Does the Fed Respond to Oil Price Shocks?

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The Policy Reaction Hypothesis

Standard models of the transmission of oil price shocks do not generate large recessions in theory or empirically. BGW (1997) propose an explanation of how the effects of oil price shocks may be amplified:

1. The Fed tends to raise the interest rate in response to actual or potential inflationary pressures triggered by positive oil price shocks.

2. This systematic and anticipated policy response is the main cause of the recessions that tend to follow oil price shocks.

3. These recessions could have been avoided (at the cost of higher inflation) by holding the interest rate constant.

What is the Rationale for a Monetary Tightening?

1. Are exogenous oil price shocks inflationary?

AS shock: $Y \downarrow, P \uparrow$ versus AD shock: $Y \downarrow, P \downarrow$

2. What happened to the dual objective of the Fed?

3. Inflation hawks in the 1970s?

4. Oil price shocks reflect deeper demand and supply shocks, each if which may necessitate a different response by the Fed. A policy reaction to oil price shocks makes no sense in a world of endogenous oil price shocks (see Kilian 2009; Nakov and Pecatori 2009)

Critiques of BGW's Empirical Methodology:

● Hamilton & Herrera (2004): BGW's empirical results are questionable

1. Sensitivity of empirical results to the VAR lag order.
2. Policy changes required for counterfactual violate Lucas Critique.

● Kilian and Vigfusson (2009): BGW rely on a censored VAR model in oil price net increases (or oil price increases). That censored VAR analysis is invalid.

1. Parameter estimates of censored VAR models are inconsistent.
2. BGW do not compute the impulse response functions correctly.
3. The null of symmetric response functions cannot be rejected.

