A microeconomic view of oil price levels and volatility

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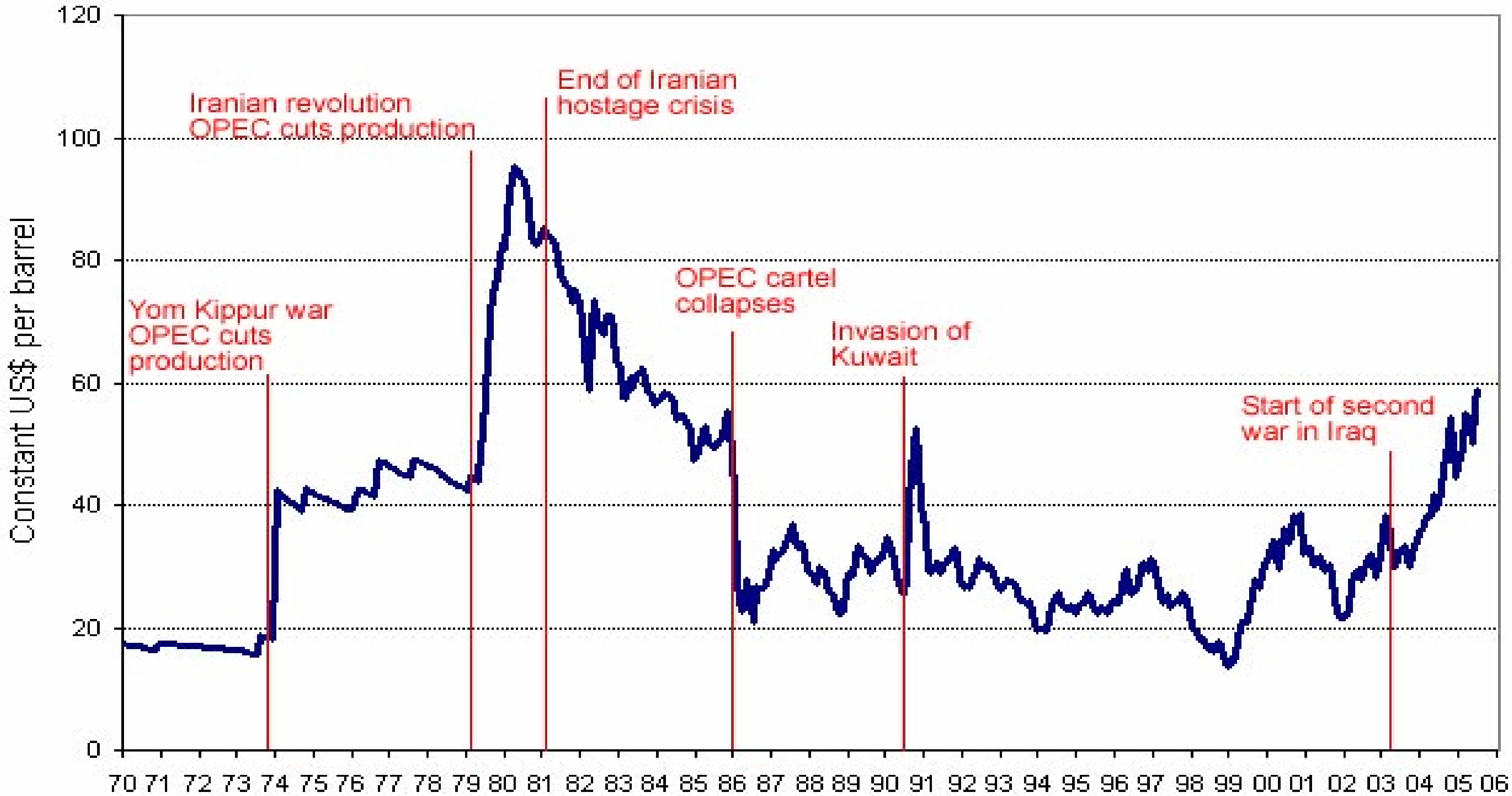
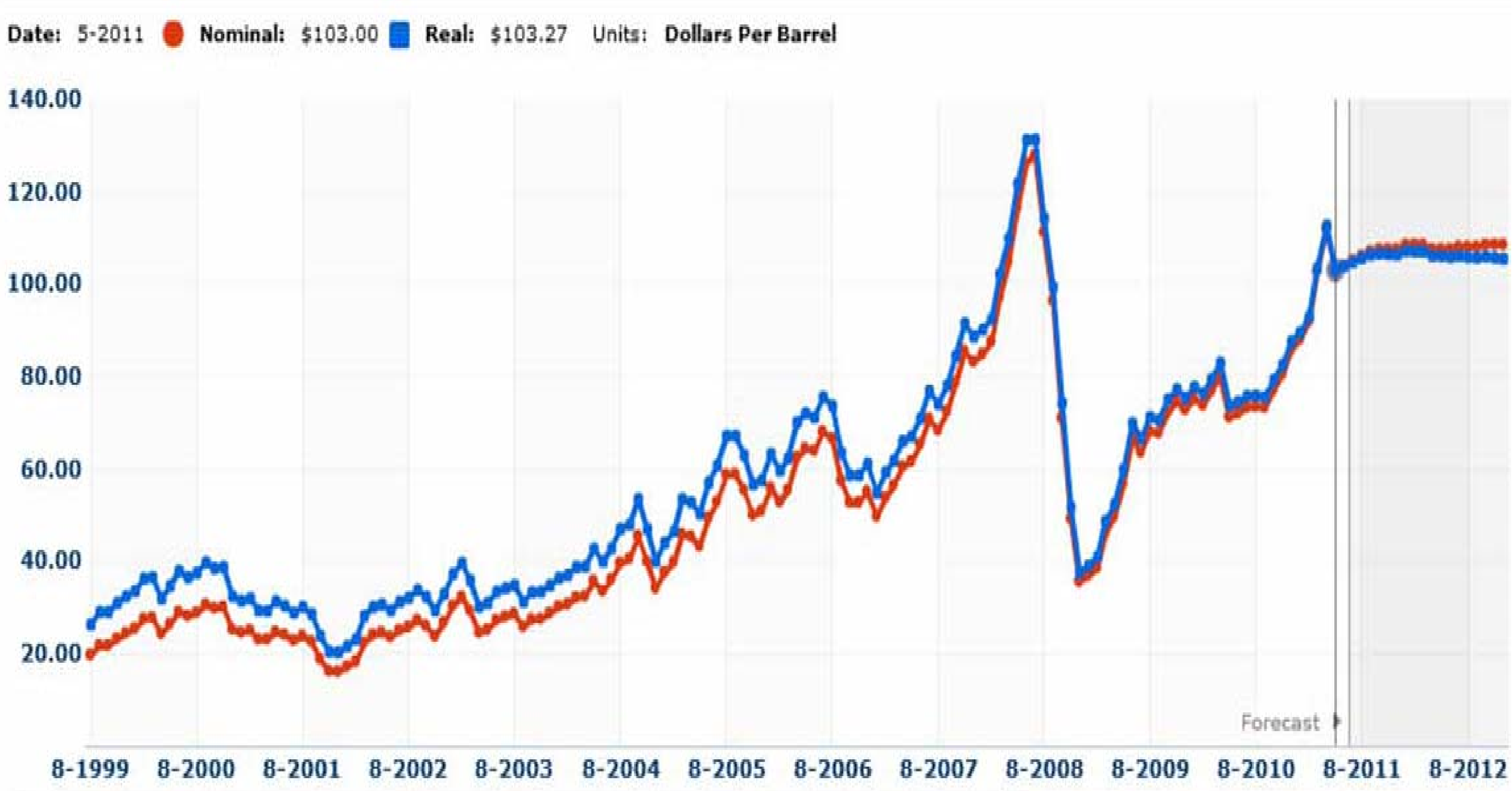
Oil Consumption Presents Four Distinct Long-term Challenges

