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Risk management strategies by Australian farmers: two case studies

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Abstract. Australian farmers operate in one of the most risky farming environments in the world. They have to cope with numerous sources of risk including weather uncertainty, variable market prices, and institutional changes in their business management. This paper reports results from two case studies undertaken to examine the issues of farming risks and risk management strategies in Australia. The first case study found that unpredictable weather, financial risk, marketing risk, and personal risk were regarded as the major sources of risk among farmers in the Upper Eyre Peninsula of South Australia. The main risk management strategies used by farmers in that region included diversifying crop varieties, adopting minimum tillage farming practices, minimising the area of risky crops and maximising the area of less-risky crops. They also regarded high equity, having farm management deposits, and other off-farm investments as appropriate risk management strategies, and mostly 'left marketing to the experts'. The second case study among dryland cropping farmers in southwest Queensland revealed that weather uncertainty was ranked as the most important source of risk in farming in that area. The risk from weather uncertainty was then followed by financial risks, government policy, and marketing risks. The main risk management strategies used by farmers in that area were enterprise diversification, moisture conserving farming practices and using zero till planting, planting at the optimal time, selling only part of the farm's production at any one time, and investing off-farm. The paper compares the results from these two case studies with results from other studies in the United States of America, Canada, Netherlands, and New Zealand.

Keywords: farming risks, sources of risk, management strategies, dryland farmers, Australia

Introduction

The Chinese maxim says: "Plans are man's, but the odds are God's". While we live in a world of uncertainty, we always try to make our plans with great consideration and anticipation of all likely events. However, every decision-maker still faces risks regularly in their decision-making (Nguyen 2002).

Eminent economist and Nobel Prize winner, Joseph Stiglitz, said: "Risk is like love: we all know what it is, but we don't know how to define it". Giles and Stansfield (1990) noted that reaching agreement on definitions in any subject could be difficult, a hair-splitting and time-consuming exercise. It usually requires compromises by everybody involved and often produces results that please nobody. Defining risk is no exception. In this paper, we adopt the definition used by Hardaker (2000) who interpreted risk as the chance of a bad outcome and the variability of outcomes, i.e. the converse of stability.

Whatever definition of risk might be used, it is important to remember that risk is an inevitable part of life, and most certainly of

farming life. Generations of Australian farmers have lived with risk since farming began in Australia after the arrival of European settlers. Australian farmers believe they operate in one of the most risky environments in the world. They farm an island continent where the weather is extremely variable and market conditions unreliable when compared to many of their competitors. For example, the 2002 drought, one of the worst droughts in Australia, had a major impact on farmers and the wider Australian community. The drought was reported to have cut farm incomes by 58 percent in 2002-03 (Potter 2003). This disastrous situation was repeated in 2006 with agricultural income in 2006-07 forecast to fall to \$2.6 billion, a reduction of 72.4 percent from 2005-06 levels of \$9.3 billion (ABS 2006).

In addition to weather variability, most farmers face significant price uncertainty. With up to 80 percent of some Australian agricultural products destined for international markets where prices fluctuate widely for a number of reasons (Clark and Brinkley 2001), producers of most major

commodities experience considerable variability in prices for their products. The variability and uncertainty associated with these two risks (weather variability and price fluctuations), in addition to other risks that farmers face (e.g. financial and institutional risks), establish the basic business environment in which Australian farmers operate and form judgments, plan strategies, and position their businesses to reap the benefits of an uncertain future.

There is an extensive literature on risk and risk management in general as well as specific literature related to risk in agriculture. The strategies used to manage price and marketing risks for farm products have been described in many recent publications, for example, Duncan et al. (1991), Cooke (1997), Williams and Schroder (1999), Meuwissen (2001), Wilson and Wagner (2002), and Adam et al. (2006). Similarly, strategies related to managing risk in agricultural production have been discussed in various publications, e.g. Hammer et al. (1996), Meinke et al. (2001), Cooper et al. (2003), Marra et al. (2003), Robertson et al. (2003), and Ritchie et al. (2004).

Nevertheless, little prior work that examines the sources of risk, practical risk management strategies employed by Australian farmers, or their interests in and attitudes to risk management has been reported in the literature. Accordingly, the two case studies reported in this paper will seek to describe the sources of risk faced, current strategies used by farmers, as well as their interest in and attitudes towards risk management. Once these are better understood, the feasibility of carrying out a risk management improvement program for farmers can be determined.

