

Lifestyles und Gesamtweltoeffekt des privaten Konsums

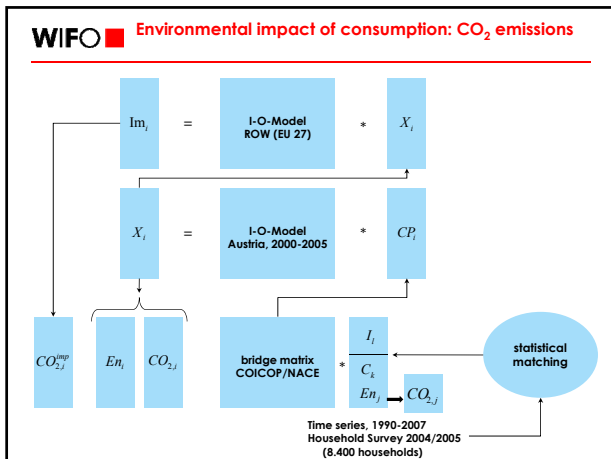
Kurt Kratena, Ina Meyer, Michael Wüger
WIFO

Full environmental impact accounting of households & spatial sustainability

- Consumers' expenditure or utility as welfare measure instead of GDP
- Consumers' expenditure has environmental impacts → 'weak' or 'strong' sustainability/social welfare or binding resource constraints (land use & ecological footprint)
- Trade, consumer welfare and spatial sustainability: "why should the arbitrary boundaries of 19th century national states be valid for global externalities?"
- → *An input-output model of direct and indirect household environmental impact including external trade*

Full environmental impact accounting of households & spatial sustainability: model blocks

- Consumers' energy demand → **direct** environmental impact
- Other consumers' demand (food, cars...) → **indirect** environmental impact
- Direct and indirect imports for consumers' demand → **imported** environmental impact
- → *Future research within this project*: environmental impacts: land-use, ecological footprint, ...other aspects of spatial sustainability: transport & lifestyles
- → *Other future research*: full consumption model: income/wealth, prices, technology, socio-demographics, full environmental impact



WIFO ■ AIDS model for household consumption

Time series model
→ *budget share (prices and income)*

$$w_{it} = \alpha_i + \sum_j \gamma_{ij} \log p_{jt} + \beta_i \log \left(\frac{C_{it}}{P_{it}} \right)$$

The budget share in 2005 w_{it} is the sum of $w_{it,k}$ with $k =$ number of households (8,400)

Identifying sustainable lifestyles:
Households with: (i) same income, (ii) same size and composition, (iii) living in the same region and for given prices (2005) use less energy than others
→ *statistical matching*

WIFO ■ AIDS model for household consumption

Statistical matching:

- (i) identical households (“statistical twins”) concerning the household characteristics (income, size, composition, region, etc.) → different energy consumption (heating, electricity, private transport)
- (ii) Ordering identified households according to energy consumption per unit of income and taking into account region
- (iii) Calculating the median of energy consumption and constructing two groups of households: “more sustainable” vs. “less sustainable”

WIFO ■ Data sources, 2000 - 2005

National Accounts for Austria (private consumption):
 Durables (energy & non-energy), food/beverages,
 clothing/footwear, gasoline/diesel, transport services,
 heating, electricity, other commodities.

Input-Output tables for Austria, 1995, 2000 and 2005:
 60 industries (NACE), imported and domestic
 intermediates

Input-Output table for EU 27, 2000:

60 industries (NACE), imported and domestic
 intermediates

Statistics Austria, IEA: NAMEA energy & CO₂ emissions

**Statistics Austria: Household Survey 2004/05, 3,500
 households with socio-demographic characteristics**

WIFO ■ Inputs for the simulation

	Sustainable	Households Others	Sustainable in % of Others
Budget shares in %			
Private Consumption	100.0	100.0	74.2
Disposable income	125.4	93.0	100.0
Food/beverage/tobacco	15.8	13.7	85.9
Clothing/shoes	5.7	5.9	72.3
Gasoline/diesel	2.0	5.1	29.1
Transport services	0.9	0.5	146.0
Electricity	1.6	1.9	61.0
Heating	2.0	3.1	46.7
Other goods & services	72.0	69.9	76.4

