Have policy and market shifts made agricultural commodity prices *more* or *less* volatile?

Yes!

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Overview

- The FAO perspective
- Historical relationships and policy
- An example of US biofuel markets and policies
- The impact of policy uncertainty
- Some *seemingly* innocuous assumptions used on analysis

Potential negative effects of volatility

- Poverty Traps
- Reduced, delayed or sub-optimal farm level investment.
  - Changes in cropping patterns
- Sub-optimal investment at the macro level
- Social instability
- Market opportunities to hedge risk are limited or nonexistent for small scale developing country farmers

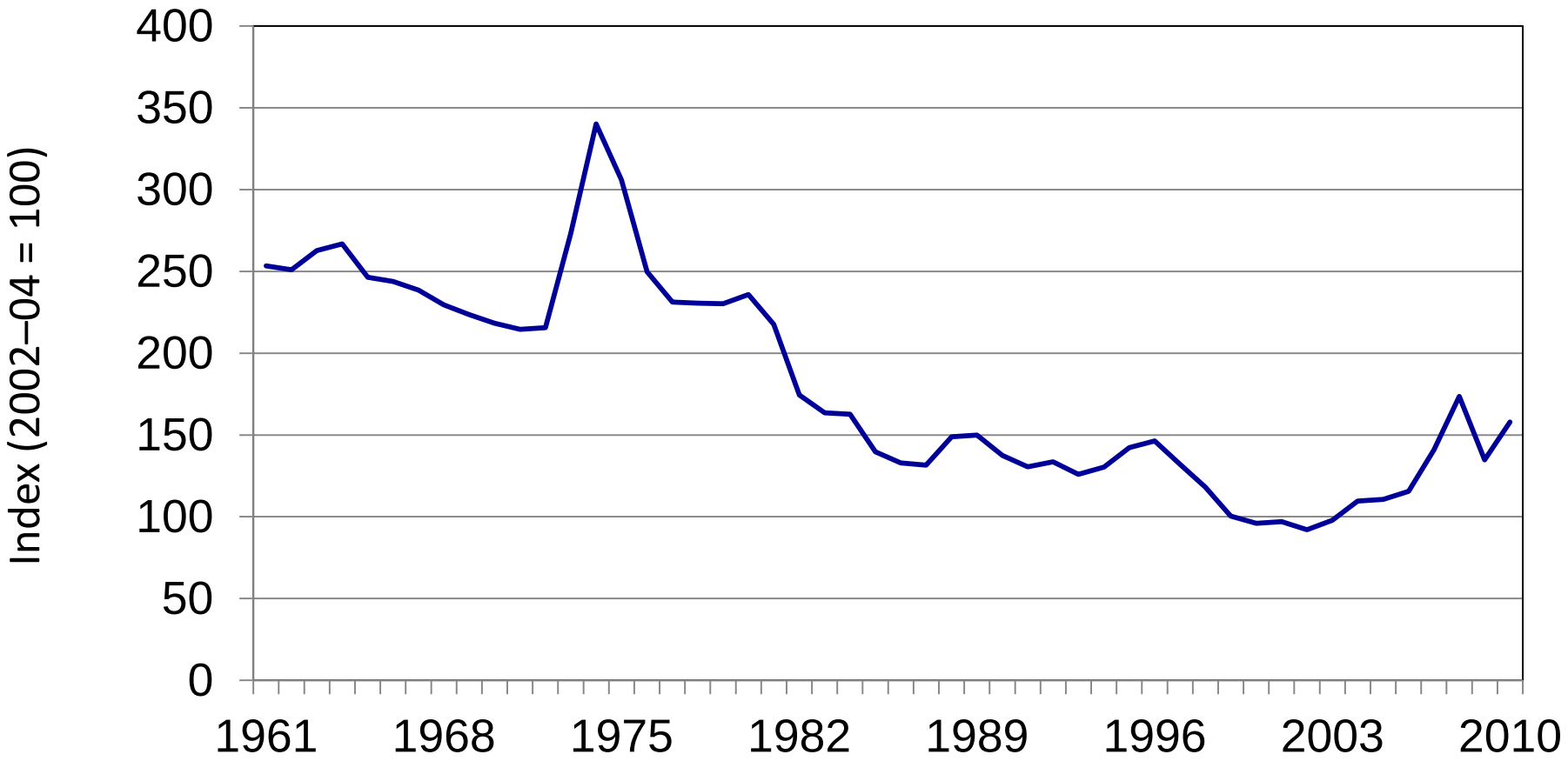
FAO policy response to volatility

- Expanded market information systems
- Trade liberalization, improve market access
- Investment in agriculture to improve productivity and adaptability
- International and national safety nets
- Strategic food emergency reserves (WFP)
- Biofuels - open markets, remove subsidies and add flexibilities to mandate policies

Long-term interest in volatility
FAO - Global Perspectives Study Unit

- Links to energy and its future volatility
- Area expansion in countries with historically greater yield variability
- Changes in climate may effect average crop yields but also distribution
- As a result, technology adoption may push for things like yield stability over productivity gains.
- Variability may be a ‘marketing opportunity’ for developed country farmers but small scale producers in developing countries can’t exploit it

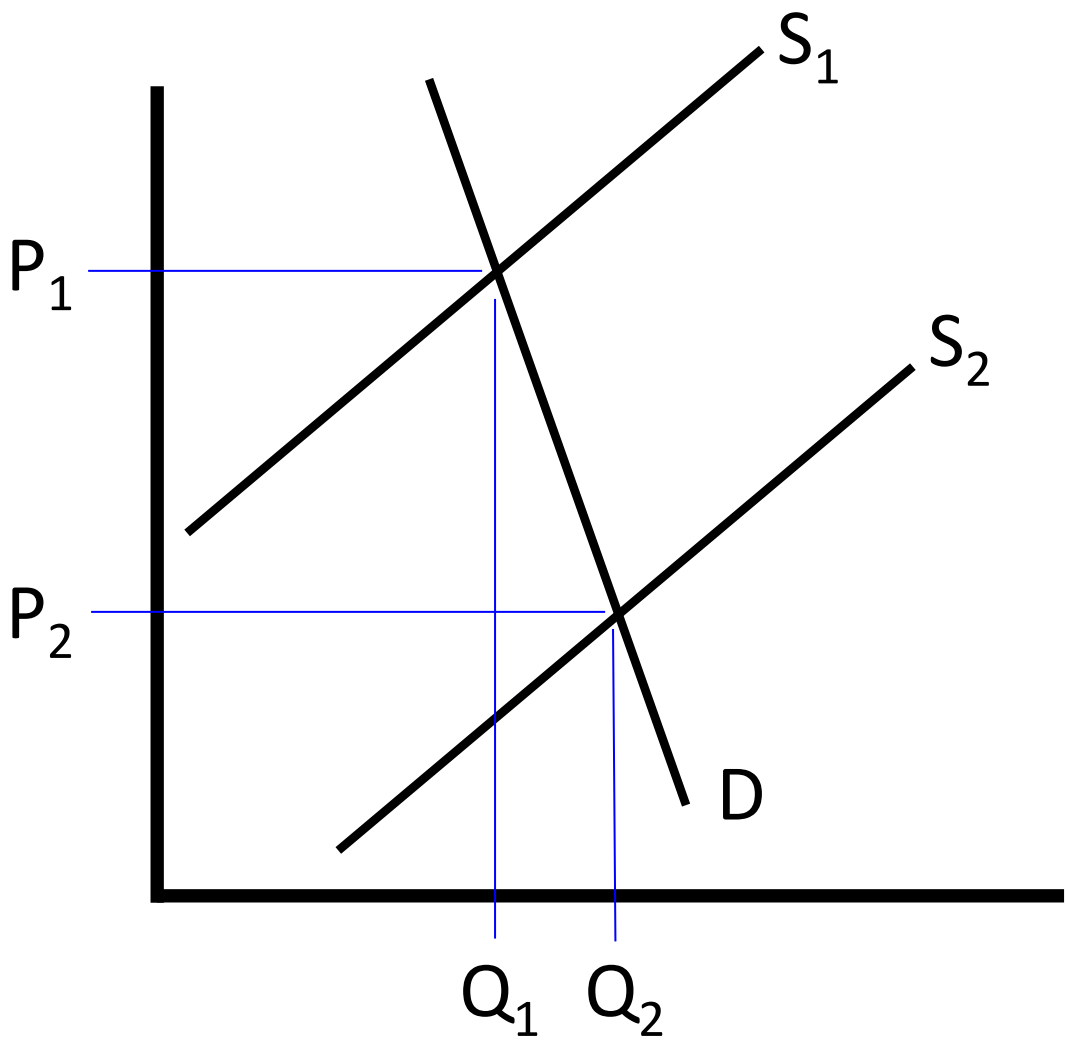
Real food prices remain low relative to history



Source: FAO-SOFI 2011 Notes: FAO Food Price Index, adjusted for inflation, 1961–2010, calculated using international prices for cereals, oilseeds, meats, and dairy and sugar products. The official FAO Food Price Index has been calculated since only 1990; in this figure it has been extended back to 1961 using proxy price information. The index measures movements in international prices, not domestic prices. The United States gross domestic product deflator is used to express the Food Price Index in real rather than nominal terms.

