If it Were a Snake, It Would Have Bitten You: Money in the New Keynesian Model

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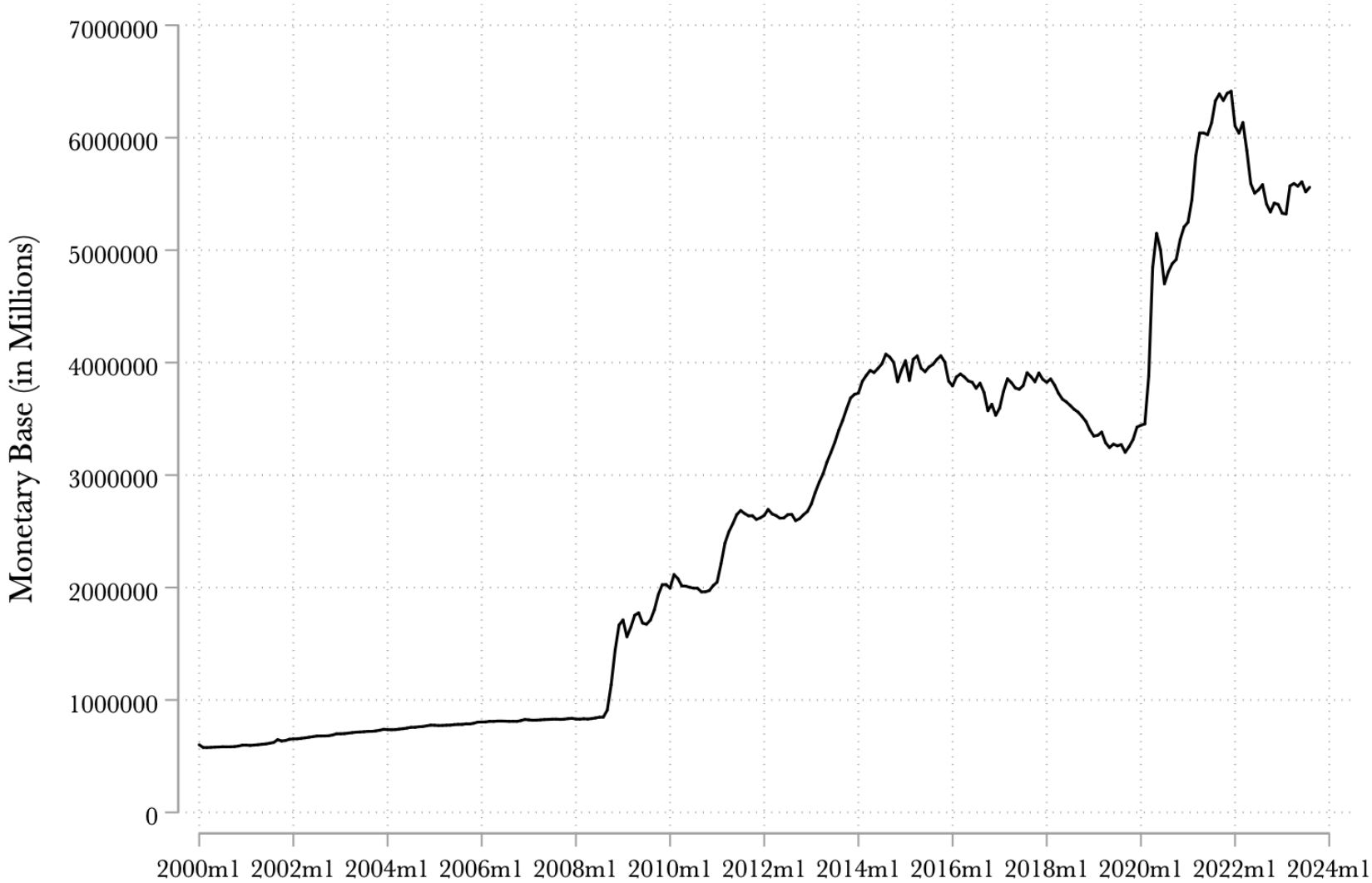
Simpler Times

- In the early 2000s, economists were concerned about:
  - Declining use of currency
  - Low levels of bank reserves without reserve requirements
- Shrinking Balance Sheet
- Monetary Policy Without Money (B. Friedman 1999, Woodford 2000)
- New Keynesian Model

Some Irony

How that worked out. . .