WIFO ■ Impact of consumption: gross output by industry

Gross output in basic prices (current prices)

	% of gross output, induced by private consumption					
	2000	2001	2002	2003	2004	2005
Products of agriculture, hunting and related services	61.3	56.4	57.4	56.1	53.8	51.7
Products of forestry, logging and related services	28.0	26.6	27.8	31.7	30.1	33.3
Fish and other fishing products; services incidental of fishing	85.4	75.3	77.2	83.3	74.6	74.1
Food products and beverages	66.9	60.5	60.9	61.6	54.8	52.7
Pulp, paper and paper products	12.3	12.4	11.8	9.9	9.8	10.1
Coke, refined petroleum products and nuclear fuels	53.3	47.8	49.4	51.9	44.0	43.2
Other non-metallic mineral products	13.0	13.0	13.9	13.1	12.7	12.7
Electrical energy, gas, steam and hot water	58.3	53.3	51.3	49.7	51.9	51.0

WIFO ■ Impact of consumption: CO₂ emissions by industry

CO₂ emissions in 1,000 tons

	2000	Induced by private consumption				
		2001	2002	2003	2004	2005
Products of agriculture, hunting and related services	657	592	623	563	513	492
Food products and beverages	685	680	801	632	518	571
Other non-metallic mineral products	553	563	590	562	566	602
Electrical energy, gas, steam and hot water	6,100	7,027	6,207	7,416	7,635	7,106
Land transport; transport via pipeline services	1,395	1,455	1,410	1,438	1,475	2,086
Air transport services	1,943	1,830	1,740	1,562	1,585	1,659

WIFO ■ Impact of consumption: total CO₂ emissions

CO₂ emissions in 1,000 tons

	Induced by private consumption	
	2000	2005
CO ₂ emissions, households	18,479	19,665
CO ₂ emissions, production	15,185	16,683
in % of emissions in production	32.4	29.6
CO ₂ emissions, imports	14,272	17,420
in % of imported emissions	29.7	27.6
TOTAL	47,935	53,769
in % of CO ₂ emissions, TOTAL	73.4	70.8
CO ₂ emissions, TOTAL	65,283	75,981

WIFO ■ Change in consumption, level-shift in lifestyles

Private Consumption, current prices

	2000	2001	Difference in %			
			2002	2003	2004	2005
Durable goods						
Purchase of vehicles	0.9	1.0	1.0	0.8	0.8	0.8
Appliances	0.9	1.0	1.0	0.8	0.8	0.8
Video/Audio/Computer	0.9	1.0	1.0	0.8	0.8	0.8
Other durables	0.9	1.0	1.0	0.8	0.8	0.8
Durables, TOTAL	0.9	1.0	1.0	0.8	0.8	0.8
Rents, housing	0.0	0.0	0.0	0.0	0.0	0.0
Vehicle operation	0.9	1.0	1.0	0.8	0.8	0.8
Non-durable goods						
Food/beverage/tobacco	8.3	8.4	8.4	8.3	8.2	8.2
Clothing/shoes	- 0.4	- 0.3	- 0.3	- 0.5	- 0.5	- 0.5
Gasoline/diesel	-43.1	-43.0	-43.0	-43.1	-43.1	-43.1
Transport services	33.9	33.9	33.9	33.8	33.7	33.7
Electricity	- 8.9	- 8.9	- 8.9	- 9.0	- 9.0	- 9.0
Heating	-22.0	-21.9	-22.0	-22.0	-22.1	-22.1
Other goods & services	2.7	2.8	2.6	2.4	2.4	2.8
Non-durables, TOTAL	0.9	1.0	1.0	0.8	0.8	0.8

