

THE ROLE OF MONEY IN FEDERAL RESERVE POLICY

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ROLE OF MONEY IN FED POLICY

- ▶ Agenda: understand the role of money in policy.
 - ★ Money effects fluctuations in the business cycle.
 - ★ Money may serve as indicator of future inflation, credit market dynamics.
- ▶ [Qureshi \(2016\)](#) attributes indeterminacy in the price level to M1 targeting in the 1970s and 1980s.
 - ★ Derive theoretical conditions for price indeterminacy.
 - ★ Data from FOMC (real time data) supports estimates of M1 targeting.
- ▶ What has been the subsequent role of money in Fed policy?

SOME BROADER ISSUES

- ▶ Taylor Rule: One of the most influential results in macroeconomics.
- ▶ Contributed significantly to the macroeconomic stability observed during the 1980s and 1990s.
- ▶ Orphanides (2004): rule not representative of the actual policy practised by the FOMC using meeting-level data.
- ▶ Unanswered theme that emerges from this:
 - ★ Inability of a systematic framework to explain Volcker-Greenspan policy.
 - ★ Concerns about the adoption of the Taylor rule in practise and as a policy yardstick. (**What is “good” policy?**)

MONEY GROWTH FRAMEWORK

- ▶ Money growth was an important indicator of FOMC policy.
 - ★ Formal evidence of M1 targeting (1970s) and abandonment (1980s). [Sims and Zha \(2006\)](#), [Burns \(1987\)](#), [Friedman \(1996\)](#), [Canova and Menz \(2011\)](#).
 - ★ My story: Instead of abandoning the money targeting framework, FOMC abandoned the M1 indicator, and adopted a broader aggregate M3.
 - ★ Not a change in objectives, but how you measure these objectives. (Think of GDP Price Deflator vs. CPI).

PAPER FRAMEWORK

1. Identify the right framework to analyze FOMC policy. This tells me what “good” policy means.
 - ★ Show that the Taylor rule cannot replicate real-time FOMC policy. [Orphanides' \(2004\)](#) result
 - ★ Show that policy with M3 targets can replicate FOMC policy
2. Study policy for the entire post 1980s sample.
3. Apply this framework to study the role of policy in the Great Moderation and Recession.
4. Super interesting extensions

THREE CONTRIBUTIONS

- ▶ **Framework:** The money growth framework enables me to outline a novel definition of what constitutes good policy, and an alternative benchmark to conduct and evaluate policy. A key policy implication of this result is that it re-evaluates the role of the Taylor rule as a policy-making benchmark.
- ▶ **Evidence:** Highlight the significant role played by money aggregate M3 in the policy discourse during the Volcker-Greenspan era using new FOMC data. Resolves conflicting conclusions of Orphanides and Taylor by presenting a rule that is robust for meeting level data.
- ▶ **Application:** Highlight an interconnected policy-based explanation of the Great Moderation and the Great Recession.

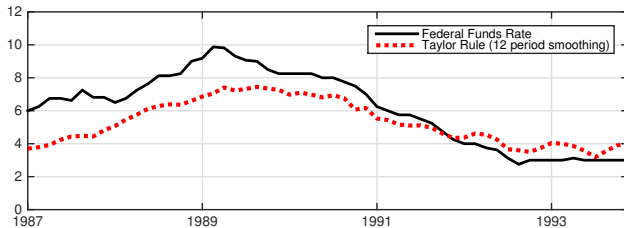
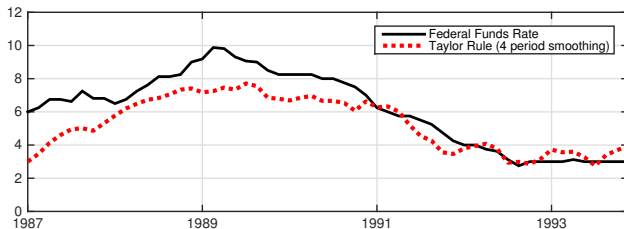
TESTING THE TAYLOR (1993) RULE

- ▶ Start with the baseline Taylor (1993) rule

$$r_t = \pi_t + \phi_y y_t + \phi_\pi (\pi_t - \pi_t^T) + r^* \quad (1)$$

- ▶ π_t^T, r^* : 2%
- ▶ ϕ_π and ϕ_y are set to 0.5
- ▶ Inflation 4 period (quarters) smoothed in Taylor's paper. That could mean both 4 monthly meetings, and 12 meetings. I plot for both.

