

Biofuels Policy and Outlook

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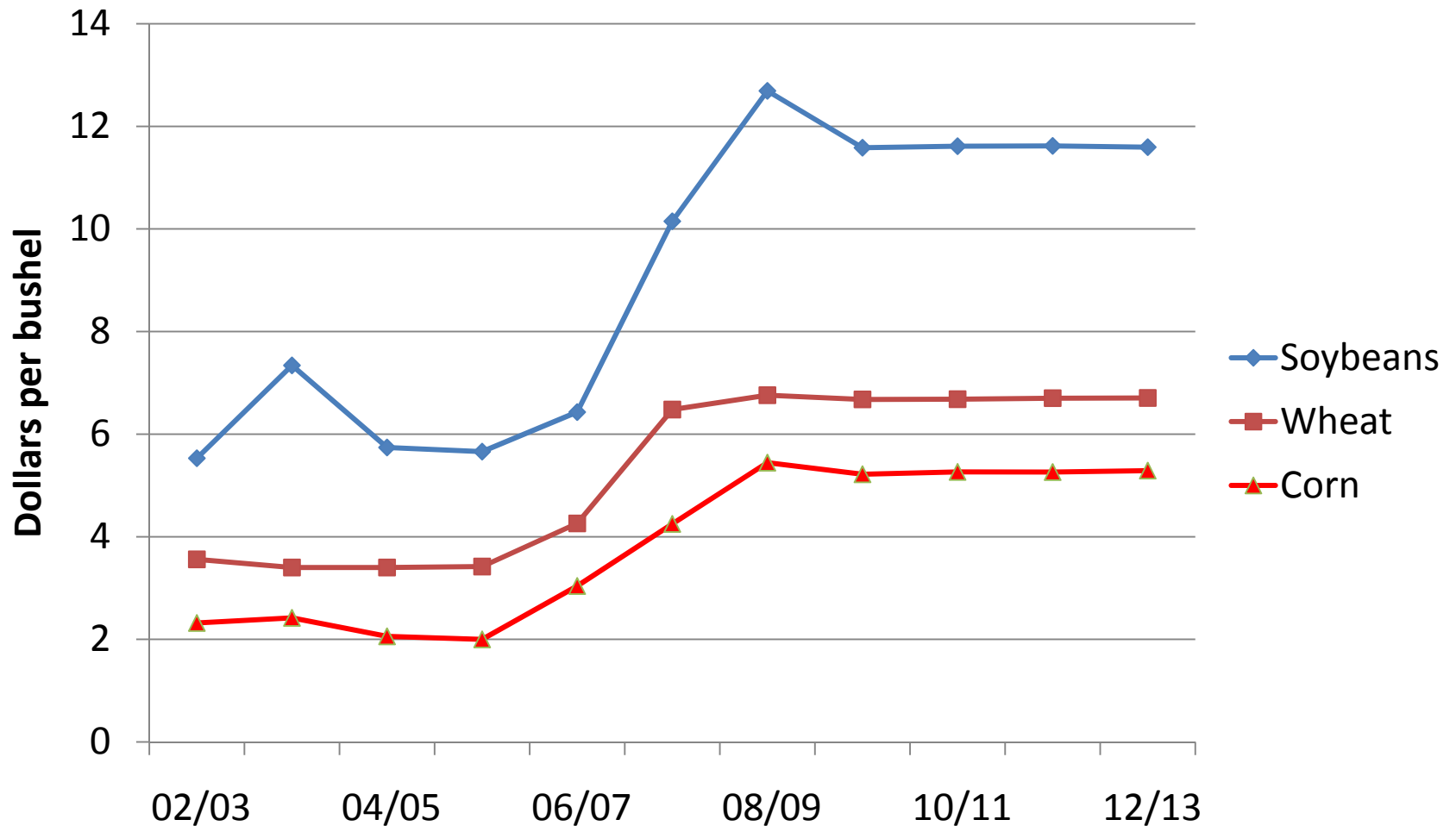
Growing the Bioeconomy

Ames, IA, 9 September 2008

Food and Agricultural
Policy Research Institute



FAPRI-MU crop price projections August 2008 baseline update

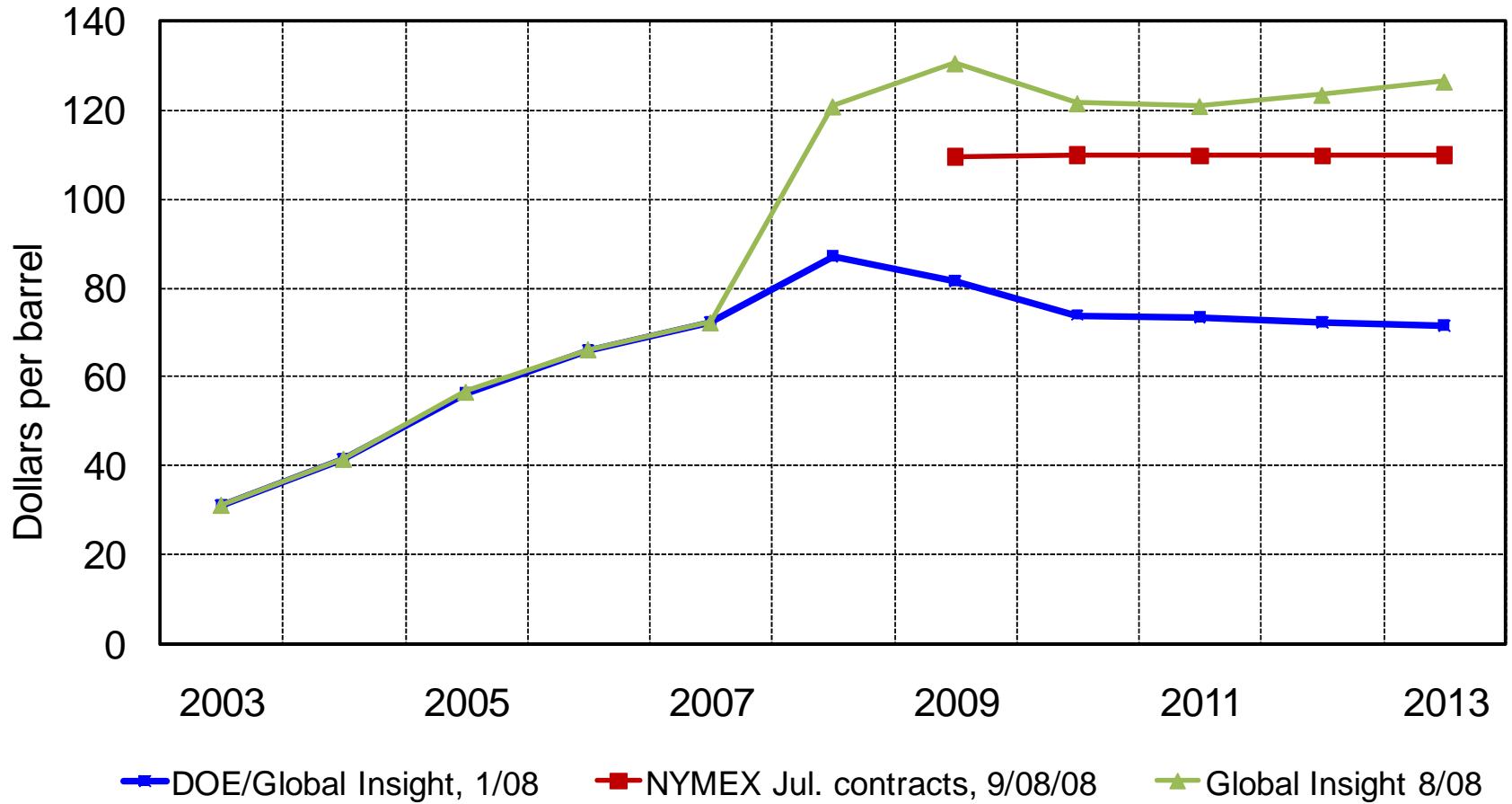


U.S. corn outlook (bil. bu.)

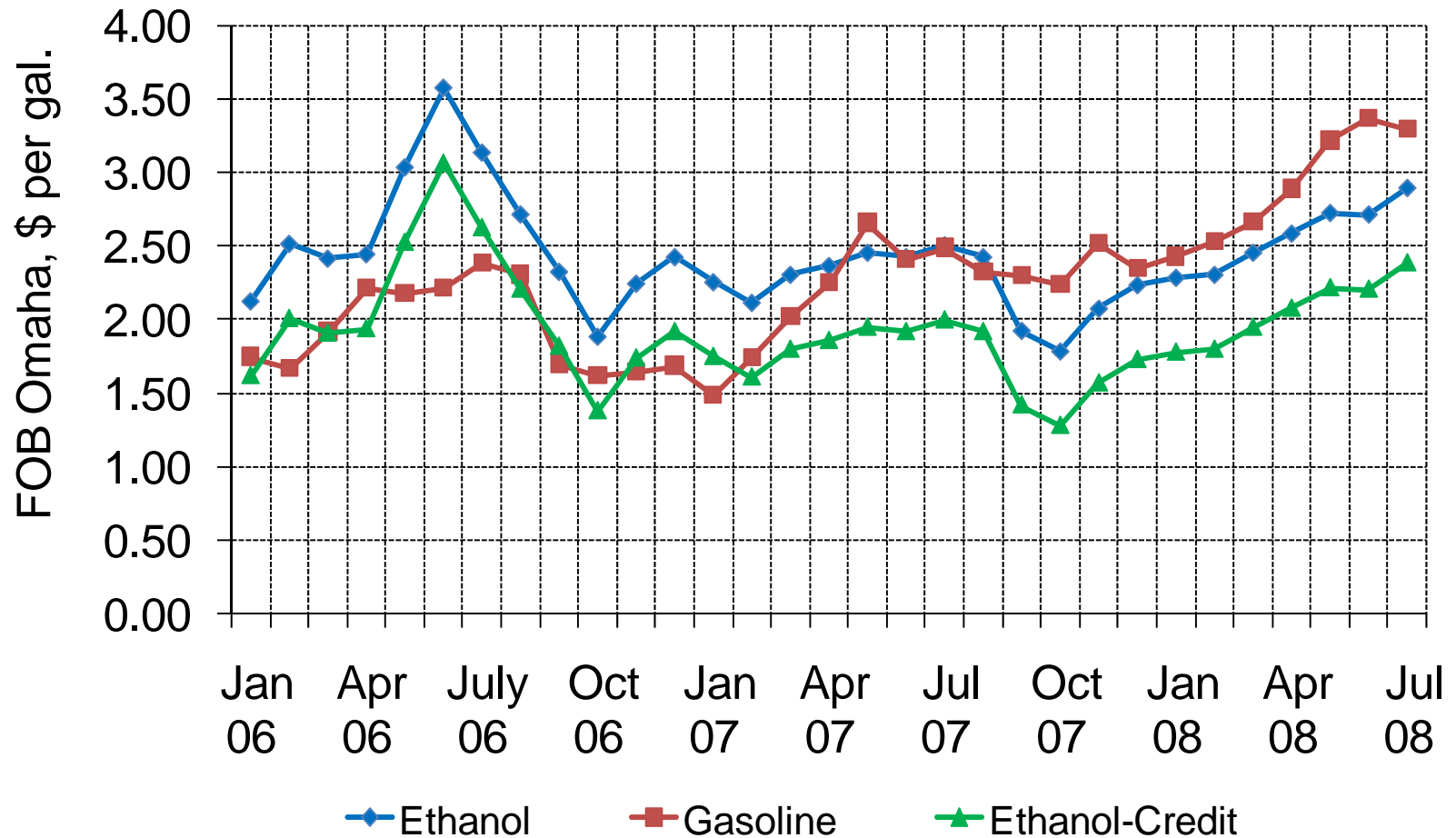
	2005/06	2010/11	2010 vs. 2005
Production	11.11	13.41	2.30 (20.7%)
Feed & residual	6.15	5.16	-0.99 (-16.1%)
Ethanol	1.60	4.99	3.39 (211.8%)
Other domestic	1.38	1.40	0.02 (1.4%)
Exports	2.13	1.92	-0.21 (-9.9%)
Ending stocks	1.97	1.19	-0.78 (-39.6%)
Farm price/bu.	\$2.00	\$5.00- \$5.50	\$3.26 (163.0%)

Petroleum price

(West Texas Intermediate)



Rack (wholesale) prices for ethanol and gasoline



Source: Nebraska government website: <http://www.neo.ne.gov/statshtml/66.html>

Dry mill ethanol plant returns

(Dollars per gallon of ethanol)

	2005/ 2006	2006/ 2007	2007/ 2008	Mar 09 futures*
Value of ethanol	2.61	2.32	2.40	2.14
Value of DDGS	0.27	0.34	0.46	0.62
Cost of corn	-0.74	-1.12	-1.55	-2.05
Cost of fuel, electricity	-0.27	-0.27	-0.31	-0.34
Other operating costs	-0.31	-0.32	-0.32	-0.33
Net return over operating costs	1.56	0.96	0.68	0.04

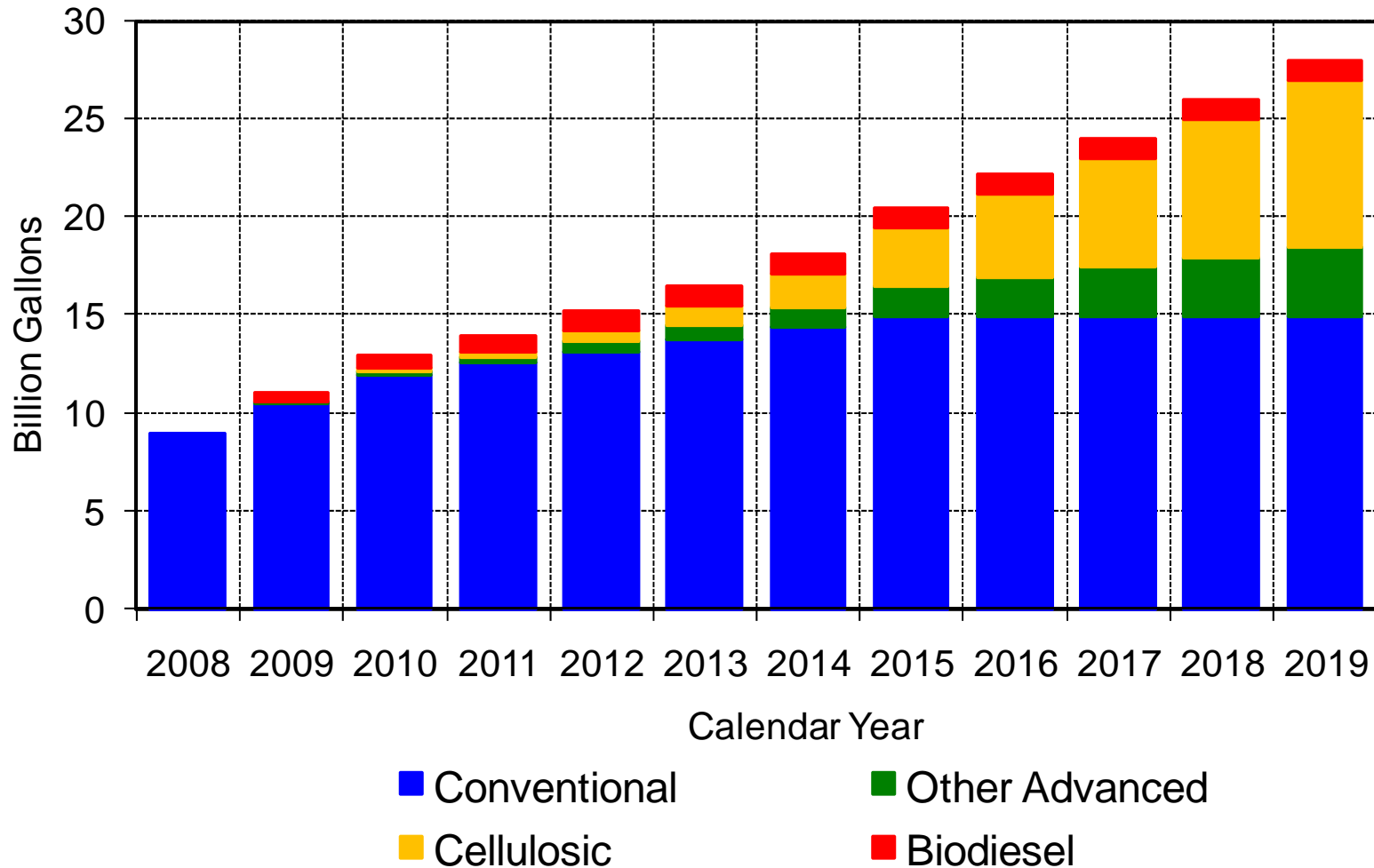
*Based on CBOT futures prices for ethanol and corn, 9/8/08

US biofuel policies other than mandates

- Blender's tax credit (pre farm bill)
 - Originally \$0.51 per gallon for ethanol, expires end of 2010
 - \$1.00 per gallon for biodiesel from pre-consumer oils, expires end of 2008
- Ethanol specific tariff (ad valorem of 2.5%)
 - \$0.54 per gallon on imports not from Caribbean
 - Specific tariff was due to expire at end of 2008
- Farm bill
 - Reduces ethanol credit to \$0.45 per gallon
 - Extends ethanol tariff through 2010
 - \$1.01/gallon tax credit for cellulosic ethanol

*For the baseline, credits and tariffs are assumed to be extended

EISA provisions



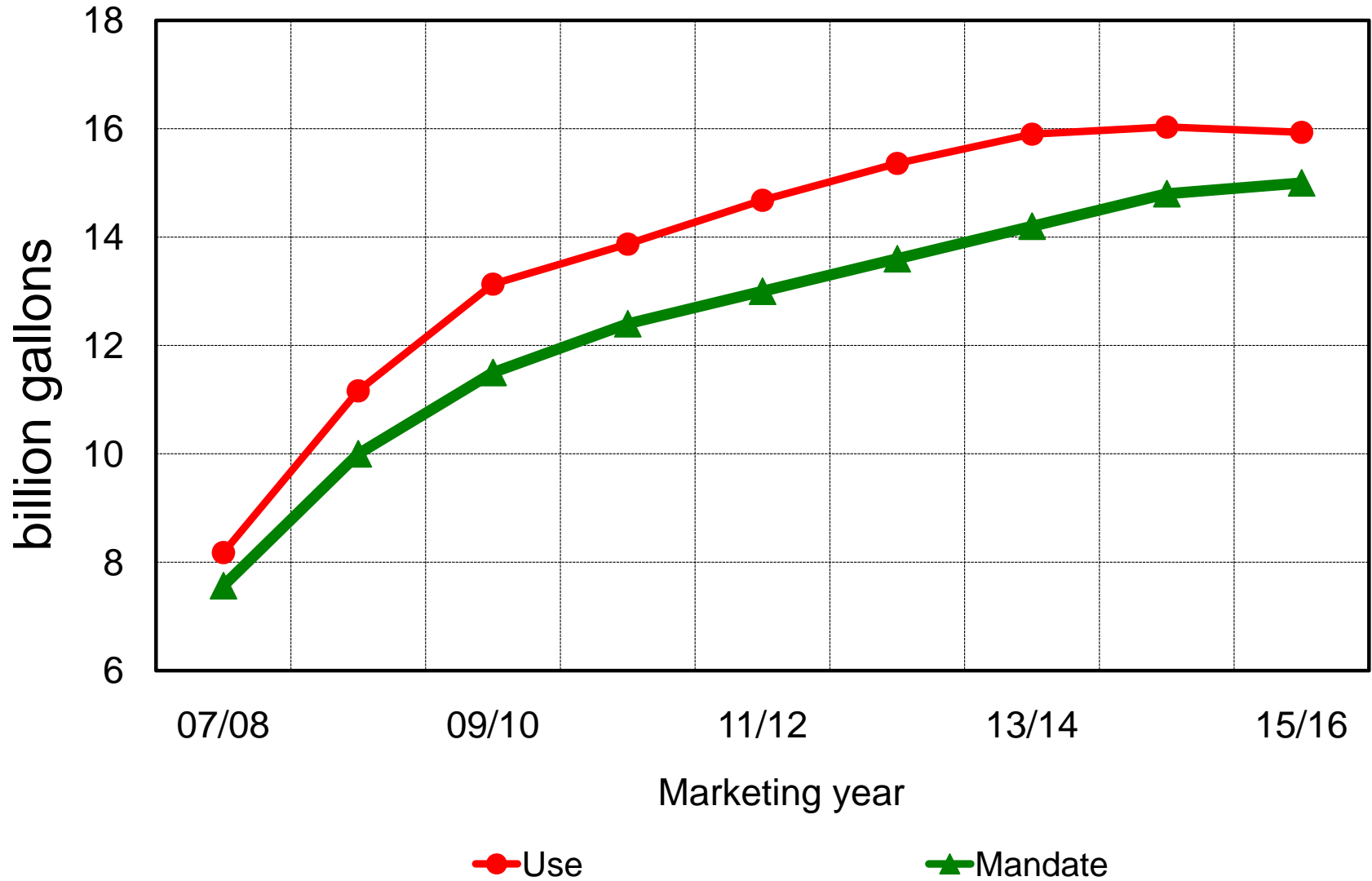
EISA: a few of the complications

- Draft regulations not expected until Fall, final regs in spring.
- New law requires 36 billion gallons of biofuels by 2022, and 20.5 billion by 2015
- Sub-mandates
 - 9 billion gallons of advanced biofuels, 5.5 billion by 2015
 - Biodiesel: 1 billion gallons by 2012
 - Cellulosic ethanol: 3 billion gallons by 2015, 7 billion gallons by 2018
- What is an advanced Biofuel?
 - Not quite what ever the EPA says it is, but...
 - “Advanced biofuels” must meet greenhouse gas reductions
 - new conventional ethanol must also
 - What about imports?
- If not waived, each mandate must be met
 - Tradable RINs
 - Each class could have a different price and RIN value (conventional, cellulosic, biodiesel and other advanced)

