What does the public want from agriculture and the countryside? A review of evidence and methods

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Abstract

Multifunctional agriculture attempts to establish a new balance between traditional commodity support and payment for the production of non-market goods and services that are increasingly demanded by the public. Supplying non-market goods presents particular problems for optimal policy design, not least the elicitation of consumer demand for those goods. The resulting configuration of support policy has potentially enormous implications for rural areas and yet surprisingly little is known about how the public would prefer public support to be allocated. This seems to have more to do with the political expediency than true public preferences. We review the evidence of consumer demand for non-market goods and consider the methodologies used for eliciting public preferences regarding the policy tradeoffs that are likely to characterise the agri-industry reform debate.

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1. Introduction

Multifunctionality has been identified as the way forward for European agriculture with emphasis on the production of appropriate market goods and non-market or public goods and services (see Scottish Executive, 2002). This shift in emphasis has been ongoing for a number of years as OECD countries face up to the mounting costs of farm support and the distorting impacts that assistance has on global trade. In the UK, the reform agenda has also been influenced by a series of food scares that have increased public awareness of agricultural practices and heightened expectations of what farmers should supply in return for continued public support. A public debate1 about the future of farming has thrown up a muddled agenda of demands including food safety, quality and environmental amenity. Delivering on public expectations will be challenging, not least because many of these demands are contradictory. This raises the question about the role of public preferences in the reform process.

But it is the non-market nature of much of this “new post-productivist agriculture” that poses the biggest policy challenge for both farmers and government. While market signals can guide patterns of commodity production, the nature of public preferences over the range of essentially non-market (public good) outputs is not always identified in markets. Public goods have specific consumption attributes of non-rivalness and non-excludability that can validate government involvement in their supply. Because of this, people do not habitually transact for many of the attributes that farmers are expected to consider when they configure their plans for farm management. Indeed, there is no clear template or set of indicators that suggest how we might measure what these outputs are and how the public weights them. Delivering on growing public demands raises two main questions for farmers and policymakers. First, what might the public actually want? Second, if farmers can deliver on public preferences for non-market goods, how can they be compensated in order to produce the right amount? These two questions lie at the heart of the increasingly prominent value for money and public

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good\textsuperscript{2} debate surrounding farming. By extension they are central to the reform of existing support schemes.\textsuperscript{3} The question of efficient compensation has been examined in an extensive literature on the design of specific support schemes (Colman et al., 1991), and theoretical papers examining government to farmer compensation transactions under conditions of information asymmetry (Ozanne et al., 2001). But these papers do not consider the match between public demand and scheme prescriptions.

Clarifying the demand (or consumer) side of this debate is important for the development of instruments that have clear objectives and that target any potential public support to the sector (Randall, 2002; OECD, 2002). This paper evaluates recent evidence of measured public (consumer) demand for the environmental and social attributes of farming. We consider the nature of any tradeoffs that the public recognises as revealed through surveys, and the robustness of the methods used to clarify the extent of consumer preferences in the current reform debate.

The structure of the remainder of the paper is as follows. First, we consider the general question of what does the public want regarding the provision of public goods in rural areas and agricultural support payments. We then review public opinion surveys relating to these two points. Next we review economic valuation studies that have attempted to value the preferences relating to the provision of environmental goods in both the UK and EU and the US. Finally, we evaluate the potential use of another environmental decision-making tool, multicriteria analysis (MCA), and suggest how we can use the details from the public opinion polls in a combined methodological approach that will use economic valuation and MCA.

2. What does the public want?

Given the importance of the question, it is surprising to note that the multifunctionality debate has rarely stopped to consider the balance of consumer preferences for market and non-market outputs. Much of what is known or assumed about the demand for public goods appears to be rooted to a policy reform scenario that has already been decided and which favours widely flung systems of farming. We have little idea of what public demand (and by extension “optimal” public good supply) might look like in other policy reform scenarios. OECD (2002) notes the challenges in decoupling agricultural support and switching payment to non-market goods. But the discussion reflects a continuing preoccupation with trade effects rather than confronting the fuzziness of public preferences or the methods used to uncover them. Reflecting the domestic vested interests, countries are adopting the reform agenda in different ways. Few seem to be explicit about the role of public preferences in decision-making. Such preferences may in fact highlight the stark policy tradeoffs that some architects of multifunctionality seem reluctant to contemplate (Potter and Burney, 2002). But the outcome of the redirection of aid may be as controversial as commodity support if it is unsubstantiated by public demand. Policy therefore requires more precise answers to a number of questions that will increase the relevance of new farm support instruments:

- What are the attributes that characterise the public perception of agriculture?
- What are the specific conventional market and non-market (environmental attributes) that are most relevant to public attitudes towards farming?
- What is the balance or tradeoff between specific attributes?
- How detailed can surveys be (broad and shallow or narrow and deep)?
- Over what duration should public preferences be considered to be stable?
- How much of each attribute does the public want?
- Do people prefer some benefits sooner than others?
- Do some features fit in some parts of the country and not elsewhere?
- What is the role of use versus non-use values (or the balance of private and public goods)?
- Should payments go to farmers as the only means of providing public goods?

Partial answers to some of these questions can be found in some of the valuation methods that have informed value for money questions in the design of agri-environmental policy to date. However, the application of these methods has been unsystematic and one can question whether the combined information actually contributes to answering the broad question about public preferences. The general public, consisting of millions of individuals, cannot transact directly for the right supply of public goods. Instead, public choice theory states that enfranchised voters will express preferences and sanction expenditure by choosing between policy plans on offer when voting in elections. The same theory states that this relationship will be distorted by constituency interests that can capture funding, thereby opening up a divergence between what

\textsuperscript{2} We note the meaning of public good here is different to the received economic definition. Indeed recent policy discussions of the House of Commons Committee for Environment, Food and Rural Affairs appear to have become side-tracked on the meaning of public good. See http://www.parliament-uk/pa/cm200202/cmselect/cmenvfru/550/55015.htm#n274.

