

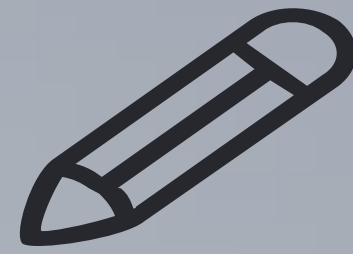
Economic and Distributional Implications of Alternative Mechanisms for Financing Renewables

Xaquín García-Muros

Co-Authors:

Dr. Christoph Böhringer

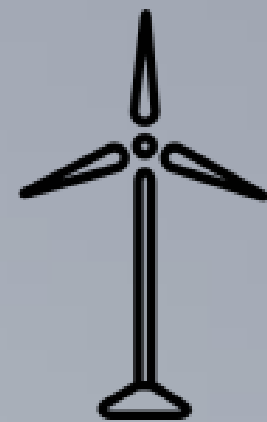
Dr. Mikel González-Eguino



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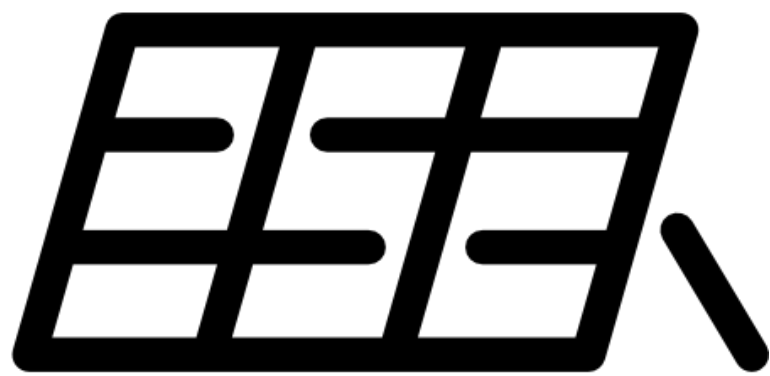
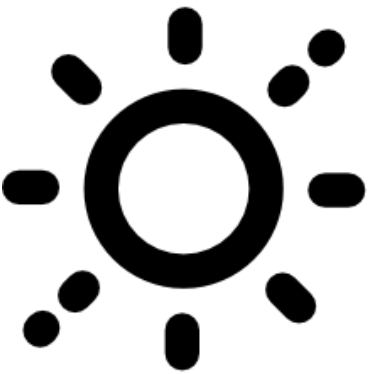
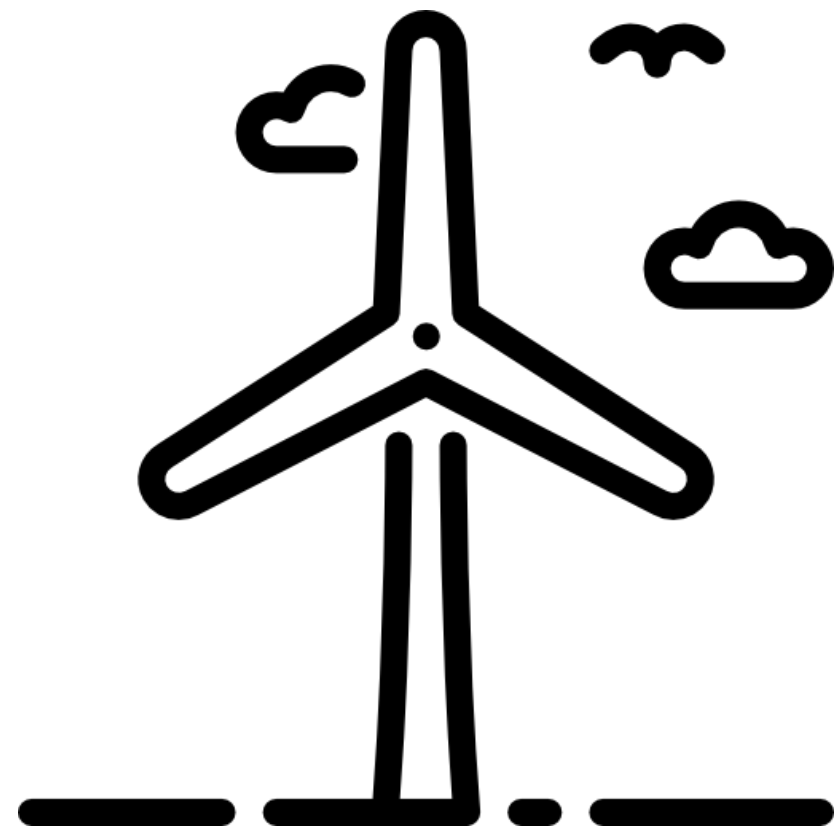
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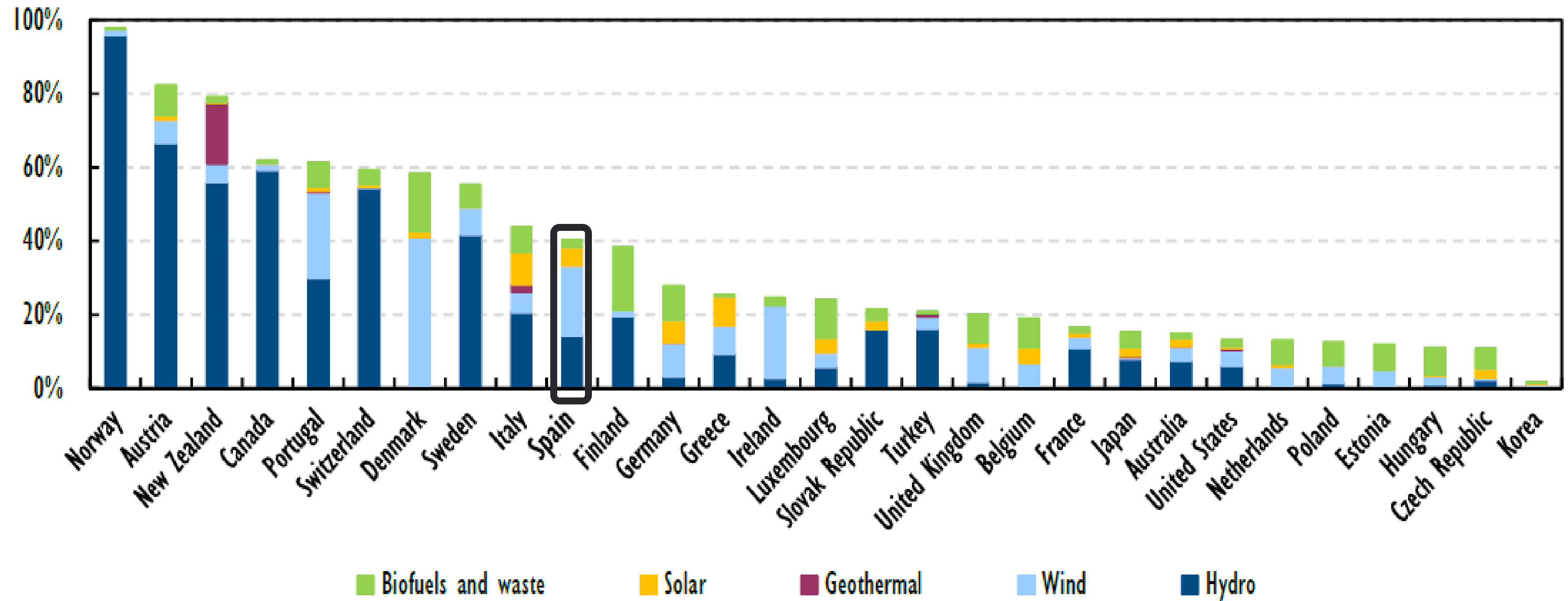
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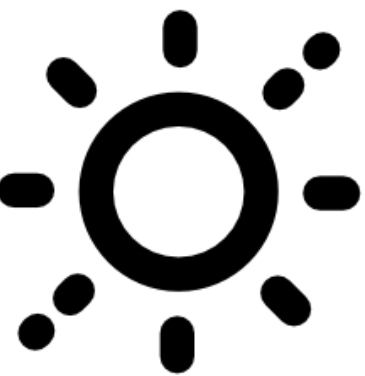
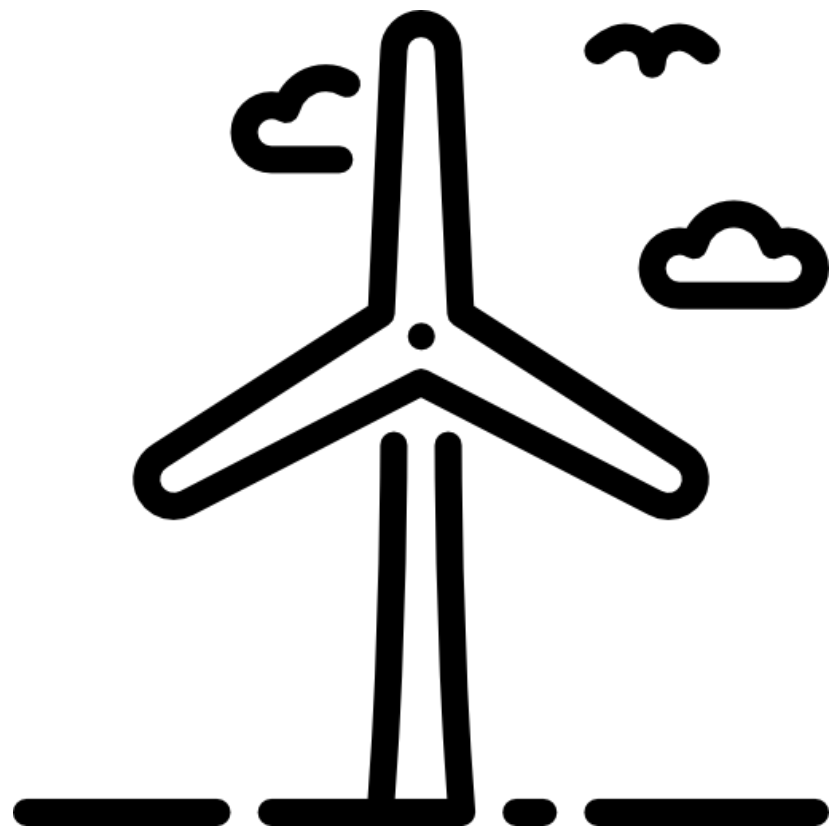


