Identifying China's Monetary Policy Shocks[1]

Kaiji Chen[a]   Patrick Higgins[b]   Daniel F. Waggoner[c]   Tao Zha[d]

[a]Emory University
[b] [c]Federal Reserve Bank of Atlanta
[d]Federal Reserve Bank of Atlanta, Emory University, and NBER

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How to think about China's trend and cycle?

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- President Xi: [We] must turn factor-driven, **investment-driven** dynamics to an innovation-driven dynamism. Source: *China's New Economic Norm*, 2015, People's Publishing Co., by Zhang Zhanbin.
- The 18th Communist Party National Committee:

  > *We should firmly maintain the strategic focus of boosting domestic demand, speed up the establishment of a long term mechanism for* **increasing consumer demand***, unleash the potential of* **individual consumption***, increase* **investment at a proper pace***.*

Key characterics about China's economic trend and cycle

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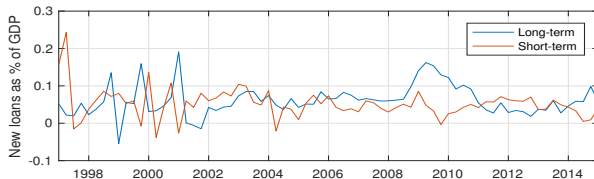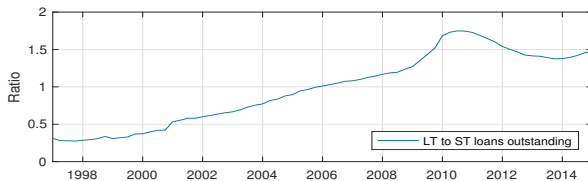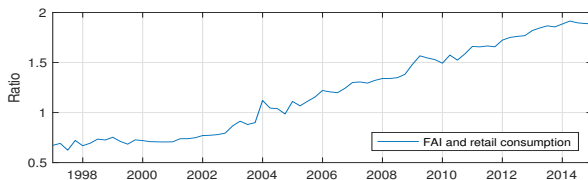- **Monetary/credit policy**: An increase in the ratio of long-term loans (for financing fixed investment) to short-term loans (for financing working capital)—to sustain an investment-driven economy.

Rising investment
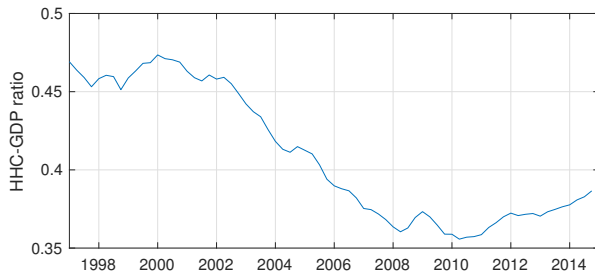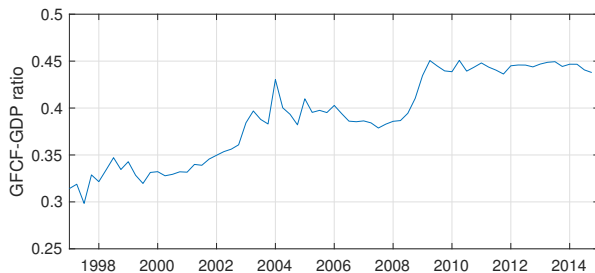
Supported by bank loans

How to think about China's trend and cycle?

- Policymakers' worry mainly focuses on the fact that China's growth has relied on two much of investment (investment-driven growth)
- **Supported by bank loans** but **at the sacrifice of consumption**.
- If China's growth has been driven mainly by continued productivity improvement (in other words, on a good path with the only question of how to improve efficiency further), such a worry expressed by policymakers is unwarranted.
- So should policymakers be concerned about China's economy?

