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Perspectives on Risk Management Research:  
Contributions of Regional Project W-149

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My task is to provide a linkage between past accomplishments in risk analysis of Project W-149--entitled "An Economic Evaluation of Managing Market Risks in Agriculture"--and the possible future directions of Project S-180. One legacy of W-149 is a rich publication base. The publication list in the project's final report contained 232 items, of which 84 were journal publications. Among these publications are the proceedings of the annual project meetings and the book manuscript "Risk Management in Agriculture" which will be published in 1983. These publications indicate the scope of the project's activities, and provide a significant base for further work.

Why look at the past, when we are ready to proceed ahead?  
Reviewing past accomplishments is useful for several reasons.

1. It establishes the stock of knowledge about concepts, methods, and empirical information that we have to work with.
2. It provides a partial departure point for future work.
3. It avoids duplicating past efforts;
4. It provides for nostalgic recollection, which may be just as meaningful and stimulating as anticipating and participating in new activities.

All of these contributions from the past are important because research is more a process than an event. We have stopping points and stock-taking along the way--as evidenced by publications, new projects, and new combinations of resources--but they are still part of the evolutionary process of producing new knowledge in response to changing conditions and situations.

Consider, for example how the research on risk has developed along with the evolution of situations and events in agriculture. Looking back over recent decades, farmers have adjusted to a long series of events, new opportunities, and challenging problems. A transition occurred from a historic emphasis on production and productivity to emphasis in the 1960s on mechanization and growth in farm size (with related demands for capital and credit), to dealing in the early 1970s with more volatile commodity markets, to dealing with higher volatile rates of interest and inflation, and now to the after-effects of too

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much production, too little demand, too much debt, too high interest, and even erosion of values of farm land and other assets.

Our research programs have followed suit--through regional projects like this one and the activities of individual researchers. The growth environment of the '50s and '60s stimulated considerable research on the growth processes of family size firms in a competitive market environment characterized by high degrees of certainty in future expectations. The increased market risks of the '70s shifted the emphasis more toward risk analysis--a shift that was accelerated by the instabilities of financial markets and the inflation problems of recent years. Sources of risk, measures of risk, and methods of managing risks came to the analytical forefront.

Regional Project W-149 was a part of this process. It was approved to begin on January 1, 1977 and lasted through September 1 of 1982. Many of the participants in W-149 were also in Western Project W-104 "Economic Growth of the Agricultural Firm" which was active from 1968 to 1973, and which focused on growth and adjustment issues in a less risky environment. W-149 was developed to provide a broad approach to market risk issues. It was originally hoped that W-149 could evaluate how market risks and risk response capacities were distributed throughout the stages of the food system, exploring comparative advantages among the stages and considering the balance between public and private responses to risk. But this broad scope was not administratively feasible. Instead, the project mainly focused on the farm production sector; but it did achieve a unique diverse blend of production economists, marketing economists, finance economists, policy people, and others--rural sociology was represented early in the project and psychology too, although indirectly. This broad scope enabled a better linkage than in the past between the micro and macro issues of agricultural instabilities and the methods of risk response. Much was gained from this diversity in people's areas of emphasis and expertise, especially in building better concepts and methods for risk analysis at micro and macro levels, and considering a host of interrelationships and linkages. But, the diversity in people's interests and background was tough to harness over the life of the project, in terms of integrated empirical analysis. Still, I believe as do others that W-149 was a productive, worthwhile effort that benefitted significantly from its diverse composition.

Another feature of W-149 was its response to the continued evolution of risks in agriculture during the last several years. The project's emphasis on market risks in the mid-1970s was timely then, and was necessary to get the project approved. But this initial focus on market risks soon acquired a much lower profile. Increasing emphasis was given to the full range of risk from production, finance, technology, policy, and human sources. In a way, the project outline

anticipated this generalization of risk issues, cautioning that irregular or shock influences on agricultural markets would likely continue in the future, and by cautioning that the potential risks added by public stabilization programs should be accounted for since they could be as disruptive and difficult to project as market risks.

Another important feature of W-149--at least one that we kept emphasizing in the annual reports to administrators--was the need to further develop the conceptual and methodological approaches for studying risks and risk management. Much of the early phases of the project, and maybe the later ones too, focused on developing, refining, evaluating, and testing methods of risk analysis. This was the impression given by the annual project meetings; but this focus was likely essential. Moreover, considerable empirical work was occurring at the home institutions, which was tailored to the needs of the particular states and regions.

Looking now at the project's objectives, for the first objective on risk measures much progress occurred in improving methods of measuring farmers' expectations and relating them to objective measures of risk. Several project participants generated measures of variability for farm income, prices, and yields for their states which helped to measure risks and evaluate various risk responses. Refinements in the elicitation of farmers' subjective expectations helped to show how volatile expectations influenced risk responses. Some work was done to compare objective and subjective measures of risk, and to relate these measures to the type of risk analysis.

For the project's second objective on risk attitudes, much effort was given to the feasibility of launching a coordinated inter-regional program to elicit utility functions for large numbers of producers. This would help to understand the distributional characteristics of risk attitudes, and their implications for farmers' responses to risk and related policies. However, the project's technical committee concluded that this program was not feasible at that time, due to major problems with the reliability of the resulting measures of risk attitudes. As a result, much emphasis was given to improving the methods of measuring risk attitudes through eliciting single-valued utility functions, observing economic behavior, studying multiple goal frameworks, and developing more general risk efficiency criteria. An example of a more general efficiency criterion was the creation of "interval measures" of risk aversion for individual decision makers. In addition, a stronger context was developed for considering expected utility and safety-first models in understanding and predicting farmer behavior.