\textsuperscript{3} The Countryside Stewardship Scheme and Environmentally Sensitive Areas (ESAs) will be replaced by a high-tier “narrow and deep” scheme. If trials are successful, it will complement the entry-level broad and shallow scheme, due to be rolled out in England in 2005.
the public wants and what suppliers provide. So, obtaining value for money in the provision of public goods is complex even when governments are responsible for supply. In the case of agriculture these problems are multiplied because public money has to be channelled through thousands of suppliers who operate as the custodians of rural land used for agriculture. In addition, there is a range of difficulties associated with monitoring inputs and outputs to and from agriculture that give rise to positive and negative externalities. Given these difficulties, it is easy to see why payment schemes can become inflexible in their response to changing public preferences. It is only when prompted by major shocks such as the foot and mouth outbreak that public pressure can be the catalyst to any review of priorities.

However, even in periods of heightened public awareness, establishing consistent preferences is not straightforward. The reality is that public preferences for complex goods are hard to identify. If they are well formed in the first place then preferences for agriculture appear to fluctuate with news events. Some people have more knowledge of the issues than others and any survey makes strong assumptions about how existing and new information is perceived and processed. Any objective survey exercise must seek to take this into account. In the end, we have to make strong assumptions about what is relevant and about what the public can process. Axioms and rules from economic and psychological theory can also provide guidance but they do not guarantee stable and consistent preferences.

Table 1 outlines the range of suggested outputs that the public might want from agriculture and the rural sector in general. Several observations are pertinent when considering value for money in meeting the demand for public goods. As recognised by some existing agri-environmental schemes, some attributes are complementary, while others are mutually exclusive. As noted by Hellerstein et al. (2002), it is possible to make a distinction between the demand for agricultural public good supply as opposed to a supply that derives from any rural area but not strictly farming. In the context of multifunctionality negotiations, this distinction is particularly sensitive. A further distinction apparent in the table is between public goods and private goods. The supply of public goods is, in theory, the sole reason for government involvement to rectify market failure. Again, much reform discussion seems to make the unstated assumption that vibrant traditional agriculture is itself a valued public good. It is as well not to lose sight of the fact that even with government withdrawal from the sector there would remain some supply of public goods. But there is little documented evidence testing the weight of preferences in favour of potential private supply scenarios (of public goods).

We can only speculate about the relevance of these issues to broad public opinion because no studies have confronted the future of farming in such stark terms. But they do prompt an examination of the central role that farming should have in providing the attributes suggested by public opinion. Given the range of socially desirable agricultural outputs, it is hardly surprising to note that policy is somewhat muddled in terms of precise objectives for support (OECD, 2002).

3. Surveying public opinion

Some of the distinctions referred to above are implicit in several opinion polls that we review. The objective is to tease out any common themes that characterise public preferences for policy reform that tradeoff conventional economic support and newer environmental objectives. Ultimately, we would like to see whether the existing evidence helps us to narrow down the information in Table 1. We distinguish three sorts of survey exercises. First, we review a range of polls and surveys conducted by conservation organisations, government departments and the EU. These provide general information on public preferences. Second, we review more rigorous surveys that have tried to quantify public preferences through structured tradeoff methods using willingness to pay (WTP) methods or alternative weighting and scoring. We are more interested in these surveys from a methodological point of view. That is, we want to assess how appropriate these methods are for framing the broad policy tradeoffs in question. Third, we allude to the merits of deliberative survey methods as a compromise between polls and valuation methods. (A table summarising the approaches we consider is included in Appendix A.)

Table 2 summarises a number of surveys that have been conducted in the UK to test opinion about a range of agri-environmental and countryside issues. All of these surveys have been undertaken in a period of heightened public awareness of rural issues, so we can expect the public opinion to be particularly focussed. The rigour of some of these surveys is questionable. Only those conducted by the Royal Society for the Protection of Birds and Friends of the Earth frame the policy question in an objective and unambiguous way to elicit environmental and economic tradeoffs for spending limited public funds. While neither survey can be considered robust in terms of deriving statistically significant results, the information suggests that the public does value a role for farming in the production of
non-market goods and that this role legitimises public spending in supporting farming as a way of life.

This is further confirmed by questions in the Department of Environment, Food and Rural Affairs (DEFRA) survey, which reveals that a high percentage of respondents agreed slightly or strongly with the proposition that subsidies should be given to farmers only if they are pursuing environmental goals.

We have considered a range of other sources of survey information, some of which overlaps with other related concerns such as food safety. Our sources also help to illustrate the point that public opinion is both unstable and somewhat suggestible. Thus the prominence of animal welfare concerns in the DEFRA study is problematic given the findings from the recent Scottish Executive Environment and Rural Affairs Department
### Table 2
Survey results on public opinion regarding agri-environmental and countryside issues

<table>
<thead>
<tr>
<th>Survey sponsor and respondents</th>
<th>Key issues</th>
<th>Key findings</th>
</tr>
</thead>
</table>
| **Wildlife and Countryside Link**<sup>a</sup> | **What role should the production of 'conservation friendly' food have in the British countryside?** | Respondents were largely in favour of:  
- conservation friendly food;  
- support for farmers being dependent on minimum environmental standards;  
- paying farmers to carry out conservation work.  
Respondents wanted to see:  
- more organic farming;  
- protection of hedgerows and woodlands;  
- a return to traditional farming practices;  
- A thriving rural economy.  
Of respondents:  
- 50% would buy food produced on conservation friendly farms;  
- 75% would pay 10% more for conservation friendly food. |

| **Friends of the Earth**<sup>b</sup> | **What should farmers receive public money for?** | Respondents believe that farmers should receive public money to help them:  
- protect the environment (36%);  
- produce food (6%);  
- both (47%);  
- neither (11%). |

| **Royal Society for the Protection of Birds**<sup>c</sup> | **What aspects of the British countryside do people value?**  
**What should be the priorities for government spending on the countryside?** | Respondents value the countryside for:  
- attractive landscapes (71%);  
- places where wildlife live (70%);  
- places for recreation (63%);  
- as a source of food (33%).  
Respondents believe that priorities for government spending on the countryside should be:  
- job creation (63%);  
- improving services (60%);  
- paying farmers to protect wildlife and environment (46%);  
- paying farmers to produce food (32%). |

