EVALUATION IN AGRICULTURE AND RURAL DEVELOPMENT

MSc Economic Policy Studies
EC8014: Economic Evaluation: Theory, Techniques and Applications
Alan Matthews
alan.matthews@tcd.ie
27 Nov 2015
Outline

- The policy context for EU and Irish agricultural policy
- Evaluation experience
- Evaluation specificities
- Case studies
  - Arterial drainage
  - Agricultural research
  - Agri-environment scheme
- Geared to helping you to identify potential dissertation project
EVALUATION OF AGRICULTURAL POLICY MEASURES AT THE EU LEVEL
Agricultural and rural development policy

- Multiple objectives
  - Ensuring food security and food at reasonable prices
  - Regulating food safety
  - Supporting farm incomes
  - Stabilising prices
  - Protecting and enhancing environmental public goods
  - Achieving greater territorial cohesion
  - Encouraging growth in agricultural output through provision of public goods, e.g. research, quality control, promotion, infrastructure provision etc.
The policy framework

- Market measures and direct payments provided through Pillar 1 of the CAP
- Rural development measures (improving agricultural competitiveness, sustainable land management and territorial cohesion) promoted through Pillar 2 of the CAP
- Significant state expenditure through co-financing EU schemes as well as independent schemes and regulatory agencies
Agricultural policy covered by EU standard guidelines for evaluation and impact assessment

- Impact assessment of proposed policy changes
  - e.g. CAP reform post-2013
- Evaluation of specific measures carried out by external contractors based on annual evaluation plan
- Evaluation of broad programmes previously confined to Pillar 2 extended to Pillar 1 in 2013 CAP reform
- DG Agriculture and Rural Development [web page](#)
- In addition, the European Court of Auditors (ECA) periodically undertakes evaluations of particular programmes
EU rural development programmes

- EU member states are obliged by EU legislation to assess the performance of their Rural Development Programmes (RDP).
- The EU Rural Development Regulation requires that each RDP undergoes ex ante, mid-term and ex post evaluations according to a specified timetable.
- Setting up of a European Evaluation Network to help establishing good practice and capacity building in the evaluation of Rural Development Programmes.
The evaluation system

Period 2007-2013

Programming
Ex-ante evaluation

Policy implementation
Mid-term evaluation

Ex-post evaluation

“Ongoing evaluation”

Evaluation expert committee
Evaluation network for RD
Helpdesk

CMEF
## Example of quantification

<table>
<thead>
<tr>
<th>Measure</th>
<th>Output (Operational objectives, RDP)</th>
<th>Result (Specific Objectives, RDP)</th>
<th>Impact (Overall objectives, examples)</th>
</tr>
</thead>
</table>
| Early retirement | - 4,900 farmers enter the scheme releasing about 56,000 ha UAA  
- 23,652 small dairy farmers leave the market releasing 240,000 tons milk quotas. | Average farm size increases from 13.7 ha in 2002 to 15.9 ha by 2006  
Share of farmers below the age of 40 years is increased from 14.4 % to 16.7 % in 2006  
Number of dairy cows increases from 2,2 cow to 3+ cows in 2006 | Competitiveness increased through 10 % reduction in unit costs in 2006  
Average farm income raised by 10 % by 2006 |
Table 4.2. Diversification into non-agricultural activities programme: “Intervention logic” and indicators

Hierarchy of indicators

Impact
- Economic growth (net additional value added expressed in PPS);
- Employment creation (net additional full-time equivalent jobs created) (division according to on-farm/off-farm jobs, gender and age category).

Result
- Increase in non-agricultural GVA in supported businesses;
- Gross number of jobs created (division according to on-farm/off-farm jobs, gender and age category).

Output
- Number of beneficiaries;
- Total volume of investment (division according to gender, age category and the type of non-agricultural activity).

Input
- Amount of public expenditure realised.

Needs

Hierarchy of objectives

General objectives
- Improve quality of life in rural areas and diversification of economic activity.

Specific objectives
- Diversity of rural areas

Operational objectives
- Diversify farming activities towards non-agricultural activities (e.g. service, craft and trade activities), develop non-agricultural activities and promote employment.
Evaluation of evaluations – has the process worked/been useful?

