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# The Energy Independence and Security Act of 2007: Preliminary Evaluation of Selected Provisions

Food and Agricultural Policy Research Institute

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**Summary**

The "Energy Independence and Security Act of 2007" (EISA) established new mandates for the use of biofuels and makes other important changes in energy legislation. The Food and Agricultural Policy Research Institute (FAPRI) at The University of Missouri has examined potential consequences of provisions of EISA that could effectively require minimum levels of use of corn-based ethanol and biodiesel.

Other provisions of the bill, including mandates for the use of cellulosic ethanol and other "advanced biofuels," are not considered in this preliminary and partial analysis of the new law.

Relative to baseline projections developed in early 2007, the implementation of the selected provisions of EISA would have important implications for biofuel and agricultural markets.

- Under a range of plausible assumptions, the EISA mandates result in more ethanol and biodiesel production than would otherwise occur.

- Higher levels of biofuel production translate into increased use of corn and vegetable oil. This increase in demand results in higher prices for corn, soybeans and most other agricultural commodities.

- Higher crop prices translate into reduced taxpayer costs of government farm programs and higher levels of crop producer income.

- Impacts of higher mandates are very sensitive to the price of petroleum and assumptions regarding the extension of current biofuel tax credits and tariffs.

- Lower petroleum prices are generally associated with lower biofuel prices and production levels when there is not a binding mandate. When petroleum prices are sufficiently high, corn-based ethanol production would be likely to exceed the levels specified in EISA.

- Without EISA in place, the biofuel and agricultural commodity market effects of extending biofuel tax credits and tariffs are very large relative to scenarios where the subsidies are allowed to expire as currently scheduled.

- Under EISA, biofuel producer prices and production are less affected by the extension or expiration of tax credits and tariffs. Tax credit and tariff policy choices do have important implications for taxpayers, consumers and biofuel producers in other countries.

- The use of waiver authority established in EISA could prove very important. For example, results suggest average biodiesel and soybean oil prices would be much higher if the billion-gallon biodiesel mandate is met than if it is waived.

The analysis is being done at this time to provide an updated current-policy baseline for the evaluation of farm bill alternatives. Soon, FAPRI will prepare a new set of baseline projections for biofuel and agricultural markets that will incorporate not only provisions of EISA, but other market and policy developments since the last FAPRI baseline was prepared in early 2007.

## Introduction

The "Energy Independence and Security Act (EISA) of 2007" was approved by Congress and signed into law by the President in December 2007. The Act makes wide-ranging changes in energy legislation, including the establishment of new mandates for the use of biofuels. Provisions of the Act will be incorporated in the next set of baseline projections prepared by the Food and Agricultural Policy Research Institute (FAPRI).

This report provides a snapshot of estimated impacts of selected provisions of EISA on biofuel and agricultural markets. The point of departure for the analysis is the set of baseline projections prepared in early 2007 that FAPRI has used to examine farm bill alternatives. The analysis focuses on just two provisions of the legislation:

1) changes in the renewable fuel standard that suggest 15 billion gallons of corn-based ethanol should be utilized by 2015, and
2) a new mandate to use one billion gallons of biomass-based diesel by 2012.

Impacts of the selected provisions of EISA can be estimated by comparing a set of baseline projections that does not include the provisions with a scenario that does. As is frequently the case, the results hinge on particular assumptions of the analysis. In this analysis, one important choice is whether or not to assume ethanol and biodiesel tax credits and ethanol tariffs will be continued when they are currently scheduled to expire.[1] A second important assumption is whether authority in EISA to waive the mandates under certain circumstances will be exercised.

Because these assumptions are so critical, the analysis compares five alternative scenarios to consider various combinations of possible assumptions.

1) **No EISA, Credits Extended** scenario. The scenario assumes pre-December 2007 provisions of agricultural and biofuel policy remain in place, and that biofuel taxes and tariffs are extended when they would otherwise expire. The scenario is the same as the FAPRI stochastic baseline prepared in early 2007, except that dairy policy assumptions reflect legislation approved in 2007.
2) **EISA, Credits Extended** scenario. The scenario assumes that at least 15 billion gallons of corn-based ethanol and one billion gallons of biodiesel must be utilized by the dates specified in EISA, and that biofuel taxes and tariffs are extended when they would otherwise expire.
3) **No EISA, Credits Expire** scenario. The scenario is identical to the first scenario, except the ethanol tariff and biodiesel tax credit are assumed to expire at the end of 2008 and the ethanol tax credit is assumed to expire at the end of 2010.
4) **EISA, Credits Expire** scenario. The scenario is identical to the second scenario, except the ethanol tariff and biodiesel tax credit expire on schedule, as in the third scenario.
5) **EISA, Credits Expire, No Biodiesel Mandate** scenario. The scenario is identical to the fourth scenario, except it is assumed that waiver authority is utilized in such a way that the biodiesel use mandate has no effect.

[1] Ethanol blenders receive a tax credit of $0.51 for every gallon of ethanol they blend with gasoline, The credit expires at the end of 2010 under current law, which is not changed by EISA. The tariff on imported ethanol and tax credits for biodiesel use are scheduled to expire at the end of 2008 under current law.

These estimates examine only the selected provisions of EISA, and do not reflect market developments that have occurred since early 2007. A more complete and current analysis of EISA would examine other provisions of the legislation and would be evaluated relative to a baseline reflecting the most recent market developments. For example, the analysis does not consider possible impacts of provisions that mandate the use of cellulosic ethanol and other "advanced biofuels." This omission does not imply that the provisions are unimportant. Indeed, they could have very large implications for the biofuel and agricultural sectors, and could have important spillover impacts on the corn-based ethanol and biodiesel markets that are the focus of this study.

The purposes of this preliminary analysis are to provide a partial and tentative evaluation of the legislation and to develop a starting point for further FAPRI analysis of farm bill options. When the Congressional Budget Office (CBO) examines farm policy proposals, the starting point for the analysis is a baseline set of projections that reflects laws that have been enacted. Now that EISA has been enacted, it is appropriate to incorporate it in the baseline against which farm bill alternatives are evaluated. If FAPRI were to follow the lead of CBO, the **EISA, Credits Expire** scenario would become the baseline for further farm bill analysis (under CBO rules, expiring tax credits and tariffs are not assumed to be extended).

Because the analyzed provisions of EISA would result, on average, in increased production of ethanol, stronger demand for corn, and higher prices for a wide range of commodities, they have an impact on estimates of future costs of government farm programs. Not only does this change the baseline against which farm policy options are analyzed, but it is likely to alter the estimated changes from baseline that result from at least some of the options under consideration in the farm bill debate.

The following sections of the reports provide five sets of pairwise-comparisons of the scenarios:

1) **EISA, Credits Extended** vs. **No EISA, Credits Extended**. This comparison isolates the impacts of the selected provisions of EISA, assuming that biofuel tax credits and tariffs are extended.
2) **EISA, Credits Expire** vs. **No EISA, Credits Expire**. This comparison also isolates the EISA impacts, but this time assuming that biofuel tax credits and tariffs expire as scheduled.
3) **No EISA, Credits Expire** vs. **No EISA, Credits Extended**. This comparison isolates the impacts of extending biofuel tax credits and tariffs under pre-EISA policies.
4) **EISA, Credits Expire** vs. **EISA, Credits Extended**. This comparison isolates the impacts of extending biofuel tax credits and tariffs under the selected provisions of EISA.
5) **EISA, Credits Expire, No Biodiesel Mandate** vs. **EISA, Credits Expire**. This comparison isolates the impacts of the biodiesel mandate and waiver authority under EISA, assuming that tax credits and tariffs expire as scheduled.

Results are provided in terms of comparisons of 2011-2016 average values across a range of stochastic outcomes. These stochastic outcomes differ from one another based on assumptions about petroleum prices, crop yields, and other factors that affect biofuel and agricultural commodity market supply and demand. Graphs are used to show the sensitivity of ethanol production and price results to assumptions about petroleum prices.

**Effects of Selected EISA Provisions, Assuming Biofuel Credits and Tariffs Are Extended**

EISA sets a series of mandates for the quantities of various types of renewable fuels that are to be utilized in the United States. In 2015, for example, EISA requires that 20.5 billion gallons of renewable fuels be used, of which at least 5.5 billion gallons should be "advanced biofuels" that are specifically defined so as to exclude ethanol made from corn starch. For purposes of this analysis, it is assumed that the advanced biofuel target will not be exceeded so that the EISA mandate effectively requires 15 billion gallons of corn starch-based ethanol. EISA also requires the use of one billion gallons of biomass-based diesel fuel by 2012.

The first two scenarios compared both assume that biofuel tax credits and tariffs are extended when they are currently scheduled to expire. Thus, the differences reported in table 1 are the effects of EISA, assuming the extension of biofuel tax credits and tariffs, and no use of waiver authority to avoid the mandates.

- EISA results in a significant increase in ethanol and biodiesel production. Across stochastic outcomes, average corn-based ethanol production between 2011 and 2016 increases by 2.79 billion gallons (24 percent) and biodiesel production increases by 0.45 billion gallons (89 percent) relative to the scenario with pre-EISA policies assumed.

- To generate this level of increased biofuel production, the average price paid to biofuel producers must be higher than it otherwise would have been. EISA results in a 17 percent increase in average wholesale corn-based ethanol prices and a 37 percent increase in average biodiesel prices.