EISA: some of the finer points

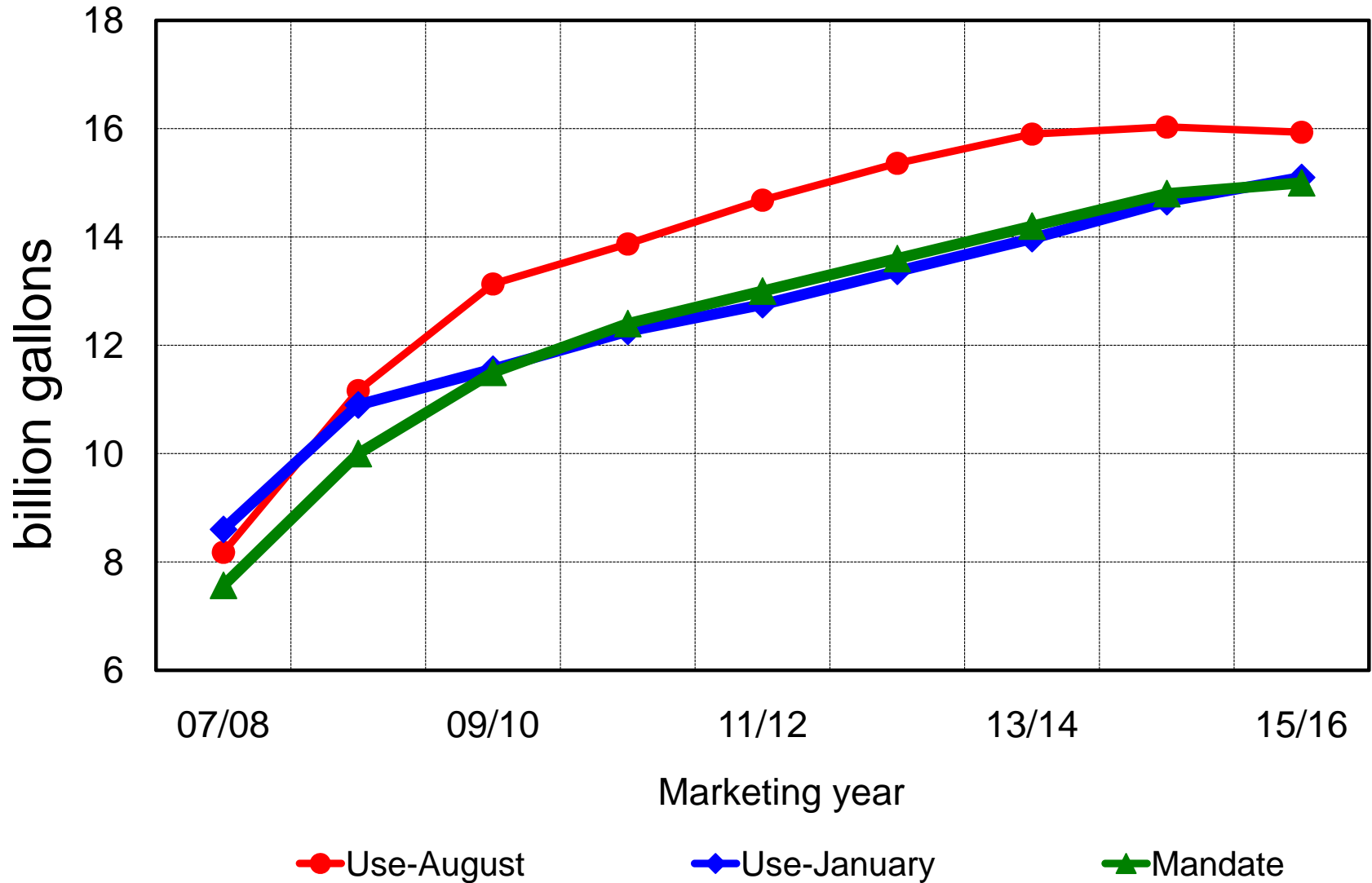
- Rollover provisions
 - If biofuel use more than required in one year, can carry some credits forward to next year
 - Thus if exceed mandate in 2009, may use less than EISA amount in 2010
- Deficit
 - Could fall short of required biofuel use this year if made up the next
- Waivers
 - Provisions to waive, some specific, some quite vague
 - Specific provisions for cellulosic and biodiesel, overall waiver more vague
 - Other readings of bill are possible

Conventional Ethanol



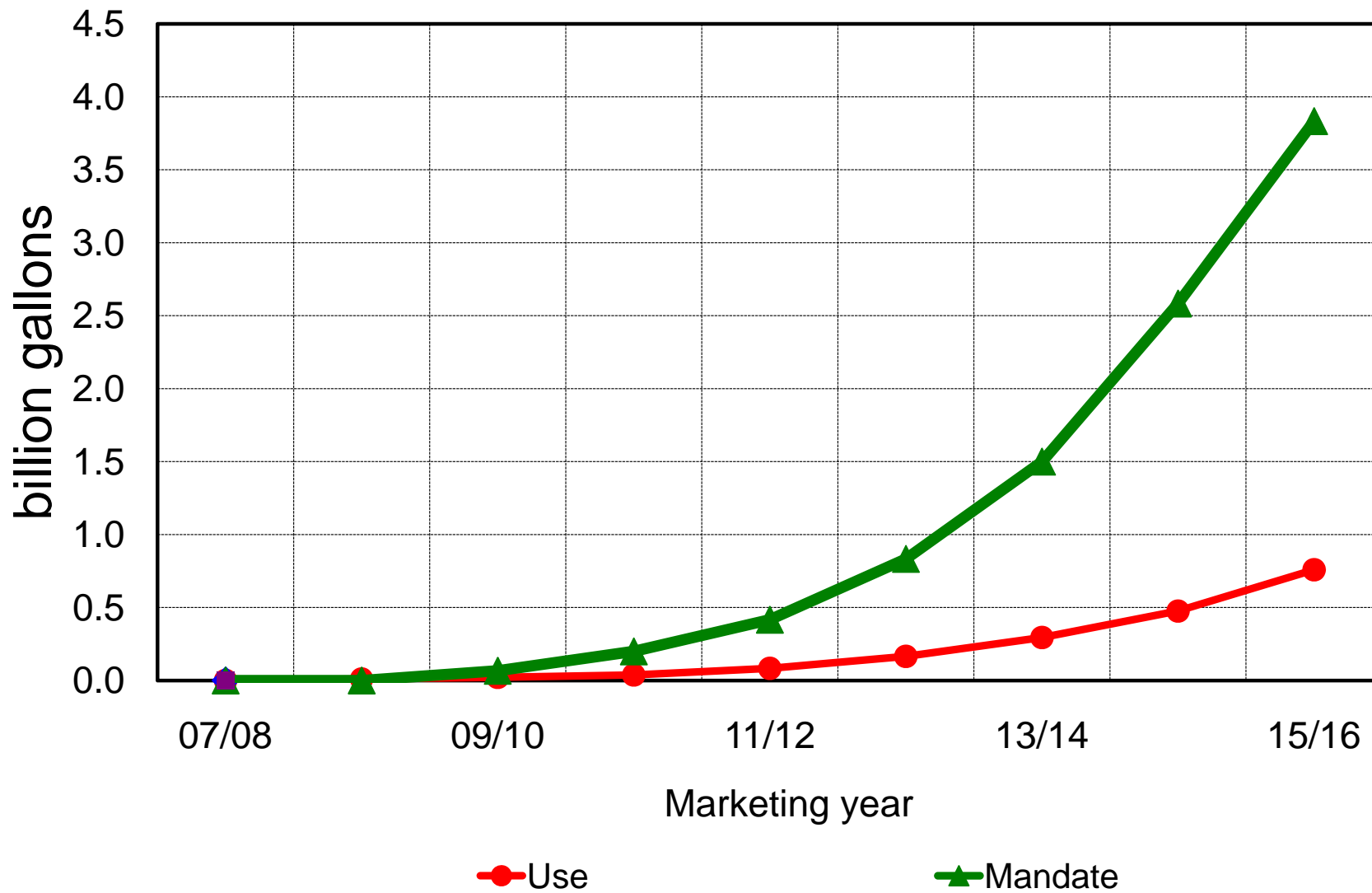
Source: FAPRI-MU estimates, January, August 2008.

Conventional Ethanol



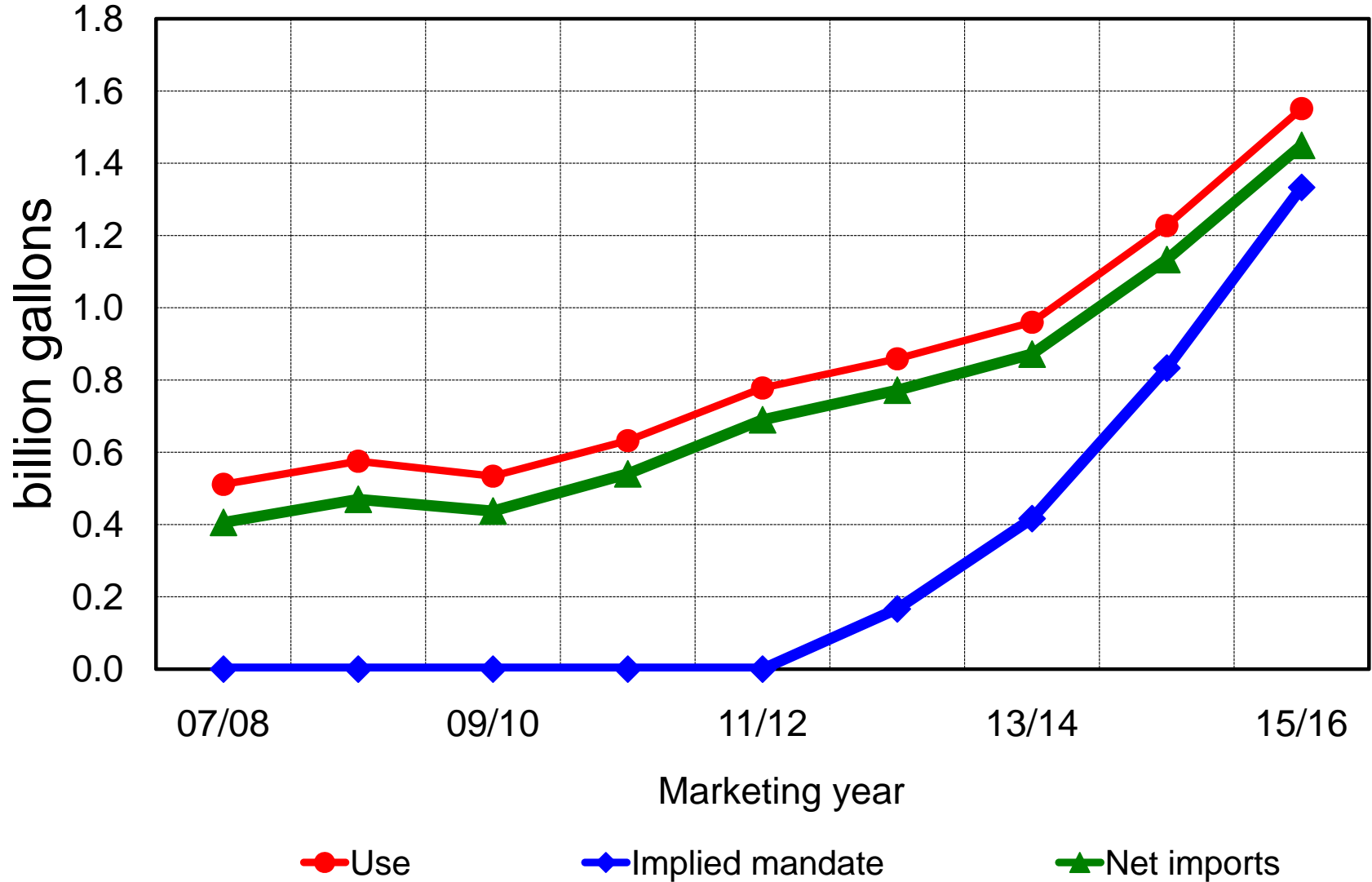
Source: FAPRI-MU estimates, January, August 2008.

Cellulosic Ethanol



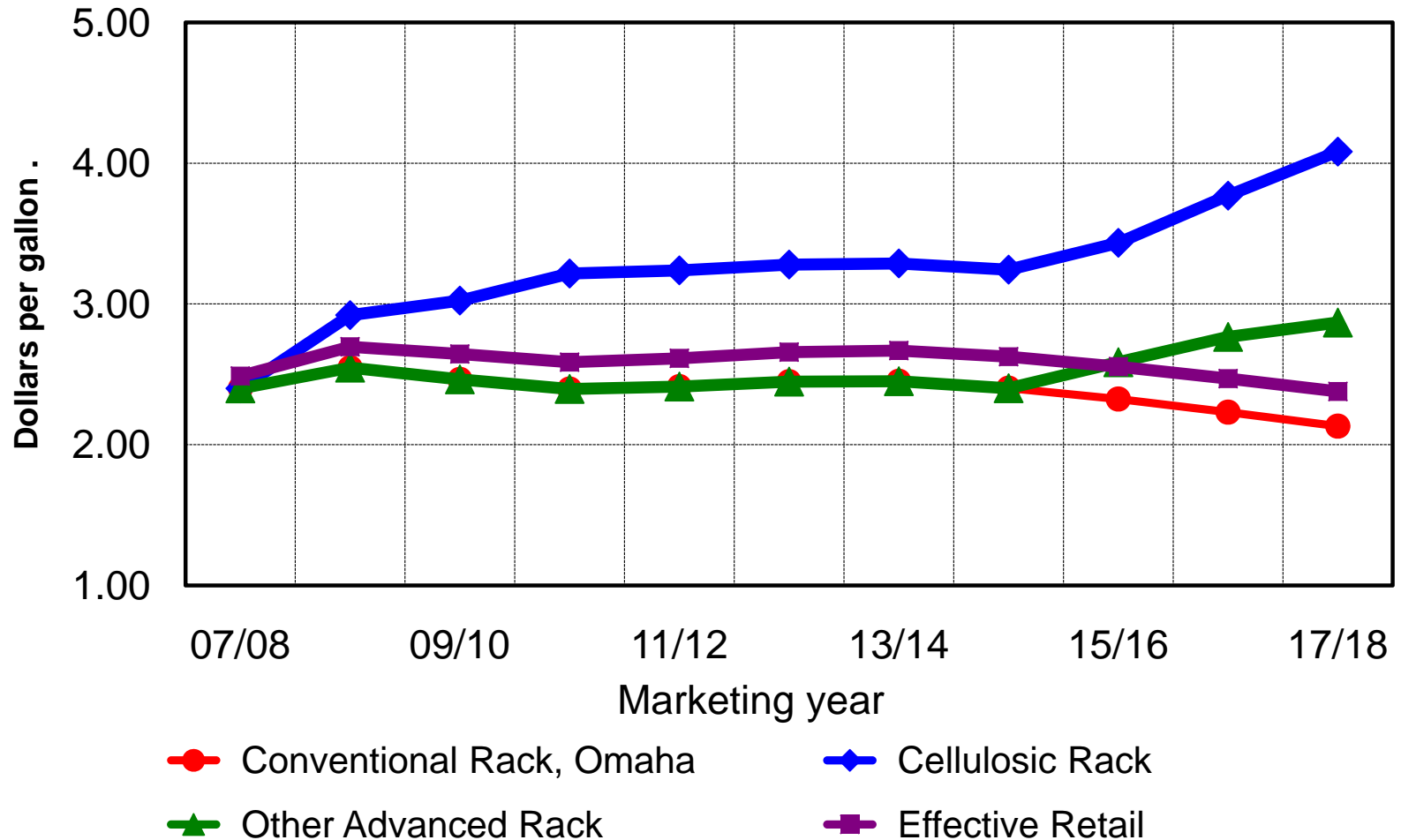
Source: FAPRI-MU estimates, January, August 2008.

Other Advanced Ethanol



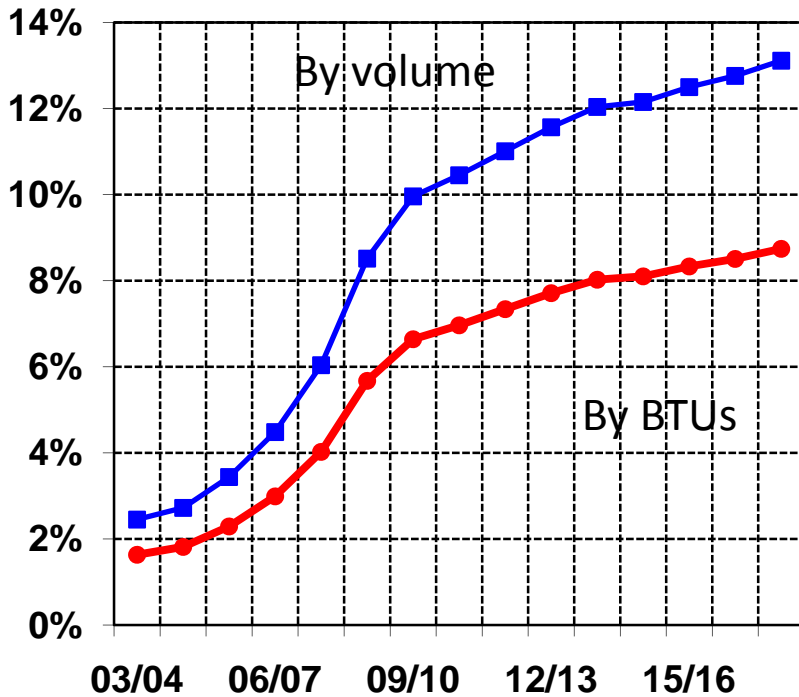
Source: FAPRI-MU estimates August 2008.