- The evaluation cycle – timing and learning
  - Evaluations come too late to be useful input for next programming period

- Tensions between appropriate and consistent evaluation
  - DG Agri desire for consistent approach across MS to allow synthesis sometimes means nonsensical evaluation questions

- Methodological issues
  - More emphasis on output rather than impact (outcome) indicators
  - Causal influence of programme on desired outcomes is often weak

- Data requirements and resourcing
  - Reporting requirements may discourage participation

Source: Dwyer, Bradley and Hill 2009
EVALUATION SPECIFICITIES IN AGRICULTURAL MEASURES
Long history of evaluation of agricultural programmes

- **Office of Public Works**
  - Began cost benefit analysis of arterial drainage schemes in 1970

- **Department of Agriculture and Food**
  - Analysis and Evaluation Unit in the 1990s supported by EU Structural Funds
  - Value for Money audits since 2005
Value for Money Reviews

- Department of Agriculture, Fisheries and Food
  - Beef Classification Scheme, 2005
  - Compensatory Allowance Scheme, 2006
  - BSE eradication, 2006
  - Laboratory Testing for Plant and Animal Diseases, 2007
  - Farm Waste Management Scheme, 2007
  - Dairy Hygiene Scheme, 2008
  - Food Industry Research Measure, 2008
  - Processing investment aids, 2008
  - Bovine TB eradication, 2008
  - Young Farmers Installation Scheme, 2009
  - Veterinary Inspection Meat Hygiene Scheme, 2009
  - Cattle Traceability Scheme, 2009
  - Forest Roads Scheme, 2010
  - Fallen Animals Scheme, 2010
  - Suckler Cow Welfare Scheme, 2012

All available on the Department website (look under Publications for each year)
Specificities of evaluation in the agricultural and rural development context

- Covers both policies and programmes
  - Difficulties in identifying impacts attributable to specific measures in the context of multiple intervening factors

- Complexity
  - Objectives are often very general in nature
  - Strong link with environmental (non-market) impacts

- Establishing additionality
  - Deadweight and displacement
  - The challenges of establishing the counterfactual of what would have happened in the absence of the programme

- Many voluntary schemes (investment aids, agri-environment)
  - Dealing with the problem of self-selection
  - Before-after vs with-and-without approaches
EXAMPLE
ARTERIAL DRAINAGE INVESTMENT
BRUTON AND CONVERY
1982
Arterial drainage case study

- **Background**
  - Arterial drainage – artificial widening and deepening of main rivers to increase their effectiveness at draining their catchment areas
  - Field drainage – the activities necessary to remove surplus water from fields
  - Interdependent
  - Long history in Ireland
  - Undertaken by the Office of Public Works
Arterial drainage case study

- Ireland suffers from drainage problem due to its topography
- By preventing flooding, main benefit is to increase the productivity of affected lands
- Potential environmental implications for:
  - Water supply
  - Fisheries
  - Wildlife (drainage of wetlands)
  - Aesthetic and amenity considerations
- Value of investment ensured only through regular maintenance
Why public involvement?

- Arterial drainage is a public good
  - Free-rider problem
  - Transactions costs
  - Role of externalities
  - Income redistribution (using tax revenues to enhance the productivity of land belonging to more deprived members of the community)

- Rationale for involvement in field drainage
  - Less clear cut? Higher discount rates of elderly farmers
Based on recommendations of a Commission set up to study how the government might best intervene on arterial drainage

- Should focus on draining entire catchments
- Govt should bear all the cost of construction
- Beneficiaries should pay 70% of the assessed improved annual value of the lands affected towards the cost of maintenance
- Significant government subsidy justified on grounds of spin-off effects of greater agricultural prosperity, the positive impacts in making field drainage possible, avoiding remedial costs of deterioriating drainage conditions, indirect benefits to transport, public health, urban areas, sewage outfalls

- Arterial draining is an “essential service” and a matter of “national pride”
The brave Mr Hanna (DoF, minority report)

- Did not accept that the (unestimated) benefits were sufficient to justify a programme whose cost per acre was almost twice the prevailing price of land.
- Better agricultural returns could be had by improving existing dry land.
- The programme offered a “palliative of very limited efficacy for unemployment”.
- Dismissed the argument of indirect benefits, pointing out that investments in housing and primary education would be far more valuable.
- Concluded that adoption of the programme would involve “a dissipation rather than a creation of national wealth”.
- Catchments should only be drained where returns commensurate with the cost of construction and maintenance could be obtained, and state should never contribute more than 60% of construction cost.
Government decision