New Keynesian Model

- The New Keynesian Model: workhorse of monetary policy-related macro
- Started as a way to think about monetary policy without money
- Quickly became a reason for not thinking about money in a world with money

Our Argument

- The baseline NK model has two equations (dynamic IS equation, NK Phillips curve) and three unknowns: output, inflation, and the nominal interest rate.
- The model is closed by a third equation that specifies a monetary policy rule. Something like this:

$$i_t = \phi \pi_t$$

where i is the nominal interest rate, π is the inflation rate, and $\phi > 1$ is a parameter that measures how the central bank adjusts the nominal interest rate in response to inflation.

Our Argument, Cont...

- But let's think about an alternative.
- For simplicity, let the velocity of money have the following specification:

$$\Delta v_t = \rho i_t + \Delta y_t$$

- Using this in conjunction with the equation of exchange would yield:

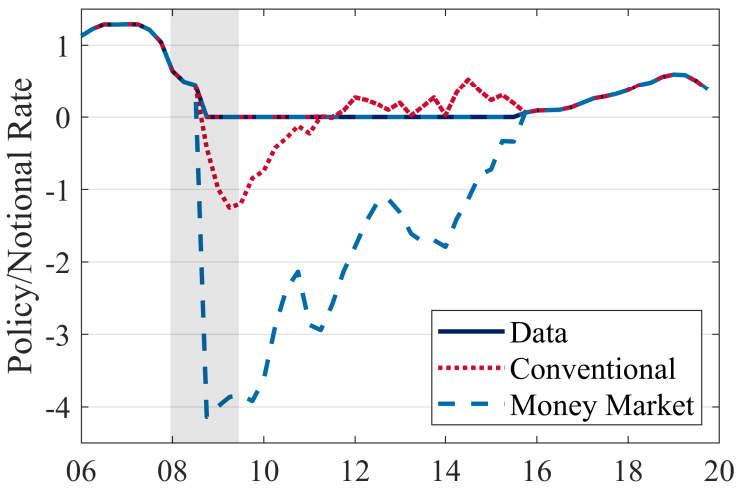
$$i_t = \frac{1}{\rho}\pi_t - \frac{1}{\rho}\Delta m_t$$

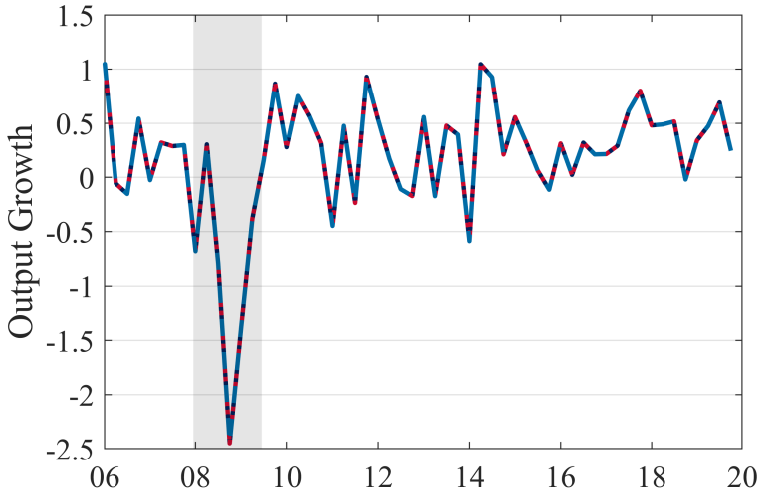
  where Δm is money growth.
- This *looks like* an interest rate rule. It's not.
- In fact, we argue that there is a direct velocity specification that can match any Taylor Rule-type interest rate rule in the literature.
  - This is especially true if we assume that the intrument of monetary policy is the growth rate of money and we specify a McCallum-type rule for money growth.

