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IMPACTS OF RECENT AND PROPOSED ENVIRONMENTAL REGULATIONS ON  
NET CASH FARM INCOME OF TYPICAL CORN-SOYBEAN AND COTTON-SOYBEAN FARMS

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ABSTRACT

This paper presents the projected impacts of recent and proposed environmental regulations on two types of crop farms under alternative regulatory scenarios and impact cases. Regulations analyzed include the restriction or prohibition of the use of certain pesticides as well as other proposed environmental programs which also impact agriculture.

# IMPACTS OF RECENT AND PROPOSED ENVIRONMENTAL REGULATIONS ON NET CASH FARM INCOME OF TYPICAL CORN-SOYBEAN AND COTTON-SOYBEAN FARMS

## INTRODUCTION

Environmental regulations affect farms in the United States in many ways. Traditionally, the most important of these regulations have been those that restrict, and in some cases prohibit, the use of certain pesticides. In addition, other proposed and forthcoming environmental programs will also have an impact on agriculture. The U.S. Environmental Protection Agency (EPA), with assistance from the U.S. Department of Agriculture's Economic Research Service (ERS), undertook a study to examine the effects of EPA regulations on the agricultural sector (see The Agriculture Sector Study: Impacts of Environmental Regulations on Agriculture by Dinan, et al.). The results presented in this paper are a portion of those presented in the full EPA study.

The objective of the study was to examine the cumulative impact of recent and proposed future EPA actions on the financial condition of farms in the United States. The actions included in the analysis were those that have been promulgated since 1982 or are anticipated to take place by 1992, and have a direct impact on agriculture. The primary goal of the study was not to determine the aggregate total cost of EPA actions on agriculture, but to examine the impact of these actions on the profitability and survivability of U.S. farms. Because of the data requirements of such an endeavor, the complexity of the agricultural sector and the many uncertainties that still accompany the new environmental programs, the study limited its focus to a few "representative" farm types and had to make assumptions about future

These regulations affect both large and small farms in the United States. Restrictions on the use of certain pesticides may require the substitution of more expensive pesticides and/or may reduce crop yields. Other environmental regulations may impose extra operating costs or may require additional investments in land preparation or farm equipment. The ability of farms to comply with these environmental regulations will depend not only on the costs of each regulation and the effects of the required activities on agricultural yields, but also on the financial condition of each farm, the market conditions at the time the regulations become effective, and the number of farms that are covered.

#### STUDY METHODOLOGY

The methodological approach followed in the study can be summarized as follows:

1. Define alternative scenarios of EPA policies.
2. Select a subset of crop production to study.
3. Obtain cost and yield change information from EPA program offices.
4. Estimate price changes resulting from EPA actions (under each scenario) for each of the selected crops.
5. Define "impacts" for selected producers.
6. Examine the change in the financial condition of "representative" producers of each of the selected crops under each scenario.

#### Definition of Policy Scenarios

The EPA study examined three alternative scenarios corresponding to a range of potential policies. Two of the three scenarios are presented in this paper and can be summarized as follows:

SCENARIO 1: Past and current EPA actions plus a conservative (low-cost) set of assumptions about future actions.

### Obtaining Crop and Yield Effects

The EPA Program Offices provided information on the cost and yield effects that were expected to result from each individual action considered. In addition, they estimated the percent of farms of a particular type and region that were expected to incur each of the effects.

### Estimation of Price Changes

The next step in the analysis was to translate the effects of the regulatory scenarios on crop production costs and yields into commodity price changes. In general, when production costs increase due to the costs of meeting environmental regulations and yields decline due to restrictions on pesticide use, commodity prices will rise. Failure to account for these price increases would result in overestimating the impacts of EPA actions on producers that are directly affected by those actions and would overlook the potential gain to those producers who are not directly affected by the regulations.

To predict the changes in crop prices resulting from the effects of EPA policies, a regional econometric-simulation model, AGSIM, was used. (For more information on AGSIM, see Eales (1987), Frank (1987) and Taylor (1987a, 1987b, and 1987c)).