TESTING THE TAYLOR (1993) RULE



MONEY GROWTH TARGETING

- ▶ M1 had been an objective of policy in the 1970s.
- ▶ Literature silent on role of M2 or M3.
- ▶ Transcripts suggest that the Fed continued to care about broader aggregates:

"In implementing policy, the Committee agreed that primary emphasis would continue to be placed on the broader aggregates. The behavior of M1 would be monitored, with any increase in the weight placed on that aggregate dependent on evidence that its velocity behavior was assuming a more predictable pattern."

(Record of policy actions, July 12-13, 1983, p. 5)

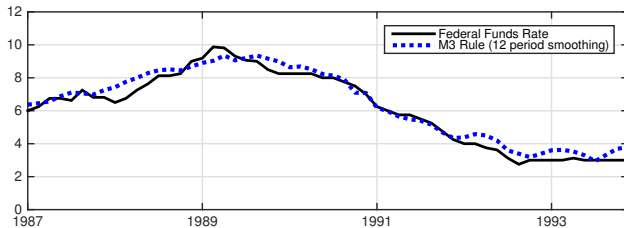
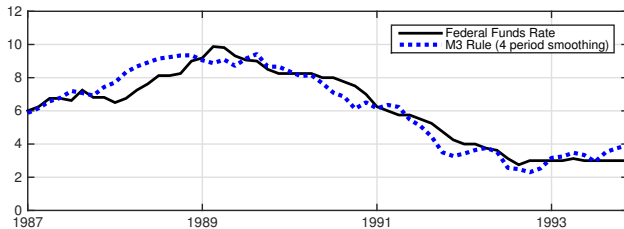
MONEY GROWTH TARGETING

- ▶ I include a money growth objective in the simple Taylor rule.

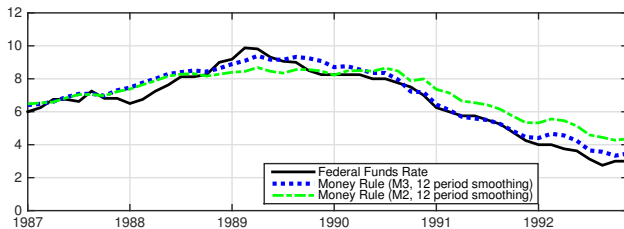
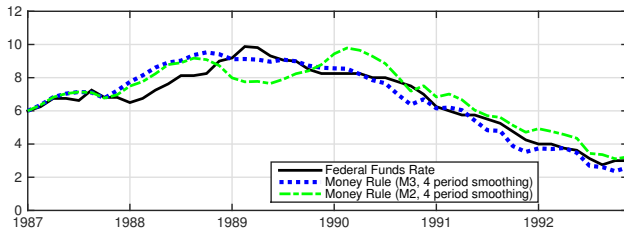
$$r_t = \pi_t + \phi_y y_t + \phi_\pi (\pi_t - \pi_t^T) + \phi_m (\Delta m_t - \Delta m_t^T) + r^* \quad (2)$$

- ▶ π_t^T , r^* , Δm_t^T : 2%
- ▶ ϕ_π , ϕ_y and ϕ_m are set to 0.5
- ▶ Inflation 4 period (quarters) smoothed in Taylor's paper. That could mean both 4 monthly meetings, and 12 meetings. I plot for both.
- ▶ Money supply smoothed like inflation.

MONEY GROWTH TARGETING



MONEY GROWTH TARGETING



POLICY RULE ESTIMATES, 1987:02 - 1992:12

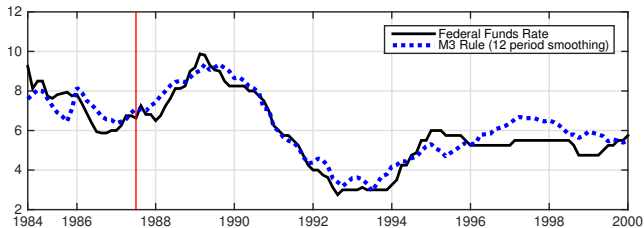
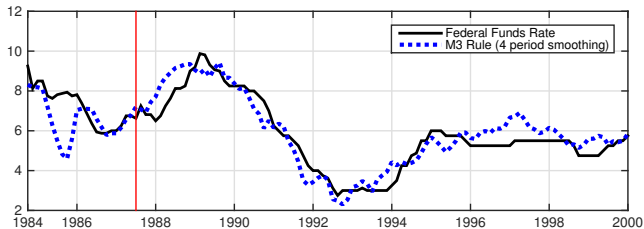
Table: Estimates of Policy Rules, 1987:02 - 1992:12