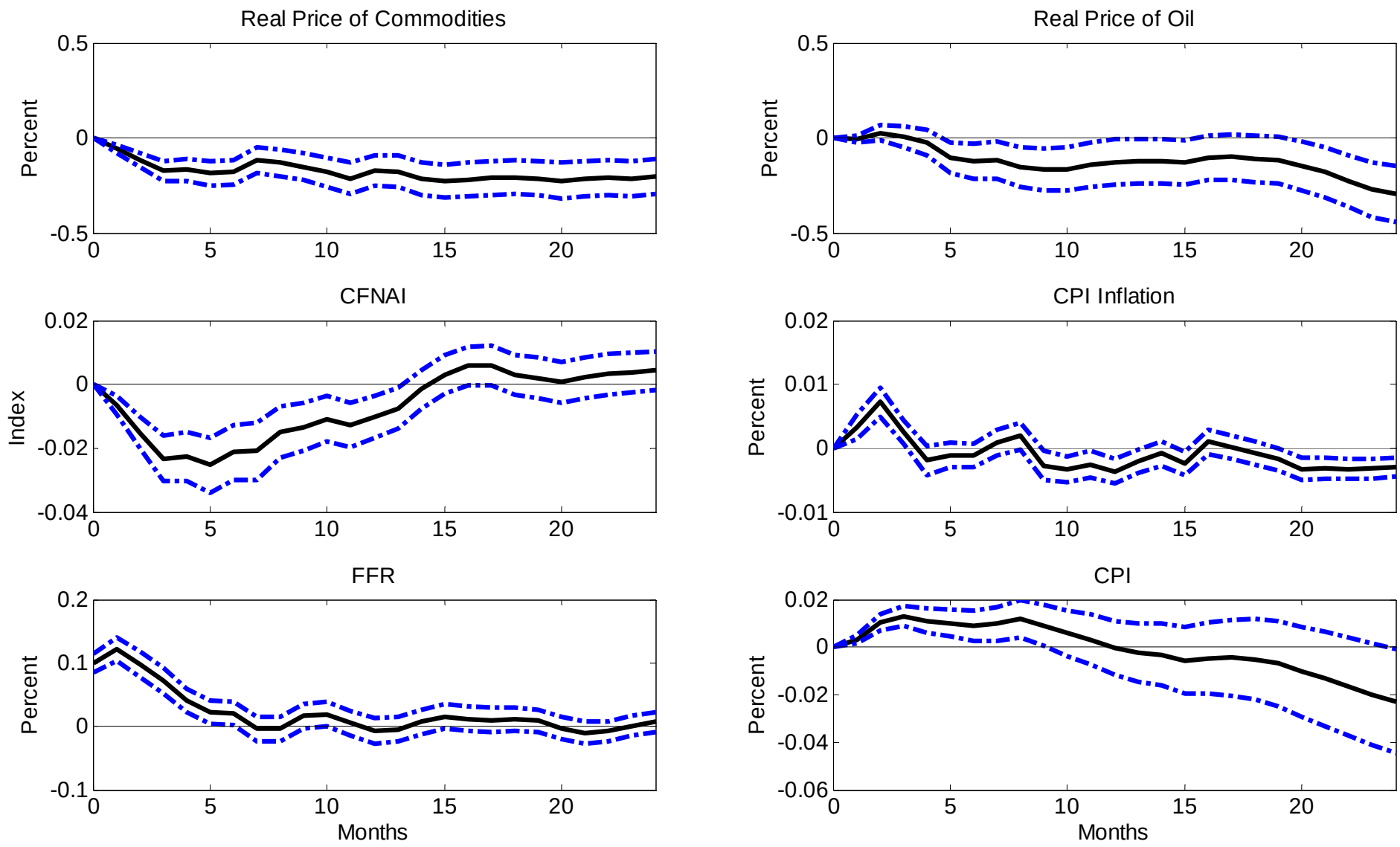
New Baseline Model

- Recursively identified semi-structural linear monthly VAR(12) model with intercept.

- Model variables:

  1. $\Delta\%$ in real price of imported crude oil (rather than nominal net increase)
  2. $\Delta\%$ in real CRB industrial commodity prices (rather than level)
  3. Chicago Fed National Activity Index (CFNAI): principal components index of U.S. real output (rather than interpolated real GDP)
  4. CPI Inflation (rather than price level)
  5. Federal funds rate

Responses to a 10 Basis Points Exogenous Increase in the Fed Funds Rate 1967.5-1987.7



Split-Sample Analysis

1967.5-1987.7

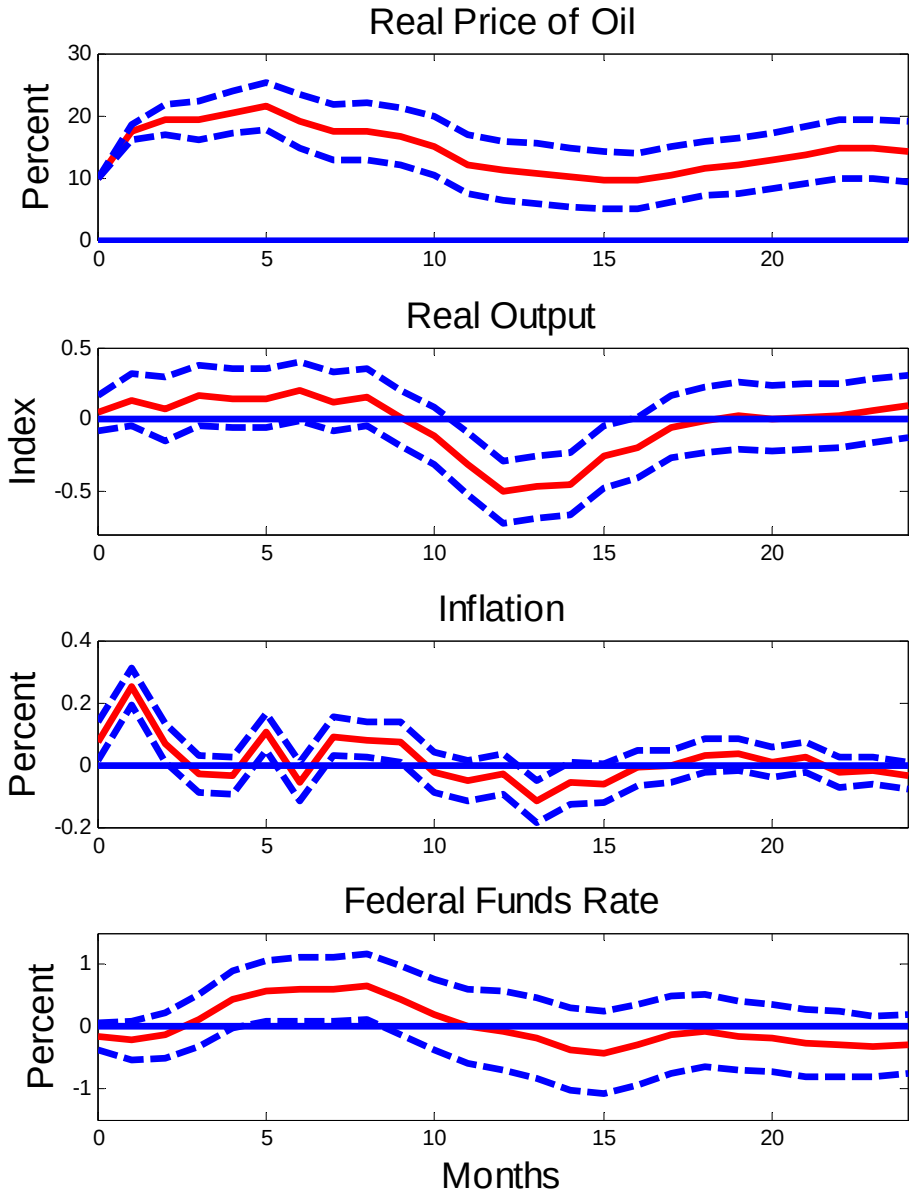
Our sample starts slightly later than BGW's due to data constraints.
Similar results with sample starting in the early 1970s.
Results not sensitive to ending date. BGW sample ends in 1990s.

