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Where's the economics? The core discipline of farm management has gone missing!*

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Economic illiteracy is abundant in farm management analysis. Failure to understand that economics is the core discipline of farm-management analysis and failure to apply the whole-farm approach leads to wrong questions being asked and wrong answers being given. The power of economic thinking is in making sense of resource allocation questions in farm systems characterised by much complexity and powerful dynamics. The challenge for those who continue to work in farm management economics is to re-establish theoretically sound farm-management analysis based on economics as the core discipline.

1. Introduction

It is a great privilege for a member of the Australian Agricultural and Resource Economics Society (AARES) to deliver the Presidential Address. Sometimes this opportunity is taken to hold forth about the condition of the profession and important issues of the discipline. For instance, Alan Lloyd in his 1970 Presidential address to AARES said ‘... our profession has an obligation to clarify important policy issues and raise the level of debate because of the large amount of economic illiteracy and irrationality served up to farmers by farm leaders and politicians’ (Lloyd 1970, p. 93).

My Presidential Address is motivated by concern with economic illiteracy and irrationality in one particular area of agricultural economics: the analysis of significant farm management questions by publicly-funded and farmer-funded agencies and agents. The rationale underlying the argument put in this address is that economic illiteracy and irrationality in analysing

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significant questions to do with managing farm resources is likely to impose costs on society that are partly avoidable. Furthermore, to know that something is wrong and to not attempt to change the situation makes us complicit in perpetuating the wrong. Bad economics happens when good economists do nothing about it.

Economic illiteracy in farm-management analyses takes many forms, but most often involves numbers without theory, inventing economics, morselisation, and a blinkered perspective. There is no shortage of specific examples of the types of economic illiteracy and quack nostrums that has bedevilled analyses of farm and public resource use over the past decade. For instance:

1. Each of the meat, grains, dairy and wool industry research and development organisations have invested substantial funds in conducting large scale 'average benchmarking' or comparative analysis studies with on-farm diagnostic and prescriptive intent, despite the intellectual flaws of such approaches (see Candler and Sargent 1962; Mauldon and Schapper 1970; Malcolm 1990; Ferris and Malcolm 1999). Several state departments of agriculture, similarly, have invested large amounts of resources over long periods of time conducting comparative analysis for farm management.
2. Massive investments have been made by agricultural research organisations investigating the technical efficiency of irrigation water use in water economies where water is tradeable.
3. Comparisons of gross margin/megalitre have been widely used by groups lobbying for the reallocation of irrigation water (see Gyles 2003; Dwyer *et al.* 2004 for a critique). Numerous decision support systems have been developed in research organisations that have estimated change in activity gross margin or net cash flow and treated this as indicating change in profit.
4. A genetics breeding index, used by most breeds of most commercial farm animals and developed with considerable public investment, is commonly represented as if the value of the index of profit per head is the same as the change in profit of a farm system that might result from investment in animals with particular index values and introduction of them to a farm system.
5. Agricultural consulting firms produce regular newsletters and reports in which comparative analysis, estimates of cost of production and 'profit per dry sheep equivalent', feature prominently. The practice of using dubious arbitrary allocations of fixed costs to activities in mixed farming systems is, therefore, rife.¹ A state department of agriculture has

¹ Are the fences there to keep the sheep in or to keep the sheep out of the wheat? (R. Richardson, pers. comm., 2003).

been producing booklets of representative activity gross margins for regions that feature a 'cost of production calculator' so that farmers could decide on 'a target price for their harvest' (Campbell 1944 comprehensively exposed the fallacies of using cost of production estimates).

6. A large industry R&D corporation invested significantly in a farm management development and extension activity that had as its basis a novel measure of farm performance, disposable income per family, that had no economic foundation. This measure managed to confound both profit and cash measures into a single measure that achieved the unique double of getting both profit and cash positions wrong (see Ferris and Malcolm 1999). Similarly, another major R&D corporation was responsible for funding programs that invented a measure of farm performance, economic farm surplus, as an alternative to the standard measures used in farm management of operating profit, return on total capital and net cash flow. This measure confounded cash and non-cash items and annual cost and capital items such that analysis using this measure did not get the profit or cash or balance sheet positions right, and so conclusions about business performance were potentially misleading (see Ferris and Malcolm 1999).
7. A major research and extension program of a state department of agriculture concerning a significant land degradation problem developed a decision support tool to assess the merit of amelioration measures that had basic errors in estimating livestock trading profit and activity gross margin, and other problems such as double counting interest costs: again, giving quite a misleading impression about the merit of farmers investing in measures to correct the environmental problem (Trapnell 1998).
8. Periodically, estimates of costs and benefits of animal health programs are made based on incorrect 'with and without' comparisons of net benefits in farm systems and the wider economy of some disease or disease prevention (Malcolm 2003).
9. Using projected dollars with no obvious distinction between real and nominal terms and using real terms accompanied by use of nominal interest rates remains common.
10. An industry R&D corporation funded a large research program to do with pastures and stocking rates, and then attempted to evaluate these valuable technical findings using activity gross margins and nominal cash flows, without accounting for capital aspects of livestock and pasture investment and without discounted cash flow analysis.
11. Commonly in farm management analyses, the with change-without change comparison is wrong, with the current situation being compared with an alternative future, implying the current situation is one of the

options for the future. The only feasible comparison is between alternative futures, because the status quo is never an option in a changing world.

