



Risk, Government Programs, and the Environment

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Prices and yields of most agricultural commodities vary markedly in unpredictable ways. How do these risks and the government programs designed to mitigate them influence the crops farmers choose to produce, the amounts they produce, and their production practices? How do farmers' production decisions, in turn, influence environmental quality?

This report provides researchers and policy analysts with an overview of the different ways risk can influence production decisions in agriculture. It describes research that examines the links between risk and the production decisions farmers make, and how different agricultural production practices in turn influence risk, farming profits, and environmental quality. The report also discusses ways to overcome some of the key challenges involved with research in this area.

What is the Issue?

Concern about the amount of risk and farmers' ability to efficiently cope with it has served as an important backdrop for government agricultural support programs. These programs, a central feature of U.S. agriculture since the Great Depression, have mainly taken the form of price supports and supply control programs. In the last decade, government programs that directly target risk have been expanded to include counter-cyclical payments and increased subsidies on yield and revenue insurance. In addition, Congress periodically approves ad hoc disaster assistance to compensate farmers for extreme local weather events that damage or destroy crops. All of these programs transfer wealth to certain farmers from the rest of the economy and reduce risks associated with some farm operations.

These policies have revived interest in classic economic questions about how well private markets function to provide risk-coping tools to farmers in the absence of government policies and to what extent government programs actually alleviate the costs of coping with risk. Risk and government programs that manage risk can influence the crops farmers plant, their production practices, and

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even the organizational structure of entire agricultural sectors. These decisions, in turn, may have environmental consequences.

How Was the Study Conducted?

The report first describes how individual incentives are shaped by risk and explains how markets can trade and thereby share risks. It then reviews two general ways that risk can influence choices in an idealized world of perfect markets. The report goes on to explain why markets are not perfect and reviews three additional ways for modeling the effects of risk in imperfect markets. Each modeling approach is presented using a basic example—the goal is not to spell out every implication of each approach, but to illustrate the economic tradeoffs underlying each one, so the reader can gain perspective on many possible consequences of risk.

The report provides a brief overview of the relevant agricultural programs, characterizes the different kinds of production alternatives available to farmers, and explains how these alternatives may influence risk, returns, and the environment. The report discusses the difficulties of empirically measuring the impacts of risk and provides six conclusions.

What are the Major Findings?

Risk is difficult to measure and the effects of risk are easily confounded by the effects of factors that have nothing to do with risk. Future work would benefit from a more careful account of these factors.

Risk can affect farm production decisions and the environment through many different channels besides farmers' attitudes toward risk (or 'risk aversion'). For example, the uncertainty of rainfall and the cost of assessing soil conditions may alter a farmer's application of nutrients even if he is risk neutral. Or, uncertain future income may alter a farmer's investment plans because of an inability to obtain credit in the event income is low. Alternatively, because investment decisions are often reversible or partially-irreversible, uncertainty about future prices can affect a farmer's investment plans in an entirely different way.

In some cases, the effects of risk on production can appear similar regardless of the channel through which they arise. Because policy implications may be different depending on which channel gives rise to the effects observed, future research would benefit from improved understanding of the relative importance of the different channels.

Future research on the effects of risk would benefit from an improved understanding of how key environmental factors, such as location, climate and soil, affect land use. These factors are among those most likely to confound the effects of risk in empirical studies. These links are also central to understanding the effects of agricultural production on environmental quality.

Many economic models linking production to risk are static in nature. These models overlook important long-run risks, which are more difficult for farmers to insure than short-run risks. Long-run risks are central to key production decisions, including capital investment, technology adoption, crop rotations, and tree plantings.

Some research supports psychological models of behavior at odds with standard assumptions in economic models, especially certain models pertaining to risk. Future research would benefit from empirical study into the practical relevance of these psychological models for farmers' production decisions.