| **Dorset Agenda 21 Forum**<sup>d</sup> | **Among a wide range of sustainability issues those relevant to this study were**  
**What should the future vision be for food and agriculture in Dorset?**  
**What are the key issues relating to food and agriculture in Dorset that need to be addressed?** | Statements relating to food and agriculture adopted by LA21 Strategy:  
- need to support sustainable farm practices;  
- need to promote agri-environment schemes;  
- need to increase the number of jobs in agriculture through reduced intensification;  
- need to extend organic food production.  
Respondents believed that possibilities for the future vision should be:  
- job creation (11%);  
- improving services (11%);  
- paying farmers to support wildlife and environment (46%);  
- paying farmers to produce food (32%). |

| **Food Standards Agency**<sup>e</sup> | **What concerns do people have about food production?** | Respondents were concerned about:  
- the way food is produced nowadays (32%) (very concerned);  
- how animals are treated and raised (23%);  
- the use of chemicals and preservatives in food production (18%);  
- Genetically modified crops (11%);  
- mass production (should be free range) (8%). |

| **Sustain and UK Food group**<sup>f</sup> | **How should the Common Agricultural Policy be reformed?** | UKFG want to see:  
- existing CAP resources redirected towards environmentally and socially beneficial farming and sustainable rural development; |
### Table 2 (Continued)

<table>
<thead>
<tr>
<th>Survey sponsor and respondents</th>
<th>Key issues</th>
<th>Key findings</th>
</tr>
</thead>
</table>
| Department for the Environment, Food and Rural Affairs<sup>8</sup> | Among a wide range of quality of life issues those relevant to this study were: | * public funds used to support the delivery of public goods that are not delivered adequately by the market;  
  * support for small-scale and family farmers. |
| 3736 respondents through at home interviews – Jan–April 2001 | * How worried do people feel about certain environmental issues?  
  * What about the British countryside make it a place where people want to spend time?  
  * To what degree do people support various environmental policy options? | Respondents stated that:  
  * they want to spend time in the British countryside because of the scenery (46%), the plants and wildlife (36%) and the way of life (9%);  
  * they strongly or slightly support the policy of only paying agricultural subsidies to farmers if they protect the environment (74%);  
  * they strongly or slightly support the policy of paying farmers to protect and regenerate threatened landscapes and habitats (69%);  
  * they strongly or slightly support the policy of planting trees and hedgerows where possible (92%). |
| Scottish Executive<sup>9</sup> | Among a wide range of questions about the environment in Scotland, those relevant to this study were | Respondents stated that:  
  * current methods of farming present the greatest threat to wildlife (22%);  
  * farmers play an important role in protecting wildlife and habitats (33%);  
  * farmers should play an important role in protecting wildlife and habitats (17%);  
  * paying farmers and foresters is a very good or good way in which wildlife and habitats can be protected or improved (60%). |
| 4119 at home interviews – 2002 | * What activities do people think present the greatest threats to wildlife and habitats?  
  * Who do people think should play the most important role in protecting wildlife and habitats? | Respondents stated that:  
  * farming is an important part of our national life and economy (92%);  
  * farmers play an important role in providing an attractive and well-managed countryside (87%);  
  * CAP money should be switched from subsidising food production into schemes that support the environment and rural development (61%);  
  * it is worth paying more for quality UK-produced food with high welfare and environmental standards (88%). |
| Country Landowners Association<sup>1</sup> | * How important is farming?  
  * How should CAP money be spent?  
  * Is it worth paying more for environmental standards in food production? | Respondents stated that they agree that:  
  * farming is an important part of our national life and economy (92%);  
  * farmers play an important role in providing an attractive and well-managed countryside (87%);  
  * CAP money should be switched from subsidising food production into schemes that support the environment and rural development (61%);  
  * it is worth paying more for quality UK-produced food with high welfare and environmental standards (88%). |
| 1001 respondents through telephone survey – Nov 2002 | * What are Europeans’ perceptions of the following  
  The benefits of the CAP for consumers and farmers?  
  The role of the CAP?  
  How the CAP fulfils its role?  
  The evolution of the CAP? | Respondents believe that the CAP should:  
  * ensure that the food you buy is safe to eat (40%);  
  * ensure that you have information about the origin of food (25%);  
  * promote the respect of the environment (88%);  
  * improve life in the countryside (77%);  
  * encourage agricultural diversification (73%);  
  * favour methods of organic production (72%).  
 Respondents believe that the CAP is currently successful in  
 * promoting respect of the environment |
funded focus groups on food,\textsuperscript{6} which suggested that the issue was rated much lower than food safety concerns. In the Eurobarometre survey much of the focus is on having the respondents validate the Common Agricultural Policy as an institutional approach to agriculture. While this is the most extensive survey of public opinion, the form of questioning does not invite clear preference tradeoffs. All of these polls confirm the difficulties involved in eliciting objective statements about what the balance of agricultural outputs should be. Specifically, response interpretation depends on

\begin{itemize}
  \item who is questioned and who is asking the questions—most surveys considered here were conducted by non-representative pressure groups with specific agendas that are not always pro-farming
  \item the type of question asked and what is not mentioned
  \item how questions are framed\textsuperscript{7}
  \item prevailing background news stories
  \item different levels of information provided as part of the exercise
  \item whether or not the respondents are allowed multiple response options rather than being forced into specific close ended (either/or) tradeoffs.
\end{itemize}

Overall, we have located very few alternative UK or European polls or research projects that take an objective standpoint in trying to elicit policy tradeoffs. This is hardly surprising since such surveys rely on a level of disinterest in the issues to be conducted objectively. Ultimately, the surveys in Table 2 should be viewed with care. At the very least, the attitudes may need validation with reference to surveys that are more realistic in the forms of economic tradeoffs that the public faces for the production of outputs. Such evidence may be contained in a body of non-market valuation literature.