- Individual wealth shocks from scarcity and high prices – political and policy implications
  - Is there a market failure? Non-competitive market?
  - Similar issue with natural gas or other commodities
- Macroeconomic impact of supply/price fluctuations
  - Different from natural gas due to net import position
- Geopolitics of wealth flows from oil
  - Significant, but little the U.S. can do in a world market
- Environmental damage from extracting and consuming oil
  - Cheap inframarginal oil will be very difficult to drive out

Oil Prices 1970-2006



Price Spike, Collapse and Rise Since 2006



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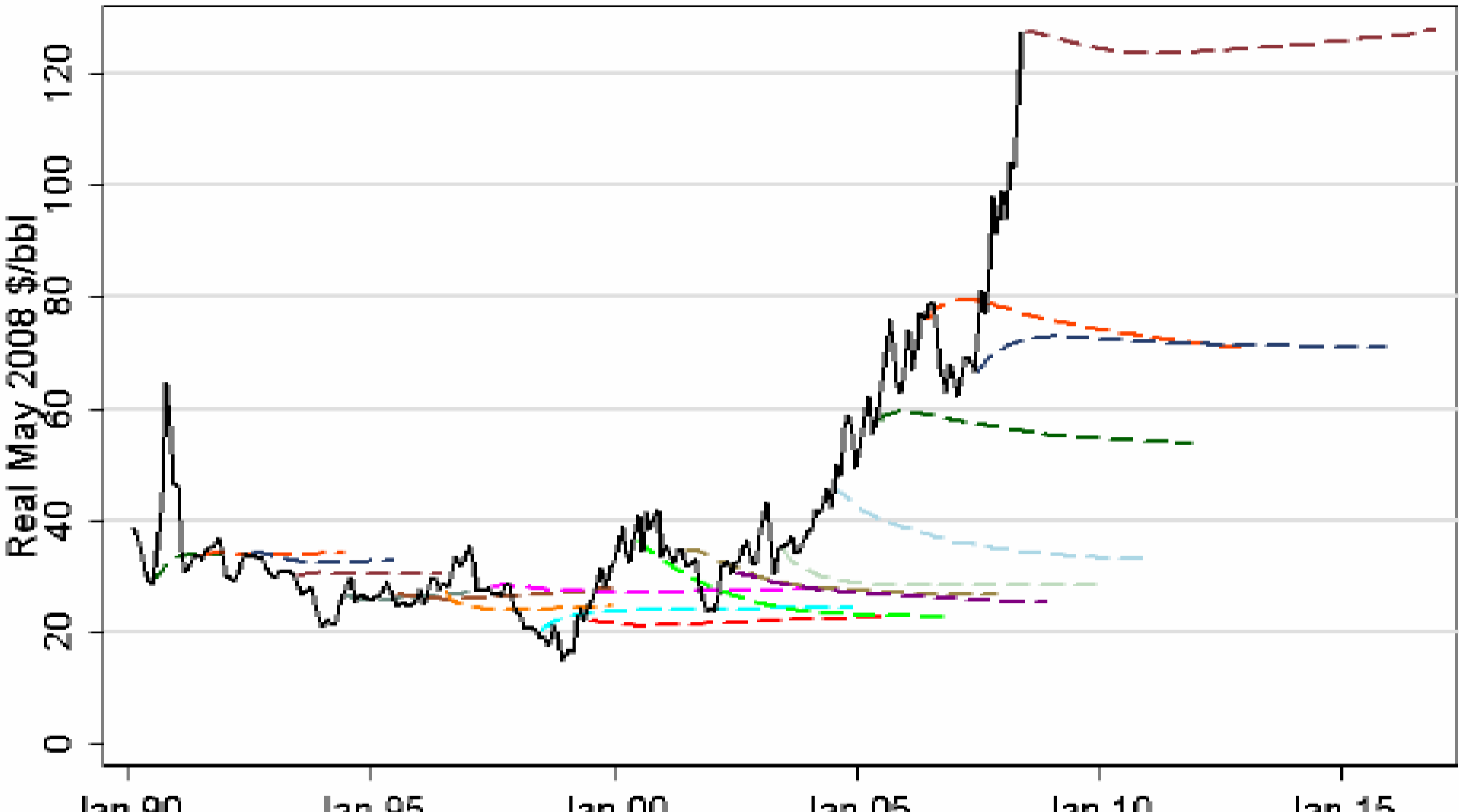
NYMEX spot (front month) and futures prices (futures curves for May)



