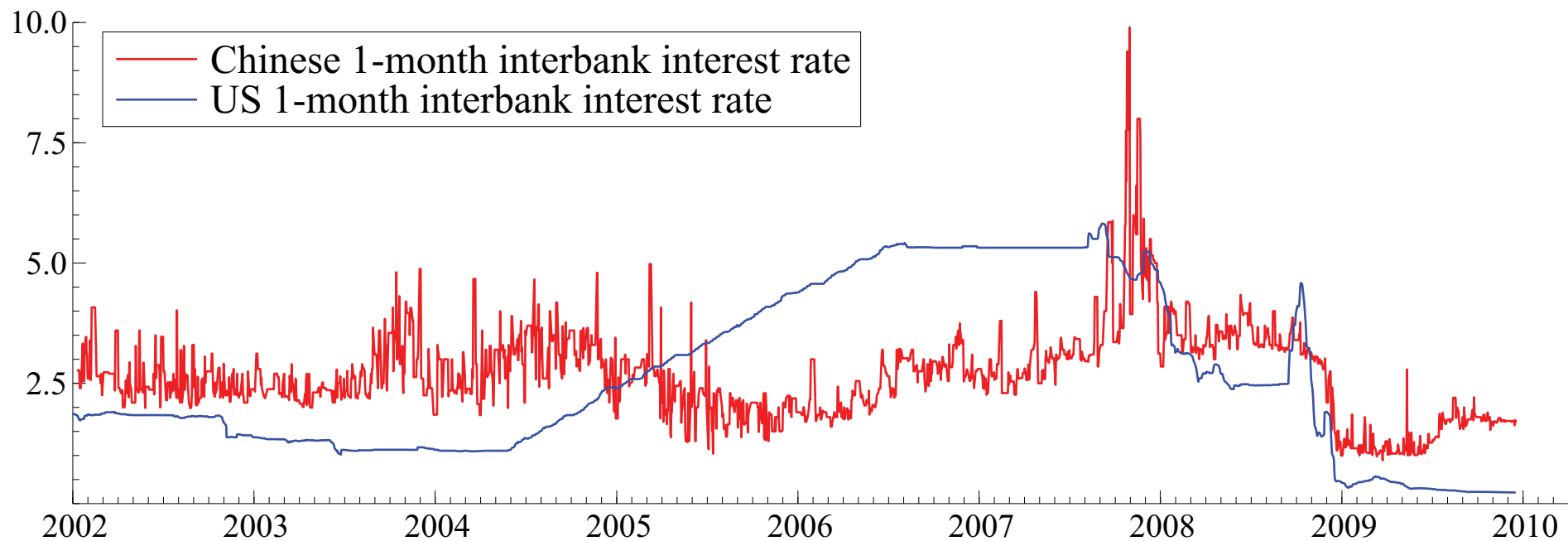
- Cointegration implies $p \times r$ matrices α and β such that $\Pi = \alpha\beta'$:

$$\Delta X_t = \alpha\beta' X_{t-1} + \Gamma_1 \Delta X_{t-1} + \cdots + \Gamma_{K-1} \Delta X_{t-K+1} + \varepsilon_t. \quad (3)$$

- $\beta' X_{t-1}$: stationary combinations of non-stationary variables.
- α : response to disequilibrium, % corrected each period.

Econometric Strategy and Data: Strategy I

- Does China exhibit independence in its monetary policy arrangements?
- Follow Cheung *et al* (2007) to investigate US-China monetary relations:
 - Does China have room to manoeuvre, monetarily-speaking?



Econometric Strategy and Data: Strategy I

- Fixed/managed exchange rate policy implies interest parity conditions may hold:

$$r_t = r_t^*, \quad (4)$$

- r_t Chinese interest rate, r_t^* US interest rate.
- Daily interbank data: Sample January 25 2001–December 17 2009 ($T = 2072$).
 - Lag length 12 employed on autocorrelation grounds.
- Trace test implies rank of one: Single steady-state relationship.
 - Expect interest rate relationship. Can test Chinese independence.

