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Anticipating Economic Impacts of the 2012 Drought in Iowa

ISU Department of Economics

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How Will the Drought of 2012 Affect Local Economies in Iowa?

Iowa has cycled through extremes in weather and climate over its recorded history, with myriad consequences to its economy and society at large. Recent examples include devastating floods in 1993 and 2008 and severe droughts in 1988 and 2012.

As of August 1st, 2012, half of the nation's 3,138 counties were considered drought disaster areas, to include 42 of Iowa's 99 counties. All of Iowa's counties were considered to be in severe drought, and a third of them were suffering exceptional drought conditions. It is logical to ask, therefore, how Iowa's overall economy will be affected by the current situation.

The initial impact of a drought is a sharp reduction in the state's water supply, which in turn has immediate impacts on agricultural productivity, commercial activities that require water, and public goods that are water-based. Households are also directly affected.

Along with the direct economic effects of a drought, there are secondary, or "ripple" effects on the economy, as well as other environmental and social effects that may be difficult to quantify in dollar terms.

This report discusses some of the issues and challenges associated with estimating the economic impacts of the 2012 drought in Iowa.

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Direct Economic Consequences to Agriculture

As of August, 2012, Iowa farmers had 159,889 crop insurance policies covering more than 12 million corn acres and 8 million soybean acres for nearly $14 billion worth of liabilities.

Source: USDA Risk Management Agency

The most visually striking impact of the drought is reduced grain, oilseed, and hay crop yields and the inevitable deterioration of pastures. For Iowa, as of August 1st, expected corn yields according to one ISU model, were rated at 22 percent below the 20 year average yield; soybeans, which are more drought tolerant than corn, were rated almost 15 percent lower. Clearly the state will realize reduced crop quantities. However, as the drought is nationally widespread and there are historical shortages of all crops, grain prices are at record or near record levels.

High grain prices will offset portions of the losses for many producers. A demonstration of this is found in the accompanying table, which lists expected gross returns per acre in Iowa considering the historical yield times the pre-drought corn price. For Iowa farmers to break-even given the pre-drought yield and corn price assumptions along with the listed estimate of average reduced yields, corn prices would have to increase from $4.90 per bushel to $6.13 per bushel. August 1st corn was selling for $7.40 a bushel, more than 20 percent higher than the modeled break-even value. If yield estimates go down, the break-even price will rise. The gross revenue consequences to Iowa's grain farmers, therefore, need to be evaluated in light of both yield reductions and price changes.

In addition, Iowa crop farmers have high crop insurance participation rates. In 2011, for example, federal crop insurance programs covered 90 percent of Iowa corn acres and 91 percent of Iowa soybean acres. As of August 2012, there were 159,889 crop insurance policies in Iowa covering 20,290,371 acres, including more than 12 million corn acres and 8 million soybean acres. Total liability under these policies was nearly $14 billion. These policies will indemnify many farmers against their losses, which in turn will further boost the gross receipts per acre in Iowa if grain prices continue to remain high.

High grain and hay prices negatively affect the profitability of animal production in Iowa, however. Iowa is a national leader in swine, egg, and beef production. It also has a substantial dairy industry. Corn and soybeans are important components of animal rations, and as feed prices rise, producer margins decline. Cattle and sheep producers in Iowa also must cope with shortages of hay, stressed range areas, and pasture deterioration. These factors will lead to herd reductions among producers unable to endure the higher prices or who are unable to procure hay. One can conclude that Iowa animal production in Iowa will decline, though the magnitude of that decline is still unknown, as will be the overall impacts of those reductions to the state's gross domestic product. Importantly, there are no insurance programs protecting livestock producers.

Finally, yield reductions should be expected among Iowa's orchards, and in berry, melon, and vegetable production. Irrigated production may not suffer significantly, provided water supplies are adequate and affordable, but non-irrigated production will certainly realize yield reductions, which will in turn affect the quantity and quality of those crops.

Demonstration of the Interaction of Yield Reductions and Market Prices

	20-Year Average	*August 1, 2012 Estimate*
Corn Yield in Bushels Per Acre	185	148
	Prior to the Drought	*Required to Generate Pre-Drought Revenue*
Corn Prices Per Bushel	$4.90	$6.13
Expected Revenue Per Acre	$906.50	$906.50

Crop yield estimates from Chad Hart, ISU Department of Economics, via personal communication.

