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RISK IN FARMING

Sandra Martin and Bill Lee
Farm Management Dept.
Lincoln University, New Zealand

ABSTRACT

The environment which is currently being faced by farmers in New Zealand is much more risky than it was a decade ago, and the relative importance of different sources of risk has changed over the period. It is likely that a variety of risk management strategies are being adopted in response to these changes. In this paper, some basic ideas on risk are outlined. The risk environment of New Zealand farming is outlined, definitions of risk are explored, and the different sources of risk are discussed. The idea that there is a maximum level of risk which can be tolerated is considered, and the implications of this for risk adjustments by farmers is outlined. A range of risk management strategies are discussed, and the linkage between sources of risk and responses to risk is considered. On the basis of this discussion, some concluding comments are made on the attributes of farmers who are likely to be successful managers of risk.

1. THE RISK ENVIRONMENT OF NEW ZEALAND FARMING

During the two decades prior to 1984, New Zealand agriculture was characterised by high levels of government intervention and assistance. Measures which were in place in the early 1980's included input subsidies, production subsidies, development schemes, taxation deductions the free provision of some government services, producer board subsidies, state ownership of lending institutions, and industry control of production (in the case of some domestic industries) and marketing.

Deregulation has seen the removal of input and output subsidies, development incentives and taxation deductions. Producer Board subsidies have been withdrawn, state assets have been sold and a user-pays principle has been introduced for some government services. Industry control of some domestic industries has been abolished, although the marketing powers of existing Boards have been retained or strengthened in some export dominated industries, although in the case of sheepmeat, the New Zealand Meat Producers' Board has withdrawn from marketing activity, and this function has reverted to individual company control.

Central government has also been reviewing more ad hoc instances of intervention in agriculture, such as adverse events assistance, and individual farmers may have to assume more responsibility for the management of outcomes of adverse events.

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When the Labour Government began its radical reform of the New Zealand economy in 1984, agriculture was one of the first sectors to be deregulated. The sequencing of the reforms meant that agriculture was likely to be relatively more disadvantaged during the period of adjustment, although it was often argued that this could be minimized if deregulation was completed quickly. However, the pace of reform seemed to slow down, and although the incoming Government is pressing ahead with labour market deregulation, the current pace of the reform process is unclear.

Not surprisingly, the agricultural sector plummeted into recession with the onset of the reforms. Farm incomes declined while on-farm costs (including the cost of capital) continued to rise. In addition, agricultural assistance had become capitalised into land values during the period when agricultural support was high, and when this support was withdrawn, farmland values fell sharply.

The recession was exacerbated in some regions of the country such as Canterbury and Marlborough, where a prolonged drought was experienced in the later 1980's. Recent publicity on the implications of the greenhouse effect for climate change has led to a perception in these regions that such droughts might become a more frequent phenomenon.

It is clear that the external environment facing farmers is now fundamentally different to what it was ten years ago. It is likely that a variety of risk management strategies are being adopted in response to these changes. In the remainder of this paper, some basic ideas on risk are outlined. Definitions of risk are explored and sources of risk are discussed. The idea that there is a maximum level of risk which can be tolerated is discussed, and the implications of this for risk adjustment by farmers is considered. A range of risk management strategies are outlined, and the linkage between sources of risk and responses to risk is discussed. Finally, some comments are made on the characteristics of farmers who are likely to be successful managers of risk.

2. DEFINITIONS OF RISK

In an on-farm context, 'risk' conjures up connotations of variability in outcomes (Sonka and Patrick, 1984). A farm situated in a region with more variable rainfall, or in an industry with more volatile market prices, is considered to be a more risky operation than one which is in an industry or region where such variability is less extreme.

The risk associated with variability in outcomes often implies a focus on the down-side of that variability (Boggess et al (1985)). That is, it is the increased change of a poor outcome, such as a drought or low prices two years out of five which gives cause for concern. Some farms may be much more vulnerable to this down-side risk than others. For example, a highly levered farmer is likely to find it much more difficult to meet fixed cost interest repayments in poor years than a farmer with a much more modest level of leverage. Hence, the notion of vulnerability, or placing the survival of the farm business in jeopardy, is an important dimension of risk (Sonka and Patrick, 1984).

3. SOURCES OF RISK

Risk in farming may emanate from a number of sources. These include production (or technical) risk, price (or market) risk, and financial risk.

Production risk is the variability inherent in the production process itself. It can include unfavourable weather (such as drought, flood, wind and frost), diseases, pest infestations, fire and theft. This type of risk impacts on profit through yield. On the other hand, price risk is associated with fluctuations in the price of purchased inputs and saleable outputs, and impacts on profit through input costs and output prices. The combined risk from both of these sources is often termed business risk.

