(4201-420)

Advanced Policy Analysis Modelling

Introduction to Policy Analysis and Policy Modelling
- Part Ib -

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Winter Term 2007/08, February 01st – February 25th, 2008
Daily, 14.15 – 17.30, HS 23

Lecture notes and further information:
http://www.uni-hohenheim.de/apo

LECTURE OUTLINE

- **Introduction to Policy Analysis and Policy Modelling**

>>> Continuation of Part Ia (which ended with "Policy Analysis - Identifying Alternatives")

Several segments of Part I of the lecture slides follow Patton & Sawicki: Basic Methods of Policy Analysis and Planning. Second Edition. New Jersey: Prentice Hall.

1

Policy Analysis

ASSESSING POLICY ALTERNATIVES

- After identifying alternatives we have to ask:
  "Which policy alternative should be adopted?"
- In this step in the policy analysis process, the policy analyst takes each of the proposed policy alternatives and, one by one, applies each of the decision criteria to each alternative.
- *Step 1:* specify the criteria that is to be used (e.g. efficiency, cost, political acceptability, and equity).
- *Step 2:* define what you mean by each of these criteria and how they will be measured.
- *Step 3:* look at each proposed policy alternative, one at a time, and ask, what would be the efficiency, cost etc. of this alternative?
- But: how do we know what, e.g. the efficiency of each alternative will be?

Policy Analysis - Assessing Policy Alternatives

FORECASTING

- The criteria that will be important in assessing the proposed policy alternatives determine what needs to be forecast.
- There are a variety of methods used to make forecasts. They range from simple stereotyping to complex statistical formulas.
- *Intuition* may use techniques such as Delphi, scenario writing, or feasibility assessment. However, it requires that the participants be quite knowledgeable, and it needs to be checked for logical consistency.
- *Theoretical models* identify important variables and specify the nature of the linkages among them. Then the model is used to predict outcomes when one or more of the variables are changed.
- Models are built from information, experience, expert advice, etc.

Policy Analysis - Assessing Policy Alternatives

FORECASTING (contd.)

- *Constructing a model* helps to get to the key elements of the situation, and focus on the most important concerns.

- It identifies the key factors and the relationships among them which will likely be impacted by any proposed policy alternative.

- In a model we demonstrate the likely consequences of either the no action alternative, or any other rival alternative.

- Models may be expressed in words, in physical dimensions (e.g., architectural models), or in numerical form.

Policy Analysis - Assessing Policy Alternatives

FORECASTING (contd.)

- *Extrapolation* uses the past to predict the future, assuming there are stable patterns.

- Extrapolation is useful for conducting a baseline analysis, showing what is expected if the status quo or no action alternative is adopted.

- It is relatively simple and cheap and can be accurate in many circumstances. Data can be either raw numbers or a computed rate of change.

- Extrapolation requires precise definitions of criteria and measures, and accurate measurement. It is most often used when there are linear patterns in the data.

- Extrapolation is less useful in the case of new problems, new issues, or new policy areas, where there is little or no past data.

Policy Analysis - Assessing Policy Alternatives

FORECASTING (contd.)

- The most commonly used form of regression is linear regression.

- Linear regression uses the values from an existing data set consisting of measurements of the values of two variables, X and Y, to develop a model that is useful for predicting the value of the dependent variable, Y for given values of X.

- <u>Elements of a Regression Equation:</u>

  The regression equation is written as: Y = a + bX + e

  - Y = Dependent variable (Y), what is being predicted or explained
  - a = Alpha, a constant; equals the value of Y when the value of X=0
  - b = Beta, the coefficient of X; the slope of the regression line; how much Y changes for each one-unit change in X.
  - X = Independent variable (X), what is predicting or explaining the value of Y
  - e = The error term; the error in predicting the value of Y, given the value of X (it is not displayed in most regression equations).

Policy Analysis - Assessing Policy Alternatives

FORECASTING (contd.)

Linear regression example: We know what the population has been in past years for a given area.

Year	Actual Population
1910	15.000000
1920	18.000000
1930	21.000000
1940	24.000000
1950	27.000000
1960	30.000000
1970	33.000000
1980	36.000000
1990	39.000000
=> Predicted population:	
2000	42.000000
2010	45.000000

- We can compute the values of the components of the regression equation, and use them to predict what the area's population will be in future years.

- But: If the data are not linear, that is, if on a graph the line that best shows the relationship between the two variables is not a straight line, then simple linear regression cannot be used to extrapolate into the future. Instead, the data must be converted, e.g. to logarithms.