In the US, Hellerstein et al. (2002) consider the nature of public preferences in the context of changing rural land use. While suggesting the need to increase the input of public preferences in designing rural amenity (from both farmland and other non-agricultural state lands), Hellerstein et al. note the absence of information on what the public really want. Side stepping direct elicitation, the authors assume a second best manifestation of preferences as represented by the explicit objectives set down in state legislation to protect farmland. By implication, public preferences are reflected in the programs that get enacted through the purchase of development rights, for example. The study therefore conducts a detailed review of farmland conservation legislation in a number of states and concludes that “the public” values rural amenity—farming as a way of life, open space and scenic beauty. The intensity of legislation is also related unsurprisingly to the amount of

\begin{table}[h]
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\begin{tabular}{lll}
\hline
Survey sponsor and respondents & Key issues & Key findings \\
\hline
\textsuperscript{a}Wildlife and Countryside Link, 2001, \textit{Future of the Countryside Web Survey—Findings}, Wildlife and Countryside Link, London & \textsuperscript{b}www.friendsofredearth.org.uk & (41%);
\textsuperscript{c}http://www.rspb.org.uk/caffairs/archive/582.htm & \bullet favouring methods of organic production (37%);
\textsuperscript{d}Dorset Agenda 21 Forum, 1999, \textit{Dorset in the 21st Century: An Agenda for Action}, Dorset Agenda 21 Forum & \bullet encouraging agricultural diversification (34%);
\textsuperscript{e}COI Communications, 2001, \textit{Food Concerns Omnibus Survey}, Prepared for Food Standards Agency by COI Communications & \bullet improving life in the countryside (31%). Respondents believe that
\textsuperscript{f}Sustain & The UK Food Group, 2002, \textit{The CAP Doesn’t Fit}, Sustain & The UK Food Group & \bullet development of the CAP away from subsidising agricultural products and towards the protection and development of the rural economy is a very or fairly good thing (62%).
\textsuperscript{i}Country Landowners Association, 2002, \textit{Image of Agriculture Survey} &
\end{tabular}
\end{table}

\textsuperscript{b}www.friendsofredearth.org.uk
\textsuperscript{c}http://www.rspb.org.uk/caffairs/archive/582.htm
\textsuperscript{e}COI Communications, 2001, \textit{Food Concerns Omnibus Survey}, Prepared for Food Standards Agency by COI Communications
\textsuperscript{f}Sustain & The UK Food Group, 2002, \textit{The CAP Doesn’t Fit}, Sustain & The UK Food Group
\textsuperscript{h}Scottish Executive, 2002, \textit{Public attitudes to the environment in Scotland—2002 Survey}.
\textsuperscript{i}Country Landowners Association, 2002, \textit{Image of Agriculture Survey}

\textsuperscript{6}Public perceptions of food and farming in Scotland.
\textsuperscript{7}There is an obvious difference between asking what the public wants from the countryside and recording the spontaneous weight put on farming or joint goods from farming, or a more specific question asking what do you want agriculture to produce.
farmland in the state. That is, the frequency of purchased development rights is greatest in the most highly urbanised states. The “farming as a way of life” finding is consistent with results from previous polls that suggest farming is a part of a cultural landscape. That the demand for rural amenity is highest in more densely populated areas is intuitive and perhaps warrants more attention in the design of agri-environmental schemes.

Other findings from this study are of interest. First, as previously noted, the authors conclude that many environmental attributes need not be provided exclusively from farming. However, they find that most state legislature ensures that farming remains an important vehicle for delivering some of them. There is thus something of an emotional attachment to an agricultural base, which we assume to be common whether we are dealing directly with public expression or—as in this case—with state legislation. Second, the design of the Hellerstein study raises the question of how the appropriate level of public demand can be practically considered for policy purposes. Finding out what the public wants by surveying them can be insightful but impractical to conduct on a regular basis. On the other hand, using legislation as a proxy for public choice is too crude to reflect preferences adequately. A possible middle way might therefore be found using more deliberative methods such as Citizens Juries and Consensus Conferences.

4. The valuation of public preferences for non-market goods

4.1. UK studies

There has been an extensive body of applied work eliciting economic values for non-market goods and environmental services related to UK agriculture. Most of this work has used economic techniques to explore individuals’ WTP in order to derive a mean value for environmental change for society in general. This economic valuation research typically has the aim of informing cost–benefit decisions for agri-environmental spend by uncovering the demand side or economic value associated with a range of environmental features, landscapes and production practices. The important difference between this research and the qualitative surveys in Table 2 is that monetary valuation is based on underlying economic theory that provides axioms or rules that allow tests of consistency of respondent WTP statements. The validity of these rules is subject to ongoing debate (Sagoff, 1988). Suffice to say that well executed surveys make respondents behave as if they were constrained by their income and produce real measures of welfare change. They avoid the hypothetical cost-unconstrained nature of opinion polls. Additionally, in theory these studies offer a better measure of social welfare to guide policy decisions. In contrast, with opinion polls, what we are looking at is whether response options are statistically significant and have categories where more than 50% respond favourably or unfavourably. In economic jargon the difference is between the measurement of a Pareto improvement—where a policy change occurs and aggregate welfare is increased to the extent that everyone (were losers compensated by gainers) could still be better off—and the median voter criterion for justifying policy change. The latter says nothing about aggregate welfare and a decision supported by over 50% of a population sample may still result in the negative welfare of the minority outweighing the majority gain.

We are interested in the economic valuation studies because those of a stated preference nature (i.e. contingent valuation methods (CVM) and choice experiments (CE)) are direct elicitation methods using surveys of the general public. Some of the methodological approaches and findings are instructive in terms of their potential to address policy tradeoffs. The standard procedure for both CVM and CE is to develop hypothetical scenarios in which specific features are valued. The content of a scenario is defined after focus groups and survey pre-tests. In the former, selected participants discuss open-ended themes that iterate towards more specific discussion of the issue of interest to the researcher. In the context of both CVM and CE, the researcher is interested in identifying and representing the key attributes that describe the issue or change being proposed by a policy. The CVM and CE methods repackage the information in different ways. In both cases, the design of the survey has to respect the cognitive limits of the respondents.

In reviewing the content of existing agri-environmental studies however, it is as well to note that by the time the study appears in published form, it is typically impossible to discern the content of discussions that took place in any design (for example, focus group) stage. Thus while respondents may be valuing specific items, we have little idea about the strength of these preferences relative to attributes or scenarios that were not deemed to be central to the specific study. A lack of co-ordination in conducting studies means that each study will be predicated on a different baseline story that respondents were invited to consider. Caution must therefore be exercised in lumping studies together to find a central message in the WTP values that arise.