12. Accounting measures of profit (net profit, return to equity) are widely used instead of efficiency of all resource use (operating profit, return to total capital), and accounting rather than opportunity cost bases of valuation of labour and capital are used. Historical averages or most recent figures in analysis of future farm systems are used often: backward looking instead of forward looking. Two other common mistakes are taxation records used for analysis of management options or tax implications of a change in a farm system not being considered.
13. Gross margins of activities are used in isolation without recognition that in multi-enterprise farming the gross margin of an activity is determined in part by the existence and performance of the other activities in the farm system.
14. In calculating livestock gross margin, often a livestock trading schedule is not done to correctly estimate trading profit. Instead, sales of capital (cast for age stock) and new investments (replacements) are treated as income and costs, a method that coincidentally gives the correct value for animal depreciation, appreciation, and trading profit, for a herd or flock in a steady state, but not for the usual situation where herd and flock numbers are changing. Further, in discounted cash flow analysis the actual sales of animals produced and capital livestock, and investment in capital replacement and trading animals, need to be registered when they occur, based on a model of herd and flock dynamics over time.
15. It is common for either economic or financial analysis to be conducted. Both types of analysis are necessary, plus analysis of growth in net worth. Investment analyses of farmland are often based on expected nominal medium-term net cash flows, with the criteria being payback period, and a future capital value factor with implied real capital gains that come more from hope than from improved real annual return to land or from substantiated non-agricultural influences.
16. Medium term, beyond farm gate changes that may have an impact on strategic changes within the farm business, like typical market responses such as induced supply increases and the tendency for competing away of super-normal profits, are often not considered. Spurious secondary benefits are rarely missed though.
17. The likely future real cost price squeeze is overlooked, with analysts often unknowingly assuming that input quality changes and other productivity changes, other than the ones explicitly being considered, will somehow counter future real cost prize squeeze effects. The alternative

is to explicitly budget such effects and productivity changes and see how the changed farm systems perform.

18. Consideration of genuine benefits and costs that are not readily amenable to quantification in dollar terms are often not part of analyses, yet are so often a major part of the motivations and objectives of a decision. With/without scenarios and breakeven scenarios can be used to give implied or required values in such cases.

And so on ...

Note: the fallacies in the analyses of farm management questions cited above have been comprehensively exposed in the published literature over the last 50 years and in some cases for much longer (See Malcolm 1990 for more on this). Still, the main concern in this address is not with 'who did what badly' in farm management analyses of the recent past: bygones are bygones. The focus is on doing it better in the future. Always though, the first step on a long journey should involve learning the big lessons from the past.

In the section that follows, the scope of the term farm management analysis as it is used in this address is defined.

2. Farm management analysis

For the purposes of the ensuing discussion, farm management analysis is characterised as a type of intellectual inquiry into changes in resource use on farms leading to the formation and promulgation of ideas and recommendations affecting the allocation and management of significant farm resources. It is a structured process of organising and manipulating information about resources used in farm systems to generate further information about the expected extra costs and expected extra benefits that are likely to result when a change is made to the way the farm system operates. The expected net benefit of using resources in a farm system in a particular way is then compared with the expected net benefits from using the resources in an alternative way. Farm management analysis is, therefore, farm benefit-cost analysis.

Farm management analyses are carried out in a number of business and administrative parts of the economy: (i) within farm businesses, by farmers making what they can of their situation in which much is unknown and unable to be known, where great uncertainty prevails, and much is uncontrollable; (ii) within public research and development organisations, by people working in research and development in the broad areas of science, agricultural and natural resource science, agricultural economics or rural social science; (iii) within private rural input supply and output processing businesses, by researchers and providers of goods and services representing

both established and new technology used in farm production; and (iv) at sources of information to farmers. These are publicly funded and private business people who provide information directly to farmers as advisers, consultants and providers of education services. They operate professionally in between the farmers and those primarily involved in farm-related research and development.

There is an overlap of people and flows of farm management information, and misinformation, between these arbitrarily defined segments of the rural economy involved with the analysis of choices relevant ultimately to the management of farms. The analyses of farm management questions that are the particular focus in this address are analyses that are conducted by agents funded by the public and sometimes by farmers too; that is, from levels (ii) and (iv) above. In such cases the brief is to evaluate research results and to provide useful generic, not individual prescriptive, advice to farmers. They are also expected to provide advice about impacts on the community about the potential benefits and costs of innovations to farm systems. Usually, in investigations of questions of agricultural and resource management carried out at levels (ii) and (iv), great effort is made to ensure 'good science'; 'good economics' is just as important.

When done in accordance with the tenets of appropriate theory, the information generated by farm management analysis informs the decisions of managers of farm resources in ways that are most likely to contribute to them achieving some of their goals. The alternative approach, analyses that violate tenets of economic theory, are most likely to generate information that leads to conclusions, decisions and actions that do little or nothing to advance the cause of farmers achieving their goals.