Monetary policy controlling banking activities through M2
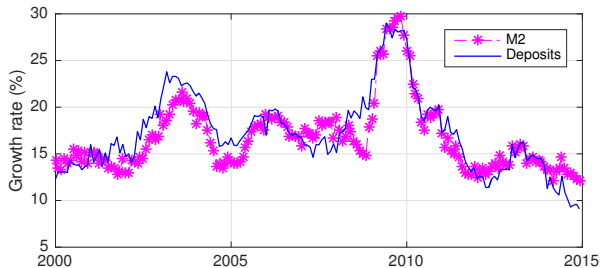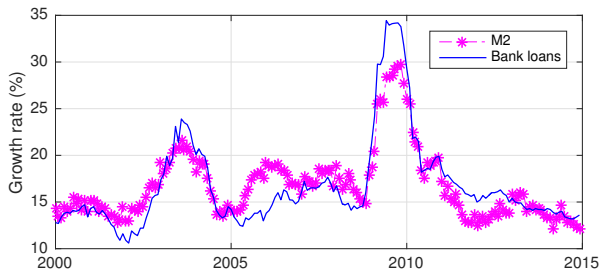
Policy questions

- More important are two related policy questions:
  - ▸ Does monetary policy play any role in China's trend and cycle?
  - ▸ Such a role, if found any, has been bad or good in the past?
- This paper intends to answer these two important questions.

Challenging task

- To answer these questions, one must identify
  - ▸ the monetary policy rule and
  - ▸ exogenous monetary policy shocks.
- Only with these shocks can one be able to assess the impact of monetary policy and its transmission mechanism, no matter what view we are holding.

Approach

- In a spirit of Romer and Romer (2004).
- Use China's specific institutional details to derive monetary policy shocks (free of endogenous and anticipated movements in the economy).
- Combine the derived policy shocks with the BVAR to assess the dynamic impact of China's monetary policy shocks and *its implications*.

China's monetary policy

- At the beginning of each year, China's National Development and Reform Commission (CNDRC) under the State Council (in its annual working report) specifies a target for overall growth rate of M2 for the whole year, to *be consistent* with the targeted GDP growth rate for that year.
- A quarterly meeting of monetary policy committee of the People's Bank of China (PBC) takes place at the beginning of each quarter to decide on a next-quarter policy orientation or move.

China's monetary policy

- The annual target of GDP growth rate *provides a floor* for the PBC to **support** by fine-tuning (planning) quarterly growth rates of M2 *for the current quarter* in response to
  - GDP growth in the previous quarter relative to the target specified by the State Council;
  - actual CPI inflation in the previous quarter.
- Quarterly growth rates of M2 are planned to be consistent with the overall M2 growth target set by the CNDRC.
- The planned quarterly growth rate of M2 is achieved via a set of monetary policy tools.
- Among other standard policy tools, for example, window guidances, expanding or contracting the issuance of central bank bills, loan quotas for commercial banks, quotas for the central bank's direct lending and discounted loans.

2007Q4 China Monetary Policy Report: Excerpts

- In 2007, given the excess liquidity in the banking system, huge pressures on money and credit expansion, and the rise in inflation, the monetary policy stance was gradually shifted from "**a prudent policy**" to "**a tight policy**."
- The PBC, according to the State Council's overall arrangement, made efforts to take comprehensive measures to maintain a balance at an aggregate level.
- The PBC, following the coordinated instructions of the Communist Party of China (CPC) Central Committee and the State Council, will make it a top priority to prevent the rapid growth from turning into **overheating** and to prevent the structural price rises from turning into **generalized inflation**.
- Efforts will be made to implement a tight monetary policy, restrain the rapid growth of money and credit, control the rhythm and degree of adjustment in a scientific manner ... by fine-tuning policies when appropriate.

2015Q1 China Monetary Policy Report: Excerpts

- Though new engines of growth were forming, **endogenous** drivers had not yet been strengthened and downward pressures remained high. Growth of prices moderated. In the first quarter, GDP growth was 7.0 percent year on year and the **Consumer Price Index** was up 1.2 percent year [to] year.