Cochrane's Treadmill

The basis for US Ag policy for 7 decades

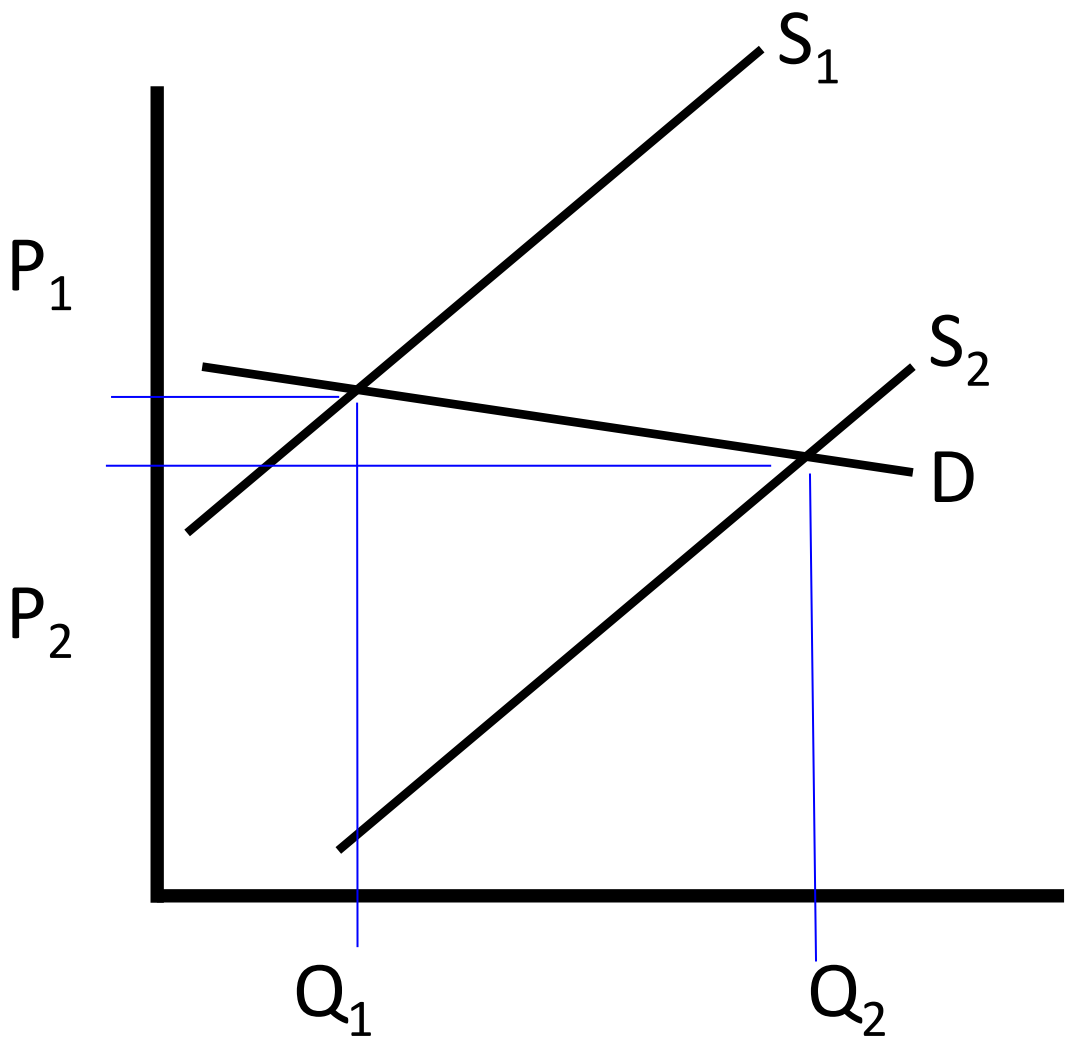


- Productivity gains shift out supply curve.
- In face of inelastic demand for food, benefits go mostly to "consumers" driving consolidation among producers.
- Is this still true given biofuel markets and policies?

Are we analyzing volatility in energy and ag markets correctly?

- Journals, and therefore the field, push for
  - Simplistic elegance
  - Ease of replication (see simplistic elegance)
  - Transparency (see simplistic elegance)
- A simple model may provide for all of these (and improve your chances of publication) but does it provide the *comprehensive* answers needed by policy makers?

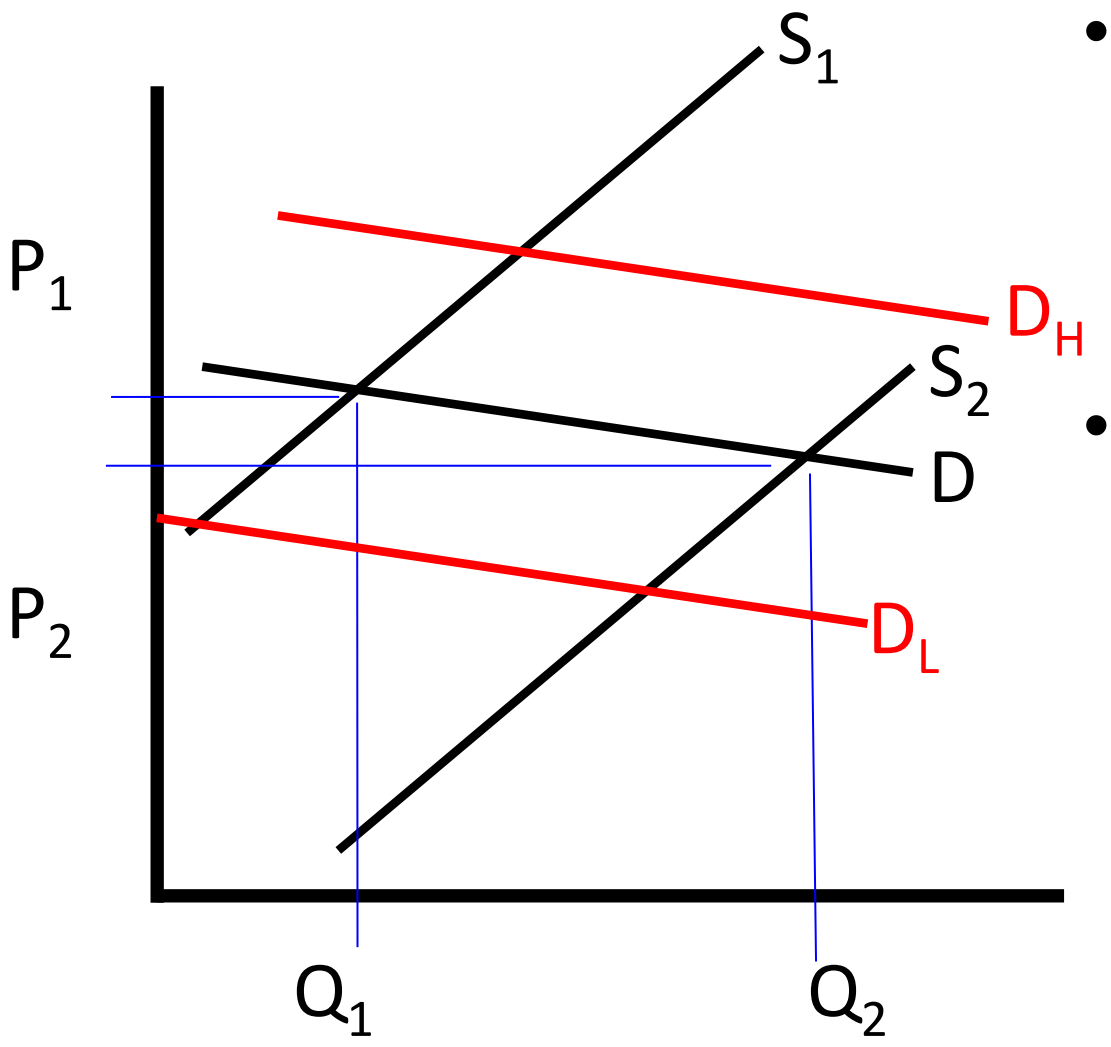
Biofuel Demand



- The production of biofuels represents a potentially very elastic demand given the relative size of the two markets.

Does this stabilize prices?

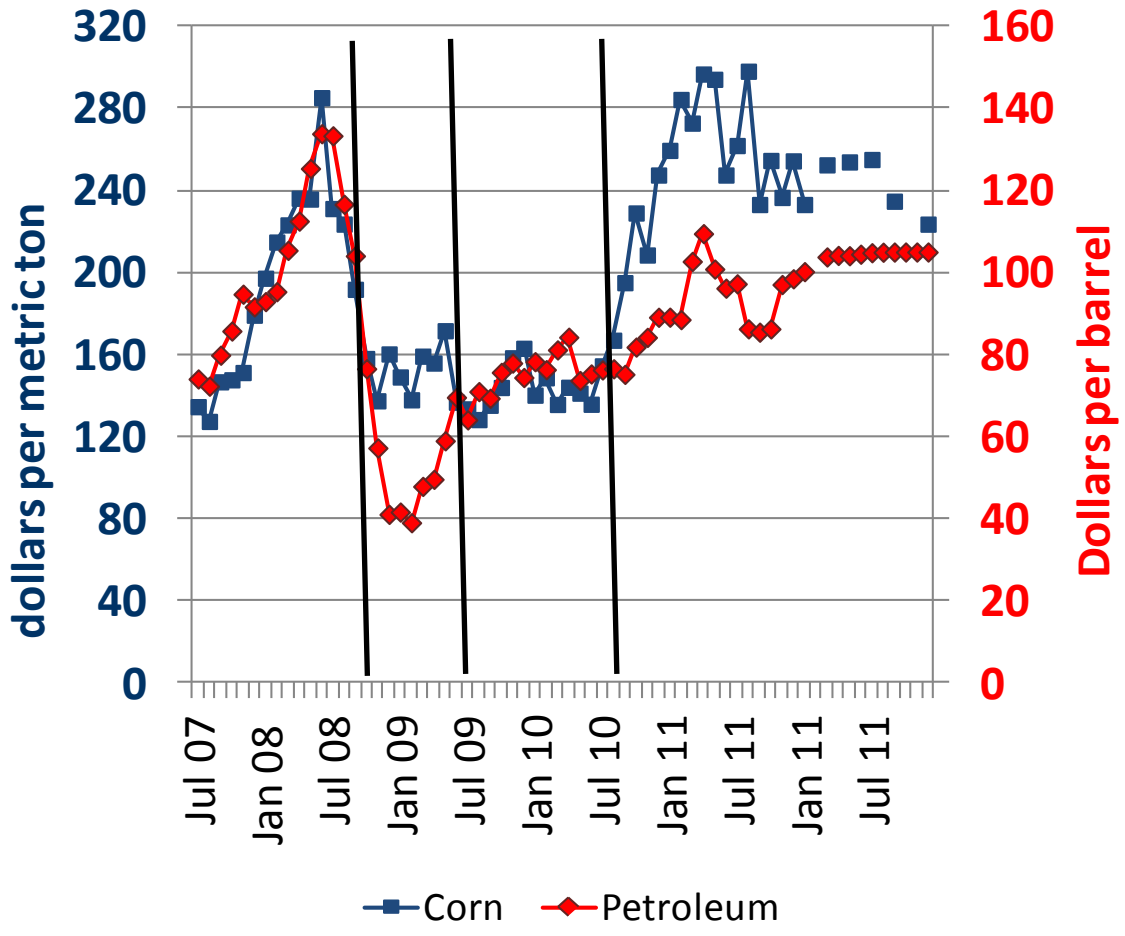
Biofuel Demand



- However, you now have a new source of volatility.
- The net effect is then not so clear

But there is more!