This is not to pretend that the text book representation of economically rational decision-making behaviour of managers explains all. In practice, usually, and sensibly, decision makers draw on other sorts of knowing too. Constraints of time and resources and 'ability to know' dictate that Gigerenzer and Todd (1999) 'fast and frugal' approach to decision-making has to apply. Furthermore, of course, a bad decision can turn out to be the right decision through the intervention of chance, and vice versa. In an uncertain world, relatively simple analysis based on a few key bits of information is the practical way to go: but the economic logic has to be right! For a series of decisions over time, sound analysis of the important relevant information, even though constrained by resources and time, will contribute to decision makers achieving more of their goals than will the alternative approaches of acting randomly or even conducting consistently bad decision analysis and hoping to be consistently lucky.

In the section that follows, economics as the core discipline of farm management is discussed.

3. Enter economics

The key task of farm management is making choices between alternatives. Farm management analysis is about analysing those choices. Economics is the discipline of choice. Economics entered farm management analysis from the middle of last century and became the core discipline of academic work in farm management

3.1 Economics as the core discipline of farm management analysis

In the context of farm management analysis, the term core discipline means the discipline that organises the practically obtainable relevant information about a question or series of questions into a framework and form which enables an informed, reasoned, rational choice to be made between alternative actions faced by management. In his inaugural lecture as Professor of Farm Management at the University of New England in 1965, John Dillon (1965) characterised farm management from 1940 to the mid-1960s as 'Enter Economics'.

The period 'Enter Economics' was characterised by Dillon (1965) as having three features:

First, institutional arrangements such that today there is no State Department of Agriculture without at least a nominal farm economics section and no established University without some teaching pertinent to farm management; second, increasing recognition of the role of economic principles in farm management; and third, the development of full time career opportunities in farm management teaching, research and consulting. These features are in marked contrast to the part-time descriptive efforts of economically trained agriculturalists in the earlier period. (p. 183)

As history has unfolded, the features that characterised the 'Enter Economics' period contrasts somewhat with the current situation.

'Enter Economics' was a time when economics was rigorously established as the core discipline of farm management. This was also when the best intellects in agricultural economics in Australia and abroad were working on problems of farm management, before they moved on to more general and arguably more amenable agricultural economic and general economic problems. For instance, in Australia, the dominant figures of the first wave of agricultural economists such as Campbell, Gruen, Lloyd, Dillon, Parish, and Jarrett²

² I am not promulgating some cult of personality(ies) here: this work was done because the environment was right and the culture of the organisations in which these agricultural economists worked fostered these inquiries.

worked on farm management economics questions (Malcolm 1990). This was the exciting time of the new marriage of economics and technology and human elements merging into whole farm management: an approach defined emphatically by Jack Makeham by the 1970s.³ As Candler explained the approach: 'people talk of the whole farm approach to farm management economics – as though there is some other approach!' (Candler 1962).

The ways modern market economies operate nowadays reflect the insights of the great economic thinkers over several centuries. Less prevalent, less influential is the economic way of thinking about farming choices that has been rigorously developed over the past 65 years by some major farm management economic thinkers. The relationship between economics and applied farm management analysis has been neither comprehensive nor consistent over time. A source of motivation for revisiting the case that economics is the core discipline of farm management was a series of invited papers to recent annual agricultural economics conferences of the AARES that had the explicit brief to ponder the state of affairs in farm management in Australia and New Zealand (e.g., Malcolm 2000; Brennan and McCown 2002, 2003; Kingwell 2002; Mullen 2002; Ronan 2002; McGregor *et al.* 2003; Martin & Woodford 2003). Further papers presented to a meeting called at Sydney University's Faculty of Rural Management at Orange in 2002 to contemplate the future of the farm management profession in Australia (Charry and Parton 2002; Kemp and Girdwood 2002) also provided significant incentive.

Each of these above-mentioned papers provided insight into the farm management disciplinary area and the profession of farm management in Australia and New Zealand. Each of these researchers and educators went to considerable length to stress the interdisciplinary, multidisciplinary, even trans-disciplinary (Martin and Woodford 2003) nature of farm management. However, no one argued explicitly that economics is the core discipline of farm management analysis. The role for economics in farm management analysis was taken for granted or stated to be one of the interested disciplines among many, or, in a few instances considered to have become *passé* because of past misdirection. No one noted that economics was often missing from analyses of farm management questions.

Economics encompasses a number of key subdisciplinary areas that are particularly significant for the management of farms. These are farm production economics (farm input-output relationships), risk, finance,

³ Regarding the significant influence of Jack Makeham, on farm management in Australia, a factor that played an important role, amongst other factors documented elsewhere (Malcolm 1990), was that Jack was training mostly students who were studying agricultural economics and who had a solid grounding in economics.

marketing, time, and the microeconomics of choices and actions of groups of firms responding to market forces. Farm management analysis encompasses considering alternative actions under risky and uncertain circumstances. Economics, the discipline of choice, is central (McConnell and Dillon 1997). Choosing between alternative uses of resources draws on a number of key economic principles; namely, comparative advantage, diminishing marginal returns, equi-marginal returns, cost analysis, opportunity costs, input and output relationships, size and scale, gearing and growth, risk, time and trade-offs between goals. Economics is needed to bring the many relationships of a system, and between systems, to some common unit or basis of comparison. If this is not done, then it is not possible to analyse systems meaningfully or compare alternatives meaningfully in terms of expected benefits and expected costs. That is the first reason why economics is the core discipline of farm management analysis.