- In accordance with the decisions and overall arrangements of the CPC Central Committee and the State Council, the PBC has continued its [prudent] monetary policy.

China's monetary policy

- The quarterly growth rate of M2, $\Delta \log M_t$, consists of two parts:
  - the endogenous (systematic) component $s(\Omega_t)$ and
  - the exogenous component g_t.
- The policymaker's information set at time t is denoted by Ω_t.
- China's monetary policy is described as

$$\Delta \log M_t = s(\Omega_t) + g_t.$$

China's monetary policy

- We allow g_t to have a general AR process (i.e., AR(4) in our case):

$$g_t = \sum_{\ell=1}^{4} \alpha_{g,\ell} g_{t-\ell} + \varepsilon_{g,t}.$$

- The systematic component of monetary policy is described as

$$s(\Omega_t) = \gamma_0 + \gamma_1 \left(x_{t-1} - \bar{x}_{t-1} \right) + \\ \gamma_2 \mathscr{I} \left(x_{t-1} < \bar{x}_{t-1} \right) \left(x_{t-1} - \bar{x}_{t-1} \right) + \gamma_3 \pi_{t-1},$$

where x_{t-1} is the actual year-over-year GDP growth rate, $\bar{x}_{t-1}$ is the targeted GDP growth rate for the calendar year that may include both $t-1$ and t if t falls in one of the first three quarters within the year, $\mathscr{I}(\ )$ is an indicator function returning 1 if the statement in paratheses is true and 0 otherwise, and π_{t-1} is the actual quarterly CPI inflation rate at time $t-1$.

The estimated policy rule

- OLS vs GLS estimates:

Coefficient	OLS Estimate	OLS SE	GLS Estimate	GLS SE
γ_0	0.0287***	0.0027	0.0294***	0.0028
γ_1	0.3412***	0.0909	0.3094***	0.0937
γ_2	-3.2858***	0.7257	-2.8882***	0.6932
γ_3	0.4571***	0.1298	0.4934***	0.1334

- The estimated rule:

$$\Delta \log M_t = \underset{(0.0937)}{0.3094} \left(x_{t-1} - \bar{x}_{t-1} \right)$$

$$- \underset{(0.6932)}{2.8882} \mathscr{I} \left(x_{t-1} < \bar{x}_{t-1} \right) \left(x_{t-1} - \bar{x}_{t-1} \right)$$

$$+ \underset{(0.1334)}{0.4934} \pi_{t-1} + \underset{(0.0028)}{0.0294} + g_t.$$

Revealing correlations

- $\text{Corr}(\Delta \log M_t, s(\Omega_t)) = 0.74^{***}$ (p-value $= 0.000$).
- $\text{Corr}(\Delta \log M_t, g_t) = 0.37^{***}$ (p-value $= 0.000$).
- $\text{Corr}(s(\Omega_t), g_t) = 0.01$ (p-value $= 0.870$).

The PBC's narrative about policy regime shift

- The PBC uses narrative to classify 5 policy regimes: Loose, Moderately Loose, Prudent, Moderately Tight, and Tight.
- We streamline these regiems into 3 categories: Loosening, Prudent, and Tightening.
- The State Council announces a shift of policy regime, often with a lag.
- Announcement of a regime shift in policy stance largely reflects an exogenous change not captured by the usual policy response (the endogenous part of the rule) and thus can be viewed as largely orthogonal to current fluctuations in economic variables.
- We examine the consistency of our model-based policy shocks with policy regimes identified from the narrative.

Constructing monetary policy regimes

- Three regimes: Loosening, Prudent, Tightening
- Regimes consistent with quarterly monetary policy reports (MPRs) PBC:
  - MPR (2002Q1-Q3) describe monetary policy as "enhancing the support to economic growth"—**loosening**.
  - MPR (2004Q1) described the recent trend for monetary policy as "moderately tightening"—**tightening**.
  - MPR (2011Q1) described the priority of monetary policy as "stabilizing the price level"—**tightening** (anti-inflation).
  - MPR (2015Q1) described the goal of monetary policy as "taking the initiative to adapt to the new normal in the economy"—**prudent**.

