Distributional impact of carbon pricing in Central and Eastern Europe
The case of Hungary
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EUKI project

Energy prices & energy poverty in Eastern Europe: realities & perspectives

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Introduction

Distributional Impacts of Carbon Pricing in Central and Eastern Europe - an EUKI project

- Bulgaria, Germany, Hungary, Poland and Romania
- Assesses the impact of carbon pricing on energy poverty
- Determines best policy-options available for decision-makers at the local and national levels to prevent and alleviate energy poverty.
- Macro- and micro-simulations based on quantitative modelling

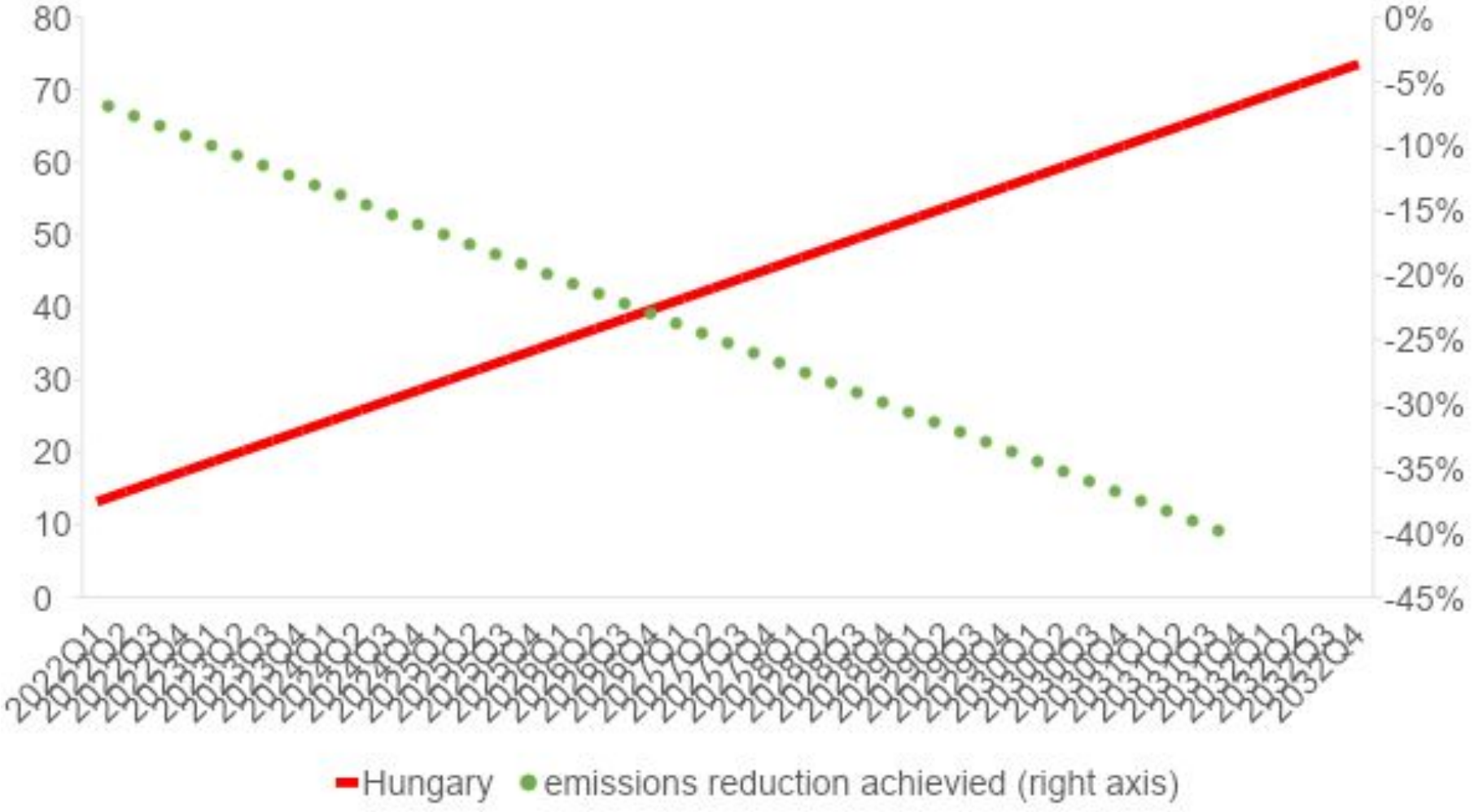
Macro-modelling – The MEMO model

Multi-sector dynamic stochastic general equilibrium (DSGE) model

- We set a CO_2 emissions reduction goal at a level of 40% until 2032, compared to 2022.
- The model estimates a carbon tax in order to reduce the emissions by 40%.
- The model estimates the impacts of the carbon tax on the GDP, employment and value added by sectors

Hungary will require a carbon tax of approx. 70 $/tonne of CO_2 to reach a 40% emissions reduction, due to the high emission intensity of the economy

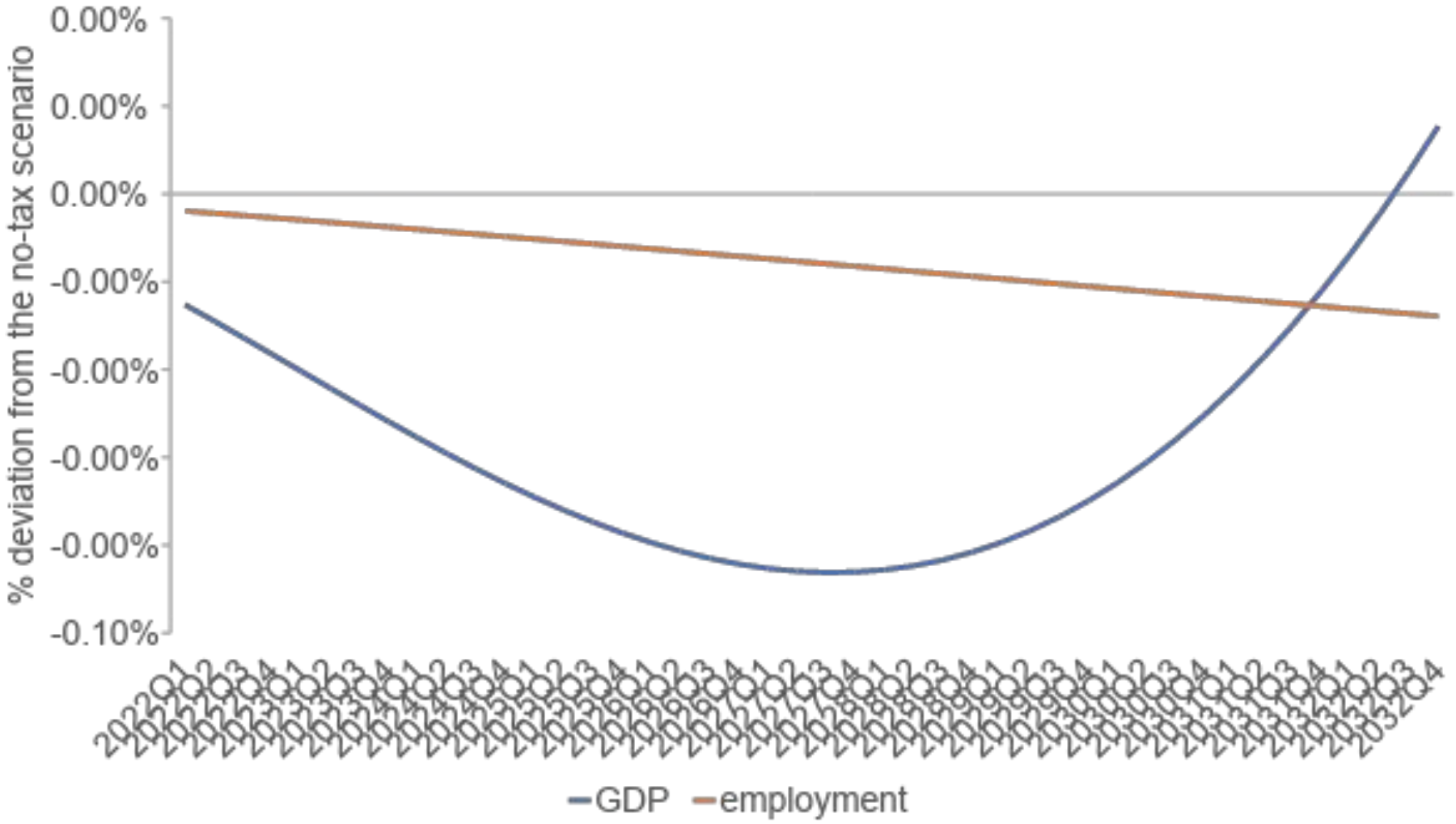
Carbon tax scenario in Hungary until 2032 ($ / tonne of CO_2)