(Additional sensitivity analysis with pre-Volcker sample not shown.)

1987.8-2008.6

Greenspan-Bernanke period
Financial crisis deliberately excluded (change in policy reaction function?)

U.S. Responses to a 10 Percent Real Oil Price Shock: 1967.5-1987.7



What is the Nature of the Policy Response?

A statistical decomposition of the response of the Federal funds rate to the oil price shocks suggests that:

- The Federal Reserve is not responding to *actual* inflationary pressures triggered by the oil price shock, but is responding preemptively to *potential* inflationary pressures (e.g., wage-price spiral?).

- There is no response to output dynamics triggered by the oil price shocks either.

Counterfactual Analysis

How much of a difference does the Fed's response to oil price shocks make?

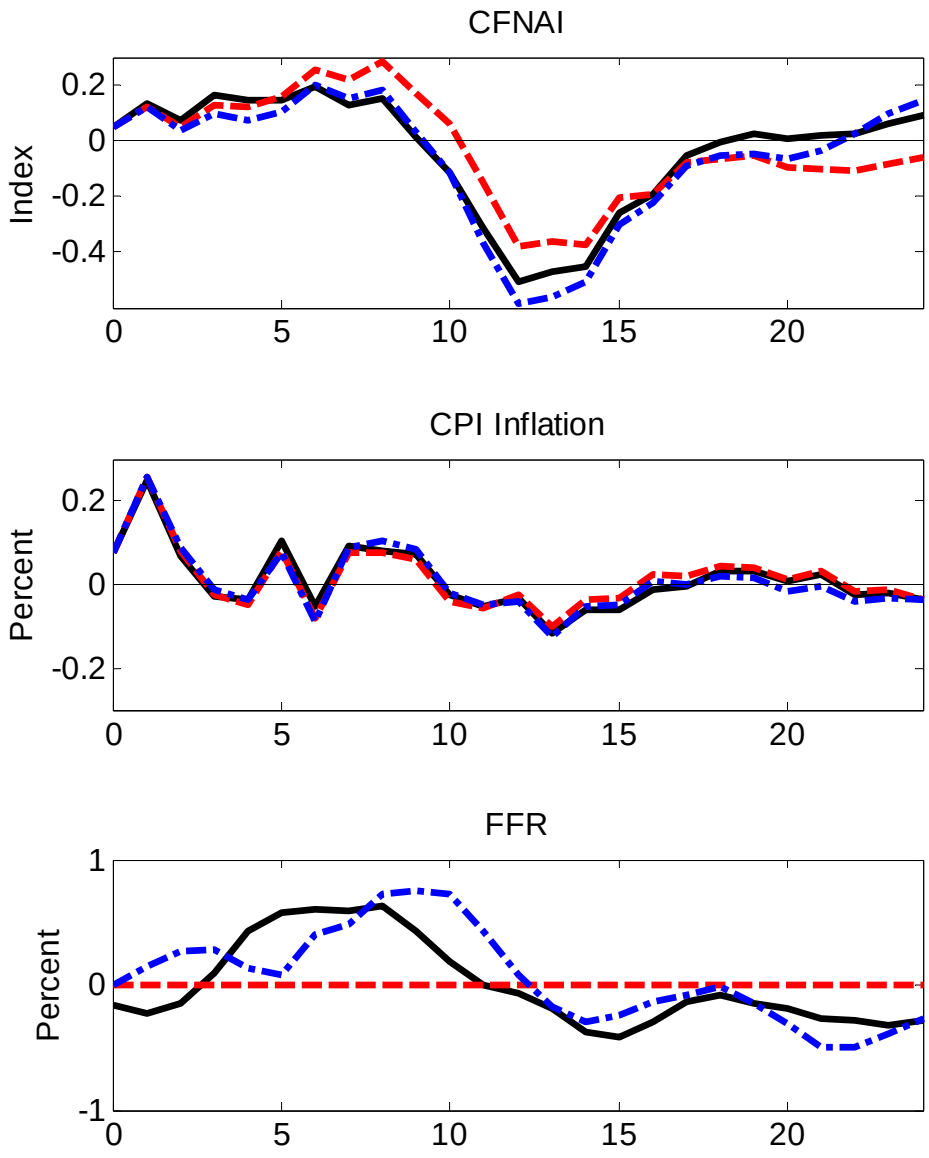
1. BGW's counterfactual:

   The Fed holds the interest rate constant.