Constructed policy regimes

Period	Regime
1998Q1-2001Q4	Prudent
2002Q1-2003Q4	Loosening
2004Q1:2008Q3	Tightening
2008Q4-2010Q4	Loosening
2011Q1-2014Q4	Tightening
2015Q1-present	Prudent

An estimated sequence of quarterly monetary policy shocks

Tightening regime: shaded gray area.

Loosening regime: shaded red area.

Monetary Policy Shock YOY
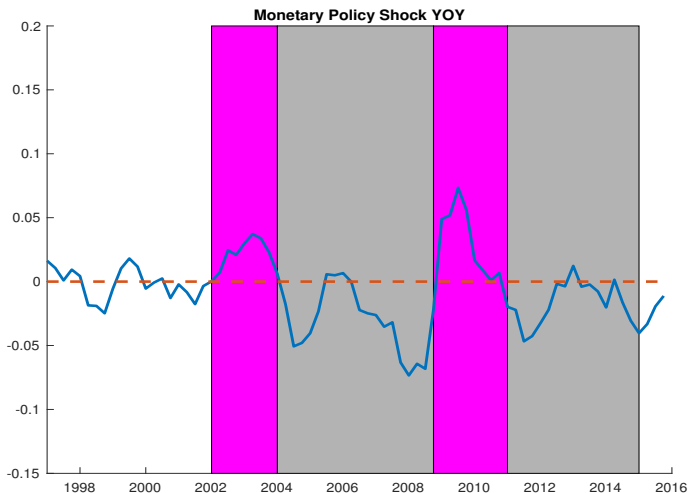
China's monetary policy

- To assess the effects of a monetary policy shock, we follow Romer and Romer (2004) and place the monetary policy rule in a linear VAR model with 4 lags.
- The quarterly variables in the VAR include
  - log real GDP (value added)
  - log CPI
  - log funds outstanding for foreign exchanges
  - excess reserve ratio
  - total reserve ratio
  - PBC one-year benchmark lending rate
  - PBC one-year benchmark deposit rate
  - Repo/Chibor rate
  - newly-originated long-term and medium-term bank loans (in percent of GDP)
  - newly-originated short-term bank loans
- We denote these variables by the vector y_t.

China's monetary policy

- Since GDP and CPI respond to other financial and policy variables in addition to monetary policy shocks, it is necessary to control for them when assessing the effects of g_t on GDP and CPI.

- We approximate $s(\Omega_t)$ by a linear function of $y_{t-1}, ..., y_{t-4}$ and an approximation error term. By construction, this approximation error is orthogonal to the monetary policy shock.

- The approximation error can be thought of informational advantage of the government (other than the PBC) for planning on GDP growth, which is *not shared* with the public.

- Indeed, $s(\Omega_t)$ and g_t have no statistical relationship (the correlation is statistically zero).

China's monetary policy

- We now postulate the dynamics of y_t as a system of simultaneous equations

$$\sum_{\ell=0}^{4} A_\ell y_t = c + \beta \log M_t + \eta_t,$$

where the vector of residuals, η_t, is orthogonal to the monetary policy shock.