Econometric Strategy and Data: Strategy I

- Model:¹

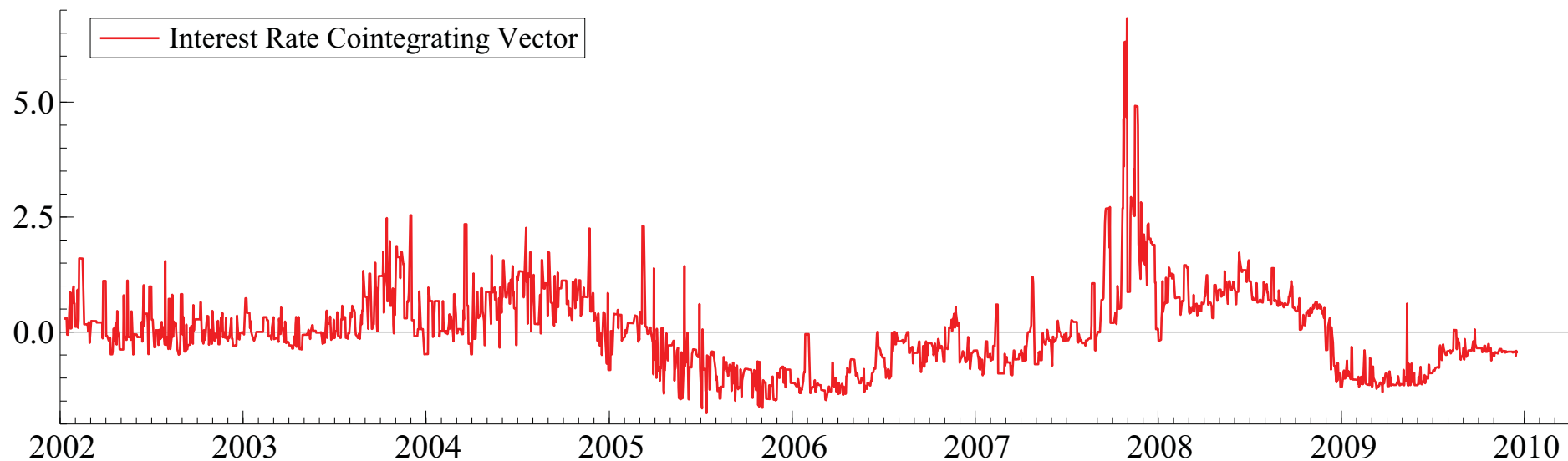
$$\begin{pmatrix} \Delta r_t \\ \Delta r_t^* \end{pmatrix} = \underbrace{\begin{pmatrix} -0.047 \\ (0.01) \\ 0 \end{pmatrix}}_{\text{Adjustment coefficients}} \underbrace{\begin{pmatrix} r_t - 0.207r_t^* - 2.098 \\ (0.108) \quad (0.345) \end{pmatrix}}_{\text{Cointegrating vector}} + \begin{pmatrix} \widehat{\varepsilon}_{1,t} \\ \widehat{\varepsilon}_{2,t} \end{pmatrix}. \quad (5)$$

- Cointegrating vectors akin to steady-state relationship:
 - Parity restriction rejected but relationship between r_t, r_t^* exists.
- Can restrict US adjustment (α) coefficient to zero (p-value 64%).
 - US exhibits independence but China's adjustment has t-stat of 4.7.
 - China adjustment implies half-life of just 15 days.

¹Standard errors in parentheses.

Econometric Strategy and Data: Strategy I

- But cointegration weak (eigenvalues not large).
- Additionally, large periods of deviation from equilibrium:
 - Should not be possible in fixed exchange rate system...
 - Potentially capital controls complicate picture...