Other Direct Economic Consequences

Nonfarm Industries. The most drought-vulnerable near-term industrial victims of drought are Iowa's nationally prominent ethanol refineries and its biodiesel production. The cost of ethanol production has increased sharply with rising corn prices. Escalating input costs coupled with an elimination of federal subsidies have resulted in widespread operating losses and a reduction of output in many Iowa plants. In addition, historically high soybean prices have affected the bottom lines of Iowa's biodiesel producers.

The state's seed industry may see increased costs and disruptions caused by drought impacts on research plots and production fields.

Iowa has a nationally prominent insurance sector, and an important component of that sector is crop insurance. While the overall industry is not expected to change markedly as a result of the drought, it is possible the magnitude of indemnity may deplete reserves and limit profits. However, that industry will require a large number of claims adjusters to process the losses, so there will be temporary regional employment gains as the damages are assessed.

Iowa industries dependent on tourism or water-based recreation have realized reduced sales as a result of the drought. Low water levels affect recreational boating, fishing, and other water uses and contribute to declines in water quality.

Low water levels have also stifled commercial barge traffic on the Mississippi River, which reduces their gross sales and indirectly boosts supply and transport costs for all industries that depend on barges for their supplies or to move their commodities. In contrast, Iowa's power providers have had to provide record or near-record levels of electricity to the state's homes, businesses, and industries, which will improve their revenues.

Iowa businesses that sell trees, plants, and flowers to homes and businesses will, in light of the on-going poor growing situation and the cost of plant and tree maintenance, see less business. Businesses that provide landscaping and lawn and garden care will also have decreased demand.

Public Sector. Adequate and safe water supplies are considered an essential public good. The ongoing drought has stressed community water supplies, especially among communities that rely on surface water. In addition, many communities have had to cope with exceedingly high water usage among residential customers attempting to maintain lawns and gardens. Though not widespread yet, water rationing and other limits to water usage may become more widespread as the drought continues.

The public is also a huge consumer of recreational water for fishing and water sports. The ongoing depletion of lakes, dams, and streams has resulted in lower usage.

The drought has also affected fish and other water-dependent wildlife, which further impinges on the value of those public amenities. Municipal, county, and state public spaces, to include parks and preserves, are all negatively affected by drought.

Additionally, drought-exacerbating high temperatures have damaged public infrastructure. As an example, roadways and other public ways have experienced buckling or severe cracking because of high temperatures.

Households. Prolonged drought coupled with historically high summer temperatures have increased home cooling costs and home water usage costs as residents try to maintain their lawns and landscaping.

Homeowners are also realizing tangible losses as plants, shrubs, and trees die because of the drought. Homeowners also risk foundation cracks as arid ground separates from basement walls.

Higher water and energy costs divert household spending from other goods and services or constrain discretionary incomes.

A county may qualify for USDA disaster designation if it has experienced severe drought for eight consecutive weeks during the growing season, as determined by the U.S. Drought Monitor.

As of August 2012, 42 counties in Iowa had received natural disaster designations by the U.S. Secretary of Agriculture.

USDA disaster designation makes qualified farm operators eligible for low interest emergency loans.

In addition, small, non-farm businesses in USDA disaster-designated counties may be eligible for low-interest loans from the U.S. Small Business Administration.

Source: USDA

The overall economic impacts of drought are difficult to isolate using standard measures such as gross domestic product (GDP), as evidenced by the drought of 1988.

Iowa's economy posted real GDP growth of 5.2 percent from 1987-1988, just slightly below the U.S. average rate of 5.3 percent. From 1988-1989, Iowa's real GDP grew by 3.6 percent, well outpacing the national rate of 2.2 percent.

Source: U.S. Bureau of Economic Analysis

Secondary Economic Consequences

The secondary, or indirect, economic consequences associated with the on-going drought can be thought of as the economic ripple effects. When production changes in one sector of the economy, it has an impact on the supplying sectors.

