Energy Price Increases and Firm Entry

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Motivation

• Nine out of the last ten U.S. recessions have been preceded by an increase in the price of oil as noted by Hamilton (1983, 1996).

• How to explain the substantial effects of oil price increases on the economy when the share of oil in production is really small (around 3-4%)?

• Explore the response of firm entry or firm startups with respect to oil price shocks using U.S. firm level data.

• In theoretical macroeconomic models, inclusion of firm entry generates another transmission channel for energy price shocks and generates a bigger decline in output compared to standard models.

Empirical Model

• Estimate a Vector Auto regression Model to estimate the effect of oil price shocks on Firm Startups.

 I identify oil price shocks following Hamilton. The Hamilton variable uses producer price index (PPI) for crude oil prices and is calculated in the following way: 

$$s_t = \max(0, X_t - \max(X_{t-1}, \ldots, X_{t-12}))$$ 

where $X_t$ is log level of the PPI value.

• Allows us to isolate large increases in the price of oil.

• New Firm Incorporations and Establishment Births are used to construct the measure for Entry.

• The other variables in the VAR model are real GDP, Federal funds rate and the GDP Deflator.

• I set the lag length to 4, given quarterly data.

Data


• The data for real GDP, GDP deflator are taken from Bureau of Economic Analysis.

• Federal funds rate data is available from the St. Louis Fed website.

Results: VAR Model

• Rising energy prices have a statistically significant negative effect on Firm startups.

• An increase in oil prices cause a 0.6% drop in New Incorporations and 0.2% drop in GDP.

• Rise in GDP Deflator implies more inflation.

• The federal funds rate increases due to the Fed’s contractionary monetary policy.

DSGE Model

• The DSGE model builds on the approach of Bilbiie, Ghironi and Melitz (2012).

• Rise in oil prices, cause profits to fall, returns to Entry falls.

• Due to sunk cost of Entry, households decide to reallocate resources from the Entry sector to the Production sector.

• Entry falls along with consumption and generates a bigger drop in output.

• Oil price increases also lead to lower real wages and lower stock prices.

Results: DSGE Model

• A 10% increase in oil prices causes a 4% decline in entry on impact.

• The impact on GDP is 1% for the same increase in oil prices.

• DSGE model in the paper successfully captures both the sign and the higher responsiveness of firm entry with respect to oil price shocks.

• The model also provides a way of linking stock prices to energy price shocks.

• A 10% increase in oil prices causes a 0.2% decline in stock prices.

• Entry also serves as an amplifying mechanism for oil price shocks.

• A 10% increase in energy prices causes a 1% decline in GDP in the baseline model with entry vs. 0.55% drop in GDP in the model without entry.

• Furthermore, when oil price increases are persistent it acts a big deterrent to entrepreneurship and is the primary channel rather than reduced firm level production as suggested in the standard literature.

Sensitivity Analysis

• Baseline DSGE model uses a AR(1) specification for the exogenous oil price shock.

• Introduce ARMA(1) specification, impulse responses are closer to empirical responses.

• Baseline model uses Cobb Douglas production function, using CES gives us similar results.

Future Research

• In all model specifications, real wages fall and help mitigate the effect of oil price shocks.

• Introducing sticky wages may give us an even bigger decline in GDP.

• A better specification of the oil price shock might also help in replicating patterns found in the data.

• In addition to firm startups or entry, firm exits may also respond to oil price shocks.

• Lower entry and higher firm exit would also be helpful in getting big drop in output.

Conclusion

• First paper to analyze the effect of oil price shocks on Firm Entry.

• Shows oil price shocks have a significant negative effect on Firm start ups using U.S. data.

• Incorporates Firm Entry in a theoretical DSGE model.

• DSGE model with Firm Entry predicts a bigger drop in GDP in response to oil price shocks.

• Firm Entry may be one of the potential explanations behind oil price shocks and U.S. recessions.

Thank You!

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