



# What Drives Natural Gas Prices?

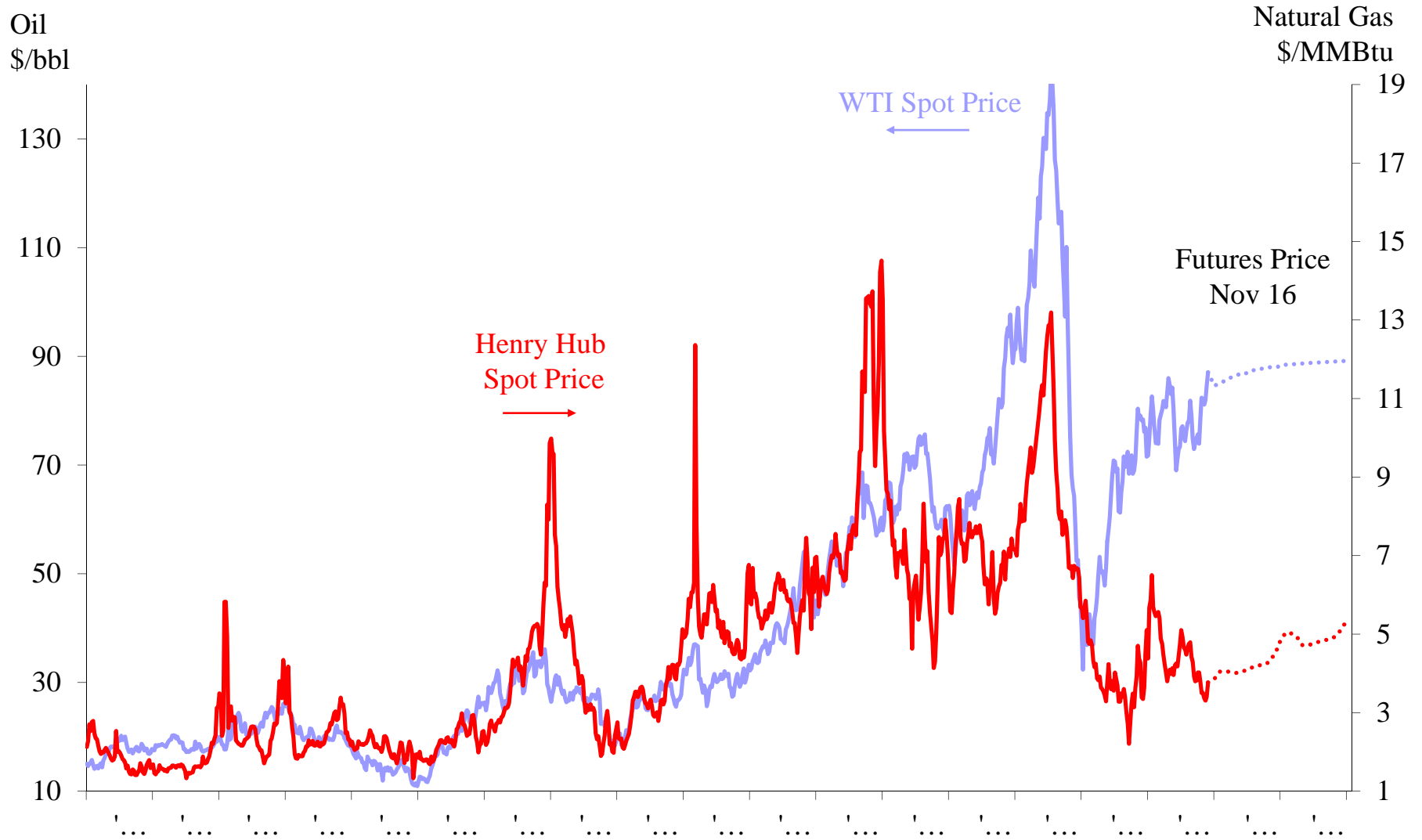
Mine Yücel

Federal Reserve Bank of Dallas

# Oil and Natural Gas Prices

- Close substitutes in the past
  - industrial production and electricity generation
- Substitutability has declined
- Prices seem to have decoupled

