GAMES, CLUBS AND MODELS: THE ECONOMICS OF AN AGRICULTURAL ECONOMICS SOCIETY*

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The Australian Agricultural Economics Society is in the process of a generational change and therefore a careful examination of the way in which such an organisation operates would seem to be valuable at this point in its history. Many Presidents before me have considered the role and future of the Society in addresses to the Annual Conference. It is therefore a somewhat daunting task to try to say something different, possibly unique, and most of all interesting. In a search for ideas I reviewed the addresses of Campbell (1957), Chisholm (1992), Dillon (1972), Fisher and Thorpe (1990), Harris (1971), Lloyd (1970), Parish (1969) and Sturgess (1993). Collectively they contained a wide variety of ideas about the discipline of agricultural economics and its future. Some were humorous in style, some were highly structured and some were pure story telling and prognostication. In seeking a somewhat different approach for this paper, I have tried to consider some of the implications of the theoretical foundations for the group or club known as the Australian Agricultural Economics Society.

Recently, in a book sale, I was fortunate enough to come across a rather battered and weathered twelfth edition of Adam Smith's *The Theory of Moral Sentiments* first published in 1759. Smith (1809, p. 36) wrote:

> But whatever may be the cause of sympathy, or however it may be excited, nothing pleases us more than to observe in other men a fellow-feeling with all the emotions of our own breast; nor are we ever so much shocked as by the appearance of the contrary.

Much of *The Theory of Moral Sentiments* is about the interaction of people. This has been a difficult area for applied economics and one which I believe it is important to pursue further. Smith was writing as a philosopher at this stage and before his more famous work, *The Wealth of Nations* first published in 1776 (Skinner 1974), which laid the foundations for modern economics. In this paper I want to reflect on some of the benefits and costs of interaction and the way in which people can interact with each other to form a professional club or group and in which the production and use of impure public goods can be shared. I then will draw some implications from this analysis for the discipline of agricultural economics and for the Australian Agricultural Economics Society. Both are closely intertwined but are clearly not one and the same.

Early in 1994, as I began to prepare for this address, I recalled that somewhere in one of the books on my bookshelves was a paper by Buchanan (1965), 'An Economic Theory of Clubs'. Eventually I found the paper in one of my old treasures, an edited volume by Breit and Hochman (1971) which contains classic papers in microeconomics. This was not a paper I would ever have planned to use when I first purchased the book. The paper, in fact, provides a significant foundation for the analysis of our profession and provided the lead I needed into a whole range of literature connected with collective decision making and the theory of clubs.

In 1969, Dale Hathaway in his Presidential Address to the American Agricultural Economics Association took basic supply and demand analysis as a framework for discussing future challenges to the profession of agricultural economics. He stated (Hathaway 1969, p. 1011):

> In a time of rapid change, the probability of failing to anticipate major market shifts and adjust to them seems great. For economists, such failure would be inexcusable. The stories are legion about physicians too busy to notice their own health problems. It would be unfortunate if we were too preoccupied to apply a modest amount of economic analysis to the services we supply . . .

Hathaway's warning, I believe, is relevant today.

In this paper I would like to achieve two modest aims. The first is to present a theoretical basis for the analysis of the professional area of agricultural economics. In the tradition of economics, this will be a grossly simplified model of the complex real world. This will lead into the areas of inclusion and exclusion and the economics of groups. The second is to consider some of the implications of the economics of the discipline for the future development of the field of agricultural economics. In choosing a topic for this paper I have been conscious for some time of a degree of unease in the profession about our future directions. In my judgement, the future will require our profession to concentrate on developing a much greater understanding of externalities and their internalisation and the institutional structures to assist in this process. Externalities in many respects involve the interaction of people.

A consequence of my analysis, I hope, will be some wider implications for the development of agricultural economics as a discipline and also for the Australian Agricultural Economics Society. It may also have some implications for what is taught in our universities.

The basic economics of economics seems not to have been studied to any great extent. Wallis and Dollery (1993) provide one perspective by considering the economic incentives involved in professional exchange of information. Hathaway (1969) also applied the principles of economics to agricultural economics. I believe some progress can be made in understanding how our profession should adjust and adapt toward the year 2000 by considering various economic perspectives of the discipline and its related Society in Australia. This is particularly important, as in the 1994 Annual Conference, Arcus (1994) made the rather surprising claim that 'Agricultural economics as a recognisable area of specialisation may not last into the 21st century'.

The Theory of Clubs

Economists are very familiar with the idealised models of the consumer and of the profit-maximising firm in a competitive market. For private goods the consumer maximises utility subject to a budget constraint while for the firm, profit is maximised subject to the technical rules given by a production function (Henderson and Quandt 1980, p. 32 and p. 98 ff). The marginal rate of substitution between pairs of goods for every consumer must equal the ratio of the product prices, while for producers the marginal rate of transformation between pairs of goods must equal the ratio of the product prices, the value of the marginal product of each input with respect to each output must equal the input price and the rate of technical substitution for every pair of inputs must equal the ratio of their prices.

The models for public goods are less well known but similar in character. In the case of a pure public good each member in society can gain satisfaction from the output of the public good and the use of the good by one person does not diminish the use by another nor can one person appropriate the good for their own use (Henderson and Quandt 1980, p. 298; Samuelson 1954, 1955). This means that if x_1 is person 1's use and x_2 is person 2's use, and if X is the total consumption of the good, then $x_1 = x_2 = X$. In this case, the optimising condition requires the sum across consumers of the marginal rates of substitution between the public good and private good must equal the marginal rate of transformation in production or the community marginal cost (Samuelson 1954, 1955). This is sometimes referred to as the Samuelsonian provision condition.

It is clear that these models give a very poor explanation of many of the phenomena that are observed in the real world, largely because they are polar abstractions. Such models, however, are of use in reaching an understanding of the way the world works.