South Australia case study: Farming risks in the Upper Eyre Peninsula

Eyre Peninsula has a long history as a significant part of the South Australian State's farm economy, but it is also recognised as a region of high agricultural risk. Many publications have been written about farming risks and risk management in this region, e.g. Whetherby et al. (1983), Hughes et al. (1990), Coventry et al. (1998), and Black (2000). However, most of these publications were mainly focused on just one type of risk, weather variability and the associated land degradation and financial risks that accompany it.

The case study reported here was carried out to highlight ways that farmers manage the main farming risks in the Eyre Peninsula, an area with low and variable rainfall, difficult soils, and restricted cropping options.

The study involved a review of the major sources of risk associated with farming in the area (production, financial, marketing, policy, and personal risks), identified in the Cropping 2000 survey. (The survey was undertaken by Jay Cummins, supported by Primary Industries and Resources South Australia [PIRSA] and a Grains Research and Development Corporation [GRDC] Research Fellowship). The survey was used to gain an overview of the characteristics of Eyre Peninsula farmers and their views on risk management. The study also analysed risk management strategies which were applicable to farm businesses in the Upper Eyre Peninsula.

This case study used a selective interview approach to provide specific information on risk management strategies used by Upper Eyre Peninsula farmers.

Farmers' characteristics and risk management

One hundred and seventy five responses from farmers in the Eyre Peninsula were available from the Cropping 2000 survey responses and analysed. Although the survey questions were much too general to provide much insight into individual farmers' risk management, the following observations were made with respect to risk management in the Eyre Peninsula:

- The group of farmers less than 40 years of age (younger farmers) had a higher level of education compared with those in the age bracket between 40 and 60 years and those more than 60 years old (older farmers).
- The younger and medium-aged groups were more innovative. They were involved in practices related to risk management (such as gross margins planning and grain marketing) more often than the older group did.
- In terms of trying new technology, the older group was less likely to take risks than the other two groups. For example, the older group agreed strongly that they would not try a new chemical for weed control until it was well proven in the district.
- Compared with the younger and medium-aged groups, the older farmers were more likely to consider themselves as fairly conservative and traditional farmers.
- The younger and medium-aged groups were more likely to plan ahead in farming, independent of weather conditions.
- The younger group had slightly higher skills in computing and grain marketing.

The three groups were judged to have the same level of skills in farm business management.

- The less educated group (those who had only completed primary school or part of secondary school), had been involved in farming and managing farm businesses for longer than the mid-level education group (those who had completed secondary school, TAFE, or agricultural college). The same observation could be made about the more highly educated group (those having tertiary or postgraduate level qualifications).
- The low and mid-level education groups regarded themselves as more conservative and traditional.
- The more highly educated group were more likely to take risks in trying new farming technology such as better chemicals and new machinery.
- Generally, the more highly educated group had better skills in computing, grain marketing, and farm business management.
- Regardless of age or education level, respondents mostly agreed that marketing the grain they produced was best left to specialists. Most of them also agreed that the key to successful farming lays in minimising costs.

Selected interviews

To provide more specific information on these points, selected interviews were conducted with several farmers in Upper Eyre Peninsula. The objectives of this selective-interview approach were:

- to report how individual farmers defined risk;
- to gain information directly from farmers about the sources of risk they face and compare that with what was described in the literature;
- to find out whether the characteristics listed of farmers described previously reflected Eyre Peninsula farmers' attitudes towards risk; and
- to record the practical strategies that farmers in that area have been using to manage farming risks.