- Over the period from 2011/12 to 2016/17, ethanol use of corn increases by an average of 1.1 billion bushels relative to the scenario with pre-EISA policies in place. About 30 percent of the increase results from an increase in corn production, another 30 percent comes from a reduction in corn exports, and the remainder comes from reductions in feed and other uses and in ending stocks.

- The increase in biodiesel production requires a 2.7 billion pound average increase in the amount of soybean oil used to produce biodiesel. Reduced soybean oil exports account for approximately half of the increase, with reductions in other domestic uses and an increase in soybean oil production accounting for the rest.

- Corn area expands by an average of two million acres in response to higher prices and returns. Average soybean acreage is essentially unchanged, as the effect of higher soybean prices is offset by competition from corn for acreage. Modest reductions in area for other crops leave the total acreage for 12 major crops up by about 0.7 percent.

- Stronger demand for corn and soybean oil translates into higher prices for those commodities. Corn prices increase by an average of eight percent relative to the scenario with pre-EISA policies, while soybean oil prices increase by 36 percent. Soybean prices increase by an average of nine percent in response to the increase in crush demand, while wheat prices increase by an average of three percent because of substitution effects. Soybean meal prices fall because the increase in soybean crush increases supplies of soybean meal, and more ethanol production means increased supplies of distillers grains.

**Table 1. Effects of Selected EISA Provisions, Assuming Biofuel Credits and Tariffs Are Extended**

| | No EISA, Credits Extended | EISA, Credits Extended | Absolute Difference | Percentage Difference |
|---|---|---|---|---|
| **Biofuel Production** | (Billion Gallons, 2011 - 2016 Average) | | | |
| Corn-based Ethanol | 11.71 | 14.50 | 2.79 | 23.8% |
| Biodiesel | 0.51 | 0.96 | 0.45 | 89.3% |
| **Biofuel Wholesale Prices** | (Dollars per Gallon, 2011 - 2016 Average) | | | |
| Corn-based Ethanol | 1.63 | 1.91 | 0.28 | 17.4% |
| Biodiesel | 3.07 | 4.20 | 1.13 | 36.8% |
| **Corn Supply and Use** | (Billion Bushels, 2011/12 - 2016/17 Average) | | | |
| Production | 13.83 | 14.15 | 0.32 | 2.3% |
| Ethanol Use | 4.14 | 5.22 | 1.08 | 26.1% |
| Exports | 2.37 | 2.05 | -0.32 | -13.5% |
| **Soyoil Use** | (Billion Pounds, 2011/12 - 2016/17 Average) | | | |
| Biodiesel Use | 2.95 | 5.64 | 2.69 | 91.2% |
| Net Exports | 1.81 | 0.44 | -1.37 | -75.9% |
| **Crop Acreage** | (Million Acres, 2011/12 - 2016/17 Average) | | | |
| Corn | 89.84 | 91.90 | 2.05 | 2.3% |
| Soybeans | 70.09 | 70.11 | 0.02 | 0.0% |
| 12 Major Crops | 253.02 | 254.67 | 1.65 | 0.7% |
| **Crop and Soy Product Prices** | (2011/12 - 2016/17 Average) | | | |
| Corn (Dollars per Bushel) | 3.11 | 3.37 | 0.26 | 8.3% |
| Soybeans (Dollars per Bushel) | 6.64 | 7.25 | 0.61 | 9.2% |
| Wheat (Dollars per Bushel) | 4.19 | 4.33 | 0.14 | 3.3% |
| Soybean Meal (Dollars per Ton) | 166.23 | 137.98 | -28.25 | -17.0% |
| Soybean Oil (Cents per Pound) | 34.34 | 46.64 | 12.30 | 35.8% |
| **Livestock, Poultry & Dairy Prices** | (Dollars per Hundredweight, 2011 - 2016 Average) | | | |
| Nebraska Direct Steers | 84.59 | 84.70 | 0.11 | 0.1% |
| OK City Feeder Steers | 100.50 | 100.04 | -0.46 | -0.5% |
| 51-52% Lean Barrows & Gilts | 49.76 | 50.06 | 0.30 | 0.6% |
| 12-City Broilers | 70.83 | 70.68 | -0.15 | -0.2% |
| All Milk | 14.46 | 14.49 | 0.03 | 0.2% |
| **Farm Program Expenditures** | (Billion Dollars, FY2011 - FY2016 Average) | | | |
| Corn | 2.15 | 2.12 | -0.03 | -1.4% |
| Soybeans | 0.81 | 0.73 | -0.08 | -9.6% |
| Net CCC Outlays | 11.31 | 11.08 | -0.23 | -2.0% |
| **Farm Income** | (Billion Dollars, 2011 - 2016 Average) | | | |
| Crop Receipts | 154.08 | 160.14 | 6.06 | 3.9% |
| Livestock Receipts | 134.21 | 134.22 | 0.01 | 0.0% |
| Government Payments | 11.16 | 10.96 | -0.20 | -1.8% |
| Feed Expenses | 38.47 | 38.37 | -0.09 | -0.2% |
| Rent to Nonoperator Landlords | 14.15 | 15.71 | 1.56 | 11.0% |
| Other Production Costs | 232.37 | 233.34 | 0.97 | 0.4% |
| Net Farm Income | 61.11 | 64.52 | 3.41 | 5.6% |

- Higher prices for corn increase feed costs to cattle, hog and dairy producers. These increased costs result in a slight reduction in production that causes modest average increases in prices for fed steers, barrows and gilts, and milk.

- The increase in corn costs is at least partially offset for some livestock producers by the estimated reduction in soybean meal prices. Poultry rations typically contain more soybean meal than hog or cattle rations, so the decline in soybean meal prices is more important to poultry producers than it is to hog or cattle producers. Broiler production marginally increases relative to the scenario with pre-EISA policies in place, resulting in a very small reduction in average chicken prices.

- The increase in crop prices translates into lower government payments on the marketing loan and countercyclical payment programs. However, even with pre-EISA policies in place, spending on price-based subsidy programs for grains and oilseeds was expected to be very low. Thus, the scope for potential budgetary savings is limited. Average net outlays on farm programs by the Commodity Credit Corporation (CCC) fall by an annual average of $230 million relative to the scenario with pre-EISA policies.

- Higher prices for corn, soybeans, wheat and other crops result in a $6.1 billion increase in average crop receipts over the 2011-2016 period. Average livestock receipts are essentially unchanged because of small offsetting price and production effects.

- Contrary to expectations, average feed expenses are also essentially unchanged, as the effect of higher prices for corn and other grains is offset by lower prices for soybean meal. This result is strongly affected by the large increase in biodiesel production and the downward pressure this places on soybean meal prices.

- Higher net returns to crop producers contribute to an increase in rental payments to nonoperator landlords. Other production costs also increase, in part because of the increase in corn production.

- Average annual net farm income increases by $3.4 billion relative to the scenario with pre-EISA policies in place. Given the estimated changes in receipts and production costs, essentially all of the benefit accrues to crop producers.

These estimated impacts of EISA are contingent on a wide range of assumptions. Two of these are explored in greater detail in the scenario comparisons which follow. It is shown that the estimated impacts of EISA generally are much larger if it is assumed that biofuel tax credits and tariffs expire as scheduled in the years ahead. It is also shown that authority to waive the biodiesel use mandate could prove to be very important. Changing these assumptions sometimes dramatically changes the magnitude or even reverses the direction of results reported in table 1.

Other assumptions are also very important. As is shown in the figures at the end of the report, the impacts of EISA are very different depending on the price of petroleum. When petroleum prices are low, ethanol prices and production are likely to be much lower in the absence of EISA mandates than when petroleum prices are high. If petroleum prices remain above $80 per barrel, for example, corn-based ethanol production eventually might exceed 15 billion gallons even without EISA in place, suggesting the mandate would have little or no effect. On the other hand,

if petroleum prices were to fall sharply from current levels, there is a greater chance that corn-based ethanol production would have fallen short of the EISA levels, suggesting the mandate could have a very large effect.

The results could also be different if evaluated against a more current baseline. There have been many market developments since the 2007 baseline was prepared. Reduced wheat yields around the world, strong Asian demand for many commodities, and a wide range of other factors have led to higher prices for grains, oilseeds, livestock, dairy, and poultry than anticipated in early 2007 when the baseline underlying this analysis was prepared. When the FAPRI 2008 baseline is developed, it will take these developments into account, and this is likely to change both short- and long-run projections.

Because EISA specifies particular levels of biofuel use, baselines matter considerably in estimating EISA impacts. Thus, the results reported in table 1 should be considered both preliminary and contingent on a wide range of assumptions.

**Effects of Selected EISA Provisions, Assuming Biofuel Credits and Tariffs Expire as Scheduled**

Under current law, the ethanol tariff and the biodiesel tax credit expire at the end of 2008, and the ethanol tax credit expires at the end of 2010. The 2007 FAPRI stochastic baseline assumed those provisions would be extended indefinitely. Given Congressional scorekeeping rules, CBO's baseline assumes that the credits will expire as scheduled.

The two scenarios compared in table 2 both assume the biofuel tax credits and tariffs expire as scheduled. The first scenario assumes pre-EISA policies, while the second assumes the selected provisions of EISA described earlier. Thus the differences reported in table 2 can be interpreted as the effect of the selected EISA provisions, assuming tax credits and tariffs expire.

