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# **CEE 22<sup>nd</sup> Annual Meeting/Think Day**

## **December 12-13, 2017**

### ***Risk and Uncertainty in U.S. Gas Who Cares and Why?***



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***What, me worry?***





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## ***Risk versus Uncertainty***

***What's the big deal? Don't all economic endeavors face similar forces? Some do a better job and prosper while others do a poor job and fail. "Creative destruction." "No risk, No gain."***

### **Traditional Economic Theory (F. Knight)**

**Risk:** situations where we do not know the outcome, but can accurately measure the odds

**Uncertainty:** situations where the probability cannot be measured.

### ***Today's Wisdom***

*All events are so complex that forecasting is always a matter of grappling with uncertainty, not risk. Therefore, past data used to forecast risk may not reflect current conditions. (Ricardo Caballero, chair of MIT's Department of Economics)*



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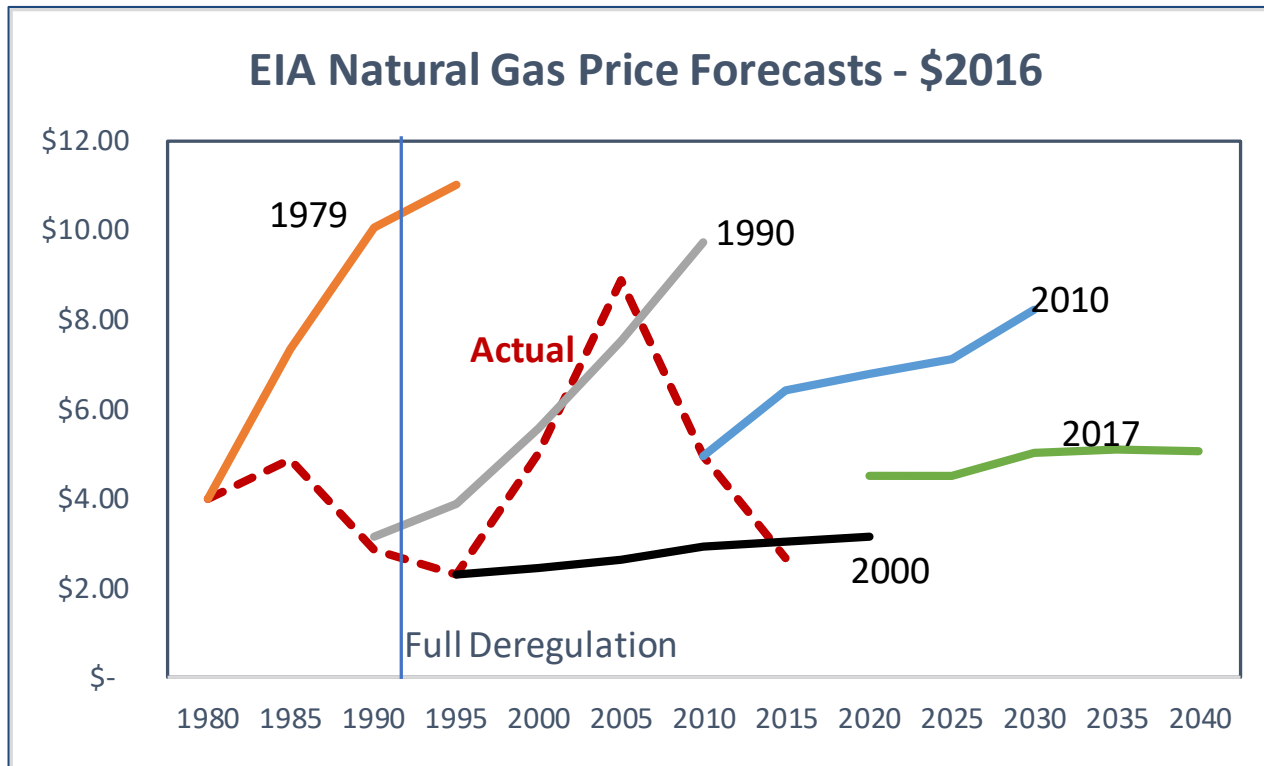
## ***U.S. Gas Risks***

