Shaping national adaptation with economic tools and assessments: For which fields of adaptation action could it work and at which scale?

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CIRCLE-2 Workshop "Cross-sectoral Vulnerability, Risk and Economic Assessments of Climate Change Impacts – What is needed for adaptation strategies?

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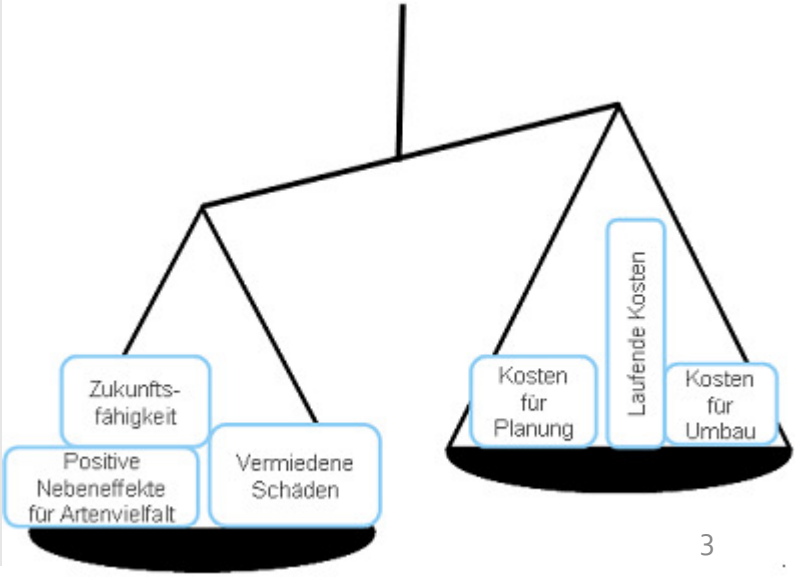
How to calculate impacts, vulnerability and adaptive capacity? Cost-Benefit-Analysis in Case Studies

- 28 case studies in 13 sectors
- Costs of climate change impacts or cost of vulnerability
- Benefit from adaptation measures for society and environment

> raise adaptive capacity

- financed by UBA, carried out by Ecologic, published 2012



CBA example: highways and summer heat

-Summer heat put strain on road-construction, increased damages

How to calculate vulnerability?

> loss of time, costs of accidents, reduced maintenance

How to calculate adaptive capacity

> price of heat resistant road surface

In Mio. €	Cost	Benefit time	Benefit accidents	Benefit repair	Benefit total	Benefit-cost ratio
Min	10	9	14	13	36	Bei min. Kosten: 3,6 bis 7,5 : 1
Max	40	14	21	40	75	Bei max. Kosten: 0,9 bis 1,9 : 1

How to calculate impacts, vulnerability and adaptive capacity? Cost-Benefit-Analysis in Case Studies

28 case studies in 13 sectors, examples

- river flooding and retention areas: (+) if ecosystems valued
- urban heat and green roofs: (+) needs only low subsidies
- heat waves and cooling systems in hospitals: (-/+)
- warning systems and adapted management in hospitals etc: (++)

CBA for impacts/adaptation – examples and lessons from ECOLOGIC study

Strength	Opportunity
- understandable for policy maker - make options comparable -established decision system	- assess under different scenarios / no regret - show up alternatives (e.g. to solely technical measures) - give space for environmental arguments
Weakness	**Threats**
- only quantifiable arguments - multiple uncertainties (cost and benefit) - rough estimates, make arguments vulnerable	- assessment of ecosystem services - assessment of social benefits - communication of assumptions

Some lessons from national cost of inaction assessment in Austria (COIN) – methods applied

Quantify impact chains in PHYSICAL terms on exposure units (at NUTS3 level)

Different impact chains for 14 sectors: agriculture, forestry, ecosystems, water, health, tourism, natural disasters, transport,...

Convert physical impact into MONETARY terms [EUR] (economic valuation) = SECTOR COSTS or BENEFITS

Many impact chains cannot be quantified!

Map sector costs/benefits into economic knock-on impact categories (changes in cost structure, productivity, investment, demand, replacement cost)