Electricity generation from renewable sources as a percentage of all generation in Spain and IEA member countries, 2014



Note: data are estimated for 2014.

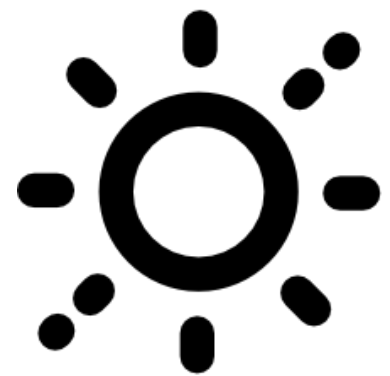
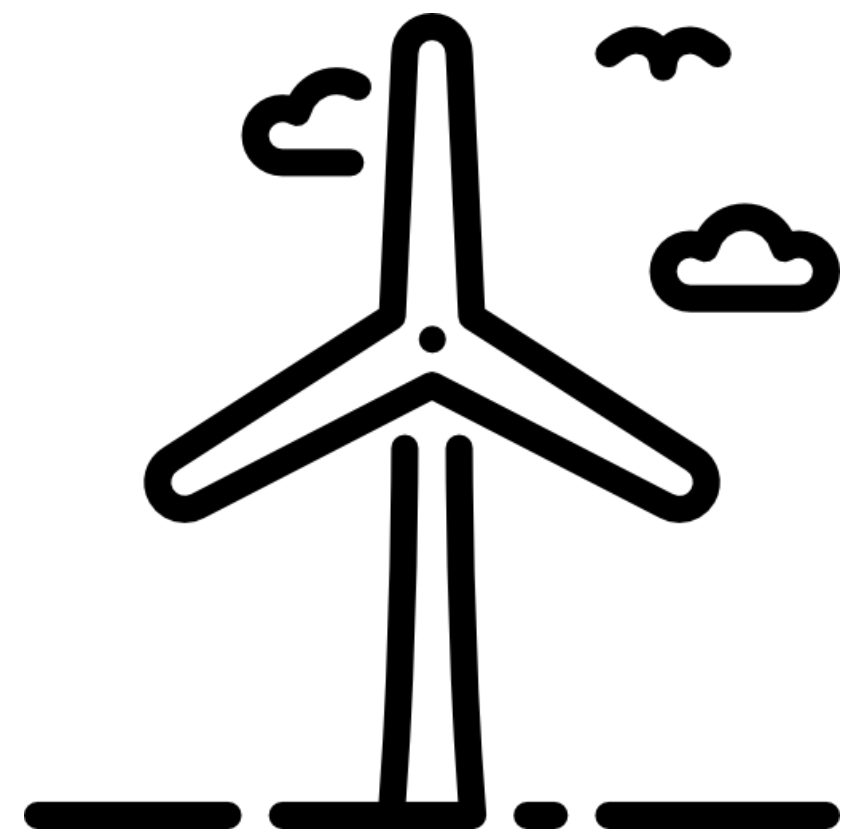
Source: IEA (2015a, forthcoming), *Energy Balances of OECD Countries*, OECD/IEA, Paris.



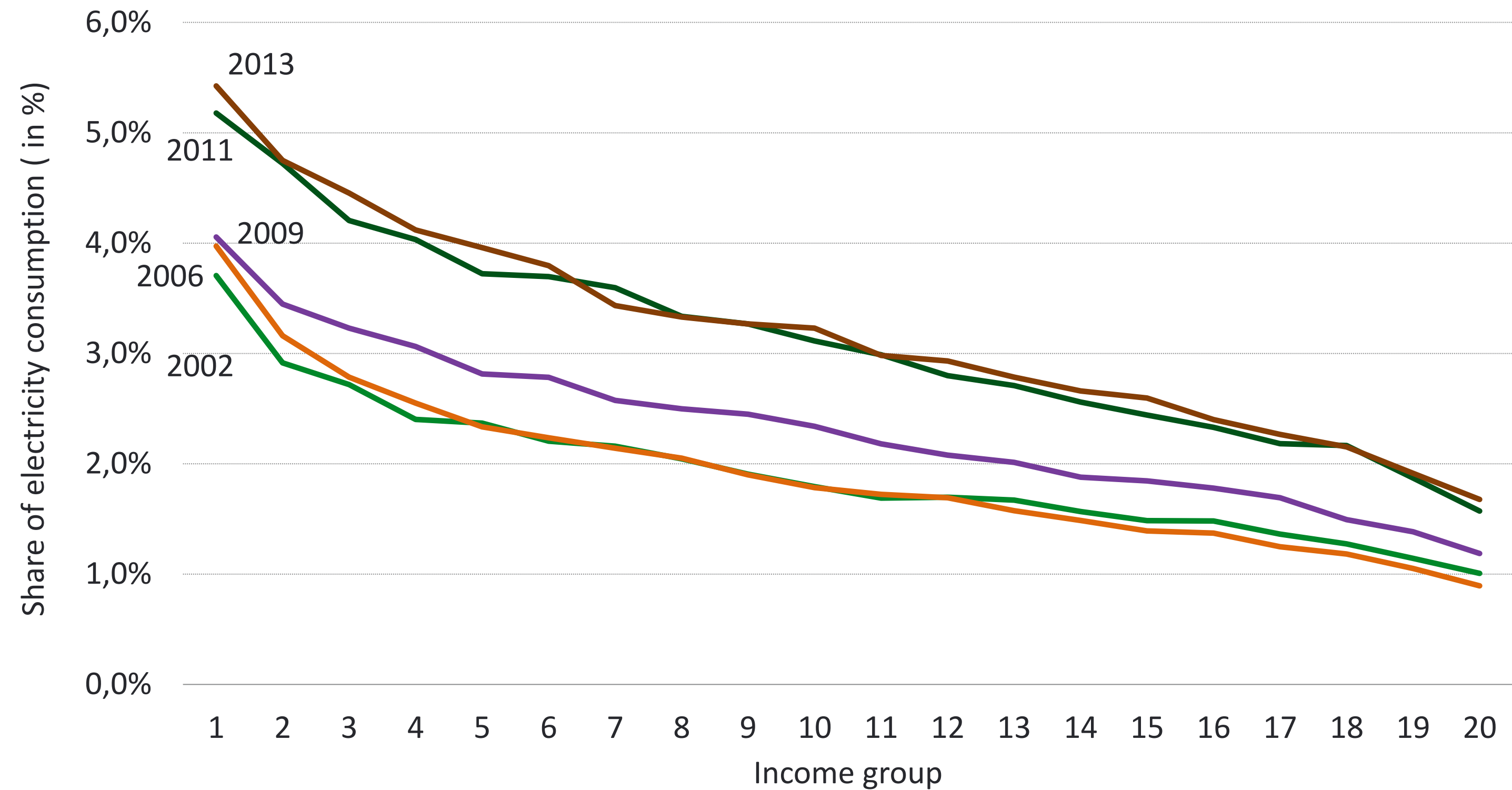
Support for renewable electricity by technology, 2013

