

Effects of Increased Renewable Energy Production on the Agricultural Sector

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Background

- Production in 2006:
 - Ethanol: 4.9 billion gallons
 - Biodiesel: 0.373 billion gallons
- Current US production capacities:
 - Ethanol: 5.6 billion gallons
 - Biodiesel: 0.864 billion gallons
- New capacity under construction:
 - Ethanol: 6.2 billion gallons
 - Biodiesel: 1.7 billion gallons

Fossil Energy Situation

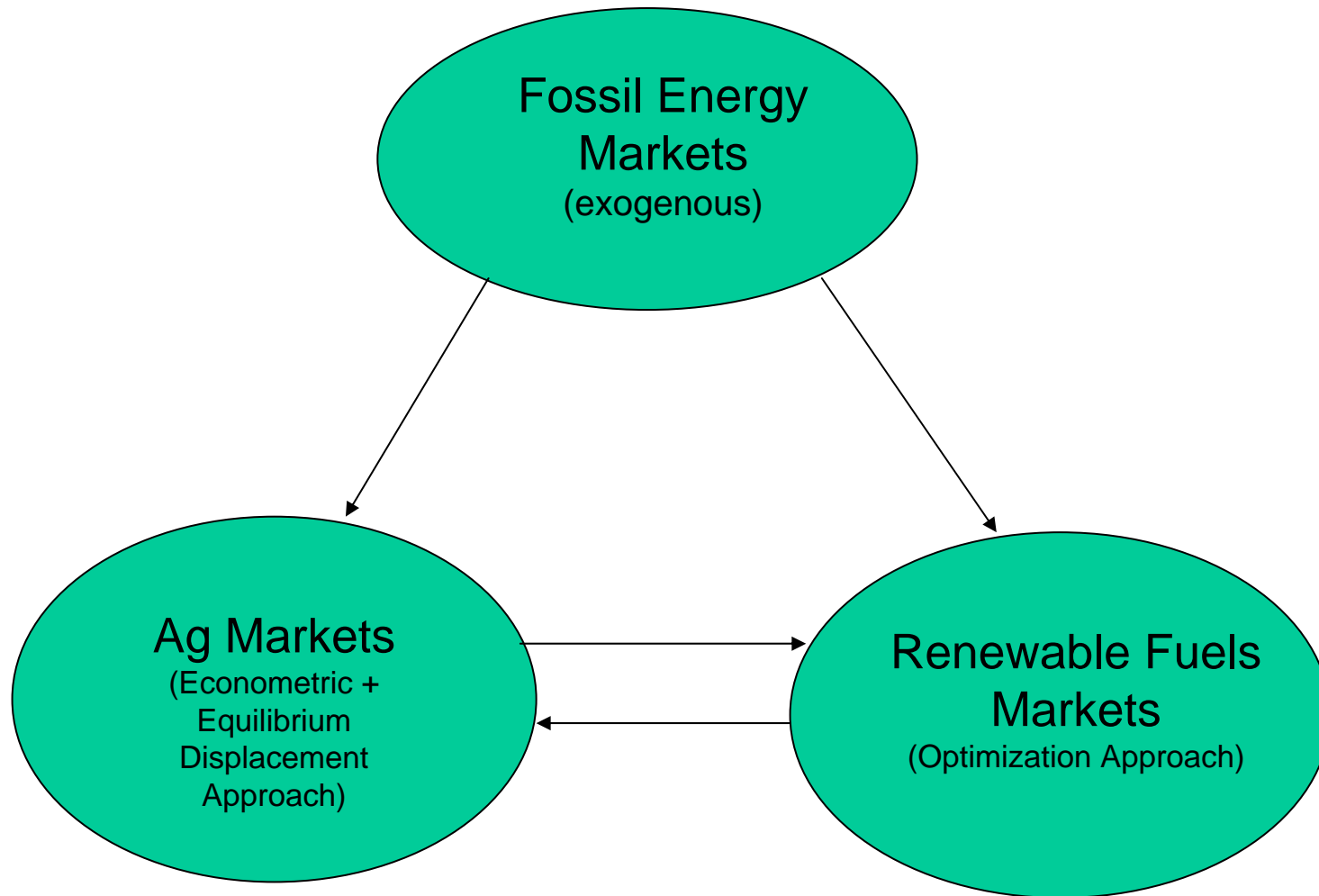
- Prices high by historical standards, but somewhat lower than the end of last year
 - Fund re-weighting
 - Geopolitical issues
- Substantial uncertainty
 - Soon-to-be-declining rate of global petroleum production?
 - Economic growth in China, India
 - OPEC

Policy Situation

- Current Renewable Fuel Standard unlikely to bind
- Current ethanol subsidy rapidly getting expensive, even as market incentives for ethanol production are high
- Proposals for higher RFS
- Proposal for variable ethanol subsidy

Given all of this
uncertainty,
where are we
going?

Agricultural and Energy Market Interaction (AEMI) Model Overview



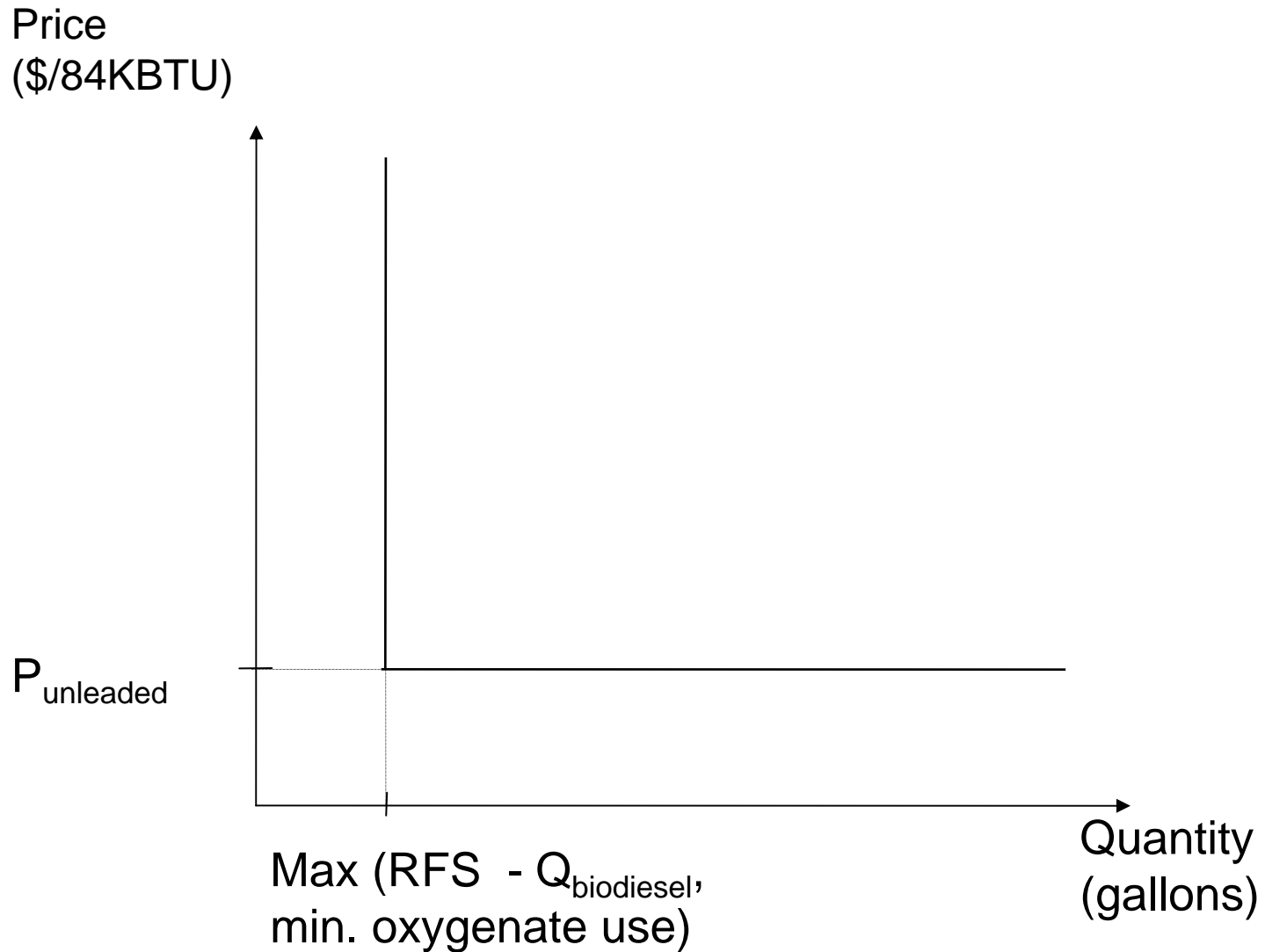
Agricultural and Energy Market Interaction (AEMI)

- Models the optimizing behavior of representative wet and dry mill ethanol producers, and representative biodiesel producers
- Fossil energy price forecasts come from NYMEX
- Ag market forecasts come from a large-scale econometric model
- Ag equilibrium is displaced based on bio-energy activity
- Stochastic simulation

AEMI Advantages

- Employs market-based price forecasts for fossil energy
- New stochastic forecasts can be generated very rapidly in response to changing fossil energy market conditions
- Stochastic analysis of alternative energy policy scenarios can be performed very rapidly