Policy Analysis - Assessing Policy Alternatives

ECONOMIC ANALYSIS

- One of the most widely used economic analysis tools is to look at the *long term costs* and *the long term benefits* of a proposed policy alternative.
  - From there, the policy analyst can calculate either the Net Present Value (NPV), the Cost-Benefit Ratio, or the Internal Rate of Return (IRR) of each alternative.
- The policy analyst must *assemble estimates of the initial or implementation year costs and benefits* of the alternative, *and the subsequent costs and values for each additional year* the project will be in effect.
- Example:

YEAR:	0	1	2	3	4	5
Costs	$15,000	0	0	$1,223	0	0
Benefits	0	$4,000	$4,000	$4,000	$4,000	$4,000

Policy Analysis - Assessing Policy Alternatives

ECONOMIC ANALYSIS - DISCOUNTING

- next step for the policy analyst: decide on a ***discount rate***.
- ⇨ The discount rate assumes that money spent in the future will not cost as much as money spent today.
- ⇨ Similarly, money gained in the future will not be worth as much as money gained today.
- ⇨ This is based on the human preference for wanting to put off costs (or payments) as long as possible, and wanting to receive benefits (or pay) as soon as possible.
- The discount rate is usually obtained from economists, from agency policy, or from the nature of the project being considered.
  - Another source is the discount rate charged by the Federal Bank, or the interest rate paid on government bonds.

Policy Analysis - Assessing Policy Alternatives

ECONOMIC ANALYSIS – DISCOUNTING (contd.)

- At times, the choice of which discount rate to use has been highly politicized.

⇨ Many government projects have high initial costs but a long stream of benefits
  - ⇨ a low discount rate will make a project look more favourable
  - ⇨ a high discount rate will make a project look less favourable

- The same discount rate is generally applied to both, the project costs and the project benefits.

- If inflation is going to be factored in, it should be applied to both the costs and benefits separately, before the discount factor is applied.

Policy Analysis - Assessing Policy Alternatives

ECONOMIC ANALYSIS – DISCOUNTING (contd.)

- To calculate the *discounted costs*, multiply each year's costs by that year's discount factor (the discount rate factor be obtained from a table of discount rates)

YEAR:	0	1	2	3	4	5	Total
Costs	$15,000	0	0	$1,223	0	0	$16,223
Discount rate	4%	4%	4%	4%	4%	4%	
Discount factor	1.0	.9615	.9246	.8890	.8548	.8219	
Discounted costs	$15,000	0	0	$1087	0	0	$16,087

- To calculate the discounted *benefits*, multiply each year's benefits by that year's discount factor (the discount rate factor be obtained from a table of discount rates)

YEAR:	0	1	2	3	4	5	Total
Benefits	0	$4,000	$4,000	$4,000	$4,000	$4,000	$20,000
Discount rate	4%	4%	4%	4%	4%	4%	
Discount factor	1.0	.9615	.9246	.8890	.8548	.8219	
Discounted benefits	0	$3846	$3698	$3556	$3419	$3288	$17,807

Policy Analysis - Assessing Policy Alternatives

ECONOMIC ANALYSIS - NET PRESENT VALUE

- The NPV is the value of the project if all the costs were paid today and all the benefits were gained today.

- To find NPV, subtract discounted costs from discounted benefits: Discounted Benefits $17,807 - Discounted Costs $16,087 = $1,720

- The NPV of each policy alternative must be calculated separately, and then it can be compared to the NPV of each other policy alternative, to find the one with the highest NPV.

Policy Analysis - Assessing Policy Alternatives

ECONOMIC ANALYSIS - COST-BENEFIT RATIOS

- The costs and the benefits of any policy alternative can be compared in a number of ways. *Cost-benefit ratios are obtained by dividing discounted benefits by discounted costs*:

- Discounted benefits =$17,807; Discounted costs =$16,087
  ⇨ Benefit/Cost ratio =1.1

- Note: the highest benefit-cost ratio may not have the highest NPV. These are two different types of analysis.

- The most efficient projects have the highest benefits-to-costs ratio, but many policy analysts prefer to maximize NPV.

- In any case, NPV should be a positive number, and the benefit-cost ratio should be greater than 1.0

Policy Analysis - Assessing Policy Alternatives

ECONOMIC ANALYSIS - INTERNAL RATE OF RETURN

- The internal rate of return is an expression of the discount rate at which discounted benefits would equal discounted costs.

- For our example, at an 8% discount rate, discounted benefits would equal $15,971 and discounted costs would also equal $15,971.

- If the calculated IRR is greater than the discount rate being used for the project, then that is an indication that the project should be carried out.