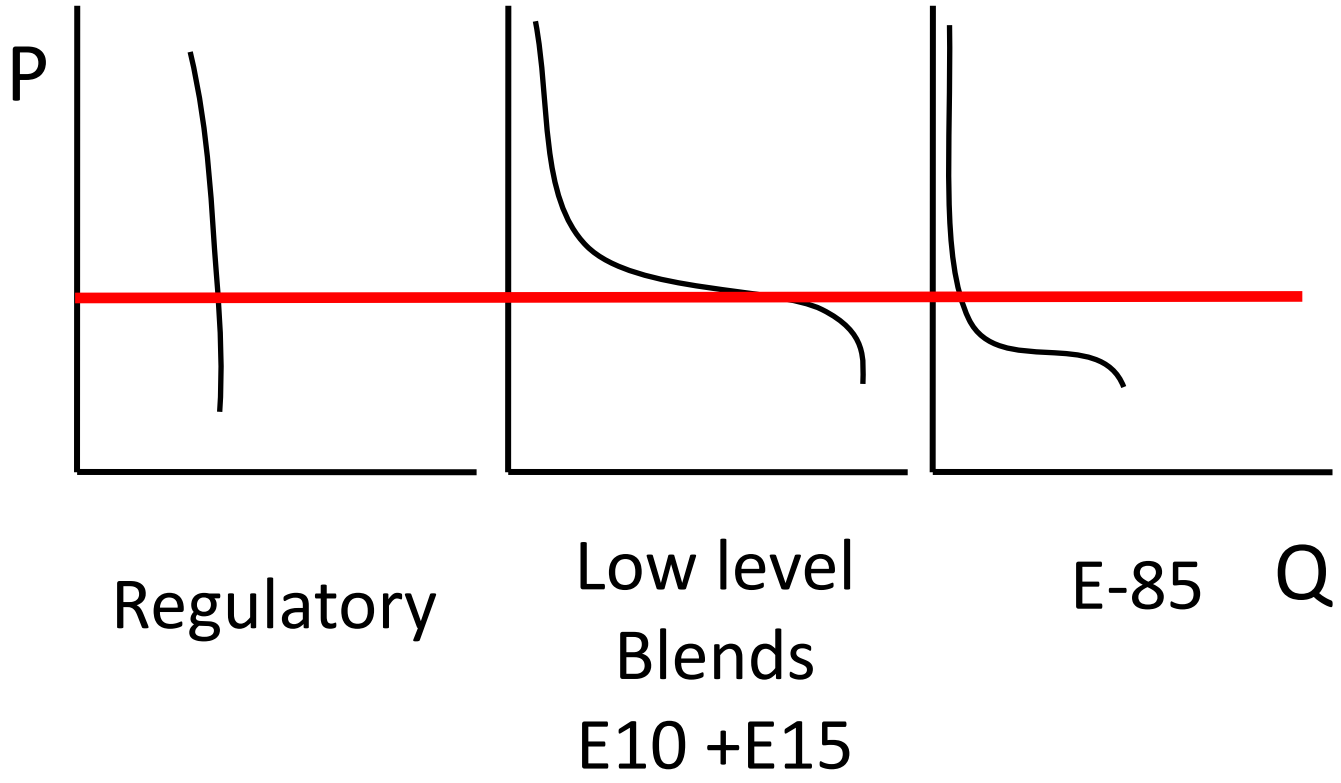
Maize and petroleum prices



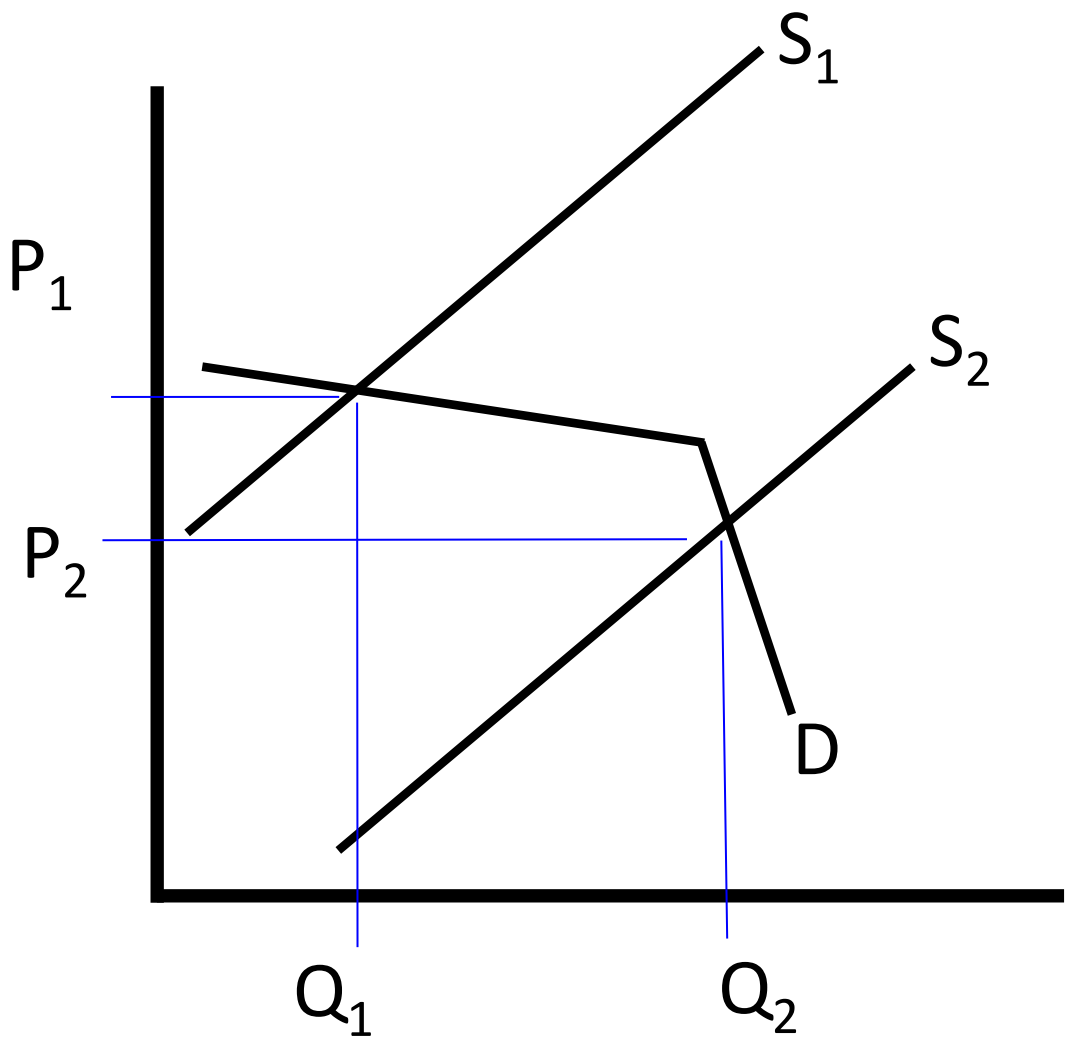
- Petroleum price spike in 08, capacity is sufficient and pulls up maize prices (speculation too)
- Petroleum prices fall but maize stops at about $150, why?
- Short maize crops in 2010 and 2011 boost prices above 2:1

Corn price is nearby futures price. Petroleum price is for West Texas Intermediate. Sources: USDA's Agricultural Marketing Service and Energy Information Adm.