Financial risk is the risk of being unable to meet prior claims with the cash generated by the farm, and is determined by the dispersion of net cash flows, the level of fixed obligations (a large component of which may arise from debt financing), and the farm's pool of financial resources.

This traditional view of risk which compartmentalizes sources of risk into production, price and financial risk allows the impact of each of these sources of risk on the farm operation to be clearly traced through by observing the influence on yield, output prices and input costs, and residual cash flows to the owners. However, it may obscure more subtle sources of risk. For example, the risk associated with the previous and present governments slowing down the pace of economic reforms and leaving the agricultural sector in a relatively disadvantaged position is likely to have implications for on-farm management decisions. Other less obvious sources of risk can also be envisaged. These include technological risk (which may arise when it is possible for current decisions to be offset by future technical improvements), legal risk (which may be associated with the use of non-farm sources of capital, and contractual mechanisms such as forward contracts), and human risk (which may include the vulnerability of a sole farm operator, and the availability and reliability of labour). Although these additional sources of risk may not be as obvious as the more familiar categories of production, price, and financial risk, they nevertheless can have quite a crucial impact on the health of the farm business.

4. TOLERANCE FOR RISK

As noted previously, the environment which is currently being faced by farmers is much more risky than it was a decade ago. That is, farmer exposure to risk has risen sharply, and this trend is likely to continue in some regions. However, the level of risk which farmers feel they can comfortably tolerate and manage is likely to vary between individuals. A farmer who is able to tolerate a lower level of risk is normally said to be more risk averse than one who can operate with a higher level of risk. It is likely that the ability to tolerate risk varies with a range of personal characteristics; for example, it is commonly assumed that older farmers are more risk averse than younger farmers. It is possible that different farmers exhibit differing degrees of risk aversion towards different sources of risk. For example, one farmer may feel more comfortable carrying a relatively high level of business risk and a low level of financial risk, whereas another farmer who is willing to tolerate the same overall level of risk may feel it is preferable to operate with high levels of financial risk and low levels of business risk.

Individual willingness to accept increased risk is also associated with the expectation of higher returns. That is, an entrepreneurial type of farmer may be willing to take relatively large calculated risks because he or she can see the potential benefits from this increased risk-taking. On the other hand, more cautious farmers may not be willing to place either

the farm or the farm family in jeopardy by taking what he or she might consider to be unnecessary risks. These two types of farmer are likely to differ in their values and personal characteristics, their management styles, and the types of strategies which they prefer (Olsson, 1988).

5. RISK ADJUSTMENT

The idea of a level of tolerable risk implies that some readjustment is likely to occur if exposure to risk increases when a farmer is already operating at his or her maximum level of risk tolerance. Conversely, if some decrease in risk exposure occurs while a farmer is operating at the risk level able to be tolerated, then it could be argued that he or she might be more willing to take decisions which may have the effect of increasing the level of risk carried.

It is possible that this is what occurred in New Zealand prior to the 1984 deregulation. (Johnson 1989). The various input and output subsidies in force at that time would have lowered the level of business risk faced by farmers, and some of them, such as interest rate subsidies, would have also lowered financial risk for a given debt level. Farmers may then have found themselves operating with a lower level of risk than they were capable of tolerating and this may have allowed them to take management decisions which had the side effect of once again increasing business risk, or financial risk, or both, up towards this maximum level of risk tolerance. For example, the assistance measures to agriculture may have encouraged increased financial leverage, the development of innately risky properties, and the adoption of more risky farm management practices. It is not unreasonable to conclude that the increased producer exposure to risk which occurred as a result of agricultural deregulation is likely to force farmers to adjust management strategies in order to lower the level of risk that they currently face.

It might be possible to argue that the risk faced by farmers was not actually lowered by government intervention, but that an 'exchange of risk' merely occurred. That is, farmers exchanged business risk for the risk that government might 'change the rules' on them, thereby having their farm business exposed. However, although this type of argument may seem plausible with the benefit of hindsight, the more subtle source of risk associated with government is unlikely to have been very obvious in the highly interventionist economic climate prevailing before the mid-1980's.

6. RISK MANAGEMENT STRATEGIES

Management strategies which can reduce risk may incorporate production responses, marketing responses and financial responses (See Sonka and Patrick, 1984 and Barry and Fraser, 1976 for a detailed discussion of responses). Production responses include selecting enterprises which are known to have a low yield variability, or selecting a region in which to farm where yields are known to be more stable. Enterprise diversification may also be an appropriate way to reduce risk, and geographic dispersion of farming activity is a further option. A modification of technical practices may serve as informal insurance schemes. These may include an excess investment in machinery, maintaining feed reserves, precautionary animal and plant health measures such as preventative applications of insecticides and antibiotics, planting several varieties of seed and investing in supplemental irrigation. Substituting capital for labour can

avoid problems associated with hired labour. Alternatively, appropriate incentive and reward structures may reduce risk from this source.