### Defining Impacts for Selected Producers

Since the impact of several EPA policies were being examined simultaneously, a fundamental issue to be determined was: How is an "impacted" farmer defined? For example, an Illinois corn-soybean farmer may

## IMPACTS ON NET CASH FARM INCOME

This paper examines the impact of EPA actions on an Illinois corn-soybean farm and a Mississippi cotton-soybean farm. Initial characteristics of these two typical farms were developed from ERS's 1986 Farm Costs and Returns Survey data and are shown in Table 1. The farms examined in this paper have typical financial characteristics for farms of their type and location. Table 2 presents the average annual changes in net cash farm income (NCFI) experienced by each farm under the average and maximum impact cases for each scenario.

For the Illinois corn-soybean farm under Scenario 1, the maximum impact case (which assumes the producer incurs all possible cost and yield impacts) results in a mean annual decrease in NCFI of \$2,900. This represents an 8 percent average decrease from the base case. Production cost and crop yield impacts under this scenario were rather small, resulting from less restrictive assumptions concerning farm pesticide use and other environmental regulations. The observed decline in NCFI is primarily due to the underground storage tank regulation. The costs associated with this regulation are substantial, yet only a small percentage of farmers are actually affected 1/.

Under the expansive set of EPA actions (Scenario 2) the maximum impact case results in an average annual decrease in NCFI of \$9,200 for the corn-soybean farm. This substantial impact is due primarily to assumptions about restrictions on the use of alachlor, triazines, and corn rootworm insecticides. Average impacts on NCFI under this scenario were very similar

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1/ Farmers having a petroleum underground tank, for example, were assumed to incur a \$2,500 per year insurance cost (1988-96) and a \$500 charge in 1991 and 1994 for a tank tightness test. No costs were included for remedial action, and it was not assumed that any farmers would remove their underground storage tanks.

producers are estimated to be affected by these particular regulations. For example, only 1.2 percent of the soybean acres in Mississippi are thought to be affected by the cancellation of toxaphene and less than two percent of the farms are expected to have underground storage tank.

Under Scenario 2, the maximum impact case results in an average annual decrease in NCFI for the cotton-soybean farm of \$14,200, representing a 24% decline from the base case average. The difference in impacts between Scenario 1 and 2 was not as great for the Mississippi cotton-soybean farm as for the Illinois corn-soybean. This result was due to the significant impact of various pesticide cancellations, organophosphate use, and groundwater restrictions assumed for the cotton-soybean farm under both scenarios.

On an average impact basis, the average change in NCFI over the entire 10-year period for the cotton-soybean farm was very similar for Scenarios 1 and 2, although there was some differences in year-to-year changes. Net cash farm income under Scenario 1 averaged \$1,700 per year less than the base case, representing a 3 percent decline, and averaged \$1,300 less per year under Scenario 2, a 2 percent decline. Results for these two scenarios were almost identical for 1987-91. However, starting in 1992, as the estimated impacts of environmental regulations varied, so did the resulting NCFI under each scenario. Under Scenario 1, NCFI remained very close to the income level of the base case throughout the 10-year period. Under Scenario 2, NCFI declined significantly in 1992, as the result of more expansive estimates of production costs and crop yield impacts, and then started to rise reflecting higher commodity market prices resulting from shifts in aggregate crop acreage, outweighing the increase costs of production.



regulations impacted which types of farms. It must be emphasized that the maximum impact cases represent unlikely worst-case events for the two particular types of farms studied. However, other proposed or potential regulations could affect other types of farms in ways different than is estimated here.

This study illustrates the advantage of examining the impacts of environmental regulations at the farm level in addition the aggregate analyses at the national level. While national analyses provide useful information concerning the total losses incurred by different types of farms (e.g., corn farms as a whole), the impact of environmental regulations on the financial conditions of individual farms depends on the distribution of those losses among farmers and on the initial financial condition of the affected farms. Limitations in the data and models must be considered when viewing the results presented in this study. Assumptions regarding the portion of the agricultural sector affected by proposed environmental regulations, the impact of those regulations on affected farms, and the reaction of the agricultural sector to counteract those impacts all have an important influence on the evaluation of such regulations.

Table 2 - Average Annual Impact of EPA Actions on Net Cash Farm  
Income (NCFI) 1987-1996 a/.

	Average Base NCFI 1987-96	Average Impact case		Maximum Impact case b/	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2
	<u>Dollars</u>	<u>Dollars</u>		<u>Dollars</u>	
IL Corn Soybean	35,400	-270 (-.8%)	+4,800 (+14%)	-2,900 (-8%)	-9,200 (-26%)
MS Cotton Soybean	58,900	-1,700 (-3%)	-1,300 (-2%)	-10,700 (-18%)	-14,200 (-24%)

a/ Estimates reflect the average annual change in NCFI. Average percent changes are indicated in parenthesis.