# Natural Gas and Oil Prices



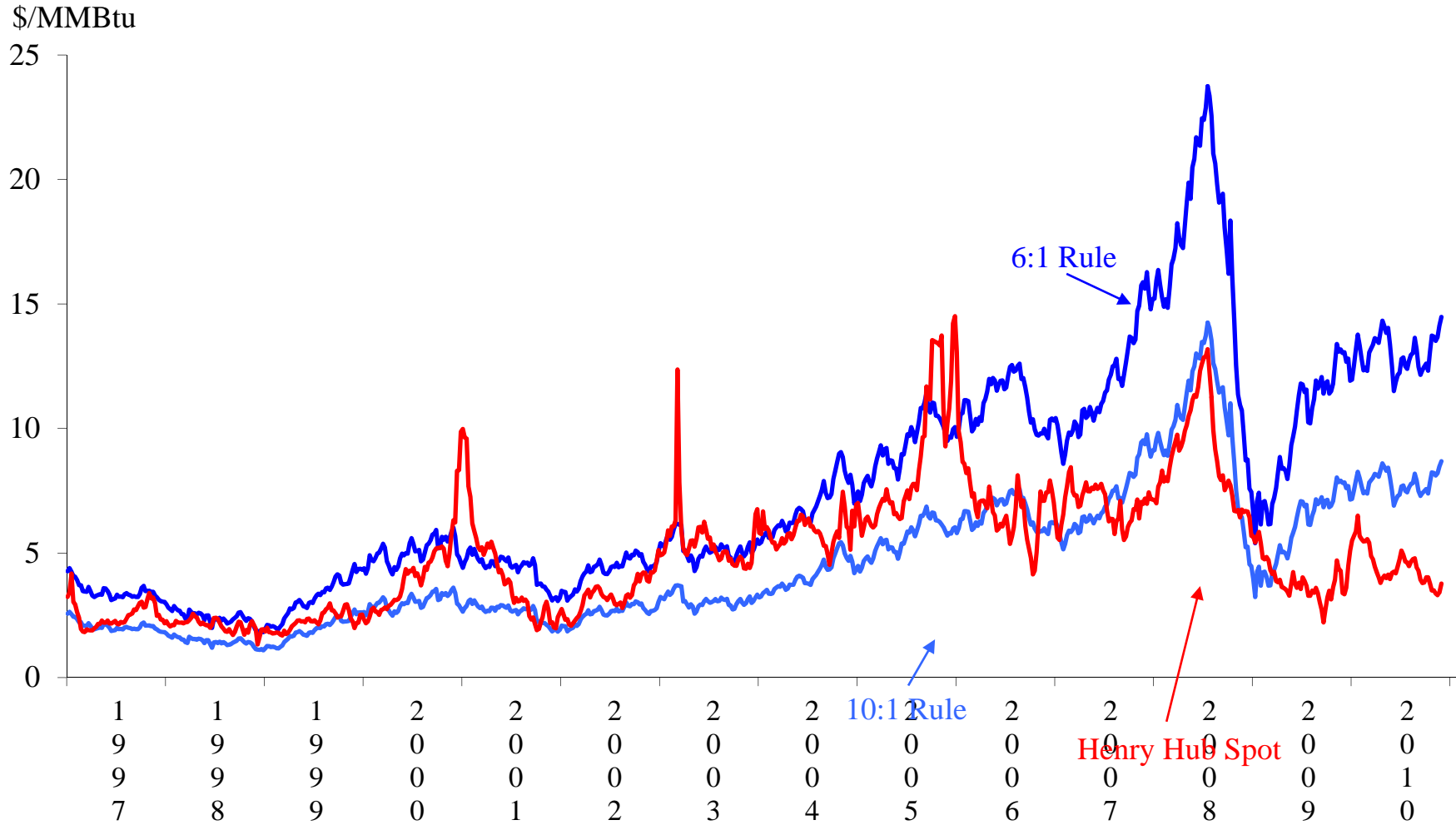
# Pricing Rules of Thumb

Do Oil Prices Matter?