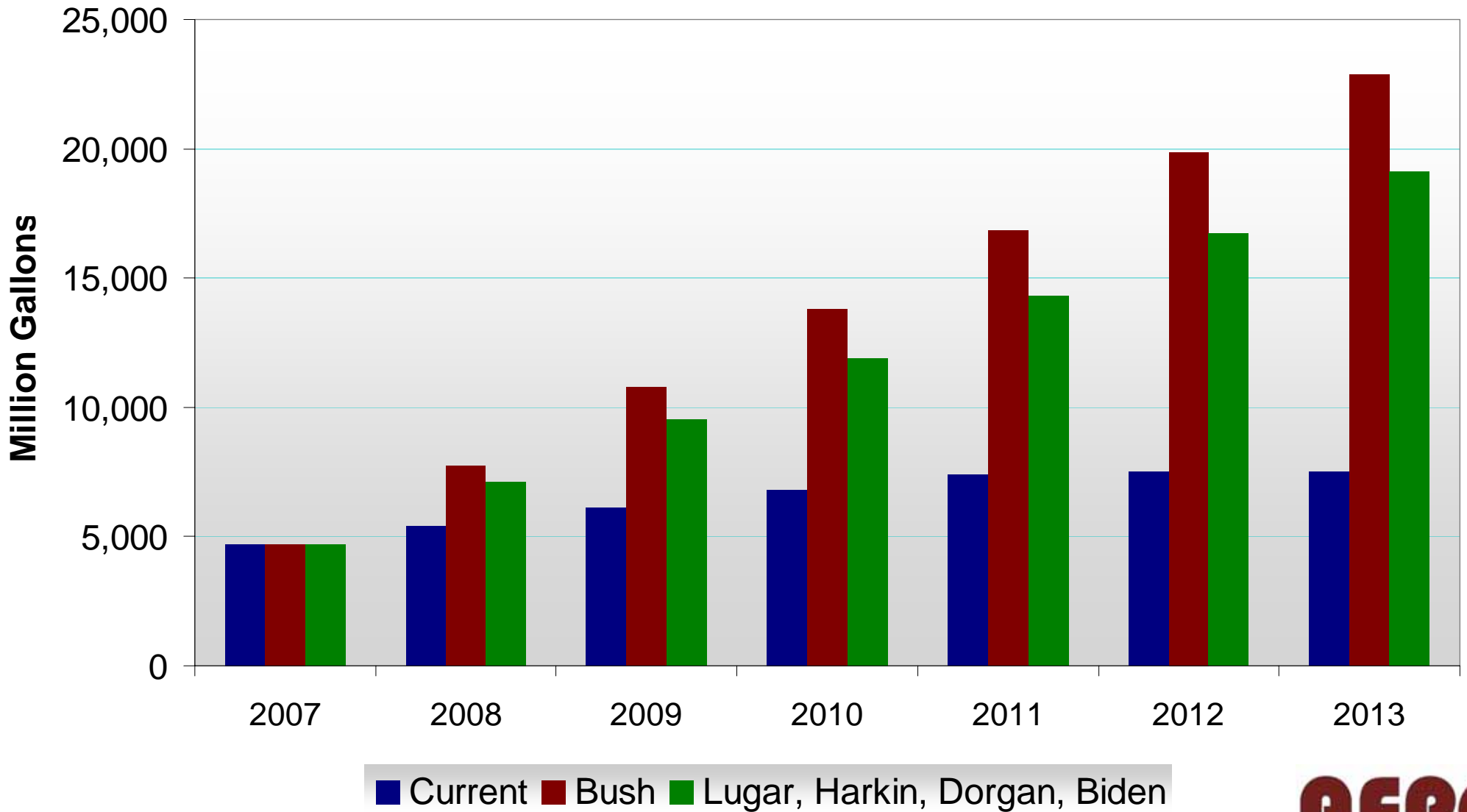
Ethanol Demand



Four Policy Scenarios

- Current situation continues
- Higher RFS is set (and current subsidy remains)
- Variable ethanol subsidy replaces the fixed subsidy (and RFS is unchanged)
- Higher RFS and variable ethanol subsidy

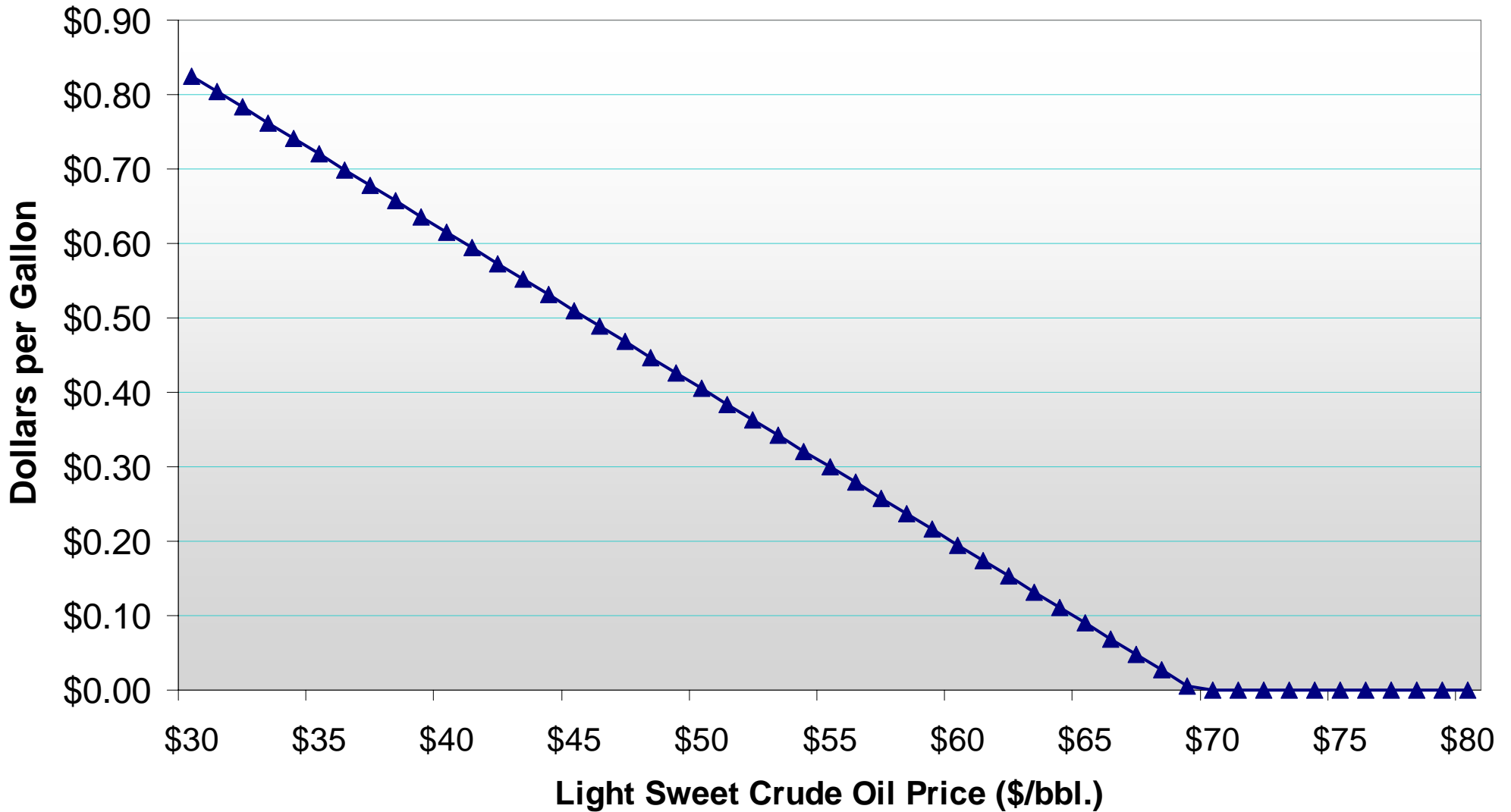
Current and Proposed Renewable Fuel Standards



Variable Ethanol Subsidy Assumptions

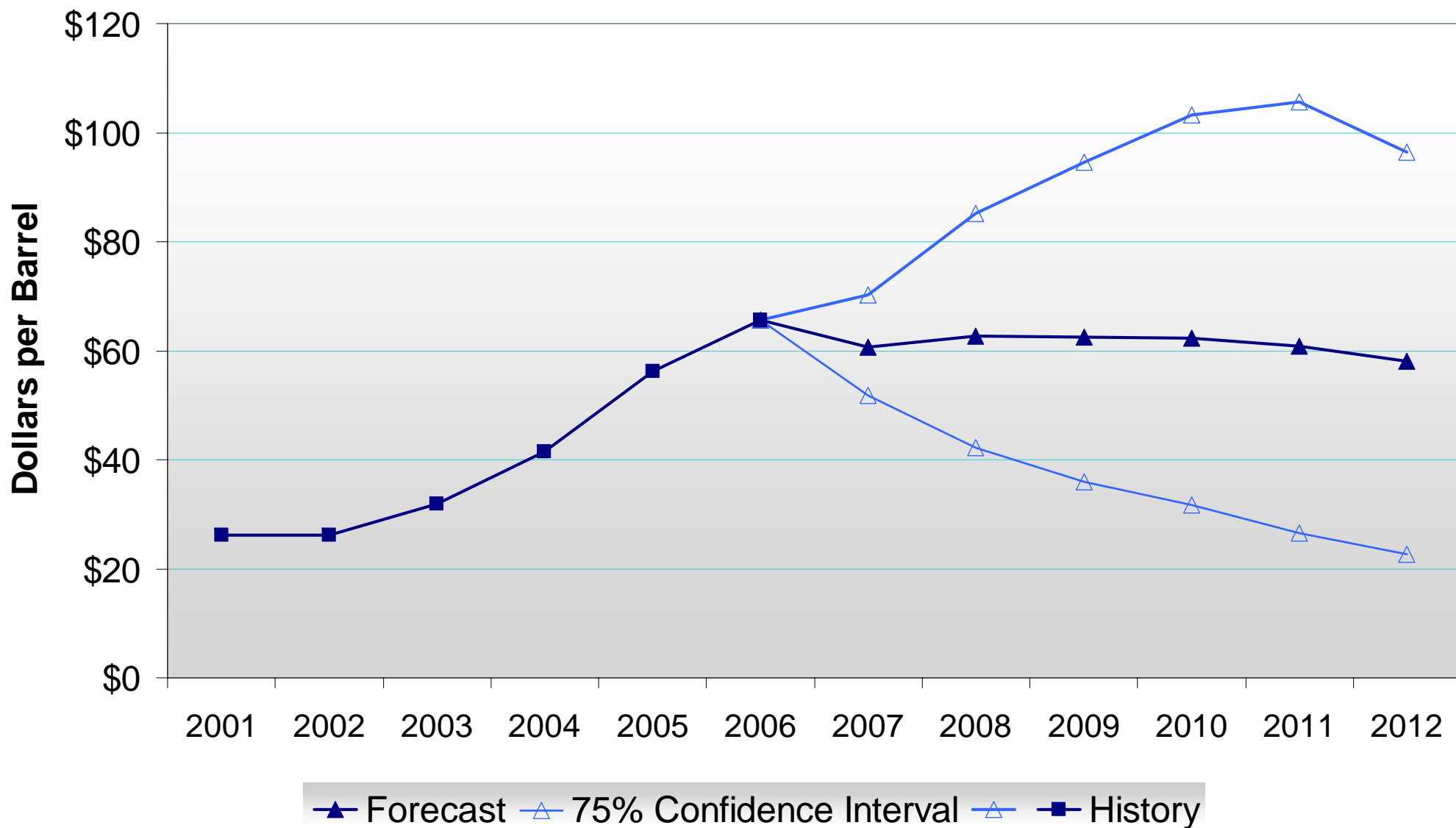
- Senator Lugar proposed a variable subsidy that establishes an effective \$45 per barrel price floor for oil
- No details!
 - Assume that current subsidy of \$0.51 per gallon of ethanol is received when crude oil is \$45 per barrel
 - Assume that subsidy changes as the oil price changes at the approximate rate at which the gasoline replacement value of ethanol changes
 - Minimum subsidy is zero
 - $VS = \max\{ 0, 1.455 - 0.021 * P_{LSCO} \}$