- As in the scenarios where the biofuel credits and tariffs were extended, the estimated results of these scenarios suggest that EISA results in higher biofuel production, biofuel prices, corn production, crop prices, and net farm income. Corn and soybean oil exports decline, as do soybean meal prices and government farm program outlays.

- While most of the qualitative changes in table 2 are the same as those in table 1, many of the magnitudes are very different. For example, without the ethanol tax credit or EISA, average corn-based ethanol production over the 2011-2016 period falls to an estimated 8.1 billion gallons, far less than with the credits extended. Increasing production to satisfy the implied EISA mandate is thus a much larger change from the pre-EISA policy levels.

- Because the change in corn-based ethanol production is very large in this comparison, the estimated impacts of EISA on corn prices and corn acreage are also very large. Corn prices increase by an average of $0.52 per bushel, resulting in a 5.0 million acre increase in average corn area planted over the 2011-2016 period.

- To meet a billion gallon biodiesel mandate without the dollar per gallon biodiesel tax credit, wholesale prices for biodiesel must almost double from those that would prevail without EISA or the tax credit. The large increase in biodiesel production results in a 72 percent increase in soybean oil prices.

- While both corn and soybean prices increase sharply under EISA, the increase in corn producer returns per acre is greater than the increase in soybean returns, so soybean acreage falls slightly. Higher crop returns result in a 1.3 percent increase in the area planted to 12 major crops, as more marginal lands are cropped.

- The large increase in corn prices means that feed costs increase in spite of the large reduction in soybean meal prices. Fed cattle, hog, chicken, and milk prices all increase because of EISA, with the largest average increase for hogs.

- Average annual crop receipts increase by almost $12 billion. Livestock receipts increase by just $0.5 billion, less than the increase in feed costs, suggesting a slight reduction in livestock producer profits. Aggregate annual net farm income increases by an average of $6 billion.

**Table 2. Effects of Selected EISA Provisions, Assuming Biofuel Credits and Tariffs Expire as Scheduled**

| | No EISA, Credits Expire | EISA, Credits Expire | Absolute Difference | Percentage Difference |
|---|---|---|---|---|
| **Biofuel Production** | (Billion Gallons, 2011 - 2016 Average) | | | |
| Corn-based Ethanol | 8.11 | 14.07 | 5.96 | 73.5% |
| Biodiesel | 0.23 | 0.96 | 0.73 | 309.8% |
| **Biofuel Wholesale Prices** | (Dollars per Gallon, 2011 - 2016 Average) | | | |
| Corn-based Ethanol | 1.34 | 1.87 | 0.54 | 40.3% |
| Biodiesel | 2.12 | 4.19 | 2.07 | 97.8% |
| **Corn Supply and Use** | (Billion Bushels, 2011/12 - 2016/17 Average) | | | |
| Production | 13.32 | 14.09 | 0.77 | 5.8% |
| Ethanol Use | 2.82 | 5.07 | 2.25 | 79.9% |
| Exports | 2.77 | 2.10 | -0.67 | -24.2% |
| **Soyoil Use** | (Billion Pounds, 2011/12 - 2016/17 Average) | | | |
| Biodiesel Use | 1.33 | 5.64 | 4.31 | 324.3% |
| Net Exports | 2.88 | 0.45 | -2.43 | -84.5% |
| **Crop Acreage** | (Million Acres, 2011/12 - 2016/17 Average) | | | |
| Corn | 86.47 | 91.46 | 4.99 | 5.8% |
| Soybeans | 71.18 | 70.27 | -0.91 | -1.3% |
| 12 Major Crops | 251.20 | 254.46 | 3.26 | 1.3% |
| **Crop and Soy Product Prices** | (2011/12 - 2016/17 Average) | | | |
| Corn (Dollars per Bushel) | 2.81 | 3.33 | 0.52 | 18.6% |
| Soybeans (Dollars per Bushel) | 6.15 | 7.21 | 1.06 | 17.3% |
| Wheat (Dollars per Bushel) | 4.03 | 4.31 | 0.28 | 7.0% |
| Soybean Meal (Dollars per Ton) | 179.99 | 138.29 | -41.70 | -23.2% |
| Soybean Oil (Cents per Pound) | 26.89 | 46.29 | 19.40 | 72.1% |
| **Livestock, Poultry & Dairy Prices** | (Dollars per Hundredweight, 2011 - 2016 Average) | | | |
| Nebraska Direct Steers | 84.11 | 84.66 | 0.54 | 0.6% |
| OK City Feeder Steers | 101.06 | 100.01 | -1.04 | -1.0% |
| 51-52% Lean Barrows & Gilts | 48.97 | 50.00 | 1.03 | 2.1% |
| 12-City Broilers | 70.09 | 70.60 | 0.51 | 0.7% |
| All Milk | 14.41 | 14.48 | 0.08 | 0.5% |
| **Farm Program Expenditures** | (Billion Dollars, FY2011 - FY2016 Average) | | | |
| Corn | 2.32 | 2.12 | -0.20 | -8.6% |
| Soybeans | 1.03 | 0.75 | -0.28 | -27.3% |
| Net CCC Outlays | 11.89 | 11.12 | -0.76 | -6.4% |
| **Farm Income** | (Billion Dollars, 2011 - 2016 Average) | | | |
| Crop Receipts | 147.37 | 159.32 | 11.96 | 8.1% |
| Livestock Receipts | 133.60 | 134.13 | 0.53 | 0.4% |
| Government Payments | 11.73 | 10.99 | -0.74 | -6.3% |
| Feed Expenses | 37.48 | 38.23 | 0.75 | 2.0% |
| Rent to Nonoperator Landlords | 12.46 | 15.47 | 3.02 | 24.2% |
| Other Production Costs | 231.11 | 233.12 | 2.01 | 0.9% |
| Net Farm Income | 58.02 | 64.16 | 6.14 | 10.6% |

**Effects of Selected EISA Provisions on Government Farm Program Outlays, Assuming Biofuel Credits and Tariffs Expire as Scheduled**

For scorekeeping purposes, the CBO baseline assumes that biofuel tax credits and tariffs expire as scheduled. To estimate the net impact of EISA on government farm program outlays, therefore, it is appropriate to make a detailed comparison assuming credits and tariffs expire.

- As reported in table 3, the average annual impact of EISA on net CCC outlays on farm programs is $763 million over the period covering fiscal years (FY) 2011 to 2016.

- Lower spending on the corn and soybean programs account for about half of the reduction in net CCC outlays, as higher prices reduce expenditures on the marketing loan and countercyclical payment programs.

- Higher prices also result in lower spending on every other major commodity program. Conservation reserve spending also dips slightly, assuming higher returns to crop production cause some producers to choose not to re-enroll when contracts expire, and that this effect more than offsets any increase in rental rates.

- In the scenario where tax credits expire and EISA is not in place, prices have a much greater chance of dropping low enough to trigger price-based benefits than when either tax credits are extended or EISA mandates are put in place. Even so, in only a minority of stochastic outcomes are grain and oilseed prices low enough to trigger benefits under the marketing loan and countercyclical payment programs.

- The annual effect of EISA on farm program outlays increases over time. The net impact of EISA is to reduce net outlays by $1.1 billion over the FY 2008 – FY 2012 period, and by $5.9 billion over the FY 2008 – FY 2017 period.

EISA would also have other effects on government outlays and tax revenues not considered here. The analysis evaluates only two provisions of EISA, and accounts only for their effects on farm program outlays. The mandates for increased use of cellulosic ethanol and other advanced biofuels are also very likely to affect commodity markets and farm program spending, but they are outside the scope of this analysis.

Furthermore, the changes in biofuel production could have significant effects on aggregate motor fuel use, which would in turn affect tax revenues. With no tax credits available after 2008 for biodiesel or 2010 for ethanol, changes in biofuel production after those years would have no direct impact on the cost of such credits, but that effect would be quite large if the credits were extended.

**Table 3. Effects of Selected EISA Provisions on Government Farm Program Outlays, Assuming Biofuel Credits and Tariffs Expire as Scheduled**

| | No EISA, Credits Expire | EISA, Credits Expire | Absolute Difference | Percentage Difference |
|---|---|---|---|---|
| | (Million Dollars, FY2011 - FY2016 Average) | | | |
| Corn | 2,317 | 2,118 | -199 | -8.6% |
| Soybeans | 1,032 | 750 | -282 | -27.3% |
| Wheat | 1,197 | 1,170 | -27 | -2.3% |
| Upland Cotton | 1,885 | 1,854 | -30 | -1.6% |
| Rice | 560 | 548 | -12 | -2.1% |
| Sorghum | 205 | 201 | -5 | -2.3% |
| Barley | 96 | 85 | -11 | -11.5% |
| Oats | 6 | 4 | -3 | -41.6% |
| Peanuts | 157 | 142 | -15 | -9.3% |
| Minor Oilseeds | 38 | 21 | -16 | -43.6% |
| Dairy | 185 | 164 | -21 | -11.3% |
| Conservation Reserve | 2,220 | 2,146 | -74 | -3.3% |
| All Other | 1,988 | 1,919 | -69 | -3.5% |
| Net CCC Outlays | 11,885 | 11,122 | -763 | -6.4% |
| **Net CCC Outlays by Year** | (Million Dollars) | | | |
| FY 2008 | 11,682 | 11,678 | -4 | 0.0% |
| FY 2009 | 11,816 | 11,799 | -17 | -0.1% |
| FY 2010 | 11,532 | 11,393 | -140 | -1.2% |
| FY 2011 | 11,725 | 11,501 | -224 | -1.9% |
| FY 2012 | 12,163 | 11,451 | -712 | -5.9% |
| FY 2013 | 12,084 | 11,428 | -656 | -5.4% |
| FY 2014 | 12,358 | 11,504 | -854 | -6.9% |
| FY 2015 | 11,452 | 10,437 | -1,015 | -8.9% |
| FY 2016 | 11,529 | 10,410 | -1,119 | -9.7% |
| FY 2008-FY 2012 | 58,919 | 57,821 | -1,097 | -1.9% |
| FY 2008-FY 2017* | 117,871 | 112,011 | -5,860 | -5.0% |

'*The FAPRI 2007 baseline extends through FY 2016. The 10-year estimate assumes FY 2017 outlays equal those of FY 2016.

