Testimony of Patrick Westhoff, Co-Director
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at the hearing of the
House Agriculture Subcommittee on Conservation, Credit, Energy, and Research on
"Potential Economic Impacts of Climate Change on the Farm Sector"
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Thank you, Mr. Chairman, for the opportunity to speak with you and other Members of the Subcommittee. My name is Pat Westhoff, and I am a co-director of the Food and Agricultural Policy Research Institute at the University of Missouri (FAPRI-MU). For the last 25 years, our mission has been to provide objective analysis of issues related to agricultural markets and policy.

Our institute is examining some of the possible impacts of climate change legislation on markets for agricultural products, farm income, and consumer food prices. So far, the research has raised many questions and provided few definitive answers.

Today, I will discuss some of the reasons why there is so much uncertainty about the impacts of climate change legislation on the farm sector. Consistent with FAPRI's mission, I will neither endorse nor oppose particular policy proposals, but hope to provide information that will be useful as you consider issues related to climate change.

Legislation approved by the House (H.R. 2454) would create a cap-and-trade system. Such a policy would raise farm production expenses by increasing energy costs to users of fossil fuels. It would also encourage activities that reduce greenhouse gas emissions and sequester carbon. Some of these activities could have important impacts on agricultural production, which in turn would affect farm commodity prices.

Production cost impacts

The Energy Information Administration (EIA) has estimated possible impacts of the legislation on energy markets and the general economy. In its "basic" scenario, EIA estimates that the House-passed bill would raise the nominal cost of diesel fuel by about 8 percent in 2020 from reference scenario levels. Electricity costs would increase by about 4 percent, and industrial users would pay 14 percent more for natural gas.

Translating these estimated changes in energy costs to changes in farm production expenses is not as easy as one might think. Consider the case of fertilizer. Nitrogen fertilizer is produced in a very energy-intensive process that uses large quantities of natural gas. One might therefore expect that nitrogen fertilizer costs would increase in line with the estimated increase in natural gas costs.

The story is more complex. First, much of the nitrogen fertilizer used in the United States is imported, and foreign fertilizer producers would not necessarily experience the same change in production costs as domestic manufacturers. Second, the House-passed legislation includes provisions to provide free emission allowances to energy-intensive, trade-exposed (EITE) industries, including the nitrogen fertilizer industry. This could hold down costs to nitrogen fertilizer producers, at least until EITE allowances are phased down beginning in 2025. Third, even if the result is a significant increase in fertilizer prices, farmers could reduce their fertilizer usage, thus limiting increases in expenditures.

FAPRI-MU has prepared preliminary estimates of impacts on farm production expenses that try to consider all of these concerns. Given EIA's basic estimates of the House bill's impact on energy costs, we estimate that operating costs for corn producers would increase by about 1.8 percent in 2020 compared to levels that would have prevailed in a reference scenario. Operating costs would increase by 2.0 percent for wheat, 2.2 percent for soybeans, and 2.3 percent for cotton.

These estimates of production cost impacts all depend on a particular set of EIA estimates of energy cost impacts for one particular year. As the cap on greenhouse gas emissions is reduced over time, EIA estimates that energy costs would increase by even larger proportions. In 2030, for example EIA's basic scenario estimates that the House-passed bill would raise nominal diesel fuel costs by 15 percent, electricity costs by 22 percent, and industrial natural gas costs by 26 percent. Furthermore, the scheduled phase-down of free EITE allowances means that nitrogen fertilizer producers would be less insulated from increases in natural gas costs.

Using EIA's energy cost estimates for 2030, we estimate that nominal corn operating expenses would increase by 5.7 percent relative to a reference scenario. Because soybean production uses little nitrogen fertilizer, soybean costs would increase less (4.9 percent), while the proportional increase in wheat (6.3 percent) and cotton (6.4 percent) costs would actually be proportionally larger than the increase for corn.

Other estimates of energy costs would, of course, lead to different estimates of crop production cost impacts. In addition to its basic scenario, EIA has examined a number of other scenarios for how the House-passed bill could impact energy markets. For example, in its "high offsets" scenario, EIA considers what might happen if it is very easy to find ways to reduce greenhouse gas emissions and sequester carbon. This would substantially reduce the cost of emission allowances and result in significantly lower energy costs.

In contrast, EIA's "high cost" scenario assumes that it is not as easy to reduce emissions in electric utilities as in the basic scenario, in part because it proves more difficult to expand production of nuclear energy. This raises the estimated costs of emission allowances and the costs to users of fossil fuels.