Param.	OLS		GMM	
	Taylor Rule	Money Growth	Taylor Rule	Money Growth
ϕ_{π}	0.6220** (0.2398)	1.9854*** (0.1512)	0.6181** (0.2250)	2.0596*** (0.1288)
ϕ_x	0.8985*** (0.0495)	0.4128*** (0.0384)	0.8955*** (0.0473)	0.3995*** (0.0424)
ϕ_m	— —	0.6073*** (0.0414)	— —	0.6203*** (0.0421)
c	5.7691*** (0.8712)	-2.529** (0.7187)	5.7808*** (0.8222)	-2.8574*** (0.6621)
R^2	0.8792	0.9669	—	—
RMSE	0.6952	0.3680	—	—
AIC	104.2261	44.07481	—	—
BIC	109.8397	51.55961	—	—
Obs.	48	48	48	48
p - value	—	—	0.21	0.54

EVOLUTION OF FED POLICY, 1984 - 2000

- ▶ Apply money growth framework to study policy during Volcker-Greenspan era.
- ▶ In particular policy may have evolved over this period.
- ▶ Thornton (2006) argues that Fed started targeting FFR in 1993.
- ▶ Testing for a break in the FFR reveals a break date in 1992.08.
- ▶ I estimate policy for 1984.11 - 2000.02, 1984.11 - 1992.12, 1993.02 - 2000.02.

POLICY RULE, 1984 - 2000



POLICY RULE, 1984 - 2000

Table: Evolution of Federal Reserve Policy

Param.	OLS			GMM		
	(1)	(2)	(3)	(4)	(5)	(6)
ϕ_π	1.6509*** (0.0750)	2.0199*** (0.1138)	1.4288*** (0.2337)	1.6693*** (0.0664)	1.9955*** (0.1033)	1.3589*** (0.2111)
ϕ_x	0.4322*** (0.0251)	0.4294*** (0.0259)	0.7833*** (0.0842)	0.4363*** (0.0226)	0.4415*** (0.0245)	0.7660*** (0.0988)
ϕ_m	0.5023*** (0.0245)	0.5639*** (0.0222)	-0.2315 (0.1187)	0.5162*** (0.0210)	0.5621*** (0.0212)	-0.2287 (0.1418)
c	-0.7670** (0.2256)	-2.477*** (0.4363)	1.8580** (0.6272)	-0.9218*** (0.2096)	-2.3444*** (0.4104)	1.9700*** (0.5533)
R^2	0.8979	0.9385	0.7034	—	—	—
RMSE	0.5639	0.4500	0.5229	—	—	—
Obs.	123	66	57	120	63	57
p - value	—	—	—	0.02	0.92	0.002

(1): 1984.11 - 2000.02

(2): 1984.11 - 1992.12

(3): 1993.02 - 2000.02

EXTENSIONS

1. Outperforms Output Growth Objectives.
2. Robust for Interest Rate Smoothing.
3. Comparison with Historical Data and Application to Great Recession.
4. Model-Based Analysis of Welfare

1. OUTPUT GROWTH OBJECTIVES

Table: Estimates of the Policy Rules, 1983.05 - 2000.02

Param.	OLS			
	(1)	(2)	(3)	(4)
ϕ_{π}	1.2008*** (0.1089)	1.5269*** (0.1340)	1.0768*** (0.0988)	1.2594*** (0.1060)
ϕ_x	0.1263*** (0.0377)	0.05467 (0.0470)	— —	0.1419*** (0.0354)
ϕ_m	0.5380*** (0.0420)	— —	0.4605*** (0.0502)	0.5005*** (0.0461)
ϕ_{gy}	— —	0.3905*** (0.0649)	0.0853 (0.0512)	0.1343** (0.0491)
c	0.5191 (0.3119)	0.8539 (0.4567)	0.8147** (0.2882)	0.1762 (0.3158)
R^2	0.7605	0.5218	0.7379	0.7702
RMSE	1.0098	1.4268	1.0563	0.99279
AIC	389.6814	483.0121	401.8462	386.0655
BIC	401.3025	494.6332	413.4673	400.5918
Observations	135	135	135	135