Assumed Variable Ethanol Subsidy



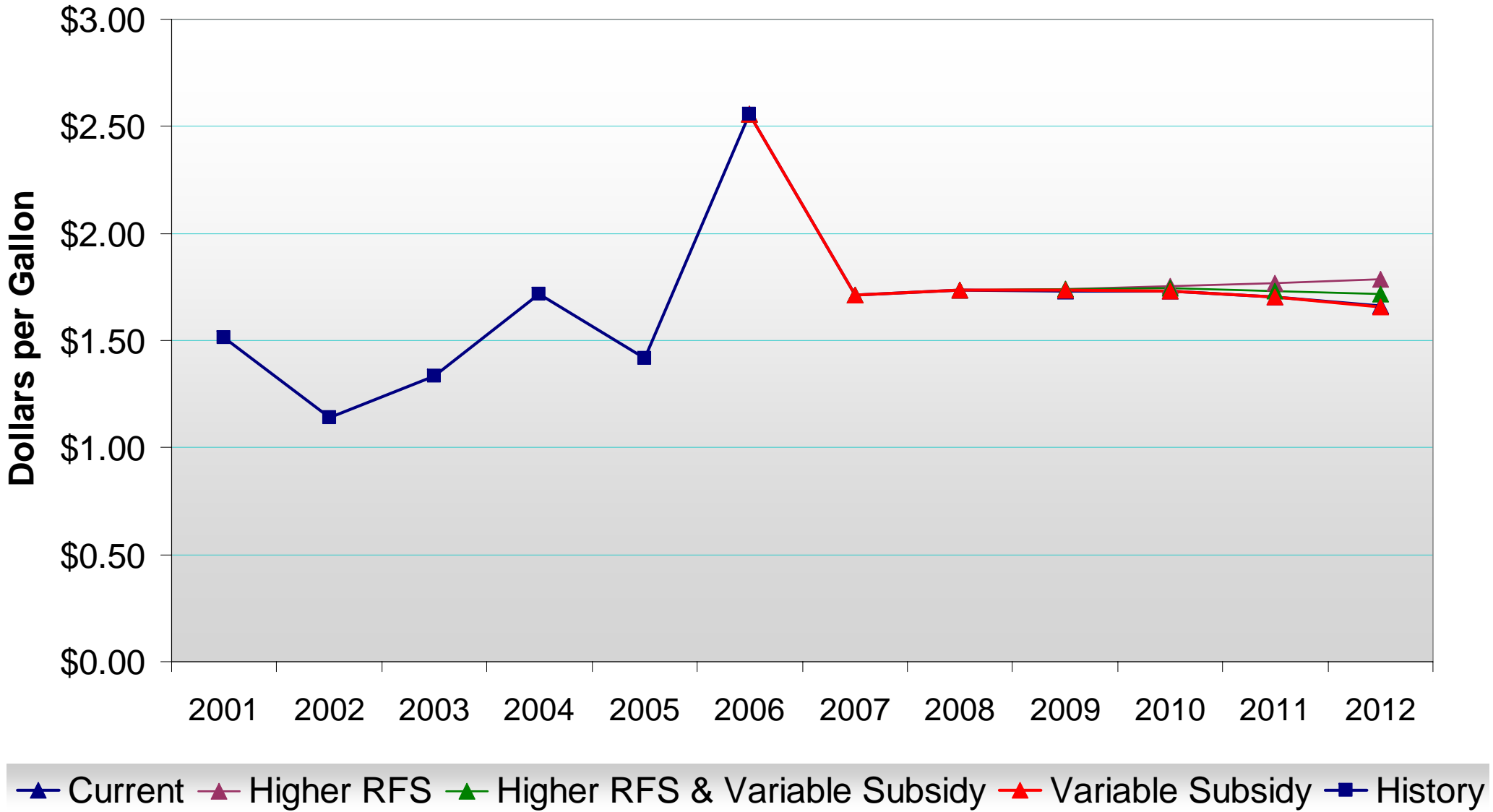
Light Sweet Crude Oil Price

Cushing, OK

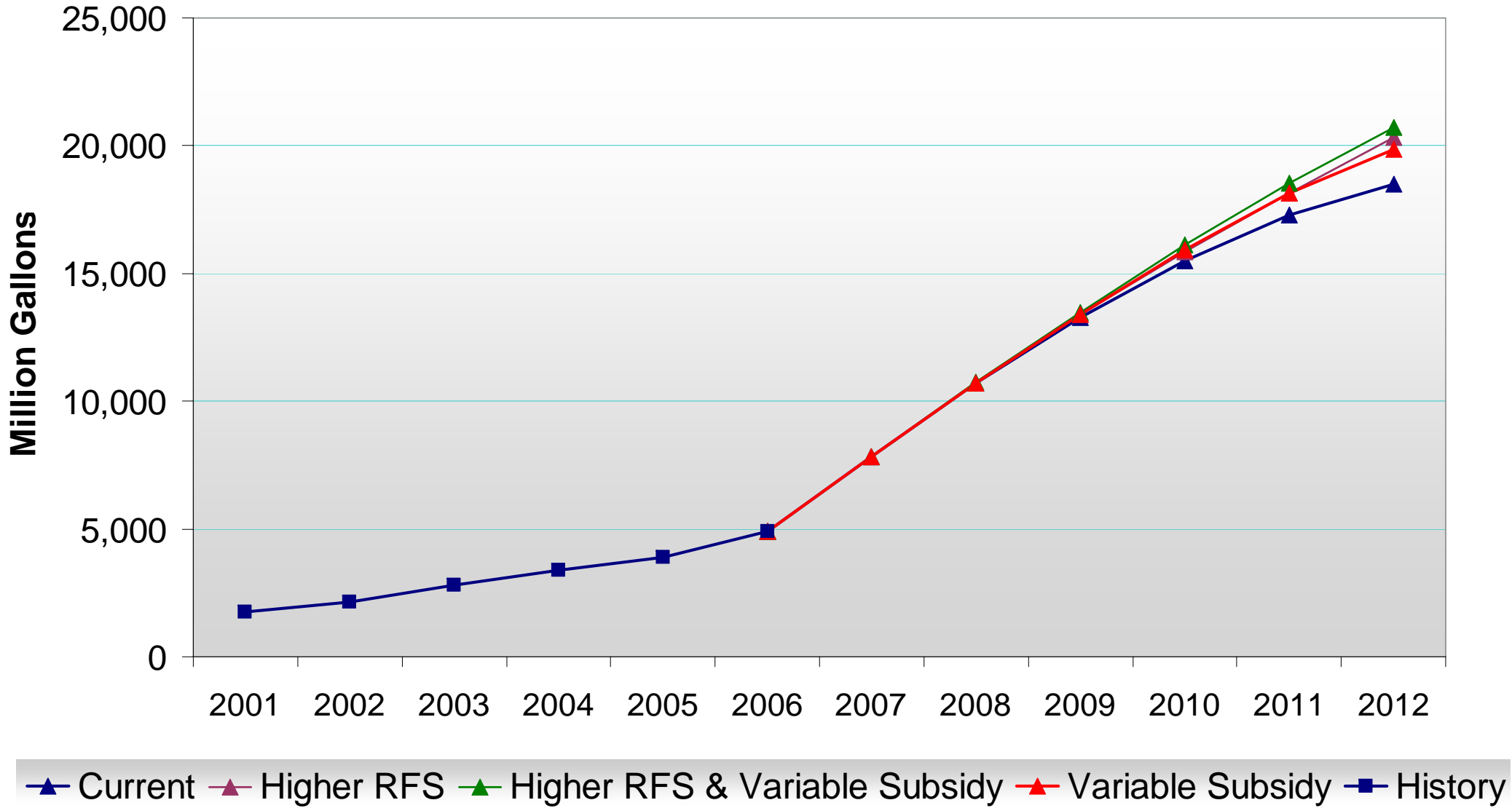


Ethanol Price

U.S. Average

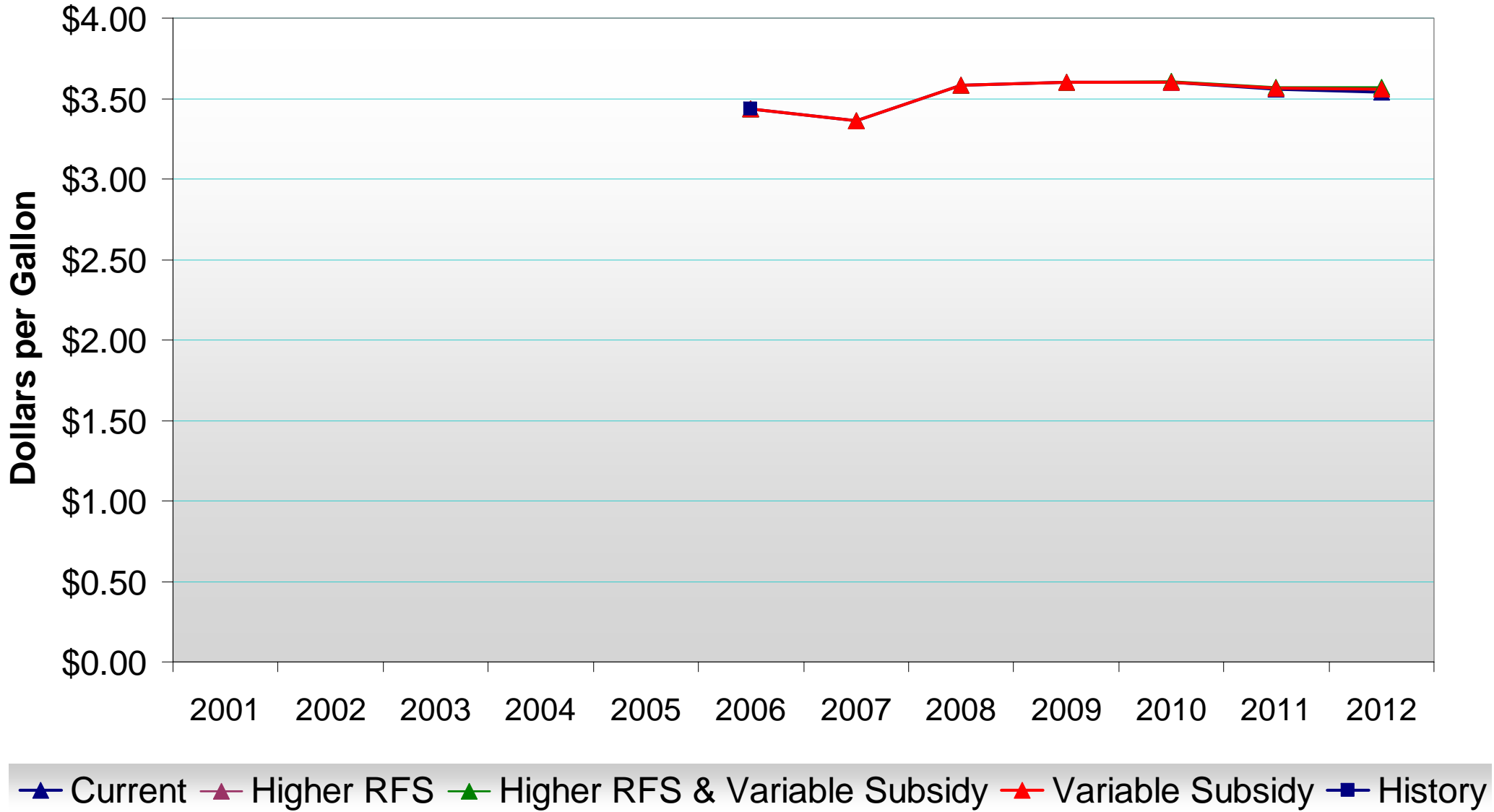


Ethanol Production United States