If animal production declines, for example, there will be a decline in feed demand, which in turn will have a moderating influence on grain and forage prices. The widespread reduction in crop yields in Iowa will reduce harvest times, it will decrease grain hauling, and there will be less demand for grain storage. Farther on, reduced yields, especially in the eastern part of Iowa, will decrease the demand for barge transport. In the nearer term, warehousing and shipping might see the greatest impacts from reduced farm quantity production.

As animal producers are reducing their herds, more animals will find their way to slaughter. This initially will increase demand for meat industry employment, but after the initial high volumes, there will be an offsetting decline in the supplies of animals available for slaughter, which will result in a decline in meat packing labor demand.

One unarguable outcome will be higher food prices in upcoming months. Initial reductions in animal herds will result in higher meat supplies and lower prices. However, over the long run, there will be constrained animal production, which will lead to higher meat prices. In addition, as high grain prices will work their way through the entire food processing industry, consumer food prices broadly are expected to rise.

It is important to note that agriculture-related disasters nearly always result in federal government responses to assist crop farmers, animal producers, and others. It is highly probable that the federal government will provide relief to the state's animal producers thereby easing their distress. The federal government has already allowed grazing and haying on portions of set-aside acres. County disaster declarations allow producers and other affected businesses to be eligible for low interest loans. Further, as this is an election year, the prospects for addition federal assistance are very favorable.

Environmental and Social Consequences

There are environmental and social consequences to consider as well that are more intangible in that they are difficult to quantify in market terms. Droughts deplete and alter natural amenities, parks, and waterways. They also stress wildlife and diminish their prospects for survival. In consequence, there is a diminution of collective natural assets which may take several years to restore. These deteriorations may entail higher public costs coupled with erosions in the enjoyment residents derive from those public goods.

Finally, prolonged droughts create stresses on individuals and on households. Business owners with reduced sales and workers may require assistance coping with the current and the ongoing consequences of the drought. Long periods of weather and economic uncertainty can create psychological and other emotional issues that will need to be dealt with in households and in firms, the costs of which will be borne by the businesses, the public, and by households.

Summary of Drought Consequences

The accompanying diagram provides a useful categorization of many of the direct and indirect consequences to be borne in Iowa because of the ongoing drought.

As is clearly evident, there are a multitude of factors to consider when estimating drought-related economic impacts.