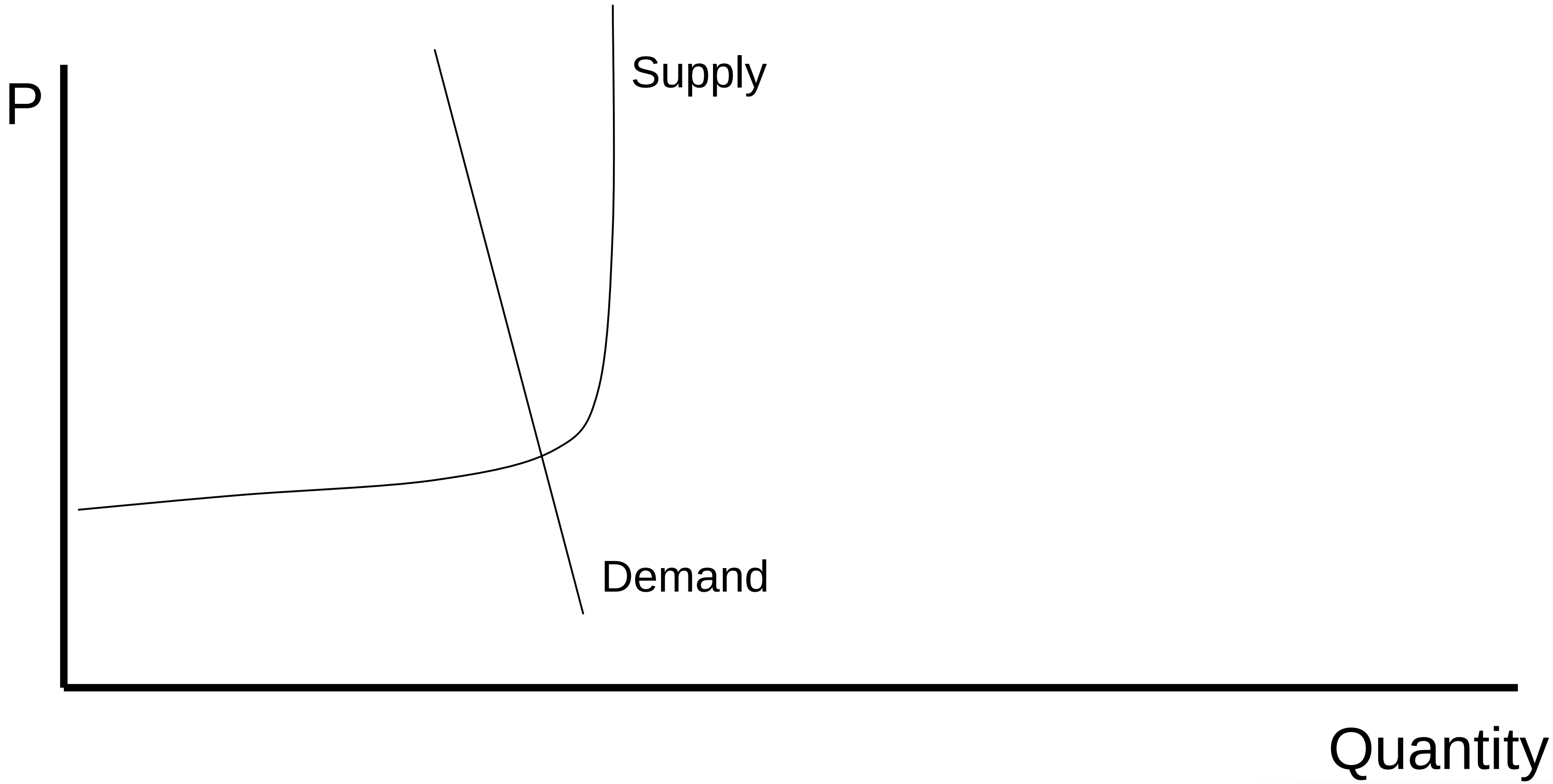
Forward curves inflation-adjusted according to their trade date, not their contract date.