**Effects of Allowing Biofuel Credits and Tariffs to Expire, Assuming pre-EISA Policies**

The first two sets of comparisons estimated the net impacts of the selected provisions of EISA, making different assumptions about the continuation of biofuel tax credits and tariffs. The next two sets of comparisons estimate the net impacts of allowing biofuel tax credits and tariffs to expire, making different assumptions about EISA.

Table 4 compares results assuming pre-EISA policies. Results are essentially the same as those reported in early 2007 in the "FAPRI U.S. Baseline Briefing Book." Now that EISA has been approved, these comparisons are primarily of academic interest, but they do help make clear that EISA has fundamentally changed estimates of how biofuel tax credits and tariffs affect markets.

- Without EISA in place, allowing biofeul tax credits and tariffs to expire would result in sharply lower producer prices for biofuels and a significant reduction in biofuel production.

- Allowing tax credits and tariffs to expire results in a 1.3 billion bushel average reduction in the use of corn to produce ethanol. This results in a $0.30 per bushel reduction in corn prices that in turn causes a 3.4 million acre reduction in corn acreage.

- The decline in biodiesel production is even larger in proportional terms than the reduction in ethanol production. This results in lower demand for soybean oil and lower prices for both soybean oil and soybeans. However, the decline in soybean prices is proportionally less than the reduction in corn prices, so soybean acreage expands.

- Lower prices for corn more than offset the increase in the price of soybean meal, so livestock feed expenses decline by an annual average of about $1.0 billion relative to the scenario continuing biofuel tax credits and tariffs.

- Lower feed costs contribute to a slight increase in livestock, poultry and milk production that in turn results in lower prices for fed cattle, hogs, chickens and milk. Annual livestock receipts decline by an average of $0.6 billion, less than the reduction in feed costs.

- Lower crop prices result in increased farm program expenditures when biofuel tax credits and tariffs are allowed to expire. Net CCC outlays increase by an average of $0.58 billion per year, with increased spending on the corn and soybean programs accounting for most of the difference.

- Net farm income declines by an annual average of $3.1 billion. The $6.7 billion reduction in average crop receipts is partially offset by increased government payments, reduced rental payments to nonoperator landlords, and other reductions in production costs.

**Table 4. Effects of Allowing Biofuel Credits and Tariffs to Expire, Assuming pre-EISA Policies**

| | No EISA, Credits Extended | No EISA, Credits Expire | Absolute Difference | Percentage Difference |
|---|---|---|---|---|
| **Biofuel Production** | (Billion Gallons, 2011 - 2016 Average) | | | |
| Corn-based Ethanol | 11.71 | 8.11 | -3.60 | -30.8% |
| Biodiesel | 0.51 | 0.23 | -0.27 | -53.9% |
| **Biofuel Wholesale Prices** | (Dollars per Gallon, 2011 - 2016 Average) | | | |
| Corn-based Ethanol | 1.63 | 1.34 | -0.29 | -17.8% |
| Biodiesel | 3.07 | 2.12 | -0.95 | -31.0% |
| **Corn Supply and Use** | (Billion Bushels, 2011/12 - 2016/17 Average) | | | |
| Production | 13.83 | 13.32 | -0.52 | -3.7% |
| Ethanol Use | 4.14 | 2.82 | -1.33 | -32.1% |
| Exports | 2.37 | 2.77 | 0.40 | 16.9% |
| **Soyoil Use** | (Billion Pounds, 2011/12 - 2016/17 Average) | | | |
| Biodiesel Use | 2.95 | 1.33 | -1.62 | -55.0% |
| Net Exports | 1.81 | 2.88 | 1.07 | 59.0% |
| **Crop Acreage** | (Million Acres, 2011/12 - 2016/17 Average) | | | |
| Corn | 89.84 | 86.47 | -3.38 | -3.8% |
| Soybeans | 70.09 | 71.18 | 1.10 | 1.6% |
| 12 Major Crops | 253.02 | 251.20 | -1.82 | -0.7% |
| **Crop and Soy Product Prices** | (2011/12 - 2016/17 Average) | | | |
| Corn (Dollars per Bushel) | 3.11 | 2.81 | -0.30 | -9.6% |
| Soybeans (Dollars per Bushel) | 6.64 | 6.15 | -0.49 | -7.4% |
| Wheat (Dollars per Bushel) | 4.19 | 4.03 | -0.16 | -3.9% |
| Soybean Meal (Dollars per Ton) | 166.23 | 179.99 | 13.76 | 8.3% |
| Soybean Oil (Cents per Pound) | 34.34 | 26.89 | -7.45 | -21.7% |
| **Livestock, Poultry & Dairy Prices** | (Dollars per Hundredweight, 2011 - 2016 Average) | | | |
| Nebraska Direct Steers | 84.59 | 84.11 | -0.48 | -0.6% |
| OK City Feeder Steers | 100.50 | 101.06 | 0.55 | 0.6% |
| 51-52% Lean Barrows & Gilts | 49.76 | 48.97 | -0.78 | -1.6% |
| 12-City Broilers | 70.83 | 70.09 | -0.74 | -1.0% |
| All Milk | 14.46 | 14.41 | -0.06 | -0.4% |
| **Farm Program Expenditures** | (Billion Dollars, FY2011 - FY2016 Average) | | | |
| Corn | 2.15 | 2.32 | 0.17 | 8.0% |
| Soybeans | 0.81 | 1.03 | 0.22 | 27.4% |
| Net CCC Outlays | 11.31 | 11.89 | 0.58 | 5.1% |
| **Farm Income** | (Billion Dollars, 2011 - 2016 Average) | | | |
| Crop Receipts | 154.08 | 147.37 | -6.71 | -4.4% |
| Livestock Receipts | 134.21 | 133.60 | -0.61 | -0.5% |
| Government Payments | 11.16 | 11.73 | 0.57 | 5.1% |
| Feed Expenses | 38.47 | 37.48 | -0.98 | -2.6% |
| Rent to Nonoperator Landlords | 14.15 | 12.46 | -1.69 | -11.9% |
| Other Production Costs | 232.37 | 231.11 | -1.26 | -0.5% |
| Net Farm Income | 61.11 | 58.02 | -3.08 | -5.0% |

**Effects of Allowing Biofuel Credits and Tariffs to Expire, Assuming Selected EISA Policies**

The impacts of allowing biofuel credits and tariffs to expire are very different when EISA policies are in place. Assuming the mandates for the use of corn-based ethanol and biodiesel are not waived, EISA results in much higher levels of biofuel production when the credits and tariffs expire than would occur if EISA were not in place. With EISA in place, extending the biofuel tax credits has only modest effects on average levels of biofuel production and agricultural markets.

- Averaging across stochastic outcomes, production of corn-based ethanol is only three percent less when tax credits and tariffs are allowed to expire than when they are extended indefinitely (table 5). As shown later, in most of the outcomes, there is essentially no change in production.

- With EISA mandates in place, corn-based ethanol production is only affected by the extension of biofuel tax credits if petroleum and gasoline prices are very high, resulting in high ethanol prices and ethanol production in excess of the mandate.

- Likewise, with EISA mandates in place and no assumed use of waiver authority, allowing the biodiesel tax credit to expire has essentially no effect on biodiesel production.

- Because the EISA mandates largely determine production levels, allowing the tax credits to expire has little effect on wholesale biofuel prices. Those prices must be high enough to result in the required levels of production; allowing the tax credits to expire has little or no effect on the prices an ethanol producer requires.

- Little change in wholesale biofuel prices implies a large effect on pump-level prices. When the biofuel credits expire, consumers have to pay more for blended fuels than they would pay if the credits were extended. In other words, the main effect of allowing the credits to expire is to shift the cost of the biofuel use mandates from taxpayers to consumers.

- With little impact on biofuel production, the effects on agricultural markets of allowing biofuel credits to expire are small. Even the modest effects reported in table 5 are somewhat misleading, as in only a small fraction of the stochastic outcomes does extending the credits make any noticeable difference on agricultural market outcomes at all.