Marketing responses may include selecting enterprises with a low expected price variability, and spreading product sales over time by either staggering production or storing produce. Forward contracting or hedging on the futures market (where these are available) allow products, and in some cases inputs, to be priced before delivery. Improving the quality of information on prices and market requirements can also reduce risk.

Changes in financial management practice can also ameliorate risk. Responses can include maintaining additional liquidity by holding more liquid assets and matching the debt repayment structure with the income generating pattern of any purchased asset. Increasing the ratio of equity capital to total assets will also reduce the financial risk associated with the farm. This will involve injecting additional capital into the farm, either from internal or external sources. Other financial responses include leasing assets rather than owning them and various forms of insurance. In addition, investing capital in off-farm assets (which may be financial or otherwise), is another variant of diversification which may be possible,

Although a wide range of risk-reducing strategies may be possible in principle, the number of strategies which are actually available to an individual farmer is likely to be much more limited in practice. Some types of strategy may not be appropriate for a farm of a particular size, type or ownership structure, or may not be available in a particular industry or region. In addition, some strategies may prove to be more effective than others in reducing risk in particular circumstances. Individual farmers may also prefer to use different strategies for a variety of personal reasons. Finally, the choice of an appropriate risk-reducing strategy is also likely to be influenced by flows of production, marketing and financial information. In some respects, appropriate information collection and utilisation might well be considered a risk reducing strategy in its own right.

7. THE LINKAGE BETWEEN RISK SOURCES AND RISK RESPONSES

Even though a reasonable range of risk-reducing production, marketing and financial strategies may be available to an individual farmer, the emphasis placed on alternative types of strategy is likely to be influenced by the importance attached to different sources of risk. That is, a farmer who perceives production risk as extremely important, but who does not appear to be too aware of market or financial sources of risk, is more likely to institute production rather than marketing or financial responses to reduce risk.

Broadly speaking, however, there need not necessarily be any automatic linkage by an aware farmer between sources of risk and the risk management strategies which are adopted in any given situation. For example, an increase in exposure to risk from financial sources which raises the overall level of risk beyond that which is able to be tolerated may lead to a production response, a marketing response or a financial response. Similarly, an increase in business risk might be countered in a variety of ways, with one farmer choosing a production strategy which in turn lowers business risk, whereas another farmer might opt for lowering his or her level of leverage while accepting the increased riskiness of price, yield or input costs.

The current risk environment facing farmers is much more complex than that portrayed in these simple examples. Since 1984, producer exposure to both business and financial risk has risen sharply, and it could well be argued that the risk associated with uncertainty in government policy has become an increasingly important source of risk. It is possible that a wide range of risk-reducing strategies have been adopted by farmers in recent years, with the types of strategies used by individual farmers varying according to the range of characteristics identified previously.

8. CONCLUSION

The above discussion suggests that a number of factors must be simultaneously taken into account when attempting to understand why farmers respond to risk in certain ways, or when giving extension advice on risk management. Risk can emanate from a wide range of sources, and some farm types are innately more risky than others by virtue of their location and the products they produce. The actual ability to tolerate risk is likely to vary between individuals, and it is possible that farmers may exhibit differing degrees of risk aversion towards different sources of risk.

Producer exposure to risk has increased markedly in recent years, and it is likely that farmers have been attempting to implement a range of risk-reducing strategies to reduce this exposure. A large number of potential strategies are possible in principle, and may include production, marketing or financial responses, but the range of strategies being actually used in practice is likely to be much more limited. Some types of strategy may be inappropriate for a farm of a particular size, type or ownership structure, or may not be available in a particular industry or region. In addition, farmers are likely to have a personal preference for particular strategies. This suggests that there need not be any automatic linkage between sources of risk and risk management responses which are adopted.

This discussion implies that farmers who are able to successfully manage risk are likely to be very adept at recognizing and realistically assessing their sources of risk, and are likely to possess a strong self-awareness of their business goals and personal attitudes towards risk. The risk management strategies which they institute are likely to appropriately reflect these goals and attitudes to risk.

Authors' addresses:

Dr Ante KULIGA, Associate Professor

Dr Tito JUREK, Associate Professor

Institut za ekonomiju, Zagreb

Fakulteta poljoprivredne ekonomije

Sveučilište u Zagrebu

15, Tsimaska cesta 111

41000 ZAGREB, YUGOSLAVIA

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