***Are price and supply the primary risks?***

	Price	Supply	Other
<b>Gas Producers</b>	X		?
<b>Gas Consumers</b>	X		?
<b>Gas Pipelines</b>		X	?
<b>LNG Terminals</b>	X	X	?
<b>Policy Makers</b>	X	X	?
<b>Others Actors?</b>			



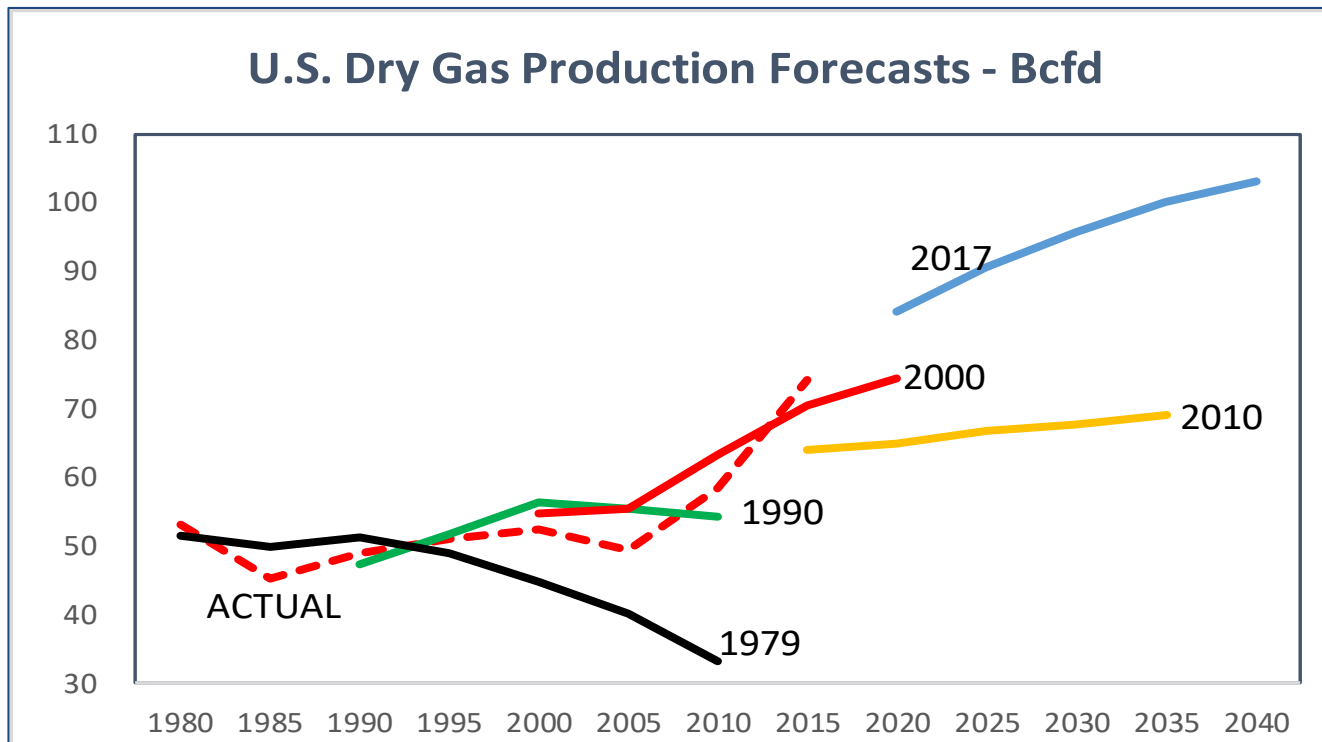
Are price forecasts affected by recent history? 2000 AEO? 2017 AEO? Have we finally abandoned the notion of increasing real prices? What decisions are driven by price forecasts?



Source: EIA (Average Wellhead or Henry Hub spot)



Are price forecasts affected by recent history? 1979 AEO? 2017 AEO? Aren't these forecasts always wrong? What decisions are driven by production forecasts?