Technology	Electricity generated receiving support (TWh)	Renewables incentive costs (EUR million)	Cost (EUR/MWh)
Biogas	0.9	51	57
Hydropower	7.0	303	43
Solar – CSP	4.4	1 113	251
Solar – PV	6.8	2 564	378
Solid biomass	4.6	354	76
Wind power	54.6	2 398	44
Total (average for cost)	78.3	6 783	87

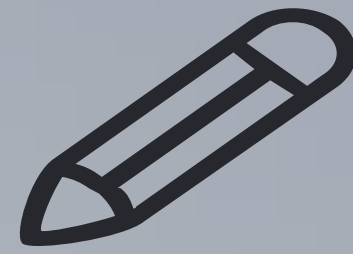
Source: CEER (2015), *Status Review of Renewable and Energy Efficiency Support Schemes in Europe in 2012 and 2013*, Council of European Energy Regulators, Brussels.



Percentage of total expenditure devoted to electricity per income group and year



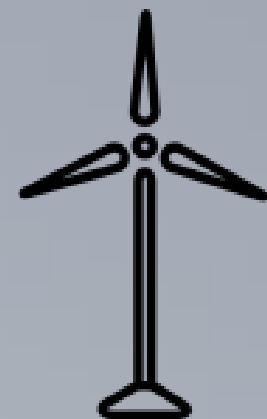
The Spanish employers' organization, CEOE, has proposed that electricity costs not related to the cost of supply should be financed from other tax sources



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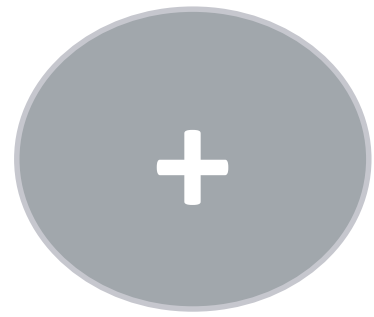
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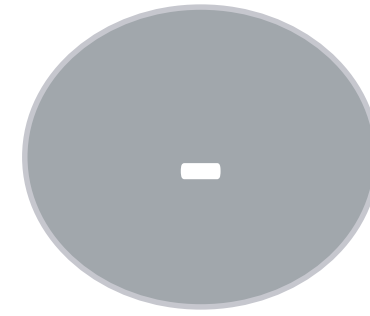
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- Surveys with **many individuals**
- Capture the **behaviour of households**
- Provide a **realistic picture** of substitution, demand and income effects

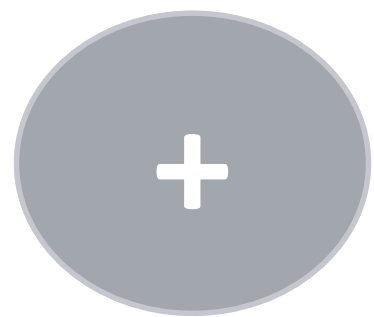


- Only focus in **one economic side**
- **Difficult** to evaluate **macro policies**

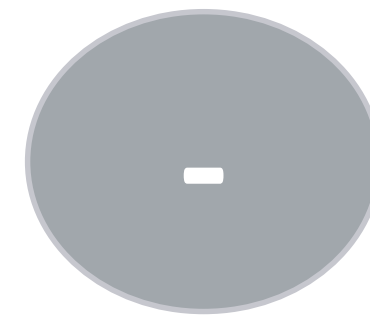
Micro-models
(AIDS)



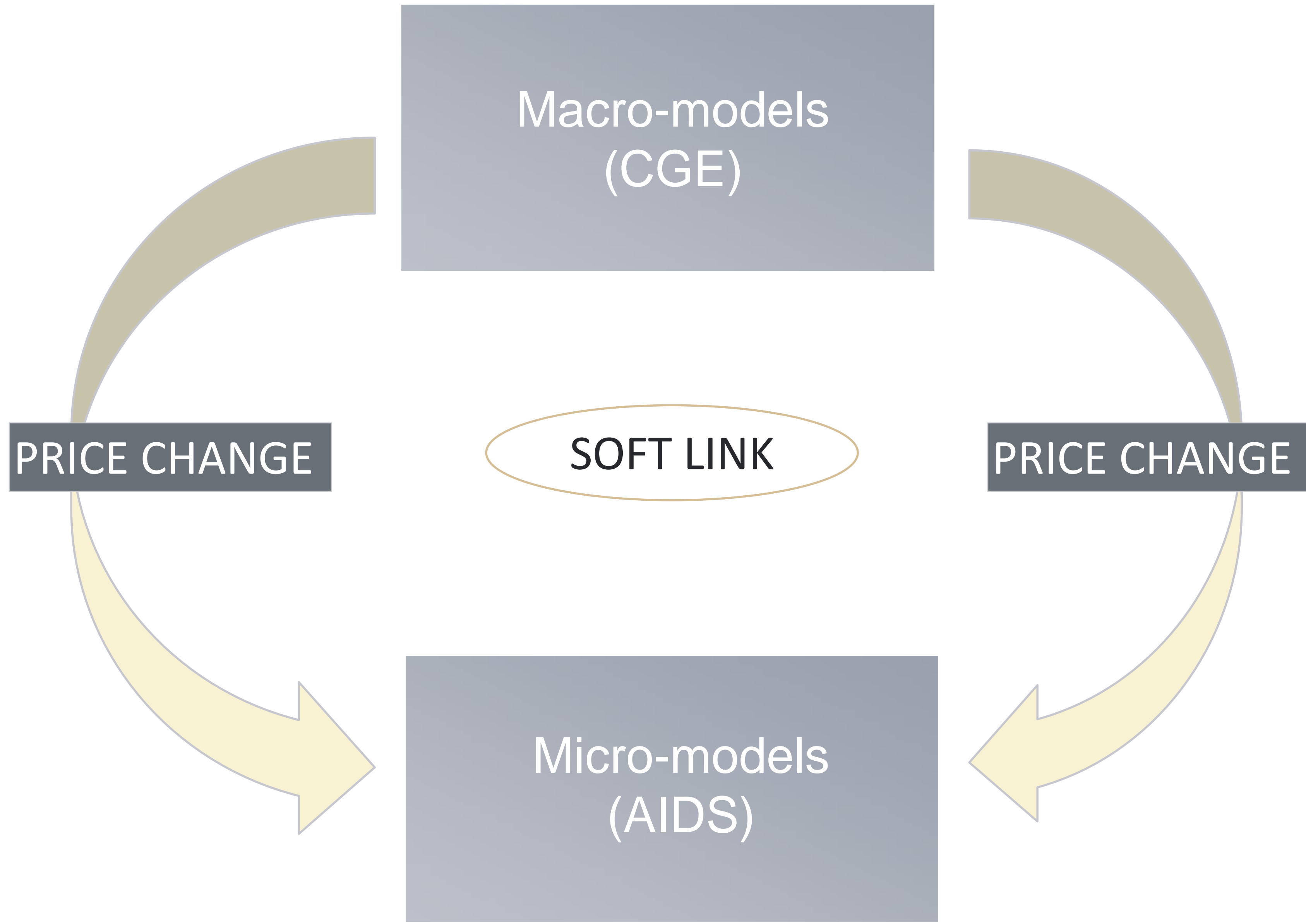
Macro-models (CGE)