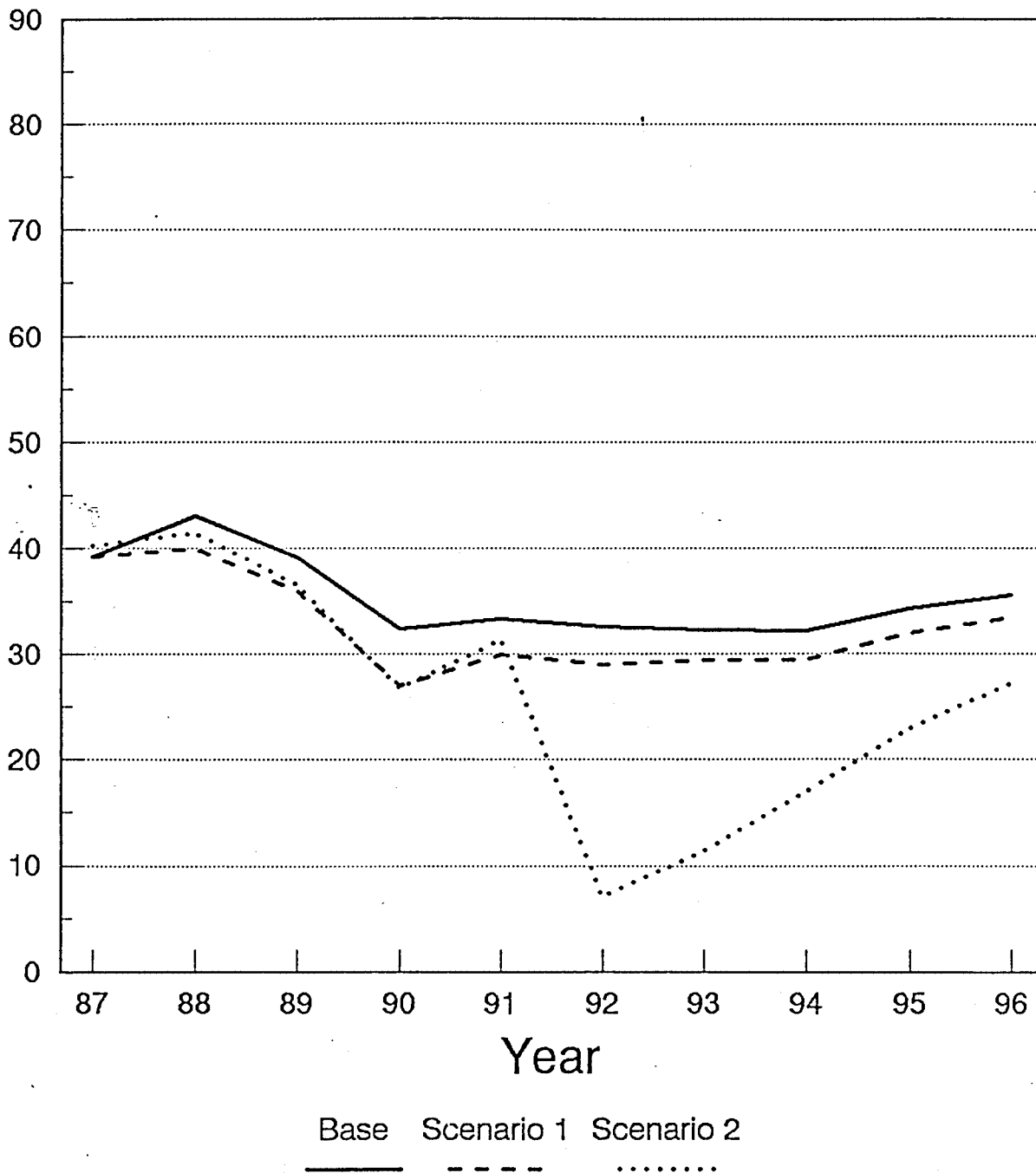
b/ Both of the typical farms have a 90% chance of incurring cost and yield impacts that are less than half of those corresponding to the maximum impact case. The maximum impact cases, therefore, must be viewed as very unlikely worst cases.