Because these different scenarios result in different estimates of fuel costs, they result in different estimates of farm operating expenses. In 2020, corn operating expenses increase by just 0.9 percent in the high offset scenario, but by 2.5 percent in the high cost scenario. In 2030, the corresponding changes are 2.3 percent in the high offset scenario and 8.4 percent in the high cost scenario (Table 1).

Other institutions have also estimated impacts of the House legislation on energy costs. For example, CRA International estimates were used in earlier FAPRI-MU analysis of possible impacts on Missouri crop production expenses. In that analysis (FAPRI-MU Report #05-09), Missouri dryland corn operating costs increased by 3.2 percent in 2020 and 3.8 percent in 2030.

The earlier analysis did not consider impacts of EITE provisions, thus explaining its larger estimate of 2020 production cost impacts. However, in 2030, EIA's basic and high cost scenarios result in larger impacts on energy costs than estimated by CRA. It should not be surprising, therefore, that the estimated impacts on 2030 national corn operating costs under EIA's basic and high costs scenarios are larger than the previous FAPRI-MU estimate of increases in 2030 Missouri dryland corn operating costs.

Table 1. Estimates of changes in nominal farm operating costs resulting from HR 2454

	EIA basic scenario	EIA high offset scenario	EIA high cost scenario
Nominal energy cost impacts*			
Diesel fuel			
2020	8.3%	4.6%	9.0%
2030	15.0%	8.0%	17.5%
Electricity			
2020	3.8%	3.6%	5.4%
2030	22.3%	11.8%	32.7%
Industrial natural gas			
2020	14.4%	8.3%	20.2%
2030	25.9%	10.2%	39.9%
Crop operating cost impacts			
Corn			
2020	1.8%	0.9%	2.5%
2030	5.7%	2.3%	8.4%
Soybeans			
2020	2.2%	1.3%	2.6%
2030	4.9%	2.5%	6.3%
Wheat			
2020	2.0%	1.0%	2.8%
2030	6.3%	2.6%	9.2%
Upland cotton			
2020	2.3%	1.4%	2.9%
2030	6.4%	3.1%	8.8%

*Calculations based on EIA reported nominal energy cost data. Note that inflation-corrected real price changes generally would be slightly smaller, as EIA estimates that the scenarios would result in slightly higher rates of overall price inflation in the economy.

The EIA scenarios are briefly described in the text. The full EIA analysis is available at http://www.eia.doe.gov/oiaf/servicerpt/hr2454/index.html

The key point is that there is great uncertainty about the magnitude of the impact on farm production expenses, primarily because of great uncertainty about the magnitude of impacts on energy costs. If it is relatively easy for electric utilities and others to reduce greenhouse gas emissions and sequester carbon, allowance prices will be relatively low, increases in energy costs will be modest, and impacts on farm production expenses will be fairly small. If it proves much more difficult to reduce emissions and sequester carbon, allowance prices will be much higher, as will energy costs and farm production expenses.

Shifts in production patterns

In addition to its effect on production expenses, climate change legislation could have many other important effects on the farm sector. For example, others will speak to you tomorrow about the opportunities for farmers to earn income by selling offsets for activities that reduce emissions or sequester carbon. I want to focus most of my remaining remarks on possible impacts on crop production patterns.

There are several reasons why crop production patterns could shift in response to climate change legislation.

First, rising input costs could cause some shifts away from crops that experience the largest increases in production expenses. Unless changes in production expenses are larger than in the scenarios we have examined so far, we do not expect this effect to cause large reductions in overall U.S. crop production. As a result, we do not expect the increase in production expenses to translate into very large increases in prices for corn, wheat, soybeans, cotton, and other crops.

Second, the opportunity to earn offset income could encourage landowners to reduce the amount of land used to produce current crops and expand the area devoted to forestry or the production of energy crops. Analysis conducted for the Environmental Protection Agency using the FASOM model suggests that climate change legislation could lead to tens of millions of acres shifting from crop and pasture uses to forestry. Analysis conducted at the University of Tennessee suggests that there could be a large expansion in production of energy crops such as switchgrass.

We have begun to do some work looking at the possible impacts on the farm sector that might result if some land shifts to forestry uses in response to climate change legislation. As the work is ongoing, it would be premature to cite specific estimates, but it could be useful to discuss some early lessons that appear likely to hold even after we refine the analysis.