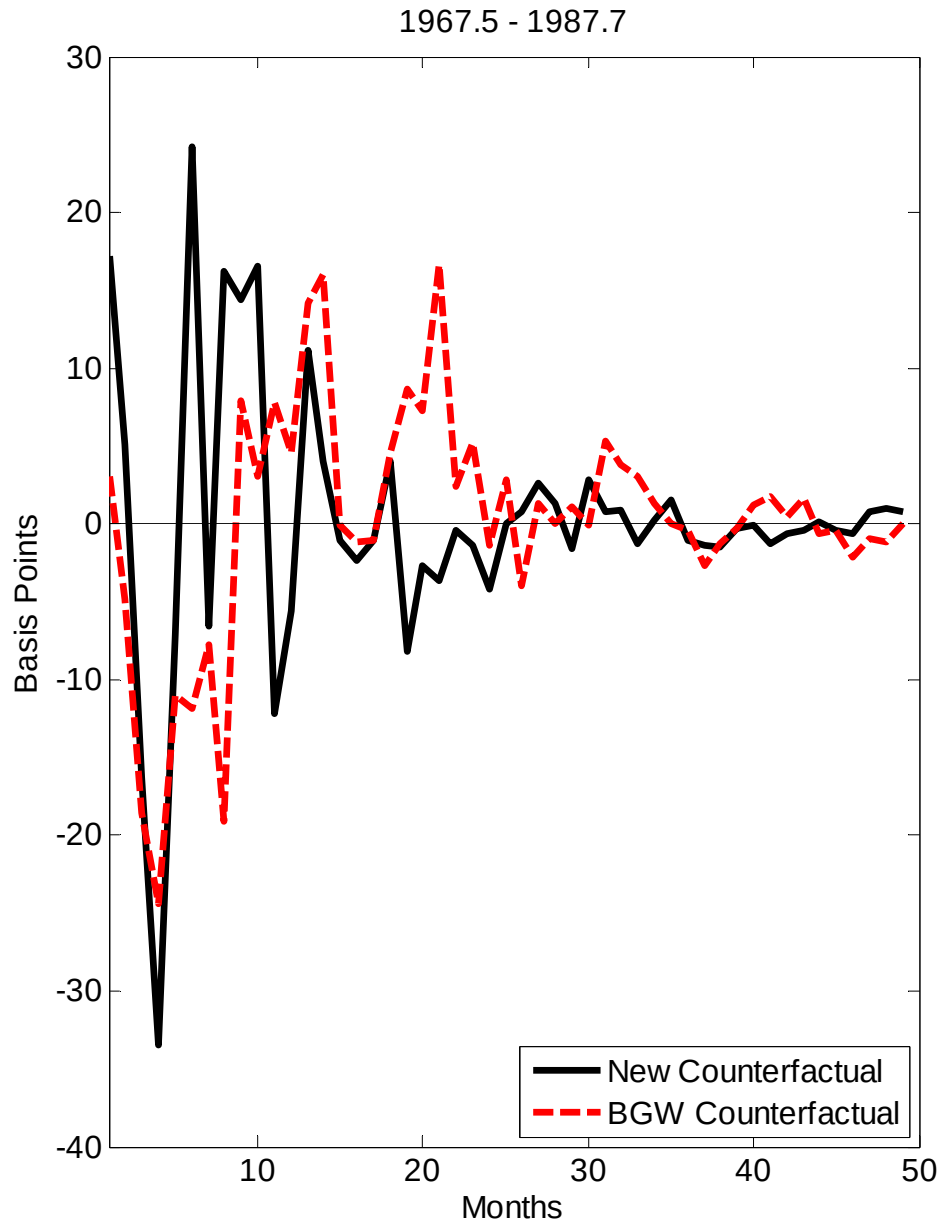
2. A more relevant counterfactual:

   The Fed reacts to fluctuations in other macroeconomic state variables (such as inflation and real output) as it normally would with only the *direct* response to the real price of oil shut down.