Ethanol prices with tariffs and credits extended

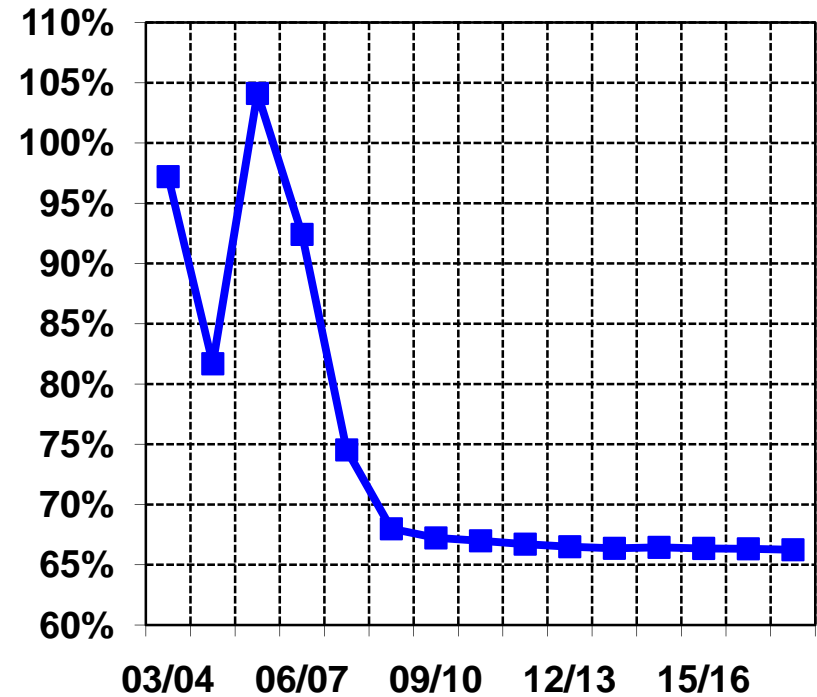


Ethanol share of gasoline use and relative retail prices

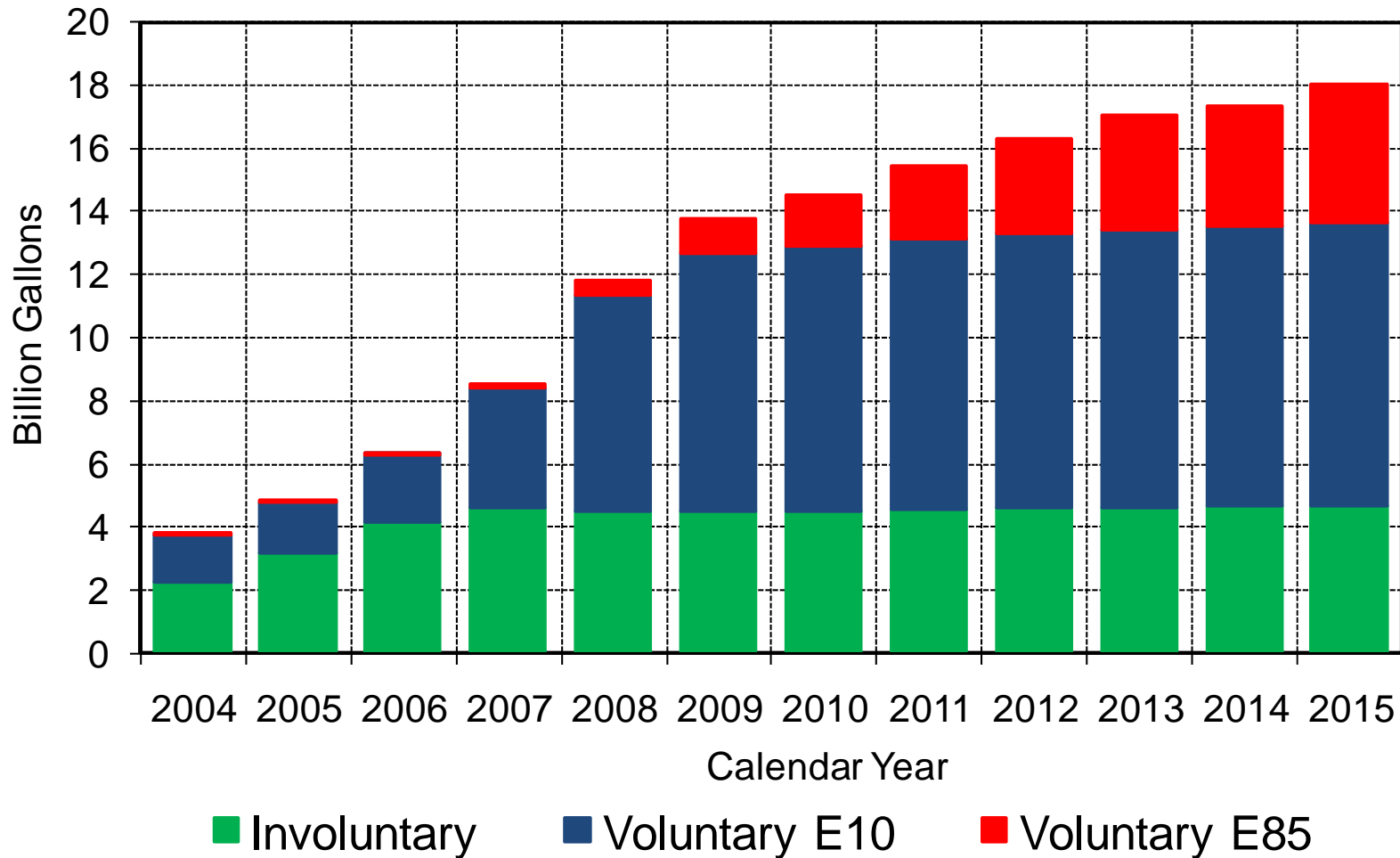
Ethanol use as share of motor gasoline use



Implied ethanol/gasoline retail price ratio



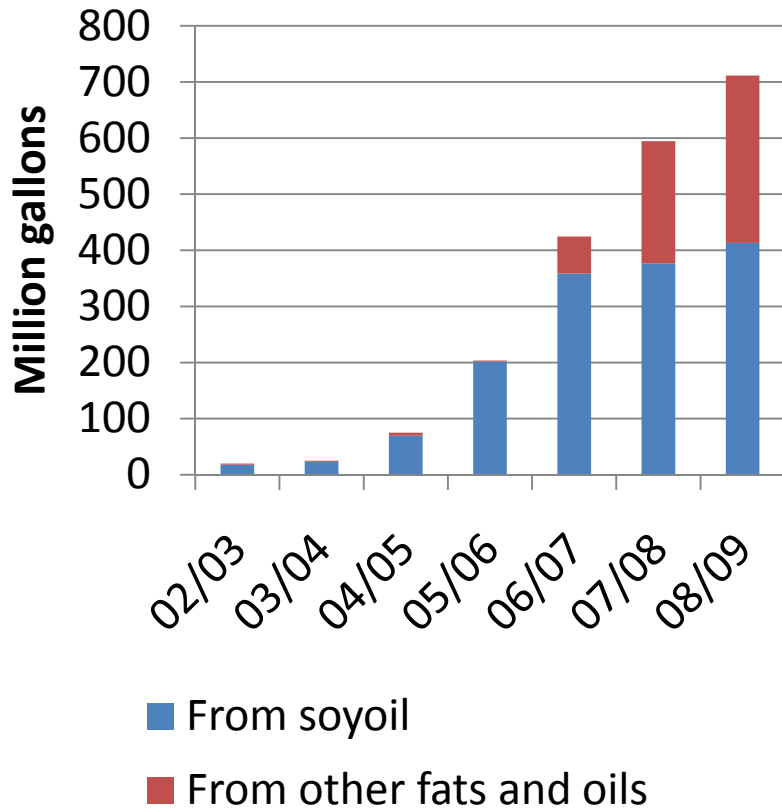
Ethanol Consumption



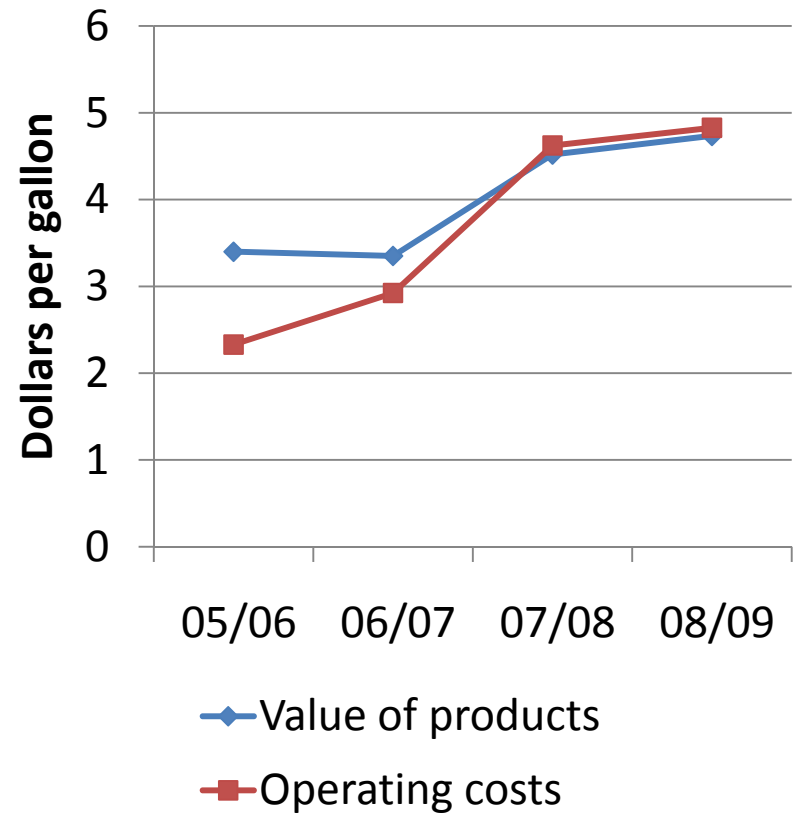
Source: FAPRI-MU estimates, August 2008.

Biodiesel

US production

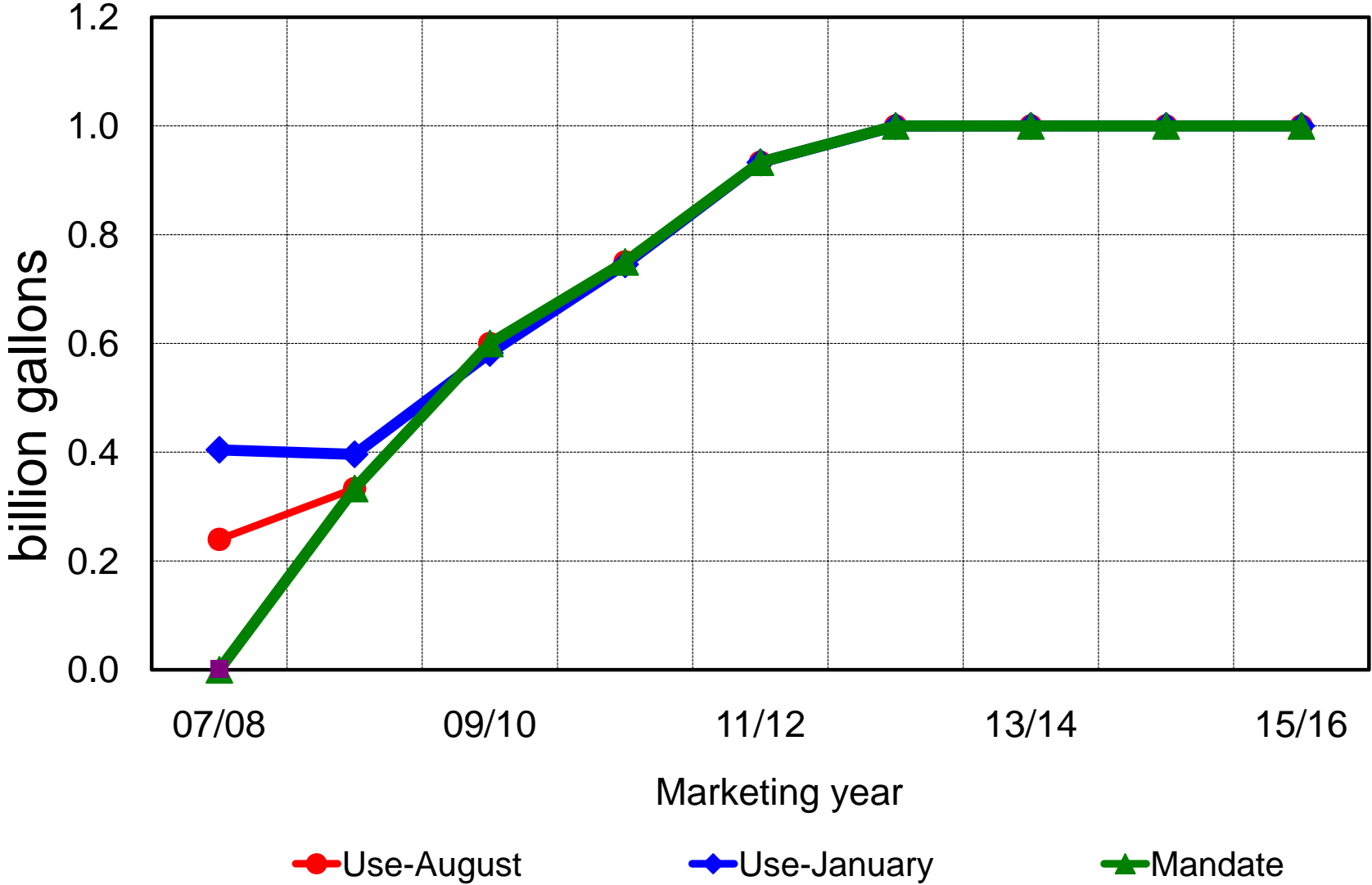


Biodiesel returns



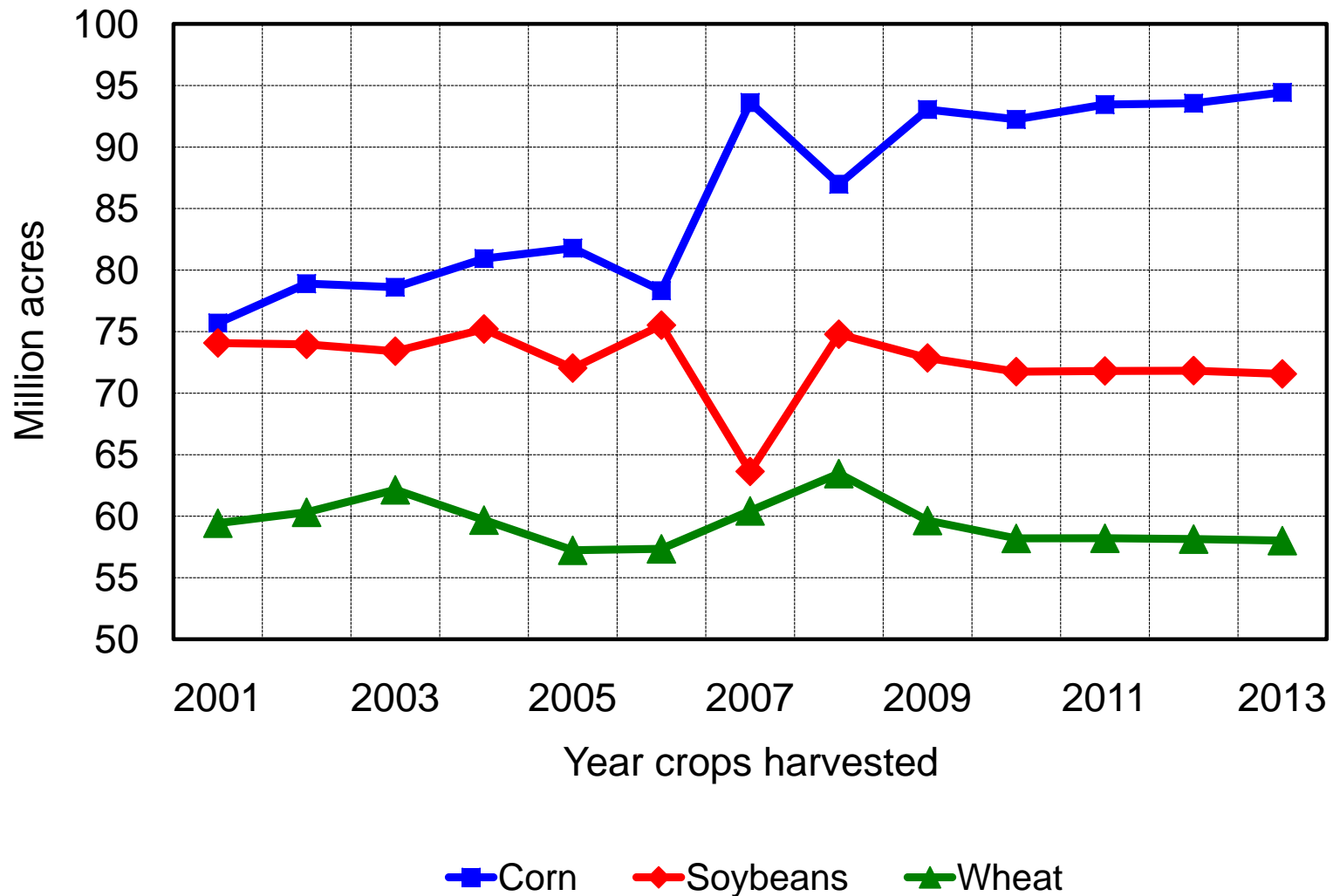
Source: FAPRI-MU estimates, August 2008

Biodiesel



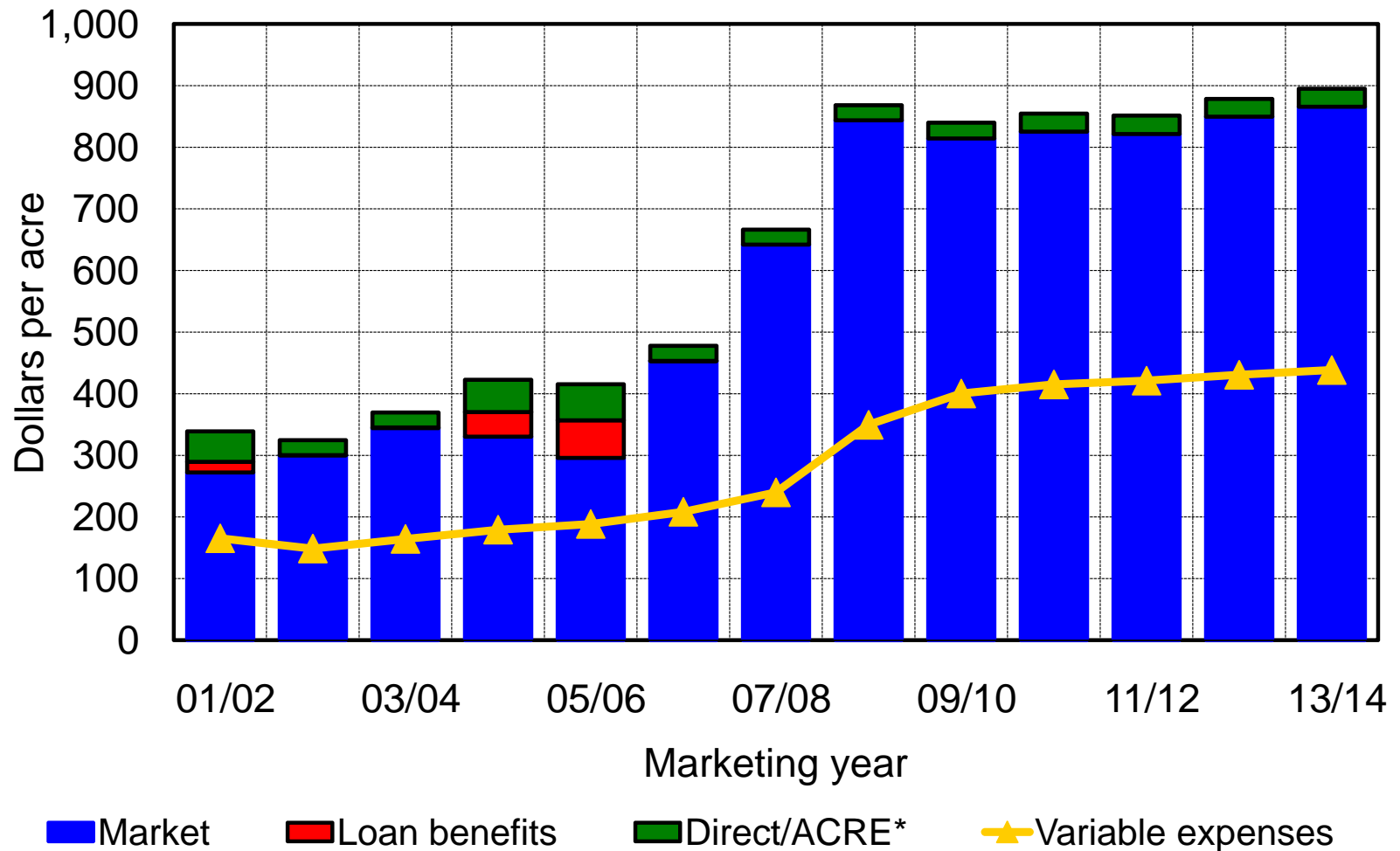
Source: FAPRI-MU estimates, January, August 2008.