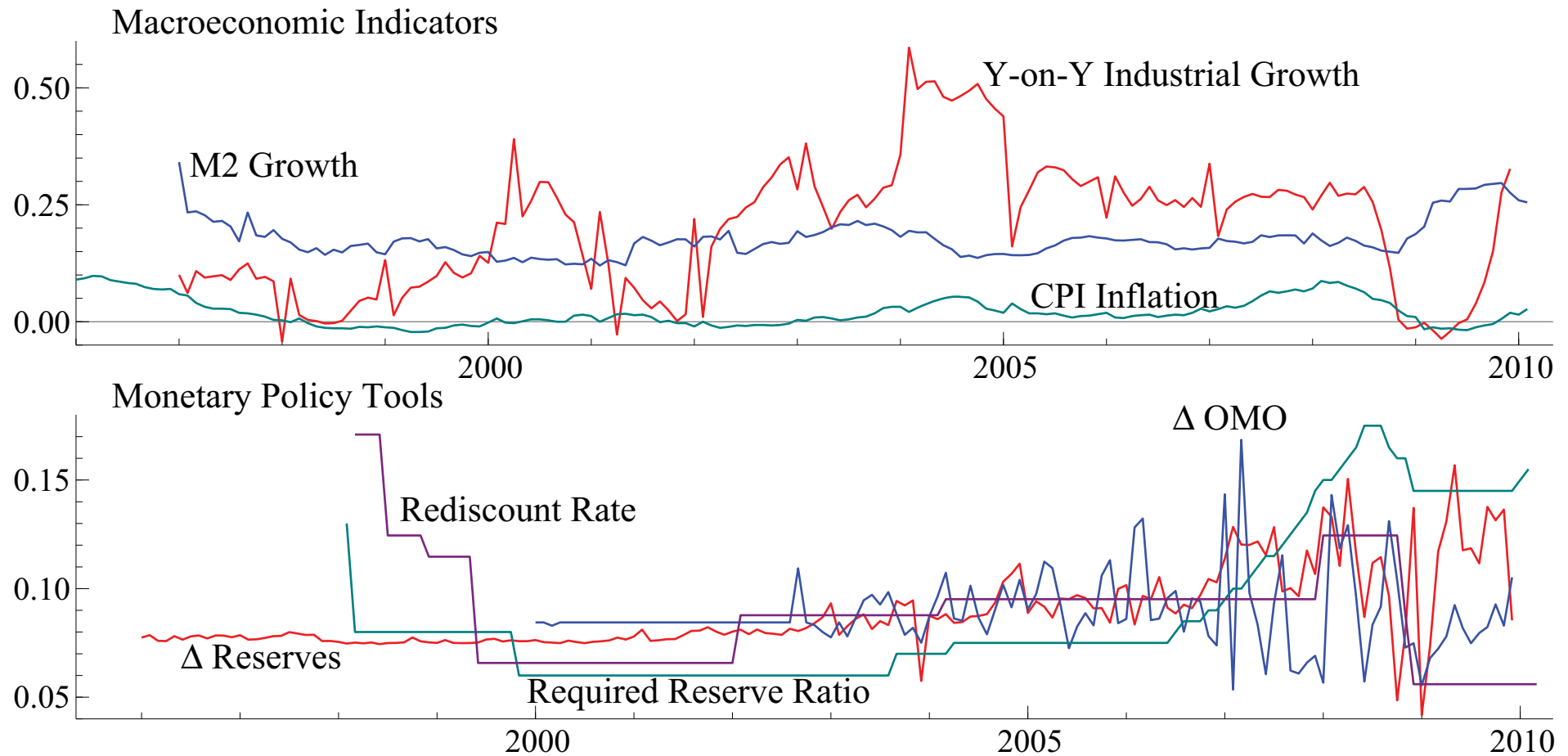
Econometric Strategy and Data: Strategy II

- Aim: Understand the monetary framework in China.
- In particular: Money demand and supply.
- Theory: Without stable money demand, monetary policy difficult.
- Demand: $(m - p)_t^d = f((y - p)_t, R_t)$.
 - Demand depends on interest rates (own and outside) and output/income.
- Supply: $(m - p)_t^s = f(R_t, RRR_t, OMO_t)$.
 - I.e. supply dependent on monetary policy tools.
 - Output $((y - p)_t)$ also?
- Ideal world: Steady state relationships for demand and supply:
 - Cointegrated VAR with rank two (minimum) excellent candidate model.