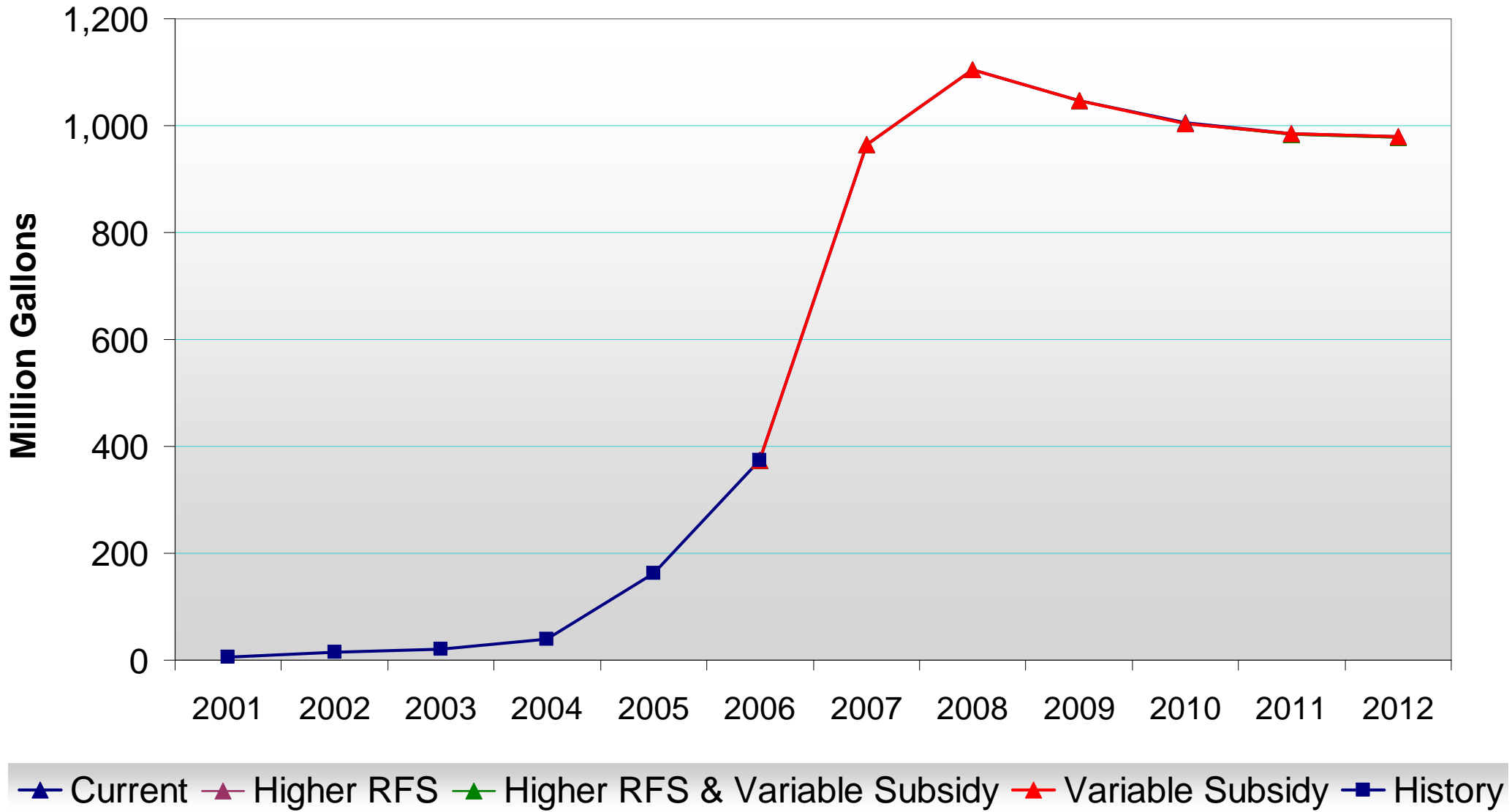


Biodiesel Price

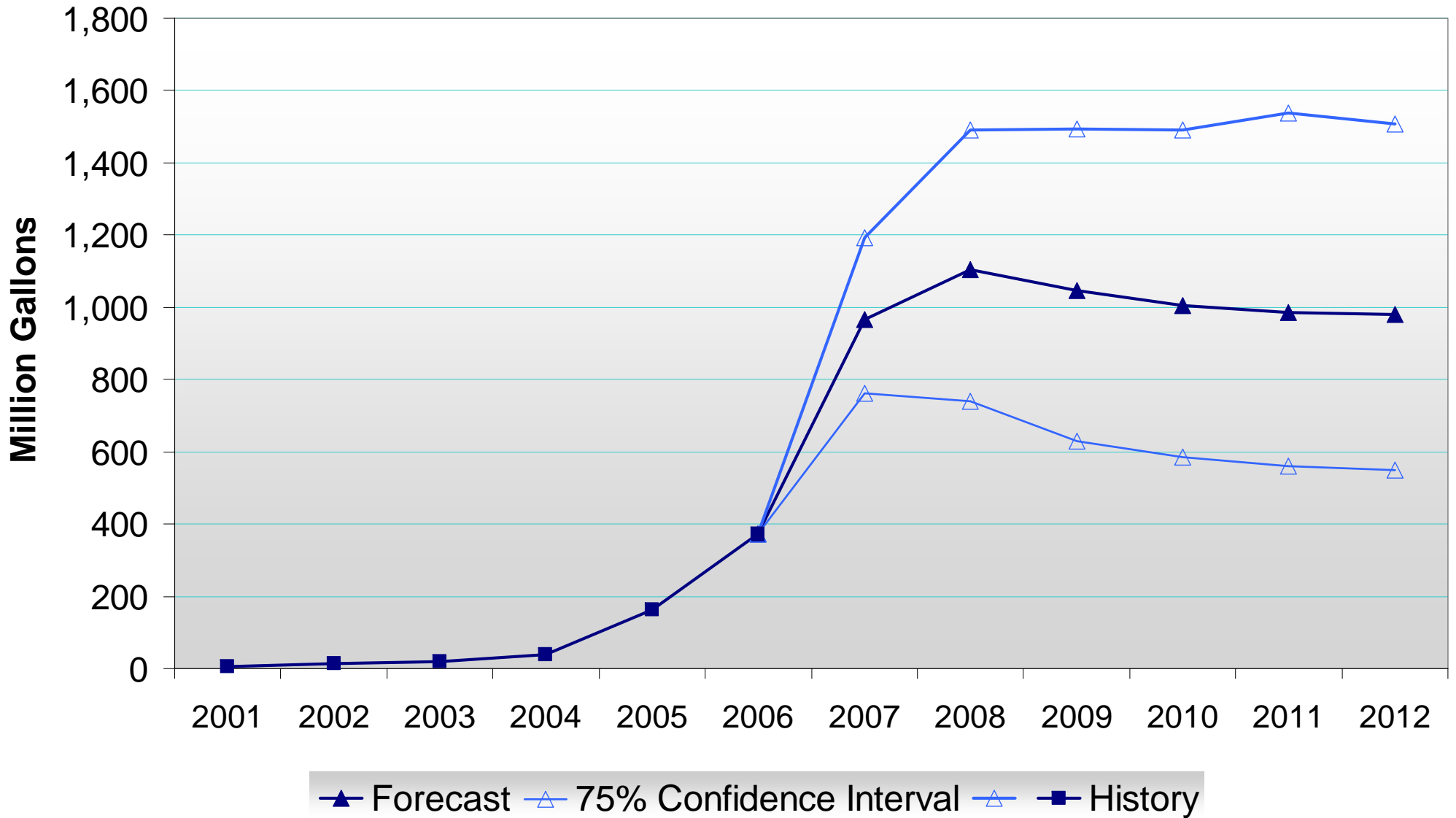
U.S. Average



Biodiesel Production United States

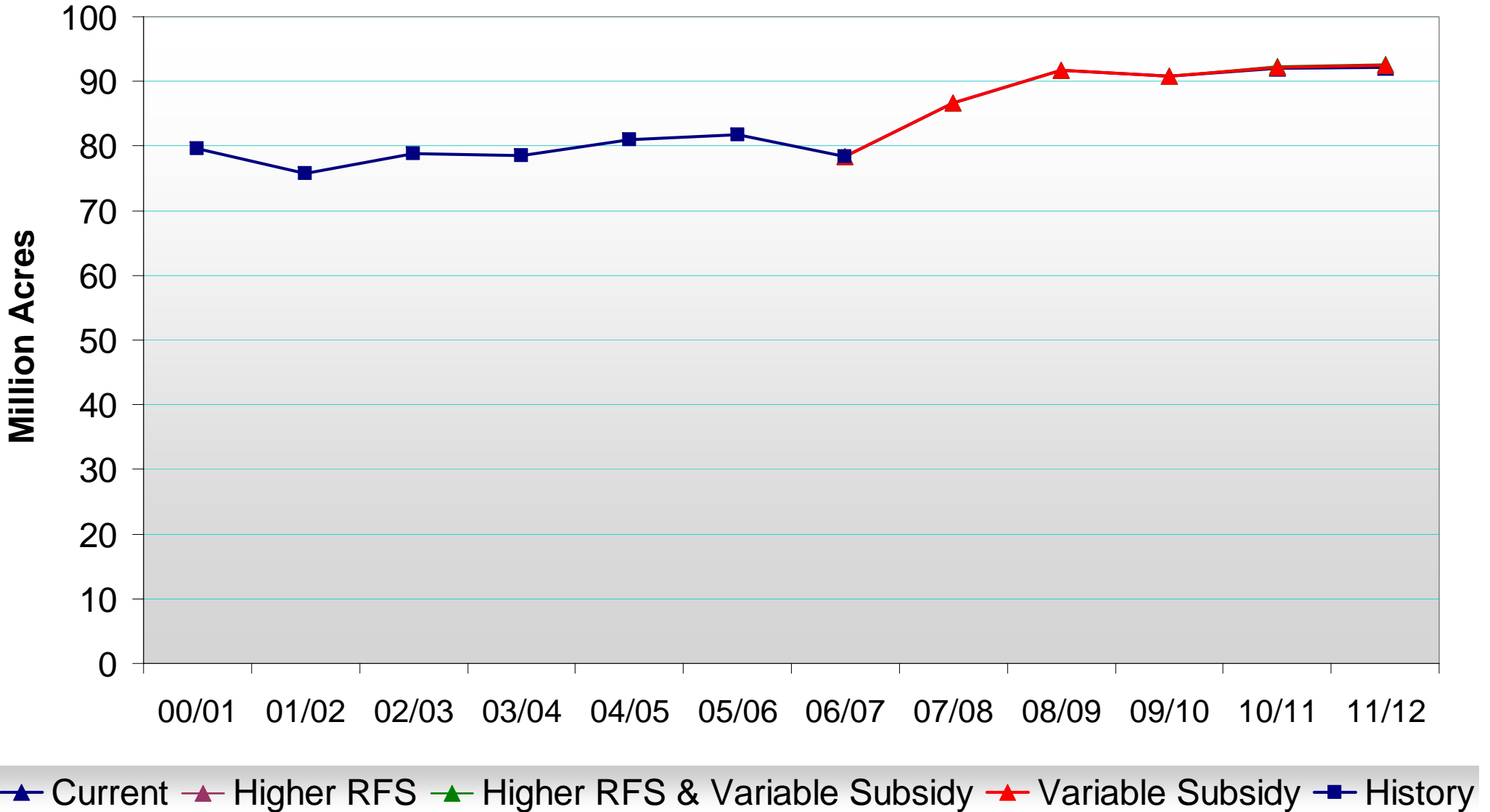


Biodiesel Production United States



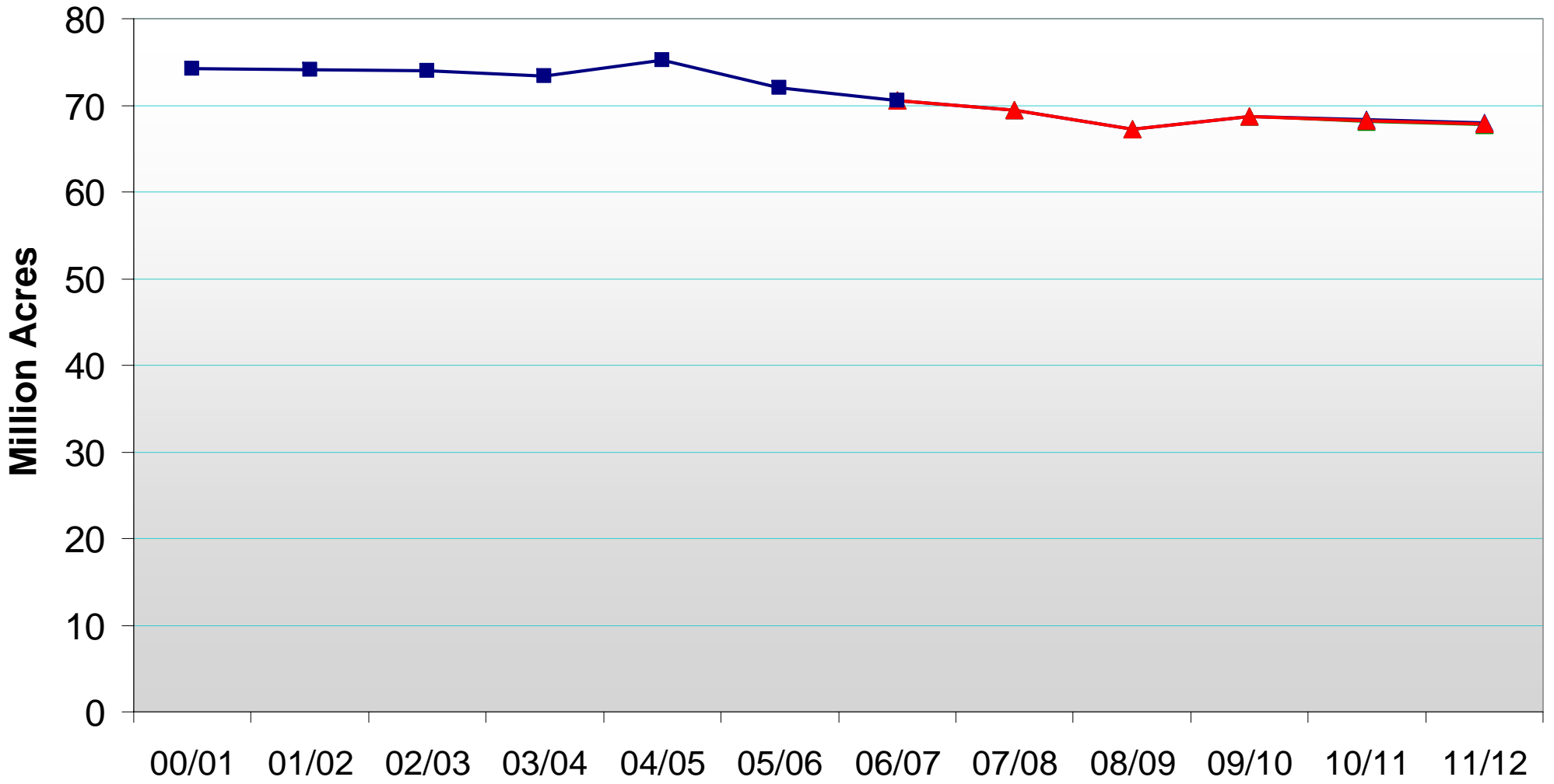