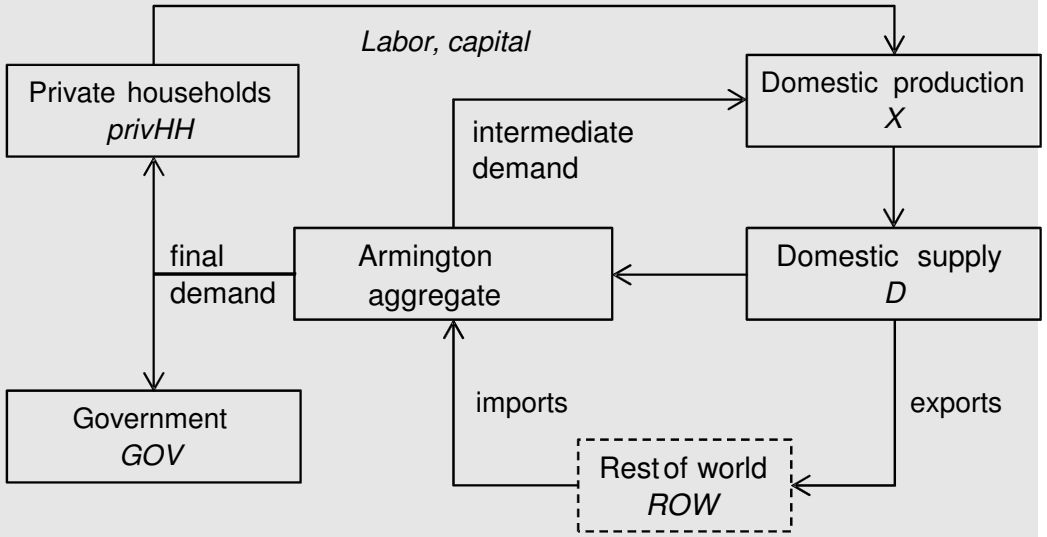
Link to input-output tables and national account data (e.g. public budget)

Quantify MACROECONOMIC EFFECTS in a multi-sectoral CGE model for Austria

CC impacts on sectoral output, GDP, welfare, public budget

Some lessons from national cost of inaction assessment in Austria – methods applied

- 40 sectors according to relevance for the cost fields (forward and backward linkages) and major Austrian sectoral activities
- Austria is one regional entity, rest of the world reflected by their trade flows
- Base year 2008



- **Scenarios for 2030 and 2050:**

  a) baseline = reference socioeconomic development without climate change

  b) climate change = baseline + mid range climate change by sector

  c) joint assessment of all CC impacts (all sectors)

Mid range CC 2030/50 relative to BASELINE 2030/50 : Climate change impacts (=Cost of inaction)					
impact field & considered impact chains	**production cost (inputs)**	**change in productivity**	**investment**	**final demand**	**public expenditures**
Agriculture (AGRI): change in productivity	x	x			x
Forestry (FORE): change in productivity, bark beetle		x	x		
Ecosystems and biodiversity: pollination service, pest control	*No macroeconomic assessment*				
Health: heat waves	*No macroeconomic assessment*				
Water supply and sanitation (WSS): more infrastructure, higher demand			x	x	x
Electricity supply and demand (ELEC)	x		x	x	
Construction & buildings (CAB): heating & cooling			x	x	
Transport infrastructure (TRM)			x		
Manufacturing and trade (MAT): heat related productivity losses		x			
Cities and urban green (CUG): enhanced urban heat island effect					x
Catastrophe management (CATM): flood damage to buildings			x		x
Tourism (TOUR): Changes in overnight stays				x	

SWOT snapshot for COIN: Multi-sectoral bottom-up assessment

Strengths	Opportunities
- evaluation of **spillover effects** to other sectors (forward/backward linkages) - **cross-sector comparison** at national scale because of consistent (SSP) baseline and CC scenarios - quantification of direct and indirect effects on **public budget**	- **priorisation** of impact fields/sectors possible (for public & private adaptation) - costs can be **compared to other public priorities** - **overlaps** of impact chains/fields can be identified and assessed - **Distinct impact chains** could be further analyzed for CBA (cf. ECOLOGIC study)
Weaknesses	**Threats**
- only **small subset of impact chains** can be quantified - **net effects** are quantified at national scale, regional hotspots are not visible - Incorporation of **extreme events** very limited	- **underestimation of true costs,** may lead to delayed or too little adaptation action - costs might be **misunderstood as risk assessment** (which they are not) - EURO-values are taken as **absolute values** for C(of inaction)-B(of adaptation) assessment (there is a stock!)

Lessons learnt so far

Economic assessments need to be complimented by adaptation policy and planning:

1. Very limited information on who exactly is loosing most
2. valuation of intangible impacts on people, ecosystem functions etc.
3. Risk analysis for extreme events needed

Lessons learnt so far

1st lesson:

CBA case analysis on impacts/adaptation help to identify yes/no decisions for action and compare different options (problem: different actor's perspective e.g. municipality/federal)

2nd lesson:

Multi-sectoral economic impacts analysis reveal orders of magnitude for the sectoral burden (benefit) share of climate change impacts and help to prioritise public action at aggregated policy scale (national/EU)

3rd lesson:

Economic assessments must be accompanied by spatially explicit vulnerability assessments and risk analysis