Ecological Economics

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Course notes

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Contents

> "As economists we only see a part of the picture"
>
> *Monica Serrano Gutierrez*

1 Warming up

1.1 Constanza et al (2015) Time to leave GDP behind

by Costanza, R., I.Kubiszewski, E. Giovanini, H. Lovins, J. McGlade, K.E. Pickett, K.V. Ragnarsdóttir, D. Roberts, R. de Vogli & R. Wilkinson (2014), Nature (link)

> GDP measures "everything except that which makes life worthwhile"
>
> *Robert F. Kennedy*

GDP is a good measure for tne flow of everything that has a market price - mot as an indicator of well-being or environment.
Alternative measures should take into account

- Happiness
- Prosperity
- Environment
- Development

1.2 Rodrik, D. (2015) Economics Rules: The Rights and Wrongs of the Dismal Science

An economist should have as many different models as possible in her toolbox
$\rightarrow$ choose the better model(s) for the specific research question.
Our models are partial, thus, our conclusions are partial.

1.3 The four laws of thermodynamis

1st Law of thermodynamis: Energy can neither be created nor destroyed, but can change formms and flow from one place to another.

2nd Law of thermodynamis: The irreversibility of natural processes, and, in many cases, the tendency of natural processes to lead towards spatial homogeneity of matter and energy.

Important works on environmental economics

- Pigout (1920): Taxing externalities.
- Coase (NPE 1991): Contracting between parties.
- Elinor Ostrom (NPE 2012): Some communities use other mechanisms than the market for allocations etc. - and it's better than the market!
- Richard H. Thaler (NPE 2017): Behavioral economics (interests of firms).
- William Nordhaus (NPE 2018): For integrating climate change into long-run macroeconomic analysis.

1.4 Environmental Economics vs. Ecological Economics

> "We cannot solve our problems with the same thinking we used when we created them"
>
> *Albert Einstein*

Ecological Economics

- Sustainability of the world as a whole.
- Looking at the world as a whole, i.e. no such thing as externalities.

Environmental Economics

- Sustainability: Of the economy.
- Negative externalities: To the economy (the core).
  - Uncompensated (adverse) impact of one person's action on the wellbeing of a bystander.
  - Causes markets to be inefficient, and thus to maximize total surplus, e.g. pollution.
  - Coase theorem: if private parties can bargain without cost over the allocation of resources, they can solve the problem of externalities on their own.
  - Government action: Regulations (permits) or taxations (market correcting solution).

The Climate:
Average weather conditions that can be observed locally regionally or globally. Changes with or without human impact.

Global warming:

- This is what is important!
- Designates the increase of average temperature
- **Global public good:**
  Standard solutions to tragedy of the commons:
  - Price market-based policy: Carbon tax: Arthur Pigou (1920) *The Economics of Welfare*
  - Quantity market-based policy: Cap-and-trade system: Ronald Coase (1920) *The problem of social cost*
  - Alternative methods: Polycentric approach (consensus): Elinor Ostrom (2012) *GLobal Environmental Commons* (NP, 2009).

  Options to manage the "global common"
  - Free rider problem: Westphalian nature of the current system of nations
  - Problem of responsibiilty

History of international climate negotiations
1987: Montreal: Agreement about the Freon gas - the only succesfull negotiation.

2 The economy as an open system

Using Input-Output analysis to answer the questions.

2.1 Growth, technology and the environment

2.2 Economic growth and the environment

Environmental Kuznets Curve

- Classical Kuznets Curve: Inequality will rise with GDP growth - but will fall again.
- Evidence about the existence of an is not conclusive (papers for and against).
  - For: Looking at Freon and other CFCs, HCHCs and HFCs (Montreal, 1987).
  - Against: Most work on GHGs.
  - Increased international trade.
  - Delocalization of CO_2: Moving industries $\rightarrow$ can increase emission intensity, but not true for all sectors!

What has been the role of:

- Technology?
- Population growth?
- Level of consumption per capita?
- Composition or structure of the consumption?
- Changes in trade structure?

Insert graph of main determinants of change in global GHG in CO2-equivalents, s. 139!
What about non-GHG? Insert: Drivers of emission growth for Spain 1995-2000, s. 143!

Innovation - examples:

- Energy (fuel) efficiency:
  - Reduction of related emissions
  - Rebound effect: Direct and indirect (sectors providing inputs to the sector)
  - Jevons Paradox: Fuel is more effective $\rightarrow$ cheaper $\rightarrow$ more car-driving
- Electric car:
  - Reduction of local emissions
  - Benefits for population health
  - Provision of additional electric demand: coal vs. renewal? (a mix)
- 3D printing
  - Reduction of scrap or production waste.
  - Reduction of emissions from transport.
  - But: Do we end up with more consumption and end-of-life waste?

You cannot think about the economy and the environment in linear terms!

2.3 Inequality, consumption & environment

Demand-graph

Does a more equal distribution increase pollution?

- China: Middle-class increase consumption and pollution
- India: Religion plays a big role, e.g. vegetarian
- Engel Curve? The consumption changes from neccesities towards luxuries with income.

Policy maker: It is important to design

- Climate policies does not increate economic inequalities
- Inequality reduction policies that do not increase GHG emissions.

Households' role is partially hidden in environmental statistics

- Statistics based on territorial or production based-approach.
- Only *direct* household emissions are considered (e.g. driving, cooking, painting).

insert two graphs from Serrano (2008) *Economic activity and atmospheric pollution in Spain: An Input–Output Approach*

Disaggregating the consumption vector

- Expenditure versus income?
  - How does savings/investments pollute?
- Different size or compusition of households?
  - Per-capita expenditure and emissions
  - Equivalent expenditure and emissions
  - Grouping households according to their size
  - Multivariate regressions
- Across countries
  - E.g. consumption's share of health and education is not recorded if provided for free.
- Bridge matrices?
  - Different classifications, different criteria (micro data on households cannot be aggregated to the whole population)

Difference between households

- Income
- Expenditure
- Settlement, i.e. municipality size
  - 2050: 2/3 of global population is expected to live in cities
- Development related to growth etc.?

Spain 2000: The richer pollute more in absolute terms, but less in relative termns. insert graphs, s.169, 173, 180

2.4 Fragmentation, trade & encvironment

Emissions from **Transport**

- International transport only grew a little
- Within-country transport exploded!

'Value added' measure can account for global value chains (intermediate goods).
Conclusion

- It seems like global trade has little effect on emissions
  - But you need to account for all of the product chain!

3 Price input-output model

Great because flows can be in all kinds of measures - we don't need to translate everything into Euroes.

4 International Databases for the economy and the environment

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