2. INTEREST RATE SMOOTHING

Table: Estimates of the Policy Rules, 1983.05 - 2000.02

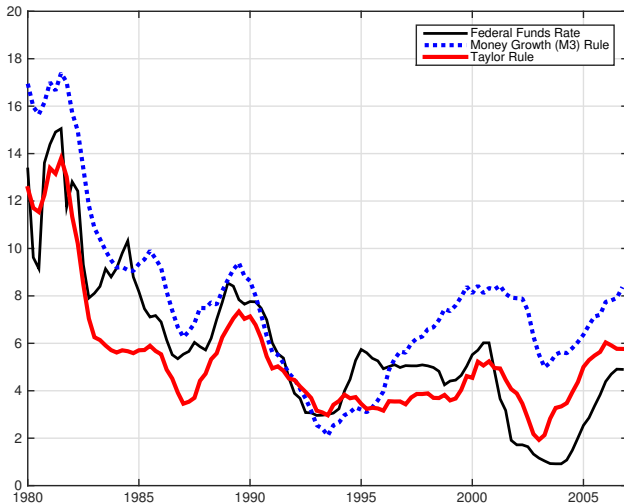
Param.	OLS		GMM	
	(1)	(2)	(3)	(4)
ϕ_π	1.2008*** (0.1089)	0.6846 (0.1512)	1.5839*** (0.1397)	1.3181*** (0.4332)
ϕ_x	0.1263*** (0.0377)	0.1699 (0.1545)	0.2409*** (0.0382)	0.2565** (0.0992)
ϕ_m	0.5380*** (0.0420)	0.6451* (0.2500)	0.5534*** (0.0435)	0.6085*** (0.1423)
ρ_1	— —	1.3140*** (0.7187)	— —	1.2860*** (0.2603)
ρ_2	— —	-0.3858*** (0.7187)	— —	-0.3982 (0.2149)
c	0.5191 (0.3119)	1.4622 (1.6616)	-0.57699 (0.3667)	-0.0623 (1.154)
R^2	0.7605	0.9756	—	—
RMSE	1.0098	0.3245	—	—
Observations	135	135	132	132
$\rho_1 + \rho_2$	—	0.9282	—	0.8878
p - value	—	—	0.17	0.84

3. FEDERAL RESERVE POLICY: REAL-TIME VERSUS HISTORICAL DATA

Table: Federal Reserve Policy: Real-time versus Historical Data

Param.	Real-time			Historical		
	(1)	(2)	(3)	(4)	(5)	(6)
ϕ_π	1.6509*** (0.0750)	2.0199*** (0.1138)	1.4288*** (0.2337)	1.4840*** (0.1045)	1.6032*** (0.1901)	2.2511*** (0.9390)
ϕ_x	0.4322*** (0.0251)	0.4294*** (0.0259)	0.7833*** (0.0842)	0.3138*** (0.0688)	0.4714*** (0.0887)	0.1314 (0.1943)
ϕ_m	0.5023*** (0.0245)	0.5639*** (0.0222)	-0.2315 (0.1187)	0.1720*** (0.0428)	0.2707*** (.0562)	0.2731* (0.1260)
c	-0.7670** (0.2256)	-2.477*** (0.4363)	1.8580** (0.6272)	-1.0253* (.4370)	0.1318 (0.8184)	-0.8080 (2.2848)
R^2	0.8979	0.9385	0.7034	0.7493	0.8578	0.2467
RMSE	0.5639	0.4500	0.5229	0.7600	0.6115	0.7650
Obs.	123	66	57	66	33	29

HISTORICAL DATA



WHAT DO WE INFER FROM HISTORICAL DATA?

- ▶ Money played a diminished role in policy making during the second half of the 1990s.
- ▶ This may have led the federal funds rate to be less active - in particular, the policy rule with money recommends a tighter policy as compared to the federal funds rate during this period.
- ▶ Growth in broad money *may* serve as an indicator for credit growth ([Kaminsky and Reinhart \(1999\)](#), [Nelson \(2003\)](#))
- ▶ This framework proposes a possible explanation for the lack of control over credit growth in the events preceding the Great Recession.

4. MODEL-BASED ANALYSIS OF WELFARE

Analyze theoretical implications of money targeting, welfare analysis.

$$x_t = E_t x_{t+1} - \frac{1}{\sigma} (i_t - E_t \pi_{t+1}) \quad (3)$$

$$\pi_t = \beta E_t \pi_{t+1} + \kappa x_t \quad (4)$$

$$\Delta m_t = \pi_t + \Delta x_t + \Delta y_t^n - \eta_i \Delta i_t + \Delta \tau_t \quad (5)$$

$$i_t = \phi_\pi \pi_t + \phi_x x_t + \phi_m \Delta m_t \quad (6)$$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ϕ_π	1.5	1.5	1.5	2	2	2	1.5	1.5	1.5	1.5
ϕ_x	0.125	0.125	-	0.125	0.125	-	0.125	0.125	0.125	0.25
ϕ_m	-	0.5	0.5	-	0.5	0.5	1	0.25	0.75	0.5
$\sigma(x)$	0.24	0.59	0.67	0.15	0.51	0.56	0.83	0.41	0.72	0.53
$\sigma(\pi)$	1.15	0.83	0.96	0.71	0.69	0.78	1.18	0.75	1.01	0.73
Welfare Loss	0.059	0.031	0.041	0.022	0.021	0.027	0.062	0.025	0.045	0.023

