Monetary Policy Responses to Oil Price Movements

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Summary

Aim: Investigate how monetary policy should react to oil-price fluctuations.

Method: Calculate optimal monetary policy in the medium-scale, two-country DSGE model of Bodenstein and Guerrieri (2011), which features an oil sector and includes many shocks and frictions.

Conclusion: Optimal monetary policy depends on what moves the oil price, policy makers should trace underlying structural shock. Each structural shock calls for a different policy reaction.

The paper is topical and relevant in the light of the renewed interest in oil prices. I also agree with the conclusion of the paper.

Critique

I also have some critique and suggestions, focusing on

- Policy recommendations
- Two assumptions
- Oil-intensity shock

Policy implications

Paper explicitly tries to give advice to monetary policy. Optimal monetary policy part is the significant difference to Bodenstein and Guerrieri (2011).

Conclusion (see above): when reacting to oil-price shocks, FED should consider underlying structural shock instead of only the oil price.

The authors conclude this from showing that interest rates under the estimated and the optimal rule react differently to different shocks.

But this is conditional on reacting only to $\tilde{y}$ and π.

Since the Taylor rule does not allow monetary policy to react to the oil price directly, we don't know if it might not be optimal.

Policy implications

Optimizing the coefficients in the Taylor rule results in the following advice: only look at the output gap (coefficient of 3,980,000).

Looking only at one variable, monetary policy cannot react differently to all different shocks in varying sizes.

Could also frame this advice opposing the actual conclusion of the paper: do not look at underlying shock, only at output gap.

Suggestion: in order to show that optimal interest rate is different after each shock, calculate optimal Ramsey policy or optimize over variables in Taylor rule.

Underlying mechanism

The policy implication and the large welfare gains from the optimal policy rule are independent of the consideration of the oil sector.

Results stem mainly from the behavior of wages. To compare, the estimates from Smets and Wouters (2007) are in brackets

- The average duration of wage contracts is 2.27 (0.93) years.
- Wage-markup shock main driver of US business cycles.
- The variance of wage-markup shocks is 10 (3) times higher than the one of price-markup shocks and 7 (0.03) times higher than the one of TFP shocks.

Problem: estimates are not very convincing. In combination with a extremely low labor-supply elasticity, the resulting wage inflation is 3.3 times more volatile than in data.

Practical policy implications

But these values drive the implications. Once wage and price-markup shocks are turned off, the results are in line with previous papers.

Oil, in particular, does not change the results! (Except a bit for the case of international coordination, maybe main result of the paper.)

Given the uncertainty about the output gap, especially in real time, a coefficient of almost 4 million would lead to large distortions.

It is most likely impossible to trace the source of the oil-price increase in real time.

Suggestion: find the best implementable simple rule, potentially including the oil price. How far do we get with this compared to the Ramsey policy?

Assumption 1: Non-durable oil

In the model, oil is modeled as a non-durable good and there is no futures market.

Resulting estimated demand elasticity for oil: -0.42.
But modeling oil as a durable good makes a difference:

Kilian and Murphy (2011):

> *"This elasticity estimate of -0.44, however, like all existing estimates, is misleading because it ignores the role of oil inventories in smoothing oil consumption."*

If oil was durable...

Kilian and Murphy (2011) take inventories into account and get an estimate of -0.26, which would change the results considerably.

Bodenstein and Guerrieri (2011):

> *"In our model, a more inelastic oil demand would imply a larger role not only for oil supply shocks, but also for many other sources of fluctuations. In that case, the volatility in oil prices implied by the model would be counterfactually high."*

Suggestion: make oil durable in the model. Could maybe resolve this conflict.

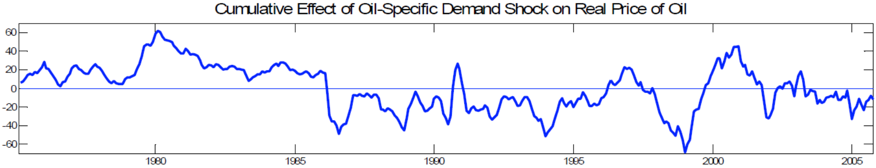
But could change results even more...

If oil was durable...

...variations in future oil supply would give rise to new (and important) shocks.

Kilian (2009):

> *"The latter shock is designed to capture shifts in precautionary demand for crude oil that reflect increased concerns about the availability of future oil supplies that are by construction orthogonal to the other shocks ('oil-specific demand shock')."*



→ By construction, model excludes shock that was found to explain up to 65% of the oil price.

If oil was durable...

...speculation would be possible.

Speculation is ruled out because no evidence b/w 2003 and 2010.

The model is estimated with data from 1984-2008.

Kilian and Murphy (2011):

> *”There is evidence, however, that speculative demand shifts played an important role during earlier oil price shock episodes including 1979, 1986, and 1990.” [and late 2002]*

Neglecting speculation could therefore give a larger weight to other shocks in the model.

Assumption 2: two-country world

Model is two-country model: US and ROW.

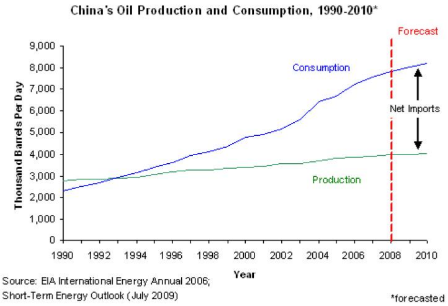
Large parts of the paper focus on a increase in oil intensity of foreign production → motivated by increased oil demand from China.

Have to follow three links to get definition of ROW. Weights are (probably) US export shares of 2003. Weight of China (probably): 4.0%. Hence, model is more about Canada then about China.

Focusing nevertheless on China, it benefits from higher oil prices after an oil-intensity shock in the model.

But contrary to the model, China is not an oil-exporter.

If there were three countries...



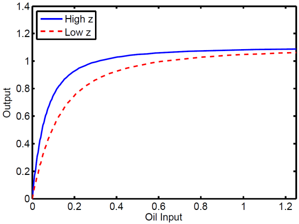
Suggestion: use a three-country setup in which China drives up oil price (see DeFiore et al. 2006, Lipínska & Millard 2011...).

But this could of course change the results and the policy implications, as relative wealth effects change after certain shocks.

Foreign increase in oil intensity

I am not sure how to exactly interpret the oil-intensity shock.

As pointed out in Bodenstein and Guerrieri (2011), this is a *reduction* in foreign oil efficiency. Marginal product rises, but average product falls.



With the same amount of inputs, the foreign country can produce less.

The trend moves in the opposite direction: ceteris paribus, MP of oil falls and production-possibility frontier shifts outwards.

Foreign increase in oil intensity

Hence, an oil-intensity shock makes China less productive.

Is this the shock were are have in mind?

Problem: it has wrong implications, such as falling foreign GDP.

Since it also drives 88% of oil price variance, the resulting correlation of the oil price with foreign GDP in the model is -0.40. In data: 0.51.

Correct specification of shocks is important for main policy conclusion of the paper: monetary policy has to trace structural shock when setting interest rates.

Suggestion: change production process.

Conclusion

The paper makes a step towards moving the discussion away from

> ”How should policymakers react to oil-price fluctuations?”

towards

> ”Why do oil prices change and how should policymakers react to the underlying shocks?”

Critique:
Results driven by some assumptions and an implausible outcome of the estimation.

Suggestion:
Calculate Ramsey policy
Make oil durable
Use a three-country model
Change the production process