Spot versus Futures Prices for Oil

- Front month futures contract, usually quoted as the "spot" price, is a bet on price days in the future
  - Specific delivery location and dates
  - Arbitrage opportunity if spot price deviates from physical trades – physical trades indexed to NYMEX
  - Front month contracts go to delivery every month
    - Not like common stock investment
    - Reflect physical markets, plus inventory fluctuations
- Futures contracts for later delivery are bets on future spot prices
    - Like equity investment, except distinct date for "returns"
    - Futures transactions can be speculation and/or insurance

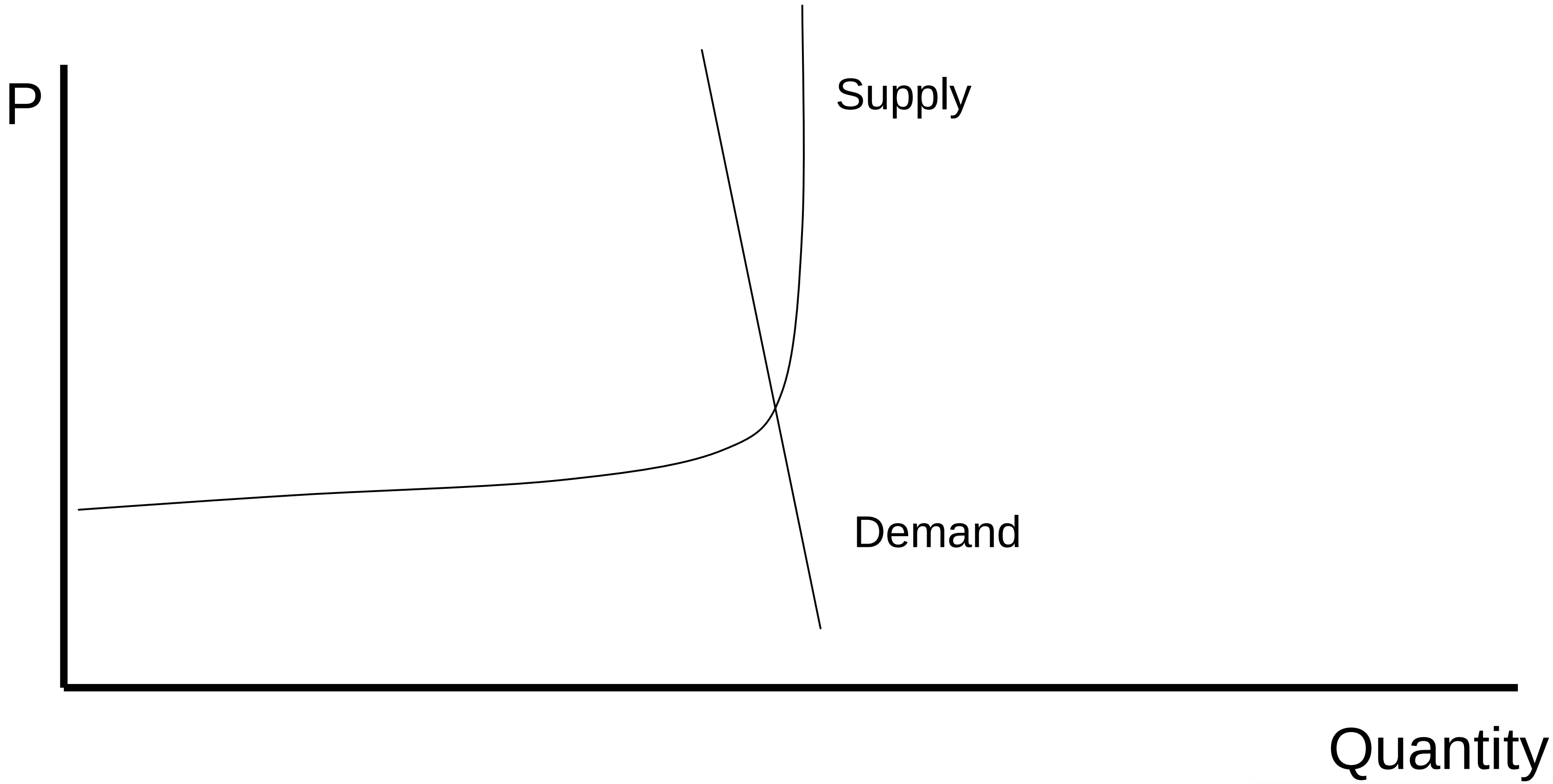
Oil Market Equilibrium around 2003

-- capacity expanding ahead of demand



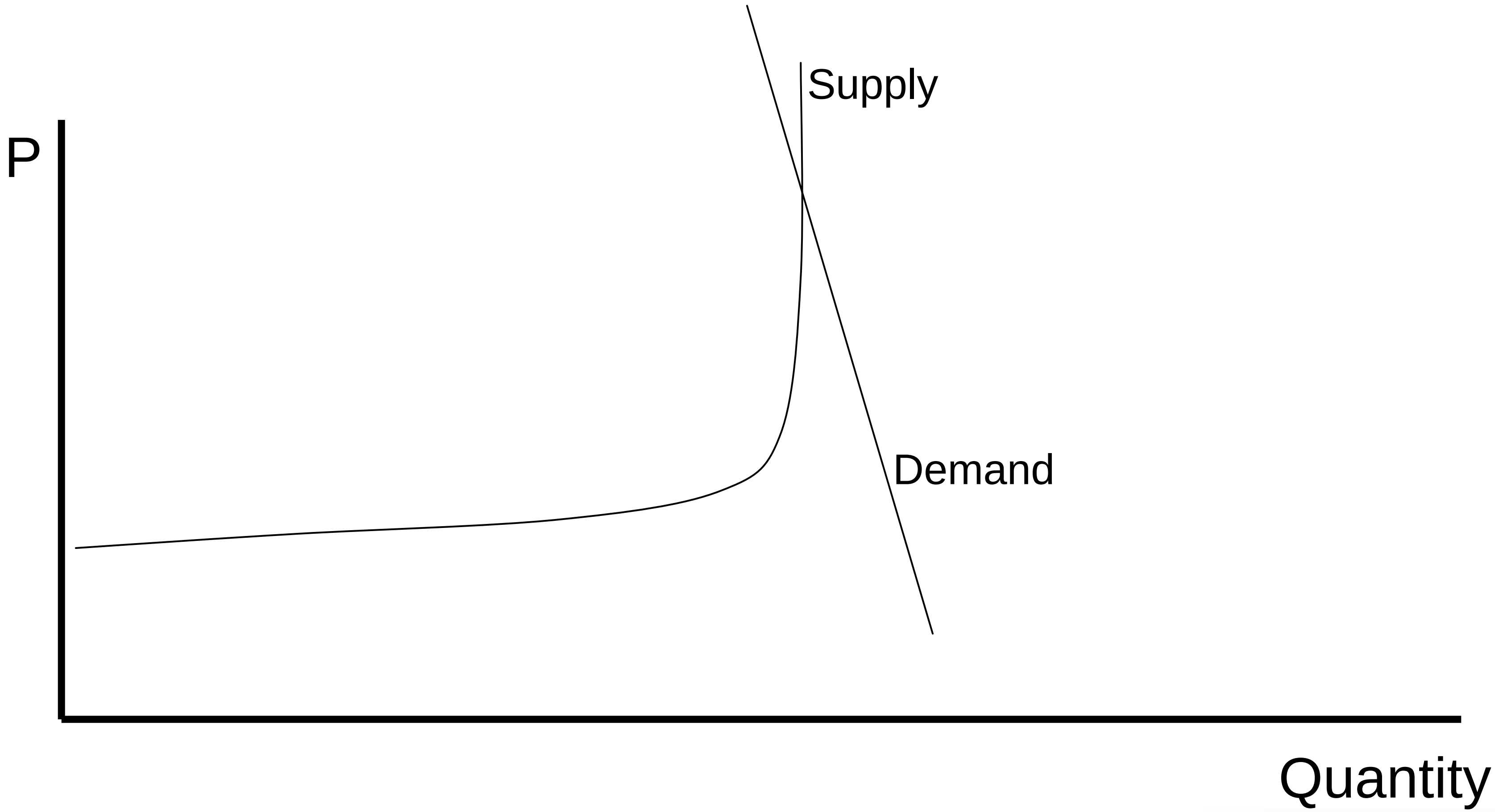
Oil Market Equilibrium around 2005

--capacity expansion slows, rapid demand growth continues



