ECN 275/375 summary: Environmental economics

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The basics

Pollution economics

Need to know the basics. For example to say that cost effectiveness implies that marginal abatement costs are equal is misleading, wrong, and imprecise. A typical cost effectiveness analysis entails equal marginal costs evaluated at the chosen emission level for agent I, M_i':

$$MAC_i(M_i^*) = MAC_j(M_j^*) \forall\, i, j \in I$$

That is something quite different than the statement $MAC_i(M_i) = MAC_j(M_j) \forall\, i, j \in I$ (which basically implies that the marginal abatement cost functions for agent i and j are the same.

Note that for supplying an environmental good or service, Q_i', the cost effectiveness criterion becomes:

$$MC_i(Q_i') = MC_j(Q_j') \forall\, i, j \in I$$

Welfare analysis

The indirect utility function $V(\boldsymbol{p}^k, Y - T^k, Z^k)$: A powerful and handy tool to capture the welfare effects of policy, where k indicates a policy scenario, usually $k = \{0.1\}$ where 0 is without and 1 with the policy. With only two policy alternatives, a convenient way to rewrite the indirect utility function is $V(\boldsymbol{p}^k, Y - \Delta T, \Delta Z)$, where usually we assume $\Delta T > 0$ if $\Delta Z > 0$ (otherwise, the analysis is trivial as we get ΔZ for free). Note that Y – ΔT corresponds to disposable income (for consumption).

The price vector $\boldsymbol{p}^k$ may be policy dependent (and always need to be policy specific under general equilibrium, Y is income, T^k is direct policy costs (taxes or other policy related outlays), and Z^k is the policy relevant level of the public good (my advice: frame this with a positive impact on welfare, as this makes it easier to analyze the tradeoffs).

Partial derivatives with signs:

$\frac{\partial V(...)}{\partial p_i^k} \leq 0$ where i indexes price on commodity i

$\frac{\partial V(...)}{\partial (Y - T^k)} > 0$ where $(Y - T^k)$ is disposable income for policy k

$\frac{\partial V(...)}{\partial Z^k} > 0$ by definition and for convenience in the analysis.

Clarity in writing and figures

The importance of being accurate in notation. If that is not the case, it is very difficult for readers to understand what is meant. This implies that:

1. Basic definitions like *cost effectiveness* and (*cost*)*efficiency* (*optimality*) is used properly.
2. Mathematical notation is clear, and terms are defined so that readers are able to know what goes on.
3. Graphs and figures have the proper names (variables suffice some times) on axes, and curves/functions are written in such a way that it is clear which are the independent and dependent variables. It is still OK for curves that are changed to drop the detailed notation to make the figure/graph less cluttered.
4. Equilibrium solutions, which usually involve both prices and quantities in some form, are properly written. For example, the basic commodity marked equilibrium is written $\{p^*, q^*\}$ where the asterix is used to denote that the equilibrium is a specific (usually optimal) combination of prices and quantities. Other chosen values are marked, for example as $\{p', q'\}$.

In brief: the basics are there to set a standard for communication with other economists and academics. Note that if one communicates with non-economists/-academics, the use of specific terms in economics is a two-edged sword: scientific language serves a purpose when one communicates with members of one own's tribe (like economists), but that some of these terms may be unknown to non-academics or -economists. If that is the case and a term is frequently used, explain it in long hand the first time it is used, f.ex. "the subsidy (*S*)".

Overarching perspective on environmental economics/regulation

The core of environmental economics is *asymmetric information* and how the principal (regulator) can induce agents to *behave truthfully*, i.e., reveal their true opportunity costs. The starting point for such analyses are *principal-agent* models. Moreover, the type (kind) of information asymmetry, it in the regulatory case determines which modeling angle one should use. *Resource allocation mechanisms* are the modern extension of *principal-agent* models.

Models used to stylize a case/situation have several purposes:

1. To make the analysis more focused and tractable
2. To put the case at hand in a setting so that useful simplifications can be made to make the analysis more focused. Recall: models are (often) simplifactions of the case to be studied.

Topics covered

See the schedule of lectures (http://arken.nmbu.no/~eiriro/ecn275/schedule.html) for list of topics. Handouts/lecture notes cover the essentials. The book and additional reading materials provide additional materials and insights that it is worth reading. Reading guide for each lecture/gathering.

The take home test

Overall purpose: to facilitate learning →.the tests cover what is important. Getting the basics right, and being able to extend the basics to more complicated settings is at the core of ECN 275/375.

The duration of each of the take home tests is 3 hours.

From a student-taking-test perspective there will be some focus on the basics, your topical knowledge, and *ability to reason as an economist*. However, parts of the analysis will require that you

are able to extend the basics to stylized applied settings. As always on my tests, computations are likely to be simple – this is a course in *environmental and natural resource economics*, not your knowledge of advanced mathematics or your computation skills.

2-3 hours after the tests are completed (= all have handed in their answers with a good "safety cushion"), my suggestions for answers are posted on the course web page to facilitate your learning.