Counterfactual Simulations: 1967.5-1987.7



Policy Shocks Required for the Implementation of the Counterfactual



Identification Issues

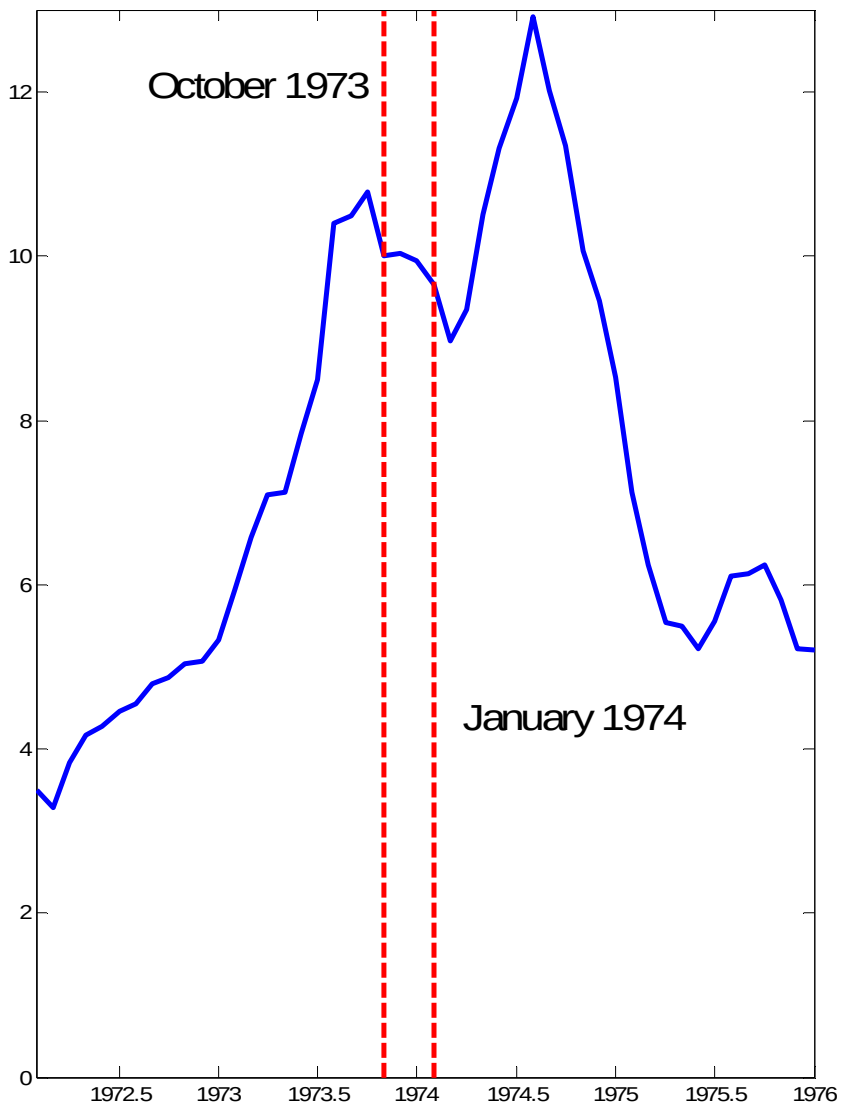
● BGW reported that there was no evidence of a policy response to the 1973/74 oil price shock; rather the Fed responded to commodity price inflation.