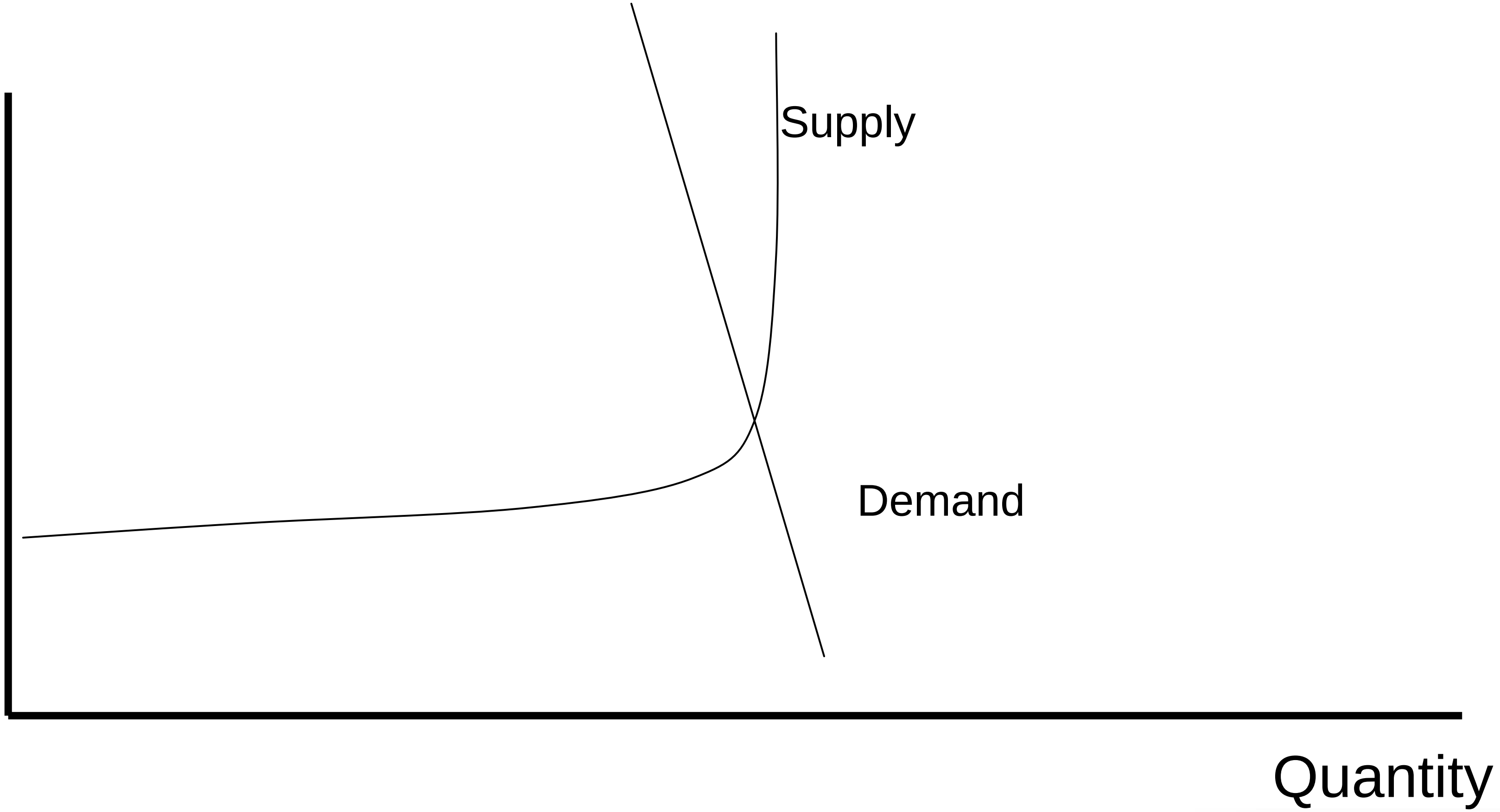
Oil Market Equilibrium summer 2008 –

capacity expansion slows, rapid demand growth continues



Oil Market Equilibrium in late 2008

--- demand declines, little quantity response, price plummets



What happened to oil prices in 2008?

- Supply and Demand (plus inventory adjustment) drives spot price
- Until about 2003 supply was expanding in sync with demand, but net supply growth slowed
- => lots of volatility as small changes in demand or supply cause large price shifts
- Evidence of market power by Saudi Arabia, maybe some other producers
- No evidence caused by US/western oil majors
- Short-term “remedy” was worldwide economic downturn

Speculation versus Market Manipulation and Market Power

- Speculators' role in spot versus futures markets