Econometric Strategy and Data: Data

- Data pose a huge stumbling block. . .
- Tools:
 - Rediscount rate: Available 1998:3 onwards.
 - Required reserve ratio: Available 1998:2 onwards.
 - * But since 25/09/2008 different requirements for different size banks.
 - Open market operations (OMOs): Measurement?
 - * Have used bonds issued by the PBC.
 - * But PBC buys and sells bills for OMOs. Some balance measure?
- Aggregates:
 - Money supply: M2 used as broader measure of money.

Econometric Strategy and Data: Data



Econometric Strategy and Data: Strategy II

- Variables: RRR_t , r_t , ΔOMO_t , $\Delta_g y_t$, Δm_t , π_t , $\Delta rest_t$.
- Unrestricted VAR(2) model suggested rank of three.
- Money supply:

$$\Delta m_t = -\underset{(3.088)}{8.272} RRR_t + \underset{(12.976)}{25.421} r_t - \underset{(0.079)}{0.685} OMO_t + \underset{(0.007)}{0.026} \Delta rest_t - \underset{(0.367)}{0.026}. \quad (6)$$

- Supply increasing in rediscount rate and reserves, decreasing in RRR_t , OMO_t .
- Adjustments (not reported):
 - * RRR_t and OMO_t adjust and correct, r_t adjusts in wrong direction.
- Implication: Interest tool not used effectively?

Econometric Strategy and Data: Strategy II

- Money demand:

$$\Delta m_t = -\underset{(4.917)}{1.227}r_t - \underset{(0.397)}{0.305}\Delta_g y_t + \underset{(2.432)}{1.093}\pi_t + \underset{(0.003)}{0.022}\Delta res_t + \underset{(0.154)}{0.164}. \quad (7)$$

- Less econometrically pleasing: Wrong signs, insignificance.
- Interest rate coefficient appears to suggest demand function.
- Policies tools appear to adjust nonetheless.

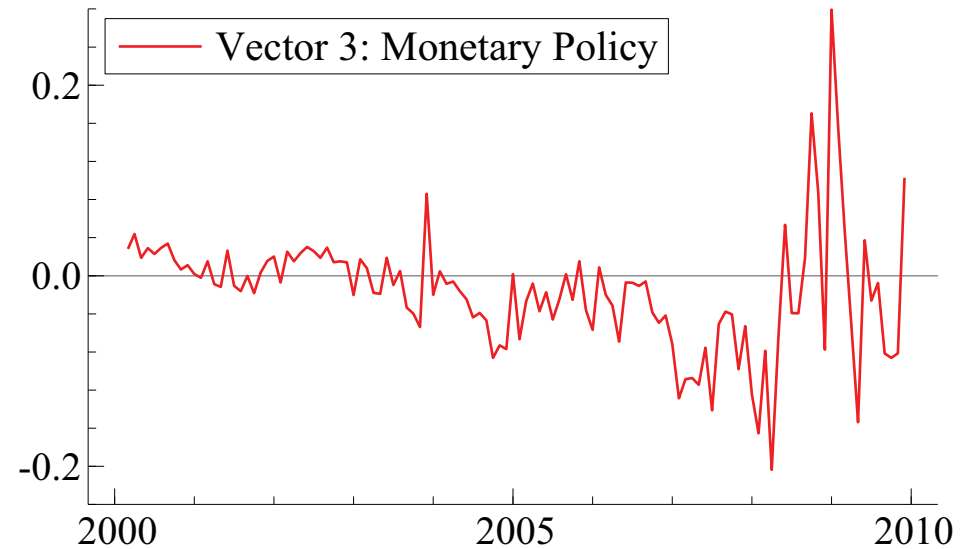
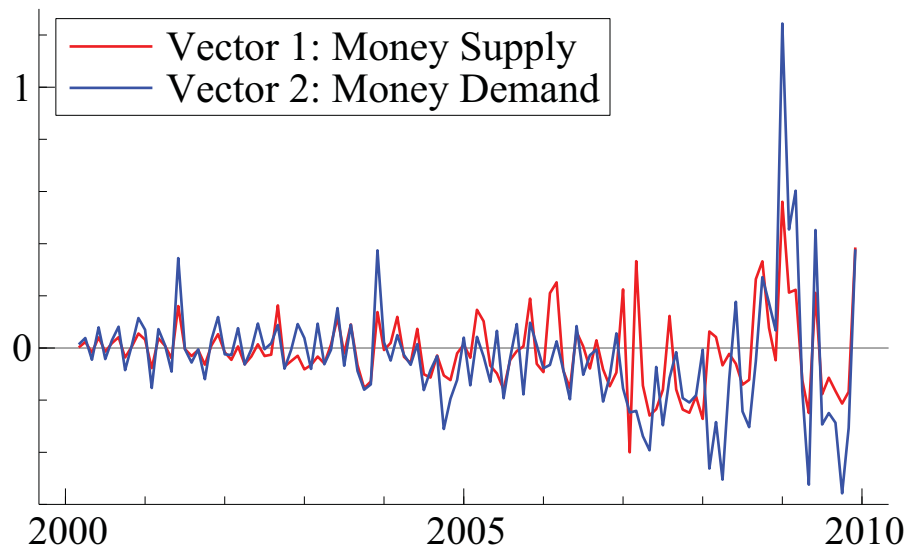
- Third vector: A policy rule?