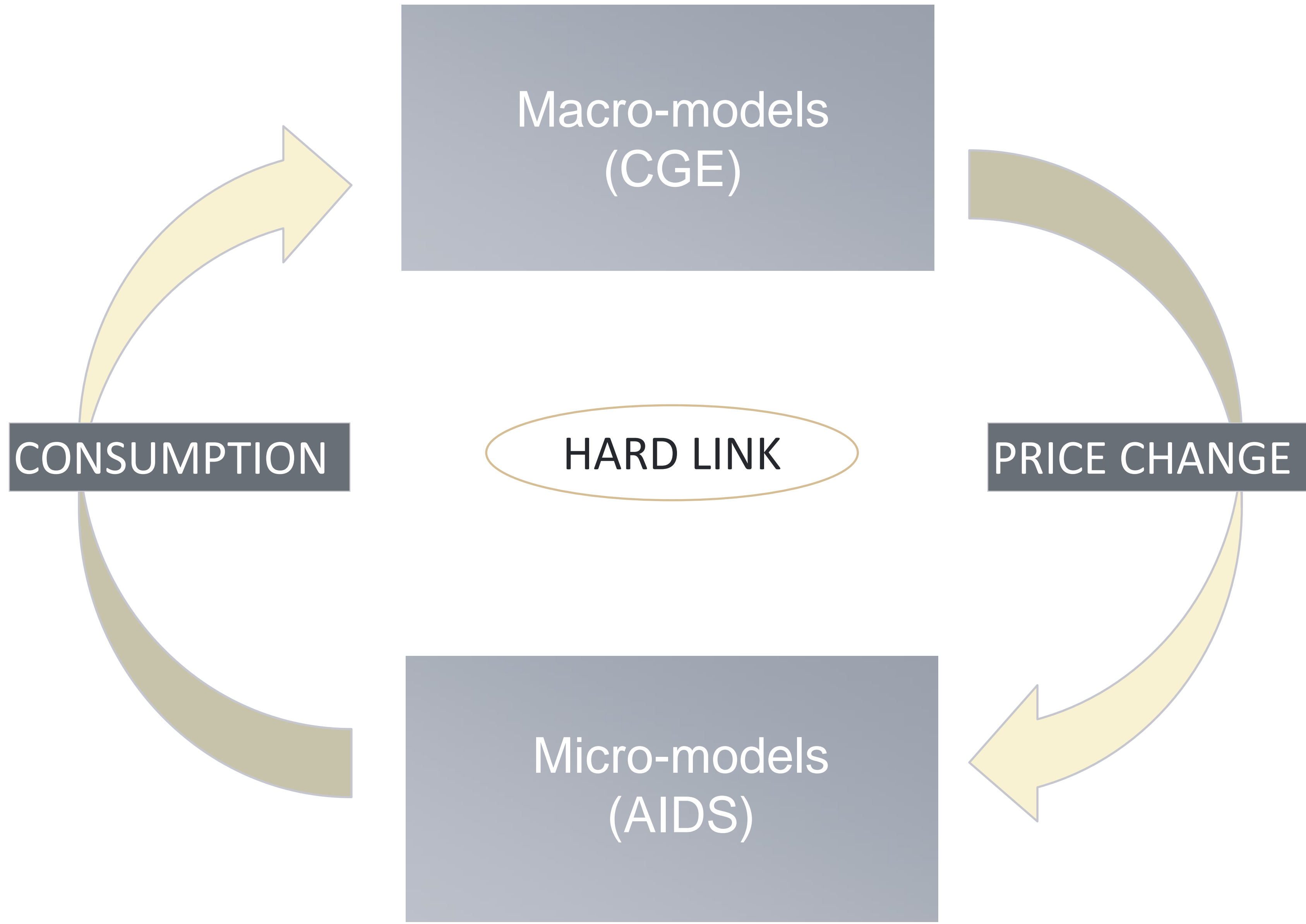


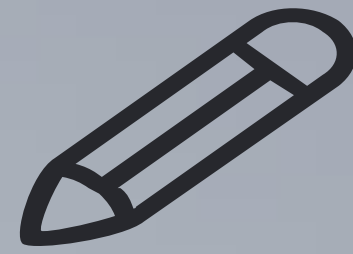
- They are able to look at the **economy as a whole**
- Analysis from the **efficiency and macro-economic perspectives**



- Only **one representative household**



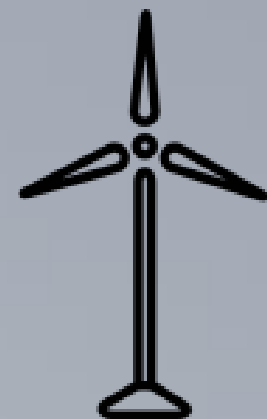




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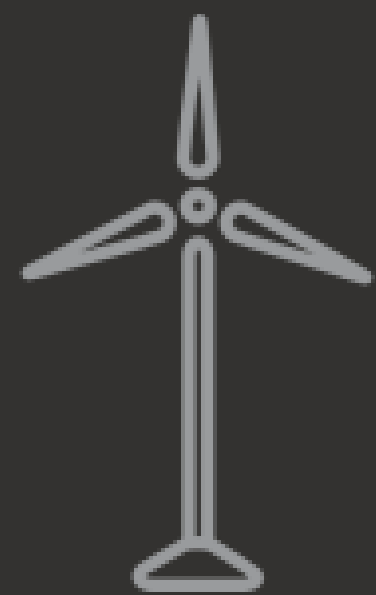
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Surcharge on electricity prices

Electricity surcharge
(BaU)

Electricity surcharge with an exemption on all
producers (exe_prod)

Electricity surcharge with an exemption on all
households (exe_house)

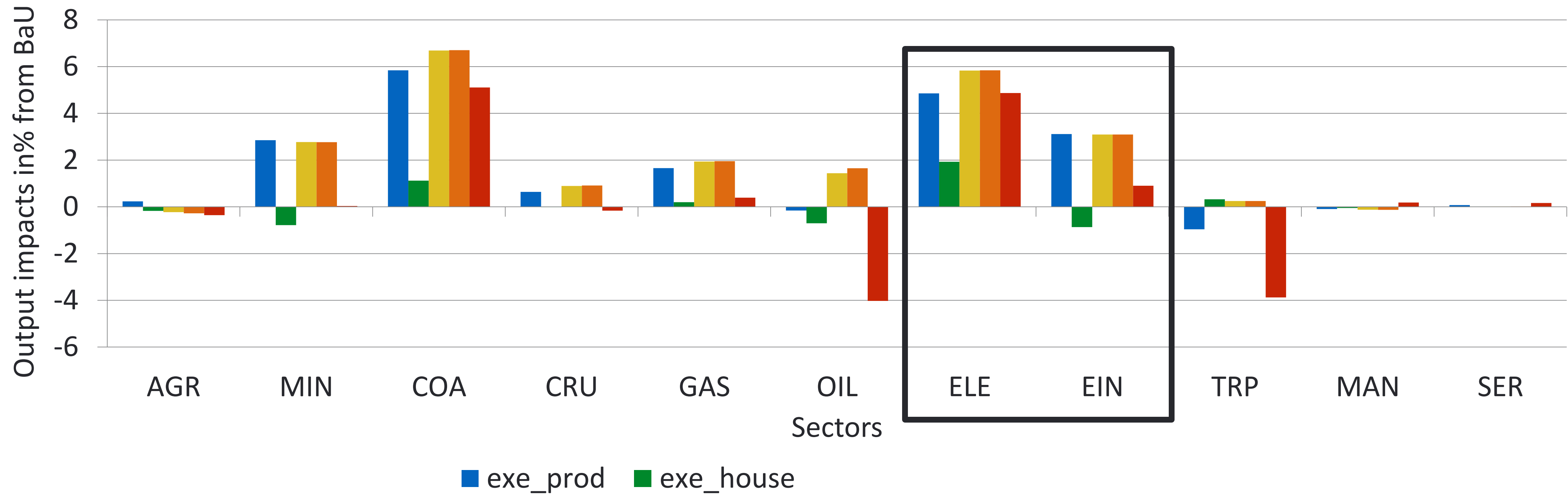
Overall economic effects per policy design.