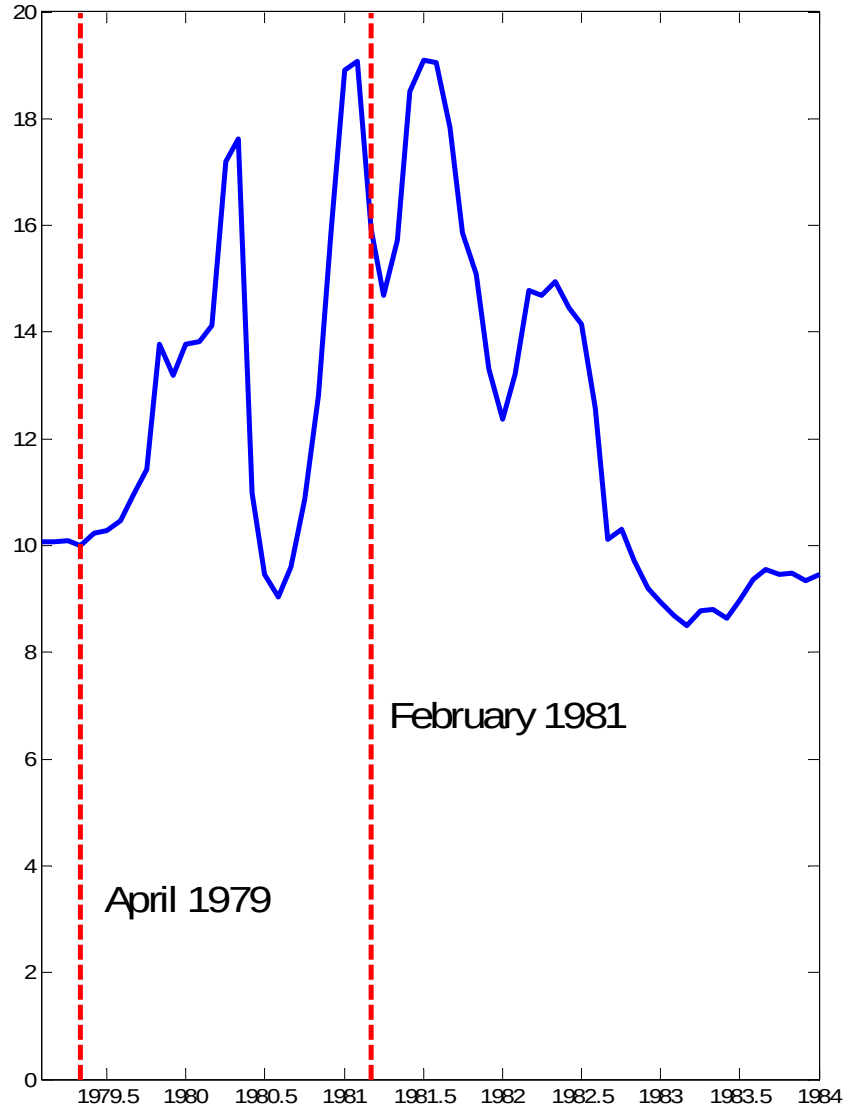
This is consistent with narrative evidence in Barsky and Kilian (2002) that the Fed raised the interest rate starting in late 1972 in response to an overheating economy.

● Nor is the 1991 episode supportive of the BGW hypothesis.

Thus, BGW's evidence rests squarely on the 1979 oil price shock episode.

Evolution of the Federal Funds Rate during the Oil Price Shocks of the 1970s and Early 1980s





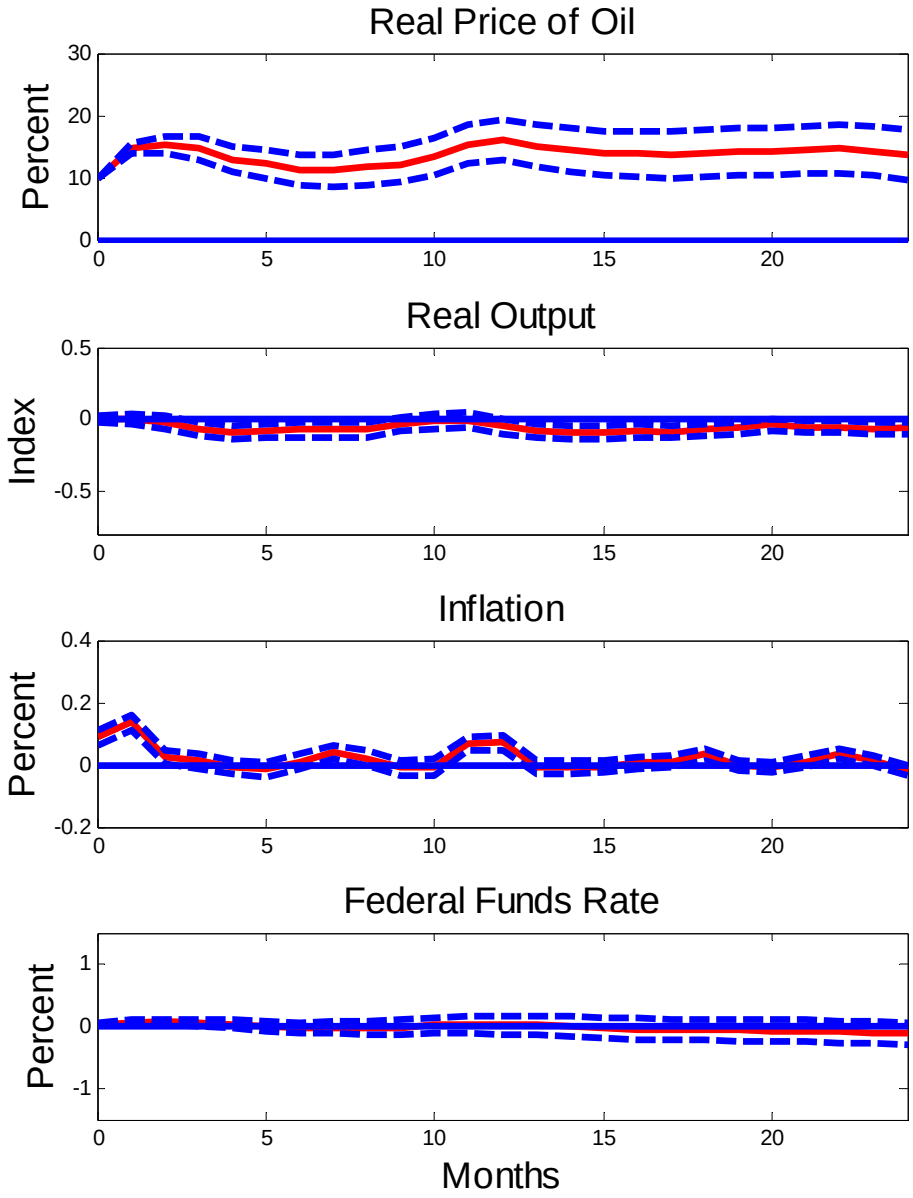
Key identification problem: Did Volcker raise interest rates in 1979 to fight domestic inflation unrelated to oil prices or in response to the 1979 oil price shock?