Ethanol demand

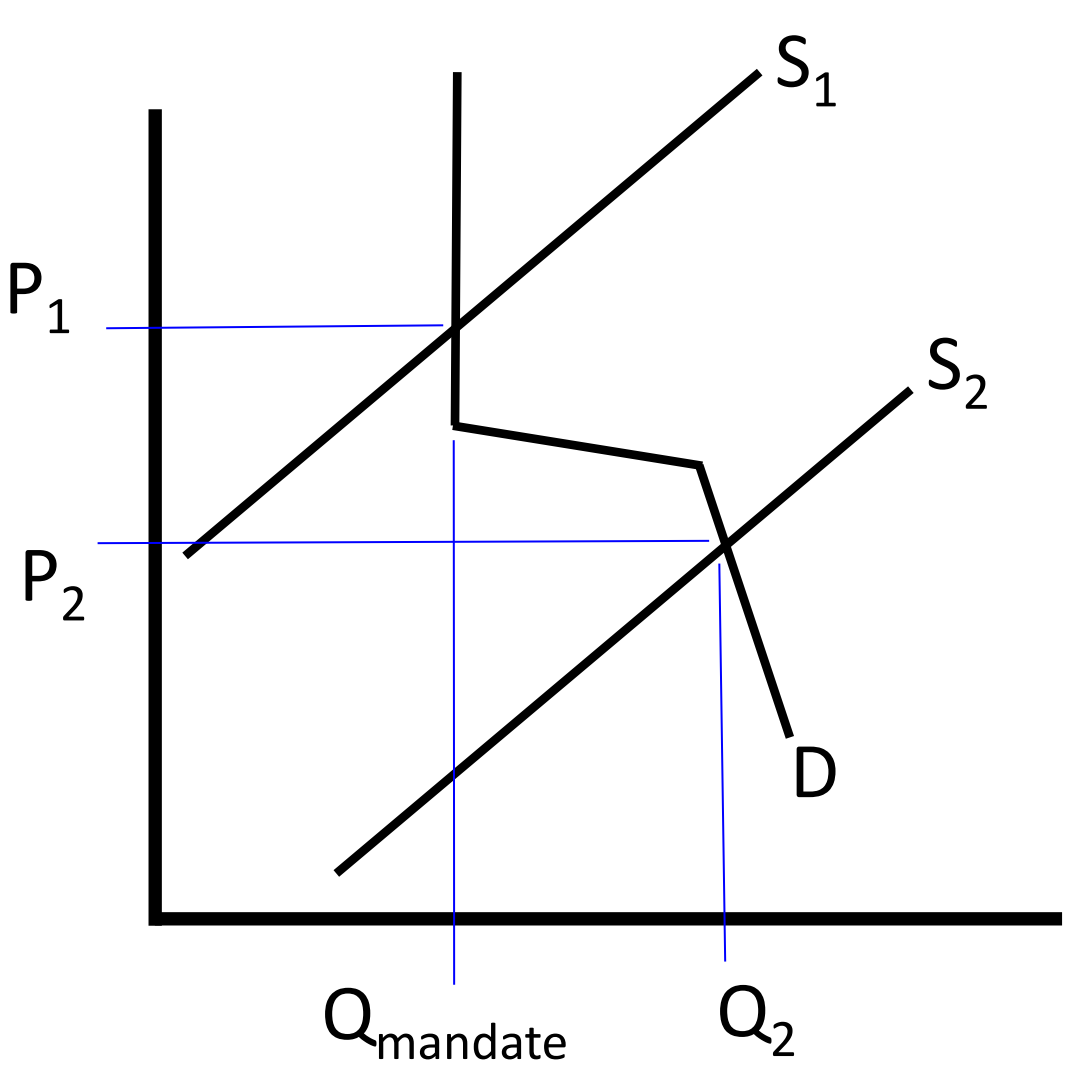


Blend Wall



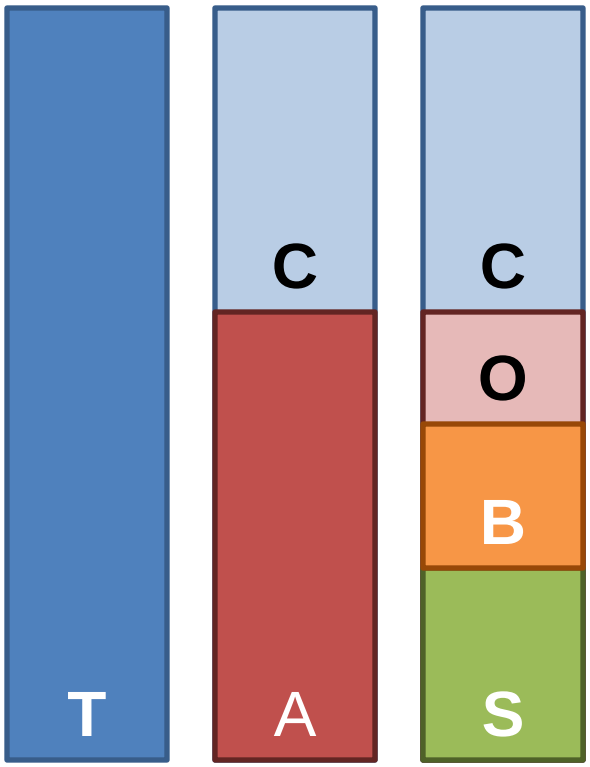
- There may be short run constrains on the growth in biofuel consumption
- Over some range demand elasticity is reduced

Mandate



- The US also imposes quantitative minimums known as mandates.
- Again, there may be short run constraints on the minimum amount of biofuel consumed
- Over some range demand elasticity is reduced