Biofuel demand alters crop acreage

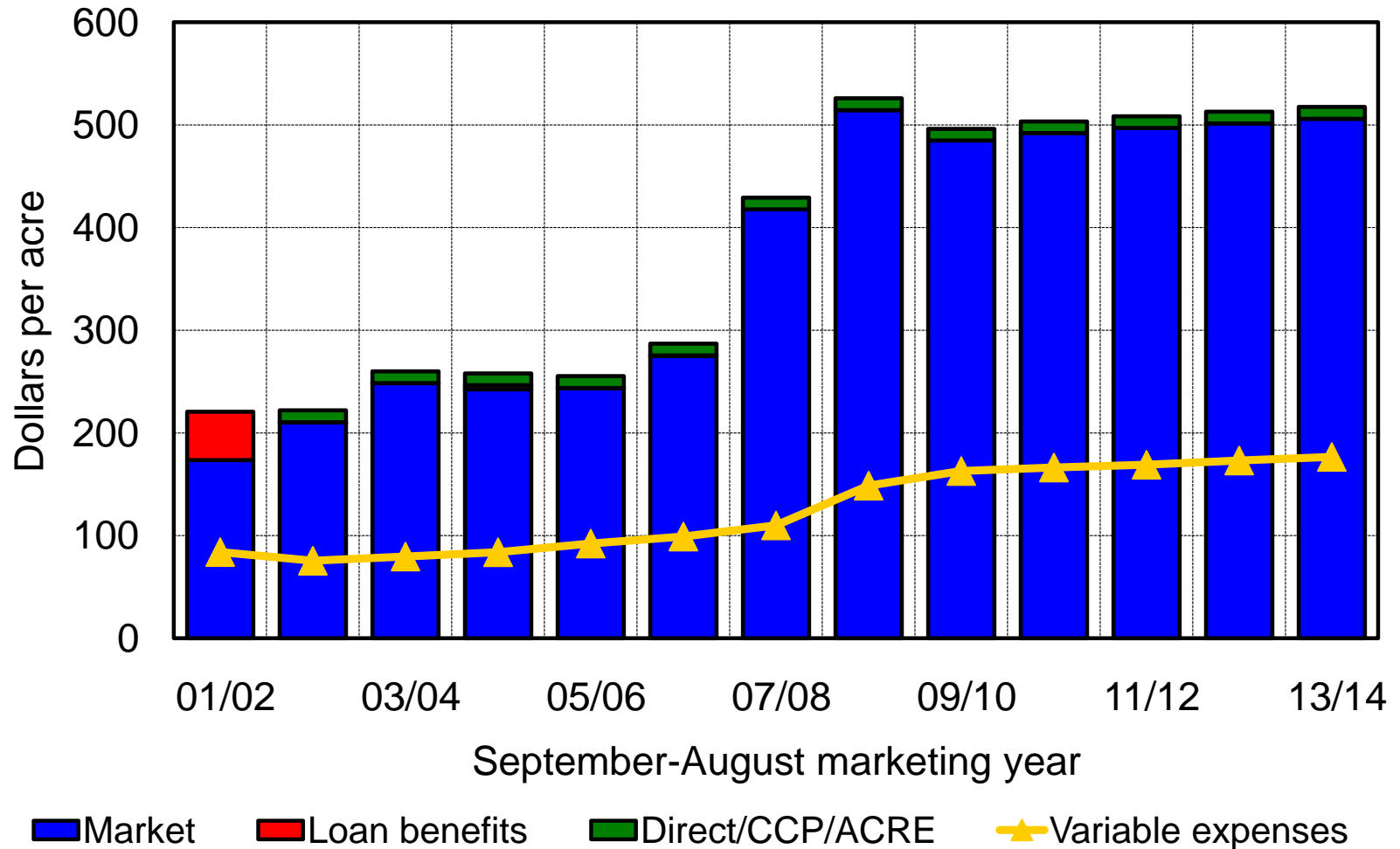


Source: FAPRI-MU estimates, August 2008.

Higher prices increase corn returns

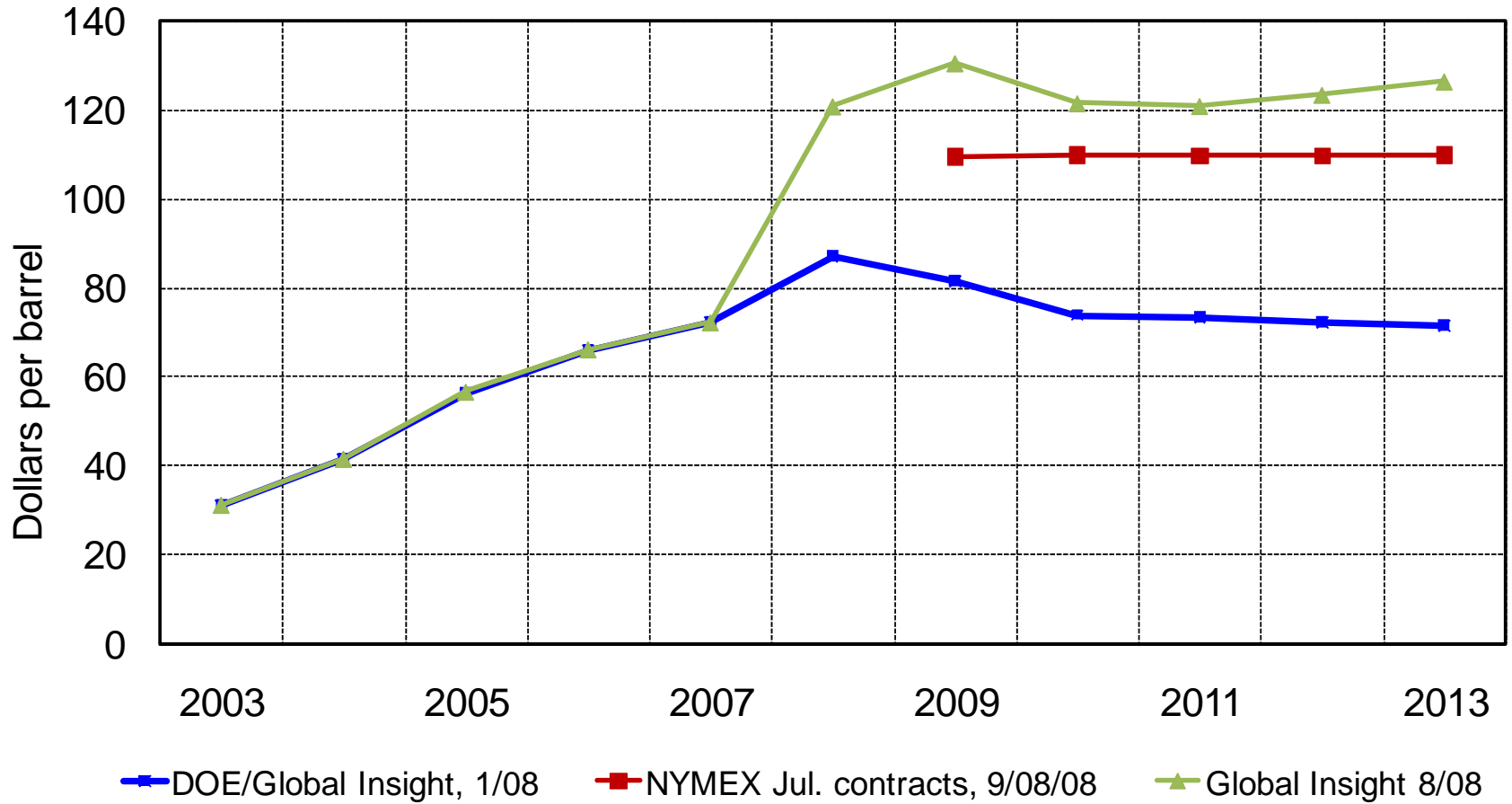


Soybean returns increase sharply



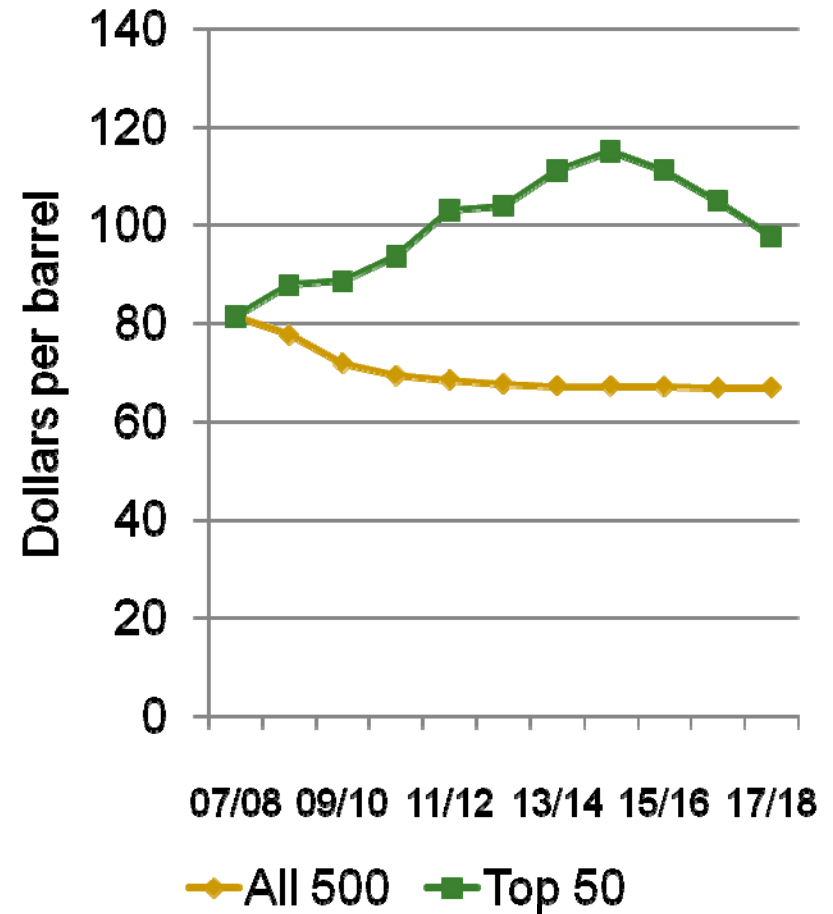
Petroleum price

(West Texas Intermediate)

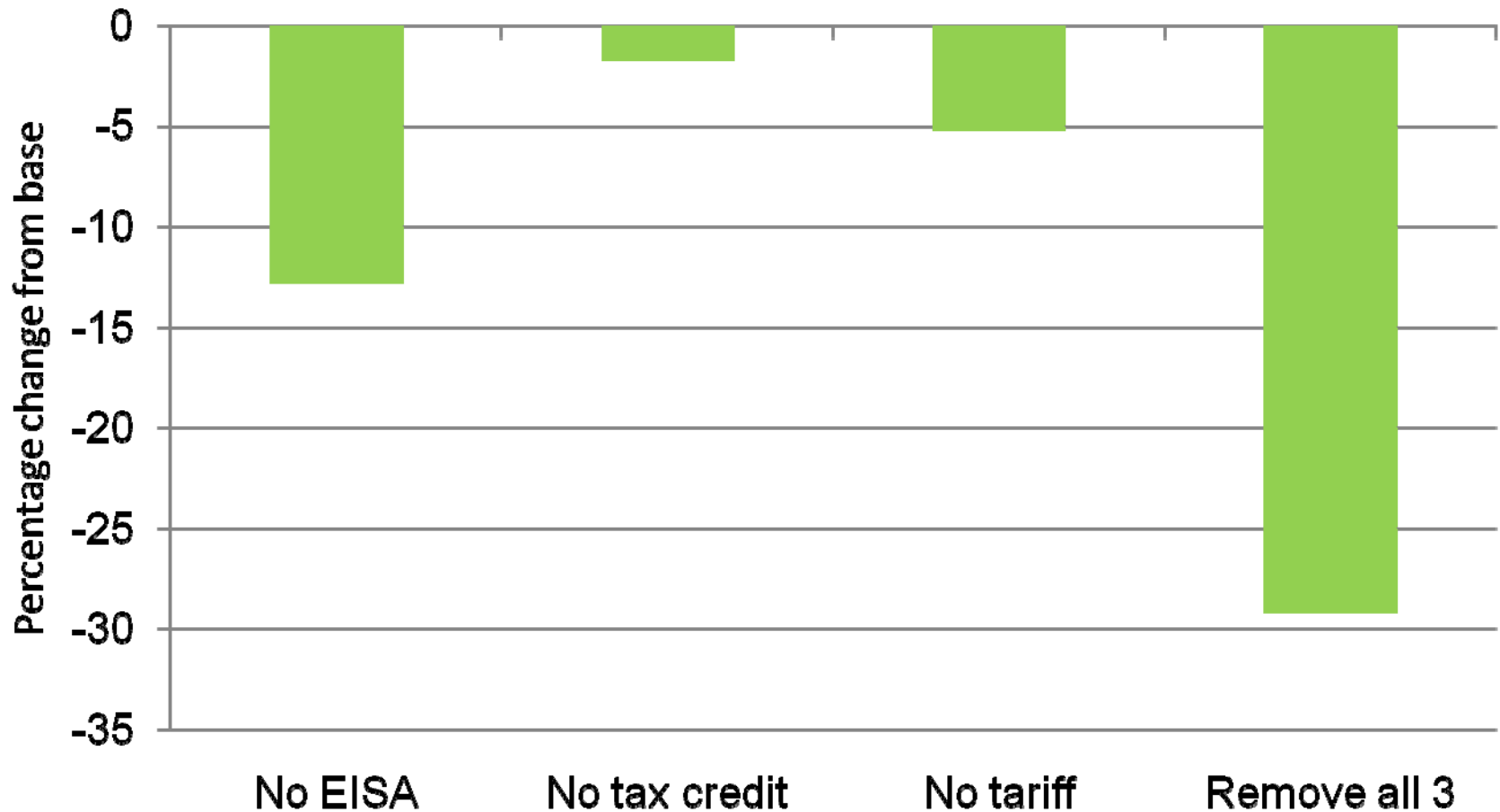


Petroleum price revisited

- Current market and futures for petroleum are far above stochastic baseline mean
- Sort stochastic results by 2008/09-2017/18 average petroleum price
- Compare top 50 oil price outcomes to average of all 500 outcomes

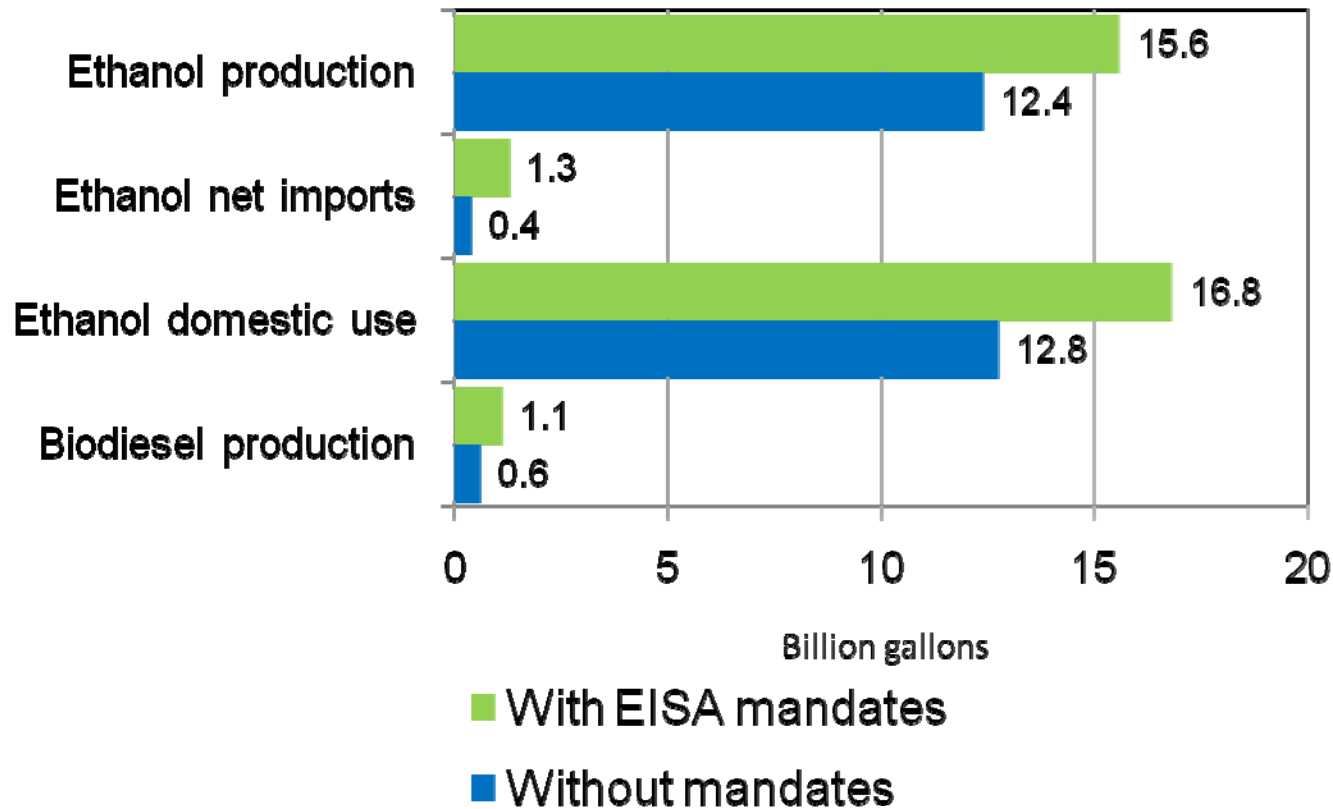


Removing current policies: effect on ethanol prices, 2011-17 avg.



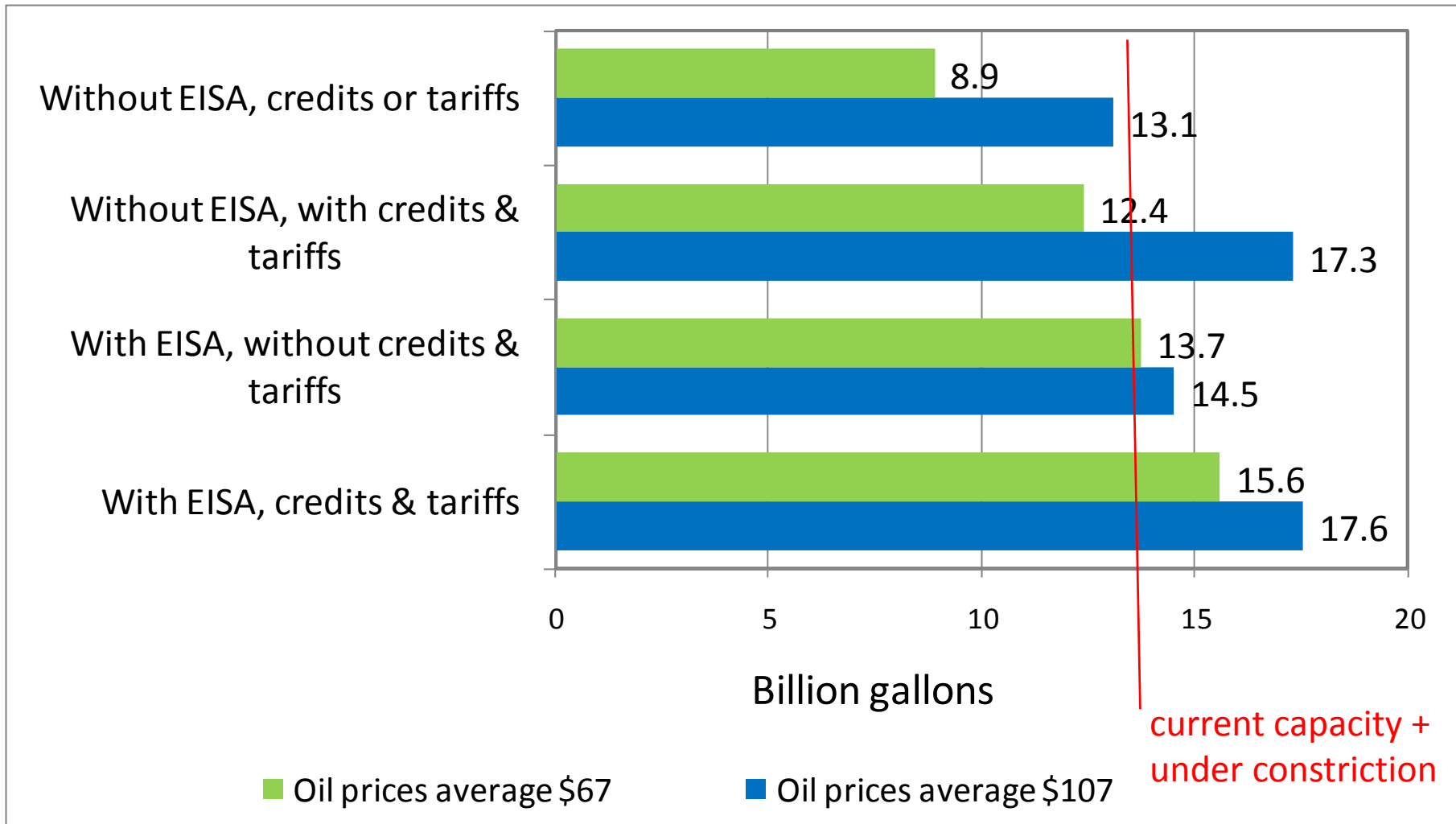
Biofuel market results with and without EISA mandates

Biofuel supply and use, 2011-2017 average



Ethanol production

2011-2017 average



Conclusions

- Exact implementation of policies uncertain
- Current set of policies offer layered support
- The policy which is ‘most important’ depends on context
- RINs will provide market signals and could potentially be used as a policy tool
- Uncertainty about policies may effect future market outcomes

For more information

- Visit the FAPRI-MU website
 - <http://www.fapri.missouri.edu/>
- To contact me:
 - 1-573-884-7326
 - meyerse@missouri.edu

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What about the farm bill?