Corn Planted Acres

United States



Soybean Planted Acres

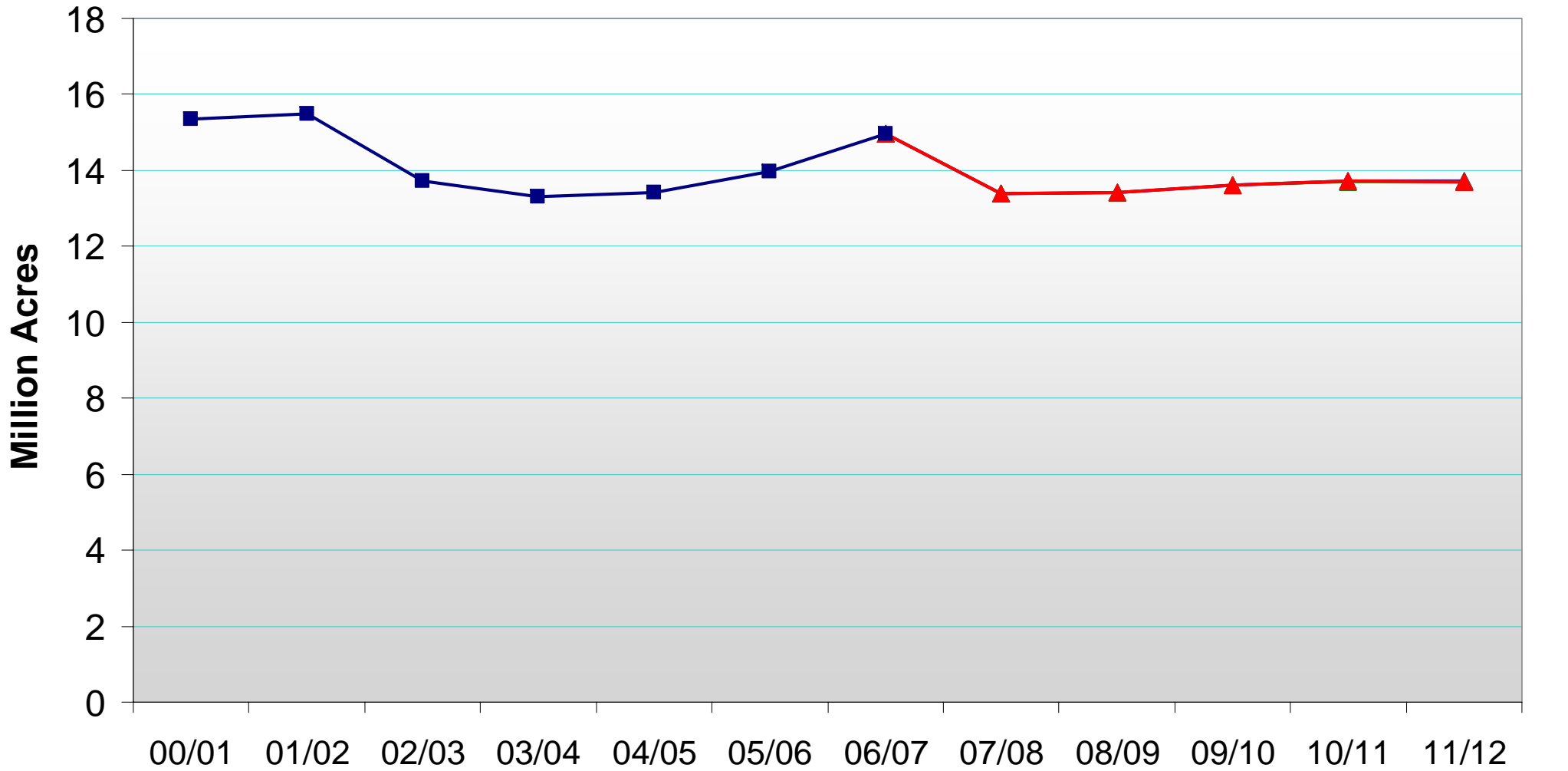
United States



—▲— Current —▲— Higher RFS —▲— Higher RFS & Variable Subsidy —▲— Variable Subsidy —■— History

Cotton Planted Acres

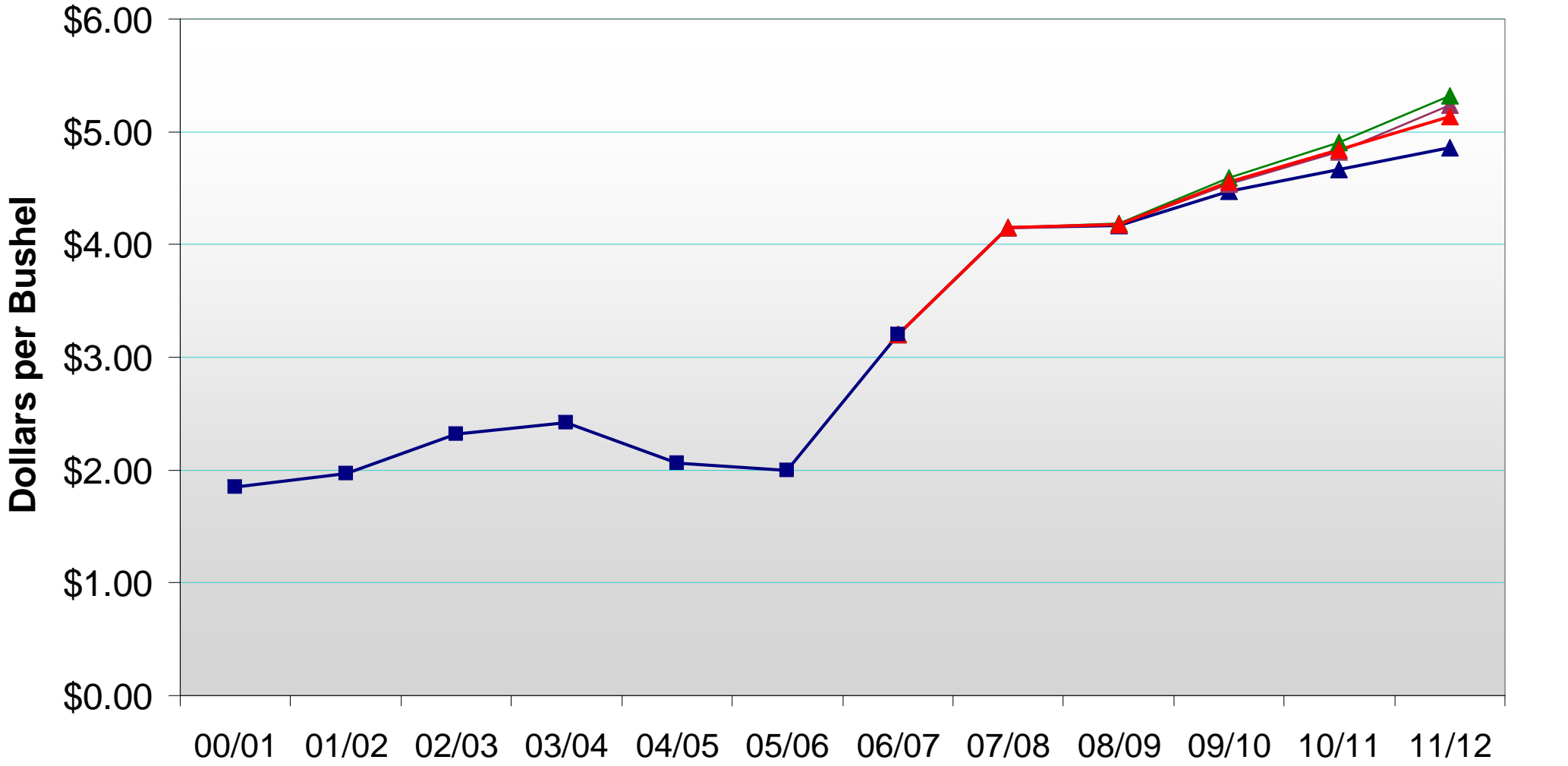