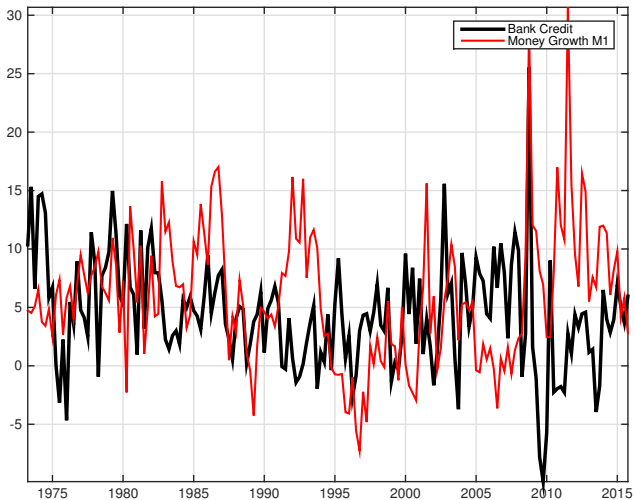
CURRENT WORK

- ▶ Growth in broad money *may* serve as an indicator for credit growth (Kaminsky and Reinhart (1999), Nelson (2003)).
- ▶ If so, then beyond money's usefulness for inflation, it may be used as a policy objective to tackle misalignments in the asset market.
- ▶ Debate on macroprudential policy versus changing policy objectives.
- ▶ Debate on the role of money in business cycle fluctuations.
- ▶ Can we come up with a unified framework to test these predictions?

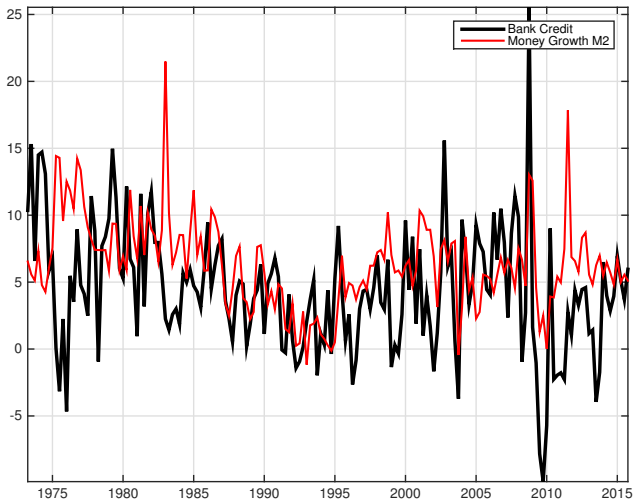
BROAD MONEY AND CREDIT

- ▶ Try to understand this relationship in the data.
- ▶ Take growth in bank credit as a fraction of GDP and compare with different measures of money (M1, M2, M3).

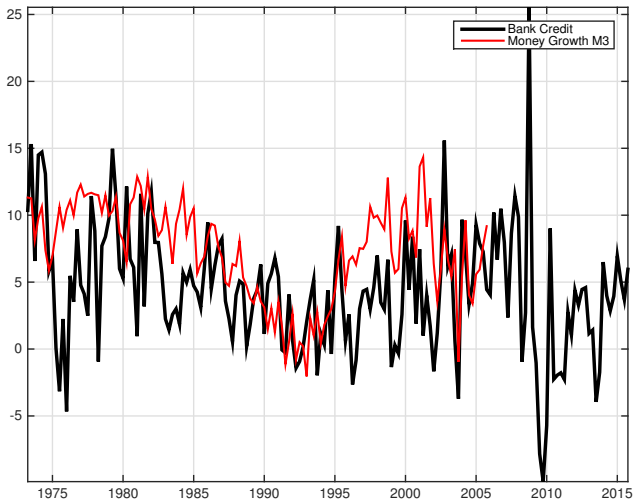
BROAD MONEY AND CREDIT



BROAD MONEY AND CREDIT



BROAD MONEY AND CREDIT



CONCLUSION

- ▶ Inability of the Taylor rule to explain the FFR using real-time data stems from the omission of a money growth objective.
- ▶ Significant role played by money during the Volcker-Greenspan era using new FOMC data, benchmarking a novel characterization of “good” policy.
- ▶ Policy-based explanation of the Great Moderation and Recession.
- ▶ Significant concerns about relying on the simple Taylor rule as a policy benchmark, money may serve as a useful indicator in guiding future monetary policy decisions.