- Government adopted an arterial drainage programme covering twice the area recommended by the Commission (1.2 million acres rather than 600,000 acres)
- 28 major catchments, ranked by severity of flooding
- Thirty years later, Department of Finance Appraisal Team (1968) noted that, often, cost of drainage exceeded full post-drainage value of affected lands and recommended halt to programme until full cost-benefit appraisal of future schemes
- Hence introduction of CB analysis for arterial drainage in 1970
Methodology evaluated by Bruton and Convery (1982)

“The Office of Public Works stands alone among public agencies in Ireland in its willingness to publish its investment appraisal procedures. We have accepted the invitation implicit in this act and have critically analysed the procedures so described. In doing so we are reviewing techniques of analysis which in many—perhaps almost all—cases are no doubt better than those employed elsewhere in government in Ireland. We salute the members of the Office of Public Works who have had the courage and confidence to subject their work to public scrutiny: this volume is dedicated to them.”
The OPW methodology

- Primary benefit: increase in landholder income
- Secondary benefits: spin-off employment and incidental benefits to non-farm community
- Direct costs of arterial drainage
- Cost of follow-up field drainage and investment in livestock and buildings associated with the output targets
- Environmental impacts not costed but reported in EIA
- Fifty year time horizon and discount rate of 3.5% used
Analytical framework

- To assess the net impacts of drainage, the prospective impacts if the land were not drained should be deducted from the prospective impacts with drainage (with-without approach)
- Analysis of alternatives should proceed marginally
- Analysis should examine alternative means of achieving the same objective (expanding net farm income)
- Test validity of assumptions using ex post analysis
- Adjust flows of funds over time using appropriate rate of interest
Select project with highest NPV
(for mutually exclusive alternatives)

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<tr>
<th>Year</th>
<th>A</th>
<th>B</th>
<th>C</th>
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<tbody>
<tr>
<td>0</td>
<td>-10</td>
<td>-40</td>
<td>-30</td>
</tr>
<tr>
<td>10</td>
<td>40</td>
<td>100</td>
<td>60</td>
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Results

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<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
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<tbody>
<tr>
<td>Present net worth</td>
<td>14.6</td>
<td>21.4</td>
<td>6.8</td>
</tr>
<tr>
<td>IRR (%)</td>
<td>14.9</td>
<td>9.6</td>
<td>7.2</td>
</tr>
<tr>
<td>Benefit/cost ratio</td>
<td>2.46</td>
<td>1.53</td>
<td>1.23</td>
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Choosing the alternative which maximises either the IRR or the B/C ratio can mean foregoing increments at the margin which return more than they cost.
Analytical framework

- Shadow pricing
  - Estimating the net additional income accruing to the landholders
  - Cost of labour (if otherwise unemployed)?

- Valuation of environmental effects
  - Assigning market values not practical
  - Marginal analysis can help identify threshold effects

- Secondary impacts
  - Multiplier effects – not valid
Difficulties with OPW methodology

- Alternative measures of gains to landholder income
  - Improved vs unimproved value of land
  - NPV of additional income
  - Requires assumption (90%) re proportion of farmers that will adopt the follow up field drainage
  - Either estimate very sensitive to base year given volatility in prices/incomes

- Treatment of secondary benefits
- Implications of cost overruns
Bruton and Convery recommendations

- Found evidence of diminishing returns – the more cost-effective schemes already undertaken
- Undertake more marginal analysis of schemes
- Introduce some cost-sharing to reduce demand for what is perceived as a free public good
- Drop estimation of secondary benefits (assuming zero shadow price of labour)
- Do more ex-post analysis
- Equalise rate of grant among competing Department schemes
THE ECONOMIC SURPLUS APPROACH TO EVALUATION

EXAMPLE
EVALUATION OF AGRICULTURAL RESEARCH EXPENDITURE
Benefits from public sector R&D

- Investment in agricultural research $\Rightarrow$ changes in technology $\Rightarrow$ increases in agricultural productivity
- Research as a public good
- Measuring the benefits from research
  - Estimating consumers and producer benefits using a supply and demand model of a commodity market
  - Both ex-ante and ex-post applications
Issues in measuring R&D benefits