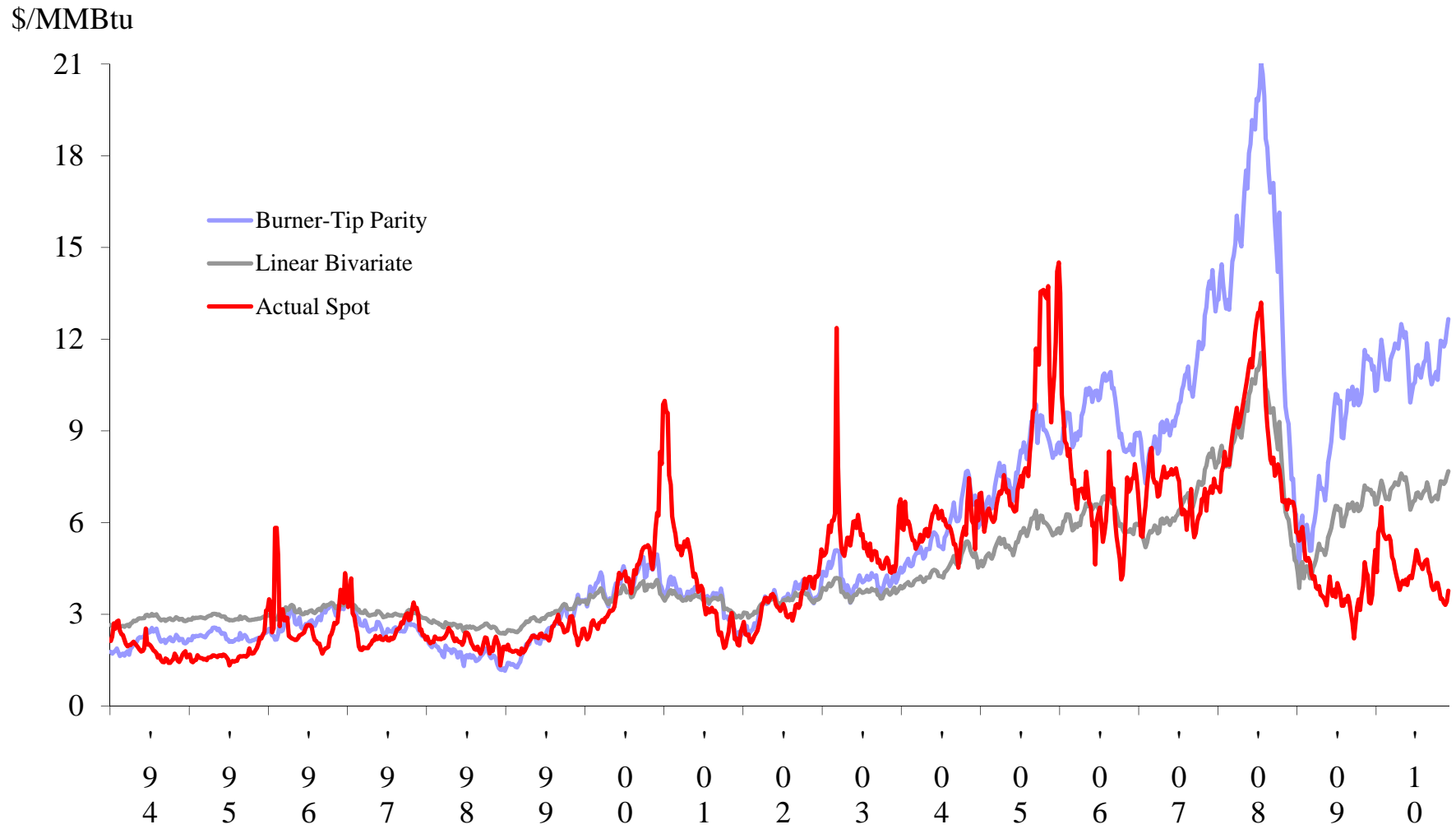
# Some Pricing Rules

- 10-to-1: Henry Hub price is  $.1 \cdot \text{WTI}$ .
- 6-to-1: Henry Hub price is  $.1667 \cdot \text{WTI}$ .
- Burner-tip parity: Henry Hub price is  $-.50 + .1511 \cdot \text{WTI}$ .
  - Based on competition with residual fuel oil