**Table 5. Effects of Allowing Biofuel Credits and Tariffs to Expire, Assuming Selected EISA Policies**

| | EISA, Credits Extended | EISA, Credits Expire | Absolute Difference | Percentage Difference |
|---|---|---|---|---|
| **Biofuel Production** | (Billion Gallons, 2011 - 2016 Average) | | | |
| Corn-based Ethanol | 14.50 | 14.07 | -0.43 | -3.0% |
| Biodiesel | 0.96 | 0.96 | 0.00 | -0.1% |
| **Biofuel Wholesale Prices** | (Dollars per Gallon, 2011 - 2016 Average) | | | |
| Corn-based Ethanol | 1.91 | 1.87 | -0.04 | -1.8% |
| Biodiesel | 4.20 | 4.19 | -0.01 | -0.3% |
| **Corn Supply and Use** | (Billion Bushels, 2011/12 - 2016/17 Average) | | | |
| Production | 14.15 | 14.09 | -0.07 | -0.5% |
| Ethanol Use | 5.22 | 5.07 | -0.16 | -3.0% |
| Exports | 2.05 | 2.10 | 0.05 | 2.4% |
| **Soyoil Use** | (Billion Pounds, 2011/12 - 2016/17 Average) | | | |
| Biodiesel Use | 5.64 | 5.64 | -0.01 | -0.1% |
| Net Exports | 0.44 | 0.45 | 0.01 | 2.4% |
| **Crop Acreage** | (Million Acres, 2011/12 - 2016/17 Average) | | | |
| Corn | 91.90 | 91.46 | -0.43 | -0.5% |
| Soybeans | 70.11 | 70.27 | 0.17 | 0.2% |
| 12 Major Crops | 254.67 | 254.46 | -0.21 | -0.1% |
| **Crop and Soy Product Prices** | (2011/12 - 2016/17 Average) | | | |
| Corn (Dollars per Bushel) | 3.37 | 3.33 | -0.04 | -1.1% |
| Soybeans (Dollars per Bushel) | 7.25 | 7.21 | -0.04 | -0.5% |
| Wheat (Dollars per Bushel) | 4.33 | 4.31 | -0.02 | -0.5% |
| Soybean Meal (Dollars per Ton) | 137.98 | 138.29 | 0.32 | 0.2% |
| Soybean Oil (Cents per Pound) | 46.64 | 46.29 | -0.35 | -0.8% |
| **Livestock, Poultry & Dairy Prices** | (Dollars per Hundredweight, 2011 - 2016 Average) | | | |
| Nebraska Direct Steers | 84.70 | 84.66 | -0.04 | -0.1% |
| OK City Feeder Steers | 100.04 | 100.01 | -0.03 | 0.0% |
| 51-52% Lean Barrows & Gilts | 50.06 | 50.00 | -0.05 | -0.1% |
| 12-City Broilers | 70.68 | 70.60 | -0.08 | -0.1% |
| All Milk | 14.49 | 14.48 | -0.01 | 0.0% |
| **Farm Program Expenditures** | (Billion Dollars, FY2011 - FY2016 Average) | | | |
| Corn | 2.12 | 2.12 | 0.00 | 0.1% |
| Soybeans | 0.73 | 0.75 | 0.02 | 2.5% |
| Net CCC Outlays | 11.08 | 11.12 | 0.04 | 0.4% |
| **Farm Income** | (Billion Dollars, 2011 - 2016 Average) | | | |
| Crop Receipts | 160.14 | 159.32 | -0.82 | -0.5% |
| Livestock Receipts | 134.22 | 134.13 | -0.09 | -0.1% |
| Government Payments | 10.96 | 10.99 | 0.03 | 0.3% |
| Feed Expenses | 38.37 | 38.23 | -0.14 | -0.4% |
| Rent to Nonoperator Landlords | 15.71 | 15.47 | -0.23 | -1.5% |
| Other Production Costs | 233.34 | 233.12 | -0.22 | -0.1% |
| Net Farm Income | 64.52 | 64.16 | -0.36 | -0.6% |

**Effects of the Biodiesel Mandate and Waiver Authority, Assuming Biofuel Credits and Tariffs Expire as Scheduled**

Waiver authority included in EISA allows some of the act's provisions to be waived under certain circumstances. It is difficult to anticipate how likely it is that this authority will be utilized, as it depends on how the legislation is interpreted by future administrations. In the case of biodiesel, the waiver authority could be especially important.

- If the waiver authority in EISA is used to effectively avoid the biodiesel use mandate, the result would be sharply lower levels of biodiesel production. If the provisions of EISA are in place and if biofuel tax credits and tariffs are allowed to expire on schedule, then average estimated biodiesel production is 81 percent less in the absence of a binding mandate.

- With a binding mandate in place, wholesale biodiesel prices must be high enough to encourage sufficient biodiesel production to meet the mandate. The average biodiesel price required is estimated to be $4.19 per gallon over the 2011-2016 period.

- Without a binding mandate and without the biodiesel tax credit, biodiesel prices must be competitive with regular diesel fuel prices to encourage consumption. Given all the assumptions of the 2007 stochastic baseline, the resulting average biodiesel price is just $2.14 per gallon.

- Sharply lower biodiesel prices and production have major impacts on oilseed and other markets. The lower level of biodiesel production requires 4.6 billion pounds less soybean oil. This results in sharply lower soybean oil prices and an 8.4 percent reduction in average soybean prices.

- Lower soybean prices result in a reduction in soybean production and an increase in corn production. Less demand for soybean oil results in lower soybean crush, which in turn results in significantly higher prices for soybean meal.

- Because the estimated increase in soybean meal prices is much greater than the reduction in corn prices, overall feed costs to the livestock sector increase. This results in less production of meat, poultry, and dairy products and higher prices for animal products. Poultry and poultry prices increase more than cattle and dairy prices, because hogs and poultry rations include more soybean meal than do beef and dairy cattle rations.

- Government farm program costs increase slightly, as lower soybean prices increase average levels of marketing loan benefits and countercyclical payments.

- Net farm income declines by an annual average of $2.0 billion relative to the scenario where the biodiesel mandate is no waived. The effect of lower crop receipts and higher feed expenses more than offsets an increase in livestock receipts and declines in non-feed expenses.

**Table 6. Effects of the Biodiesel Mandate and Waiver Authority, Assuming Biofuel Credits and Tariffs Expire as Scheduled**

| | EISA, Credits Expire | EISA, Credits Expire, No Bio-diesel Mandate | Absolute Difference | Percentage Difference |
|---|---|---|---|---|
| **Biofuel Production** | (Billion Gallons, 2011 - 2016 Average) | | | |
| Corn-based Ethanol | 14.07 | 14.10 | 0.03 | 0.2% |
| Biodiesel | 0.96 | 0.18 | -0.78 | -80.9% |
| **Biofuel Wholesale Prices** | (Dollars per Gallon, 2011 - 2016 Average) | | | |
| Corn-based Ethanol | 1.87 | 1.87 | 0.00 | -0.2% |
| Biodiesel | 4.19 | 2.14 | -2.05 | -48.9% |
| **Corn Supply and Use** | (Billion Bushels, 2011/12 - 2016/17 Average) | | | |
| Production | 14.09 | 14.27 | 0.18 | 1.3% |
| Ethanol Use | 5.07 | 5.07 | 0.01 | 0.2% |
| Exports | 2.10 | 2.09 | 0.00 | -0.1% |
| **Soyoil Use** | (Billion Pounds, 2011/12 - 2016/17 Average) | | | |
| Biodiesel Use | 5.64 | 1.03 | -4.61 | -81.8% |
| Net Exports | 0.45 | 2.97 | 2.53 | 565.8% |
| **Crop Acreage** | (Million Acres, 2011/12 - 2016/17 Average) | | | |
| Corn | 91.46 | 92.67 | 1.20 | 1.3% |
| Soybeans | 70.27 | 68.00 | -2.27 | -3.2% |
| 12 Major Crops | 254.46 | 253.54 | -0.92 | -0.4% |
| **Crop and Soy Product Prices** | (2011/12 - 2016/17 Average) | | | |
| Corn (Dollars per Bushel) | 3.33 | 3.31 | -0.02 | -0.7% |
| Soybeans (Dollars per Bushel) | 7.21 | 6.60 | -0.60 | -8.4% |
| Wheat (Dollars per Bushel) | 4.31 | 4.28 | -0.03 | -0.7% |
| Soybean Meal (Dollars per Ton) | 138.29 | 182.73 | 44.44 | 32.1% |
| Soybean Oil (Cents per Pound) | 46.29 | 29.45 | -16.84 | -36.4% |
| **Livestock, Poultry & Dairy Prices** | (Dollars per Hundredweight, 2011 - 2016 Average) | | | |
| Nebraska Direct Steers | 84.66 | 85.32 | 0.67 | 0.8% |
| OK City Feeder Steers | 100.01 | 100.81 | 0.80 | 0.8% |
| 51-52% Lean Barrows & Gilts | 50.00 | 51.13 | 1.13 | 2.3% |
| 12-City Broilers | 70.60 | 72.97 | 2.37 | 3.4% |
| All Milk | 14.48 | 14.54 | 0.05 | 0.3% |
| **Farm Program Expenditures** | (Billion Dollars, FY2011 - FY2016 Average) | | | |
| Corn | 2.12 | 2.12 | 0.00 | 0.1% |
| Soybeans | 0.75 | 0.86 | 0.11 | 14.5% |
| Net CCC Outlays | 11.12 | 11.23 | 0.11 | 1.0% |
| **Farm Income** | (Billion Dollars, 2011 - 2016 Average) | | | |
| Crop Receipts | 159.32 | 156.89 | -2.43 | -1.5% |
| Livestock Receipts | 134.13 | 135.56 | 1.42 | 1.1% |
| Government Payments | 10.99 | 11.11 | 0.12 | 1.1% |
| Feed Expenses | 38.23 | 40.26 | 2.03 | 5.3% |
| Rent to Nonoperator Landlords | 15.47 | 14.72 | -0.75 | -4.8% |
| Other Production Costs | 233.12 | 232.99 | -0.14 | -0.1% |
| Net Farm Income | 64.16 | 62.14 | -2.02 | -3.1% |

**Effects of Selected EISA Provisions on Ethanol Production**

The tables have reported average results across years and across a range of stochastic outcomes. However, these averages can obscure as much as they reveal. The figures which follow focus on just one of the conditioning assumptions for the analysis: the price of petroleum. The stochastic outcomes for the 2016/17 marketing year are sorted by the average price of petroleum assumed for each outcome.