An introductory letter listing some issues for discussion was sent to each farmer in advance of the interview. Enclosed with this letter, as background reading, was a draft copy of the study report. Some important parts of this draft were highlighted to attract the farmers' attention. The interviews were undertaken in the farmers' homes (approximately one week after they received the documents). The main findings from

these interviews are summarised in the following set of dot points:

- Weather variability (reflected in production risk) was often the first source of risk that respondents mentioned.
- Financial risk was regarded by respondents as the "automatic follow-on" from variability in production caused by weather variability.
- Market prices and changes in policy were seen as very unpredictable, to the point that respondents felt they usually had no control over these risks.
- Personal risk was often ignored by farmers, although one respondent commented that it might become a major concern in the Upper Eyre Peninsula in the near future. Of particular concern was the reduction in the number of people continuing to live in rural areas and the need for farm succession planning.
- Improved financial, computing, and business management skills have helped some farmers in this area cope with risk management problems. However, more training is required and farmers have to be willing to undertake this.
- Practically, farmers have implemented many strategies to manage the risks they face. Diversifying crop varieties and practicing zero or minimum tillage were commonly used strategies to manage production risks. Moreover, farmers often planted minimal areas of risky crops (peas, canola, and vetch) and maximised the area of less risky crops (wheat) to minimise the consequences.
- Maintaining high equity in the farm and making off-farm investments were the most frequently used strategies to manage financial risks. Other commonly used strategies included gross margins planning and investing surplus cash in farm management deposits.
- The strategy most commonly used by farmers to manage marketing risk was "to leave it to the experts". Farmers shared a common perception that it was better for them to focus on things they knew they were good at (e.g. improving yields) rather than staying in the office and studying forward prices, and marketing contracts. They thought these were jobs that should be left to specialists. They also preferred keeping stocks of grain for high-priced times.

In summary, it was concluded from this study that farming risks are an accepted reality in rural Australia and the Upper Eyre Peninsula in South Australia was no exception in that regard. As farmers have greater exposure to

risk than many other business people, the farmers in the Upper Eyre Peninsula appear to understand the risks they face and are well prepared to manage them. However, favourable seasons and/or improved farming technologies can tend to hide the on-going requirements for prudent risk management.

Queensland case study: Farming risks in southwest Queensland

This study aims to evaluate and try to improve risk management strategies and decision support tools for dryland farmers in southwest Queensland. The main objectives of the study are:

- to review the current trends in the theory and practice of risk management in general and in agriculture in particular;
- to identify the sources of risk that farmers in southwest Queensland have to face;
- to investigate the risk management strategies currently employed by farmers in that area as well as find their interest in and attitudes towards risk management; and if possible
- to help farmers cope better with the risks they face, to assist them to make good decisions under risky conditions, and encourage them to apply appropriate risk management and decision support tools in their farming businesses.

The study is being undertaken as part of the research for a Doctor of Philosophy degree at The University of Queensland. In the first year of this study, relevant literature was reviewed partly in fulfilling the first objective. In the second year, several preliminary interviews and focus groups discussions were conducted and some results of these interviews and discussions are briefly reported. That in part fulfils the second and third objectives of the study.

Preliminary interviews with experts

It was recognised during the literature review phase that the study could benefit from discussions with experts in the field who might offer constructive comments and allow refinement of the research questions. Consequently, in June 2004, a series of face-to-face and email interviews were conducted with staff from two of the principal research and extension organisations in Australia, Commonwealth Scientific and Industrial Research Organisation (CSIRO) and Queensland Department of Primary Industries and Fisheries (QDPI&F). These people had usually been working in agricultural risk management or related areas for many years.

Interviewed experts shared a common understanding that very few formal 'tools'

such as models, and information derived from modelling, were used by farmers to manage risks. They suggested that several risk management strategies were being used by Queensland dryland farmers. These included maintaining a high level of equity, keeping overhead costs low, reinvesting profits into the farm business, diversifying activities, using conservative nitrogen fertiliser rates, and using long fallows to build up stored soil moisture. Many of these strategies rely on high levels of technical competence. Overall, it was concluded that the risk management strategies adopted by farmers were quite similar in principle to those applied by most other risk averse managers.

By and large, the preliminary interviews with experts did give some insights into the direction of the study as well as helping to refine the research questions. The experts interviewed all agreed that it would be essential before building a risk management program to conduct focus group discussions or survey farmers to find out how they perceive sources of farming risk and what their current risk management strategies are.

Preliminary interviews with farmers

In late November 2004, a presentation of this study was given to a group of farmers at Roma (centre of the study area) and some preliminary interviews were conducted with some of them to understand how they were managing their farms and identify problems that they were facing.