The theory of clubs, as developed by Buchanan (1965) and Olson (1965), provides a bridge between private goods and public goods. As Buchanan points out, there is a spectrum of ownership-consumption

possibilities between these two polar cases. This led him to the idea of extending the ownership-consumption rights over a good to a variable number of people, that is, the membership of the club. In its simplest form, the size of the club for private goods is one person and for pure public goods the size of the club is very large. However, the interesting cases are often in the in-between category where consumption of the good involves some of the characteristics of a public good and the optimal size of the sharing group is greater than one. A golf club is a useful example. The interesting socio-economic question then is what is the optimal size of the club, given that there is a cost to producing the good(s) and services which will also depend on the size of the club. As Buchanan points out, this is a theory about 'exclusion' and 'inclusion'. Others, including Berglas and Pines (1981) have extended the analysis to the question of what is the optimal number of clubs.

A basic property of clubs is voluntary participation in the utility derived from membership and the consumption of the club good or goods. This utility must equal or exceed the utility of non-membership. As explained by Cornes and Sandler (1986, p. 159), there is always a right of exit, usually at very little cost. In addition, it is assumed that any particular individual is indifferent as to who else belongs to the group provided they meet the membership criteria. As well, the costs of securing agreement among the members have generally not been taken into account. There are two key distinctions between the private firm and the club in that the production cost is shared among the members and the club good has public good characteristics but is subject to the problem of congestion (Porter 1978).

Even with the above limitations, it is clear that the theory of clubs is a theory of optimal inclusion as well as optimal exclusion. It should be noted that the theory can be applied from the point of view of the individual club (as in this paper) or from an economy-wide perspective in which the focus is on the number of clubs rather than the size of a club (Cornes and Sandler 1986). If individuals think that full exclusion, on whatever grounds, is not possible, they are likely to become free-riders to some extent. Thus, increasing the penalties for free-riders, increasing the probability of them being detected or finding means to make the benefits of more specific value to members will all increase the willingness of those who gain from membership to pay.

Consider an individual as a representative member of a club. The arguments in the utility function of this individual are assumed to include the club good, X, which is available for consumption to the whole membership of the club. Also, the utility of the individual will depend on the number of individuals in the club consuming the good or goods and with whom this individual must share the benefits. For an almost private good there will be a very direct effect on utility of the individual of the number of people in the group, for example, sharing a book, through to the case of the purely public good where the effect of the number in the group will be negligible until the capacity of the good is reached. In a

more recent formulation than that of Buchanan, Cornes and Sandler (1986, p. 165) write the utility function of the i-th individual as:

(1) $U_i = U_i[y_i, X, s]$,

where y_i is the i-th member's consumption of a representative private good, X is the club good and s is the membership size of the club. The utilisation of the club good by the i-th individual is x_i which in this simple case is assumed to be the same for all members and equal to the production of the club good, X, which could be considered to be the size of the club facility. That is $x_i = X$ for all the members of the club. The utility function is assumed to be well behaved and satisfy the normal requirements for a utility function: more of the good increases utility, the indifference curves are convex to the origin and the function is twice differentiable. In relation to the membership variable, s, utility is initially assumed to increase as numbers rise and then, as the effect of crowding takes hold, increased numbers will diminish the utility from X. A crowding effect is an essential element of the club problem.

For the simple model it is assumed that there is no cost to exclusion of potential members (this could be relaxed) and that congestion will eventually occur. This implies that the club good is not a pure public good.

At the same time as individuals obtain utility from belonging to a club, there is usually a membership fee which is used to produce the goods and services provided by the club. This implies a cost function for the production of the club good which will depend on the size of the club good, X, and also the number of individuals, s, sharing the club good. With a total cost of production for the club good, $C(X,s)$, it is now possible to specify the typical member's resource constraint. Given an income level or budget allocation, I_i, used for the purchase of both the club good and the private good(s), y_i, with price p_y equal to 1.0, then the normalised constraint may be written as:

(2) $I_i = y_i + C(X, s) / s$.

The cost function is assumed to be well-behaved and to increase with the size of the club facility and the number of members (that is, $C_X > 0$, $C_s > 0$).

It is now easy to set up a constrained maximisation problem for a representative club member in which utility is maximised subject to the resource constraint (subscript i is dropped for the sake of more compact notation).

(3)   Maximise $U[y, X, s] + \lambda (I - y - C[X, s] / s)$

         $\{y, X, s, \lambda\}$

The relevant first-order conditions that result are as follows:

(4) $\partial U/\partial X/\partial U/\partial y = \partial C/\partial X/s$ Provision condition

         $MRS_{Xy} = MC_x / s$ or equivalently $s\, MRS_{Xy} = MC_x$

(5) $\partial U/\partial s/\partial U\partial y = \partial C/\partial s/s - C(X, s)/s^2$ Membership condition

$MRS_{sy} = MC_s / s - C(\cdot) / s^2 = MC$ of increasing membership.

From equation (4), the marginal rate of substitution between the club good and the private good, MRS_{xy}, must be equal to the individual's share of the marginal cost of the club good, MC_x/s; or equivalently the sum of the marginal rates of substitution across the membership of the club equals the marginal cost. This is the standard Samuelsonian provision condition for public goods, but restricted to addition across the club membership. In a slightly modified formulation it can be shown that the marginal rate of substitution between the club good and the private good must equate to the marginal rate of transformation in provision of the two goods for the typical member.

Equation (5) is a first-order condition which relates to the number of members in the club. For the optimal club size the marginal rate of substitution in consumption between the size of the group sharing in the use of good X and the other good y, MRS_{sy}, is equated to the marginal costs of increasing membership. The marginal cost of increasing membership is made up of two components. The first is the increased facility maintenance costs, and the second is reduced membership fees as a result of sharing over a larger number of members.