- **Proposition** The effect of the monetary policy shock g_t on each variable of y_t is identified even if A_0 and β are unrestricted.
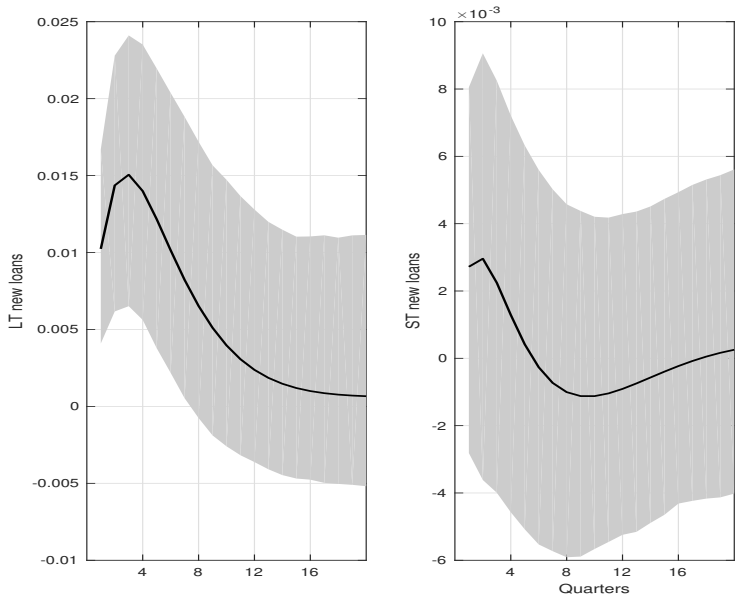
- The model is estimated from 1997Q1 to 2015Q4.

Estimated dynamic effects of a monetary policy shock
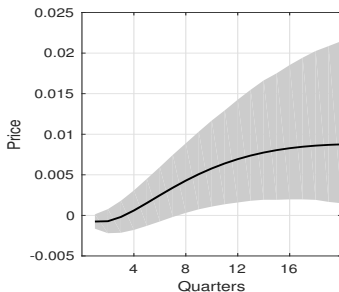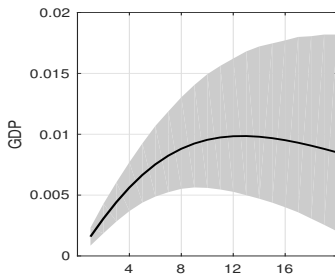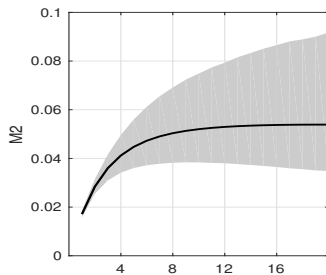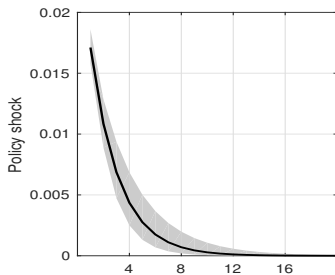
GDP variations contributed by policy shock (%)

Horizon	Impact	Year one	Year two	Year three	Year four	Year five
	6.97	29.28	46.25	52.62	54.04	52.82

Estimated dynamic effects of a monetary policy shock

# Benchmark vs. simple models: further testing of exogeneity
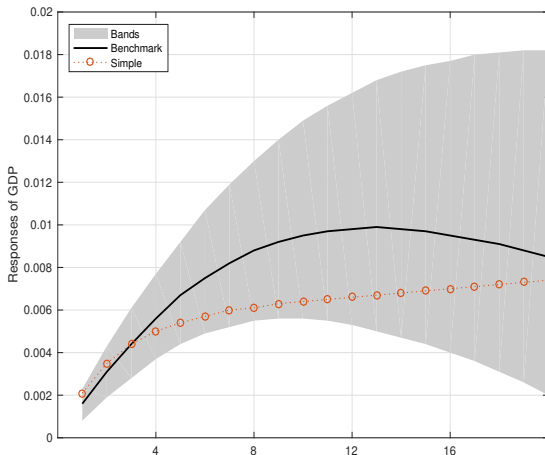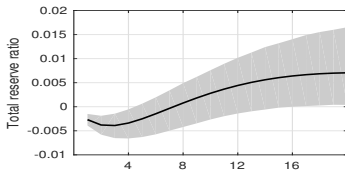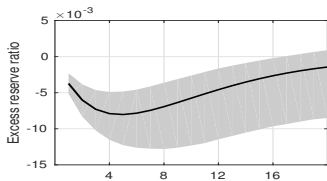