- Simple regression: Henry Hub price is  $1.5977 + .0698 \cdot \text{WTI}$ .

# Old Rules of Thumb



# Burner-Tip Parity



# Looking Beyond Pricing Rules of Thumb



# Other Factors Driving Natural Gas Prices

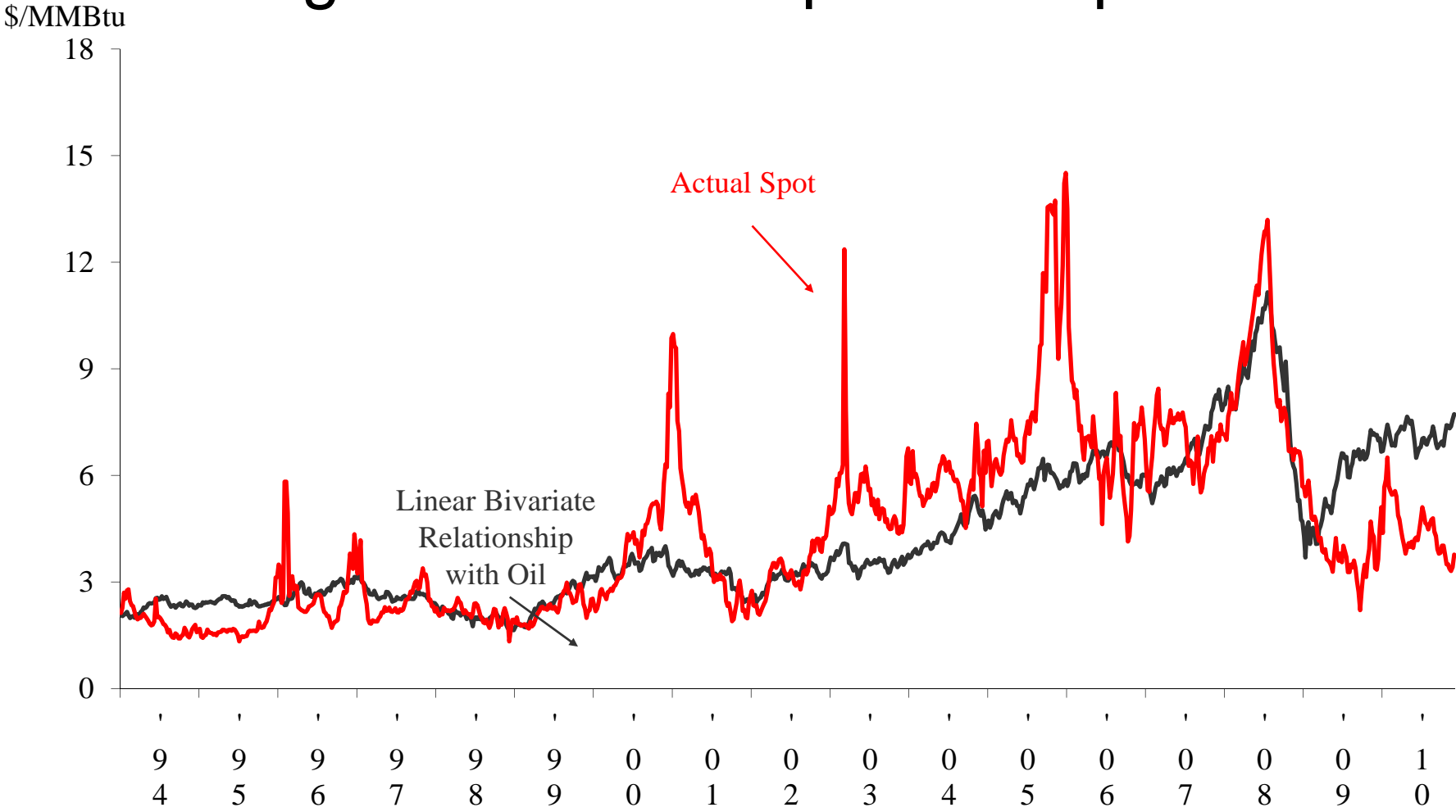
- Weather
- Seasonality
- Storage
- Production Disruptions