Biofuel mandates



Mandates

Mandates

T = overall mandate

A = advanced mandate

B = bio-based diesel mandate

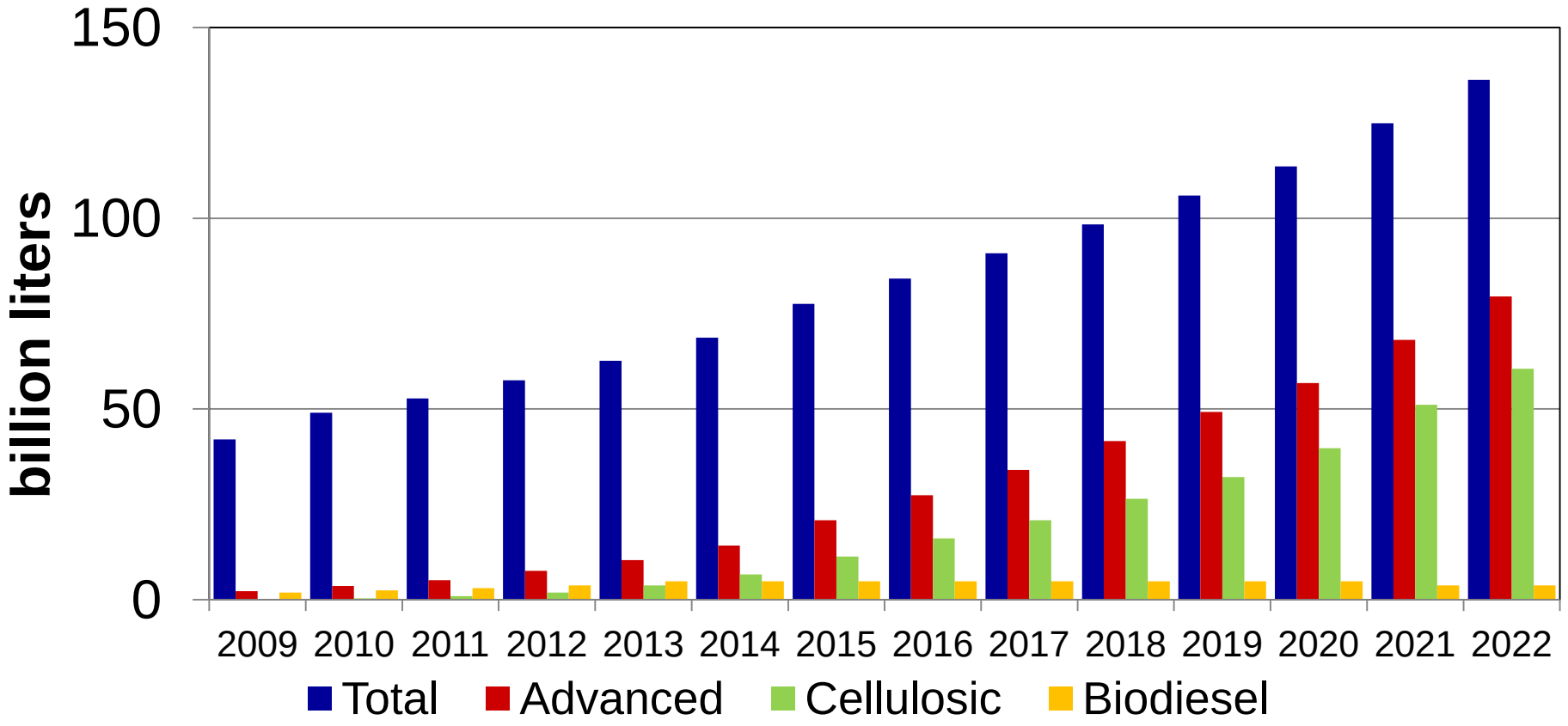
S = cellulosic mandate

Implied gaps

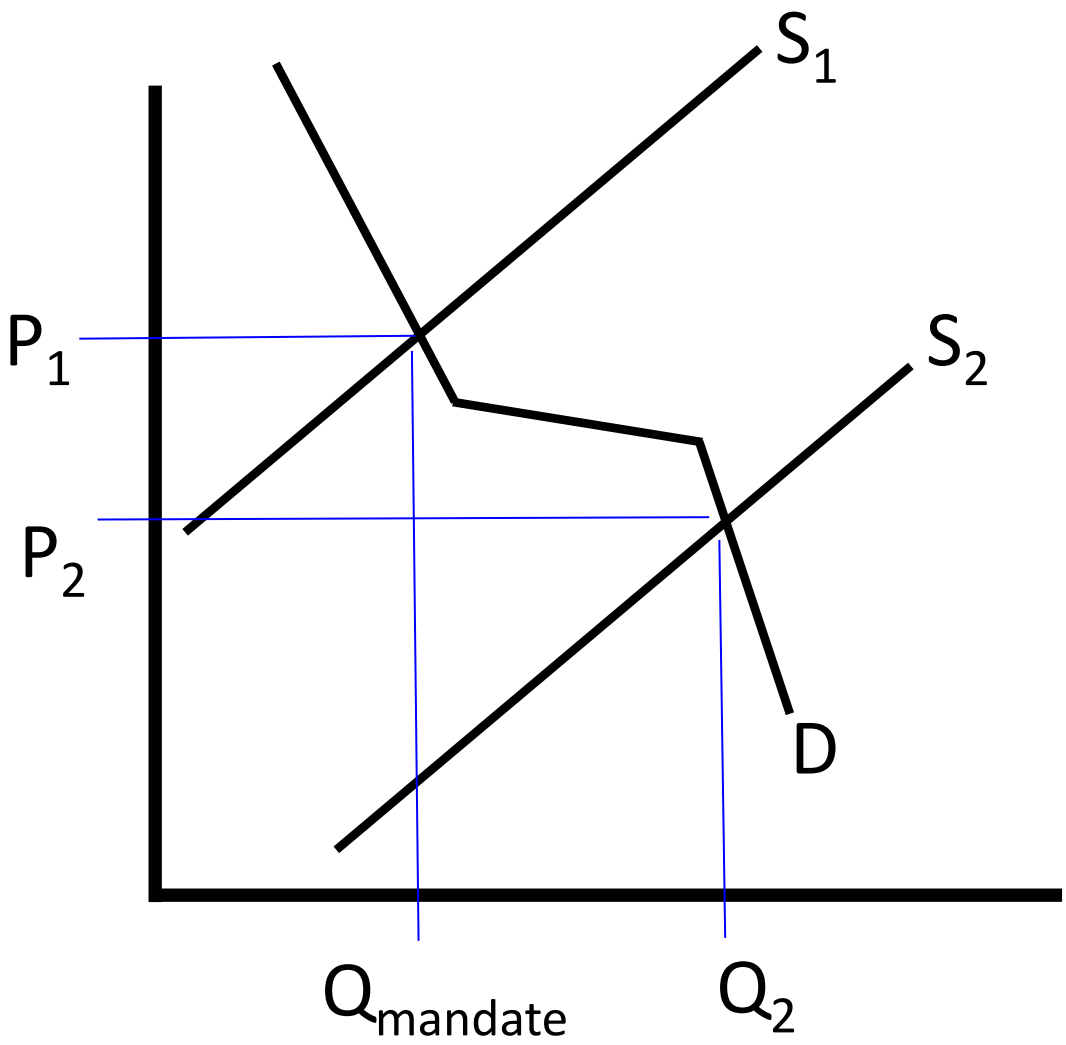
C = conventional ethanol gap

O = other advanced gap

Multiple interrelated mandates

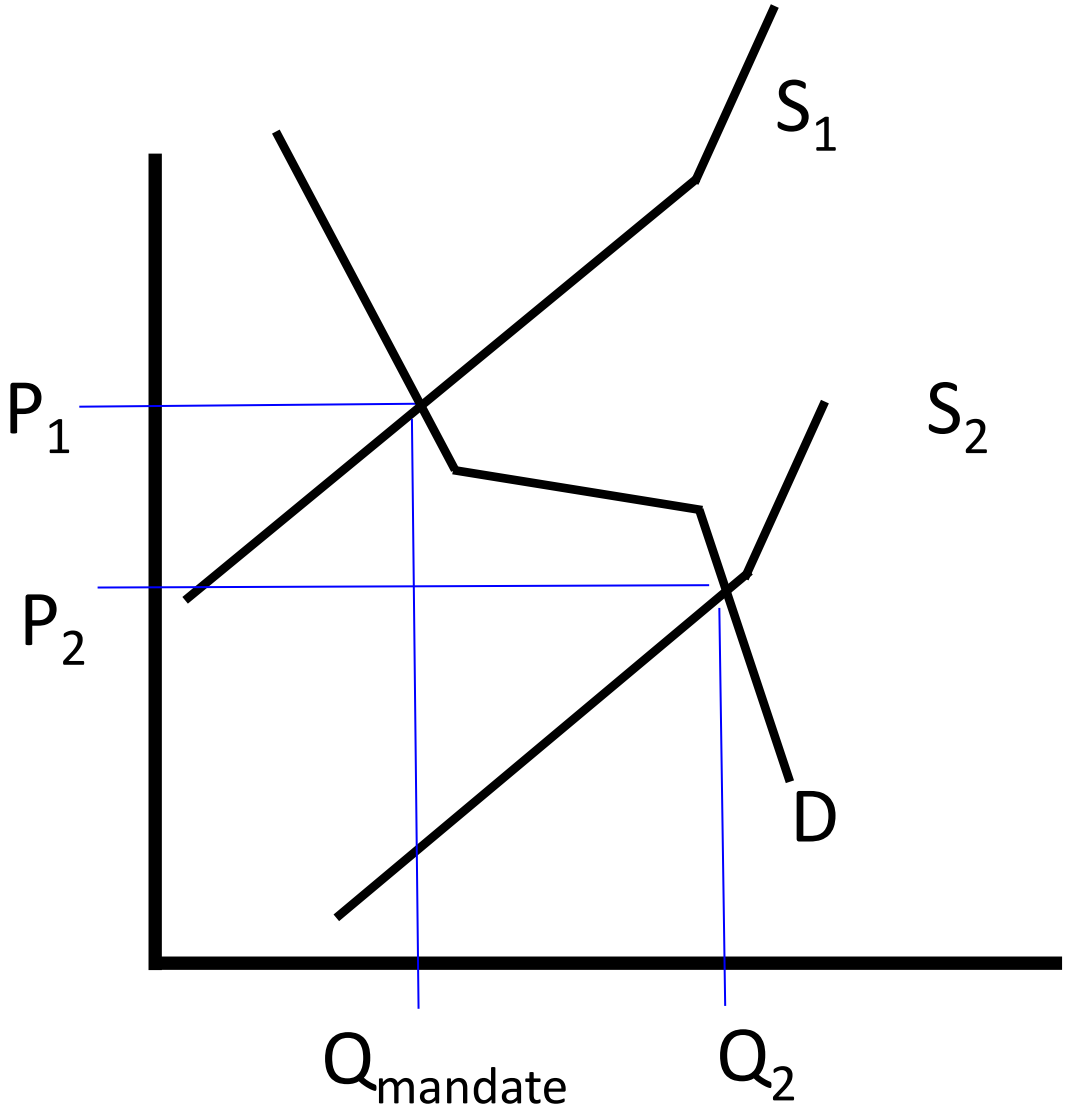


Mandate with Rollover and Deficit



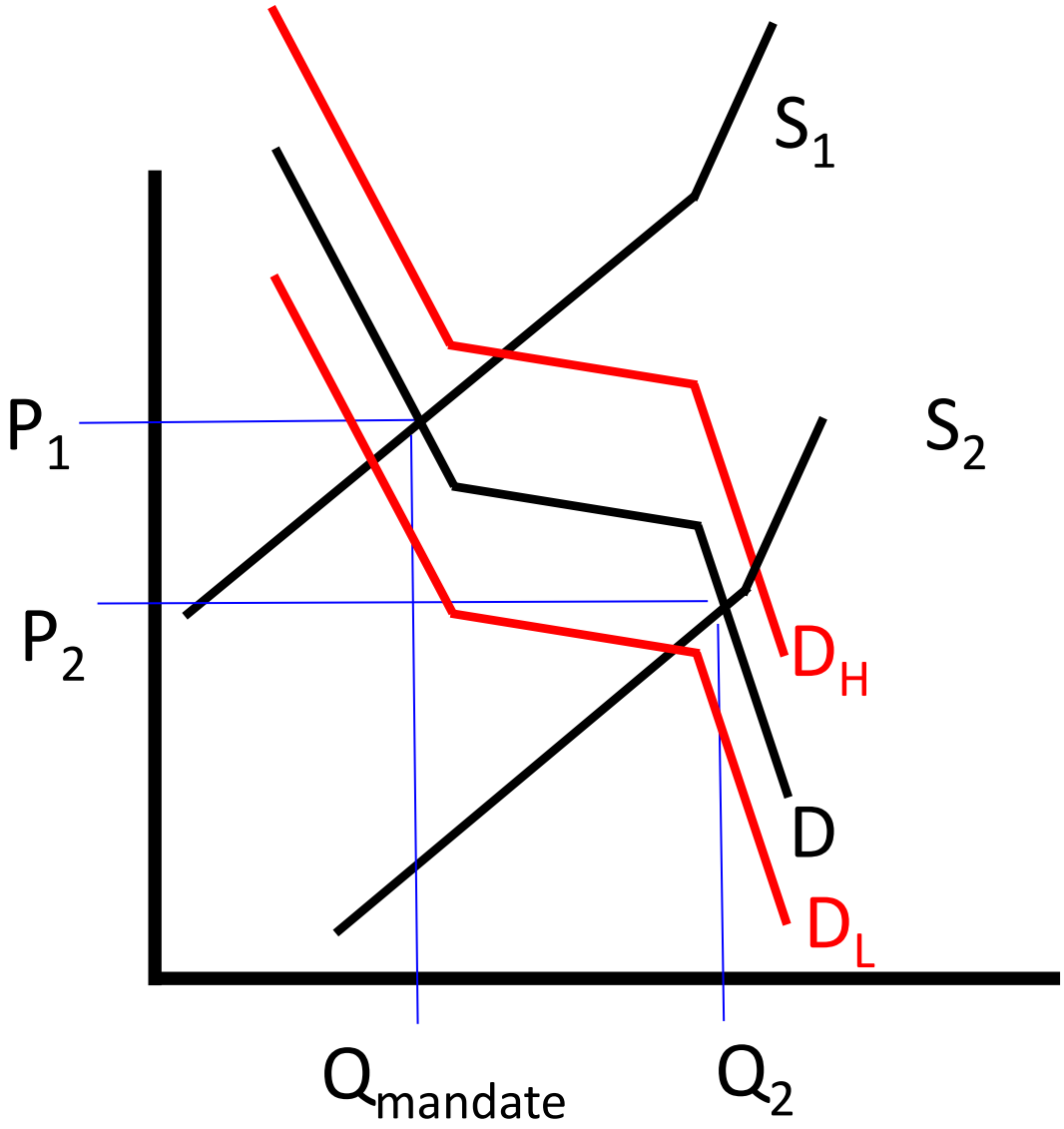
- Mandates are ‘nested’, so substitution may occur.
- The mandates have provisions for ‘rollover’ and ‘deficit’ which provide limited inter- temporal flexibility.
- Again, there may be short run constraints on the minimum amount of biofuel consumed

Capacity constraints



- Productive capacity may also be limited in the short run (Example: MTBE replacement

So is the result more or less volaitlity?