RESULT 1

Scenarios	<i>exe_prod</i>	<i>exe_house</i>
Welfare (in % compared to BaU)	-0.018	0.001
CO ₂ (in % compared to BaU)	2.23	1.02
Subsidy on renewables (in €bn)	5.40	5.63
Share of renewables (% total electricity)	38.09	39.21
Supply of renewables	14.92	14.92

Impacts on output per sector and scenario (in % compared to BaU).

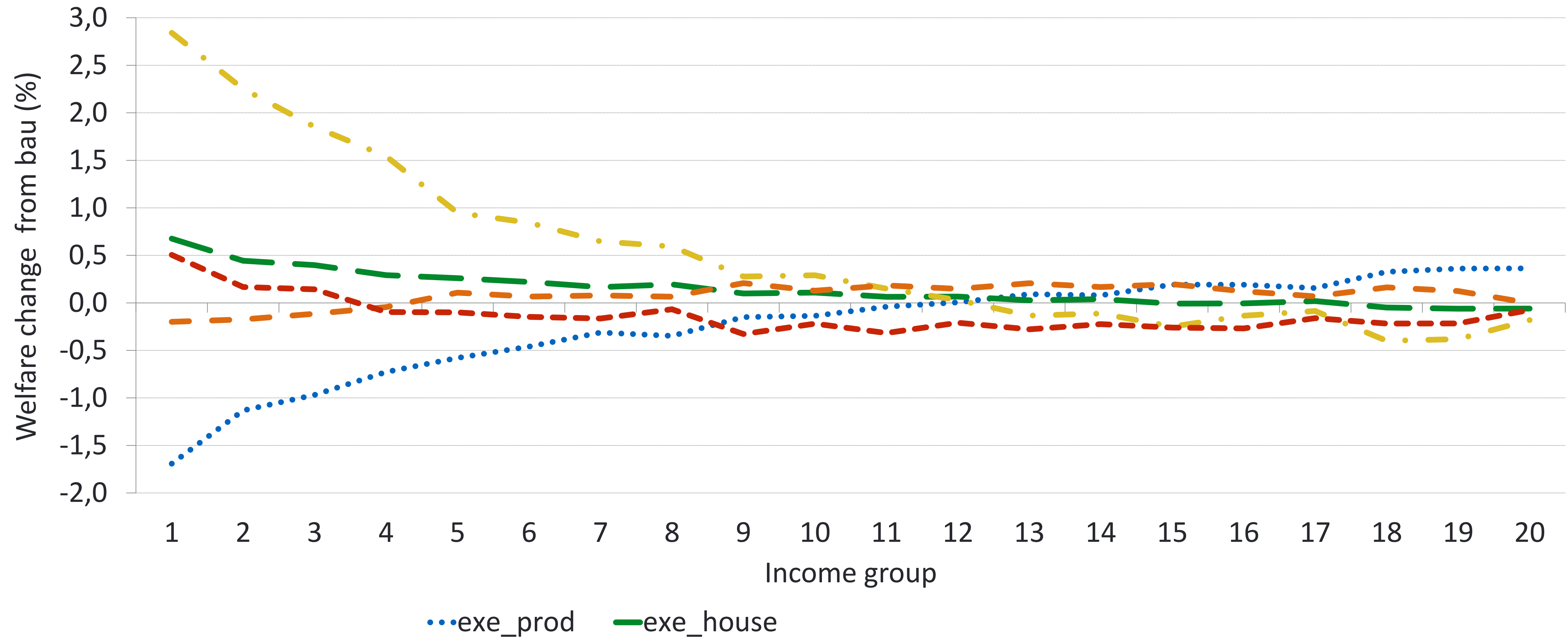
RESULT 2

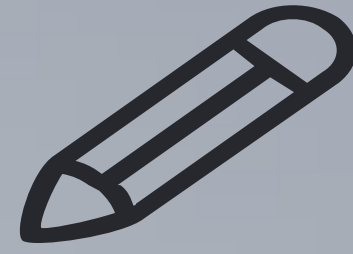


Sectors	
Agriculture (Agr)	Gas and distribution (Gas)
Mining (Min)	Manufacturing (Man)
Coal (Coa)	Energy intensity (Ein)
Crude oil and gas (cru)	Services (Ser)
Petroleum products (Oil)	Transport (Trans)
Power electricity sector (Ele)	

Welfare change per income group and scenario (EV in % compared to BaU).

RESULT 3

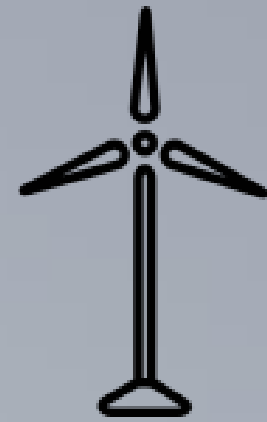




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Conclusions

- Our results provide **evidence against the use of a surcharge on electricity prices to promote renewables.**
- Exemption on producers or households show a **trade-off between protecting sectoral output effects and protecting low income households.**
- We show the **possible benefits of alternative ways of financing the promotion of renewables.**