Thus, the individual is in equilibrium in relation to club size when the marginal benefits of an additional member are just equal to the marginal costs incurred by having the additional member. There may, of course, be integer-type restrictions involved in clubs of a very small size. It is also worth noting that, after the solution has been determined, the nature of the good can be determined. Goods can be classified as to their degree of 'publicness' according to the equilibrium value of s or the optimal size of the sharing group. If the membership is small, the goods can be classified as largely private; if it is large, they are public in character.
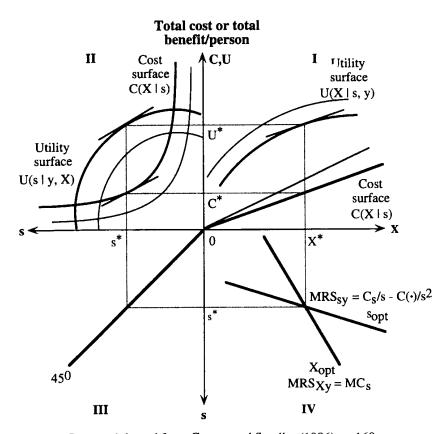
The above model can be reflected in a four-segment diagram (Figure 1 modified from Cornes and Sandler 1986, p.169). However, what is being portrayed is a three-dimensional benefit surface and a three-dimensional cost surface. The point of the largest vertical difference between the two will give the optimal size of the club and the optimal membership. In quadrant I the utility of the consumption of the club good is indicated with diminishing marginal utility at a given membership size along with a constant-returns-to-scale cost function. Optimal provision of X corresponds to the point where the slope of the utility surface is equal to that of the cost surface at the given membership size. In quadrant IV the optimal provision of X is traced out as the membership size is changed.

In quadrant II the utility and cost surfaces are again indicated for a given level of provision of X. The optimal club size for a given X is indicated where the slope of the utility surface equals that of the cost surface. Equal cost sharing per member implies that the cost function in this dimension is a rectangular hyperbola. The utility surface reflects camaraderie with small numbers and this is then overshadowed by the

effect of congestion. The optimal levels of membership for different club facility sizes are traced out in quadrant IV. The intersection of the lines s_{opt} and X_{opt} in quadrant IV gives the simultaneous solution to the problem for both membership and club size in terms of X. Within the model the assumption is made that the membership fees will be such as to cover the costs of the provision of the club good X. This is implied in the resource constraint.

Using some simple comparative statics it is clear that, if the cost surface for membership is lowered, the level of provision is likely to rise and the optimal number of members increases. If the benefit surface is raised, membership and provision levels should also rise.

FIGURE 1
Graphic Representatation of the Determination of an Optimal Club Size

Total cost or total benefit/person

II Cost surface C(X | s)

I Utility surface U(X | s, y)

Utility surface U(s | y, X)

Cost surface C(X | s)

$MRS_{sy} = C_s/s - C(\cdot)/s^2$

s_{opt}

45^0

X_{opt}

$MRS_{Xy} = MC_s$

III **IV**

Source: Adapted from Cornes and Sandler (1986), p. 169.

Many clubs, such as the Australian Agricultural Economics Society, produce multiple goods. In this case a similar set of conditions (Appendix A) can be obtained but, as Berglas and Pines (1981) point out, there is

then the interesting possibility of cross subsidisation from a profitable area to finance a deficit area. As well as multiple goods, cases of non-homogenous membership groups have been considered. Again, many clubs face the problem of membership heterogeneity.

The case of non-homogenous populations and the formation of clubs raises many interesting questions. Heterogeneity leads to differentiated or mixed clubs. Berglas and Pines (1981, p. 159) conclude in relation to non-homogeneous populations that the larger the differences in tastes and the smaller the degree of increasing returns in the production of the club good the more likely that segregation is optimal. In this paper, this issue of non-homogeneity will not be pursued but it is recognised as important in explaining some of the observed phenomena relating to clubs.

Game Theory and the Number of Clubs

Game theory has been used in the analysis of clubs (Cornes and Sandler 1986, ch. 13). The application of game theory has allowed an examination of what is the optimum number of clubs and the stability of their composition. In using game theory, the provision condition is placed in the background.

The 'core of an n-person game is the set of feasible outcomes that cannot be improved upon by any coalition of players' (Shapley 1971, p. 11). This implies that no reorganisation of the set of players into different coalitions can improve on the payoffs to the participants. Implicit is an unlimited bargaining process among the population with respect to the payments to support the club. The implication is that the core will be a stable set of clubs and members. With a homogeneous population it is reasonable to assume that the total payoff to all members depends only on the number of members and not the composition of the membership. Pauly (1967) found that a core would consist of a set of clubs which maximises average net benefits. This implies an optimal set of membership sizes and level of provision. The number of clubs is then simply determined by dividing the population by the membership size. If an integer does not result, a continuous shuffling in and out of marginal members is likely.

Without pursuing in detail the nature of game theory solutions to the clubs problem, a number of results are of interest for a professional organisation (see Sandler and Tschirhart 1980 for a review). First, there will be a strong incentive for the size of clubs to equalise with members in oversized clubs moving to undersized clubs and also the possibility of new clubs forming. Second, discrimination among members, such as with differential membership fees changing the net benefit from the club, can only be limited since either the members being discriminated against will leave the club or members from other clubs will wish to join the favoured group. With multiple clubs, discrimination is more difficult to sustain. Third, in a heterogeneous population, clubs with higher average payoffs are likely to have fewer members than those with lower average payoffs. This ensures that for larger clubs there is little incentive for members to

transfer to the smaller clubs or to accept members from smaller clubs (Cornes and Sandler 1986, p. 202).