- Food, Conservation and Energy Act
- Became law over President's veto
- More than just farm programs
 - Food stamps
 - Conservation
 - Energy, research, trade...
- Farm program changes mostly modest
 - Changes in target prices, loan rates, etc.
 - Introduction of ACRE program

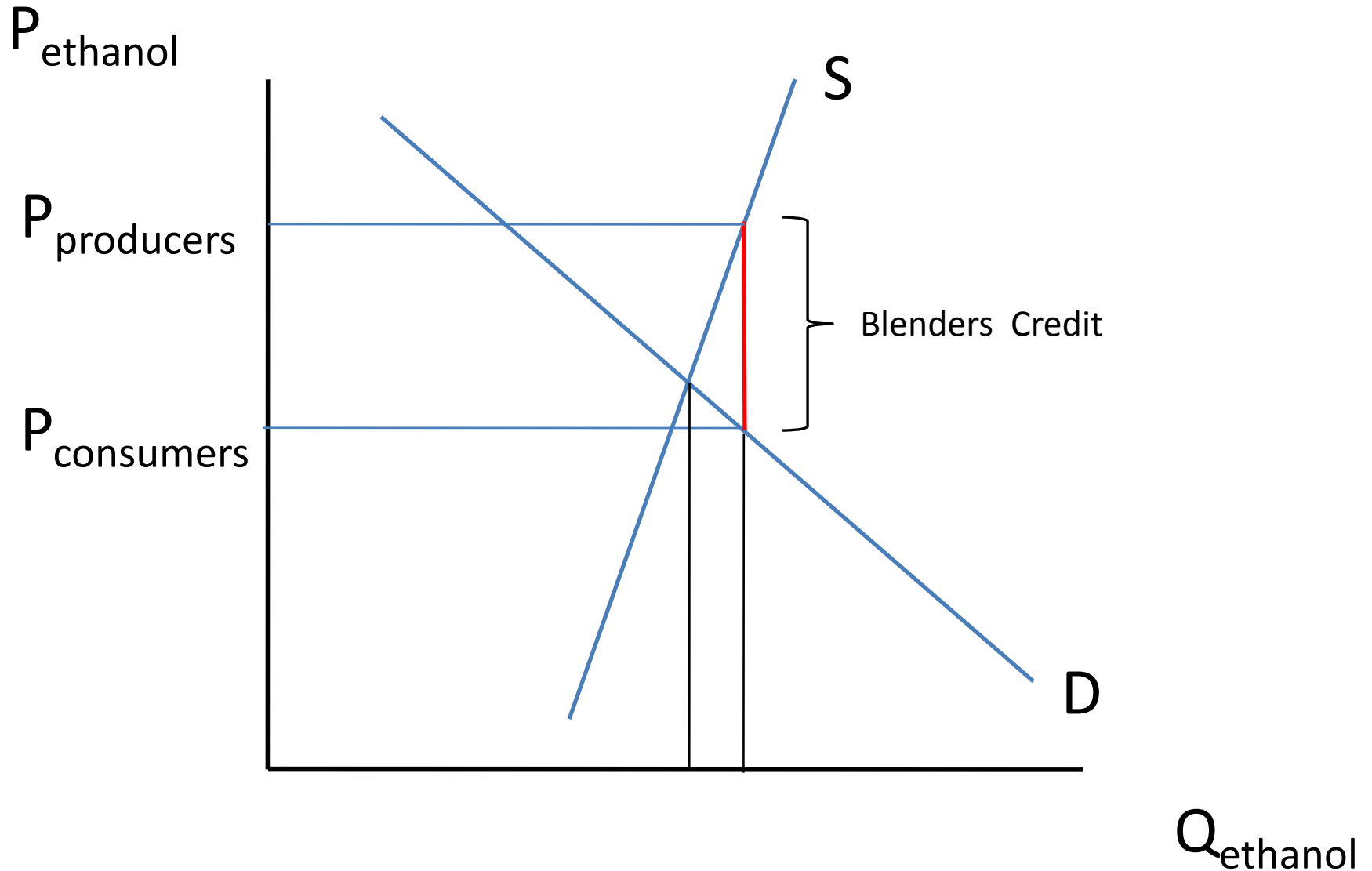
Average Crop Revenue Election (ACRE) program

- Short version: make payment if state per-acre revenues fall below a trigger level
- Trigger
 - 2-year average national price, multiplied by
 - 5-year Olympic average (throw out high and low) of state yields per planted acre, multiplied by
 - 0.9
 - Cannot adjust more than 10%/year
- Payments made on 83.3% of planted acreage from 2009-2011 (85% in 2012)

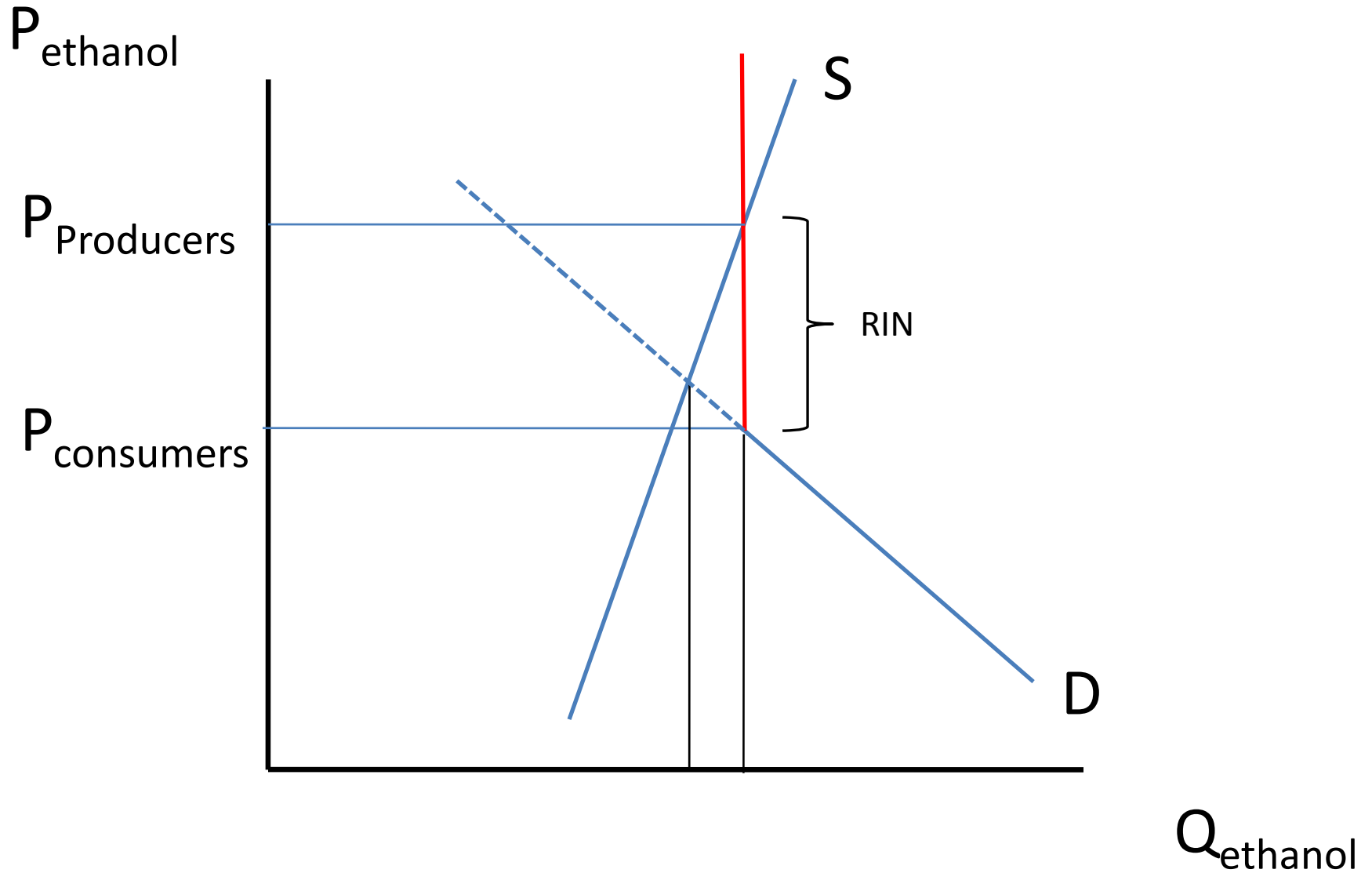
ACRE program provisions, continued

- Farm must have a loss to get a payment (double hurdle—state and farm loss)
- Farm level payment adjusted based on Olympic avg. farm yield/avg. state yield
- Trade-off: to enter program, farmers must give up
 - 20% of direct payments
 - All countercyclical payments
 - And must accept 30% lower loan rate
- Farmers must choose whether or not to enroll
 - First available in 2009
 - Once enroll, must stay in program through 2012
 - If enroll, must enroll all crops on farm

Biofuel Policies: Blenders Credits



Biofuel Policies: Mandates



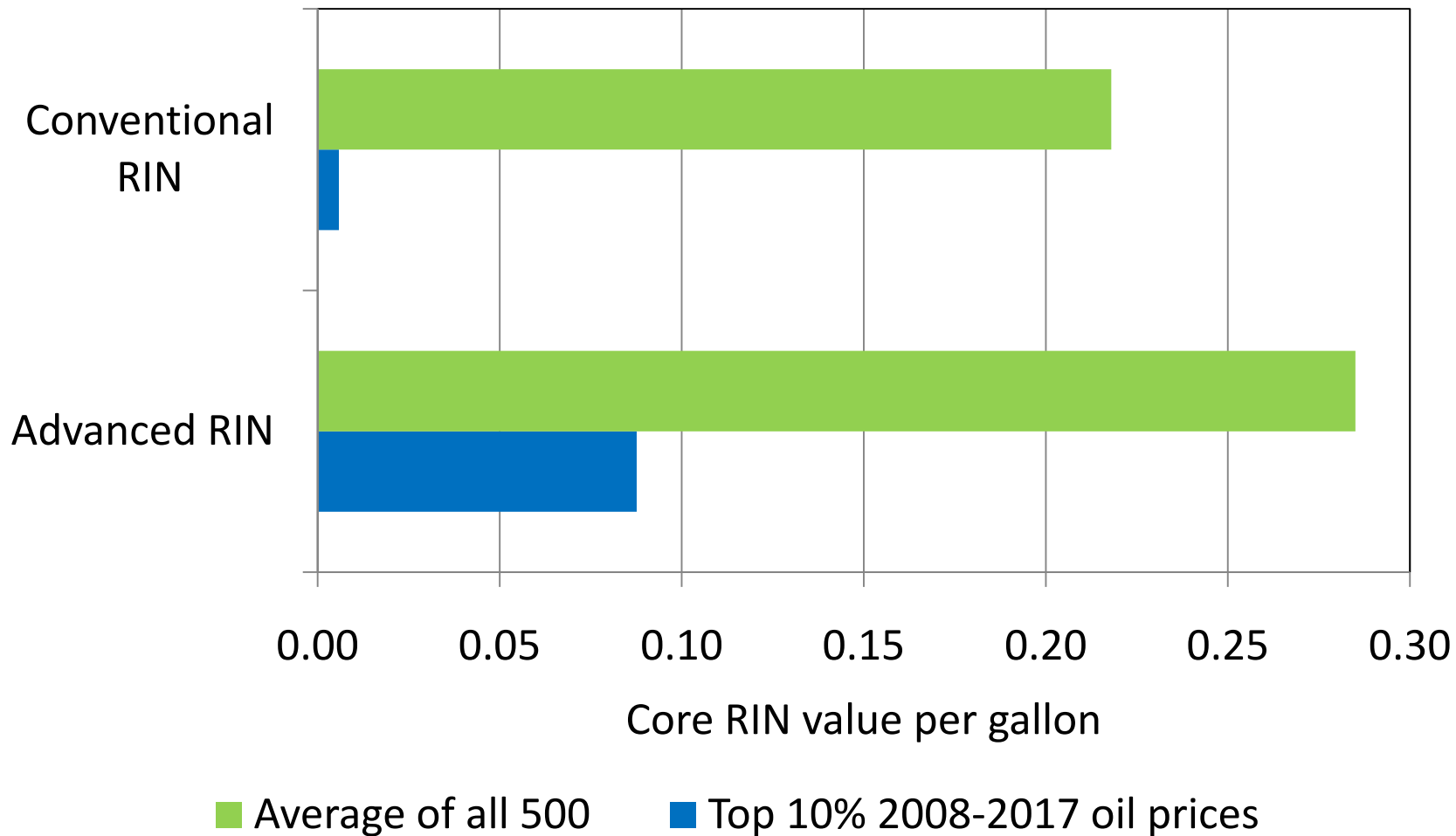
RIN

renewable identification number

- Created by biofuel producer
- Tradable
- Elements of RIN value
 - Consumer cost calculation
 - Speculation about how binding mandates may be over the life of the RIN
 - Transaction costs

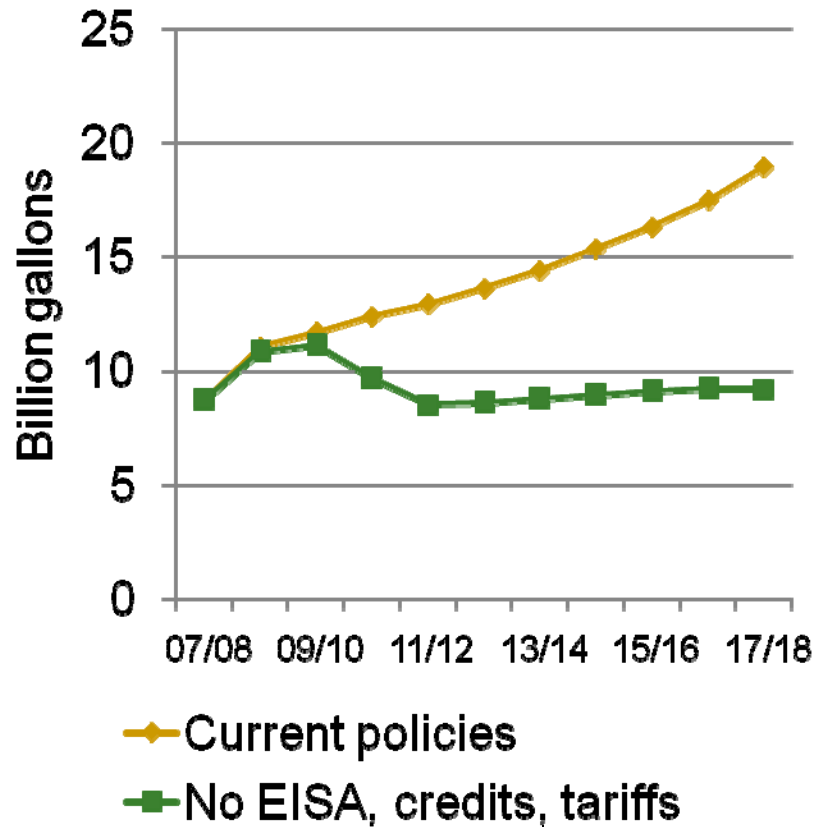
Could RINs be used as a policy tool?