Source: own elaboration based on the MEMO model.

The impact of the carbon tax on employment are low, the impacts on GDP are initially negative. After 2032 the climate policy will contribute to the economic growth

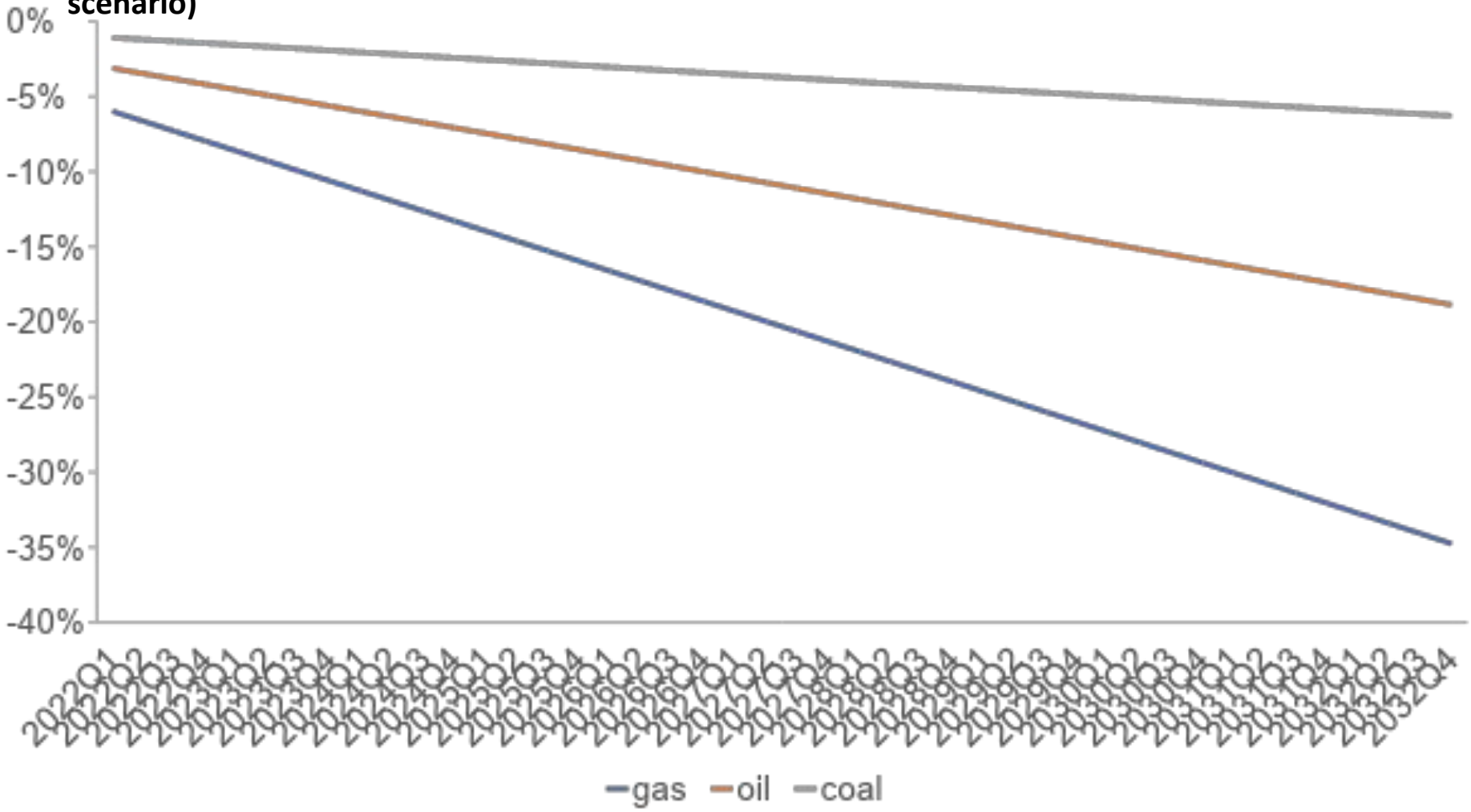
Differences in GDP and employment in Hungary (compared to the no carbon tax scenario)