THANKS FOR YOUR ATTENTION

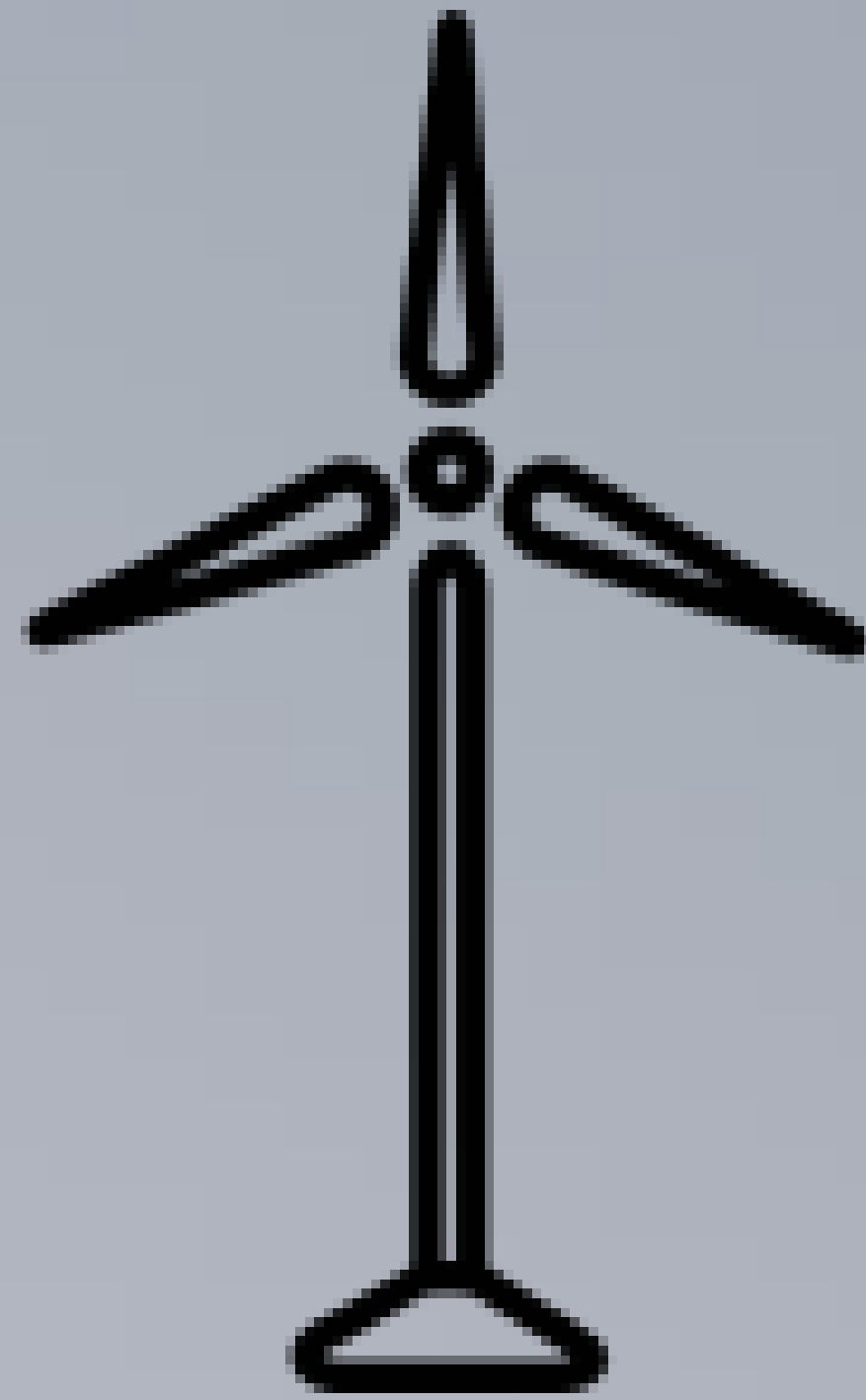
Xaquín García-Muros



bc³ BASQUE CENTRE
FOR CLIMATE CHANGE
Klima Aldaketa Ikergai

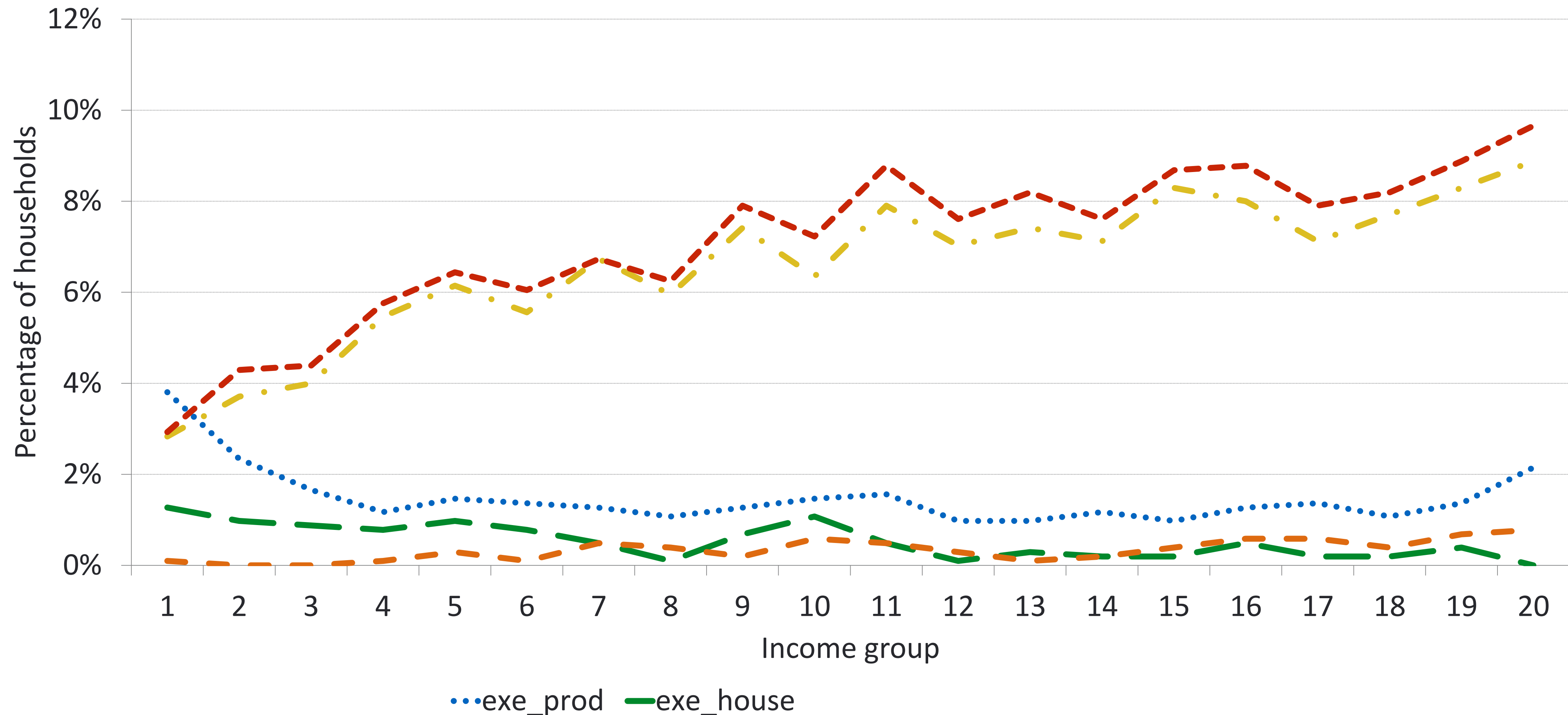


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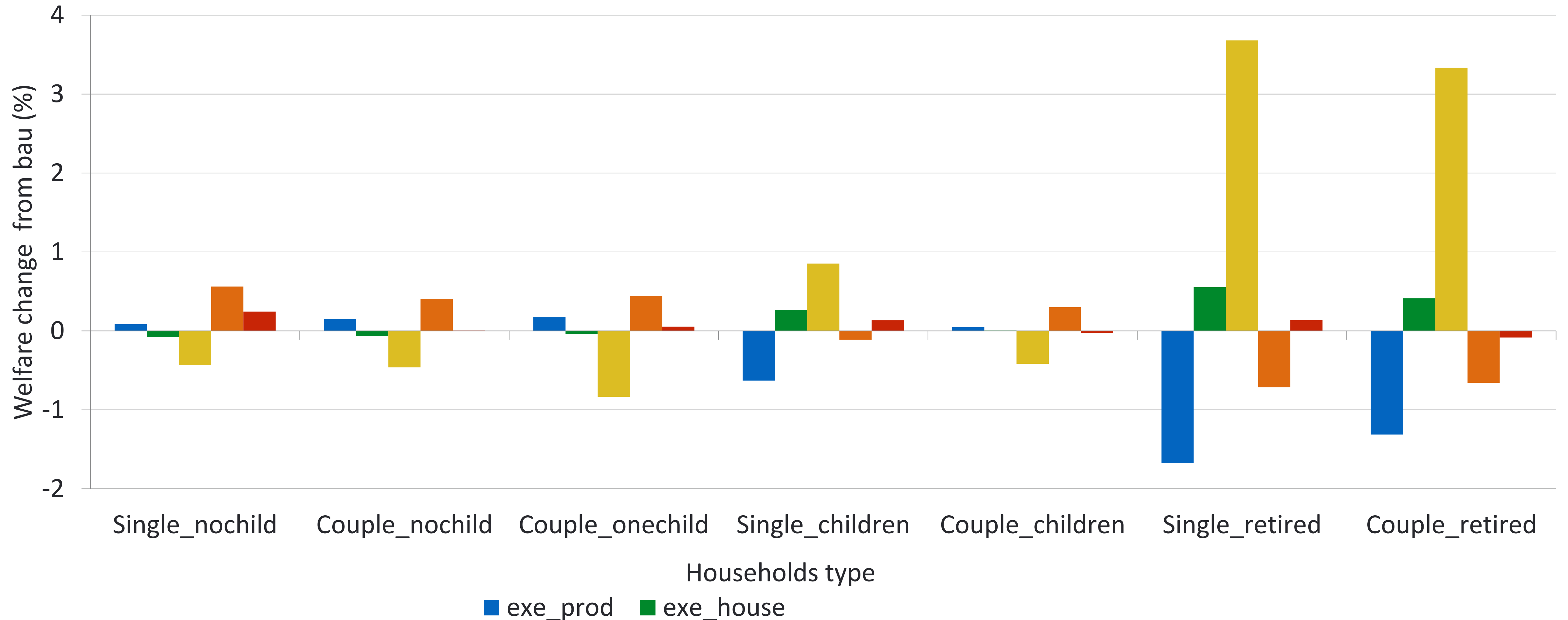
Percentage of households with losses greater than 5% compared to BaU per income group

RESULT 4



Welfare impacts per household type (in % of Hicksian equivalent variation (HEV) in income).