# Econometric Modeling

- Crude oil and natural gas prices move together in the long run
- Changes in crude prices lead changes in natural gas prices
- Short term dynamics explained by exogenous variables such as
  - Weather, storage and disruptions

# Natural Gas Price

## Long-run relationship with oil prices



# Natural Gas Price Brown-Yücel Model

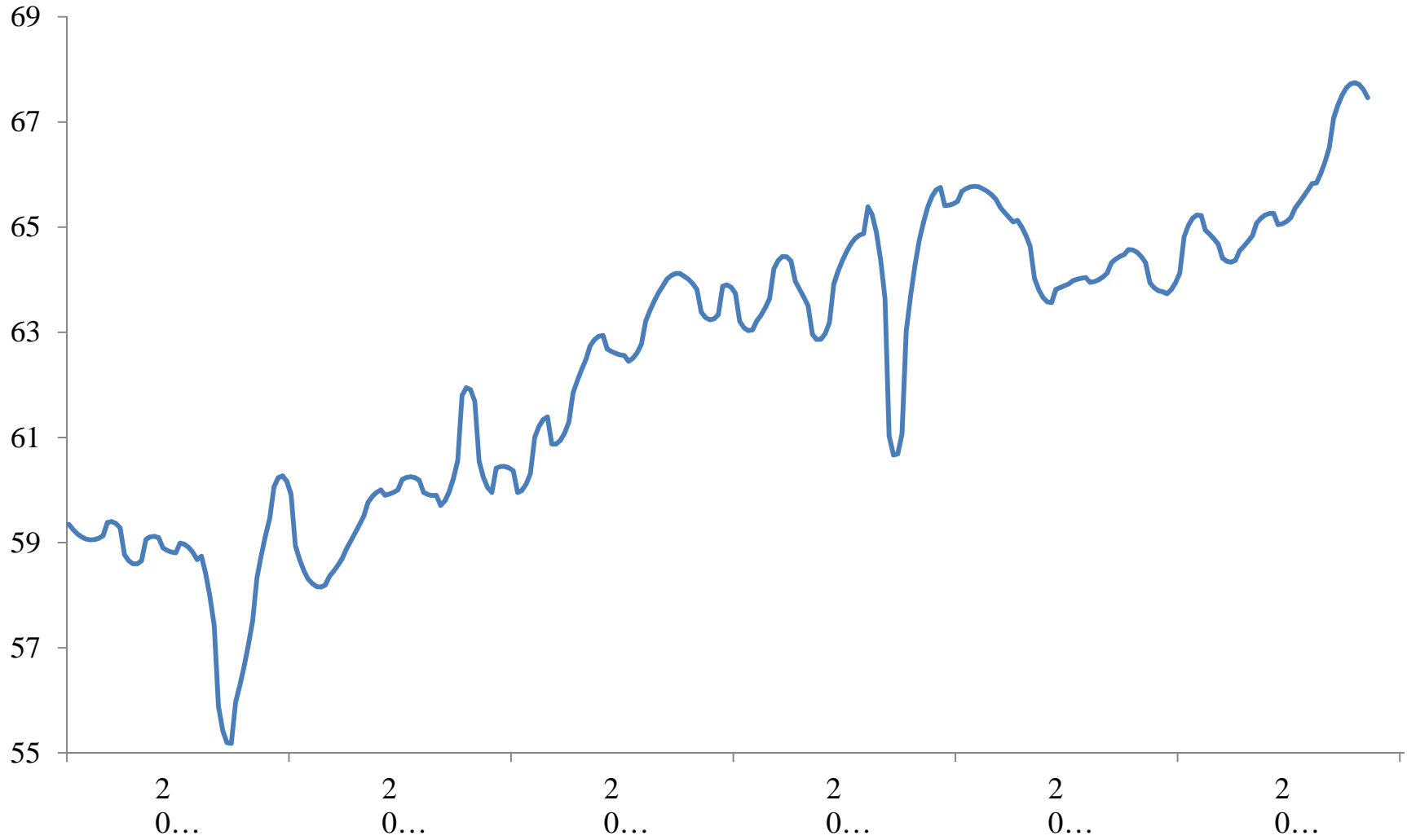


# Other Econometric Studies

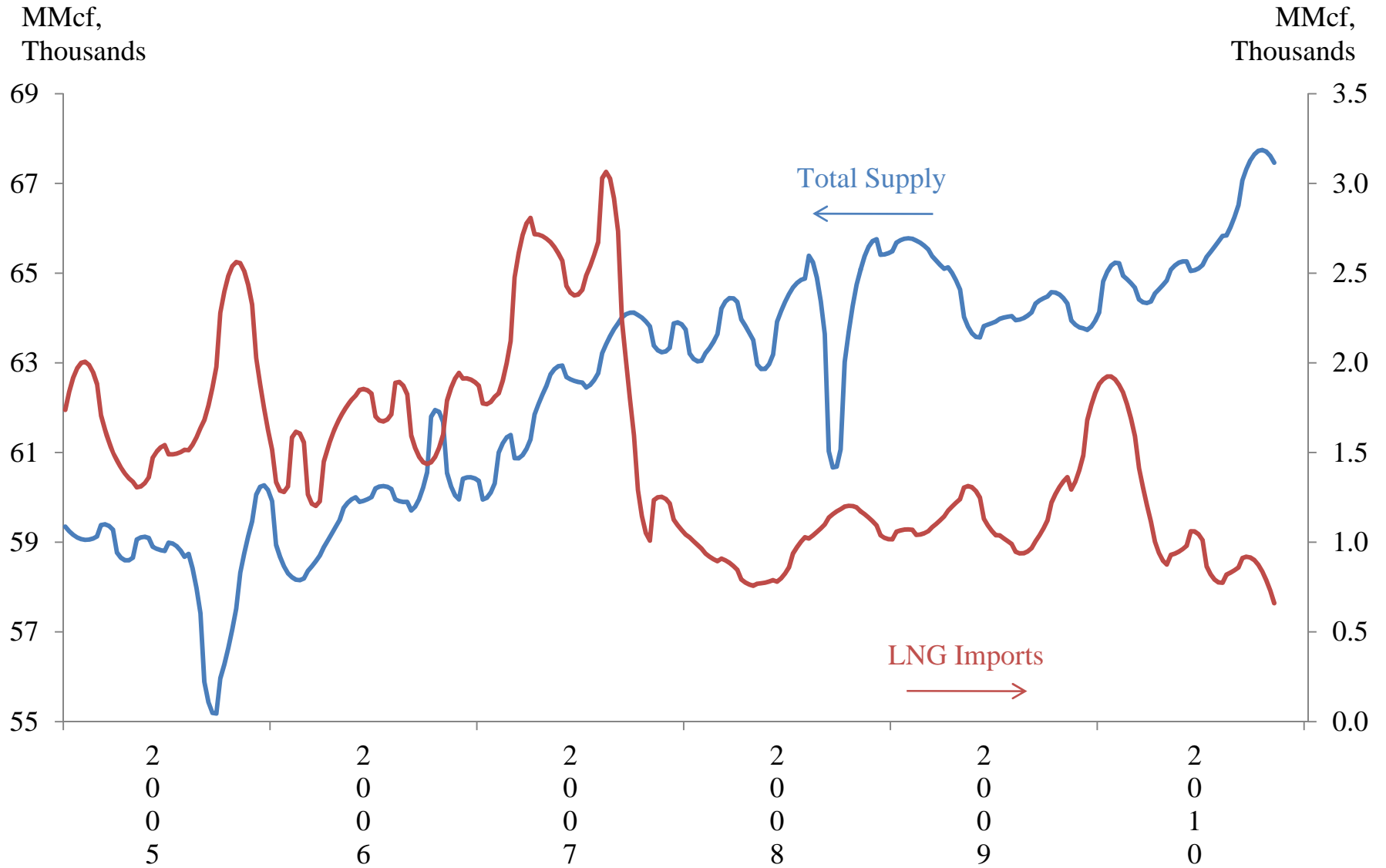
- Ramberg and Parsons (2010)
  - Study the periods 1997-2005; 2005-2009
  - Find that the oil and gas cointegrating relationship has changed in recent years
  - Dec 2005 – Feb 2009 period: Natural gas prices discounted with respect to oil