- There may be very distinct regions of elasticity/inelasticity
- Context (oil prices?) is going to drive results both in the first and higher moments of analysis
- Those with a quick answer may not understand the question

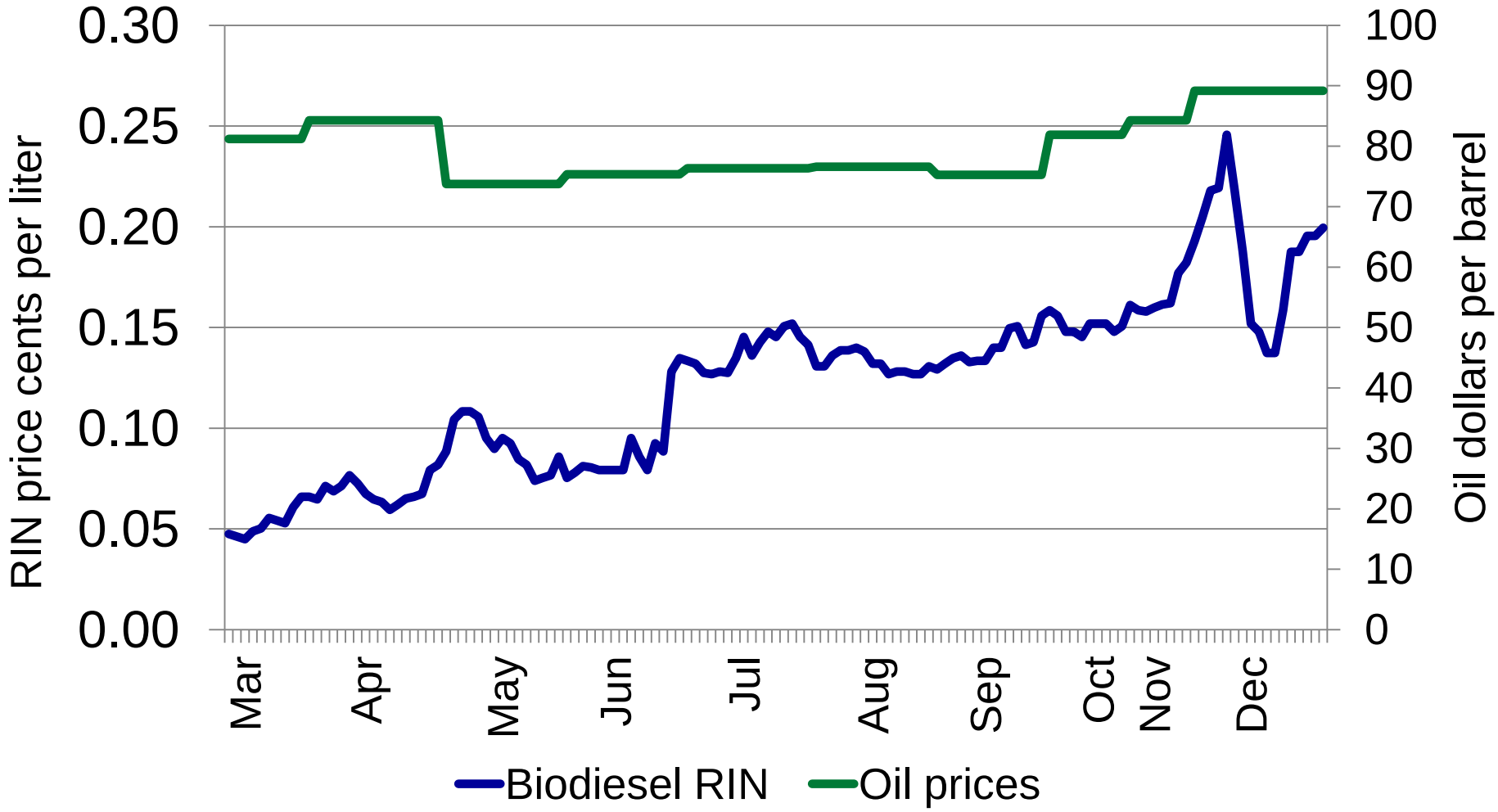
Uncertainty in policy may be influencing price volatility

- Talk of rule changes, shifts in legislative priorities and objectives of policy may be influencing the volatility in commodity prices.

Example: The subsidy given to blenders of biodiesel in the US of $1.00 per gallon (~$.26 per liter) expired on December 31, 2009.

- How did the market respond in 2010?

Uncertainty of Policy
Biodiesel blenders credit in 2010



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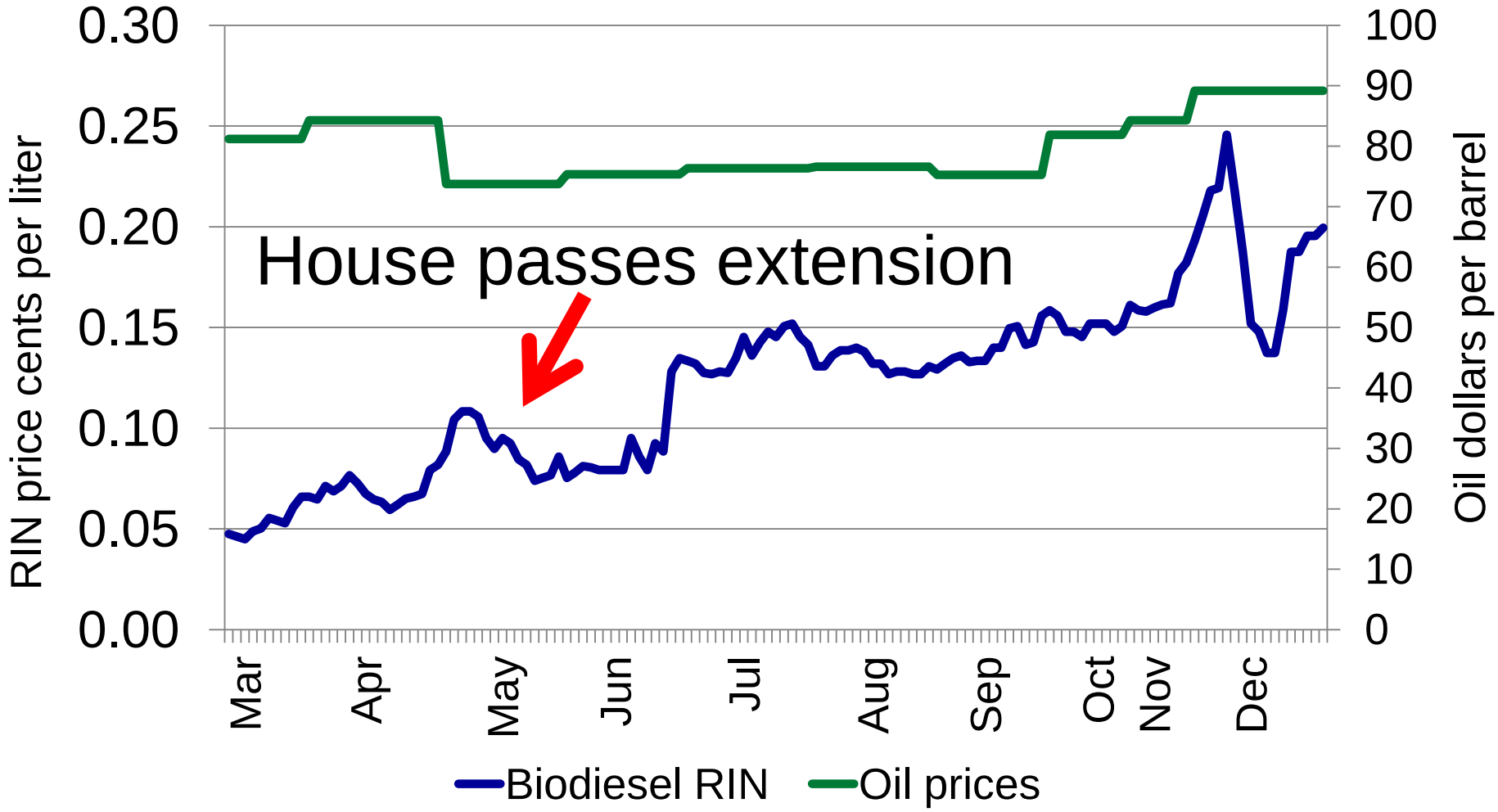

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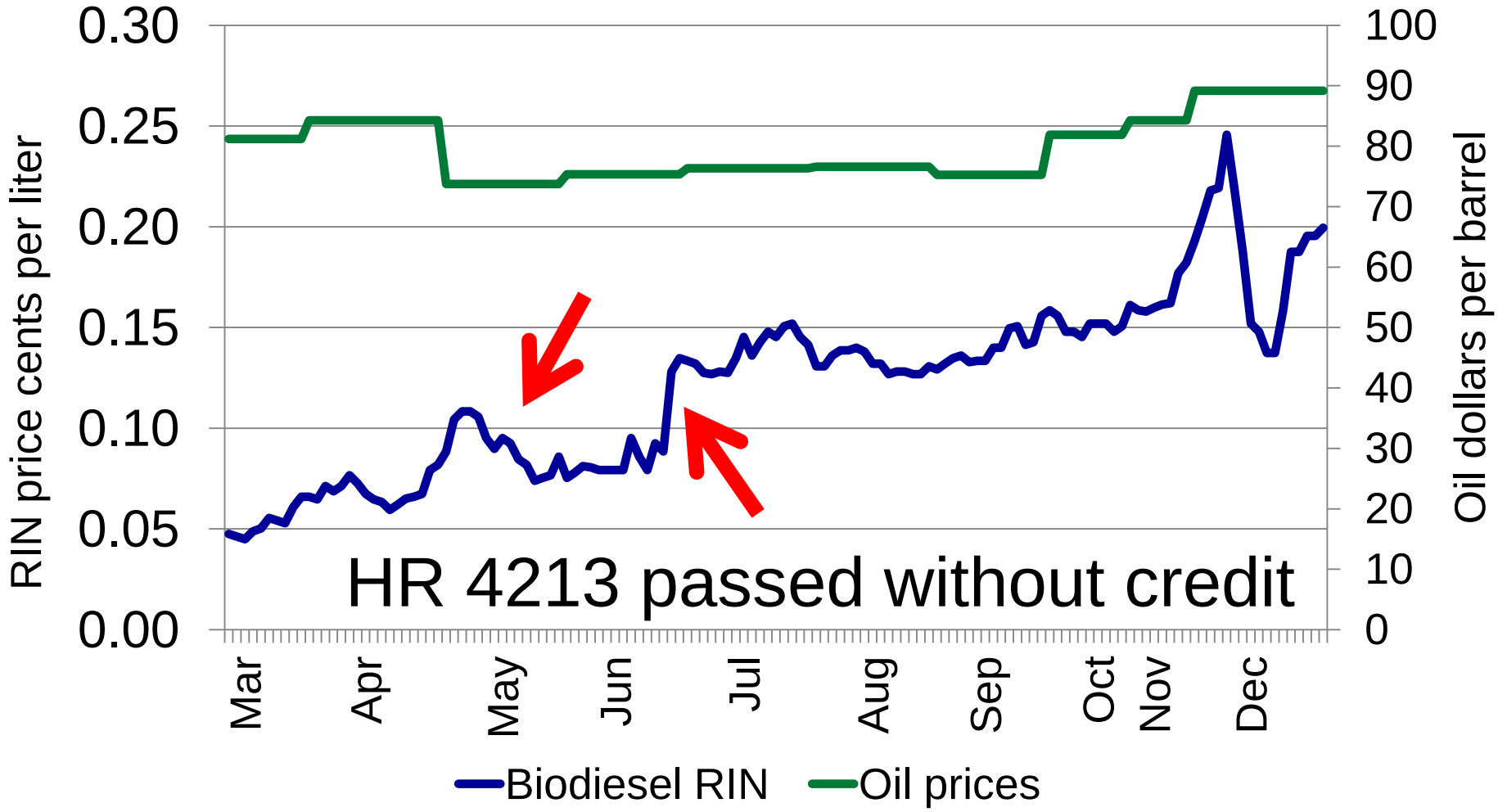