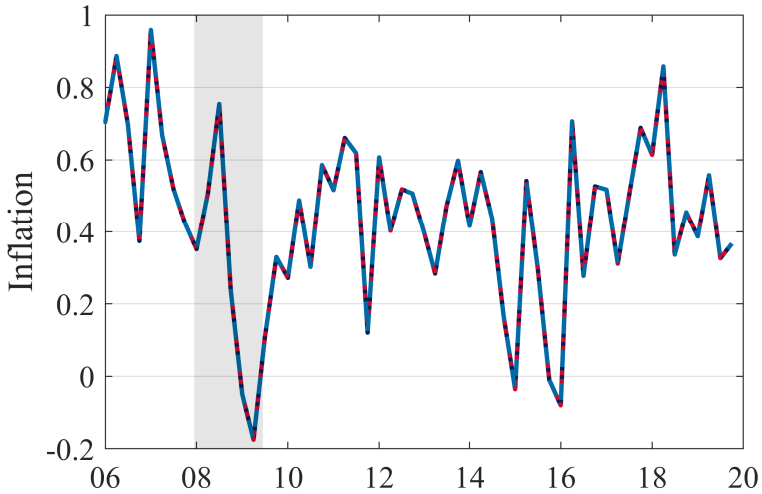
Why Our Argument Matters

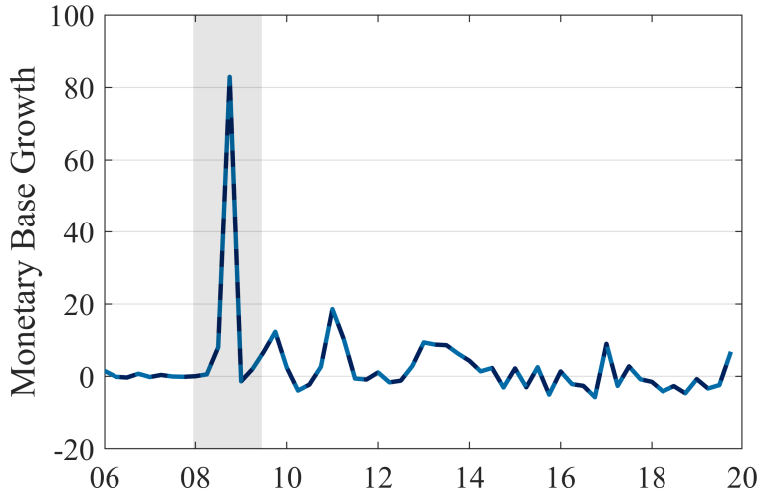
- Picking a rules-based interest rate policy in the NK model is isomorphic to imposing a money demand structure with an exogenous money supply.
- With this specification, optimal money supply policy simultaneously targets inflation and the output gap, with the interest rate equal to the natural rate in equilibrium. (Setting $i = i^n$ in standard model means indeterminacy)
- Estimating our money market version of the model, we are better able to match the data during the zero lower bound period than the interest rate approach.

Estimation


Policy/Notional Rate
1
0
-1
-2
-3
-4
06
08
10
12
14
16
18
20
Data
Conventional
Money Market


Output Growth
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
06
08
10
12
14
16
18
20


Inflation
1
0.8
0.6
0.4
0.2
0
-0.2
06
08
10
12
14
16
18
20


Monetary Base Growth
100
80
60
40
20
0
-20
06
08
10
12
14
16
18
20

Why Does This Matter?

- The two model specifications are identical under certain parameterizations.
- This is not merely a theoretical curiosity.
  - We show that a determinate rational expectations equilibrium exists even when the nominal interest rate is permanently fixed.
  - English translation: Practical concerns about the zero lower bound may be overblown.

Implications

- There is a disconnect between our models and policy.
  - Money doesn't seem to matter in our models much.
  - Central bankers clearly see the size of their balance sheet as a possible tool.
- Money growth was the best predictor of the recent surge of inflation.
- Money matters. Let's get it back into the models.