Farm systems are dynamic and complex. The second reason why economics is the core discipline derives from the rigorous, abstract and conceptual nature of economic enquiry. The emphases in economics on the counter-factual and the counter-intuitive go a long way clarify understanding of complex, dynamic whole farm systems. Economic principles tell what information is needed, and conveniently organises such information in ways that suit analysis. Most importantly, the logic of economics defines the question in a way that facilitates finding solutions. The question is the answer!

The third reason economics is the core discipline of farm management analysis is that economics sets much of the agenda for the decisions that have to be made. Knowledge and techniques from the economics discipline are combined with empirical data to help make decisions about what, how, and when to produce and market farm product.

Finally, the major focus of much farm management is the implementation of new production technology amidst re-organization of the farm business in the face of market forces for structural change. Factors beyond the farm gate, in markets, over time, play as big a role in determining the achievement of farmer goals such as wealth accumulation, consumption, leisure, as do actions farmers take within their farm boundaries. Components of the larger economic picture, including changing comparative advantage of competitors, the cost-price squeeze and pressures for adjustment and adoption of new technology, are critical to farm management analysis and farm business success. All of this, in an activity with such limited scope for product differentiation that the conventional tenets of business marketing are irrelevant.

Economics plausibly explains the behaviour of many agents (producers/firms and consumers) beyond the farm gate. It facilitates plausible

conjecture and expectations about the behaviour of competing and complementary businesses and changes in industry structure. It anticipates to a degree the external forces for internal change on farms. Keen appreciation of these wider economy phenomena and forces brings valuable insights to decisions about opportunities created by counter-cyclical behaviour; to asset valuation; to financing, gearing and growth decisions; to activity mix choices; to investment timing; to intensification and extensification; to risk diversification; and of course, to the increasingly important off farm investment portfolio decisions. Therefore, the fourth reason economics is the core discipline of farm management analysis is that in economics the effects of markets and time and growth and dynamics are confronted explicitly.

Making the case for economics being the core discipline of farm management is not a case of disciplinary imperialism; nor should it be seen as implying a narrow, unbalanced, approach to farm management. The 1987 Nobel Prize winner in economics Robert Solow explained the strengths, and limits, of economic analysis; namely,

The true functions of economic science are best described informally, to organize our necessarily incomplete perceptions about the economy, to see connections that the untutored eye would miss, to tell plausible – sometimes even convincing – causal stories with the help of a few central principles, and to make rough qualitative judgements about the consequences of policy and other exogenous events ... the end product of economic analysis is likely to be a collection of models contingent on society's circumstances and not a single monolithic model for all seasons. (cited in Fitzgerald 1990, p. 21)

Substitute 'farm actions and goals' for 'policy', and 'farm' for 'economy', and 'farm family' for 'society' and what Solow says about economics applies equally to economic analysis at the level of unique farm systems. In the context of farm management analysis, it just so happens that at the level of sensible analysis of farm choices, the key theoretical principles to do with marginality, costs, time, investment, and risk are well established, and estimates of key economic parameters can be made. Theory about equally important but less congenial elements of farm management analysis such as uncertainty and non-material goals still has quite a way to travel. However, the criticism of farm management analyses made in this address concerns the absence of the basics of economic thinking in analysis of farm management problems.

The discussion in the section that follows is about economics going missing and why this happens.

4. Exit economics

Economic illiteracy refers to a low level of understanding of basic micro-economic concepts. With a given distribution of income, markets may provide a reasonable approximation of the quantity of private economic literacy required. The supply of public economic literacy is different. The two obvious means of increasing economic illiteracy in public sector areas involved in farm management analysis are more education and vigilance.⁴

Over the past decade, and amidst some resurgence of professional activity in farm management economics, there has been much farm management analysis carried out that has had a tenuous relationship with economics. Such work has often appeared to be 'locked-in' to prefarm management economics paradigms,⁵ and can be found in evaluations of research results; in farm management analysis by advisers and consultants whose primary skill and interests were orientated to the technical, accounting or the sociological; in the bureaucracy related to agriculture and natural resources; in farmer training courses; and on some farms. Hence, the paradox: high quality work being done in farm management economics, and at the same time farm management analysis conducted as if economics had yet to enter the arena, sometimes within the same organisation.

Too often analyses of farm management questions deriving from public or farmer-funded sources show little evidence of knowing: first, that the

⁴ More generally, in the 18th century Adam Smith advocated, controversially, the study of science along with reading, writing and arithmetic at the level of elementary educational (Castle 1984). Science fiction writer H.G. Wells reportedly predicted 'Statistical thinking will one day be as necessary for efficient citizenship as the ability to read and write' (cited in Gigerenzer 2002). While recognising that curriculum design and childhood learning are specialist areas of expertise, maybe fundamental microeconomic, especially production economic, ideas could be added to the list of basic elements of elementary education. Once arithmetic is mastered, the ideas of introductory microeconomics can be demonstrated.