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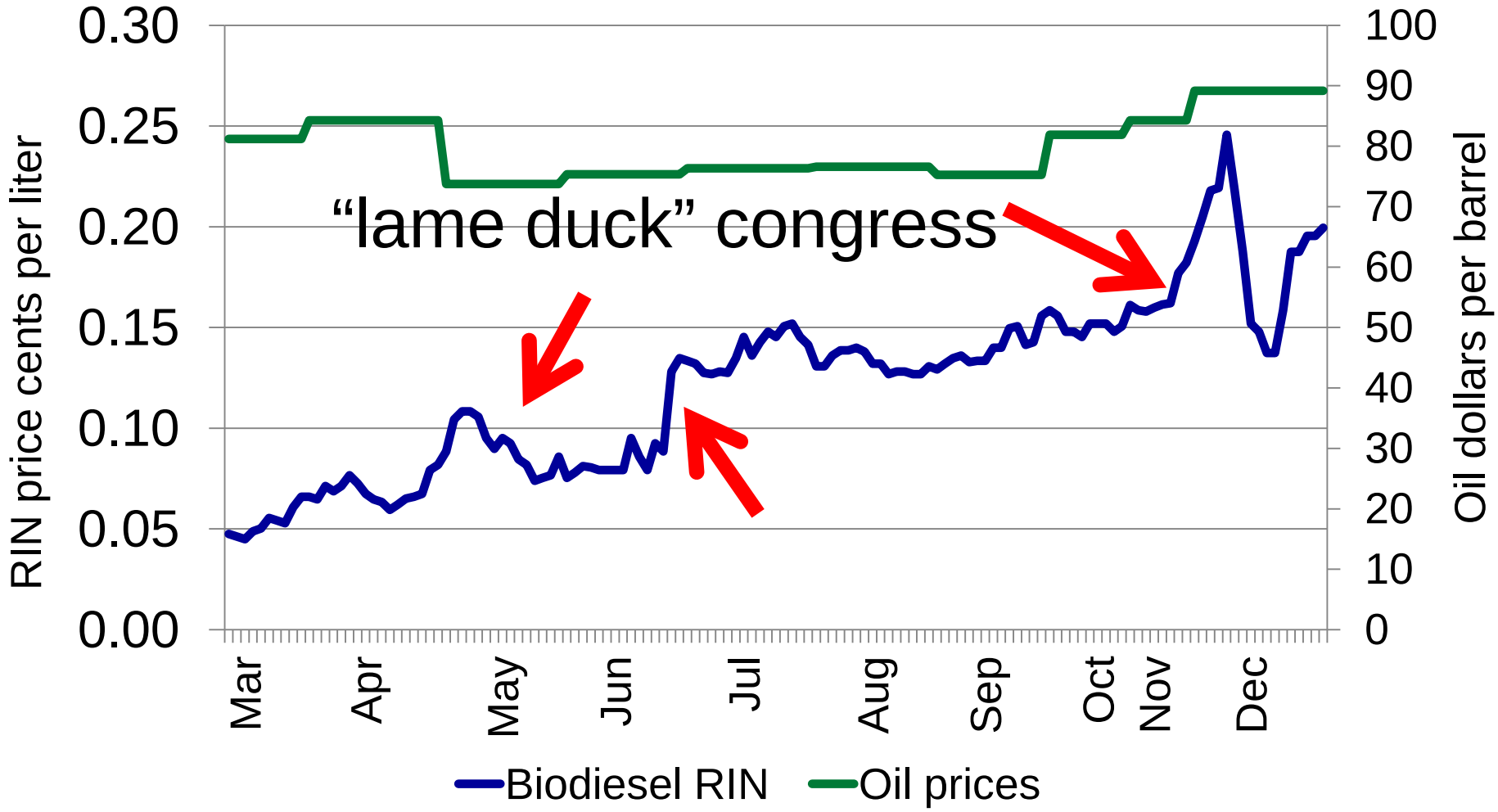

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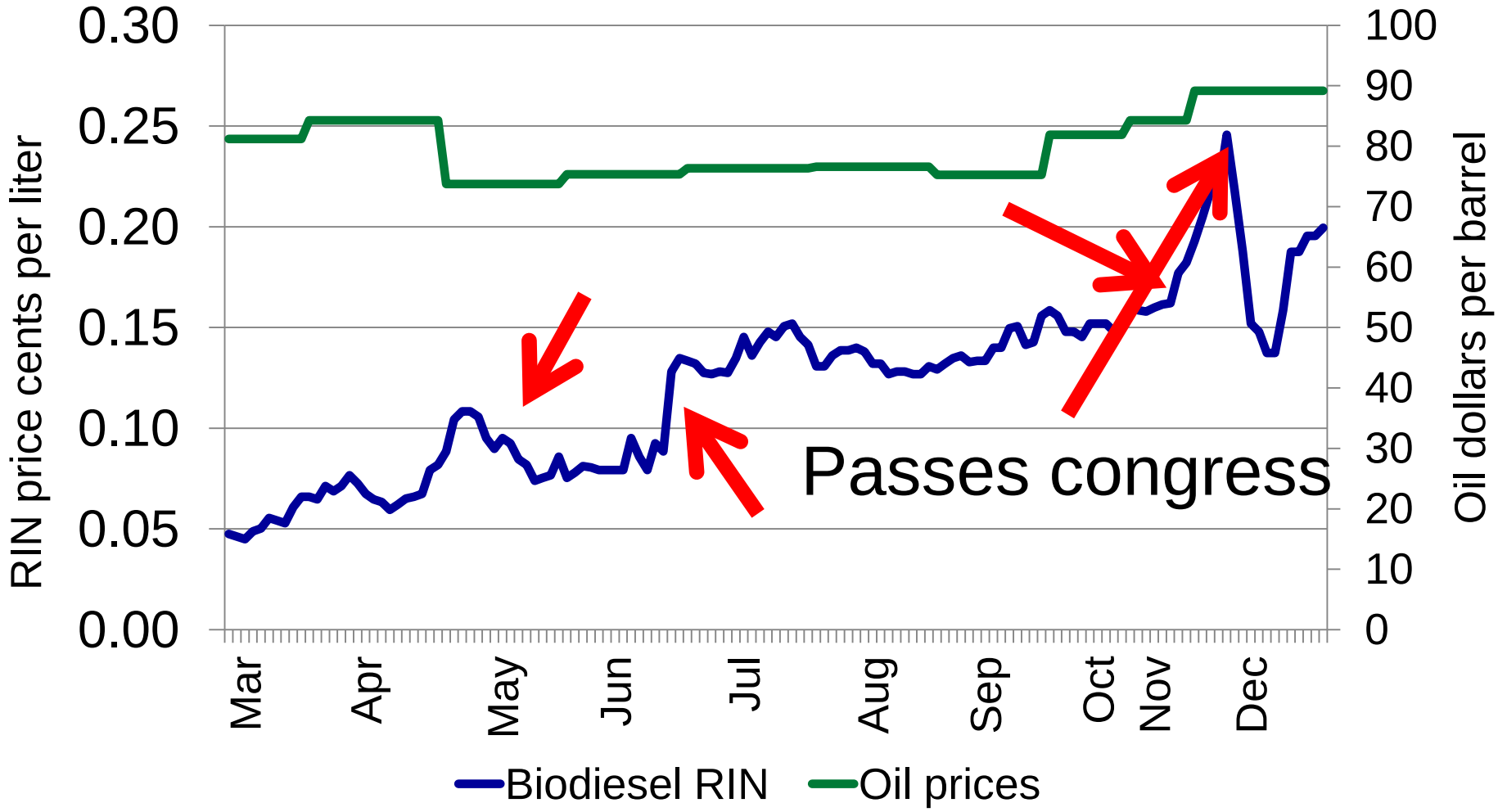