Several issues have emerged from the discussions with these farmers. First of all, it was claimed that risk is very difficult to identify. In addition, farmers normally do not know what the probabilities of particular events occurring are. It was stressed that it is important to "get the timing right" as one of the essential features in risk management and making planting decisions. Timeliness is important as one of the farmers said: "Every time it rains, it brings income opportunities". Other farmers added: "Sometimes doing the right thing is not as important as doing it at the right time". This is true because as Gilovich and Griffin (2002) noted, successful ideas must not only be good, but timely – even lucky. It was largely agreed that experience and preferences are very important in decision making. This relates especially to decisions regarding crop planting. Generally, production risks were mentioned as the main source of farming risk and weather variability is the obvious factor driving this. Other sources of farming risk identified in the literature review were also mentioned by farmers, but it seems that the things that concern them most of all were what to grow and when to plant it. Finally,

owning machinery or using contractors was another essential issue concerning many farmers since it has a big impact on managing risk in this uncertain environment.

In general, the discussions with these farmers did not necessarily imply the situation in the whole study area since the discussions were conducted with a fairly small number of farmers. However, they indicated what farmers were actually doing as well as describing their problems. As such, their comments could be used to provide guidance for the focus group discussions and design of risk management and decision support tools that were expected to occur in later stages of this study.

Focus group discussions

Focus groups were selected as the next step in the research phase because they have many advantages as a method of gathering qualitative data (Krueger and Casey 2000; Berg 2001; Coutts 2004). The main objectives of the focus group discussions were to explore the issues that could be studied, identify what risks farmers face, and learn how they deal with these problems. In addition, it was hoped that we could assess farmers' needs in regards to risk management and decision support tools and learn how these needs might be met.

Wolff et al. (1993) noted that the selection of participants for focus group discussion is typically purposive and based on suitability or convenience rather than representativeness. In this study, the participants who were to be asked to participate in the focus groups were suggested by QDPI&F staff, and were considered relatively representative of farmers in the study area. Thus the information that was generated by the discussions was generally applicable to the wider population in ways suggested by Kennedy (1979).

Twenty-two invitation letters were sent to potential participants and sixteen of them agreed to participate in the discussions. This high rate of response (16 out of 22) reflects both the nature of the farmers selected and their interest in the topic. Following suggestions for successful focus groups (Morgan 1998; Krueger and Casey 2000), participants were divided into two groups and the discussions were conducted on the same day (18 February, 2005). Each discussion lasted approximately two hours.

Definition of risk

Generally, farmers' definitions of risk are not as long or as complicated as those used by scholars, e.g. Hardaker et al. (1997), Williams and Schroder (1999), or Just et al. (2003). In the discussions with the two groups of farmers, there was a general

agreement that risk is anything that threatens farm enterprises. "Risk is something that would prevent you from gaining profit or profitable opportunities which you would expect to get". All participants accepted the fact that farming is risky. "You can't go into farming without risk. In other words, you can't be a 'no' risk farmer".

Type of risk

Like the colours in the spectrum, the range of business risks contains many shades and variations. Generally speaking, the way scholars categorise sources of risk may depend on the study objectives. Nonetheless, according to many authors, the main sources of risk in farming include production, marketing, institutional, personal, and financial risks (Boehlje and Trede 1977; Fleisher 1990; Hardaker et al. 1997; Kay and Edwards 1999). These same sources of risk were mentioned by the participants in the group discussions; with many additional comments made about how climatic, personnel, business environment, and government policy changes affected the risks they face.

Participants were asked to select three sources of risk that they considered most important. Climatic variability was ranked as the most important source of risk in both discussion groups. This was followed by financial and government policy risks in the first group and government policy and marketing risks in the second group.

Risk management strategies

Farmers in this area (near Roma, southwest Queensland) were using a range of strategies to manage the types of risk that they face. These strategies included enterprise selection – having predominant cattle, with farming of cash crops regarded as a complementary activity, and using different strategies to spread the risk. Participants said that: "In this area, at least you can sleep at night when you have cattle. Crops have to rely so much on rain, which is very unreliable here". Most farmers were concentrating on growing the crop rather than worrying about marketing it, and managing weather variability by conserving soil moisture and using zero till planting. The common consensus among participants was that: "Given the water we have available, zero till is the best way to reduce the risk of erosion and water evaporation". To manage marketing risk, they were selling only part of farm products at any one time. "You'd better not to sell all your crops or cattle at one time because you can never be completely right". Other risk management strategies mentioned included practising good business

management methods and having off-farm investments.