  - Can affect inventories and futures prices, which is likely to be a good thing *ex ante* though maybe not *ex post, eg,* first gulf war in 1990-91
  - Don't drive spot prices in physical market equilibrium unless they change physical market
- Market manipulation is an attempt to *change* market price through asymmetric information
  - Creating a short-term mismatch between financial and physical positions
- Market power requires a non-trivial market share

Potential speculation impact on futures and spot oil prices

- Speculators buy front-month contracts in speculative frenzy (or just naivete)?
  - But then what? When contract expires price collapses…even if they roll the contract.
- Speculators buy long-dated futures?
  - Drives up long-dated prices => increases incentive to produce later vs now, or to increase inventories
  - Two indicators
    - Futures market in contango…but not in 2008
    - Inventories increase
      - Very conservative estimate: 1.5 billion barrels would have gone into inventories from July 2007 to June 2008
      - Inconsistent with data or storage facilities

Some remaining puzzles/questions

- Futures market was in backwardation most of 2007 and through June 2008, but flattened out in mid-2008 around $140/bbl
- Current Brent crude (Europe) versus NYMEX (Cushing, OK) price spread and co-movement
- Why did nearly every airline CEO sign a letter urging restrictions on oil market speculation?

- Severin Borenstein, "Cost, Conflict and Climate: Navigating the Global Oil Market", *Milken Institute Review*, 4th Quarter 2008. (a more detailed version of the paper is available at "Cost, Conflict and Climate: U.S. Challenges in the World Oil Market", Center for the Study of Energy Markets Working Paper #177, University of California Energy Institute, Revised June 2008.)