For example, figure 1 indicates that in the 2016/17 stochastic outcomes where the refiner's acquisition price for petroleum was assumed to be between $70 and $80 per barrel, the average level of corn-based ethanol production in 2016/17 was 15.9 billion gallons under pre-EISA policies and an extension of biofuel tax credits and tariffs, but 16.8 billion gallons with EISA policies in place along with an extension of biofeul tax credits and tariffs.

- Without EISA but with an extension of biofuel tax credits and tariffs, corn-based ethanol production increases dramatically as petroleum prices increase (figure 1). Production is almost three times as great when average petroleum prices are over $80 per barrel as when the prices are less than $30 per barrel.

- With EISA in place and no assumed use of waiver authority, corn-based ethanol production in 2016/17 never dips below 15 billion gallons. If petroleum prices are sufficiently high and the ethanol tax credit is extended, production exceeds the mandate.

- Relative to the no-EISA scenario with tax credits extended, EISA causes only a very small average increase in corn-based ethanol production when petroleum prices are high, but a much larger increase when petroleum prices are low.

- The story is even more extreme if the ethanol tax credit and tariff are assumed to expire as scheduled (figure 2). Without EISA in place, corn-based ethanol production drops to very low levels when petroleum prices are below $50 per barrel. In extreme cases, the 7.5 billion gallon renewable fuel standard under pre-EISA law supports the market (corn-based ethanol production drops even lower because part of the mandate is supplied by biodiesel, ethanol made from feedstocks other than corn, and imported ethanol).

- Only when petroleum prices exceed $80 per barrel do average levels of corn-based ethanol production near 15 billion gallons without EISA or tax credits in place.

- Relative to this lower point of comparison, therefore, EISA has a much greater impact on ethanol production, especially when petroleum prices are low.

**Figure 1. Corn-based Ethanol Production in 2016/17, Assuming Biofuel Tax Credits and Tariffs are Extended, Sorted by 2016/17 Petroleum Prices**

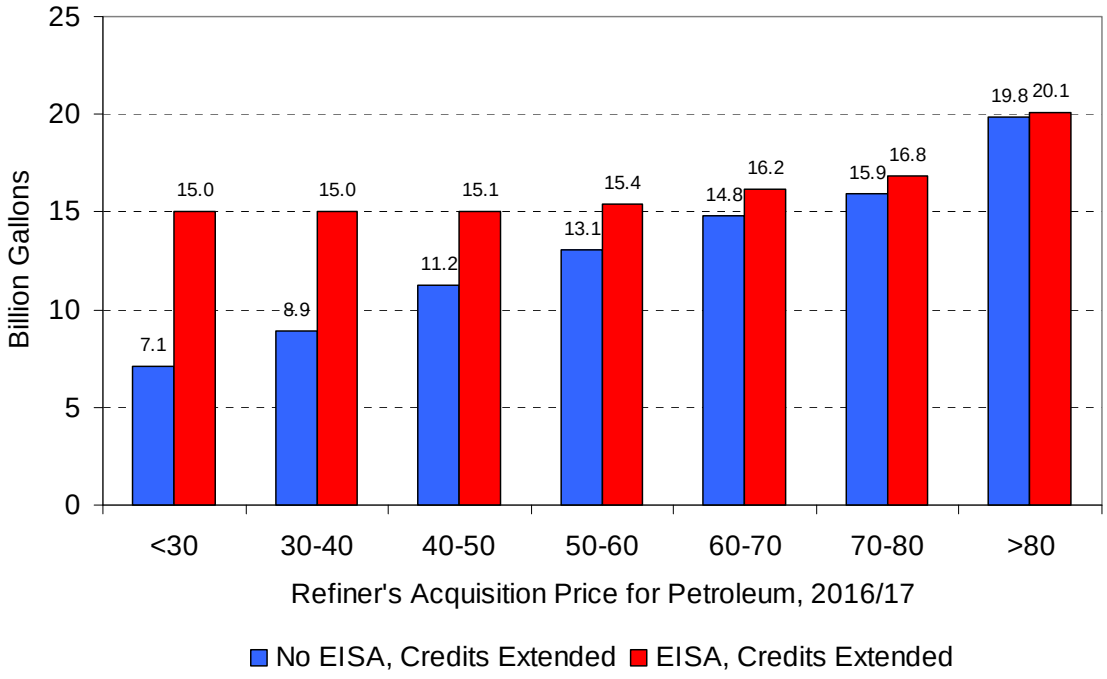
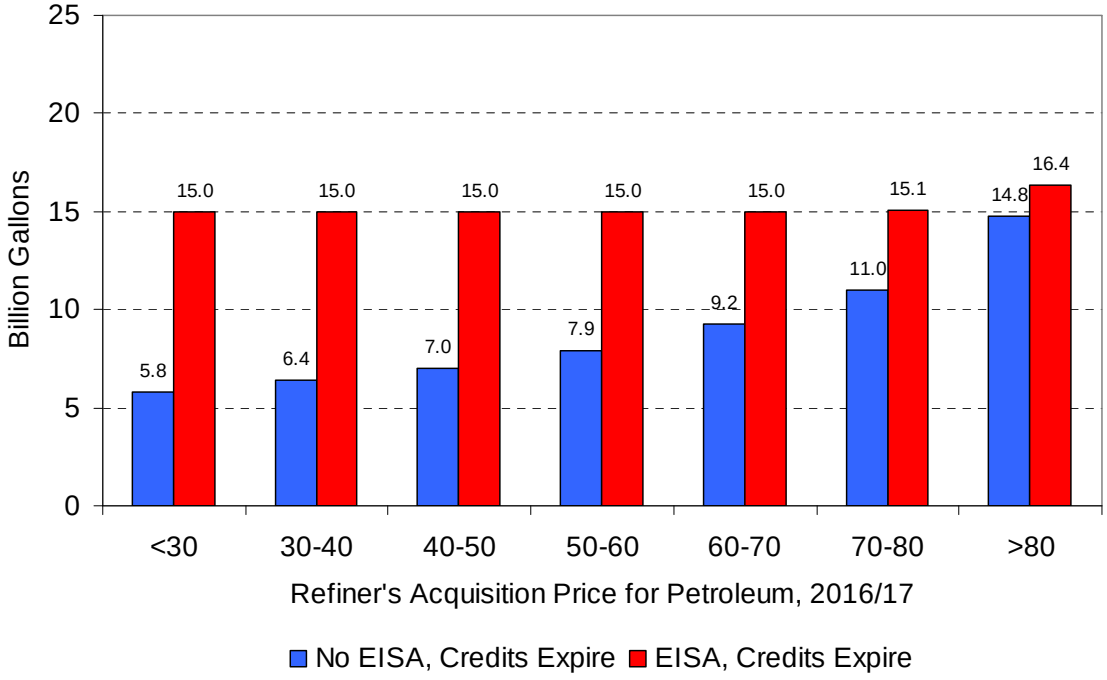



**Figure 2. Corn-based Ethanol Production in 2016/17, Assuming Biofuel Tax Credits and Tariffs Expire as Scheduled, Sorted by 2016/17 Petroleum Prices**



**Effects of Extending Tax Credits and Tariffs on Ethanol Production**

The effect of extending or not extending biofuel tax credits and tariffs is very different depending on whether EISA is in place. Figures 3 and 4 present the same information as in figures 1 and 2, but make different pair-wise comparisons.

- Without EISA in place, the choice of whether or not to extend biofuel tax credits has large implications for ethanol production. For any given petroleum price, production is much greater if tax credits are extended than when they are allowed to expire.

- For example, extension of tax credits increases 2016/17 corn-based ethanol production from 6.4 to 8.9 billion gallons when the price of petroleum is between $30 and $40 per barrel, and from 11.0 to 15.9 billion gallons when the petroleum price is between $70 and $80 per barrel (figure 3).

- With EISA in place, corn-based ethanol production is at or near the 15 billion gallon mandate as long as the price of petroleum is less than $50 per barrel, regardless of whether or not tax credits and tariffs are extended (figure 4).

- When petroleum prices exceed $60 per barrel, 2016/17 corn-based ethanol production exceeds 16 billion gallons when the tax credits are extended. However, production remains near 15 billion gallons until petroleum prices exceed $80 per barrel when tax credits are not extended.

- In summary, tax credits have major impacts on ethanol production when EISA is not in place, regardless of the price of petroleum. But under EISA, tax credits only have a noticeable impact on corn-based ethanol production levels when petroleum prices are sufficiently high.