There was little discussion about how to manage the risk that government policy might change. This source of risk was claimed by participants as something “out of control” (which probably reflected a recent decision by the Queensland government to ban tree clearing which affected farmers in this area). “Government rules and regulations are risks because we are not able to do anything about it”. Others added: “Once you could do whatever you wanted to do with your plot, but now you can’t”. There was also awareness of the need to educate younger farmers to have good farming skills. “What the young people are learning from agricultural colleges is sometimes absolutely different with what actually occurs in the field”. Participants expressed deep concern that there should be more education in schools about agriculture. “Many kids still think that milk comes from bottles at supermarkets”.

Participants questioned the effectiveness of most of the decision support tools and programs that were available and commented on their complex nature. There was a general conclusion that knowing what is available was a problem and learning how to use these new tools could take a lot of time. The cost-effectiveness of these tools/programs was another aspect questioned by participants.

In summary, the Queensland case study is an ongoing investigation into the large number of problems and potential answers to the question of appropriate risk management strategies and decision support tools for farmers in the area. The problem to be addressed is whether to develop something that might address part of the problem very well or whether to try doing something that tries to address the whole problem. However, the whole problem is extremely complex and it may be wise to break it down into parts and try to tackle one or two parts initially. The key messages from the group discussions were that soil moisture management and crop choice were the topics that concerned farmers most in dealing with the risks they face. Overall, it was concluded that it would be useful if participants had information that could help them understand ways to store water and utilise it more effectively. Another aspect of this question was choosing the right crop at planting time to make most effective use of available water. It appeared that some decision support tools could be useful to the farmers to help them assess crop planting options in their very risky farming environment.

Next steps

The research for this study has proceeded to the next stage by conducting a survey with Australian agricultural experts working in the field of decision support systems (Nguyen et al. 2006a). A number of workshops have subsequently been conducted with the selected group of farmers (Nguyen et al. 2006b). These workshops presented some existing decision support tools designed to manage farming risks to farmers. (Freebairn et al. 2002), WhopperCropper (Cox et al. 2004), and Yield Prophet (GRDC 2005).

The next stage of this research will involve working closely with these farmers to develop a decision support tool that is relevant to their conditions and which can help them make better decisions when they are faced with such uncertainty in their farm management.

Conclusions

These two case studies were approached differently for specific reasons. However, in each case it was generally found that Australian farmers, especially those in marginal cropping areas, have to cope with various types of risk. Climate variability was considered as the most important source of risk by farmers in each case study. Other important sources of risk included financial, government policy, and marketing risks. The Australian farmers rank these risks rather differently to farmers in other countries, where climate variability is probably not as significant as a source of risk as it is in Australia. For example, price or marketing risks were perceived as the most important source of risk by a group of Dutch farmers (Meuwissen et al. 2001). Similarly, a nationwide survey of New Zealand farmers revealed that marketing risks were ranked as very important by all farmers (Martin 1996). In America, crop price and yield variability were the top-rated sources of risk by many farmers (Patrick and Musser 1997; Knutson et al. 1998; Harwood et al. 1999; Hall et al. 2003).

Australian farmers, like their peers overseas, e.g. American farmers (Patrick et al. 1985; Jose and Valluru 1997), Canadian farmers (AAFC 1998), Dutch farmers (Meuwissen 2001), and New Zealand farmers (Martin 1996), use a range of strategies to manage the various sources of risk that affect their farming businesses. In the Australian case, such strategies included diversifying activities, using minimum tillage and practising long fallows as methods of conserving soil moisture, maintaining high equity in the farm, using farm management deposits to level out cash flow and reduce tax, and making off-farm investments. They

also thought marketing should be “left to experts”, and only part of farm production should be sold at any one time.

In conclusion, management of risk is an important activity for farmers worldwide. Different farmers confront different situations and their experience and preferences toward risk have a major effect on decision-making in each given situation. The management task facing farmers is to choose a combination of strategies that best suits the unique conditions of their particular farm and personal circumstances.

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