Finally, there are three other important areas of analysis in club theory which may have some relevance to professional organisations such as the Australian Agricultural Economics Society. First is the issue of multiple-product clubs. In fact, most clubs provide a range of services for members. The Society is also a multi-product club which provides journals, conferences, workshops and branch meetings. Second is the issue of clubs having a life longer than the life of a particular set of members. These are known as inter-generational clubs. Clearly, an organisation such as the Australian Agricultural Economics Society is inter-generational in character. Third is the issue of uncertainty in relation to the extent of congestion and also to the payoff from membership. Clearly, the decision to attend a conference is made before the member is aware of the consequences of any congestion that might occur once the conference is attended.

The Australian Agricultural Economics Society as a Club

The Australian Agricultural Economics Society was founded in 1957 with the aim of encouraging the pursuit of study, research and extension work in the discipline of agricultural economics in Australia. As a discipline, agricultural economics has had many successes summarised by the classic comment of Leontief (1971) that agricultural economics is 'An exceptional example of a healthy balance between theoretical and empirical analysis and of the readiness of professional economists to cooperate with experts in the neighbouring disciplines. . .'. This comment was made in the context of severe criticism of economics and the emphasis on theoretical methods often devoid of application to data and to real problems. Agricultural economics has succeeded in many different ways, such as in successfully getting the idea across that if the rural sector adjusts to changes in the environment rather than seeking protection the nation will be better off; that quotas and other regulatory strictures often associated with marketing boards limited the development of an industry, etc. The Presidential Address by Lloyd (1970) is a good example, among many, of the application of economic logic to debunk spurious arguments. As Harris (1971, p. 119) notes: 'The strength of the agricultural economics discipline in Australia — as in overseas countries — is that it has remained, as it developed, basically an "applied" or problem oriented discipline.' Thus, in a theoretical sense there has been a strong public demand for the services of agricultural economists as applied analysts. This is reflected as a derived demand for the services of the individual agricultural economist and may give some clues as to the factors that shift the demand for applied economists such as the nature of the economic problems that our customers see as being in need of solution, the understanding by the public of the role of the agricultural economist and so on.

Given the demand for the services of agricultural economists, the question which then arises is why form the Australian Agricultural Economics Society? The theory of clubs gives a clue in that there are some goods which have public good characteristics and would not be economic to be produced by an individual. The key activities of the Society which fall into this category would seem to be the annual conferences, workshops and Branch meetings and the journals the society produces. It is reasonable to ask: Are there other club goods that may have significant net benefits? Both journals and conferences have partial public good characteristics in the sense that information is involved and that attendance or use by one individual does not seriously reduce the information available to other individuals but may enhance it to a point and then cause it to diminish. As well, the greater the number of members of the Society, the lower the membership fees can be to provide the services of the Society. It is also apparent that it is the trade in information in each case and the gains to be made from its trade that are the significant issue. Part of the perceived benefit of the Society as a club is clearly connected with the role of refereed publishing in relation to the promotion criteria of educational and research organisations.

I now want to turn to some interpretation of the theory of clubs for some of the choices that the Australian Agricultural Economics Society seems to be facing. These are alternatives that have been identified from various sources but clearly have much in common with what is happening in the United States. These issues also largely reflect the benefit side of the clubs model rather than the cost side. This is not to suggest that there might not be gains in understanding to be made from a detailed consideration of the cost of production of club goods.

Professional Specialisation vs Applied Economics (Broadening)

The debate about narrowing the focus of agricultural economics or broadening it has been of long standing. In 1969, Parish (1969, p. 1) was concerned with the 'disproportionate growth in Australia of agricultural economics relative to other branches of applied economics.' He stated:

> It would seem to me to be in the national interest if some of our more high-powered managerial scientists were to move from university departments of farm management to the Department of Defence; if cost-benefit experts were to scrutinise the decisions of the biggest irrigation authorities of them all, our metropolitan water boards; if more attention were to be paid to the price of oil and gas, even at the expense of less being paid to the price of wheat; if a Bureau of Urban Economics were to poach some staff from the B.A.E.; and if those concerning themselves with problems of wheat- and meat-grading were to widen their interest to encompass the whole field of consumer protection and education.

It is interesting in this context to reflect on the career paths of many of the Presidents of the Agricultural Economics Society and how they have

broadened their professional activities as a matter of career choice. Along with Parish, Harris (1971, p. 128) also has suggested a broadening of the fields of inquiry for agricultural economics. Dillon (1972, p. 80) too has stated: 'Whether or not we widen our interests in this way will, I predict, be our major source of conflict through the middle term, with yesterday's radicals being today's conservatives and saying agricultural economics can only mean agricultural economics.' Dillon saw conflict in the issue but in the longer term argued that agricultural economists are by far the best equipped of any Australian professional group to contribute policy alternatives to solve many of the world's bio-economic problems. In part, the argument for broadening is that many of the problems tackled by members of the profession require analysis in a wider context and that many of the problems of the future will be broader than what has been termed the 'line fence' (farm management) conception of agricultural economics (Pasour 1993, p.65). The paper by Fisher and Thorpe (1990) is a clear example of the potential for broadening the range and scope of agricultural economics into resource economics and policy areas. Another example is the change of the Bureau of Agricultural Economics to the Australian Bureau of Agricultural and Resource Economics. This change has involved many staff who have recognised themselves as agricultural economists working in the resource industries. Thus there have been very significant pleas and moves to broaden the role of agricultural economics.