United States



Current Higher RFS Higher RFS & Variable Subsidy Variable Subsidy History

Corn Price

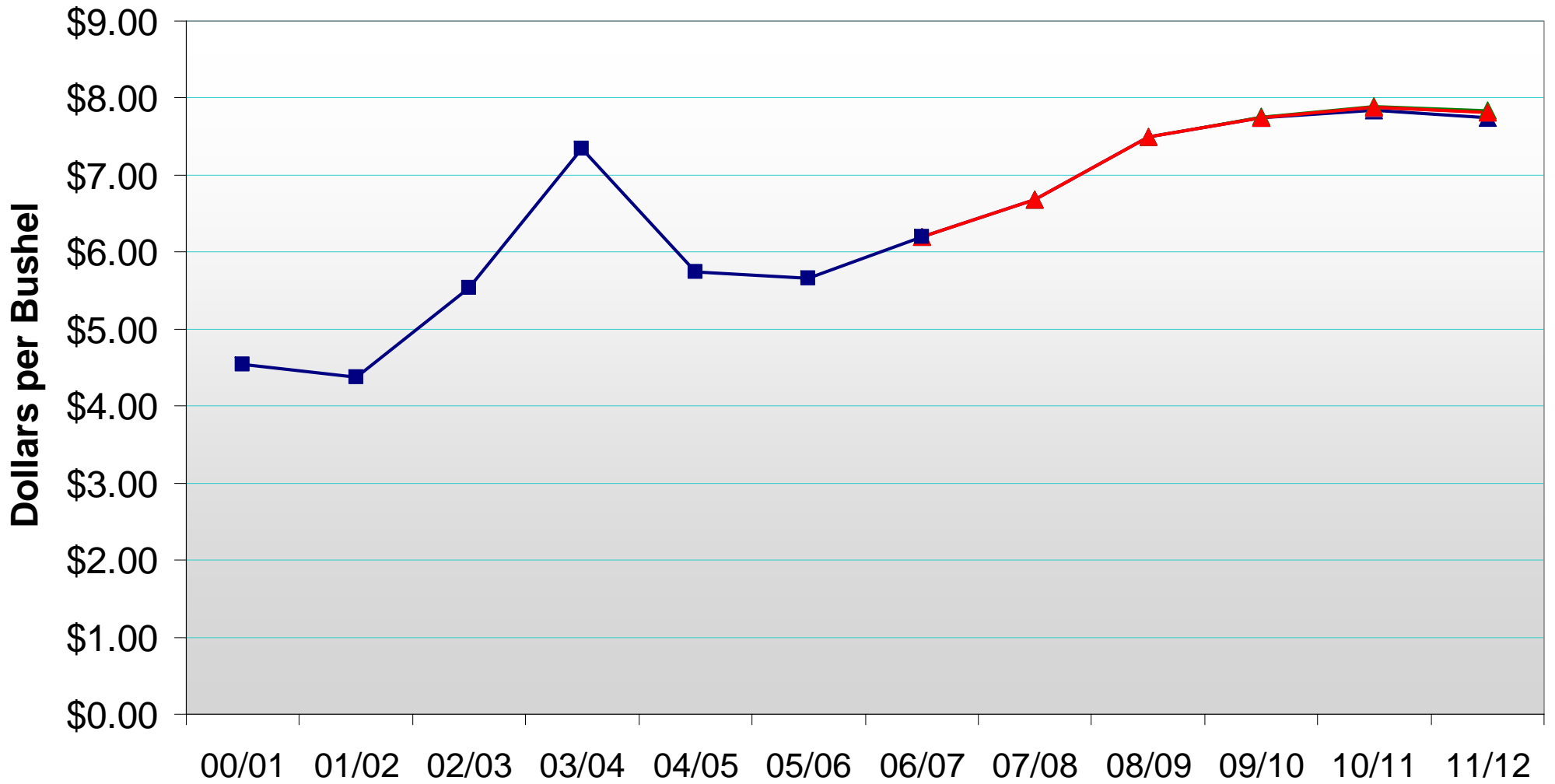
U.S. Average Farm Price



▲ Current ▲ Higher RFS ▲ Higher RFS & Variable Subsidy ▲ Variable Subsidy ■ History