Education about economic ways of thinking for a broad cross-section of the population could be presented in popular mediums. Imagine advertisements about the fallacies of cost of production approaches to farm management analyses, or fallacies of comparative analysis, or borrowing funds from abroad without hedging exchange rates, or the operation of the principle of increasing risk. The essence of plenty of other complex but worthy messages are presented in such ways, for example in political campaigns.

⁵ Some modern farm management professionals may argue that they have moved on from economics being the core discipline of farm management analysis to something else, a superior way of resolving questions of choice under uncertainty in which economics is redundant; that is, a post-economics farm management paradigm. For those not convinced of this, there remains the compelling possibility that when modern farm management analyses are conducted that do not have economics as the core discipline, it is more likely to be because of ignorance of economics than the analysts having devised a better way of doing it without economics.

maximum is not the optimum, and so the science/technical emphasis on maximising physical output per unit input is flawed; second, that the future is a different world so the accounting focus in looking backwards on averages and minimum average costs of production is also flawed; and third, that the whole of the farm system is the domain on which to focus in analysing changes to farm management practice.

The wrong-headedness of these criteria (maximising output, minimising costs, partial systems, backward-looking) is proven by the logic of production economics. In essence, what makes the economist's analysis of farm management questions right – and analyses conducted by agricultural and natural resource scientists and accountants so often wrong – is the 'too little, too much, just right' production economics model of inputs and outputs that resides permanently in the heads of economists but is generally missing from the understanding of non-economists. The claim that economics is the core discipline (note: not one of several core disciplines but *the core discipline*) is a matter of established farm management (production) economic theory.

The list of erroneous farm management analyses given in the Introduction is just a sample of those that have come to my attention. They relate to non-trivial uses of resources (far from it), and would not happen if conducted by an analyst who brought economics as the core discipline to the analysis.⁶ A glance at any agriculturalist journal will reveal many examples of good agricultural scientific work analysed badly in terms of its economic implications. As happens occasionally, the fallacies of this type of work are exposed when a farm management economist is brought in after the event to review such research analyses. Therefore, it might be thought that there are adequate safeguard mechanisms in place and working. However, as this can happen after several years work and millions of dollars wasted, it is hardly satisfactory. Worse, similar ill-thought analyses are repeated sometime later. Furthermore, such checks do not always happen.

The extent of farm management analyses that are not sound in terms of economic principles has to be placed in the proper perspective. Some agricultural consultants, accountants and scientists in the public sector and in private firms, and farm management economists working in government departments, do first class farm management analytical work, even if at

⁶ This list comprises examples I have come across in various roles, as supervisor of post-graduate students who have attempted to use analyses and found the flaws in them; as invited or uninvited reviewer; from discussion with farmers, sometimes from casual reading of the rural press; or brought to my attention by farm management economic colleagues working in the bureaucracy and feeling alarmed at what is happening but feeling powerless to do anything about it.

times they are at odds with the culture of their organisations. Some research and development organisations have responded positively to the types of criticisms outlined above and make an effort to treat seriously the farm management economics element of their domain.

However, a major motivation for the tone and content of this address is that there is no reason to be confident that in the future economic thinking will become an entrenched, routine part of research evaluation and priority setting. This is because in those organisations where economics is currently given an appropriate hearing, the credibility given to the role of farm management economics is mostly the result of individuals, and is not convincingly indicative of enduring development in research organisational policy or culture. In the hands of different non-economic bureaucrats and technical specialist consultants and accountants in the future, there seems a reasonable probability that the discredited 'pre-economic' approaches will prevail.

On the face of it, it may seem odd in a competitive world of ideas to be bewailing the phenomenon that an important body of knowledge required to answer properly questions about the management of farms, such as economics, would be absent or used incorrectly in attempts to solve farm problems. Farming problems require knowledge from many disciplines. Therefore, while many people have a go at doing farm management analysis, not all of them have an adequate grounding in economic ways of thinking. Is this phenomenon any more than the scientists being interested in improving production while the economists are interested in improving resource allocation? Still unanswered is why researchers who apply the highest standards of theoretical rigour in plying their own trade, are content to accept and draw conclusions from work outside their area of expertise (i.e., economics) that is of quite indifferent quality. Some conjecture about why economics sometimes goes missing from analyses of farm management questions follow.

A pervasive belief by non-economists that questions of efficient resource allocation can somehow be answered sensibly without economic analysis could be one reason economics is often missing. In non-economic circles, economic ways of thinking about agricultural and natural resource questions are commonly perceived as 'just another perspective' deriving from a set of relatively uncommon beliefs. However, production economic theory, the basis of budgeting benefits and costs of alternative uses of resources, has little to do with beliefs and a lot to do with the logic and consequences of the technical production function underlying business activities and the effects on these activities of having to compete. Economics is not 'another way to look at a question': it is integral, first to what question is asked and second to answering it. For sure, the less economics known, the easier it is to arrive at the 'answer'.

A part answer to this question about why economics has gone missing may be found in Arrow's 'Clouds of Vagueness' (Arrow 1992) that engulf decision-making in all business activity. At the time of making decisions there is much that is unable to be known. The soundness or otherwise of resource allocation decisions becomes blurred by the passing of time and the delivery of the risks and uncertainties of the future. In a business world that is so highly uncertain and risky as agricultural production, the errors in decision-making induced by substandard information from economically deficient analyses are weighed against the resultant errors of decision-making from all other sources such as volatility of prices and seasonal conditions.