Counter to these pleas is the apparent challenge to the broadening of the boundaries of agricultural economics by other clubs. As noted in MacAulay (1993), the profession of agricultural economics currently would seem to be under considerable threat. The Agribusiness Association of Australia and New Zealand has implicitly defined agricultural economists out of the area of business management of the food system largely because we failed to understand the nature of the business involved. The Australian Association of Agricultural Consultants and the Farm Management Society have similarly defined roles at the farm level, partly because of the change in extension from being mostly a publicly funded activity to being a privately funded activity. In educational terms, agricultural economists have a major battle to fight to retain control of the agenda in relation to curriculum and professional training in agricultural economics with the Australian Institute of Agricultural Science claiming authority over the area of agricultural economics in relation to competency standards. As Sturgess (1993) explains, such standards may be seen as a survival strategy for the Australian Institute of Agricultural Science. In the context of the theory of clubs, the implementation of competency standards can be seen as raising the barriers to membership and attempting to increase the perceived benefits to existing members. When new clubs can readily be formed in the various areas of agricultural science, standards may simply spawn more clubs without such costly entry procedures or encourage potential members to choose other similar clubs.

From the point of view of the theory of clubs, it is possible that narrowing the breadth of professional coverage of a club may enhance the benefit to each of its members by raising the level of utility from each of the goods produced in the sense that there is less 'wastage' of information. If, the cost of forming a professional society is not particularly high, and modern technology has probably helped a great deal in reducing costs, the formation of a new club to meet more specific needs may become economically rational. As well, this may imply a narrowing of the focus of existing clubs to improve the benefits for the existing membership. It is perhaps not too surprising that professional societies are 'spun off' other societies at a reasonably rapid rate.

The counter view may also be put that more members will mean a lower per person cost of providing the goods and services of the club and that one way to gain more members is to broaden the range of the property rights attached to membership. In addition, it is possible that if the users of the professional services can have their demand raised by providing a broader range of services, the demands for professional support from professional organisations may also need to widen. This will be the case if the professional organisation or club is involved in professional training.

In the end, the balance between these effects will be a quantitative judgement on the optimum size of the professional grouping, given the nature of the shifts in the cost function and the utility of benefit function. My hunch is that the Society will need to be well focussed on the interests of existing members and on improving their benefits while at the same time broadening the extent of the discipline area to attract more members thus moving down the cost function for the provision of services. This means, meeting the demands and needs of our members as they change and continuous adjustment and adaptation of the Society to new and evolving areas. I believe it is important to continue to broaden the base of the profession and be prepared to drop areas as they lose relevance. There may also be great benefit in cooperating or 'trading' between similar clubs for certain of the Society's activities.

Private vs Public Goods

Debate in the American Agricultural Economics Association about its future directions is also intense. Numerous articles have been written on the subject but the debate is sharply focussed in the pages of the 75th Anniversary Issue of the *American Journal of Agricultural Economics*.

Many arguments are involved but a central issue is whether the focus of publicly funded research efforts should be on the production of public goods. Pasour (1993, p. 65) points out that the public-goods model has important implications for the funding of agricultural economics work. He goes on to add that, with the recognition of the ideas of public choice, it is likely that the public-goods rationale for publicly funded research and education will not stand the test of time. His argument is that many

of the returns to such activities can eventually be appropriated. However, in the context of information, appropriation is still likely to lead to its under provision because of the difficulty of complete appropriation.

Alternative arguments have been put by Just and Rausser (1993). They argue that with publicly funded institutions and limited public funds, the public expects that the funds will be used to produce goods with public-goods characteristics. They also argue that with declining public budgets the agricultural establishment has received a declining share of the public research budget and the shortfall has been offset by increases in private funding of various kinds. In taking on privately funded research, powerful private interests can 'leverage' public research funds and thereby divert them from the production of public good outputs. Eventually, the agricultural research establishment will be subject to public criticism for failing to produce what it has been funded to do and thus face even further reductions in funding. A similar argument would seem to apply in Australia.

Just and Rausser (1993, p. 72) go on the offensive and suggest that:

> Not only is an expanded product line needed to seriously attract an expanded support base (consumers, environmentalists, rural communities, etc), but investment is needed to develop an institutional structure that lowers the transaction costs of organizing the expanded constituency and facilitates their political access to the science funding process. ... A broad scale social science effort is needed to educate scientists and administrators as well as political support groups about appropriate roles of public and private research organizations.

They go on to suggest also that agricultural economics must become:

> ... politically astute and 'sell' the importance of public good products. ...
> It must educate potential political support groups about public-good productivity versus continued privatization.

The basic argument of Just and Rausser (1993) is that public goods will be under-produced and that unless the argument is made forcibly that the public benefits substantially from the production of such goods, research and education being two such goods, then private interests can capture what funding there is for public goods and orient the use of the funds in their own self-interest.

In the context of the theory of clubs such argument has a direct bearing on the stance that the Australian Agricultural Economics Society might adopt in relation to education and research and therefore may affect the perceived benefits to members. However, adoption of a privatisation line (as would seem to have been the approach in the past by many members) may have left agricultural economists as a group tending to ignore the overall social benefits of the production of appropriate levels of public goods. It is my belief that there is a large task ahead in designing economic and institutional structures to deal with the significant problems of endemic externalities. As Pasour (1993, p. 60) suggests, the marginal payoff is likely to be greater from institutional choices rather than from analyses which assume given institutional arrangements. If the payoff is higher,

this should lead to higher benefits to an agricultural economics society which focuses on institutional change rather than change within a given set of institutional structures. In addition, a focus on institutional change and design clearly has many of the characteristics of public goods to which Just and Rausser refer in their paper. This is an area, however, in which the profession does not seem to have adequate theory that can be effectively applied.

Political Economy vs Empirical Analysis

The extent and level of quantitative training of agricultural economists and of the nature of journals and conferences in this context is clearly an issue in defining the nature of the services provided by the Society. Much has been written on the role of empirical analysis in the contribution that agricultural economists have made in the past. Leontief (1993), for example, makes a plea for the reconstruction of economics into a truly empirical science. However, in the process he recognises that a significant investment must be undertaken in empirical research and particularly in a systematic gathering of data. As a counter to this argument on empirical analysis, others such as Soth (1986) and Storey (1978) have argued for a return to the study and practice of political economy. Martin (1990) argues that changing the rules for policy formulation is an important factor influencing policy outcomes. Just and Rausser (1993) concluded that the profession had become too technique oriented and also pleaded for more highly readable journal papers.