Core RIN values average of 2008-2017

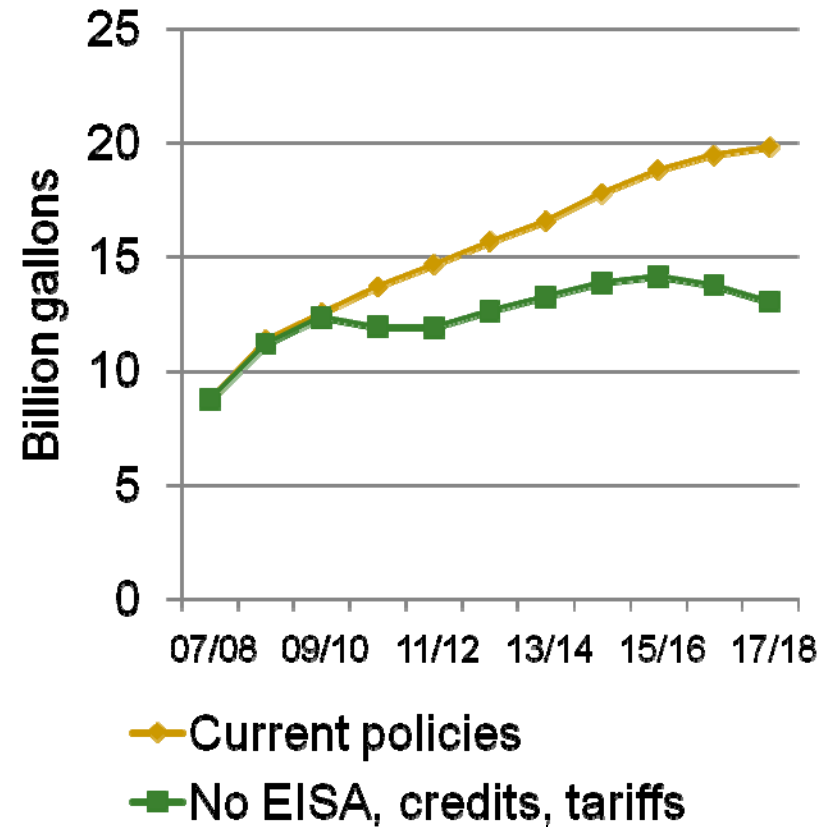


Ethanol production

Average of all 500

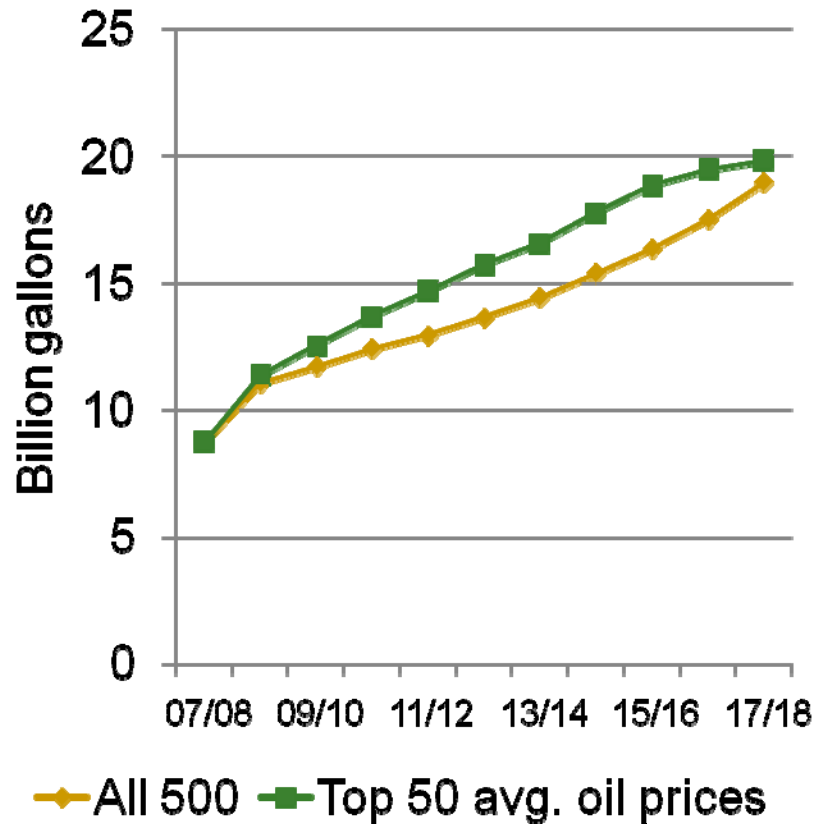


Top 50 avg. oil prices

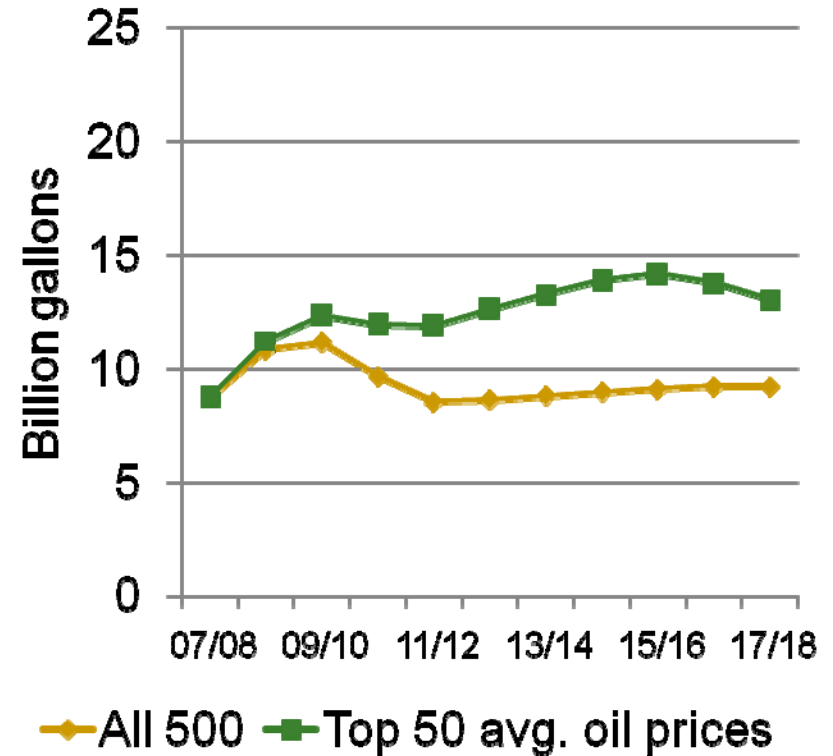


Ethanol production

Current policies

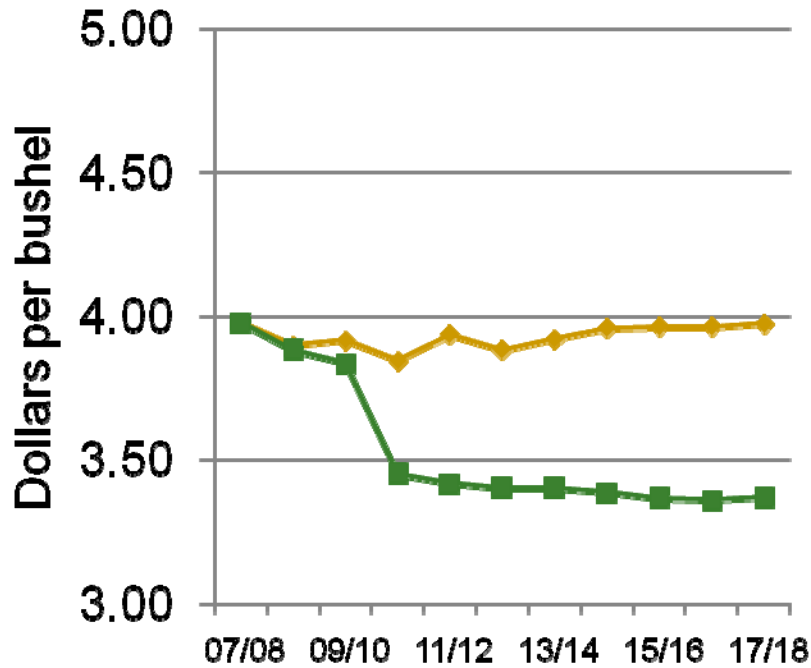


No EISA, credits, or tariffs



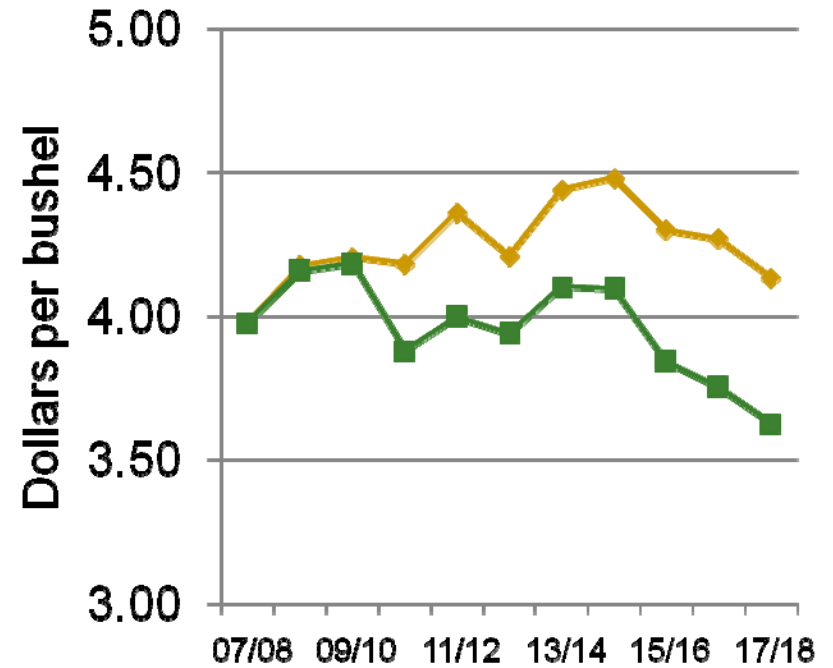
Corn prices

Average of all 500



- ◆ Current policies
- No EISA, credits, tariffs

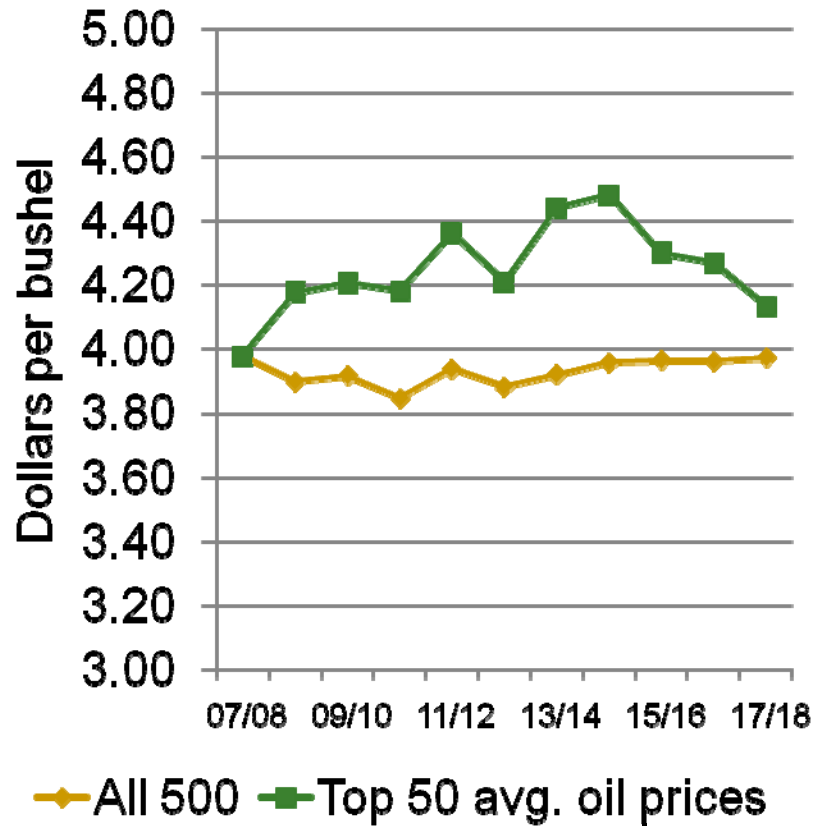
Top 50 avg. oil prices



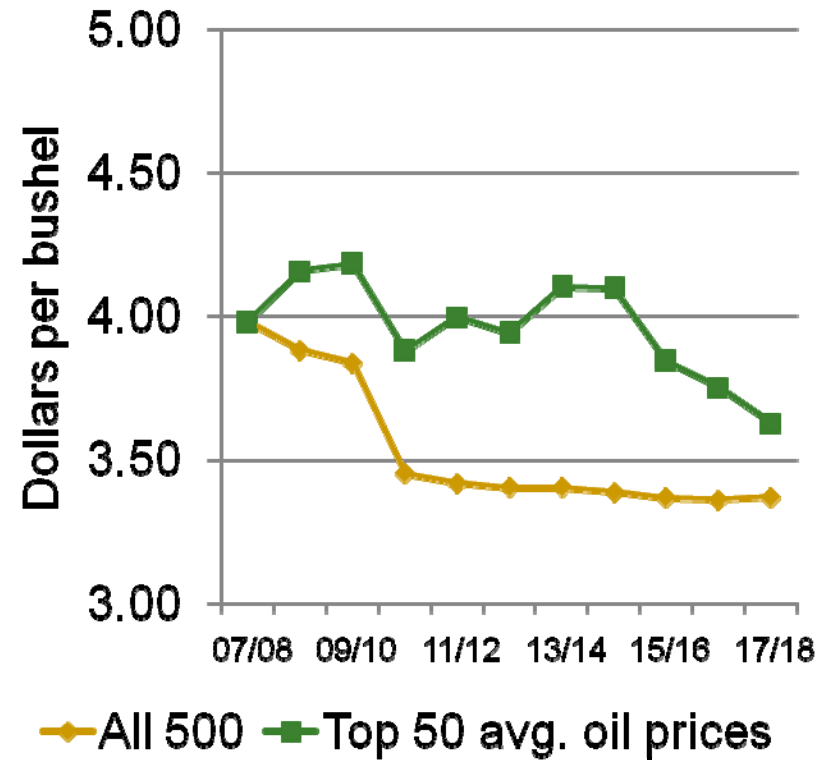
- ◆ Current policies
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Corn prices

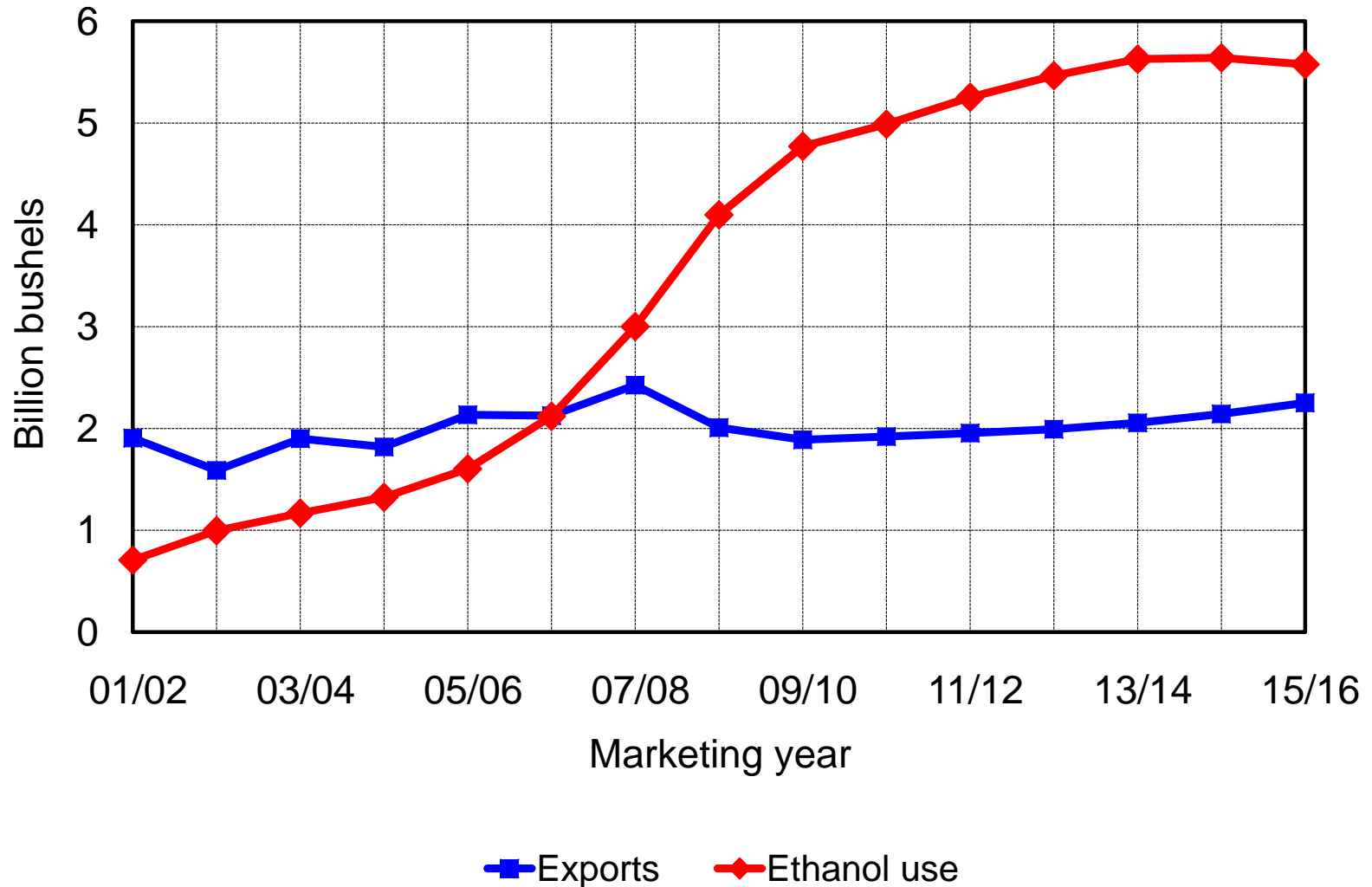
Current policies



No EISA, credits, or tariffs

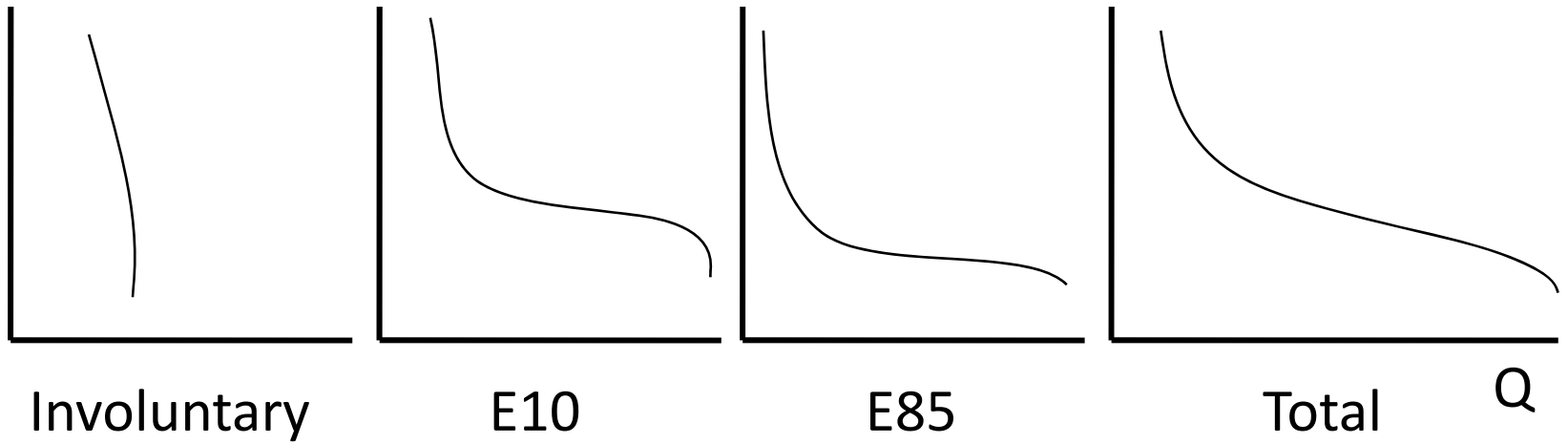


Ethanol use of corn surpasses exports



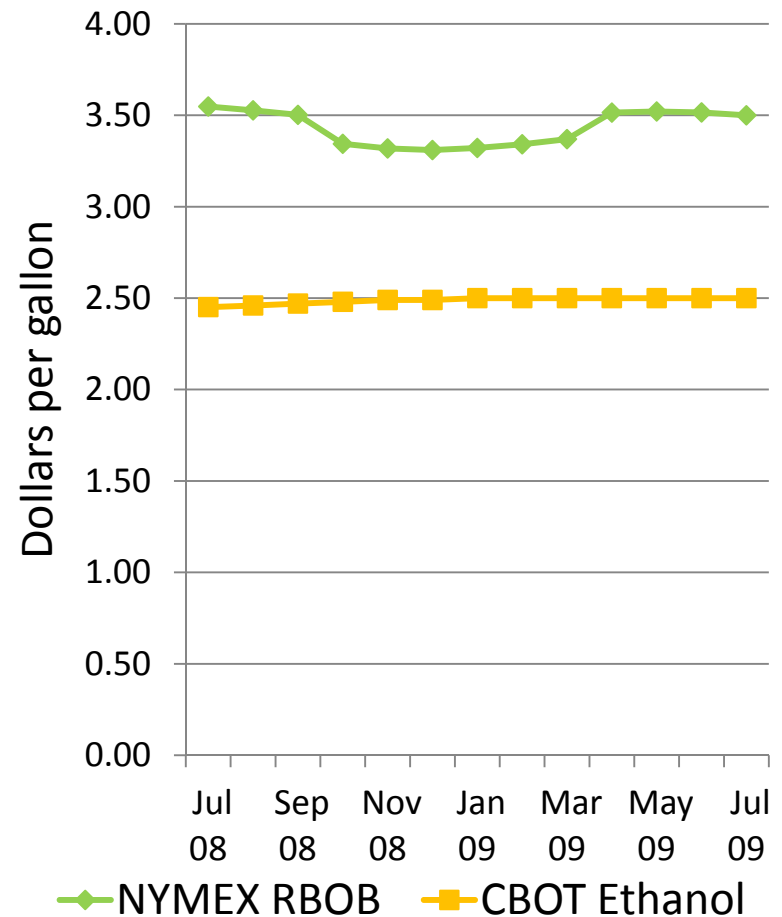
Source: FAPRI-MU estimates, August 2008.