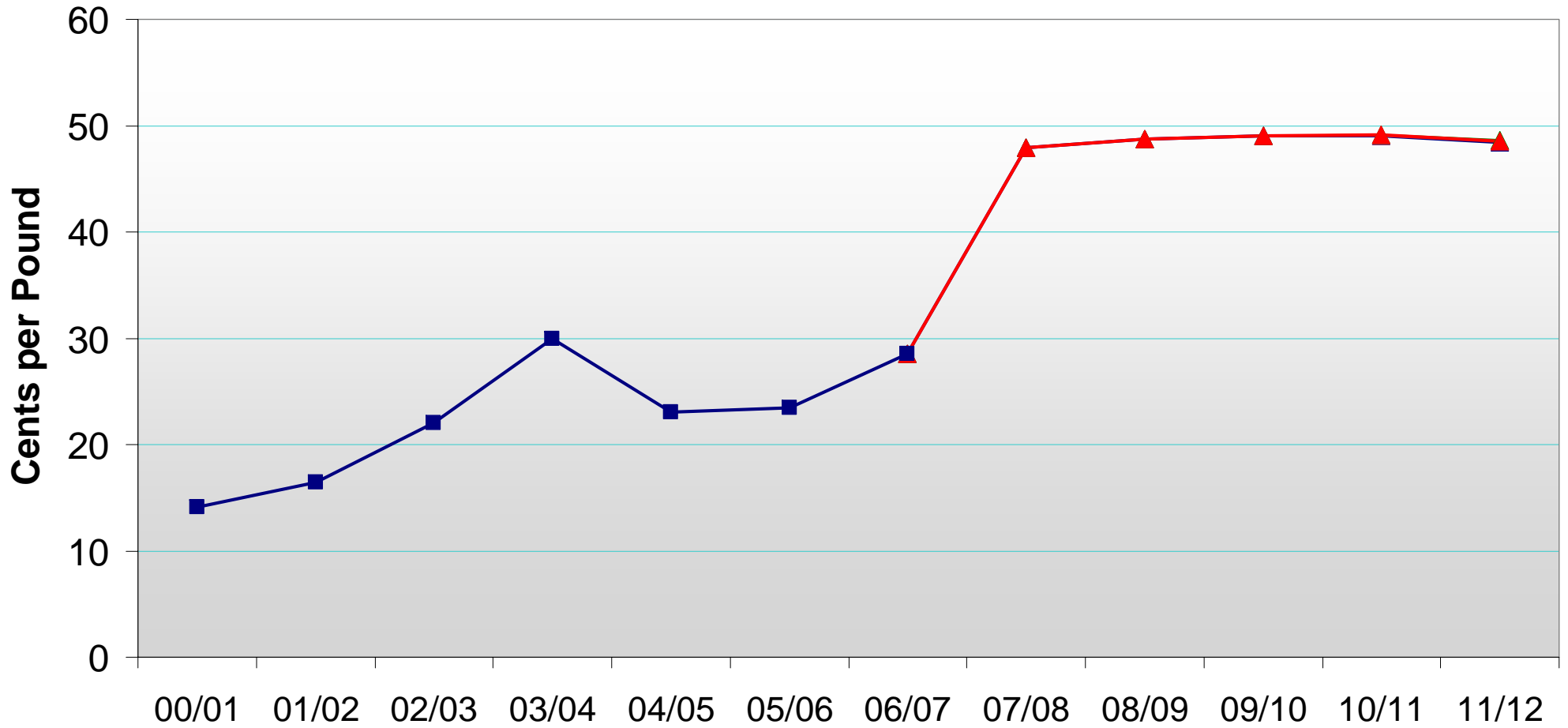
Soybean Price

U.S. Average Farm Price



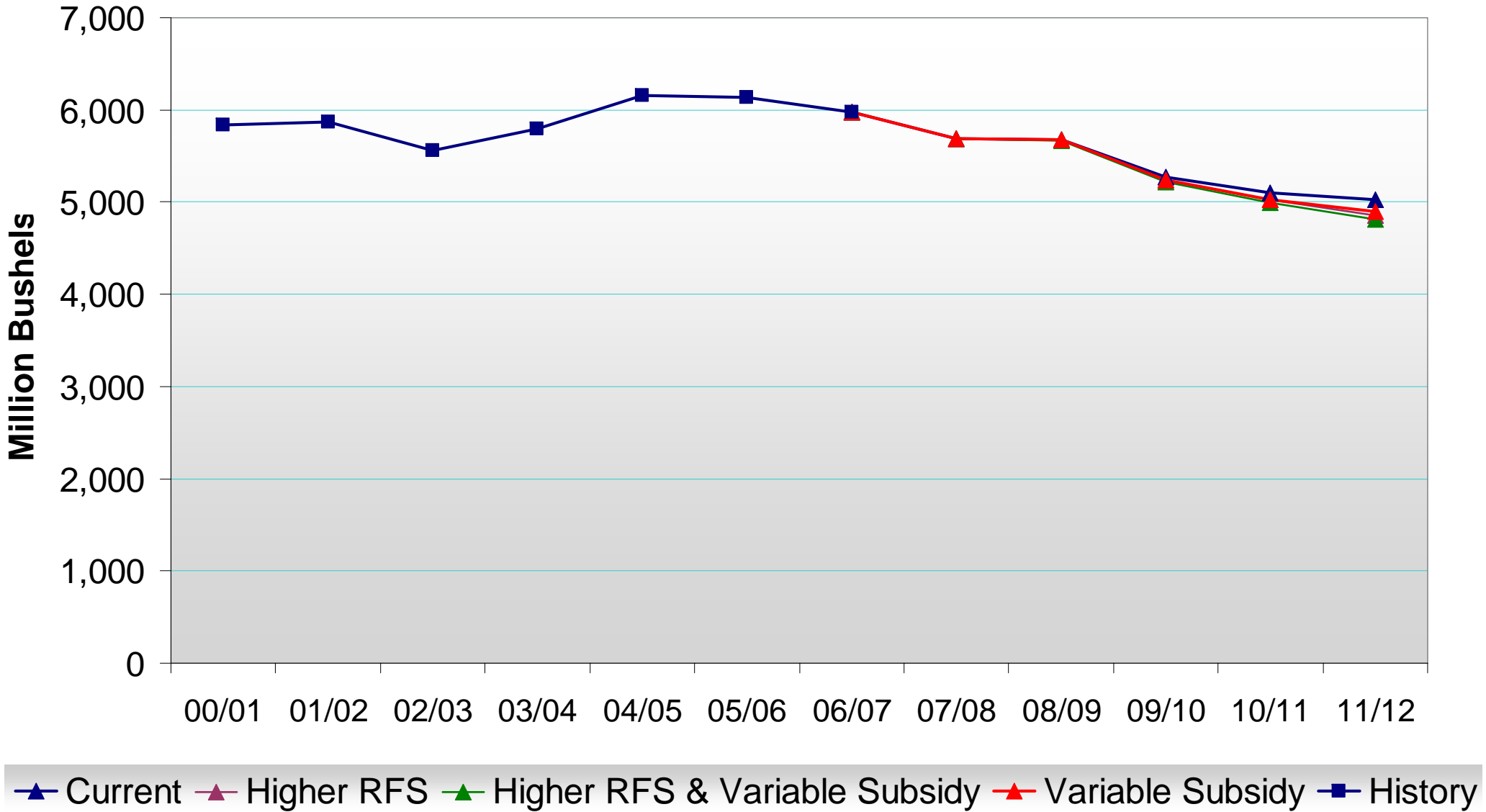
▲ Current ▲ Higher RFS ▲ Higher RFS & Variable Subsidy ▲ Variable Subsidy ■ History