It is clear that an absolute choice between the political economy approach and the empirical approach does not have to be made. Paris, et al. (1993) reassert '. . . the importance of a balance of theoretical and empirical efforts.' They support the notion of good empirical research. Thus, it would seem important as a profession that there is a collective knowledge about both approaches, that both can be carried out with a high degree of excellence and that they can be matched appropriately to the problem at hand. This conclusion has implications for the design of Society conferences and workshops and professional development programs. I believe that as an applied discipline, a very wide range of tools in the 'kit bag' are required and that the skills to effectively use them are also vital if agricultural economists are to retain a comparative advantage as applied analysts. The Society, in conjunction with universities, clearly has a role in providing some of the services needed for professional development. Adding new products to the product range of the Society also has the potential to retain both members who may go to other clubs for such services and to increase membership through satisfying a more diverse set of wants.

Agriculture vs the Food and Fibre System and Resource Economics

In an Australian context, I believe, the issue of the combination of agricultural economics with resource economics is largely settled. Most

departments of agricultural economics in universities have now included resource economics in their name and/or have courses in resource economics. The more important issue is to what extent can a real claim to the area be made without significant research being carried out and a significant impact being made on policy. There is probably still a way to go in this area but the direction seems clear. However, with the integration of resource economics into the training of undergraduates, the Society may find it has appeal to a larger number of graduates if there is a clear indication of the willingness of members to include resource economics by a revision of the name of the Society.

In looking forward in 1972, Dillon (1972) pointed to the industrialisation of agriculture as a most likely trend. Looking from the 1990s, his timing was a little out. However, the time when agriculture and the production of food and fibre is considered as a set of industrial processes rather than as agricultural processes which are integrally bound up with family farming is clearly much closer than in 1972 (see Drabenstott 1994). Dillon (1972, p. 79) defined industrialised agriculture as '. . . where farms are typically much larger than they are today in terms of capital, volume of production, turnover and managerial competence; where the approach to management and production is far more 'industrial' and profit oriented than it is today; and where the traditional values of rural living and ownership count for less than they do among today's producers.'

The declining relative importance of pre farm-gate agriculture is well recognised (Chisholm 1992; Johnson 1987). However, if the whole food and fibre sector is considered, this forms a very significant part of the economy. It is also important to remember that the value of farm production in Australia and the value of farm exports have increased over a very long period of time. The rest of the economy has grown even faster. In 1990-91 the value of Australian exports was estimated at $15.7 billion (balance-of-payments basis) (ABARE 1993). At the same time the value added in the food and beverage industry was close to $12 billion in a total turnover of $34 billion (Department of Industry, Technology and Regional Development 1993).

These observations point to a set of changes taking place in the environment in which agricultural economists operate. In considering these changes, the issues are similar to those of taking on a broader focus. In terms of teaching and educational programs for agricultural economists and the potential membership of the Society the industrialisation of agriculture is likely to be a gradual process. Also, the changes are not likely to change significantly the basic principles of applied economics that should apply to the analysis of problems. Thus adjustment to the new environment should be reasonably straightforward.

The issue of the economic analysis of the food processing, distributing and retailing sector is important. Clearly, there are many issues needing research which are purely of a private nature but there are also other areas of analysis such as food quality, nutrition and safety which are of broad public interest and of a public good nature. It would seem that if the

argument of Just and Rausser (1993) is followed, then a clear distinction should be made between the issues of a private nature and those of a public good nature. In this context, I believe agricultural economists have both the skills and techniques to make a significant contribution to the analysis of problems involving public goods. However, if the conceptual definition of the discipline area is too restrictive in character through limited objectives and a name which narrows the scope of the club, the discipline is likely to decline and become irrelevant. Rather, by considering the set of skills that members have and looking broadly at where these skills might be applied, it would seem possible to come to a new definition of the role and objectives of the Australian Agricultural Economics Society.

I must also add, that in this context, I am of the second generation of agricultural economists since I had not begun my professional career in 1957 when the Agricultural Economics Society was formed. In this sense, the torch of the Society has been passed to a new generation who must define a new rationale for existence as a professional grouping. The radical dynamism and enthusiasm of the founders of the Society, who saw a clear need for such an organisation, must now be transformed into an understanding of a new set of problems and a new environment with a new sense of direction.

Implications

What are some of the implications for the Australian Agricultural Economics Society of the analysis thus far? There are several.

The first of these is the utility levels of members can have an important effect on the optimum size of the club. This is a technical way of saying that the way in which the services of the club satisfy the needs of the membership is very important. It is clear that with a diverse set of needs a reasonable range of different services needs to be provided. A quick read of *Choices* from the American Agricultural Economics Association and also *Agricultural Science* from the Australian Institute of Agricultural Science gives a clear picture of one possible way to add to the services for members. These magazine type publications package information in an easy-to-read form and over a wide range of areas of interest. They are also edited and prepared by professionals with the time and expertise to provide a very attractive product. They effectively reduce the cost to the reader of information transfer. Information technology may also provide various means to also reduce the cost of obtaining information (Stix 1994).

The second is that members' utility levels can be influenced by the number of participants in the club, particularly for single events such as conferences. The basic insight of the 'clubs' literature is that numbers of people matter from an economic point of view. To specify exactly how they matter is much more difficult. However, designers of events such as conferences can get feedback from participants over a sequence of events on how they were perceived and how the size of the facilities and the number of people using them affected the satisfaction levels of the

participants. This information should start to be accumulated in a very organised way by the Society.