In the UK context, we note that there is large body of agri-environment valuation studies (for a review see Stewart et al., 1997). Most studies are of the CVM variety that invite respondents to express a WTP in response to a specific scenario and some policy on/off alternative. A number of CE-type studies have been applied to agri-environmental issues. These studies are more explicit in the way change scenarios are broken...
down into two or three key attributes that can vary across different choice packages. Some studies are more ambitious in the list of attributes that respondents are invited to consider although none frame the issue in terms of the policy choice between income support and decoupled environmental payments.

As an example of the typical breadth and depth of environmental attributes, Hanley et al. (1996) report on the application of CE (a CVM exercise was undertaken concurrently) to the Breadalbane and Machair Environmentally Sensitive Areas (ESA). The Breadalbane ESA CE involved presenting respondents with choices of attribute bundles concerning the protection of woodlands, archaeological sites, moorlands, wetlands/herb-rich grassland and dry stone dykes, each taking a “policy on” or “policy off” level. For the Machair ESA survey the attributes were the protection of birds, flora and archaeology. There was also a tax (price) attribute with eight levels, which allowed the calculation of WTP for different attribute levels and for whole policy options. Respondents were presented with eight choice sets of two options, the choice being either option A, option B, neither or do not know. The use of several choice sets with varying levels allows the researcher to infer four pieces of information (Hanley et al., 1998):

1. attributes with a significant influence on choice;
2. the implied ranking of the attributes;
3. the marginal WTP for a change in any significant attribute; and
4. the implied WTP for a programme that changes one or more attributes simultaneously.

Table 3 shows the implied rankings and implicit prices (WTP for a one unit change in each attribute) for each of the attributes used in the CE. The implicit price estimates can be used individually or in combination to assess the benefits of different combinations of policy outcomes. More sophisticated experimental designs can contain a wider range of attribute levels to allow a fuller analysis of utility functions for different levels of each attribute. A priori, we might expect the implicit prices for an attribute to increase and then decrease due to diminishing marginal utility. That is, the more of an attribute that is supplied, the less we value the last unit.

A similar study by Foster and Mourato (2000) considers a different range of attributes that mix public and private good considerations. Their CE study concerns the impacts of pesticide use in wheat cultivation. The study is of particular interest as it considers both the effects of pesticides on biodiversity, in terms of number of bird species in decline, as well as impacts on human health. Whereas many valuation studies involve a price attribute (to estimate WTP) presented in terms of an increase in tax, this study uses the price of a loaf of bread; a payment vehicle suggesting a private payment obligation for the mixture of a private good (health) and the public good (conservation of species).

The CE approach differs from CVM in that although the statistical design process is identical, respondents are asked to rank a number of treatments rather than choosing one. In this case respondents were asked to rank four alternatives, one of which was the current production practice, as shown in Table 4. Foster and Mourato (2000) used two different model specifications to analyse their survey responses. The first was the most preferred alternative (MPA) model, which considers only the attribute levels of the highest ranked alternative. The second, known as the ranks data (RD) model, uses the ranking of all the alternatives thus fully exploiting the information gained from the survey. These different specifications result in divergent WTP estimates, ranging from 0.7 to 1.2 pence per loaf to avoid a case of ill health and from 5.3 to 7.4 pence per loaf for one less bird species in decline for the MPA and RD specifications, respectively. These results relate to models aggregated over the entire sample. Table 5 summarises WTP across different population segments. These results are consistent with a priori expectations, particularly in that bird watchers and those respondents

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Table 3
Implied rankings and implicit prices for environmental attributes for the Breadalbane and Machair ESAs

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Breadalbane</th>
<th>Machair</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Implicit price (£ per household)</td>
<td>Implied ranking</td>
</tr>
<tr>
<td>Woodlands</td>
<td>82.86</td>
<td>1</td>
</tr>
<tr>
<td>Moorlands</td>
<td>37.14</td>
<td>2</td>
</tr>
<tr>
<td>Wetlands/herb-rich grassland</td>
<td>34.29</td>
<td>3</td>
</tr>
<tr>
<td>Dry stone dykes</td>
<td>18.57</td>
<td>4</td>
</tr>
<tr>
<td>Archaeology</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Birds</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Flora</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

*a Calculated from estimated coefficients reported in Hanley et al. (1996).
*b All estimated coefficients were significant at the 95% level with the exception of “flora”.

---
expressing high environmental concerns have much larger WTP for biodiversity. It is important to identify such segments in valuation studies, (as they may be over- or under-represented in the survey sample), in order to avoid bias in aggregated WTP estimates.

4.2. US studies

Table 6 summarises a number of relevant US studies and is taken directly from the review of valuation studies by Hellerstein et al. (2002). We note that the US has a different rural tradition to the UK and our review is more interested in methodological findings. In this regard WTP valuation studies are prevalent. But the use of non-monetary pilot surveys and focus groups in the design of valuation scenarios is instructive. As we find with the European literature, the authors indicate a major disconnection between the extent of this specific valuation literature and the more general question of what the public wants.

Of methodological interest in this list are the studies by Kline and Wichelns (1994, 1996) and Duke et al. (2002). Kline and Wichelns (1994, 1996) use the output of focus groups to develop lists of attributes that characterise public preferences for farmland preservation in Rhode Island. These are subsequently used in the design of a preference list that is presented as a survey for the general public to derive a mean rank (1–10 with 10 being the most important). The rankings are then used in a factor analysis that produces more specific attributes that are used as input attributes to CEs.

Duke et al. (2002) draws on this approach and their study is a template for exploring public preferences. Like Kline and Wichelns they undertake a CE. The attribute set includes simple photographs and symbols to characterise the three environmental attributes: growth control (urban sprawl), transitional agriculture and open space (roughly landscape amenity). These attributes also form the basis of a parallel MCA. Basically, these two methods provide alternative ways of presenting attributes to the public to derive more robust statistical insights into public preferences and tradeoffs between farming and environmental attributes.