# Natural Gas Production

MMcf,  
Thousands

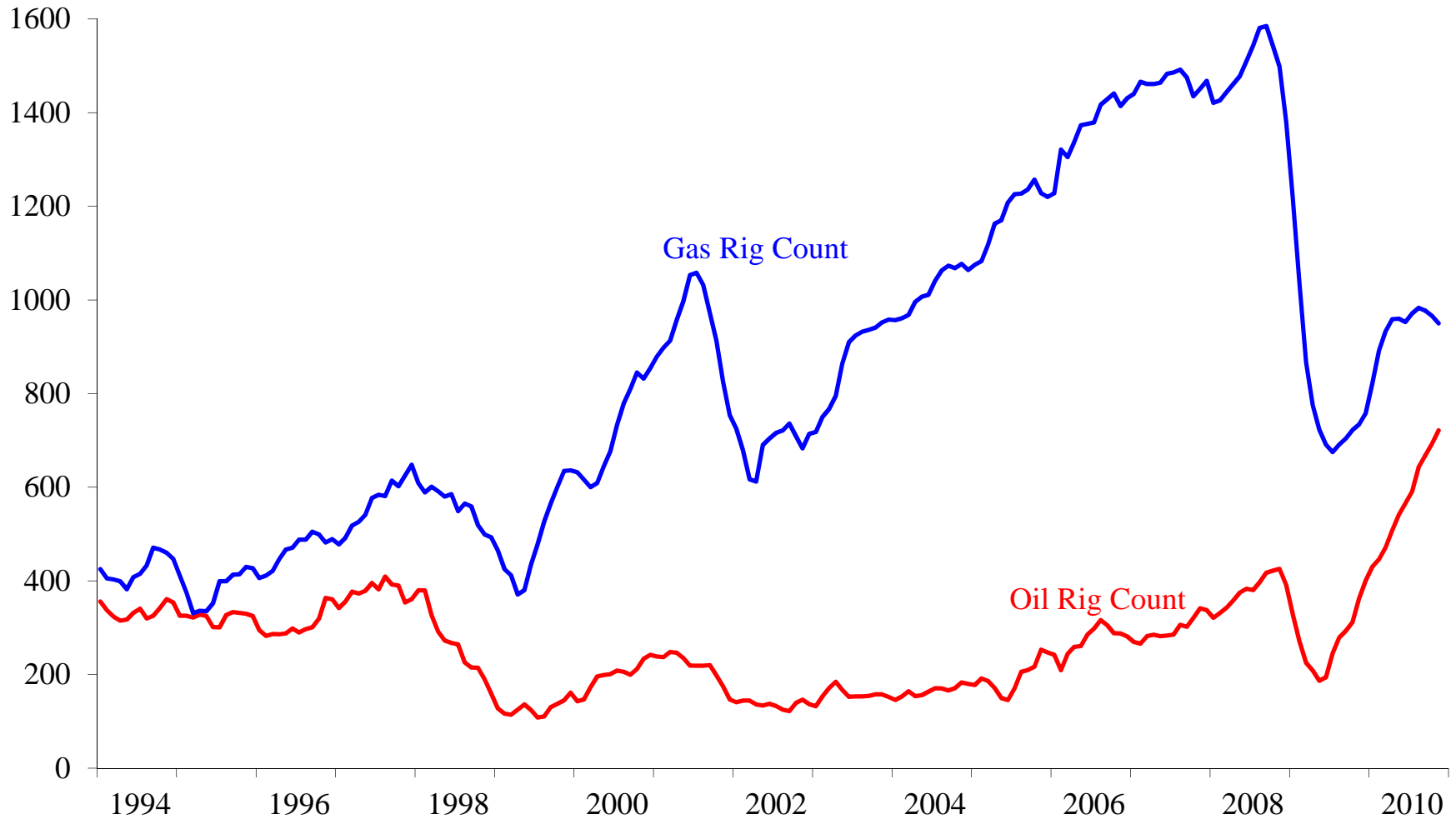


# Natural Gas Supply



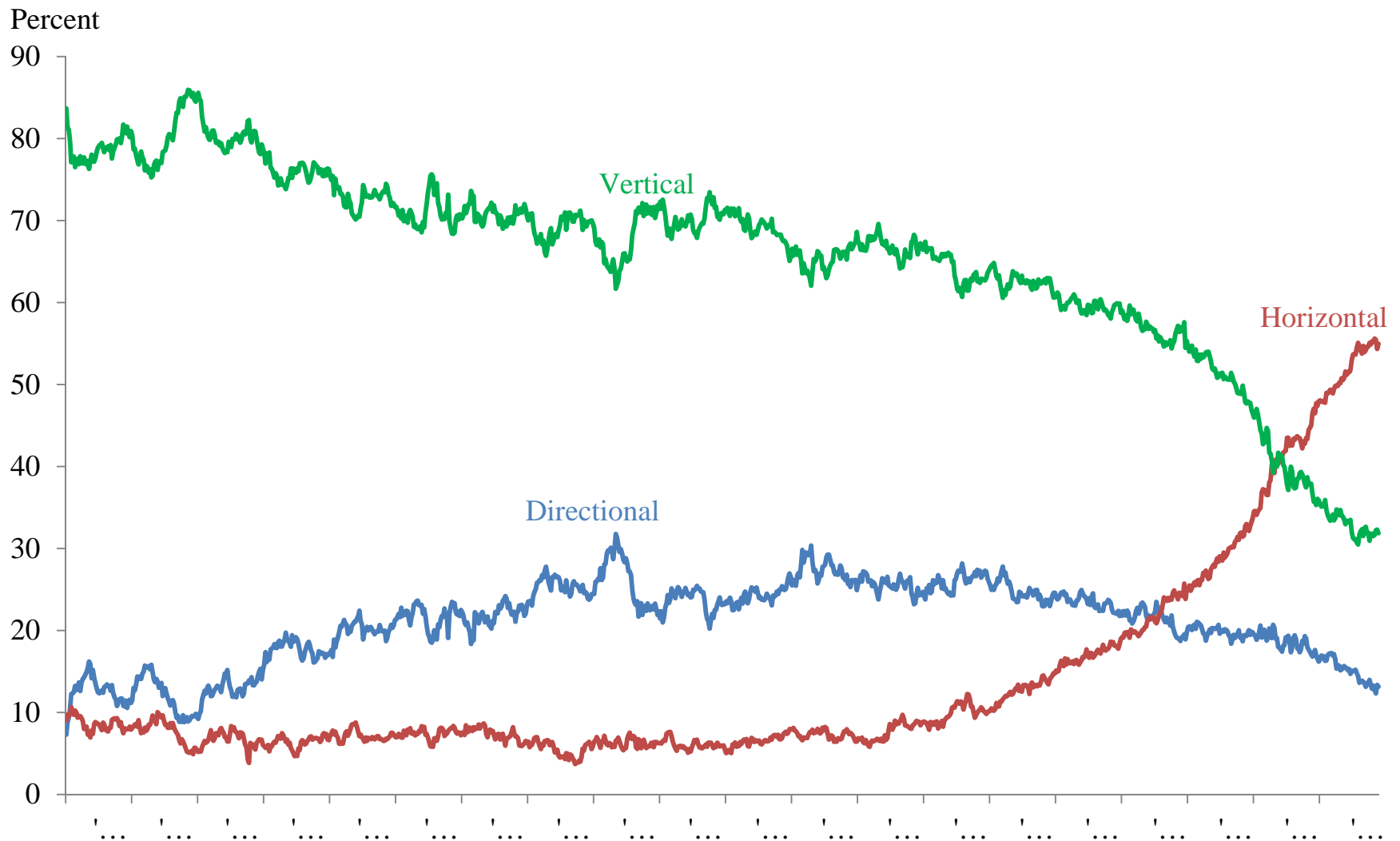
# Oil and Gas Rig Count

Rig Count, SA



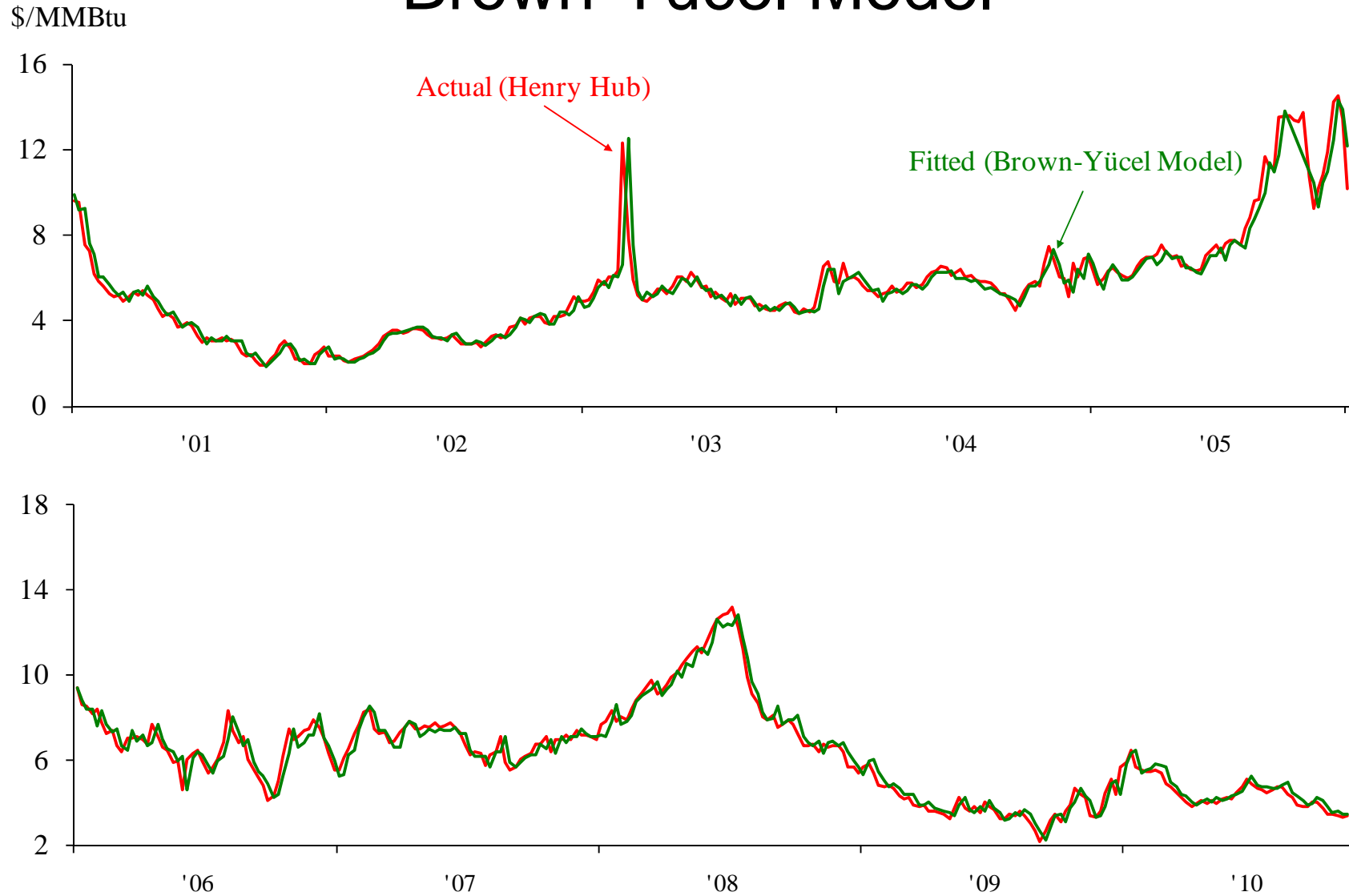


# Shale gas drives horizontal drilling

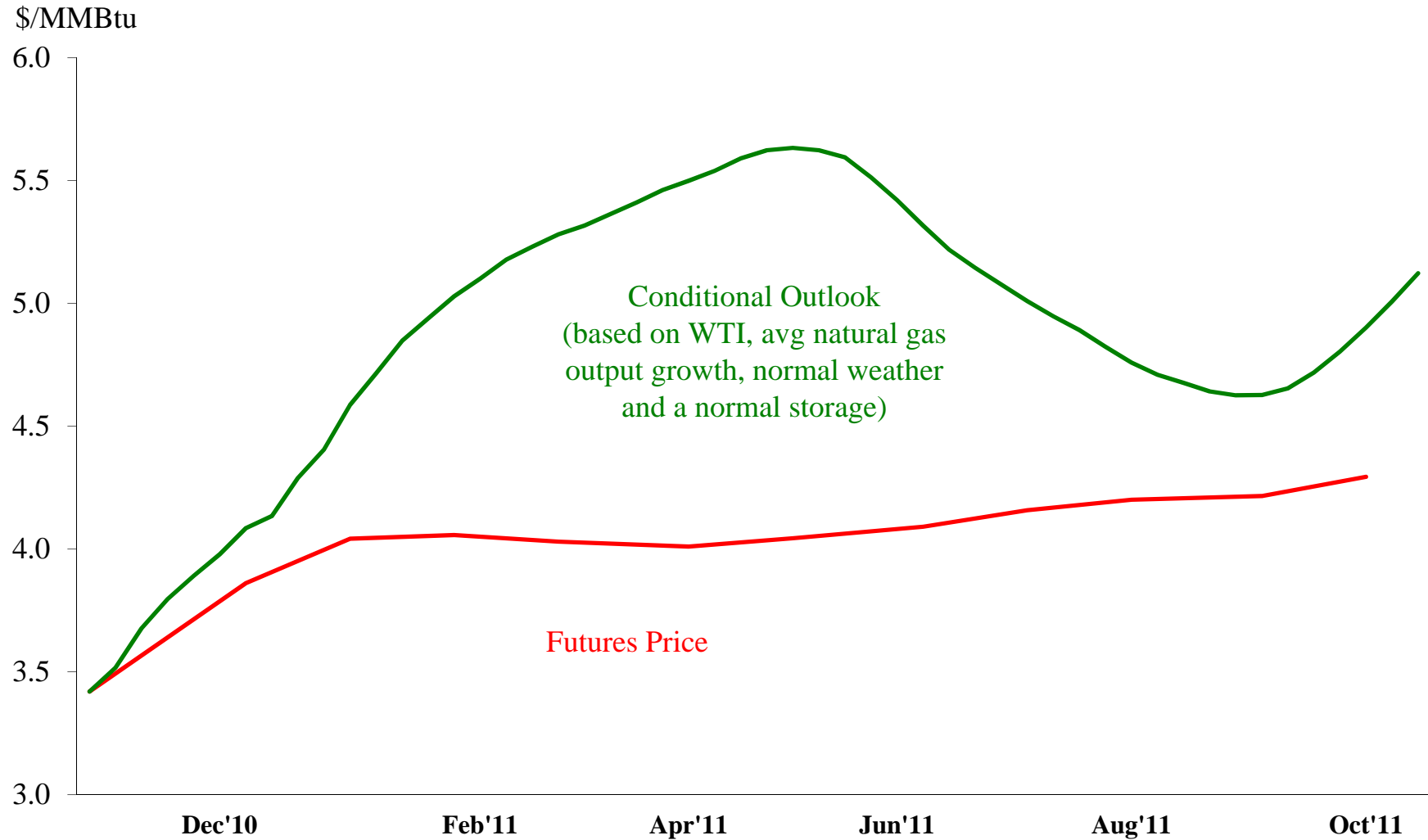


# Natural Gas Price

## Brown-Yücel Model



# Natural Gas Price Outlook



# Conclusions

- Simple rules of thumb don't perform well
- Natural gas prices linked to oil in the long run
- Short term dynamics driven by exogenous factors such as
  - weather, seasonality, storage, output disruptions
- Relationship may have shifted
- Gas prices at a discount to oil prices
  - Oil prices driven by global demand
  - Natural gas prices pressured by increased supply

# What are the Models Missing?

- Declining LNG imports
- Influence of financial markets?
- ...more research needs to be done.