**Figure 3. Corn-based Ethanol Production in 2016/17, Assuming Pre-EISA Policies, Sorted by 2016/17 Petroleum Prices**

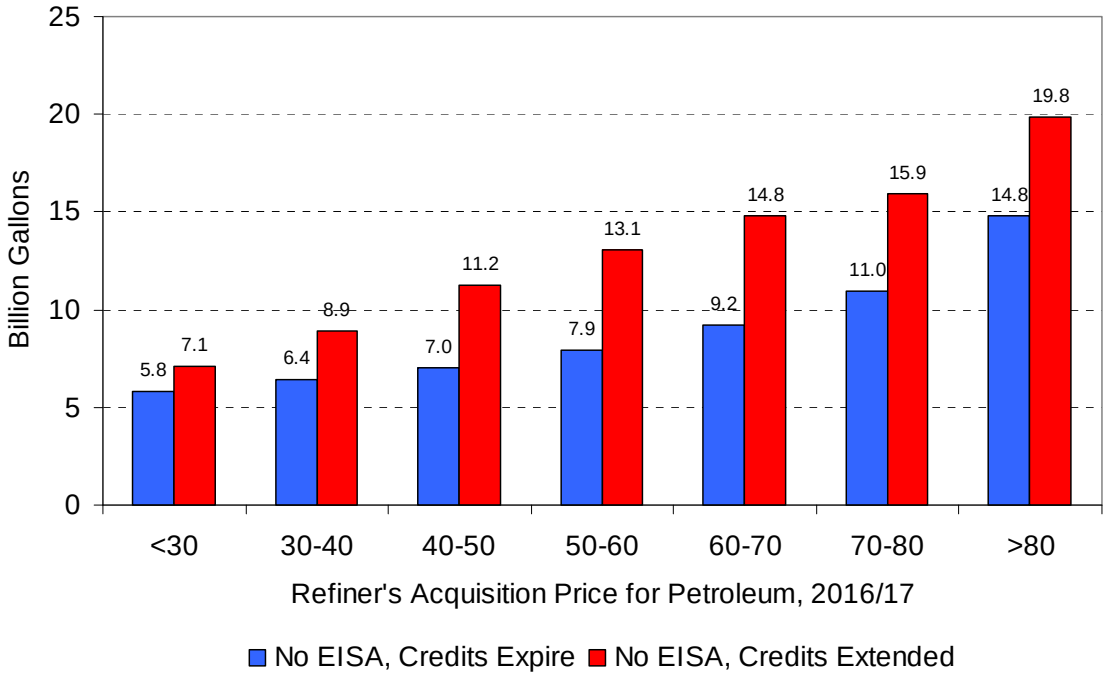
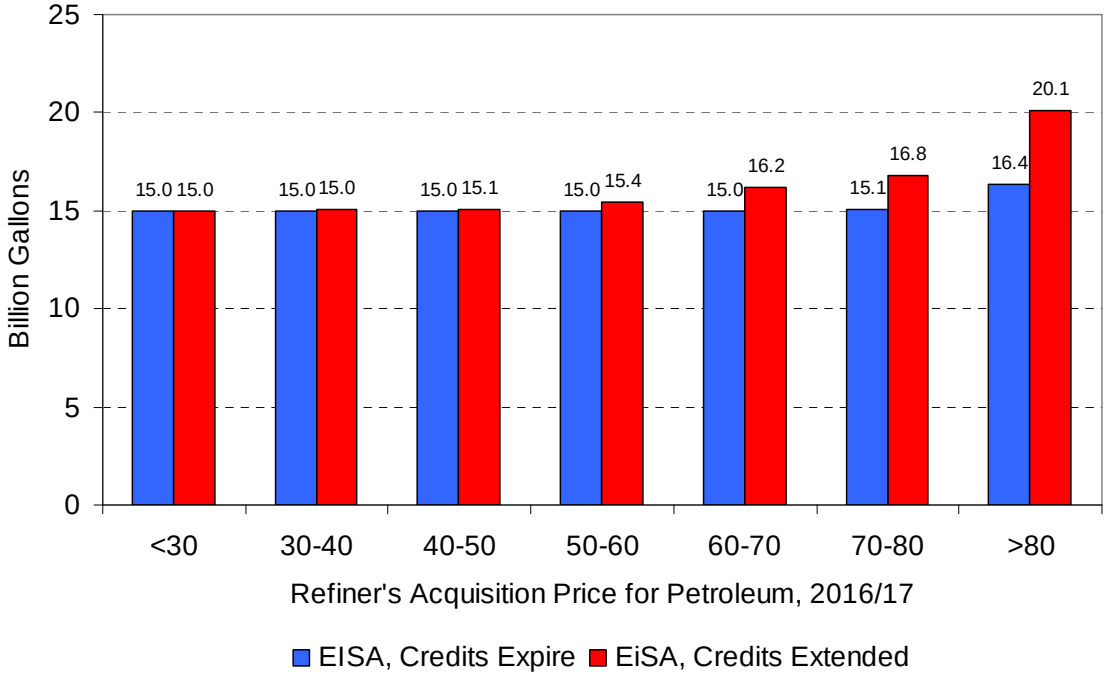



**Figure 4. Corn-based Ethanol Production in 2016/17, Assuming Selected EISA Policies, Sorted by 2016/17 Petroleum Prices**



**Effects of Selected EISA Provisions on Ethanol Prices**

As with ethanol production, the impact of EISA on wholesale ethanol prices is strongly affected by assumptions about petroleum prices and the biofuel tax credits and tariffs.

- There is a strong correlation between ethanol prices and petroleum prices when EISA is not in place. When tax credits are extended but EISA is not in place, 2016/17 wholesale ethanol prices range from $1.21 per gallon when petroleum prices are under $30 per barrel to $2.24 per gallon when petroleum prices are over $80 per barrel (figure 5).

- For comparison, the average wholesale price of ethanol (FOB Omaha) was $2.08 per gallon in November 2007.

- With EISA in place, the producer price of ethanol must be high enough to stimulate the mandated levels of production. In the 2007 version of the FAPRI model, an average wholesale ethanol price of about $1.70 per gallon is required to encourage production of 15 billion gallons of corn-based ethanol by 2016/17. A new baseline might require a different average ethanol price to achieve the mandate.

- When tax credits are extended, EISA has a large impact on ethanol wholesale prices when petroleum prices are low, but almost no impact when petroleum prices are above about $60 per barrel.

- The effect of EISA on ethanol prices is much greater at low prices when the ethanol tax credit is allowed to expire on schedule (figure 6). Under that assumption, EISA increases average wholesale ethanol prices by more than $0.50 per gallon when the price of petroleum is less than $50 per barrel, and by an average of $0.23 per gallon when petroleum prices are between $70 and $80 per barrel.

- At least some portion of the increase in wholesale ethanol prices under EISA would be passed along to final consumers of blended gasoline. Beyond the scope of this study is the question of how increased levels of ethanol production under EISA would affect petroleum and gasoline markets.

**Figure 5. Corn-based Ethanol Rack Prices in 2016/17, Assuming Biofuel Tax Credits and Tariffs are Extended, Sorted by 2016/17 Petroleum Prices**

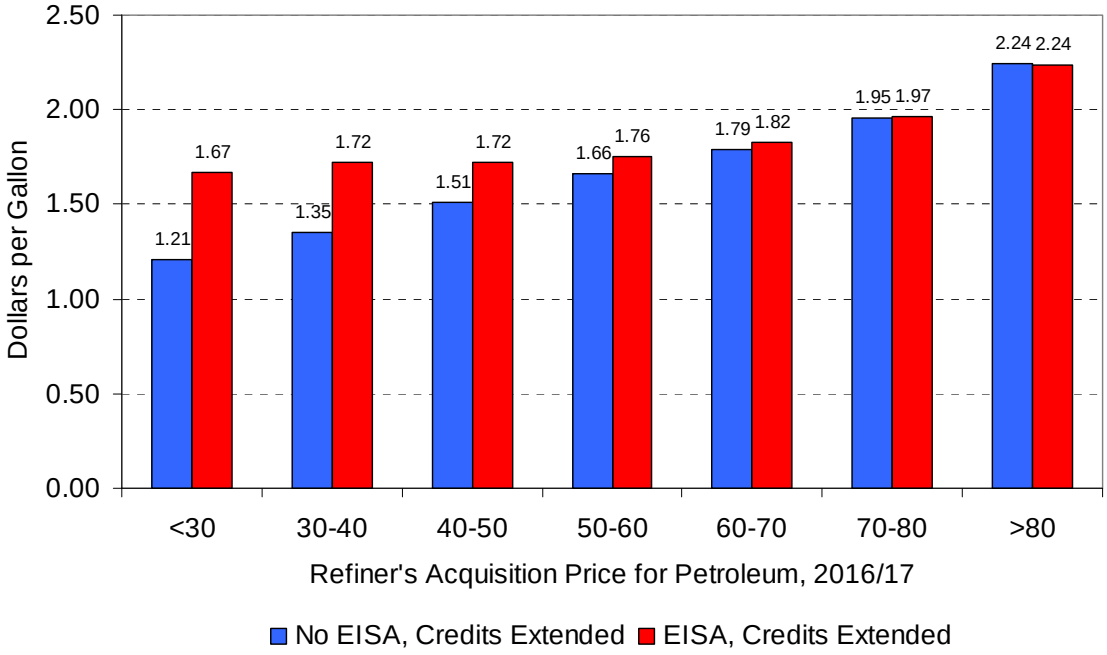
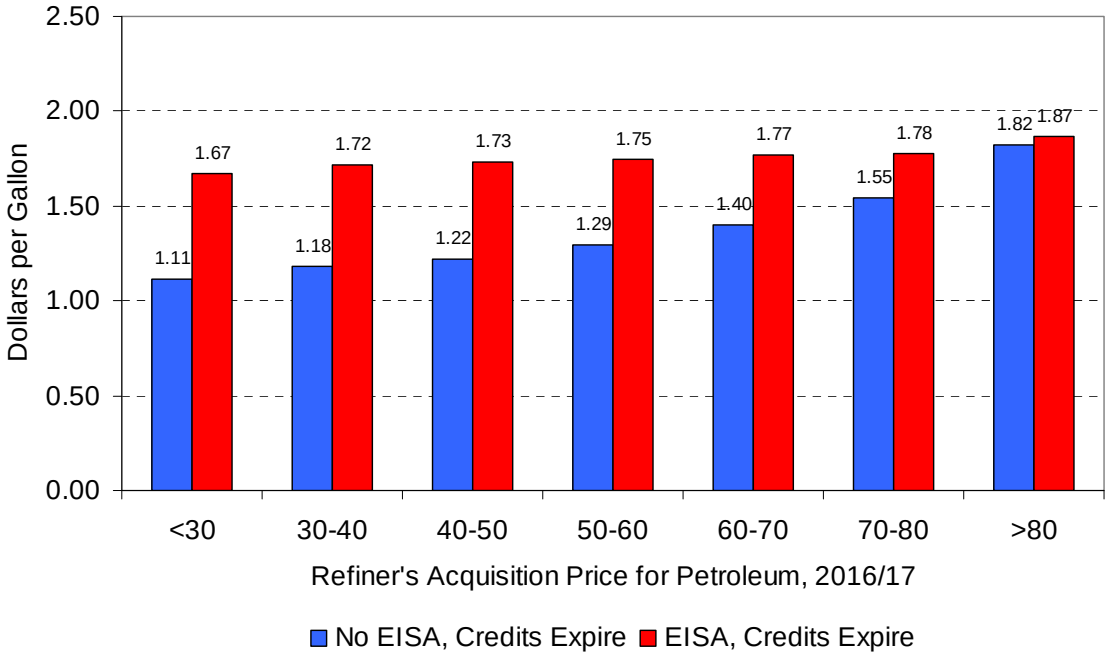