The body of these studies appears to conclude in favour of preferences for a traditional cultural role for farming even if the environmental attributes can be delivered by other means. The control of urban sprawl and the role of farmland in protecting water sources and quality are also highlighted.

5. Multicriteria analysis (MCA) and the analytical hierarchy process (AHP)

The limits of monetary valuation methods have been highlighted in an extensive literature that suggests cognitive barriers arise after presenting respondents with certain levels of information. Faced with difficult choice exercises, respondents can take mental short cuts and base all choices on the price variable. MCA is an alternative non-monetary preference elicitation method that is common in environmental decision-making and has been extended to assess public preferences over many different environmental attributes (see for example, Tzeng et al., 2002). The essential distinction between MCA and monetary valuation is that MCA is not circumscribed by the strict utility theoretical design requirements. For some, the consequent removal of a monetary choice attribute facilitates the choice exercise.
The Department for Transport, Local Government and the Regions (DTLR) manual on MCA (DTLR, 2001) distinguishes several MCA variants, including the analytical hierarchy process (AHP) that has been used by Duke et al. (2002) and Duke and Aull-Hyde (2002). The method uses a number of pairwise comparisons between quantitative or qualitative criteria to assess the relative importance of each criterion. These can be arranged in a hierarchical manner known as a value tree to form sets of attributes and qualities (levels) within these attributes. The simplicity of the AHP approach is that unlike CEs, the qualities (or levels) of different attributes are not directly compared, thus removing the need for complex survey designs and associated impacts on sample size. Instead, respondents first make pairwise comparisons of the qualities within each attribute before comparing each of the attributes. Cognitive burden is also reduced as comparisons are between two qualities or attributes rather than a larger bundle of attributes and levels. As a consequence, respondents are less likely to adopt mental short cuts by concentrating disproportionately on one attribute. As noted above, in CEs this can result in a choice directed by the price variable.

The pairwise comparison is framed in the form of the question: how important is criterion A (say, farm income) relative to criterion B (say, number of bird species on farm)? The responses to these questions are typically coded along a nine-point scale as set out in Table 7.

So for example, from Table 7, if B is considered to be more important than A, then the reciprocal of the relevant rating is assigned (i.e. 1/7 as opposed to 7 which would be assigned if A were strongly more important than B). As it is assumed that a respondent is consistent

Table 6
US valuation and preference survey studies for farmland

<table>
<thead>
<tr>
<th>Authors</th>
<th>Region</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Halstead (1984)</td>
<td>Hampden County, MA</td>
<td>There are strong preferences for protecting remnant farmlands that increase with size of program, and seem to be positively influenced by the proximity to farms</td>
</tr>
<tr>
<td>Furuseth (1987)</td>
<td>Mecklenberg County, NC</td>
<td>There is broad support for farmland protection; farmland heritage, environmental reasons, and protection of future food supply were important reasons</td>
</tr>
<tr>
<td>Variyam et al. (1990)</td>
<td>National</td>
<td>Support for a variety of agricultural programs suggests that preservation of family farms is important, but respondent self-interest also influences support for agricultural policies</td>
</tr>
<tr>
<td>Dillman and Bergstrom (1991)</td>
<td>Greenville County, SC</td>
<td>Positive, though small, benefits to protection of farmland, with the benefits of such protection stated as being limited to changes in rural amenities. The low values are attributed to the large amount of agriculture in the study region</td>
</tr>
<tr>
<td>Kline and Wichelns (1994, 1996)</td>
<td>Rhode Island, PA</td>
<td>Environmental reasons are most important, followed by local food concerns, preservation of rural communities, and slowing development</td>
</tr>
<tr>
<td>Bowker and Didychuk (1994)</td>
<td>New Brunswick, Canada</td>
<td>Positive difference between survey-derived compensating variation measures and house-price/wage-rate hedonic measures of the value of protecting horse farms suggests that these farms have an existence value</td>
</tr>
<tr>
<td>Ready et al. (1997)</td>
<td>Kentucky</td>
<td>Protection of ranchland yields small overall per acre values. These values may be substantially larger if preferences of summer visitors are considered</td>
</tr>
<tr>
<td>Rosenberger and Walsh (1997)</td>
<td>Routt County, CO</td>
<td>Residents prefer continued agriculture on some lands, and wildlife/recreational uses on others, with development never a preference</td>
</tr>
<tr>
<td>McLeod et al. (1999)</td>
<td>Sublette County, WY</td>
<td>The support for rural land protection (which includes farmland protection) seems suburbs to be derived from quality of life concerns, especially those related to sprawl reduction. Compared with other rural land protection programs, the most important reasons stated for supporting farm protection were protecting family farms and maintaining food supplies</td>
</tr>
<tr>
<td>Krieger (1999)</td>
<td>Chicago</td>
<td>Focus groups suggest that the public favours protection of family farms, protecting land with water on it, and favouring land with active farming</td>
</tr>
<tr>
<td>Boyle et al. (2001)</td>
<td>Several states</td>
<td>Delawareans seem to be most concerned with keeping farming as a way of life, having access to locally grown agricultural commodities, protecting water quality, and preserving rural character</td>
</tr>
</tbody>
</table>
in judgements about any one pair of criteria, this use of
the reciprocal allows only \(1/2n(n-1)\) comparisons to be
made where there are \(n\) criteria. The ratings, and their
reciprocals, are then collected in a comparison matrix.
So for three attributes this might look like
\[
\begin{bmatrix}
1 & 7 & 9 \\
1/7 & 1 & 2 \\
1/9 & 1/2 & 1
\end{bmatrix}.
\]

This is then used to derive weights that are consistent
with the relativities between the attributes or qualities
contained in the matrix. Although there is consistency in
the judgements made between any pair of criteria, this is
not guaranteed in judgements between pairs, so the
estimated weights aim to provide the “best fit” of the
observations (DTLR, 2001). This can either be achieved
using complex matrix algebra or by calculating the
geometric mean of each row and normalising these by
dividing by the sum of geometric means for each row.