Source: own elaboration based on the MEMO model.

The carbon tax will help to reduce the dependence of Hungarian economy of imports of fossil fuels – mostly gas – by 35% until 2032

Differences in the imports of fossil fuels in Hungary (compared to the no carbon tax scenario)



Source: own elaboration based on the MEMO model.

Methodology

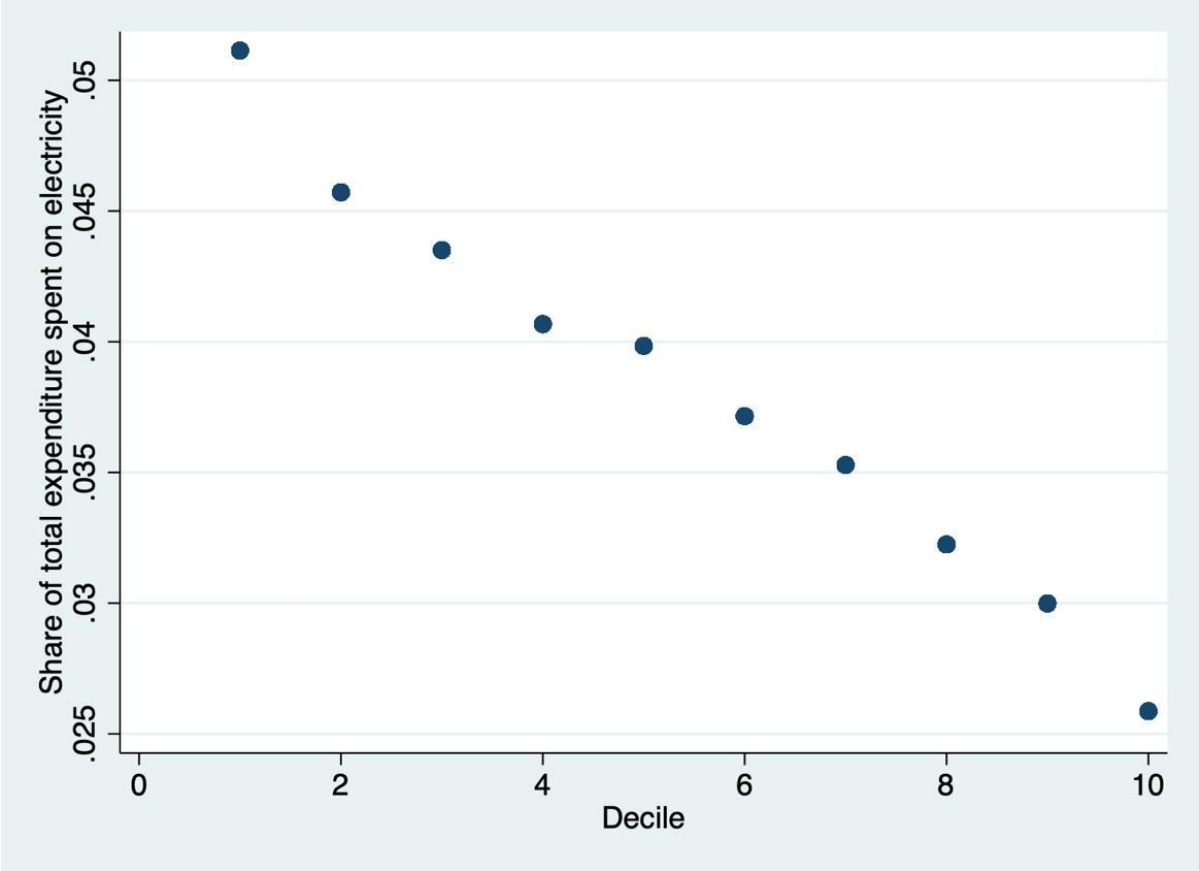
The Micro model

The micro model leverages data from Household Budget Surveys (HBSs) to evaluate the reaction of households to the introduction of a carbon tax.

- ➔ Theoretical foundation: the QUAIDS demand system estimation (Banks, Blundell, and Lewbel, 1997).
