Effects of the Oil Price Decline in 2014-2015 on the U.S. Economy

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World oil production surged 2013-2014 after long period of stagnation

Monthly, in million b/d. Excludes natural gas liquids, refinery process gains, and biofuels
Why did oil price fall in 2014-2015?

(1) Technological advances in fracking
   • U.S. oil production up 3.5 mb/d Jan 2012 to March 2015

(2) Postwar investments in Iraq
   • Production up 1.3 mb/d since Jan 2013

(3) Iran sanctions lifted
   • Production up 1 mb/d since Jan 2013

(4) Signs of weak world economic growth (Europe, China)
• Frictionless neoclassical model predicts (1)-(3) should unambiguously be good news for the U.S. economy
  • U.S. imports 6 million more barrels of crude oil and refined products than it exports every day
• Resources devoted to domestic oil production should shift to where they are more productive
• But frictionless neoclassical model is not a good description of short-run economic fluctuations
The oil price decline stimulated U.S. consumption spending.

But this was mostly offset by drop in investment spending in the oil sector.

Result was close to net wash for the economy.
Theory predicts an oil price decline should have increased U.S. consumption spending

• Closed economy:
  • Increased productivity in domestic oil industry means more of everything
  • Since oil demand is price inelastic, it also means lower share of total spending going to oil producers
  • Oil consumers have higher marginal propensity to consume than owners of oil companies

• Open economy:
  • Improved terms of trade mean we can consume more of everything
  • Foreign oil producers have lower marginal propensity to spend on U.S. goods than U.S. oil consumers
Historical evidence was that U.S. consumption spending responds strongly to changes in oil prices

• Edelstein and Kilian (2009)
• Hamilton (2009)
And the latest evidence supports the conclusion that the oil price decline in 2014-2015 boosted consumption

- Farrell and Greig (2015)
  - Examined debit, credit and bank transactions of 25 million Americans
  - Found that those individuals who had been spending more on gasoline before the drop increased their spending
- Gelman, et al. (2016)
  - Examined smart-phone app recording financial transactions of 1 million Americans
  - Found the same thing
We see an increase in aggregate consumption consistent with this
Calculations similar to those in Baumeister and Kilian (2016)

• Share of gasoline in total consumer expenditures in June 2014 was 3.2%
• Real price of gasoline fell 45% between June 2014 and March 2016
• Frees up \((0.032)(0.45) = 1.4\%\) to spend on other goods and services
• Aggregate private U.S. consumption spending was observed to grow at 2.9% annual rate 2014:Q3-2016:Q1 compared with 1.9% over 2012:Q1-2014:Q2
• About 15% of higher consumption spending went to imports
• Some also went to buying more gallons of gasoline
• So stimulus to GDP would be less than simple calculation
• Still, should have seen significant acceleration in GDP growth
• In fact real GDP grew at 1.8% rate 2012:Q1-2014:Q2 and 2.2% rate 2014:Q3-2016:Q1
Lower spending by oil sector subtracted 0.5% from GDP

Year-over-year change in mining investment as percent of GDP
• But shouldn’t lower oil prices raise the marginal product of capital and increase investment?
• Capital is not homogenous lump of stuff that can be costlessly directed to new activities
• 75% drop in utilization of drilling rigs
• 30% drop in rail transport of petroleum and products
• Total nonresidential investment grew at 5.1% rate 2012:Q1-2014:Q2 versus 1.5% rate 2014:Q3-2016:Q1
• Less utilization of specialized capital hurts GDP for any big increase or decrease in oil prices
  • Increases: auto companies that were tooled to produce fuel-inefficient vehicles are idled (Bresnahan and Ramey, 1993)
  • Decreases: specialized capital in oil-producing sector is idled (drilling rigs, rail cars)
• But consumption spending falls when oil prices go up, rises when oil prices go down
• Result: oil price increases reduce GDP growth, oil price decreases have little net stimulus
Empirical evidence of asymmetry

• U.S. macro data [Loungani (1986); Mork (1989); Lee, Ni and Ratti (1995); Balke, Brown, and Yücel (2002); Hamilton (2003); Ferderer (1996); Elder and Serletis (2010); Carlton (2010); Ravazzolo and Rothman (2010)]

• U.S. micro data [Davis and Haltiwanger (2001); Herrera, Lagalo, and Wada (2011)]

• International data [Cuñado and Pérez de Gracia (2003), Jiménez-Rodríguez and Sánchez (2005); Engemann, Kliesen and Owyang (2011); Kim (2012); Jo (2014)]
Is this time different?

• Using the coefficients in equation (3.8) from Hamilton (2003) exactly as published with no updating
  • Did a good job describing data observed through 2008:Q4 (Hamilton, BPEA 2009)
  • Did a good job describing data observed through 2010:Q1 (Hamilton, Macro Dynamics 2012)
  • Would have predicted that oil price decline of 2014-2015 would have zero net effect on U.S. real GDP growth
Conclusions

• To interpret economic fluctuations, have to get away from frictionless neoclassical model
• The nature of the key frictions is technological, not nominal
• This view of the economic effects of oil prices is consistent with historical evidence as well as what we observed in 2014-2015