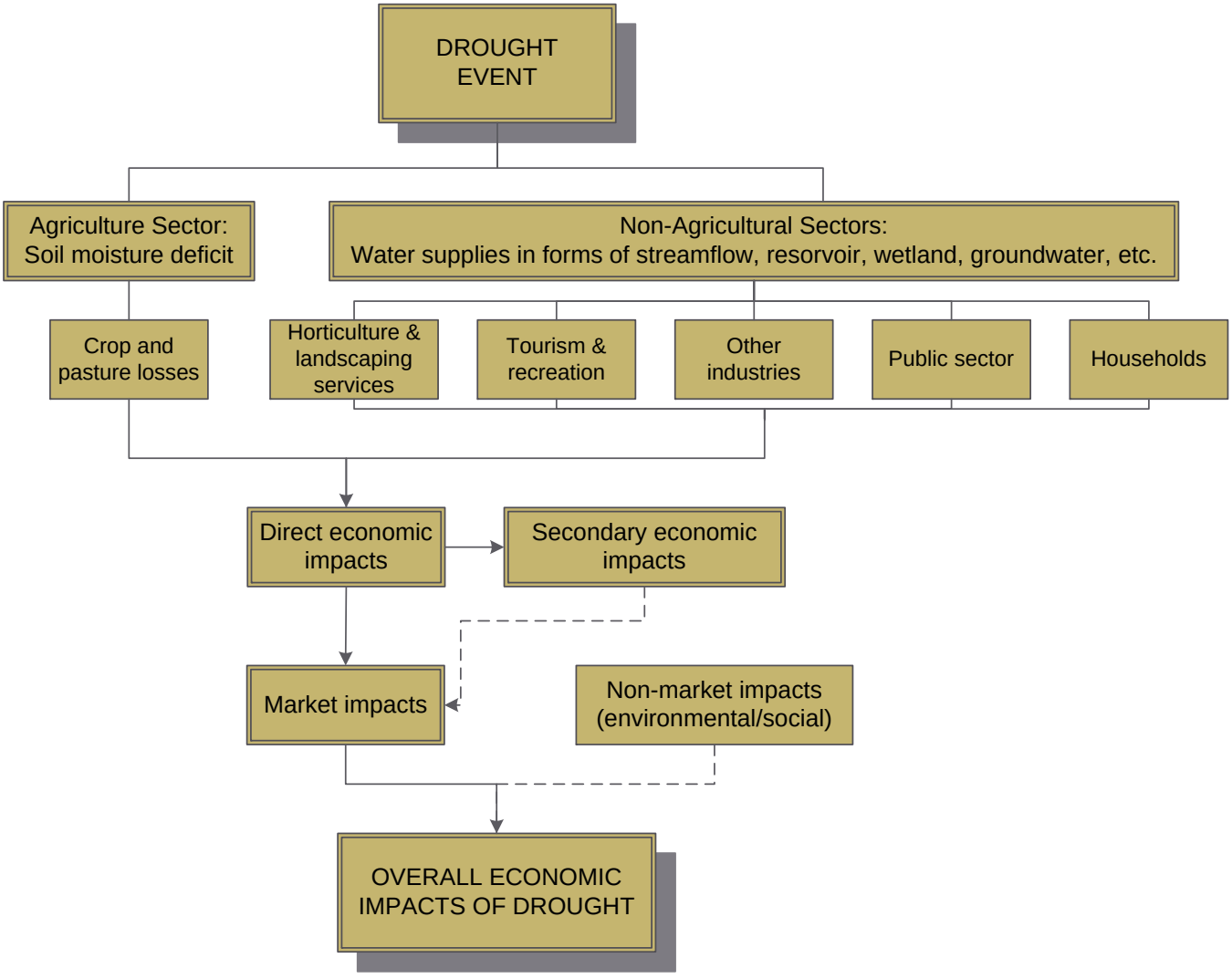
Most of those factors involve quantification of net economic losses realized by different sectors of the economy along with the timing of those losses.

The 2012 drought will result in economic losses to some and gains to others. For example, the drought-induced run-up on crop prices will yield windfall profits for unaffected farmers.

Losses need also be considered in light of insurance and government offsets. As insurance and disaster assistance flows into drought impacted regions, there may be increases in commercial activity that boost state and regional economies.

Other public costs, too, will have to be quantified, including restoration of natural amenities.

In short, the overall economic consequences of the drought of 2012 will not be known for many months.



Source: Adapted from "Measuring Economic Impacts of Drought: A Review and Discussion," Ya Ding, Michael J. Hayes, and Melissa Widhalm, School of Natural Resources, University of Nebraska-Lincoln, 01/01/2010. Accessed at <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1198&context=natrespapers>

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Conclusions and Evidence From Past Disasters

Past experience tells us that the overall economic impacts of drought can be difficult to isolate using standard measures such as gross domestic product (GDP). After the 1988 drought, for example, real gross domestic product (GDP) in Iowa actually posted real gains and even ouptaced the national rate of GDP growth in the year after the drought.

Despite any apparent gains in the aggregate economy, there will be strong pockets of loss resulting from the 2012 drought. Many crop and livestock producers will not be made whole, and many businesses and households will experience uncompensated losses. Public sector losses will be difficult to tally and costs may continue to accumulate even after the drought has ended.

Economists caution against attempting to project economic impacts while in the midst of a disaster.*

Accordingly, while this drought is on-going, it is only possible to infer the kinds of economic damages to be expected, but not the magnitude of those losses in economic terms.

For more information and assistance with the consequences of drought on crops, livestock, businesses, and households, visit the ISU Extension "Dealing With Disasters" Web site at the following link: http://www.extension.iastate.edu/topic/recovering-disasters.

*A discussion of the need for caution is found in Dave Swenson and Liesl Eathington, Evaluating Direct and Indirect Economic Outcomes of the 2008 Iowa Weather- Related Disasters, Department of Economics, ISU. August 2010.