WIFO ■ **Change in consumption, level-shift in lifestyles**

Private Consumption, energy (in Tj)

	2000	2001	Difference in %		2004	2005
			2002	2003		
Heating	-22.0	-21.9	-22.0	-22.0	-22.1	-22.1
Electricity	- 8.9	- 8.9	- 8.9	- 9.0	- 9.0	- 9.0
Gasoline	-43.1	-43.0	-43.0	-43.1	-43.1	-43.1
Diesel	-43.1	-43.0	-43.0	-43.1	-43.1	-43.1
CO ₂ emissions						
Difference in 1,000 tons	-5,897	-6,370	-6,369	-6,514	-6,571	-6,384
Difference in %	-31.9	-31.7	-32.1	-31.7	-32.4	-32.5

WIFO ■ **Change in gross output, level-shift in lifestyles**

Gross output in basic prices (current prices)

	2000	2001	Difference in %		2004	2005
			2002	2003		
Products of agriculture, hunting and related services	6.4	6.5	6.4	6.3	6.2	6.1
Products of forestry, logging and related services	-3.3	-3.3	-3.5	-4.3	-4.1	-4.9
Fish and other fishing products; services incidental of fishing	11.2	10.4	10.2	8.9	7.9	8.0
Coal and lignite; peat	-5.5	-3.7	-4.5	3.2	39.6	-19.8
Crude petroleum and natural gas; services incidental to oil and gas extraction excluding surveying	-5.9	-4.1	-5.0	-1.8	-1.5	-1.3
Coke, refined petroleum products and nuclear fuels	-1.5	-1.7	-1.1	-2.1	-1.5	-1.7
Electrical energy, gas, steam and hot water	-7.1	-7.1	-6.4	-6.4	-6.9	-7.0
Land transport; transport via pipeline services	3.4	3.3	3.3	3.4	4.0	4.2
Air transport services	10.2	10.0	11.0	12.2	9.0	9.6
Recreational, cultural and sporting services	2.0	2.1	2.0	1.7	1.8	2.0
Other services	2.4	2.4	2.2	2.1	1.9	2.3

WIFO ■ **Change in CO₂ emissions by industry, level-shift in lifestyles**

CO₂ emissions in 1,000 tons

	2000	2001	Difference in 1,000 tons			2005
			2002	2003	2004	
Crude petroleum and natural gas; services incidental to oil and gas extraction excluding surveying	- 13	- 12	- 11	- 6	- 6	- 5
Food products and beverages	78	82	93	71	60	67
Coke, refined petroleum products, nuclear fuels	- 54	- 64	- 46	- 75	- 55	- 65
Electrical energy, gas, steam and hot water	- 739	- 935	- 780	- 957	-1,017	- 973
Land transport; transport via pipeline services	114	118	118	120	165	216
Air transport services	274	261	266	254	268	290

WIFO ■ **Change in total CO₂ emissions, level-shift in lifestyles**

CO₂ emissions in 1,000 tons

	Difference in 1,000 tons	
	2000	2005
CO ₂ emissions, households	- 5,897	- 6,384
CO ₂ emissions, production	- 163	- 294
CO ₂ emissions, imports	332	241
TOTAL	- 5,727	- 6,437
In % of CO ₂ emissions, TOTAL	- 8.8	- 8.5
CO ₂ emissions, TOTAL	65,283	75,981

WIFO ■ **Conclusions**

- ➔ **Total private consumption and consumers' welfare (utility)** is the base for alternative traditional measures of well-being (i.e. for alternatives to GDP)
- ➔ **Economic welfare measures** can be complemented by physical measures with binding resource constraints (land use, footprint), analysis: impact of private consumption on these physical measures
- ➔ **Total environmental impact of households** has a relevant share in total environmental impact based on domestic inventories & statistics
- ➔ ex post simulation (2000-2005) shows that a **shift in existing lifestyles** has a **significant influence on total environmental impact** of households