In the ensuing years since the era of 'Enter Economics', structural changes in academia and in the public and quasi-public sector are significant reasons for the decline in the role played by economic thinking in farm management analyses. Structural changes in agriculture, education and the bureaucracy have implications for farm management as an organised profession, and for farm management education.⁷ Appreciation of likely future structural change in the economy is often missing in contemplations about the future of farm management as a profession, even though structural change is a continual process.

So far consideration has been given to why farm management analyses are conducted without economics. A related question, not pursued here, concerns the fate of good farm management analysis: how the results of such work can end up being ignored or misrepresented as vested interests pursue courses of action contrary to the dictates of economic sense.⁸ A more amenable query is where is it justifiable to try and improve economic literacy; tackled in the following subsection.

4.1 Where to improve economic literacy

The main focus for improving economic literacy should be within research and development organisations as they identify research problems, analyse research findings, and develop new farm technologies. There is also need to

⁷ The training of farm managers will likely retreat to a small number of specialist places that maintain a sound, practical, economics-based farm management curriculum. As always, a significant proportion of the future managers of large farm businesses will come with a good general education in a wide range of disciplinary areas, drawn to the task by innate love of farming and technical mastery and bringing to the task practical economic understandings.

⁸ Maybe a good starting point for this line of inquiry would be Bruce Davidson's classic works, *The Northern Myth* (1965) and *Australia Wet or Dry?* (1969).

understand the farm level resource implications and the incentives farm managers face when presented with new technologies or when there is a change in policy with respect to the use of natural resources. Catchment and regional level analyses of resource management strategies do not replace the need for understanding the incentives faced by the farm managers who actually make decisions about how resources are used.

A good reason for focusing on analysis of research priorities and results is because there is a public funding and public good dimension to this type of agricultural and natural resource research. Accountability ought to dictate that public and farmer-funded research is based on the best science and economics. If there are not people working in or with these organisations who have sound training in economics, not much can be done. In such circumstances, a dominant economics-free culture will remain dominant. At the same time, economics-free agricultural research organisations could claim that they would like to employ people skilled in farm management analysis but that there is not an abundance of people with this training. Agricultural economics courses and the numbers of students in them are declining faculties. People with straight, not applied, economics training only rarely move into the fields of agricultural economics and farm management economics. If an enlightened demand for economics trained staff were to emerge from organisations that are under-supplied with economics expertise, it is not clear that the domestic supply side could cope! Still, Australia has a long tradition of importing the skilled labour it needs, in any field. Inter-disciplinary and international trade remains a likely solution. Regardless, the question still left begging is, 'How to change anti-economic, fundamentalist organisational cultures?'

Economic illiteracy at the level of private firms supplying inputs to farmers and purchasing farm outputs, private advisers, and farmers, is arguably a lesser problem because of the private nature of the phenomenon. There should be no lack of incentive to ameliorate the problem. That is, while lack of farm management economic expertise is a phenomenon amongst some farmers and their advisers, just as it is amongst any other segment of the population of business people; it is a problem with a self-correction mechanism. Though, the resource misallocation and adjustment costs from the lack of farm management economics could still be significant.

At present only around one-third of farmers make a significant contribution to the gross value of agricultural production, and this proportion is steadily declining. To the extent that farmers in this group are already seeking and absorbing new technically focused information to help in decisions about productivity improvements, the delivery of such information ought to be in a sound whole farm economic context. Of the other farmers, there is a portion who are not commercial farmers, and of the small commercial

operators, there is always a portion who 'already know how to farm better than they do' (Castle and Becker 1962); that is, it does not matter much either way.

The focus in the present paper is on elementary concepts and analytical techniques of farm management analysis. While knowledge from the other disciplines relevant to the problem is necessary to inform the choice, but not sufficient to make the choice, there is plenty of evidence that the necessary analyses of questions relating to farm management can be conducted soundly in the hands of farm management economists. The basics are set out in any text on farm management economics, such as Boehlje and Eidman (1983) or Makeham and Malcolm (1993) or Hopkin *et al.* (1999) or even going back to the start, Heady (1952) or McMillan and Campbell (1949).

In the section that follows, how economics can contribute more to farm management analysis is pondered.

5. More from economics for farm management analysis

Changes of language can change perceptions. A positive change would be to define farm management analysis as farm benefit cost analysis. Farm benefit cost analysis would involve aligning the approach with some of the emphases found in social benefit cost analysis such as getting the spatial and temporal boundaries of the question about the farm system defined clearly; rigorously defining the with/without possibilities; and thinking long and hard about those parameters for which we can impute or measure values and those which we are unable to measure sensibly. Then, imagine and analyse a few scenarios. This approach might help redefine farm management analysis as a very economic thing to do: and make it clear that it is something that cannot be done properly without a solid knowledge of economics.