- Assessing the relationship between the size of investment in R&D and output or productivity change
- Identifying the relationships between increased productivity flows and economic benefits
- Accounting for the timing of streams of benefits and costs, given lengthy lag times
The basic supply-and-demand model of research benefits

Producer surplus gain = C + E + G - A
Consumer surplus gain = A + D + F
Social benefit = C + D + E + F + G
Issues

- Clearly identifies distributional implications
- Measurement issues (slopes of curves...)
- Taking account of market distortions (price support, environmental externalities)
- Potential for understating costs (cost of public funds...)
- Potential for overstating benefits (ignoring other sources of productivity gains, only evaluating ‘winners’,...)
- Potential for understating gains by assuming that productivity would remain unchanged in absence of innovation
  - Stress again the importance of the counterfactual
EXAMPLE OF A VOLUNTARY SCHEME

RURAL ENVIRONMENT PROTECTION SCHEME
Agri-environmental Payments: REPS scheme

- REPS designed to encourage improved environmental management of farmed land
- Successive scheme iterations since 1994
- Originally focused mainly on nutrient use/encouraging more extensive farming
- Recent schemes have focused more on enhancing biodiversity
Evidence of REPS success?

Chemical Nitrogen Use (Kg) on REPS and Non-REPS Extensive Farms – 2002, 2005 & 2009

Source: Authors analysis of the National Farm Survey 2002, 2005 and 2009.

Source: INDECON, Mid Term Review of RDP 2007-2013
Establishing a counterfactual

- This study assumed that input use on REPS farms would develop in a similar pattern to input use on extensive Non-REPS farms in the absence of REPS.
- An extensive Non-REPS farm index was developed for the reference periods for the six variables. The extensive Non-REPS farm index was then applied to the base year figures for REPS farms to establish a benchmark for activities in a subsequent year.
- The proportionate difference between the benchmark figure in the chosen year and the actual figure was then attributed to the presence of the REPS programme.
- Has selection bias been controlled for?
Hynes et al (2007) results

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<tbody>
<tr>
<td>Land improvement (€)</td>
<td>16.38</td>
<td>26.12</td>
<td>46.78</td>
</tr>
<tr>
<td>Chemical Nitrogen (Kg)</td>
<td>-9.92</td>
<td>-1.75</td>
<td>-11.52</td>
</tr>
<tr>
<td>Chemical Phosphorus (Kg)</td>
<td>-6.07</td>
<td>-3.37</td>
<td>-9.23</td>
</tr>
<tr>
<td>Organic Phosphorus (Kg)</td>
<td>-0.064</td>
<td>-0.065</td>
<td>-8.34</td>
</tr>
<tr>
<td>Chemical Potassium (Kg)</td>
<td>-5.23</td>
<td>-9.95</td>
<td>-14.66</td>
</tr>
<tr>
<td>Fertiliser Purchased (€)</td>
<td>-35.58</td>
<td>-1.64</td>
<td>-36.63</td>
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REPS and biodiversity

- The REPS scheme also aims to improve and promote farming practices that protect and increase biodiversity (wildlife habitats and endangered species of flora and fauna).

- Copland and O’ Halloran study aimed to determine whether REPS farms had greater numbers and more diversity of birds than Non-REPS farms. Bird and habitat data were collected from 61 REPS farms and 61 Non-REPS farms from three regions in Ireland over three bird breeding seasons.

- The study found that overall there was no increased diversity among REPS farms compared to Non-REPS farms and concluded that REPS had little or no impact on bird diversity and numbers.

- “The lack of any significant differences in species diversity between REPS and non-REPS farms is perhaps not too surprising given the “shallow” nature of the scheme. The basic eleven measures within REPS are likely to have limited impacts on bird diversity, with many of the measures requiring habitats to be “retained” or “maintained”, rather than managed, increased, created or improved.”
Summary - Highlights

- Be clear on what is the counterfactual
- Think about additionality – what is likely size of deadweight (actors would do what you are paying them to do anyway) and displacement (scheme output displaces non-scheme output)
- Valuing non-market benefits
- Control for selection bias in voluntary schemes
- Avoid including spurious benefits – multiplier effects, employment effects