Third, the technology and cost of producing club goods is a factor in the optimal size of a club. Depending on the nature of the utility surfaces and the cost surfaces, very small changes in the technology appear to be able to have dramatic effects on the optimal club size. In the real world, however, there may be factors such as risk and uncertainty, collegial motives and the understanding of professional jargon which will tend to stabilise the size of a club. If this is the case, it is important to have an efficient and cost effective technology for producing the club goods. For the Australian Agricultural Economics Society, this means effective and efficient production of conferences, workshops and journals. I believe the Society should invest real effort and probably funds in making sure these are as efficient and effective as it is possible to make them. This is particularly the case when much of the production is based on voluntary effort.

Fourth, the role of voluntary effort raises a number of interesting issues. Although from the point of view of the club, voluntary effort is considered free of charge, in a broader sense this is not true. Voluntary effort has an opportunity cost for the members who are providing the effort, since to do work for the club, implies giving up something else. As a club becomes more mature it is likely that the opportunity cost of that effort will increase and particularly so in times of financial stringency. It may be so high that voluntary participation is no longer rational. Former luminaries fading into a background role in the Society may, in part, be reflecting their high opportunity cost of voluntary participation. It is also possible that the level of altruism toward the collective well-being in society has declined in the public more generally as government programs and tax-funded activities in the economy use a larger proportion of earned income. This will increase the marginal valuation of self-oriented activities as the proportion of income available for them declines. Thus, in general, it has become more difficult to depend to the same extent on voluntary effort for the operation of the Society.

Fifth, it is clear that the population available for membership of the club will depend on the number who will value the impure public good or goods that are produced. The number may differ for different goods and thus the mix of goods and services produced will influence the number of people who can be attracted as members. In the case of agricultural economics, the number of people in the community who include access to agricultural economics journals and conferences in their utility functions may be declining as the agricultural sector becomes relatively smaller. However, the number of graduates in agricultural economics is increasing. This would seem to imply that some attention should be given to the definition of the nature of the boundaries to the club. The move to combine with the area of resource economics would seem to be clearly a response to this kind of issue but further revision to discipline boundaries may be needed.

As Just and Rausser (1993) suggest, an aggressive redefinition of the role of agricultural economists is needed to 'build and organize political support for public good research activities, and of restructuring incentives to enhance the public good productivity of research and outreach.' The 'catch-22' that they point to is that if a passive role is taken to the '. . . waves of budgetary and political pressure to seek private research funding . . . and to produce private goods and patents that compete with the private sector products . . . public research universities will undermine the very foundation of their existence.' An important implication that Just and Rausser (1993, p. 81) point out is that the incentive system for individual researchers needs to change to make sure the redirection takes place. Powerful incentives need to be given such as merit increases, promotions, research assistants, etc for those doing research with public goods output. The necessary analysis, debate and discussion of such issues would only seem possible within the context of a club or clubs. The benefits of membership of the Australian Agricultural Economics Society may be considerably enhanced by effective analysis, debate and discussion carried out within the context of the Society.

Concluding Comment

For the Australian Agricultural Economics Society I believe that it is important that the 'goods' produced be designed so that the net benefits to the membership are at a maximum or as close to this as possible. The existing membership would seem to be important in this respect. However, because membership continually changes, the Society must have appeal to new members also. Thus, I believe, new and experimental activities which have a impure public good character should be being attempted whenever possible. One of these might include a more active role in professional training, particularly in the methods and techniques of the profession. Another is the provision of a more diverse set of published material. As well, it would seem worthwhile to focus on how the cost of the exchange of information between members can be reduced and its benefits can be raised. New technologies may play a part here.

In relation to the issue of broadening the scope of the Society, I believe that a careful approach is needed, but that it certainly needs to take place. However, the window on the world should not be so wide that there is a loss of focus nor so narrow that relevance is lost.

For the tertiary educational institutions I believe the Society needs to help ensure excellence in methodology, methods and techniques along with a passion for learning so that the membership is well trained and able to continue the excellent applied work to which Leontief (1971) refers as a 'healthy balance between theoretical and empirical analysis'. Thus, breadth of coverage in techniques of analysis and a realistic focus on the areas of agriculture, resources and the food and fibre system as a whole, would all seem to be appropriate in the training of future members of the Society.

areas of agriculture, resources and the food and fibre system as a whole, would all seem to be appropriate in the training of future members of the Society.

For government, industry and the rest of society it would seem important to support the call of Just and Rausser (1993) and make sure that the importance of the production of public goods is not overlooked in the scramble to privatise. Further, work on the institutional structures relating to the agricultural and resource industries would seem to fit this requirement well.

Finally, by way of conclusion I return to my earlier statement, that for applied economists, such as agricultural economists, the analysis of externalities will be crucial in our future. In this paper I have presented one of a number of ways of dealing with externalities in the case of impure public goods where the size of the community sharing the impure public good needs to be determined. In a broader policy context, finding means to facilitate the formation of clubs through reducing the cost of their formation, improving the legal and institutional arrangements for their development and generally ensuring that the benefits of collective action can be effectively shared, may help make the world a little better off and a slightly better place in which to live.

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APPENDIX A

A Club Model of a Professional Association

The basic structure of the Australian Agricultural Economics Society will be used to develop a model of a professional organisation. The products of the Society will be assumed to be two goods referred to as 'journals' and 'conferences'. Journals will be measured in terms of pages published and conferences will be measured in terms of sessions provided. Many assumptions might be made about the various functional forms of the relationships involved, all with varying theoretical properties. Clearly various assumptions will imply that slightly different conclusions might be drawn. However, the basic economic structure of a professional society can be gleaned from such a model.