The literature on risk attitudes has grown extensively with a tendency for individual studies to build on previous ones, and move

from descriptive and experimental orientations toward more rigorous tests of alternative decision criteria. One can see a transition in the literature from earlier attempts to elicit utility functions and draw inferences about risk attitudes, to testing their predictive accuracy, to evaluating the stability of utility measures over time, to studying how risk attitudes may change between different levels of monetary outcomes, to analyzing the combined effects of risk attitudes and subjective expectations, to comparing single and multiple attribute utility functions, and to equilibrium analysis under uncertainty. These conceptual and methodological developments for risk attitudes should give a strong basis for further empirical analysis.

Objectives three and four of W-149 evaluated many different risk management techniques at the firm level, using different methodological approaches. Here the applications and results were mostly specific to the characteristics of farm types and locations. The methods studied included forward and futures contracts, inventory management and spreading of sales, enterprise diversification, use of crop insurance, participation in government programs, and management of liquidity provided by credit reserves and holdings of farm and financial assets. Most of the risk response studies had a normative or prescriptive orientation; some surveying of farmers and lenders was done about their use of risk management techniques--but the surveying was not very much and not very widespread, especially for understanding how various risk responses might differ with farm and farmer characteristics. Thus, the project was somewhat short on what farmers were actually doing to cope with risk, and the aggregate implications.

Some highlights of the risk response work would likely include the following:

1. The need for a comprehensive, integrated evaluation of risk responses in production, marketing, and finance;
2. The existence of possible trade-offs in farmers' responses to business and financial risks and other portfolio adjustments, as they respond to various shocks, safety nets, and rewards. (These tradeoffs call for comprehensive modeling approaches to fully reflect the relevant options);
3. The relatively high risk efficiency of public programs for risk management, including commodity price stabilization, insurance programs, and public credit;
4. The potential importance of innovations in marketing policies (options, new futures contracts), financing instruments (variable amortization, graduated payments) and public policy (PIK, Income Insurance) as risk problems become more relevant; and

5. The linkages between farming risks, liquidity, inflation, capital gains (or losses) in land values, and some of the paradoxical effects of public policies intended to resolve these problems.

Objective five of W-149 considered the value of market and financial information for agricultural producers, and the effects of qualitative changes in this information. These areas received scant attention until near the end of the project when a couple of studies evaluated the quality of information from alternative price forecasting techniques, including comparisons of price forecasts from econometric models versus the futures market. Perhaps these areas will attract more widespread interest in the future.

Other objectives of W-149 focused on structural aspects of risk and risk management, and on policy responses to risk. In the policy areas, the project helped to improve methods of welfare analysis under risk at an aggregate (sector) level to better show the effects of price and output instabilities on social welfare. Instabilities in the policy process itself were also identified as a source of policy risk to farmers. Various methods were suggested to make policy responses self-initiating rather than left to executive discretion. The modeling efforts by some of the project's participants helped to enrich the capacity to analyze multiple policy instruments under a variety of environmental conditions, affecting both domestic performance and international trade and development. As an example, the policy chapter in the W-149 book Risk Management in Agriculture will show the development of international trade models, and show how systematically including components for business and financial risks, diversification, monetary exchange, liquidity, and policy variables may have significant effects on standard trade theory under conditions of certainty and on comparative advantages among different countries. So, the linkages between financial phenomena and production and marketing appear relevant at both micro and macro levels, and both domestically and internationally.

As W-149 terminates, it appears that substantial progress has occurred in improving the concepts and methods for analyzing risks, with considerable applications occurring as well. This progress should set an effective stage for further work in the risk area--measuring risks, evaluating their importance, identifying their sources, measuring risk attitudes, evaluating methods of managing risks, and evaluating the proper balance between public and private responses.

I will close with a personal highlight of W-149, that actually occurred before it began. This involved the industry seminar held in St. Louis in November 1975 as a basis for developing the project outline. One session on the program presented the risk management setting of two farmers--one owning and operating a diversified corn-hog farm in

central Illinois. The other serving as chief executive officer (CEO) for a diversified cattle-broiler-hog-tropical plant operation headquartered in Houston, Texas but spread over Georgia, Mexico, and the high plains of Texas, with equity shares traded on a stock exchange. The Illinois farmer recounted his large swings in net worth from price and production instabilities, and his ability to weather these situations through the graces of a good banker and the flexibility offered by a family sized operation to idle some capacity, adjust enterprises, and tighten belts when needed.

The CEO farmer enjoyed the benefits of diversification but told a different story about 1) the inflexibilities of a larger, salaried personnel base; 2) the adverse effects of guaranteeing minimum returns on equity subscriptions to investors who did not want the company's profits constrained by hedging; 3) the greater difficulties of working with a consortium of lenders; 4) the unanticipated effects from the rapid moves in grain prices in 1973-74 without effective hedging of feed costs in the cattle operations; and 5) later losses taken on adverse shifts in exchange rates between the U.S. dollar and the Mexican peso. Today, Stratford of Texas no longer exists and their CEO is into other activities. However, the Illinois farmer is still doing quite well. Differences in business size, flexibility, financing arrangements, marketing techniques, experience, and other factors all played a role in the risk bearing and survival capacities of these operations. I believe that we need to know more about efficiencies of risk bearing along these lines.