RESULT 5



Impacts on consumer prices and income sources (% compared to BaU)

Scenarios	<i>exe_prod</i>	<i>exe_house</i>	<i>lsm</i>	<i>vat</i>	<i>fueltax</i>
Impact on consumer prices					
Food	-0.92	0.27	0.02	0.02	-0.36
Education and Leisure	-0.79	0.26	0.20	0.19	-0.12
Electricity	57.31	-19.16	-16.27	-16.25	-15.33
Fuel	-0.86	0.26	0.12	0.12	8.15
Heat	-0.89	0.34	0.08	0.09	13.02
Housing	-0.81	0.26	0.18	0.18	-0.20
Durables	-0.86	0.27	0.13	0.13	-0.21
Transport	-0.79	0.26	0.19	0.19	1.52
Other goods	-0.80	0.26	0.18	0.18	-0.20
Impact on income sources					
Labor	-0.52	0.26	0.77	-0.32	0.44
Capital	-0.38	0.10	0.55	-0.55	-0.99
Transfer	-0.84	0.23	3.63	-1.17	-0.01

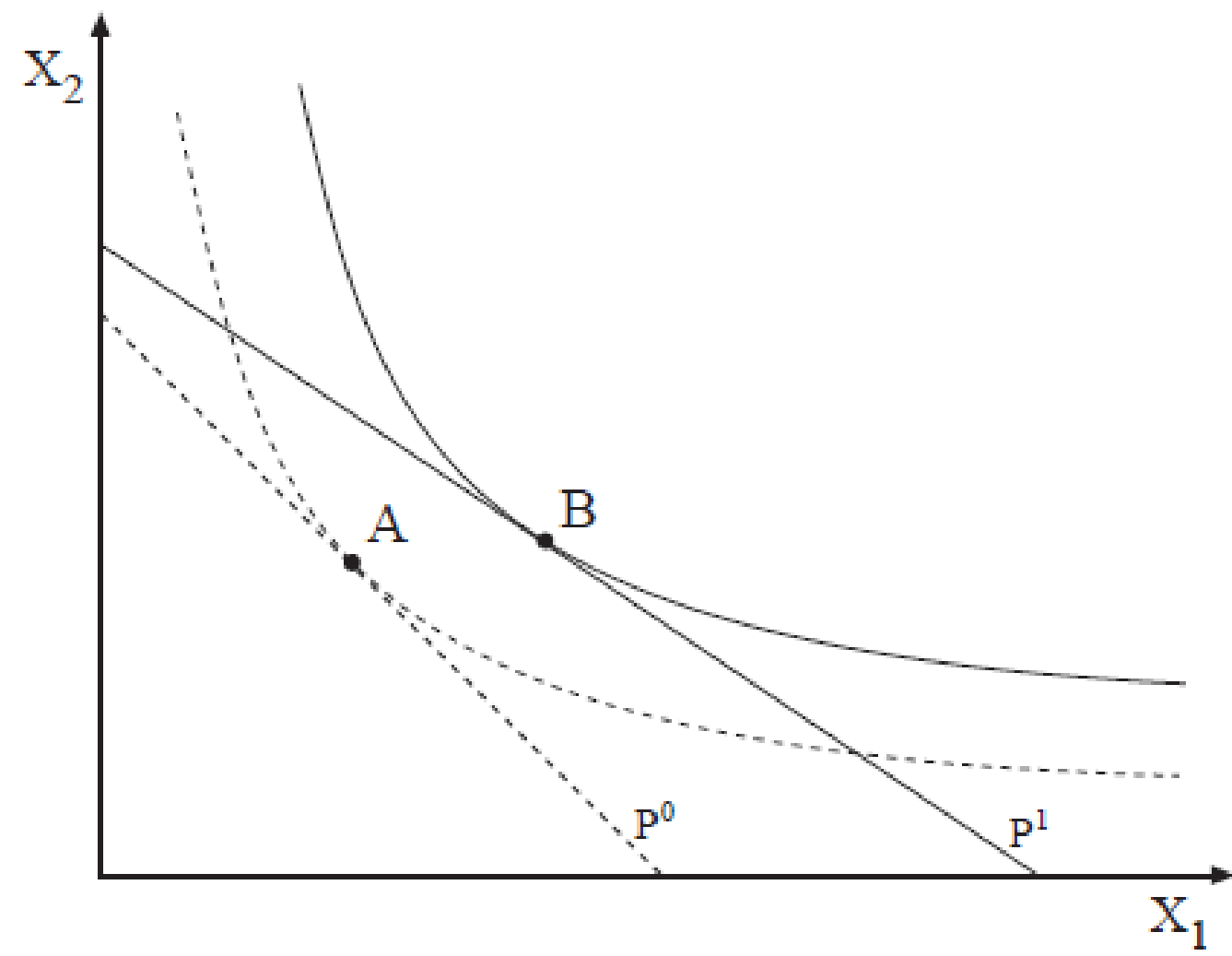


FIGURE 1: SOLUTION TO THE INITIAL REPRESENTATIVE AGENT MODEL (STEP 0 AND STEP 1)

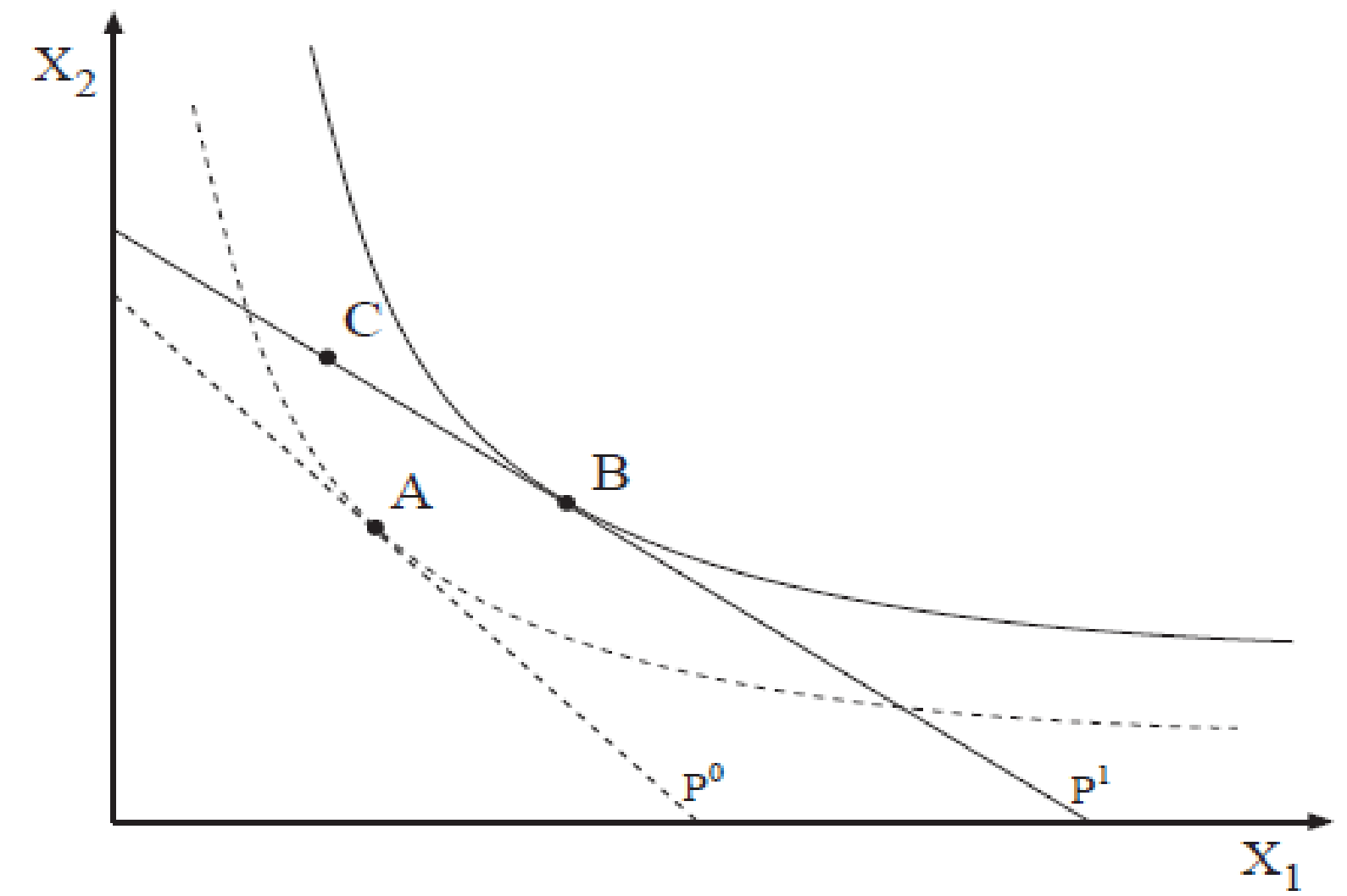


FIGURE 2: EVALUATING HOUSEHOLD DEMANDS AT NEW PRICES (STEP 2)