- Generally, IRR is not comparable to either NPV or the benefits-to-costs ratio. The IRR from one project, however, can be directly compared to the IRR from an alternative project

Policy Analysis - Assessing Policy Alternatives

ECONOMIC ANALYSIS - SENSITIVITY ANALYSIS

- Often there is no clearly superior potential policy alternative, but several that seem equally acceptable,
  i.e. one alternative may be better on the criterion of efficiency, while another is better on costs, and a third on political acceptability.

- A policy analyst will usually try to see *how sensitive the analysis is to changes in assumptions*.

  Things that the policy analyst will test include:

  1) the length of the project (how long will benefits continue)

  2) the discount rate

  3) the value placed on various quantities (costs, benefits, probabilities, etc.)

ECONOMIC ANALYSIS - SENSITIVITY ANALYSIS (contd.)

- Another type of sensitivity analysis is to *identify the break-even point*. This can vary according to:
  1) the length of the project (how many years are needed to break even?);
  2) the discount rate (how low before benefits equal costs?);
  3) the value of other quantities that are generated through the policy.

- *Contingency analysis* identifies what will happen if one of the basic assumptions about the project is altered.

  For example: what if there are large cost over-runs? What if people do not behave as predicted?

ECONOMIC ANALYSIS - SENSITIVITY ANALYSIS (contd.)

- A *fortiori analysis* examines the likelihood that any one factor will take on a value that makes the project infeasible.

  Example: what if the project takes two years to complete instead of one? What if interest rates rise dramatically? What if new regulations are adopted?

⇨ ***To perform sensitivity analysis:***
  1) list all relevant considerations;
  2) establish the range of values that each variable can take, from low to high;
  3) holding all other values constant, vary the value of one variable at a time;
  4) test sensitive values to find the break-even, contingency, and a fortiori points.

Policy Analysis - Assessing Policy Alternatives

RISK ANALYSIS

- Some decision-makers are risk averse. They want to minimize any possible losses, rather than to pursue the (riskier) maximum possible gains. They will want to go for the sure thing.

- If there is a great deal of uncertainty about the analysis, there are a number of strategies:
  1) delay until more is known
  2) map out all uncertainties and the information that is needed
  3) collect more data to reduce uncertainty
  4) estimate a wide range of possible values for those which are uncertain
  5) develop alternatives under a wide range of possible conditions
  6) build in more flexibility
  8) compromise to an acceptable alternative, even if it is not the optimal one
  9) choose a strategy that minimizes the maximum possible losses
  10) conduct in-depth research to provide the information needed

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Policy Analysis - Assessing Policy Alternatives

POLITICAL ANALYSIS

- Often one criteria for assessing proposed policy alternatives is political acceptability to the client.

- A *political feasibility analysis* can help the policy analyst to identify the important elements to be considered for each proposed policy:
  1) Actors -- people, groups, and organizations
  2) Beliefs and motivations -- which are negotiable, and which are non-negotiable?
  3) Resources -- power, influence, money, staff, public opinion, etc.
  4) Effectiveness -- leadership, ability to use resources effectively
  5) Sites -- agendas, windows of opportunity, sequencing of decisions, etc.

- A political feasibility analysis takes each proposed policy alternative and examines how well it will hold up in the current political reality.

Policy Analysis - Assessing Policy Alternatives

IMPLEMENTATION ANALYSIS

- In conducting an implementation analysis, the policy analyst looks at factors that will make the alternative easier or more difficult to implement, such as:

1. Are there few or many actors required to implement this alternative?
2. Will there be one or multiple implementation settings?
3. Will there be a single or multiple sets of instructions?
4. What is the degree of consensus around this alternative?
5. What magnitude of change will be required?
6. How much of the political conflict from the adoption stage will be displaced into the implementation stage?
7. Can game theory be used to model the possible outcomes?
8. Are the necessary resources present, such as administrative will, competence, budget, skills, authority, personnel, etc.

Policy Analysis

DECISION RULES

- Policy assessment techniques do not determine which policy should be adopted.
- Policy analysis presents the benefits and drawbacks of each alternative, but in addition one or more decision rules are needed in order to determine which policy is the "best."

There are many problems in trying to determine which policy to adopt:

1. Many problems in the public sector have multiple facets. Policies are designed with multiple goals or objectives. There may be no dominant objective, or several objectives may be in conflict.

2. There are multiple criteria to take into account -- technical, economic, political, and administrative -- but who decides which is the most important?

Policy Analysis

DECISION RULES

3. Not all important considerations can be converted into comparable units (such as dollar values).

4. Which is the proper criterion to use, greatest net present value? greatest internal rate of return? largest benefit-cost ratio?