For the above matrix the weights would be

\[
\begin{align*}
\text{Geometric mean} &\quad \text{Weight} \\
(1 \times 7 \times 9)^{1/3} &\quad 3.9791 \quad 0.7926, \\
(1/7 \times 1 \times 2)^{1/3} &\quad 0.6586 \quad 0.1312, \\
(1/9 \times 1/2 \times 1)^{1/3} &\quad 0.3816 \quad 0.0760, \\
\text{Sum} &\quad 5.0193 \quad 1.000.
\end{align*}
\]

Thus for policy purposes, the method provides an
unambiguous weighting from a three-way comparison.

The majority of existing applications of AHP to
environmental and natural resource management issues
have involved small samples of experts, resource
managers and stakeholders. In these cases, the aim
was to reach consensus on management decisions and
priorities in a manner similar to Delphi exercises, but in
a way that also elicits the relative “utilities” of different
management options. The fact that AHP is not
statistically designed in the same sense as a CE also
means that it lends itself to applications with small
number of participants.

As previously noted, Duke et al. (2002) and Duke and
Aull-Hyde (2002) report on a study concerning public
preferences for land preservation in Delaware, USA.
The study departs from previous applications in that a
large-scale sample of 129 residents of four counties was
obtained. Respondents were asked to make pairwise
comparisons between a number of attributes and also
the qualities or levels within these attributes. These are
illustrated in Table 8. In this case each respondent
needed only to make 14 pairwise comparisons. This is
much less onerous than the equivalent choice set in a
CE, which would require \(3^3 \times 2^2 = 36\) combination

<table>
<thead>
<tr>
<th>Table 7</th>
<th>Typical AHP rating scheme</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Rating</th>
<th>Explanation of relative importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Equally important</td>
</tr>
<tr>
<td>2</td>
<td>Between 1 and 3</td>
</tr>
<tr>
<td>3</td>
<td>Slightly more important</td>
</tr>
<tr>
<td>4</td>
<td>Between 3 and 5</td>
</tr>
<tr>
<td>5</td>
<td>Moderately more important</td>
</tr>
<tr>
<td>6</td>
<td>Between 5 and 7</td>
</tr>
<tr>
<td>7</td>
<td>Strongly more important</td>
</tr>
<tr>
<td>8</td>
<td>Between 7 and 9</td>
</tr>
<tr>
<td>9</td>
<td>Overwhelmingly more important</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 8</th>
<th>AHP state-level results</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Quality</th>
<th>Quality weight</th>
<th>Quality rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Attribute weight</td>
<td>Within attribute</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Providing locally grown food</td>
<td>0.416</td>
<td>0.141</td>
</tr>
<tr>
<td></td>
<td>Keeping farming as a way of life</td>
<td>0.422</td>
<td>0.140</td>
</tr>
<tr>
<td></td>
<td>Important industry</td>
<td>0.163</td>
<td>0.053</td>
</tr>
<tr>
<td>Environmental</td>
<td>Protecting water quality</td>
<td>0.483</td>
<td>0.132</td>
</tr>
<tr>
<td></td>
<td>Protecting wildlife habitat</td>
<td>0.316</td>
<td>0.084</td>
</tr>
<tr>
<td></td>
<td>Preserving natural places</td>
<td>0.202</td>
<td>0.054</td>
</tr>
<tr>
<td>Growth control</td>
<td>Slowing development</td>
<td>0.462</td>
<td>0.099</td>
</tr>
<tr>
<td></td>
<td>Preserving rural character</td>
<td>0.538</td>
<td>0.114</td>
</tr>
<tr>
<td>Open space</td>
<td>Preserving scenic quality</td>
<td>0.605</td>
<td>0.111</td>
</tr>
<tr>
<td></td>
<td>Breaks in the built environment</td>
<td>0.395</td>
<td>0.073</td>
</tr>
</tbody>
</table>
matrices (of attributes times qualities) to be presented to respondents.

Table 8 illustrates the results obtained by Duke et al. (2002) and Duke and Aull-Hyde (2002). The table gives some idea of the potential output from an AHP study. Separate sets of weights are calculated for pairwise comparisons between the qualities and then the attributes. Overall weights are then calculated by multiplying attribute and quality weights. This further allows the implied ranking of attributes and qualities.

The implied ranking of attributes suggests that “agricultural factors” are the most important, while “providing locally grown food” and “keeping farming as a way of life” are the two highest ranked qualities. Interestingly, agriculture as an “important industry” is ranked lowest. This may indicate that industry concerns are not seen as overriding public concerns such as “protecting water quality” (3), “preserving rural character” (4) and “preserving scenic quality” (5). These public priorities also appear to be anthropocentric in nature as water quality has a greater direct impact on people rather than “protecting wildlife habitat” (7) and “preserving natural places” (9).

6. Proposed methodological approach for scoring public preferences

It is our view that a combination of the AHP approach and a CE offers scope for including an array of attributes and their constituent qualities. Both methods offer potential for mixing attribute levels (i.e. broad and shallow and narrow and deep). In the CE literature, the Foster and Mourato (2000) study shows this by mixing human health, the price of farm outputs (bread) and a farmland environmental attribute (bird species). Layton and Brown (2000) use a CE to evaluate preferences for greenhouse gas emission scenarios and resultant forest loss in Colorado over time horizons up to 150 years into the future. Both studies conclude that the method provides internally consistent responses. This conclusion gives us confidence that with appropriate communication devices CEs lend themselves to a general policy experiment that proposes broad environmental and economic categories for respondents to consider. Thus it will be possible for us to test whether attributes such as farm incomes, food prices and other environmental attributes can be bundled for consideration in the same way. Of course the price attribute is the key that allows us to infer marginal values (MV) of attributes (by extension revealing how MV diminishes with rising supply).

An AHP application allows some scope in terms of attribute “depth” but the pairwise methodology is not constrained by the strict design criteria of a CE. What this method loses (in terms of its economic rigour) it gains in terms of the ease of flexibility in the way we can represent attribute sets. CEs are often criticised for being over-optimistic about the way tradeoffs are made. An AHP study would provide insurance that we can derive a preference ordering over a final set of attributes. Both methods allow for tests of sensitivity to suggestions about the time preference for realisation of benefits and to investigate spatial (for example, regional) variation in the strength of preferences for specific attributes.