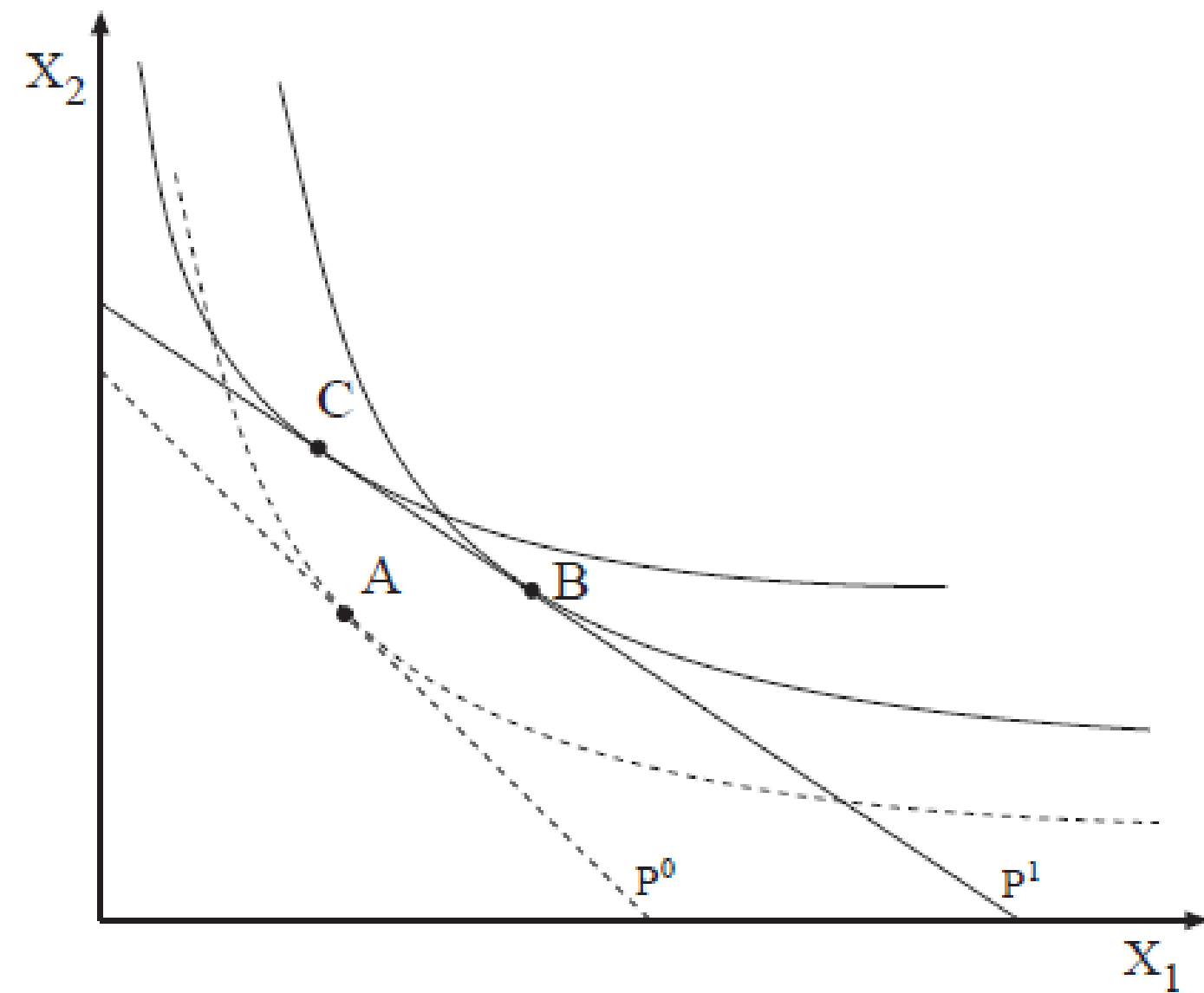


FIGURE 3: RECALIBRATION OF PREFERENCES (STEP 3)

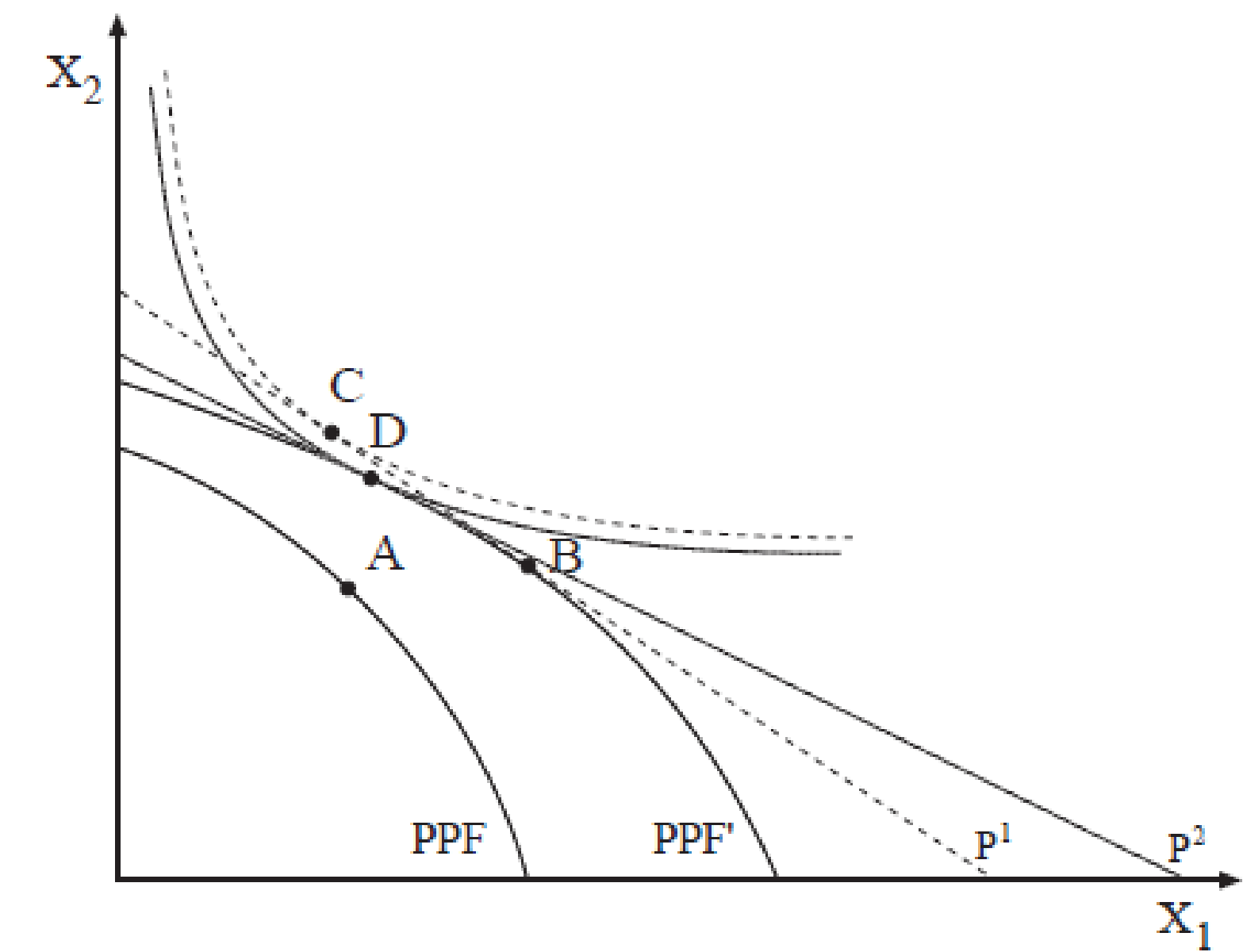


FIGURE 4: ITERATIVE ADJUSTMENT