A key feature of the proposed model is that the membership fee for the society is the source of funds for the journal while for the conference a conference toll is charged. Thus there is a membership fee and a toll. Also, in such a society all members receive the journals and only some members attend any given conference. For simplicity it is assumed that the number of members is reasonably large so that there is not an integer problem. It is also assumed that members of the society are indifferent in relation to which members of the society share the conferences and the journals.

Congestion costs of a different kind are involved in both the journals and the conferences. With the journals, congestion is involved in getting access to the journals for the purpose of publication if membership is large. With a very small membership, there is a loss in quality and appeal of the journal since the available range of articles will be small. In relation to conferences, there will be an increase in the utility of conferences as the number of attendees rises to a certain point. Eventually, with increasing numbers of attendees in relation to the size of the conference facilities the effects of crowding will start to be felt. The benefits to attendees will start to fall as numbers become large in relation to the given conference facilities. As the size of the conference increases in terms of sessions, there is likely to be a loss in utility because of an inability to attend sessions which occur simultaneously. It is apparent that the congestion functions for the journals and the conferences will be different but there is a clear case for congestion to eventually occur. The effect of congestion is rather like a positive/negative externality. Initially, 'camaraderie' and the other benefits of group interaction increase but at a decreasing rate until the negative external effects of people using a facility start to dominate the positive effects. As Porter (1978, p. 31) points out 'congestion for consumers is rather like common property for producers'.

Let y be a normal good (as opposed to a club good), X_a a club good funded by membership fees and measured in terms of journal pages, X_b is a club good with a toll (that is a conference fee) and measured in conference sessions, s is the membership numbers in the club and v_b is the proportion of members attending the conference. The utility function of a typical member is assumed to be a function of the normal good, the

number of journal pages (delivered to all members), the number of conference sessions, the number of members and the proportion of members attending the conference. It is assumed to be a well-behaved function as indicated in the main text. The utility function is subject to a normalised resource constraint similar to equation (2) but the cost function for journals, C_a, is a function of the number of journal pages and the number of members to which the journals are delivered. The conference cost function, C_b, is a function of the number attending the conference (all assumed to be members). The cost functions are assumed to be well-behaved functions.

The Lagrangian function for the constrained utility maximisation problem for a typical club member is as given in equation (A.1). The first-order conditions are equations (A.2) to (A.7).

(A.1) $Max\ L = U[y, X_a, X_b, s, s\ v_b] + \lambda\ (I - y - C_a[X_a, s]/s$

$- C_b[s\ v_b, X_b]/(s\ v_b))$

(A.2) $\partial L/\partial y = -\lambda + \partial U/\partial y = 0$

(A.3) $\partial L/\partial X_a = -(\lambda \partial C_a/\partial X_a/s) + \partial U/\partial X_a = 0$

(A.4) $\partial L/\partial X_b = - (\lambda\ \partial C_b/\partial X_b/s\ v_b) + \partial U/\partial X_b = 0$

(A.5) $\partial L/\partial v_b = \lambda\ (C_b[s\ v_b, X_b]/(s\ v_b{}^2)) - \partial C_b/\partial s\ v_b/v_b) + s\ \partial U/\partial s\ v_b = 0$

(A.6) $\partial L/\partial s = \lambda\ ((C_a[X_a, s]/s^2 + C_b[s\ v_b, X_b]/(s^2\ v_b) - \partial C_a/\partial s/s$

$-\partial C_b/\partial s\ v_b/s) + v_b\ \partial U/\partial s\ v_b + \partial U/\partial s = 0$

(A.7) $\partial L/\partial \lambda = I - y - C_a[X_a, s]/s - C_b[s\ v_b, X_b]/(s\ v_b) = 0$.

Using equation (A.2) and substituting for λ, a similar set of conditions to those in equations (4) and (5) may be derived.

(A.8) $\partial U/\partial X_a/\partial U/\partial y = \partial C_a/\partial X_a/s$ Provision condition for X_a

(A.9) $\partial U/\partial X_b/\partial U/\partial y = \partial C_b/\partial X_b/(s\ v_b)$ Provision condition for X_b

(A.10) $\partial U/\partial s\ v_b/\partial U/\partial y = \partial C_b/\partial s\ v_b/(s\ v_b)$

$- C_b[\cdot]/(s^2 v_b{}^2)$ Conference attendance

(A.11) $(\partial U/\partial s + v_b\ \partial U/\partial s\ v_b)/\partial U/\partial y = (\partial C_a/\partial s + \partial C_b/\partial s\ v_b)/s$

$- (C_a[\cdot]/s^2 + C_b[\cdot]/(v_s\ s^2))$ Membership condition

Conditions (A.8) and (A.9) closely parallel the provision conditions for the case of the single club good in that the marginal rate of substitution between the club goods (journal pages or conference sessions) at the optimum must equal the marginal provision cost per member. The conference attendance condition (A.10) requires that the marginal rate of

substitution between changes in the membership attending the conference must equate to the marginal cost of an additional conference attendee. Finally, the membership condition is a little more complex in that it requires that the marginal rate of substitution between change in membership and a change in the consumption of good y is made up of two components (left-hand-side of equation (A.11)). These are the direct effect of a change in membership on utility and also the effect on utility of a change in the numbers attending the conference weighted by the proportion of members attending the conference. This marginal rate of substitution at the optimum is equated to marginal costs of a change in membership made up of two components of the marginal costs of additional members both in relation to journals and conferences and also the reduction in membership costs as a result of sharing the cost of journals and conferences.

From the membership condition (A.11), it is apparent that in setting the membership fee allowance needs to be made for the fact that membership bestows a benefit of access to conferences. However, in setting the conference toll only the marginal costs of the conference need to be taken into account since the access costs have already been accounted for in the membership fee. Further, under the set of assumptions incorporated into the model, the provision of journal pages and conference sessions need only take into account the marginal cost of the provision of each separately.