Source: EIA



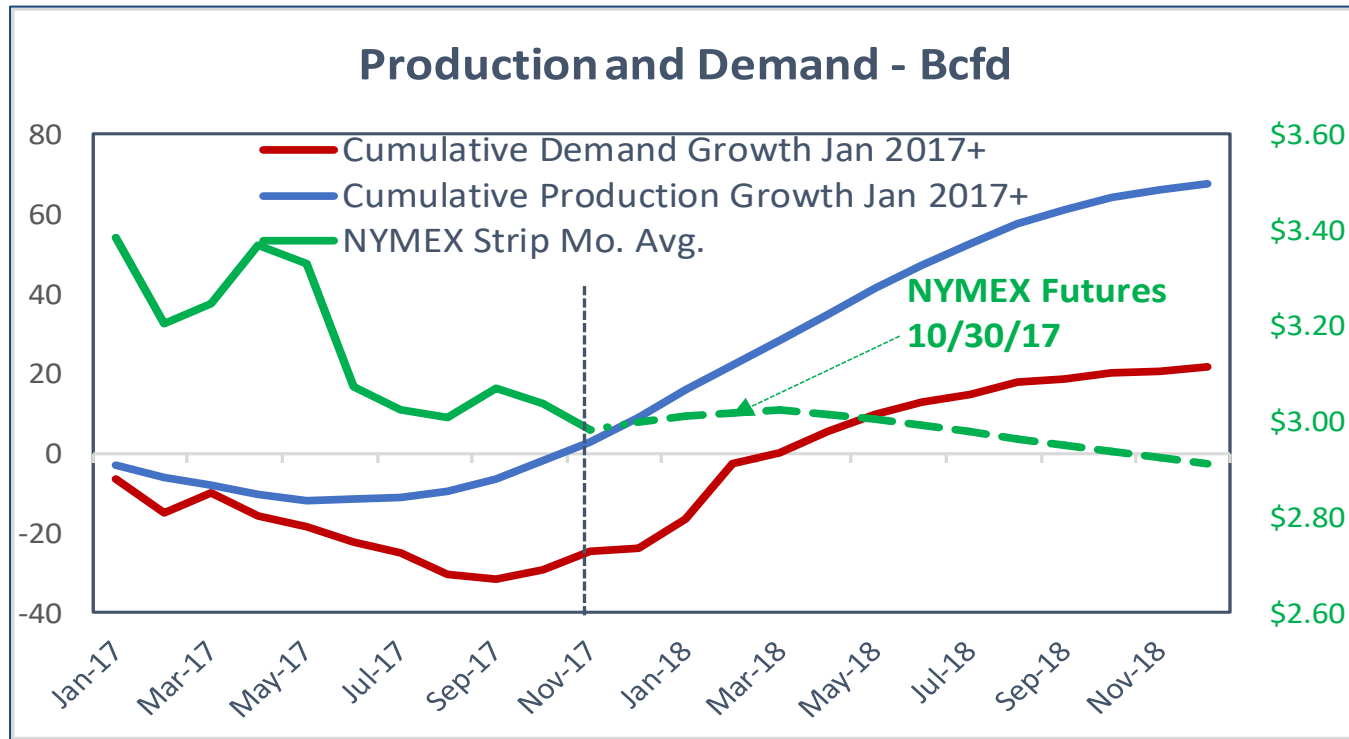
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## Aren't most risks insurable?

- Prices
  - Futures and swaps
  - Portfolio of sources
  - Storage
  - Contracts
- Supply
  - Portfolio of sources
  - Storage
  - Contracts
- Causality and liability insurance
- Etc.



# Do Economics 101 Principles Still Apply? Does a Deficit = High Price & Surplus = Low Price?



Source: EIA and CME





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## Microeconomics 101: Gas Prices Elasticity

- EIA forecast: 2018 Production up ~6 Bcfd
  - Market reaction: NYMEX Strip <\$3.00
  - High elasticity = demand up and drilling down in 2018 & prices move higher
  - Low elasticity = little change in demand and supply in 2018 & and prices remain weak
- Factors impacting supply elasticity
  - Hedging
  - Realtime data
  - DUCS
  - J-I-T techniques
- Factors impacting demand elasticity
  - Hedging
  - Fuel Switching



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## *Les' Rules for Businesses*

- 1. Hedge all “bets” that’ll cost you the company.*
- 2. Try to be the lowest cost producer/seller.*
- 3. Diversify if you can.*
- 4. If all is lost, ask the government for help.*