1) If relatively little land shifts from cropland to forestry uses, climate change legislation may have only small effects on crop production and prices. If crop prices are largely unchanged, producers who face higher production expenses are likely to experience a reduction in income, unless they can earn money by selling offsets for practices like conversion to no-till farming methods.
2) If more significant amounts of cropland shift to forestry uses, the result would be a larger reduction in crop production. This, in turn, would result in higher crop prices that would increase market revenue for farmers who continue to grow traditional crops. This increase in market revenues could offset some or all of the increase in crop operating expenses.
3) If very large amounts of land shift to forestry uses, as suggested in the FASOM analysis, the reduction in crop production could cause very significant increases in crop prices. The resulting

increase in market revenue could well exceed any increase in crop operating costs. In such a case, net revenue over operating costs could exceed reference scenario levels, even for producers who do not directly earn any offset income.

If large shifts in acreage do indeed occur, they would have impacts that go far beyond possible effects on crop producer receipts. Higher crop prices would increase feed costs for the livestock industry. These higher feed costs, in turn, would result in reduced production and higher prices of meat and dairy products. Consumer food prices would increase, not just for products made from grains and vegetable oils, but also for beef, pork, poultry and milk. All else equal, higher crop prices would reduce the quantity of agricultural products exported by the United States. Forestry uses of land result in different patterns of rural employment and economic activity than result from current crop production patterns.

If climate change legislation increases the demand for land to sequester carbon in trees, prices for crop and pasture land are likely to be bid higher. This would benefit current landowners, but could make it more difficult for new and established producers who rent land or who were looking to buy additional land to grow traditional crops.

In addition to possible impacts on crop supplies, climate change legislation could have complex effects on the demand for agricultural products. Higher energy costs would make it more expensive to process and transport food, likely increasing the gap between farm and consumer food prices. The demand for biofuels could be affected both by the opportunity to earn offset income and by changes in fossil fuel prices. Effects of climate change legislation on the macroeconomy could have an impact on domestic food demand. Export demand facing U.S. agriculture could be affected both by the legislation's impacts on the global economy and by the opportunity of foreign producers to earn offset income by changing production practices to reduce emissions and sequester carbon.

From bills to regulation

Any analysis being done today about the impacts of climate change legislation will be built on a series of assumptions about how the rest of the policy process will unfold. Final legislation may differ in important ways from the House-passed bill. Many important decisions would need to be made in writing rules to implement any legislation that is finally approved. It is inevitable that many of the policy assumptions underlying analysis today will differ in important ways from final implementation of compromise legislation. Just to take one critical example, impacts of climate change legislation on the farm sector will look very different if implementing rules make it very easy to earn offset income by planting trees than if it is difficult.

Climate change and international efforts

The discussion so far has not focused on climate change itself, primarily because I am not an expert on climate change and its potential impacts on agricultural production. It has been argued that the proposed legislation would have only modest impacts on the world's climate over the next few decades. If instead the climate effects are large, they might have important impacts on agricultural production and prices.

When examining trade agreements, it is important to distinguish effects that result when one country changes its policies from effects that result when all countries change policies simultaneously. A similar point is relevant here: it is important to be clear whether one is reporting changes that result only from

proposed U.S. climate change legislation, or changes that might result if there is a global agreement. The discussion here has focused on U.S. legislation only, but it could matter tremendously what actions other countries are also taking to address climate change.

For example, much of the analysis conducted so far assumes that the U.S. firms will be able to purchase large amounts of offsets from other countries for practices that reduce emissions or sequester carbon. Similar policies in other countries could increase competition for such offsets. This would tend to increase allowance prices, resulting in higher domestic energy costs and more demand for domestic offsets.

Summary

There is considerable uncertainty over the possible impacts of climate change legislation on the U.S. agricultural sector. Here is a brief summary of what we think we know and what we do not:

1) The House-passed legislation would raise energy costs, and this would translate into higher farm production expenses.
2) Just how large the increases in production costs would be is unknown. Alternative sets of reasonable assumptions result in very different estimates of production cost impacts.
3) The ability to earn offset income by changing production practices or planting trees or energy crops could have major impacts on agricultural production, commodity prices, farm income, consumer food costs, and rural communities.
4) The greater the shift in acreage away from production of traditional crops to trees or energy crops, the larger the potential impact on crop production and prices. Resulting increases in revenues may offset some or all of the increase in production expenses for crop producers.
5) Unilateral U.S. changes in climate policy could have very different impacts than if there is a multilateral agreement to reduce greenhouse gas emissions.

Thank you for your interest in our work.