Ethanol demand by type



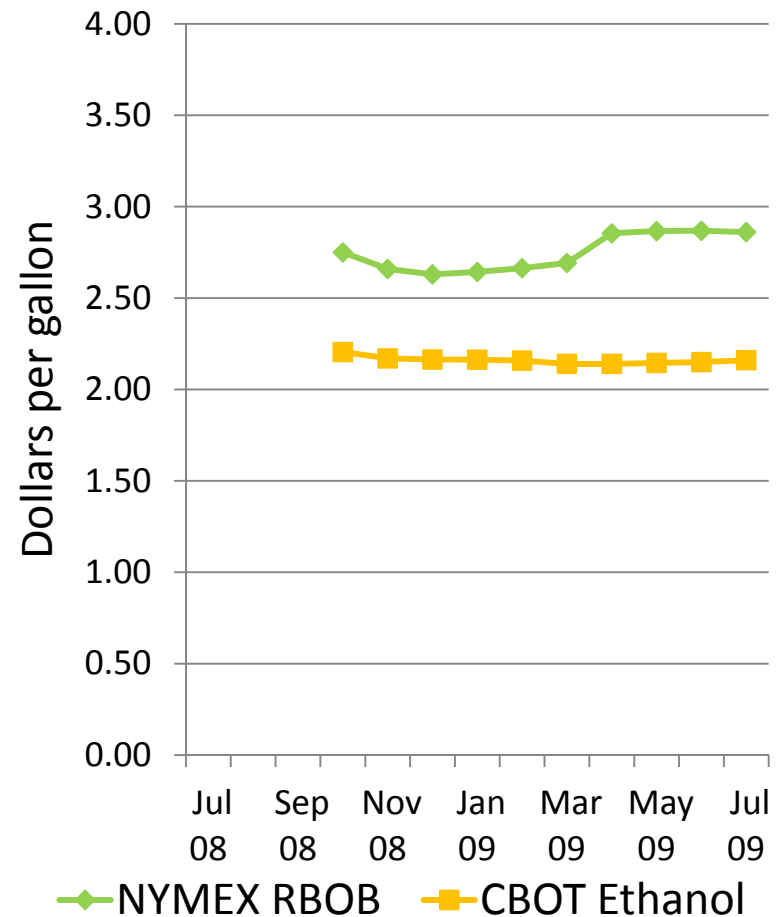
Futures prices for ethanol and gasoline, June 6, 2008

- July 2009 contracts
 - Ethanol: \$2.50
 - Gasoline: \$3.50
- Ratio: $\$2.50/\$3.50 = 71\%$
- To blenders: $(\$2.50 - \$0.45 \text{ tax credit in 2009})/\$3.50 = 58\%$
- To consumers: $(\$2.50 - \$0.45 + \$0.62 \text{ taxes \& markup})/(\$3.50 + \$0.62 \text{ taxes and markup}) = 65\%$
- Ethanol BTU content/gal.: ~67% that of gasoline



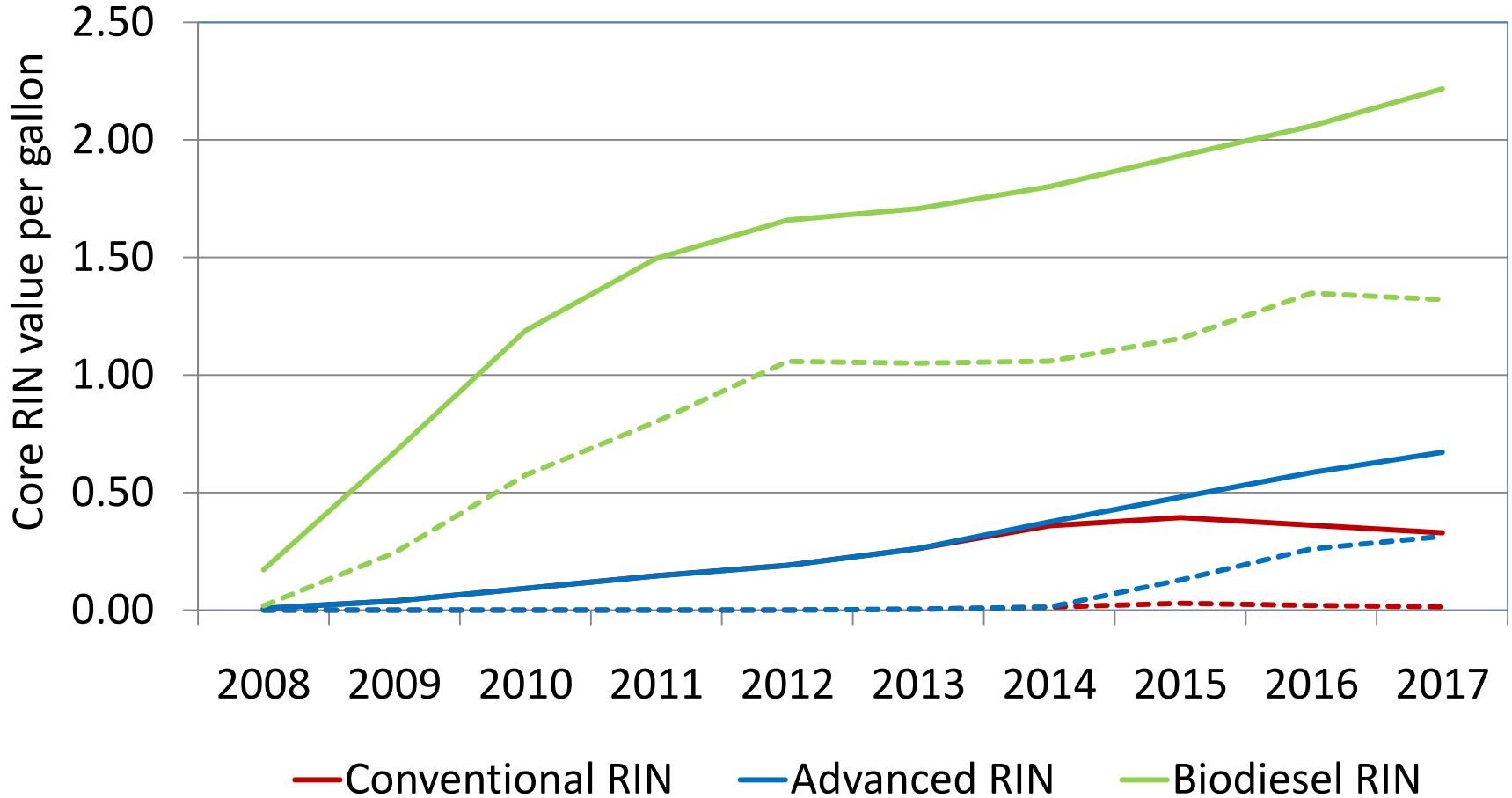
Futures prices for ethanol and gasoline, September 08, 2008

- July 2009 contracts
 - Ethanol: \$2.16
 - Gasoline: \$2.86
- Ratio: $\$2.16/\$2.86 = 76\%$
- To blenders: $(\$2.16 - \$0.45 \text{ tax credit in 2009})/\$2.86 = 60\%$
- To consumers: $(\$2.16 - \$0.45 + \$0.62 \text{ taxes \& markup})/(\$2.86 + \$0.62 \text{ taxes and markup}) = 67\%$
- Ratio remains consistent with energy content: no short run expectation of a binding mandate?



Core RIN value per gallon

— All 500 - - - Top 10% of oil prices for that year



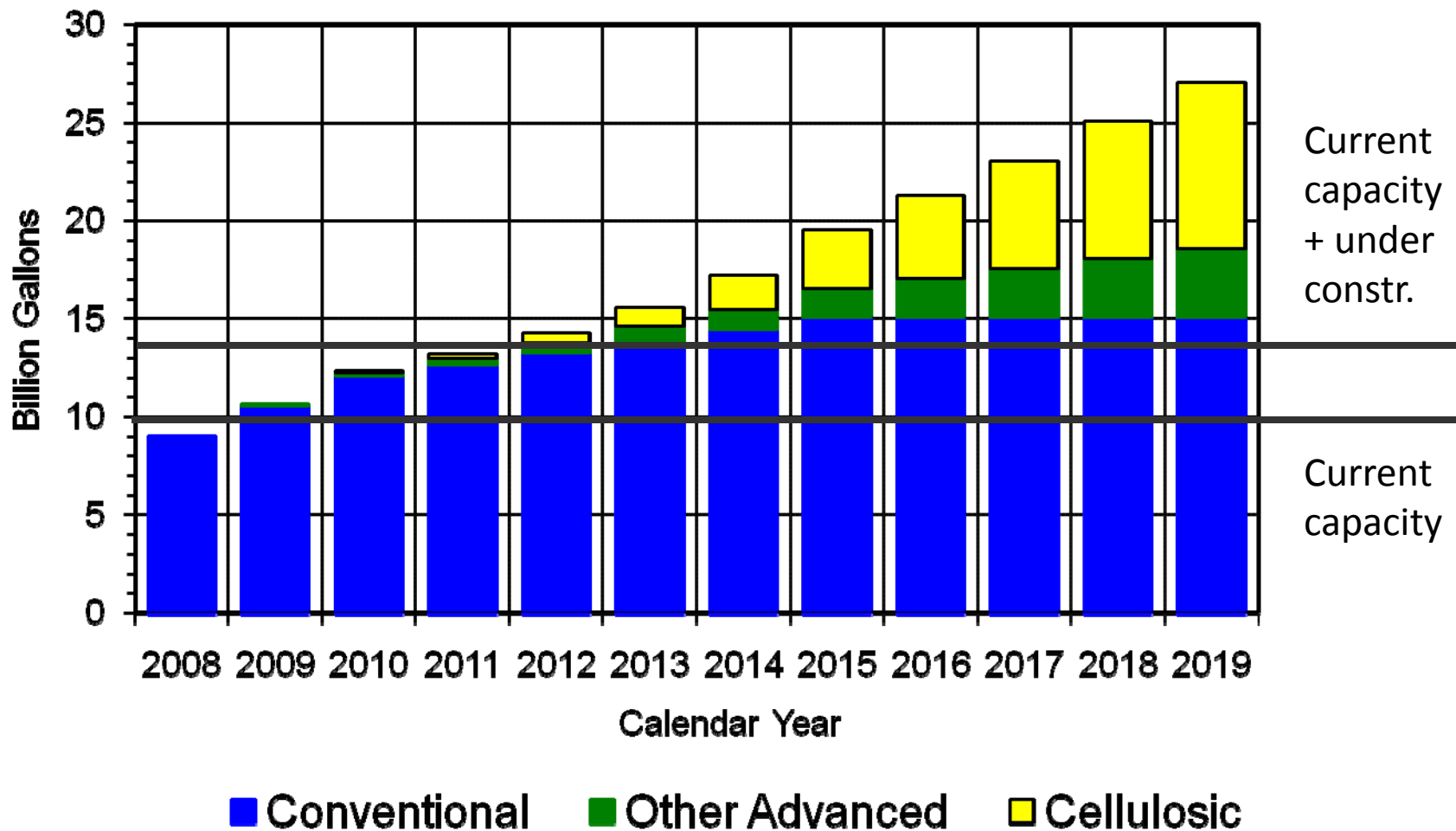
Additional Policy Risk

- Presidential ability to unilaterally waive import tariff?
- Short run commodity or oil market shocks induce waivers setting precedent
- New administration, new priorities
- 2009 energy bill?

Uncertainty affects markets

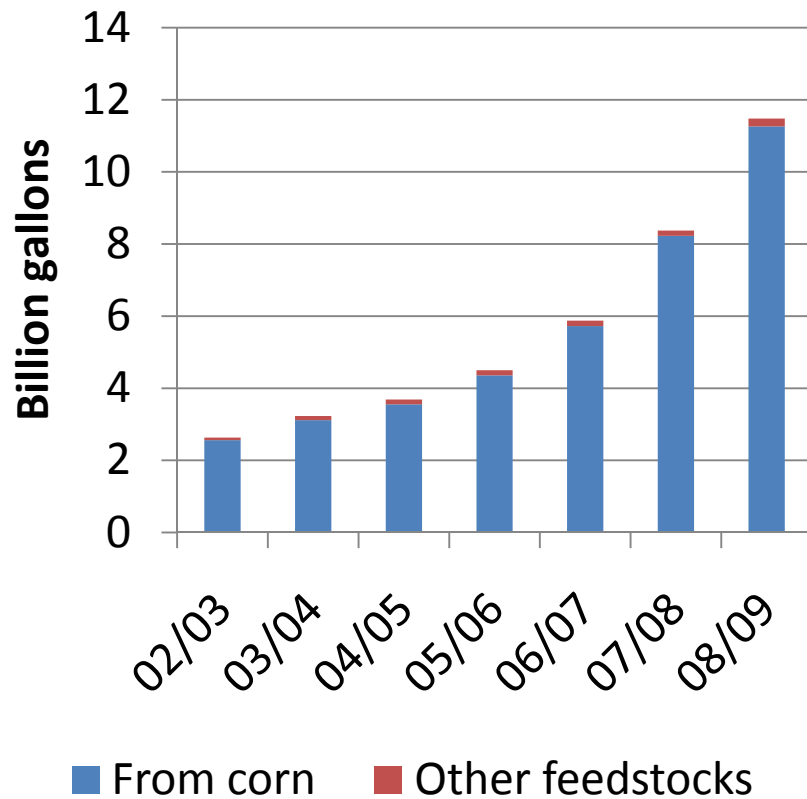
Ethanol Mandate Minimums by Type

Conventional Capacity

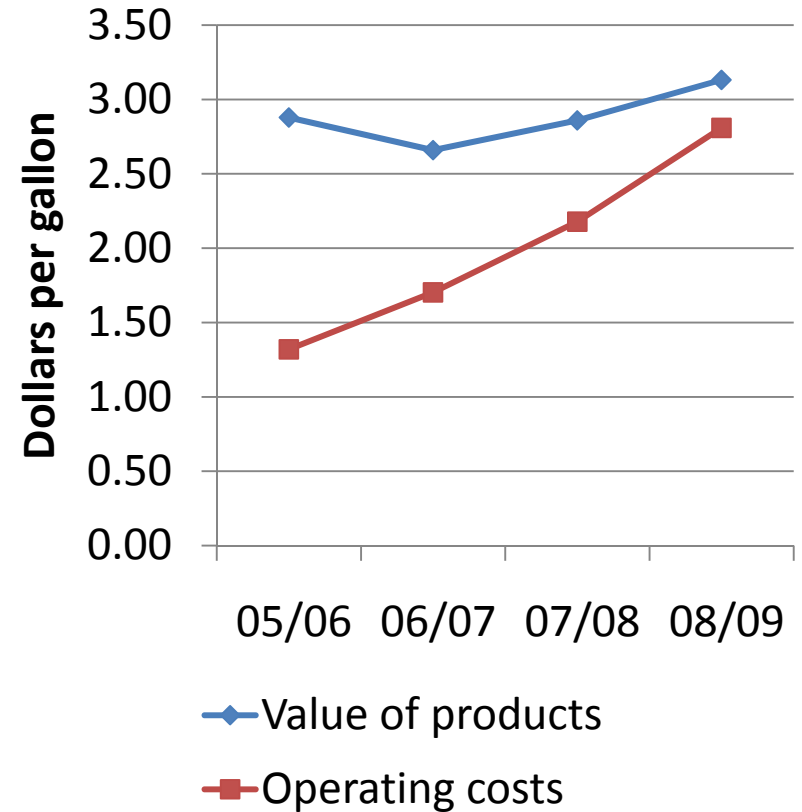


Ethanol

US production

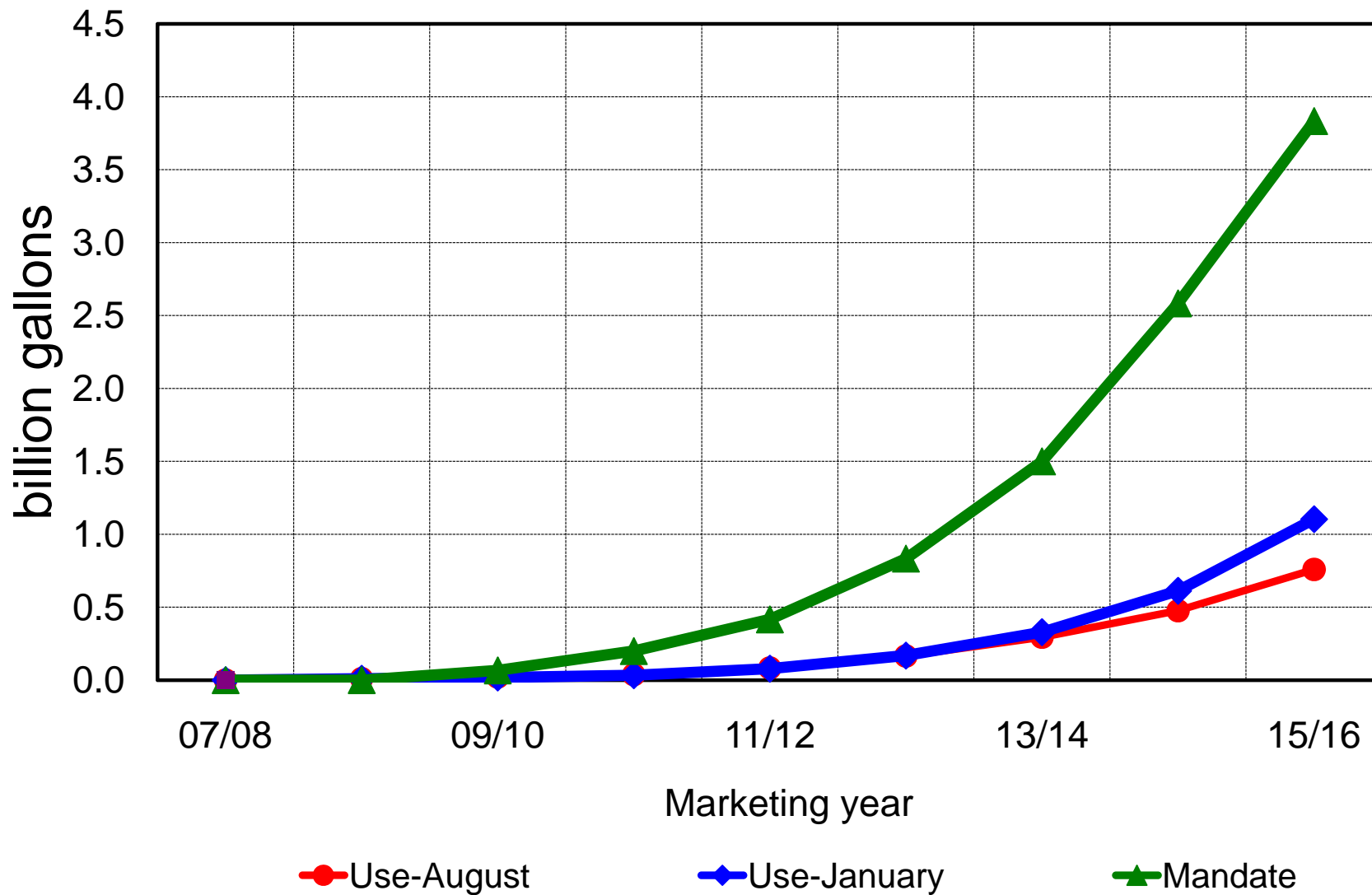


Dry mill returns



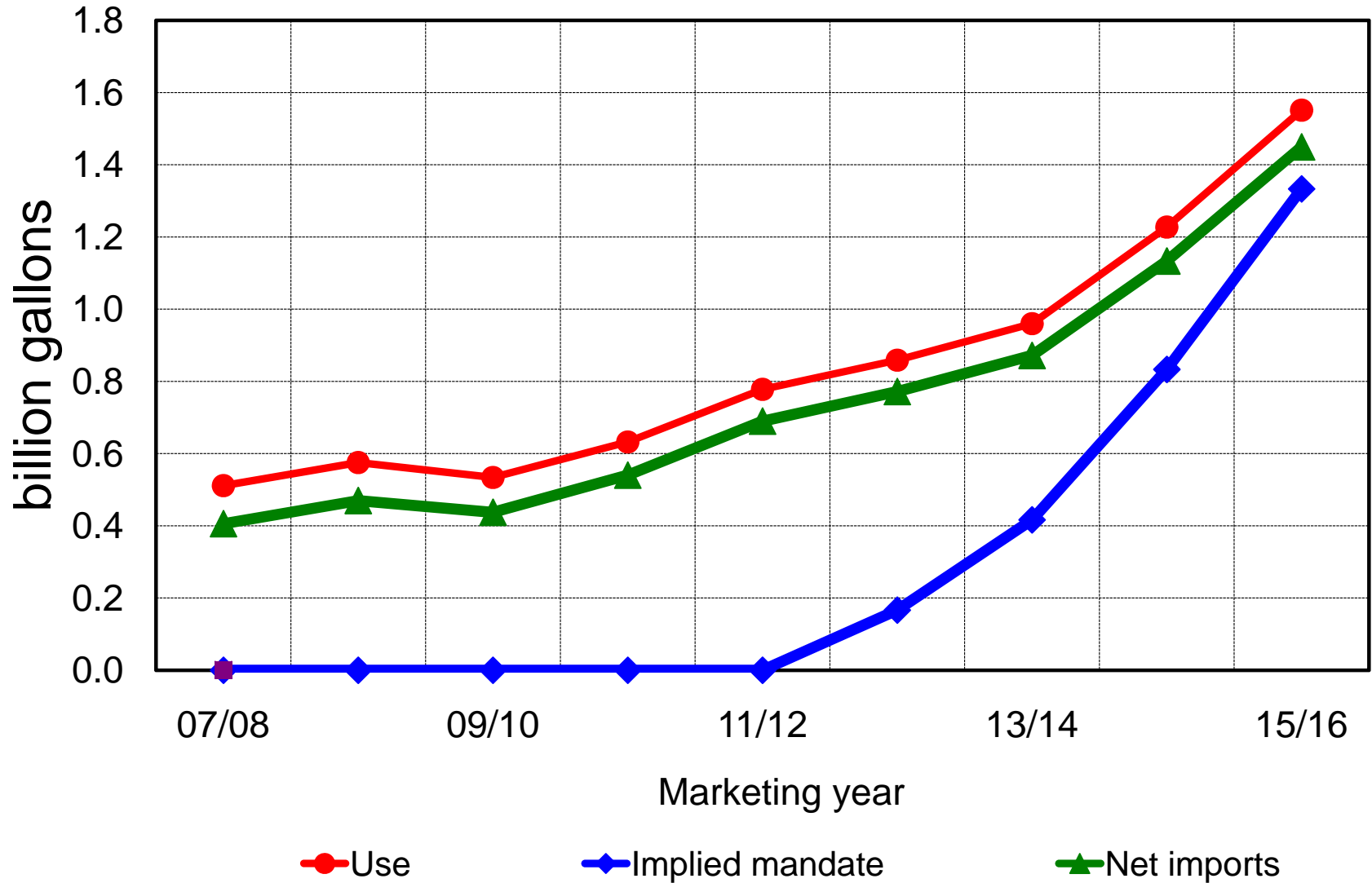
Source: FAPRI-MU estimates, August 2008

Cellulosic Ethanol



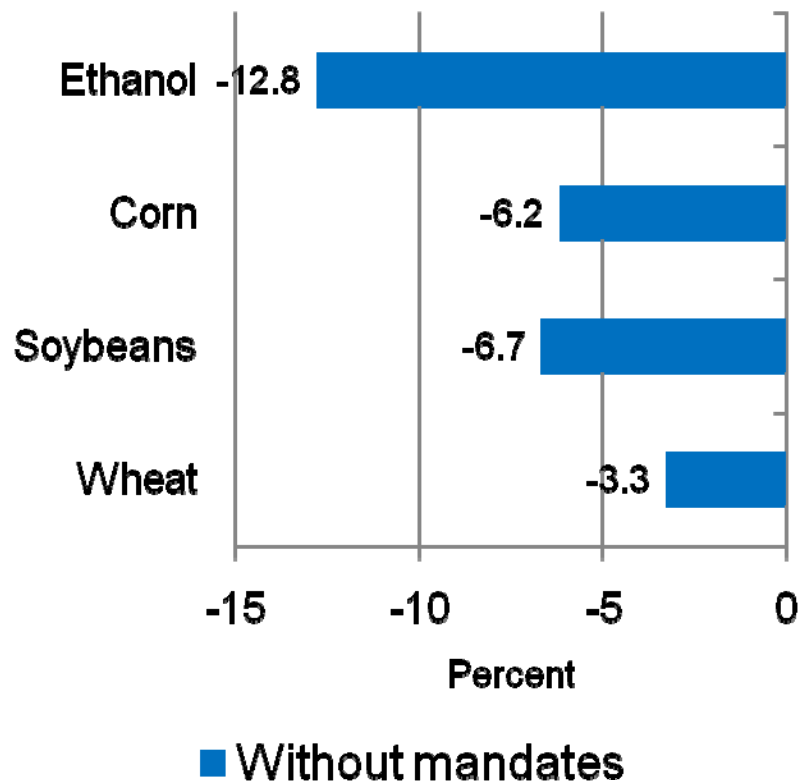
Source: FAPRI-MU estimates, January, August 2008.