5. There is often a lack of agreement beforehand on decision rules, or which rules to apply.

6. Even if each decision criterion is optimized separately, there may still be a sub-optimal choice at the end (a camel is a horse designed by a committee).

⇨ The policy analyst is often faced with trying to present multiple policy alternatives which have been assessed in terms of multiple decision criteria. There are various methods which can be used to display this information in a way that facilitates decision-making.

Policy Analysis - Implementation, Monitoring, & Evaluation

IMPLEMENTATION ANALYSIS

The full policy process is often described by the following steps:
1) problem definition
2) alternative generation
3) analysis of alternatives
4) policy adoption
5) policy implementation
6) policy evaluation

A thorough policy analysis will include some consideration of policy implementation, monitoring, and evaluation.

▪ The policy analyst can sketch out an *implementation plan* for the most highly ranked alternative(s) that considers:
1) relevant actors and their interests
2) required resources and who might provide them
3) facilitators and barriers likely to be encountered
4) reasonable time frame

Policy Analysis - Implementation, Monitoring, & Evaluation

- Implementation analysis might involve writing a "best-case" scenario and a "worst-case" scenario for each policy alternative, as well as the "most likely" outcome.

⇨ The idea is to think systematically through the implementation process, identify potential problems, and develop actions that can be taken to either avert catastrophes or reduce losses.

POLICY MONITORING

⇨ *Policy maintenance* refers to keeping the policy or program going after it is adopted. *Policy monitoring* refers to the process of detecting how the policy is doing.

- To monitor a policy, some data about the policy must be obtained. A good implementation plan will suggest some ways in which ongoing data about the policy can be generated in the regular course of policy maintenance (e.g. from records, documents, feedback from program clients, ratings by peers, tests, observation, and physical evidence).

Policy Analysis - Implementation, Monitoring, & Evaluation

POLICY EVALUATION

- Policy evaluation is the last step in the policy process. It may ask deep and wide-ranging questions, such as:
  1) was the problem correctly identified, or was the correct problem identified?
  2) were any important aspects overlooked?
  3) were any important data left out of the analysis? did this influence the analysis?
  4) were recommendations properly implemented?
  5) is the policy having the desired effect?
  6) are there any needs for modification, change, or re-design? what should be done differently next time?

⇨ When policies fail to have the intended effect, it is usually due to one of two types of failure: theory failure, or program failure.

POLICY EVALUATION (contd.)

- A *theory failure* occurs when the policy was implemented as intended, but failed to have the desired effect.

- An *implementation failure* occurs when the policy is not implemented as intended.

FORMATIVE EVALUATION

- If adequate monitoring processes are in effect, it should be fairly easy to detect whether a policy has been implemented as intended. This type of policy monitoring is referred to as formative evaluation.

- Formative evaluation documents and analyzes how a policy is implemented, with the objective of making improvements as the implementation process unfolds.

SUMMATIVE EVALUATION

- Summative evaluation is conducted after a program has been fully implemented.

- It looks at whether the program is meeting its objectives, and why or why not.

- In general evaluations may be unpopular for many reasons:

  1) the program is controversial;

  2) there are strong political interests in seeing it succeed or fail;

  3) there are difficulties in measuring program accomplishments;

  4) those involved may be uncooperative;

  5) program effects may be influenced by outside developments.

14

Policy Analysis - Implementation, Monitoring, & Evaluation

SUMMATIVE EVALUATION (contd.)

- To decide whether an evaluation will be helpful, the answer to the following questions should be "yes":

    1) will the evaluation be accepted by politicians, administrators, and/or participants?

    2) has an evaluator been involved from the beginning?

    3) are there measurable objectives?

    4) are data available?

    5) are multiple evaluation methods plausible?

    6) has the program remained stable over time?

    7) can program staff become involved in the evaluation?

    8) will the findings be made widely available?

Policy Analysis - Implementation, Monitoring, & Evaluation

EVALUATION DESIGN

- Policy evaluation applies accepted social science research methods to public programs.

- *Before-and-After Evaluation:* a policy is evaluated for the changes it has produced since its implementation; the situation is controlled to exclude other possible influences on the outcome.

- *With-and-Without Evaluation:* a policy is evaluated for producing changes in the target population, compared to another population without the policy.

- *After-Only Evaluation:* the extent to which the policy goals were achieved, compared to the state of affairs before the policy was implemented; but the situation is not controlled to exclude other possible influences on the outcome.

- *Time-Series Evaluation:* the changes produced by the policy, tracked over a long time period.

- **Introduction to Policy Analysis and Policy Modelling**

Further reading on policy analysis:

Patton & Sawicki: Basic Methods of Policy Analysis and Planning. Second Edition. New Jersey: Prentice Hall.