$$RRR_t = -\underset{(0.058)}{0.104}\Delta_g y_t - \underset{(0.010)}{0.055}\Delta m_t + \underset{(0.342)}{1.162}\pi_t + \underset{(0.000)}{0.004}\Delta res_t + \underset{(0.017)}{0.061}. \quad (8)$$

- RRR_t candidate policy rule: Responds to inflation in 'right' way.
- But responds to output pro-cyclically.

Econometric Strategy and Data: Strategy II

- Cointegrating vectors can be plotted to investigate equilibria.
- Non-zero values are disequilibrium values.
- Hence can assess periods of excess demand and supply in monetary sphere.



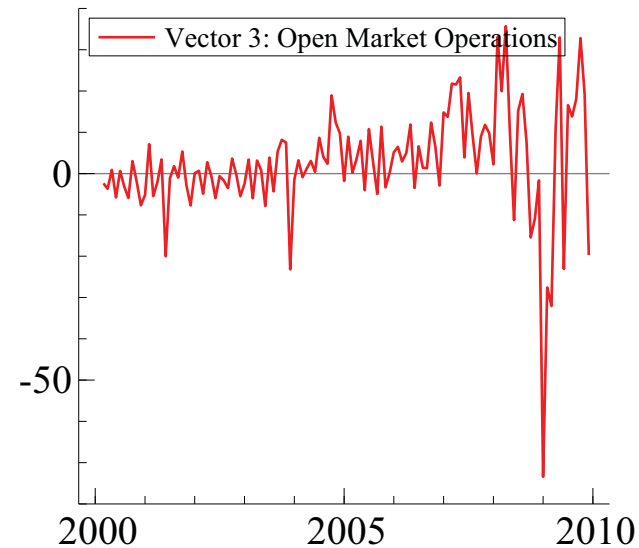
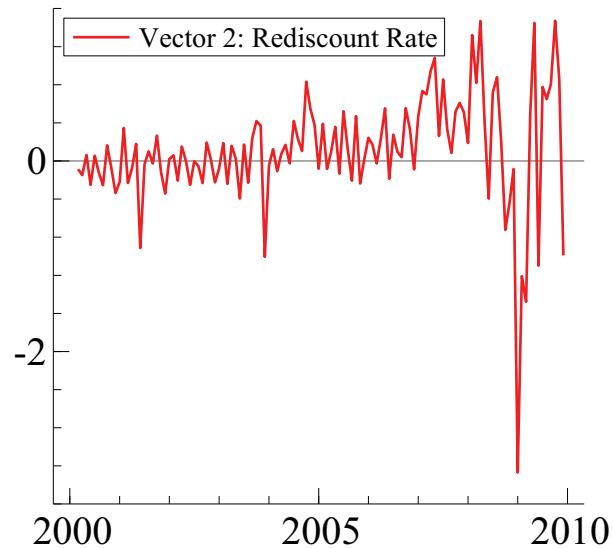
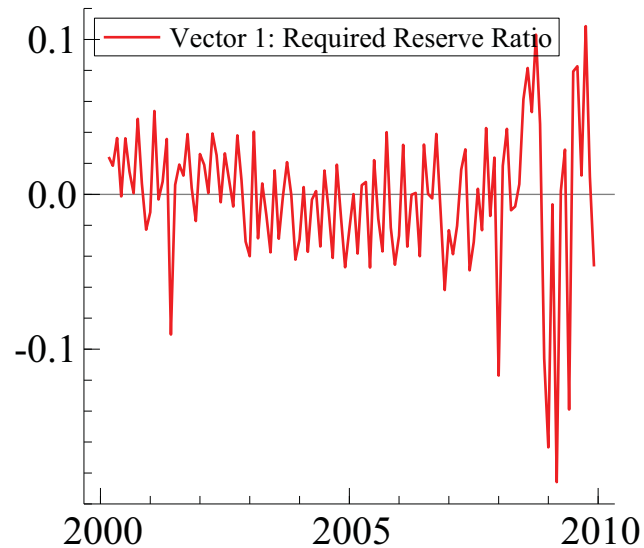
Econometric Strategy and Data: Strategy III