- ➔ It uses the results of the DSGE macro model as inputs.
- ➔ Allows us to determine behavioral changes in response to an increase in prices.
- ➔ Exhibits the average expenditures of households categories on different types of goods and services.
- ➔ Accounts for the fact that different consumers react differently to the same tax.

Results - Micro model

Share of electricity in expenditure - after tax

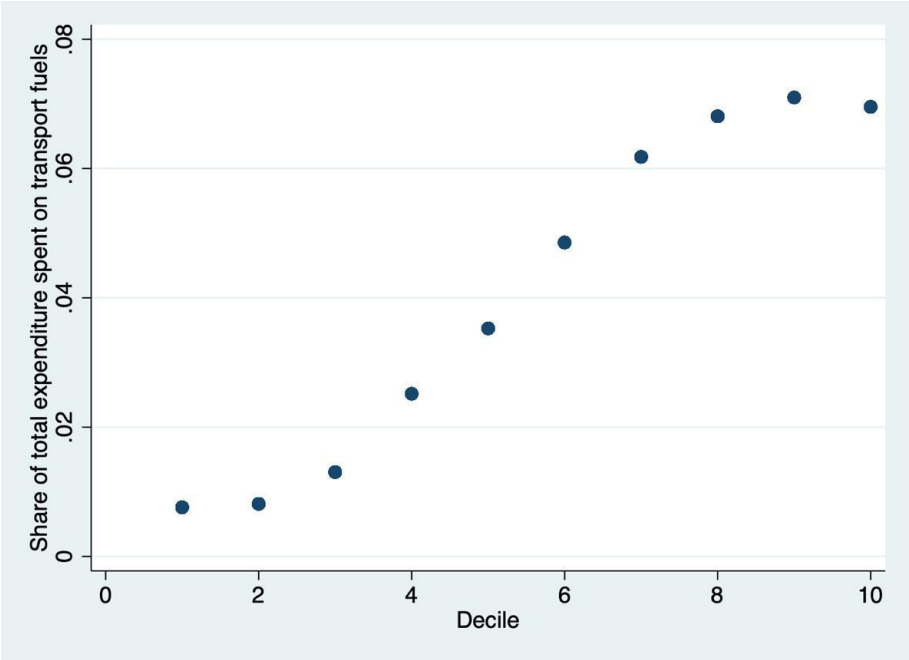


After a carbon tax, low income households will face a high burden of electricity costs, double than the most affluent households.