7. Conclusion

This review has attempted to see whether and how the fundamental question of what the public might want from agriculture has been adequately addressed in the existing agriculture and environmental literature. We conclude that we cannot derive meaningful quantitative conclusions from the existing literature. Existing studies address public preferences in a very partial way and no statistically robust UK study has attempted to evaluate public preferences from scratch. Existing studies have typically evaluated a feature or several features of some form of countryside designation. It would be invalid to infer public preference from comparing the magnitude of WTP values between studies of a partial nature.

We have nevertheless sought to identify some evidence of public preferences from polls and WTP studies. Our aim has been to narrow down the wide array of attributes presented in Table 1. A range of polls has been undertaken and some of the topics featured overlap. While these methods are not statistically robust, they do suggest that the public see a definite role for farming as an intrinsically valued provider of rural environmental public goods. Additional themes that reoccur are farmland as cultural heritage, biodiversity and environmental quality. Of the more statistical studies, none addresses public preferences in such a broad ranging fashion. However, we have taken methodological guidance from a study conducted in the United States, which combines MCA and CEs in a novel way to address a similar question to our own for the state of Delaware (Duke et al., 2002).

Of the two methods, MCA has the weaker theoretical foundation but offers flexibility in permitting a mix of attributes at different levels. CEs on the other hand posit a much tighter set of rules that define what we can offer people in our choice sets and how they should be trading them off if they are consistent. What we note about this literature is that on the whole the attribute sets have been quite narrow. Few studies have used choice sets of comparable dimension to the policy tradeoffs implicit in
agricultural reform. A notable exception is Layton and Brown (2000), who attempted to test preferences for climate change mitigation. The dimensions of this problem are possibly even more extreme than the ones we are tackling. The development of CEs has reached a stage where they can be appropriately used to test the public policy implications of agri-environmental reform.

Acknowledgements

This review derives from the project “Beauty Beast and Biodiversity: What does the Public Want from Agriculture?” The project is funded by the Scottish Executive Environment and Rural Affairs Department.

Appendix A

<table>
<thead>
<tr>
<th>Approach</th>
<th>Comment (strengths and limitations)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Opinion polls and consumer surveys</strong></td>
<td><strong>Strengths</strong>&lt;br&gt;Less challenging in terms of respondent effort</td>
</tr>
<tr>
<td></td>
<td><strong>Limitations</strong>&lt;br&gt;Not always statistically robust</td>
</tr>
<tr>
<td></td>
<td>Often carried out by non-representative pressure groups with specific agendas</td>
</tr>
<tr>
<td></td>
<td>For policy purposes, unclear how outcomes or results link with any theory of public choice—i.e. may use result of survey where more than 50% say yes or no. This does not consider overall social welfare</td>
</tr>
<tr>
<td><strong>Proxy for public preferences</strong></td>
<td><strong>Strengths</strong>&lt;br&gt;Can be useful if primary data collection not feasible</td>
</tr>
<tr>
<td>Eg review of legislation</td>
<td><strong>Limitations</strong>&lt;br&gt;Crude</td>
</tr>
<tr>
<td>(see for example, Hellerstein et al., 2002)</td>
<td>Ignores other influences on regulatory decisions</td>
</tr>
<tr>
<td><strong>Deliberative methods</strong></td>
<td><strong>Strengths</strong>&lt;br&gt;Participatory</td>
</tr>
<tr>
<td>Eg focus groups</td>
<td><strong>Limitations</strong>&lt;br&gt;Not statistically robust</td>
</tr>
<tr>
<td>Citizen’s juries</td>
<td>Somewhat open-ended formats. Do not present questions and statements that limit the scope of the study</td>
</tr>
<tr>
<td>Interviews</td>
<td><strong>Limitations</strong>&lt;br&gt;Not statistically robust</td>
</tr>
<tr>
<td>Delphi methods</td>
<td><strong>Strengths</strong>&lt;br&gt;Survey methods based on recognised axioms and rules of consumer choice for the derivation monetary value assigned by respondents to attributes under consideration CV uses a general verbal (sometimes graphic scenario) followed by a direct WTP question to the respondent CEs use design sets of several key attributes that describe a change to be valued. One of the attributes is a price variable. Repeat choices of favoured sets allow the investigator to derive WTP indirectly</td>
</tr>
<tr>
<td>Consensus conferences</td>
<td><strong>Limitations</strong>&lt;br&gt;Strict design criteria</td>
</tr>
<tr>
<td></td>
<td>Grounded in economic theory (which not everyone subscribes to)</td>
</tr>
<tr>
<td></td>
<td>Usually requires focus groups to establish scenario</td>
</tr>
<tr>
<td></td>
<td>Must recognise cognitive limits of respondents</td>
</tr>
<tr>
<td><strong>Monetary valuation</strong></td>
<td><strong>Strengths</strong>&lt;br&gt;Combination of qualitative (participatory) and quantitative (can be statistically robust)</td>
</tr>
<tr>
<td>Eg Contingent valuation</td>
<td><strong>Limitations</strong>&lt;br&gt;Strict design criteria</td>
</tr>
<tr>
<td>Choice experiments</td>
<td>Grounded in economic theory (which not everyone subscribes to)</td>
</tr>
<tr>
<td></td>
<td>Usually requires focus groups to establish scenario</td>
</tr>
<tr>
<td></td>
<td>Must recognise cognitive limits of respondents</td>
</tr>
<tr>
<td><strong>Multi-criteria analysis</strong></td>
<td><strong>Strengths</strong>&lt;br&gt;Combination of qualitative (participatory) and quantita-</td>
</tr>
<tr>
<td>Eg Analytical Hierarchy</td>
<td>tive (can be statistically robust)</td>
</tr>
</tbody>
</table>
Procedure

Offers flexibility in permitting a mix of attributes at different levels
AHP allows attribute depth
The pairwise methodology of AHP is not constrained by the strict design criteria of choice modelling (including monetary values)

Limitations
Time consuming
Has weaker theoretical foundation (than CE’s)
Can be cognitively challenging for respondents

References