- Alternative approach: Each steady state relationship describes policy tool.
 - Well established principle: Johansen and Juselius (2003), Nielsen (2009).
- Taylor rule seems unlikely but rank three implies rule for each tool.
- Model:

$$\begin{pmatrix} \Delta RRR_t \\ \Delta r_t \\ \Delta^2 OMO_t \\ \Delta \Delta_g y_t \\ \Delta^2 m_t \\ \Delta \pi_t \\ \Delta^2 res_t \end{pmatrix} = \begin{pmatrix} -0.036 & 0.002 & 0 \\ (0.008) & (0.001) & \\ -0.020 & 0.012 & -0.0005 \\ (0.006) & (0.004) & (0.0001) \\ -14.71 & 22.354 & -0.979 \\ (4.381) & (2.854) & (0.122) \\ 0 & 0 & 0 \\ 5.976 & 0 & 0 \\ (0.906) & & \\ 0 & 0 & 0 \\ 143.3 & -21.835 & 0 \\ (41.45) & (2.935) & \end{pmatrix} \begin{pmatrix} RRR_t - 0.131\Delta m_t - 0.768\pi_t - 0.024 \\ (0.010) & (0.125) & (0.005) \\ r_t - 1.153\Delta m_t + 0.029\Delta res_t \\ (0.157) & (0.003) \\ OMO_t - 24.36\Delta m_t + 0.642\Delta res_t \\ (3.628) & (0.074) \end{pmatrix}$$

Econometric Strategy and Data: Strategy III

- All policy tools respond to change in money supply:
 - All appear to correct for monetary growth by tightening policy.
- RRR_t plays counter-inflationary role.
- RRR_t vector also most constant policy rule recursively.



Concluding Empirically: Open Questions. . .

- How best to model monetary policy and the 'money market' in China?
 - Many questions need many China experts!
- Questions (non-exhaustive):
 - What variables?
 - What transformations (if any)?
 - What identification strategies?
 - * Policy tools or money demand/supply or both?

Conclusions

- Preliminary investigation of Chinese monetary policy.
- Results suggest answers to two questions:
 1. Chinese monetary policy independence:
 - Some dependence of Chinese interest rate movements on US rates, but relationship not strong
 - Implies China has been able to isolate its monetary policy from US policy
 2. PBC monetary policy:
 - Interest rate tool not effectively used
 - Monetary policy has relied on open market operations for sterilisation and changes in reserve ratio requirements to affect monetary growth

Conclusions

- Through the maintenance of capital controls and the reliance on monetary instruments other than the interest rate China has been able to exert relatively autonomous monetary policy.
- We nonetheless believe that the PBC's current monetary policy mix is suboptimal, since the interest rate is not effectively made use of, which arguably is a direct consequence of the constraints resulting from the exchange rate peg