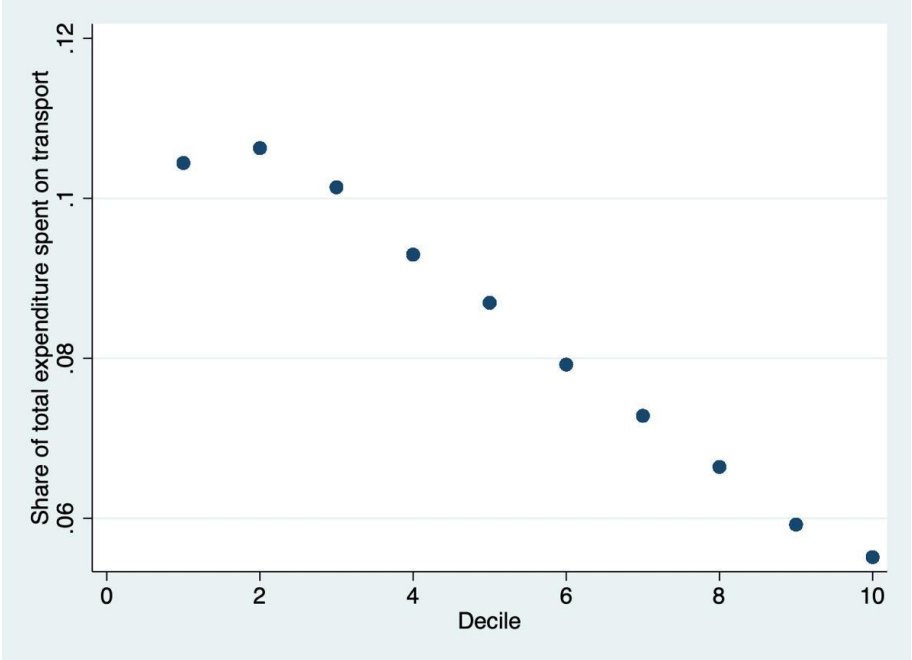
Results - Micro model

Share of expenditure after tax

Transport fuels



Public transport



Results - Micro model

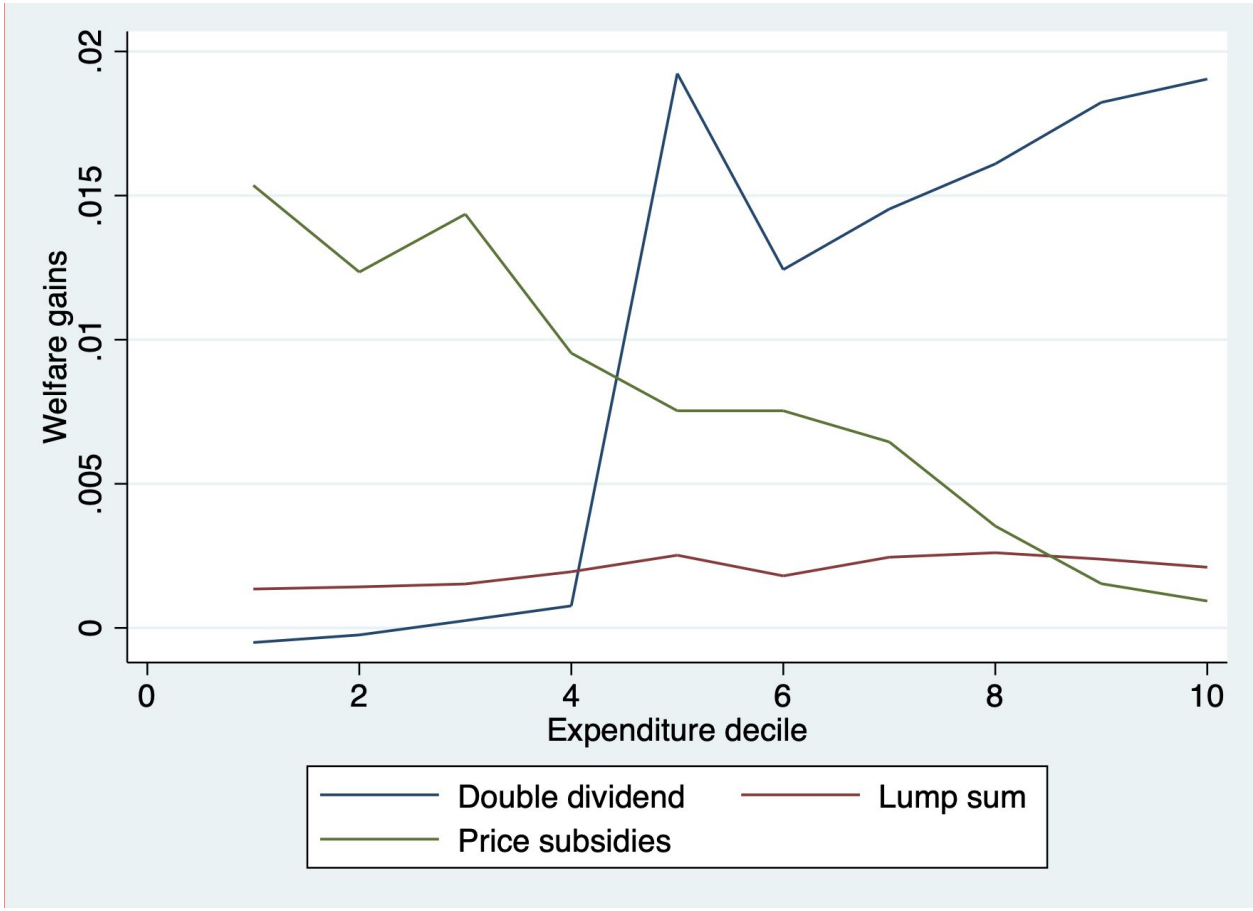
How households would shift their consumption due to a price increase? - Compensated Elasticities

		Price (1% increase)					
		Food	Others	Electricity	Transport	Transport fuels	Other energy costs
Demand (%)	Food	-0.1065236507	-0.1440102844	-0.1540253039	-0.04956650241	-0.4661701096	0.1400555385
	Others	-0.6577123386	-0.2569155446	0.3369637843	-0.03737857219	0.2597354026	0.5760887227
	Electricity	-0.9724168303	-0.4667628258	-0.3524334138	0.5440687761	-0.4307055757	0.7403288168
	Transport	-0.3001412448	-0.4781192617	0.5083563208	-0.8507796526	1.26305844	-0.1423746018
	Transport fuels	-1.649315735	0.201273873	-0.240066648	0.7516150353	-0.00119323961	0.2389528032
	Other energy costs	0.4100233139	0.3692057813	0.3423612679	-0.06953470566	0.1982553998	-0.3103449014

Lower consumption levels of electricity and energy
Elasticity of transport is very high, and of transport fuels very low

Results - Micro model

Welfare gains of compensation policies



Price subsidies

The least affluent household are the only ones compensated for the welfare losses

Inversely redistributed revenues proportional to the income level of a household.

Results - Micro model

Key takeaways

Regressive tendencies in some of the services (electricity, transport)
Reduced consumption levels
To be avoided:

- low-income households further reduce their already low energy consumption
- low-income households' mobility is blocked due to increased price of transport and fuels

Needed:
Compensation for welfare losses of vulnerable households
Reduction of negative externalities

- Revenues from energy tax —> increasing energy efficiency among the poorest households
- tax on transport fuel used for developing public transport.

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Thank you