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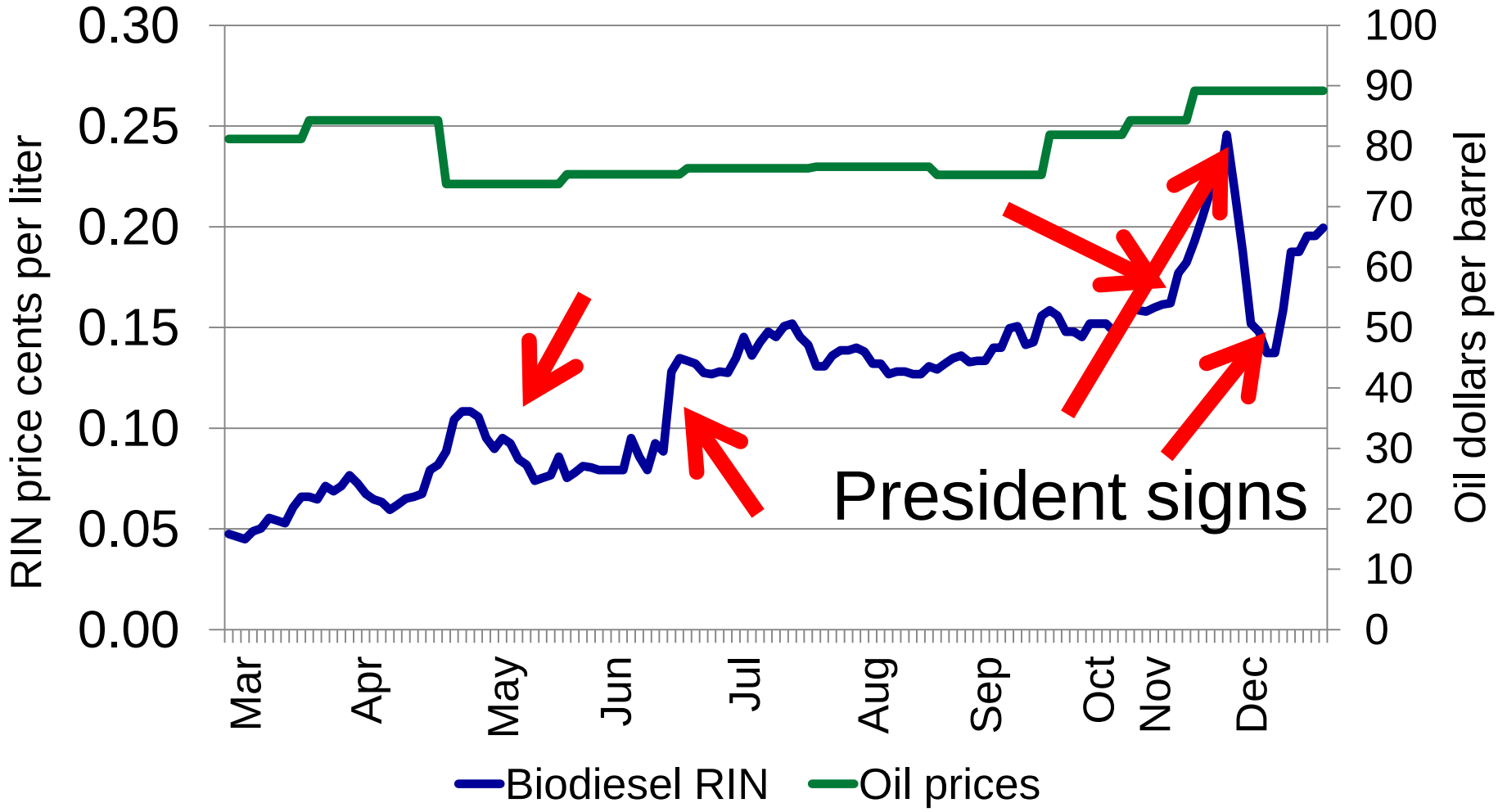

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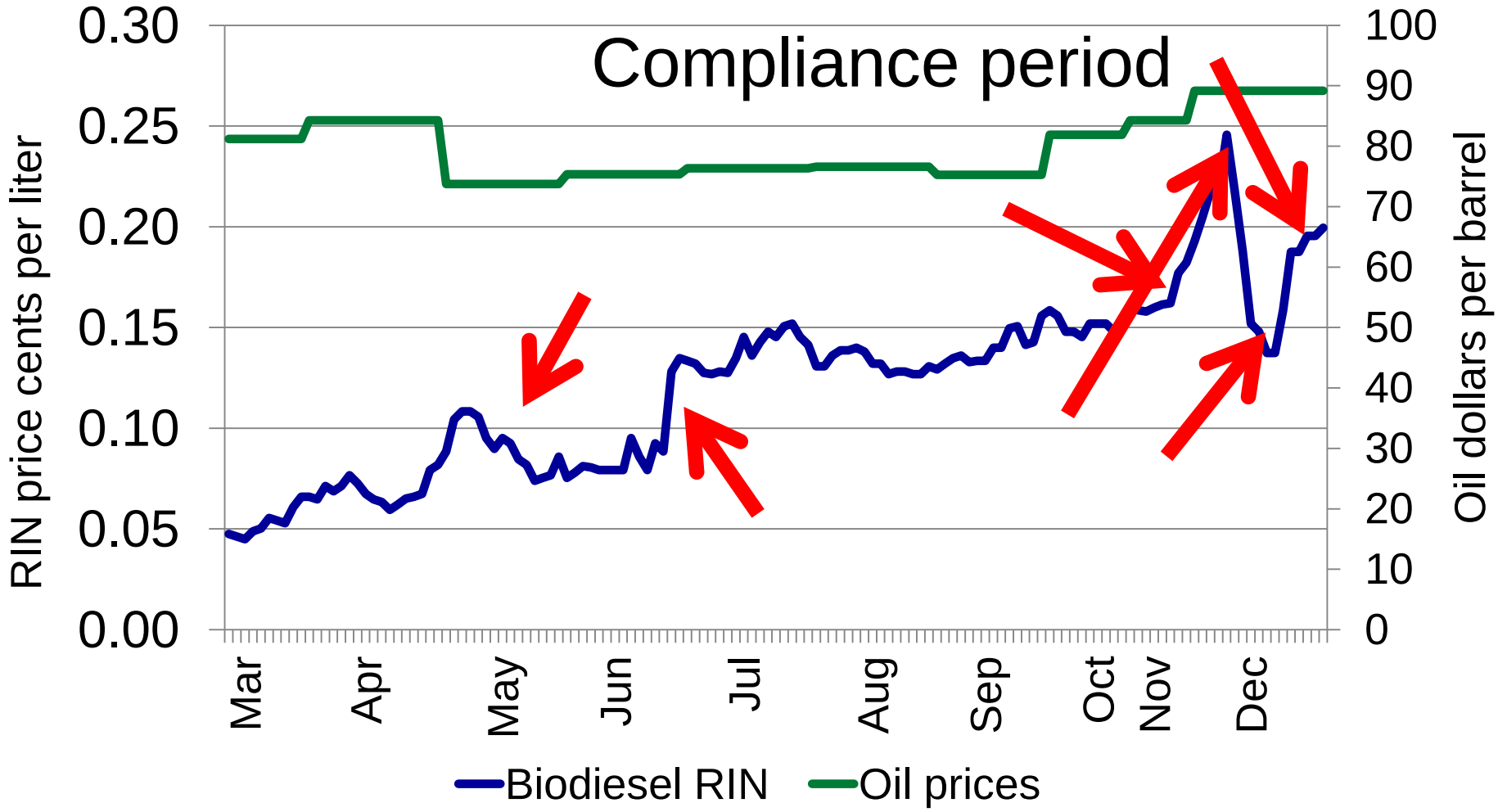

Seemingly Innocuous Assumption #1

15 billion gallon maize ethanol produced to satisfy mandate

- There is no maize ethanol mandate, merely a gap between the total mandate and that which must be ‘advanced’
- Doesn’t act as a cap on production.
- In the short run rollover and deficit can change the effective mandate required

Flexibilities should reduce volatility

Seemingly Innocuous Assumptions#2

US trade in ethanol can be represented by a net-trade equation

- Imports of ethanol go to satisfy the advanced mandate.
- Maize ethanol goes to satisfy the overall mandate.

Increasing advanced mandate ► imports (from Brazil) ► higher world ethanol prices ► maize ethanol exports (back to Brazil).

Seemingly Innocuous Assumptions#3

EU target of 10% means 10% of petrol market is renewables

- Goal can be achieved by either electricity or renewable liquid fuels in transport.
- There could also be tradeoffs between petrol and diesel uses.
- Some fuels count ‘double’
- Analysis at the EU level would ignore the rigidity imposed by individual member state targets.

Some conclusions

- These issues are not unique to US biofuel polices.
- Past relationships, even fairly recent observations, *may not* be a good representation of future ones.
- The drive for simplicity *may* be to the detriment of good policy analysis.

Further reading

Background publications for this presentation

- FAO. **Safeguarding food security in volatile global markets**
- FAO / IFAD / WFP **The state of food insecurity in the world 2011**

- Meyer, Seth, Julian Binfield and Patrick Westhoff. "**Technology adoption under U.S. biofuel policy: Do Producers, consumers or taxpayers benefit?**" *European Review of Agricultural Economics, Vol. 39 (1), 2012: 115-136*
- Meyer, Seth and Wyatt Thompson. "**EPA Mandate Waivers Create New Uncertainties in Biodiesel Markets**" *Choices*, Vol. 26 (2), 2011.
- Thompson, Wyatt, Seth Meyer, and Pat Westhoff. "**The New Markets for Renewable Identification Numbers**." *Applied Economic Perspectives and Policy*. 32(4): 588-603. 2010.
- Meyer, Seth and Wyatt Thompson. "**Demand Behavior and Commodity Price Volatility Under Evolving Biofuel Markets and Policies.**" Handbook of Bioenergy Economics and Policy. Madhu Khanna, Jurgen Scheffran, and David Zilberman (editors). Springer-Verlag. 2010.

Thank you

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Seemingly Innocuous Assumptions#4

US cellulosic ethanol price rises with gasoline prices

- US policy essentially caps cellulosic ethanol prices under current conditions
- Price cap is a function of three factors
  - + wrt Ethanol value (which is + wrt gasoline)
  - - or 0 wrt Gasoline prices
  - + wrt Advanced RIN prices (which is - wrt gasoline)

Over much of the range this cap falls as gasoline prices rise.

Seemingly Innocuous Assumptions #4

Treating the US mandate as a % inclusion

- In an individual year this may be true, in the log run it is more complicated
- Mandates are quantitative, so fluctuations in fuel demand do not effect this volume.
  - Oil price movements
  - RIN prices (movements from oil prices, yields, etc)

Assumption may reduce the implied volatility