Other Advanced Ethanol

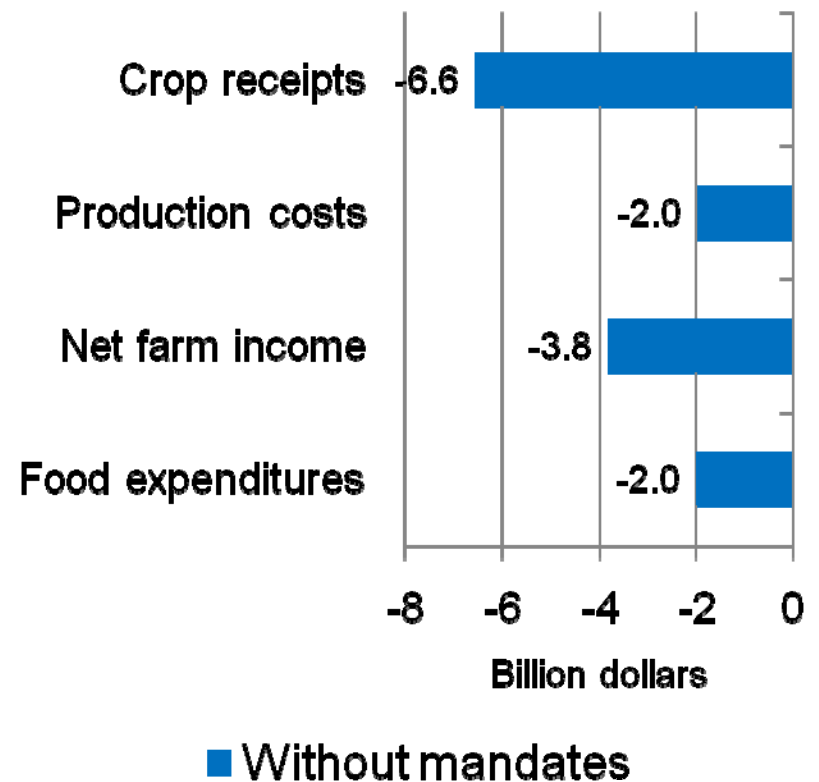


Impacts of removing EISA mandates 2011-2017 average effects

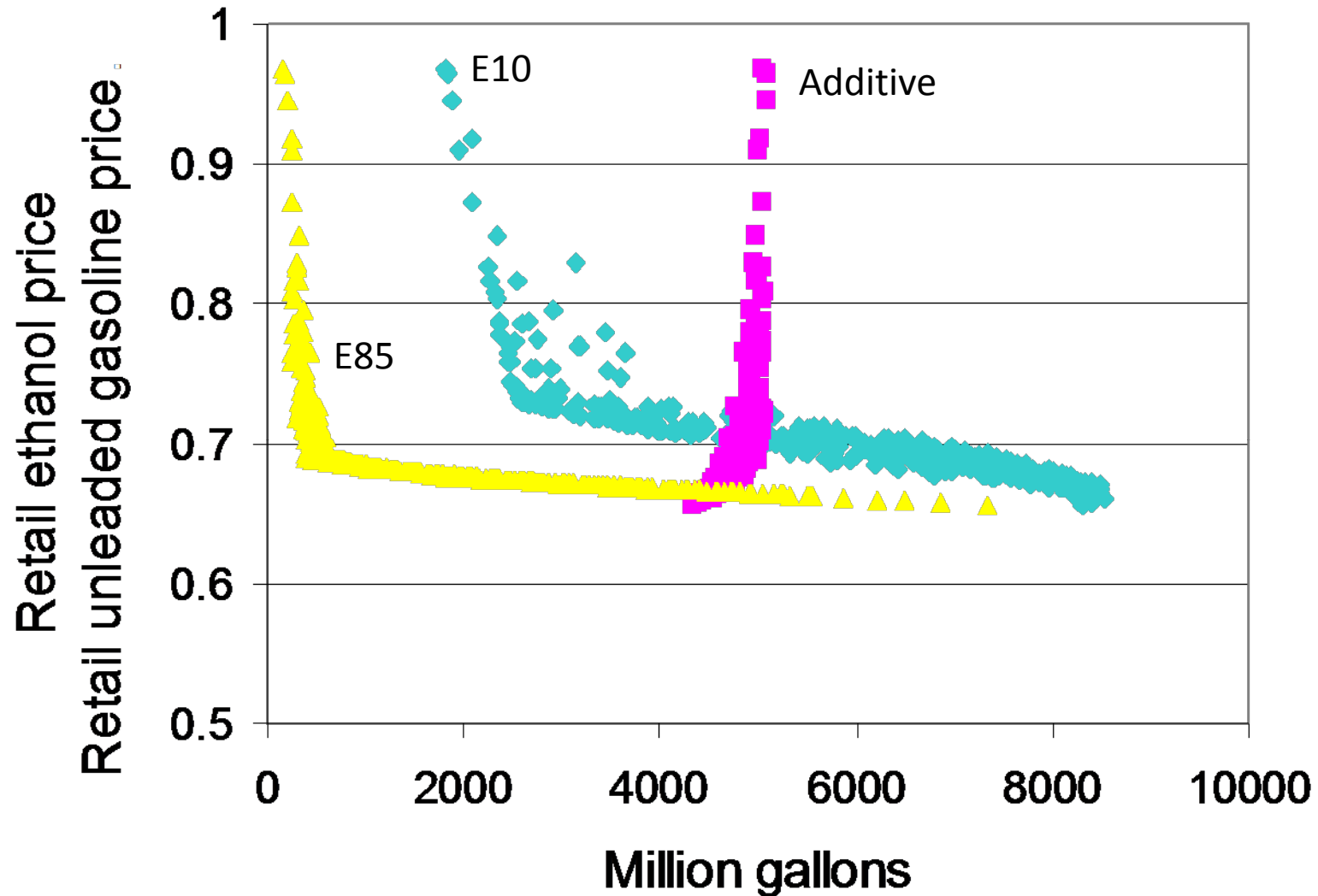
Change in prices



Farm income and consumer effects

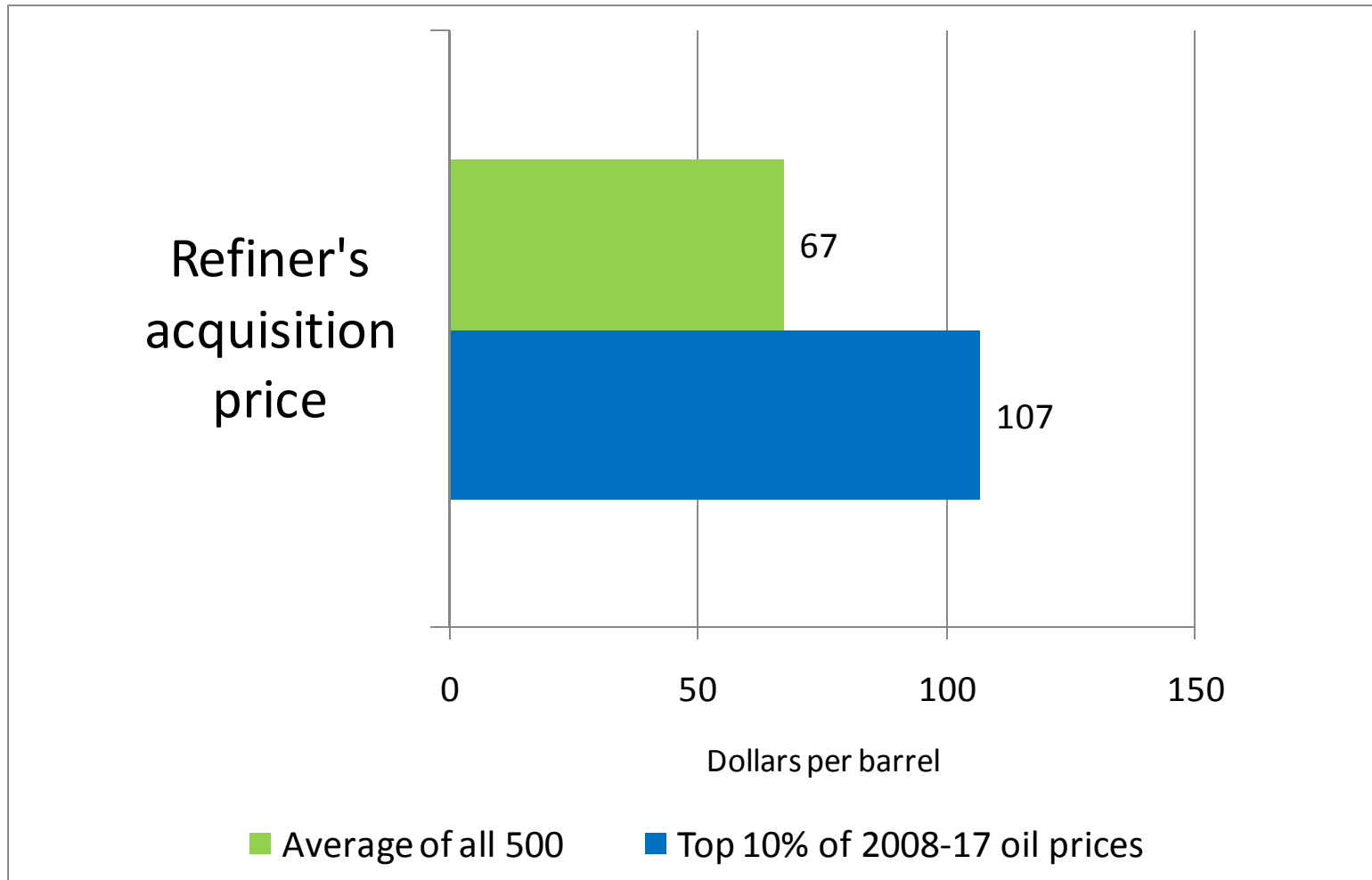


Ethanol demand by type 2012/13

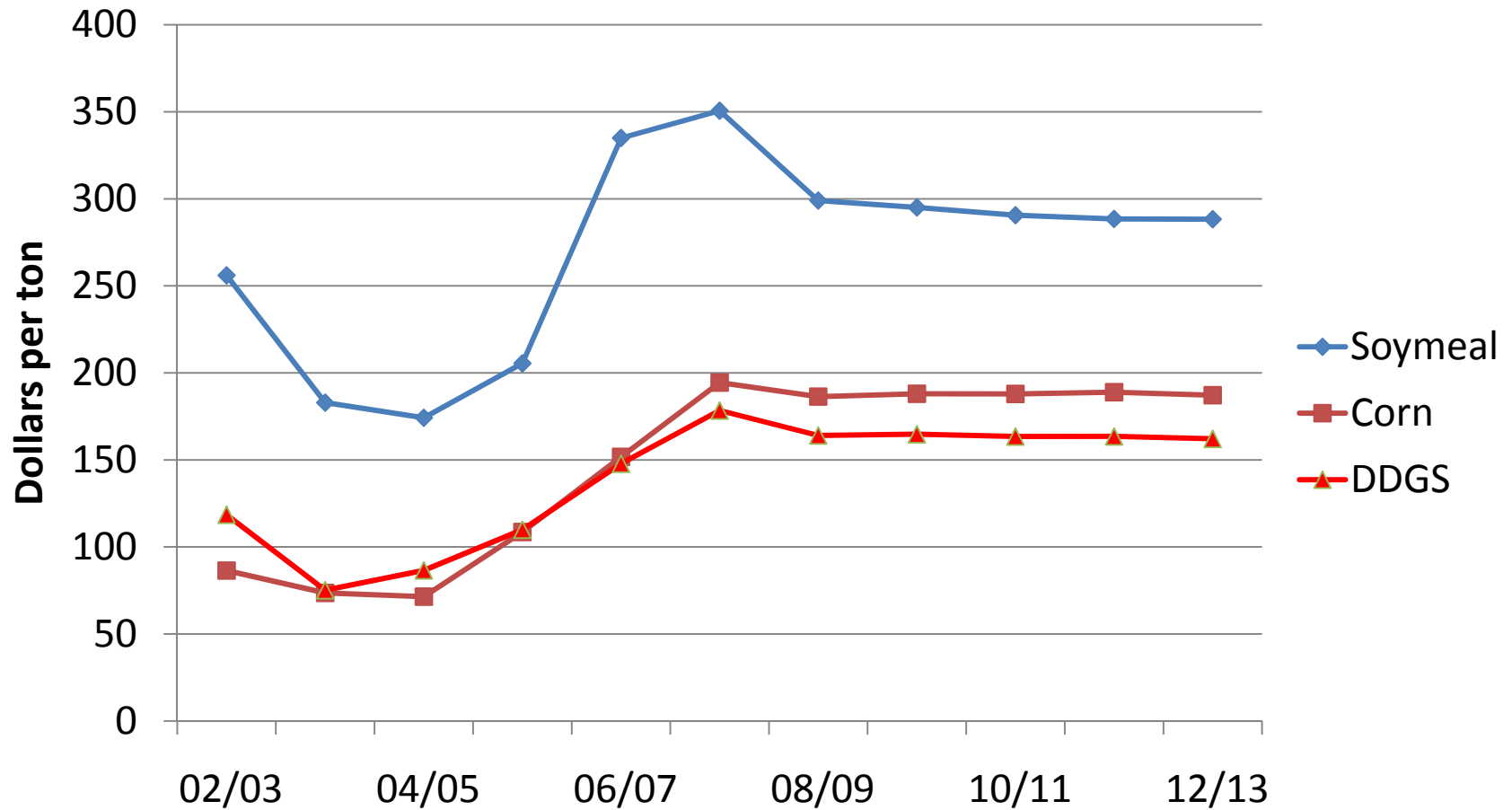


Petroleum price revisited

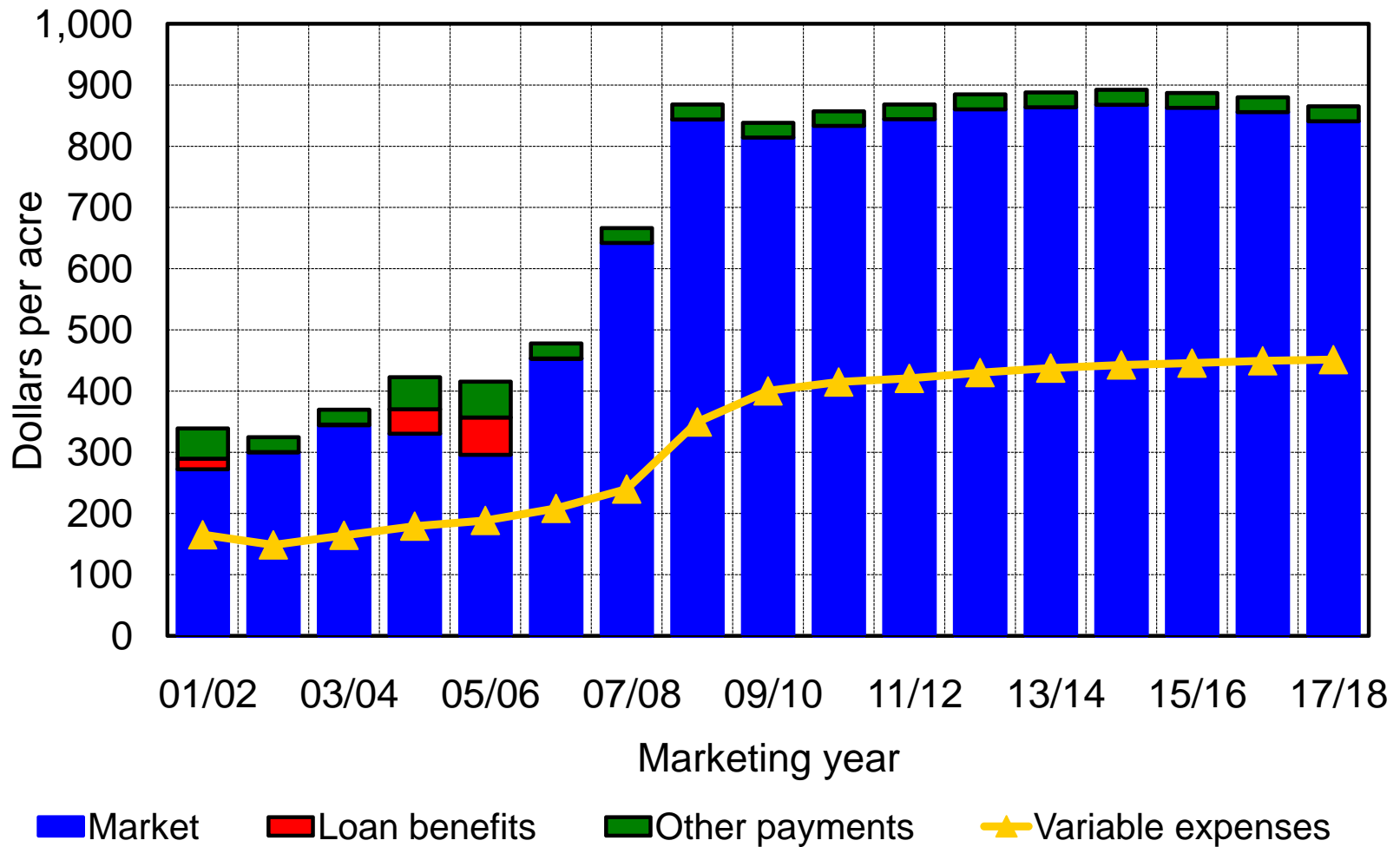
2011-2017 average



FAPRI-MU feed price projections August 2008 baseline update



Higher prices increase corn returns



Soybean returns increase sharply