**Figure 6. Corn-based Ethanol Rack Prices in 2016/17, Assuming Biofuel Tax Credits and Tariffs Expire as Scheduled, Sorted by 2016/17 Petroleum Prices**



**Effects of Extending Tax Credits and Tariffs on Ethanol Prices**

The decision of whether to extend biofuel tax credits and tariffs when they expire has major implications for wholesale ethanol prices when EISA is not in place, but is less likely to affect prices paid to ethanol producers when EISA is in place.

- Without EISA in place, wholesale ethanol prices increase with petroleum prices and are significantly higher when tax credits are extended than when they are allowed to expire (figure 7).

- At high petroleum prices without EISA, most of the impact of extending the $0.51 per gallon tax credit is reflected in terms of higher producer prices for ethanol. At petroleum prices over $80 per barrel, wholesale prices are $0.42 per gallon higher with the tax credit extended than when it expires. This suggests only a small portion of the tax credit would be reflected in terms of lower prices to retail consumers.

- At lower petroleum prices without EISA, less of the impact of extending the tax credit is reflected in higher producer prices for ethanol. At lower levels of petroleum prices and ethanol use, a lower proportion of ethanol consumption is in price-sensitive categories such as the voluntary use of 10 percent blends, and more of it takes the form of uses that are required or at least strongly encouraged by regulation.

- With EISA in place, wholesale prices of ethanol must be at an adequate level to encourage the required level of corn-based ethanol production, regardless of whether ethanol tax credits are available. Only when petroleum prices exceed about $60 per barrel does the extension of biofuel tax credits have a noticeable impact on wholesale ethanol prices (figure 8).

- With EISA in place, the main impact of the ethanol tax credit is on consumers rather than producers of ethanol when petroleum prices are low. Wholesale prices are essentially the same at low petroleum prices regardless of whether the tax credit is in place. If even a portion of the tax credit is passed on to final consumers of gasoline blended with ethanol, extending the credit would reduce fuel consumer costs while increasing taxpayer costs.

- When petroleum prices are sufficiently high, the benefits of the ethanol tax credit are shared by ethanol producers and consumers.

**Figure 7. Corn-based Ethanol Rack Prices in 2016/17, Assuming Pre-EISA Policies, Sorted by 2016/17 Petroleum Prices**

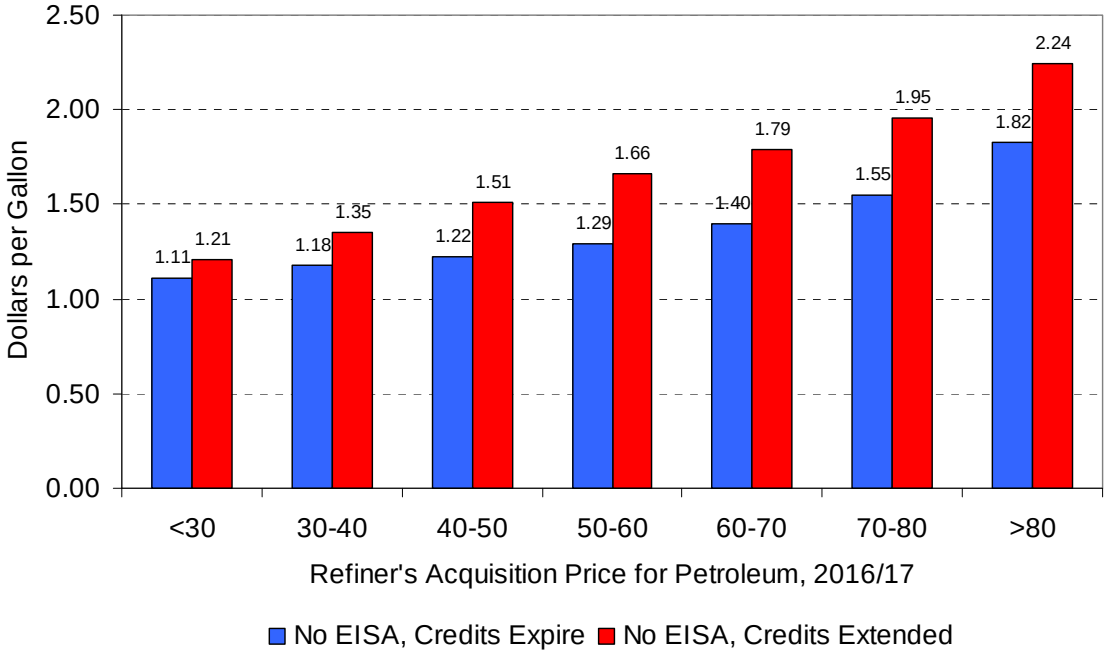
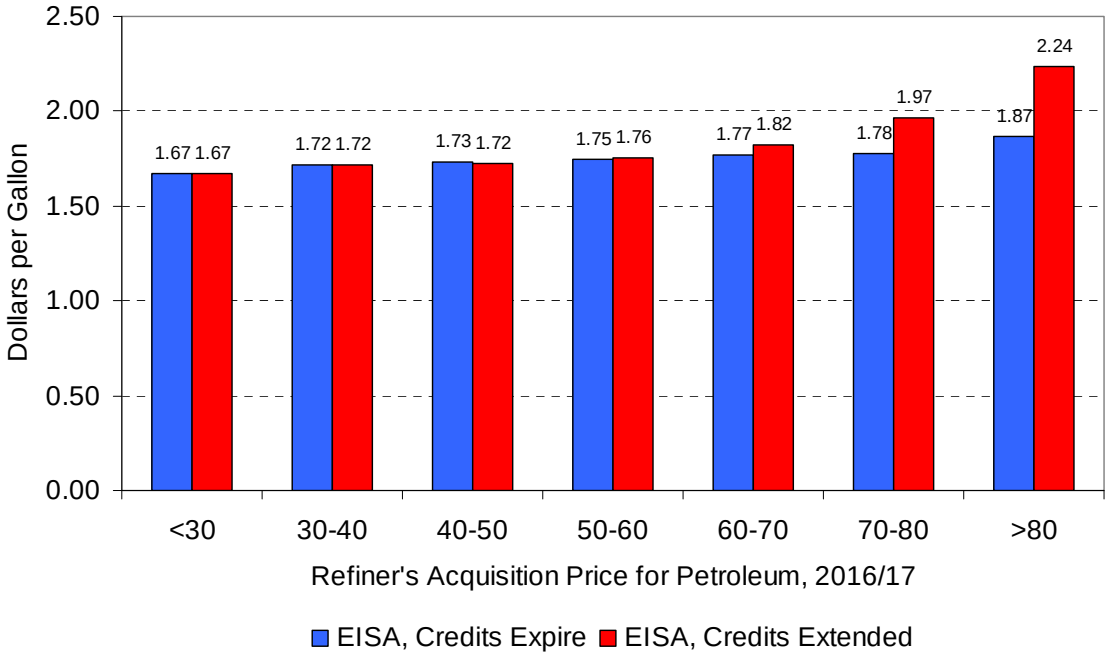



**Figure 8. Corn-based Ethanol Rack Prices in 2016/17, Assuming Selected EISA Policies, Sorted by 2016/17 Petroleum Prices**



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