Figure: The simple model contains only the GDP and CPI variables. The similarity implies that our identified monetary policy shocks are exogenous without contamination of endogenous policy responses through interest rates, reserve requirements, or interventions in the foreign exchange market.
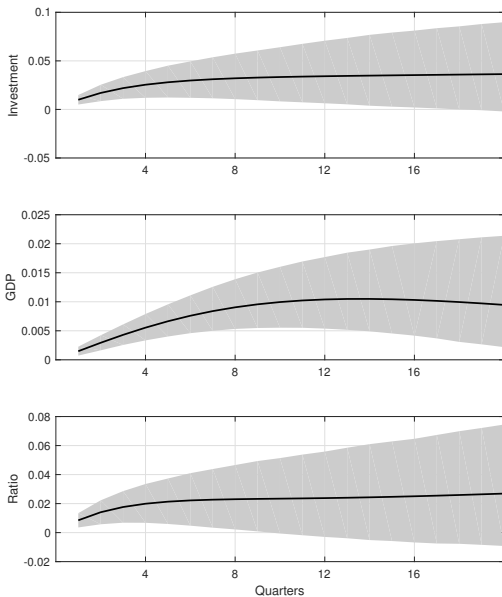
Dynamic effects of an expansionary monetary policy shock
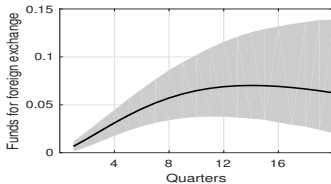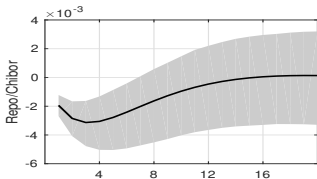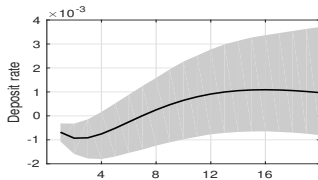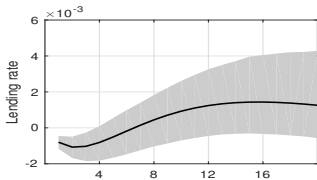
Dynamic effects of an expansionary monetary policy shock
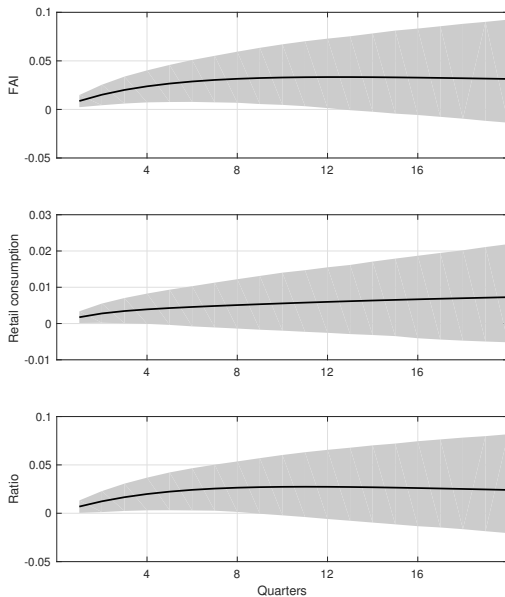
Dynamic effects of an expansionary monetary policy shock

Summary

- China's economic growth miracle is coupled with problems.
- Indeed, a recent economic slowdown has triggered a new round of monetary loosening.
- Assessing the quantitative effect of monetary policy is urgently needed.
- Using institutional details, we provide a new approach to separating the endogenous and exogenous components of monetary policy.

Summary

- Our measured monetary policy shocks are
  - exogenous free of policy's endogenous responses to the overall economy and
  - consistent with the PBC's policy reports and other narratives.
- We show
  - China's monetary policy has a considerably large effect on output.
  - This results in an increase of the investment-to-consumption ratio persistently.
  - The effect is transmitted through credit distortion or misallocation.