Soybean Oil Price Decatur Price

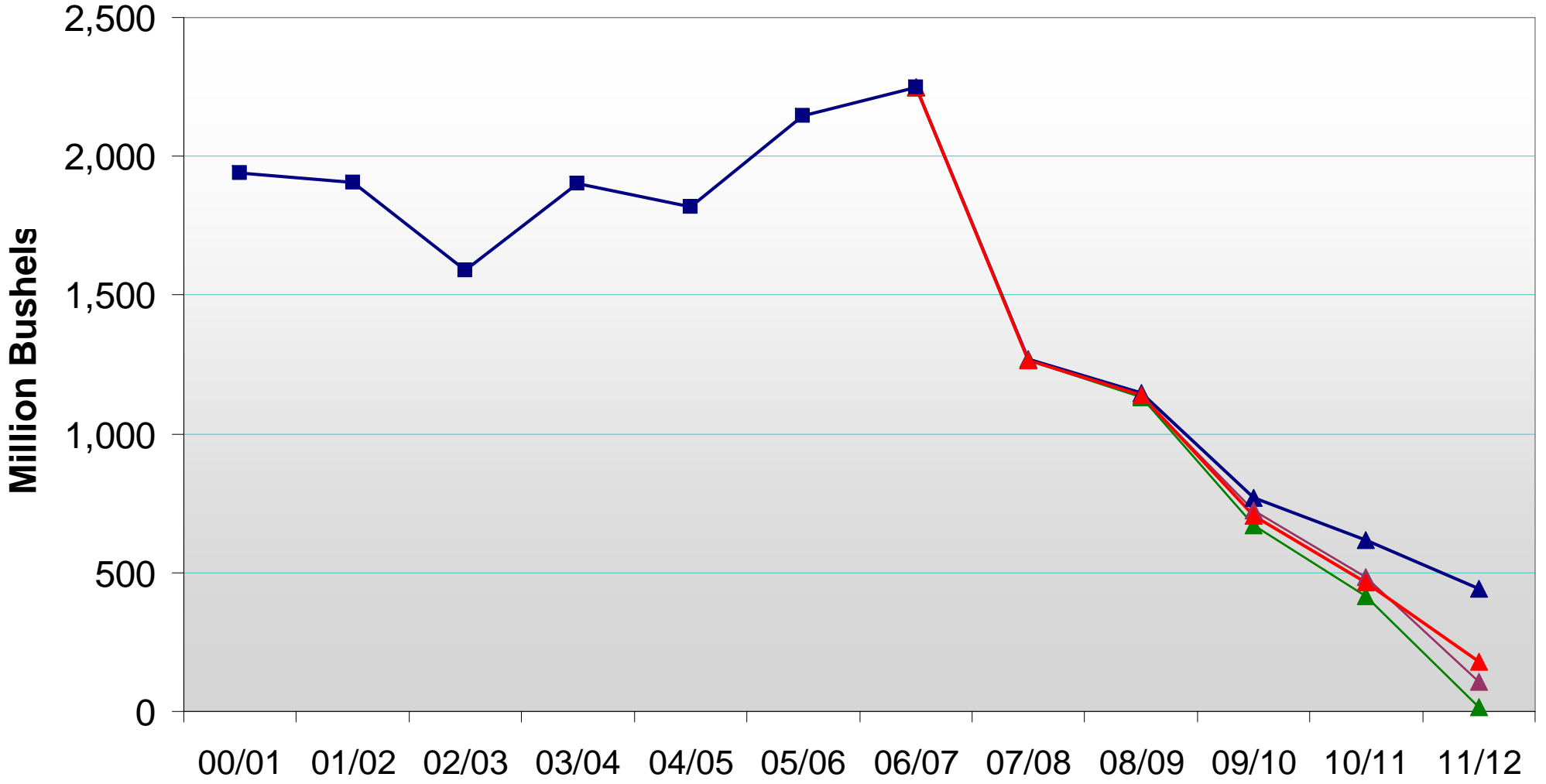


Current Higher RFS Higher RFS & Variable Subsidy Variable Subsidy History

Corn Feed Use

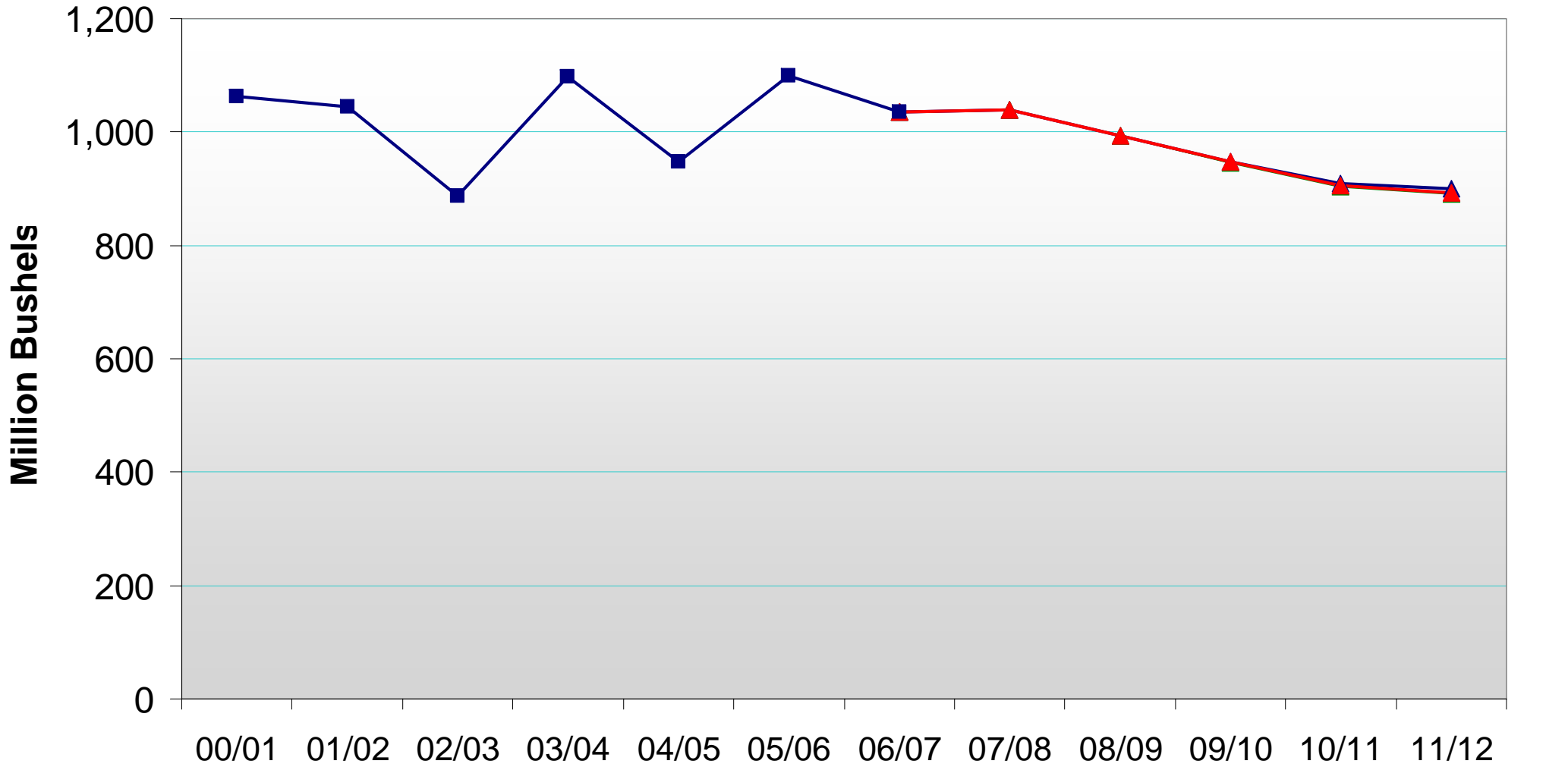


Corn Exports



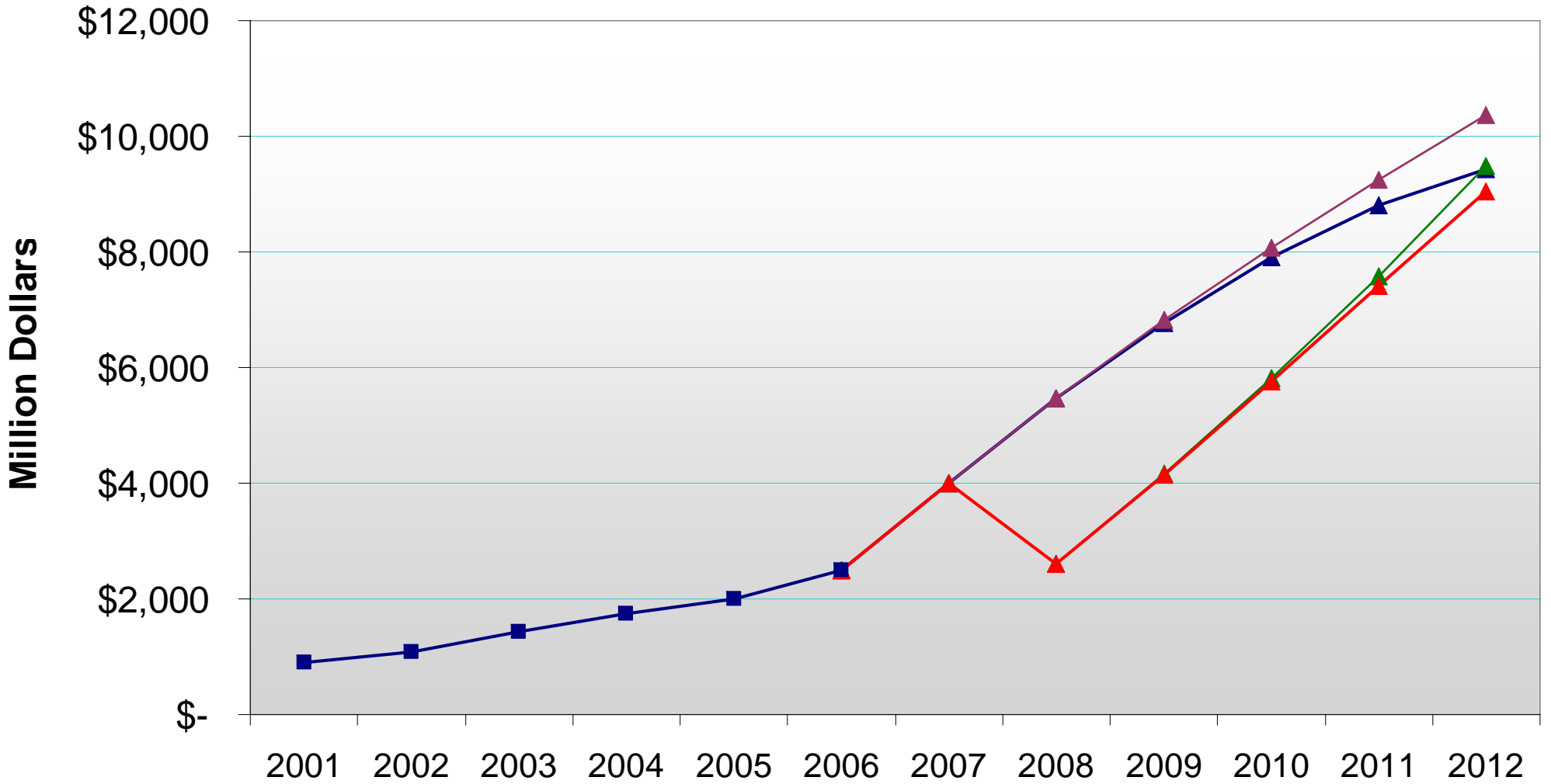
▲ Current ▲ Higher RFS ▲ Higher RFS & Variable Subsidy ▲ Variable Subsidy ■ History

Soybean Exports



▲ Current ▲ Higher RFS ▲ Higher RFS & Variable Subsidy ▲ Variable Subsidy ■ History

Federal Government Expenditure on Ethanol Subsidy



▲ Current ▲ Higher RFS ▲ Higher RFS & Variable Subsidy ▲ Variable Subsidy ■ History

Conclusions

- We are likely to produce a lot more ethanol in coming years, and somewhat more biodiesel
- Biodiesel capacity glut possible
- Higher prices for ag commodities are likely to continue
- Declining exports of ag commodities, especially corn
- More acres in corn

Conclusions

- Effects on ag economy of different policy scenarios are minimal over the next 5 years
- Variable ethanol subsidy would reduce expected federal government expenditure somewhat