A legitimate test of this proposition is to evaluate the BGW hypothesis on data not yet available to BGW, namely 1987.8-2008.6.

Rationale:

- Greenspan and Bernanke are inflation hawks, as postulated by BGW.
- Fairly long sample and arguably homogenous data.
- There is a sufficient number of oil price shocks in that sample period to allow identification.

U.S. Responses to a 10 Percent Real Oil Price Shock: 1987.8-2008.6



Alternative Explanations in the Literature

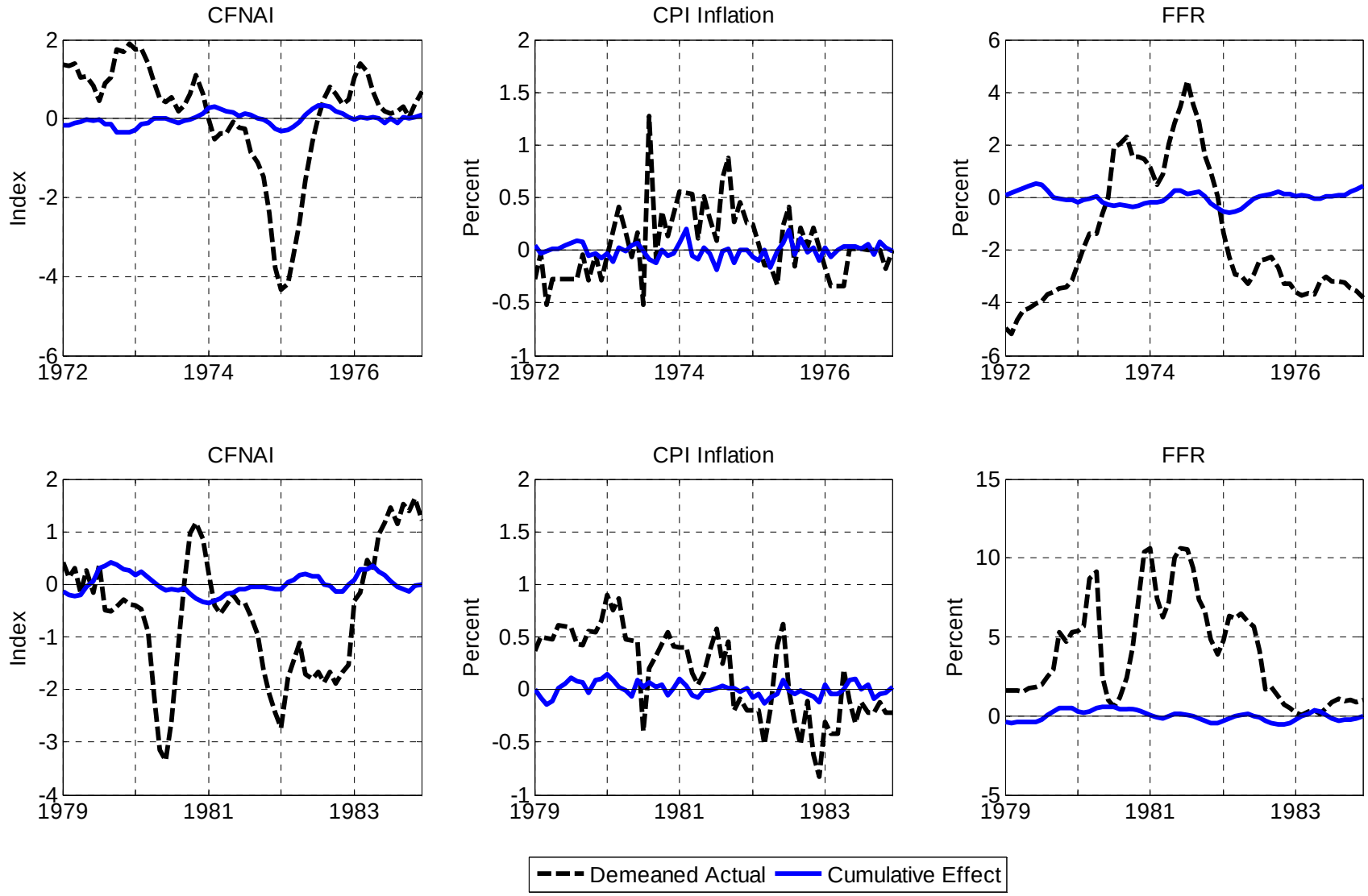
1. Improved monetary policy reaction?