'Farming is a business' and 'the whole farm approach' are constant refrains with implications for farm management analysis. The implication of these refrains is that analysts ought to start with the business' balance sheet and the value of assets and gearing instead of the usual technical activity analysis. Use whole farm budgets, 'first look' partial budgets and discounted cash flow analysis. Eschew the Australian fetish with activity gross margins: they are rarely the right tool of analysis. Profit, cash and growth in equity are the three main measures of farm business prospects. Distinguish between economic analysis (is it worth doing?), financial analysis (is it financially feasible?), the growth in wealth analysis, and the non-pecuniary analysis. Establish what is likely to be the case without significant change to a farm business' operation, in terms of the balance sheet at the start, expected operating profit, expected net cash flow before and after

debt servicing, and balance sheet at the end. This approach places the consequences of past decisions, goals, and the role of expectations, at the heart of the analysis, and places growth in wealth to the fore. Another common refrain is that goals are multiple and multi-attribute. It is not just about profits. A focus on consumption possibilities and leisure as well would be worthwhile. Simple powerful analysis.

The use of partial, activity analyses and non-use of the whole farm approach to evaluate farm research is sometimes defended on the grounds that financial and investment questions can only be resolved on the basis of each individual case, and public agencies ought not, and cannot, provide individual analyses. While this is correct, the anomaly remains: it remains that proper analysis of significant change to farm businesses can only be done using the whole farm approach. The solution to analysing research and using the whole farm approach lies in using representative and real whole farm case study analyses to test the whole-of-business implications of an innovation (see Malcolm 2000, 2004). Done properly this approach has the added advantage that the method of analysis developed is readily adapted to the situations of individual farmers by the farmers and their advisers.

Decision support systems that provide technical information for incorporation into standard farm management analyses potentially have something to offer, even though much of the history of the development of agricultural decision support systems (DSS) epitomises the declining role of economic thinking in farm management analysis. As computer technology proceeded apace from 1980, computer-based DSS proliferated. Most of the early DSS started life as technical systems models, providing technical output about perturbations to agricultural systems. Such output is valuable input to farm management analysis. Often the DSS builders would add some economics to the output. Commonly this involved some crude gross margin analysis or cash flows instead of whole farm or partial budgets and discounted cash flow analysis of development opportunities. Recognition of the difference between what is needed to be included in a model for the purposes of science modelling for research and the information requirements for management decision analysis was rare. While farm management was undoubtedly systems, systems were not yet farm management.

However, progress happens. During the 1990s McCown, Brennan and others (Brennan and McCown 2002, 2003; McCown 2001, 2002a, 2002b; McCown *et al.* 2002) worked out what is needed for DSS to be more useful at farm level. Regardless of whether the economic content is incorporated into the DSS or comes into the question in a separate farm management analysis, the key to success is extensive involvement by the potential

users in the initial development of the tool, and intensive investment in education of the direct users of the DSS, who will generally be advisers not farmers.

5.1 Risk and uncertainty

The 21st century is eagerly anticipated to be the age of understanding risk (e.g., Bernstein 1996; Schiller 2003). More accurately, it might be the age of understanding more about risk and uncertainty. Economics as the discipline of choice inevitably became also the discipline of risk and uncertainty. Economics literature can give the impression of economists in awe that managers manage the great unknowns at all, when it is precisely the existence of risk and uncertainty that creates the opportunities and rewards that people are in business to capture. The core discipline of farm management should bring to the analysis of decisions both an offensive (opportunities, profits) as well as the more obvious defensive view of risk and uncertainty as something whose consequences are to be reduced or avoided.

In decision-making and running businesses, how do we cope with knowing that we do not know? (Wright, pers. comm., 2002). One consequence of uncertainty is that the decision-makers goals are modified in response to the existence of this uncertainty. The nature and extent of this modification is determined by the decision-maker's perception of where the decision lies on the continuum from risk (probabilities can be estimated and risk analysed) to uncertainty (no probability estimates possible, uncertainty not able to be analysed), and their attitude to these circumstances. Note that Wright (1983) and Pannell *et al.* (2000) have argued that in a highly risky and uncertain world such as farming, increasingly elaborate economic analyses of farm management decisions are unlikely to add much information of value to that deduced from a rigorous base level of analysis.

Decision-makers, faced with risk and uncertainty are constrained by what is known or knowable or imaginable. 'Life is risky. We can't remember the future' (Anderson and Dillon 1992). So, imagine it instead. Explore the consequences for goals of a small number of discrete scenarios encapsulating significant combinations of events, both sequential and simultaneous. Risk can be analysed using information about probability distributions where judgements can be formed about such distributions. Single values for key variables are not all that useful: it is distributions that count. And, it is the distributions likely in the future that matter; the context is dynamic.

Further, the notion of risk as a commodity to be sold by those wishing to reduce their exposure to risk and bought by those willing to accept more risk and consequently earn higher average returns is profound. A major focus of risky decision analysis then ought to be about opportunities offered

by markets to trade the risk and uncertainty associated with changes to farm systems.⁹

It is overly simplistic to reduce farm decision analysis to analyses of 'once and for all options'. Making a decision is just the first step. The next steps are to apply the decision and respond as the farming world changes both as a consequence of the decision and irrespective of the decision. In practice, sequences of decisions create the future and eventually the history of any business. Just as it is common to distinguish between tactical (day to day) and strategic management decisions, a similar type of distinction can be made about types of risk and uncertainty, with tactical risk and uncertainty creating problems and opportunities of less significance for the business than strategic risk and uncertainty (medium term) which has major consequences for gain or loss in the business.