# Illinois corn-soybean farm

## Net Cash Farm Income, 1987-96

### Maximum Impact Case

NCFI (\$1,000)

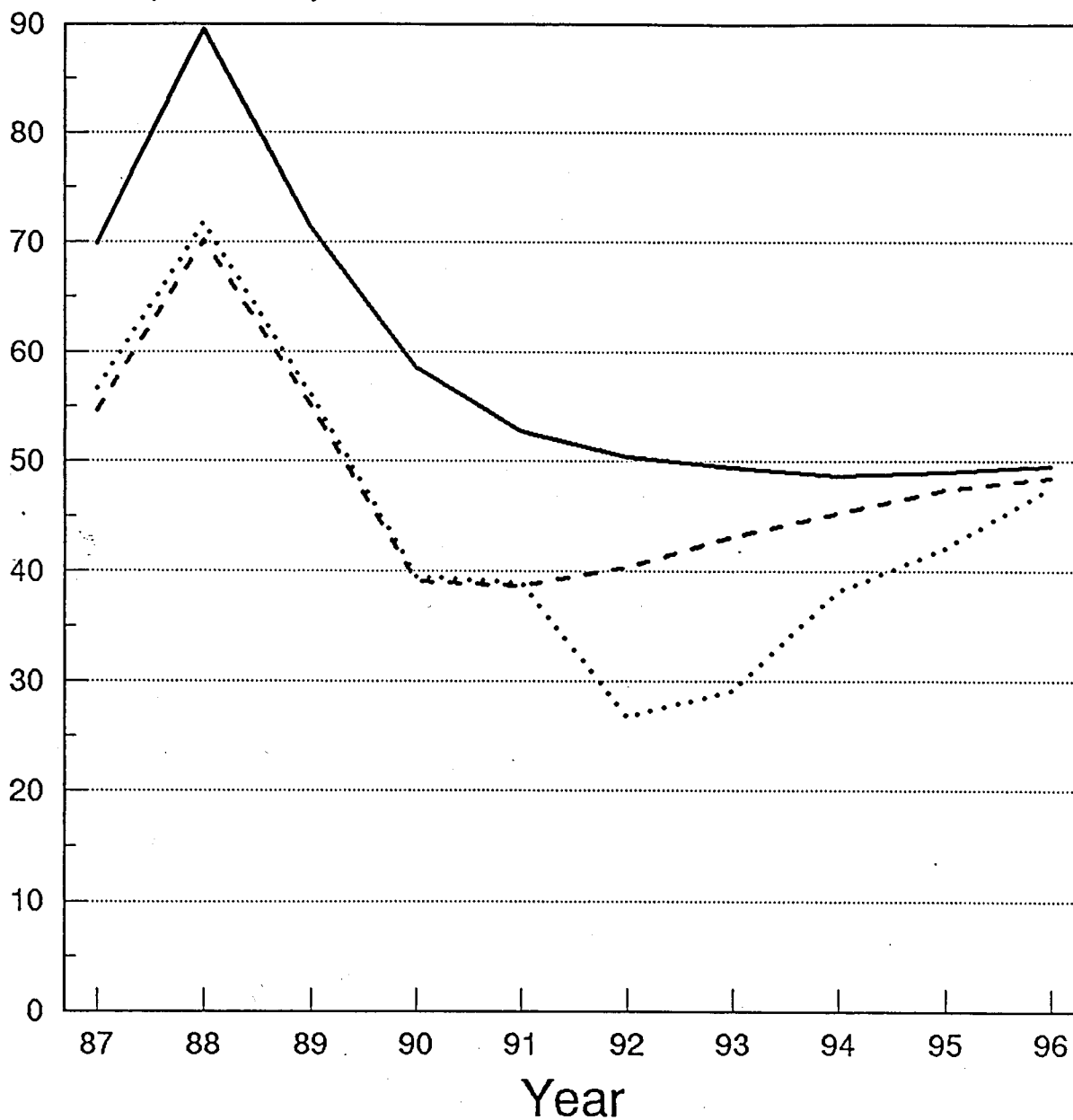


# Mississippi cotton-soybean farm

Net Cash Farm Income, 1987-96

Maximum Impact Case

NCFI (\$1,000)



Base Scenario 1 Scenario 2

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