   If so, where is the recession?

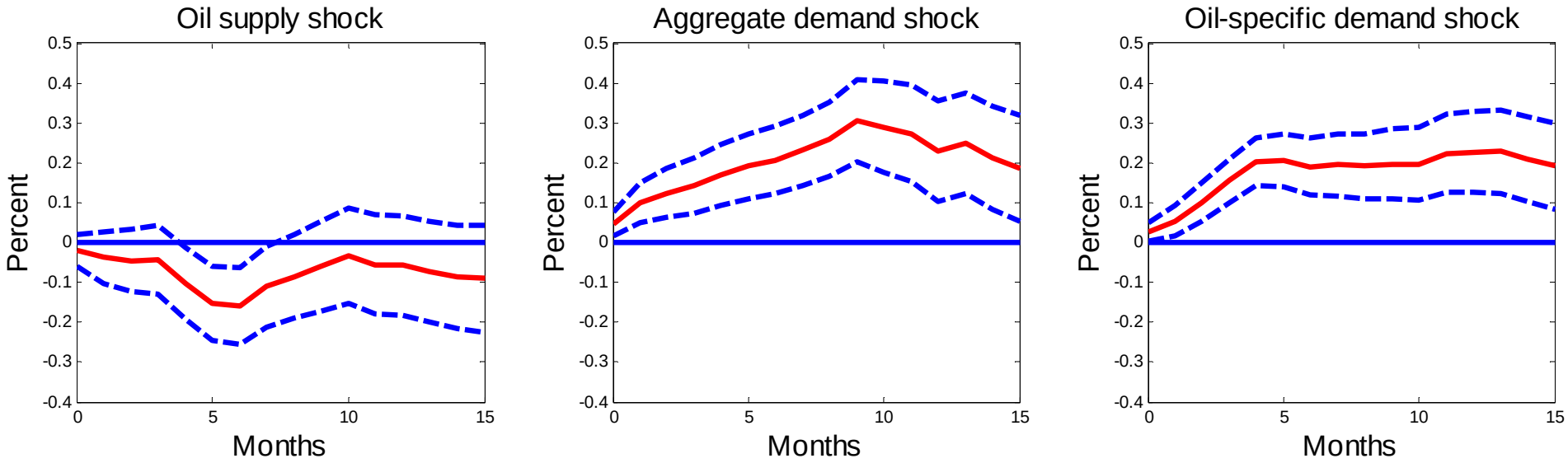
2. Oil price shocks not as inflationary as they used to be?

   - Changes in the composition of oil demand and oil supply shocks (Kilian, AER 2009)
   - Lower energy share in the economy? (Edelstein and Kilian, JME 2009)
   - Reduced real wage rigidities? (Blanchard and Gali, NBER 2009)

Cumulative Effect of Real Oil Price Shocks on U.S. Real Output, Inflation and Interest Rates



Response of the Effective Federal Funds Rate to Oil Demand and Oil Supply Shocks



Conclusions

1. There is no evidence that monetary policy responses to oil price shocks had large effects on U.S. real activity or CPI inflation in the 1970s and 1980s. That conclusion is *independent* of the choice of counterfactual.

2. The search for explanations of the diminished importance of the BGW channel of transmission after the 1980s is moot because that channel never was quantitatively important even in the 1970s and 1980s.

3. Our analysis suggests that the traditional monetary policy reaction framework explored by BGW and incorporated in subsequent DSGE models has outlived its usefulness.

Lessons for Policymakers

1. Rather than respond to relative price shocks that often are merely symptoms of broader global macroeconomic developments, central banks must identify and respond to the deeper causes of oil price shocks.

2. This requires a different class of structural models than are customarily used by policy makers, namely DSGE models that explicitly model the endogenous determination of the real price of oil.

3. The question of how to respond to higher oil prices is likely to take on a new urgency, as the world economy recovers from the current crisis.