The important business-related risks and uncertainties are those that have potential for causing great good or harm to the owner's goals that matter most, like wealth and business survival. Strategic decisions which play themselves out over a run of years are the most critical to achieving goals such as wealth, business survival, consumption and leisure. It is sometimes argued that the medium and long-term outcomes are merely the coalescence of numerous day-to-day and tactical decisions. While the affects of day-to-day and tactical decisions add to whatever cumulative outcomes eventuate, the strategic periodic big decisions affecting intensification, extensification, specialisation, diversification, enterprise type, gearing, land and machinery acquisition, are the major determinants of ultimate wealth and business survival. Yet so much risk research in agricultural economics has focused on the short-term risks of farming. As Just (2003) argues, the serially correlated risk events have the big impacts. Information (research) in these areas will be worthwhile.

Appreciation of risk and uncertainty and its management is aided in all manner of ways by more information and by greater clarity of communication about risk and uncertainty. Gigerenzer and Todd (1999, p. 33) talk of the 'miscommunication of risk – the failure to communicate risk in an understandable way', with the three major forms of communication of risk that lend themselves to miscommunication being the use of single event probabilities, relative risk, and conditional probabilities. He makes a compelling case for presenting risk information, from probabilities and distributions to applications of Bayes theorem, in terms of the arithmetic of events and populations of interest, using natural frequencies. Such a simple step, applied to common risk decision situations, can do much to better the

⁹ The constraints imposed by a relative scarcity of liquidity in the face of growing markets for risk is another matter!

understanding of risk situations. The simple arithmetic of risk can bring clear perspective to probabilistic events.

5.2 Where to base farm management

In this address about farm management analysis in general, and in a subsection about improving economics to better fit the purposes of farm management, there has hitherto been a lot about economics and little about management.¹⁰ Some academics (e.g., Wright 1983) argue that the management 'discipline(s)' make a more apt home for farm management than agricultural economics because the interdisciplinary, multidisciplinary focus of management suits farm management and farm management economics better. The problem with this is that, hitherto, efforts along these lines – management emphases on farm management – commonly have had a lot of management and not a lot of economics (on-farm or beyond the farm), and just as serious, often little technology either. Unfortunately, interdisciplinary can sometimes mean little of any discipline.

There is always the danger of confounding the discipline and the profession in debates about the meaning of the term farm management: about where its disciplinary home should be, about whether the farm management disciplinary area or profession is faltering or flourishing, about whether this state of affairs is because of too much of something or too little of something else, and about how the situation can be saved. These debates have a circularity and perenniarity about them that border on tedium. The disciplinary home of farm management may not matter as much as the content and balance of disciplinary knowledge brought ultimately to bear on the appropriate questions. Good farm management will be done by people with a wide range of educational backgrounds, types of training and intellectual strengths and objectives. What is not in doubt is that those who master basic economic ways of thinking and apply them to good purpose in their management will reap rewards. In summary: you may call farm management what you like, declare its home to be where you like, but you cannot do in farm management analysis whatever you like. You

¹⁰ Insights about the practical management behaviour in businesses that survive and succeed in meeting owner goals, are reported in (Collins 2001). For instance Collins' finding from a USA study of thousands of non-farm firms was that the keys to businesses consistently growing and meeting owner's objectives are simple. The owners have to be in the business about which they are passionate, doing the thing at which they have the best chance of being among the best, and must understand with absolute clarity which component of the business has the single greatest impact on profit. Translated into farm management economics terms: continually strive to build and maintain comparative advantage; understand the key source of profit of the business; and most of all, love farming.

cannot analyse choices sensibly without economic understanding, nor does making up idiosyncratic versions of economics work.

6. Conclusion

One manifestation of economic illiteracy is the failure to understand that economics is the core discipline for analysing questions about farm management. This failure leads public agencies, and others, to inadequate analysis of important questions about farm management. It leads to wrong-headed science equating the maximum with the optimum. It leads to backward-looking accounting misrepresentations of the benefits, cost, and efficiency of farm businesses. It leads to blinkered partial analyses solving small problems while overlooking big ones. With economics as the core discipline, the awesome analytical power of the whole farm approach allied to marginal thinking is brought to bear on the most important questions of farm management dealing with choosing new technology, pursuing growth and managing risk.

The great power of economic thinking is in making sense of resource allocation questions in farm systems characterised by much complexity and powerful dynamics. The logic and rigour of economic thinking act as an antidote to the merely intuitive. The challenge for those who continue to work in farm management economics is to re-establish theoretically sound farm management analysis, or farm benefit cost analysis, based on economics as the core discipline. Education, vigorous vigilance, rigorous professionalism, and enthusiastic and influential collaboration with non-economic disciplinary specialists are, therefore, the most important professional tasks for farm management economists.

It would be prudent to not be sanguine about cycles of disciplinary fashion and disciplinary momentum, where ideas and methods develop and prevail for a time, then the influence and application of these ideas decline. When this happens it is not always because the ideas have been replaced by better ideas and methods.

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