Discussion of

Faiella and Lavecchia:
Households' energy demand and carbon taxation in Italy

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ECB workshop on fiscal policy and climate change

The views expressed are mine
and do not necessarily reflect those of the ECB.

Key contributions

What the paper does

- Estimate demand elasticity of energy components in Italian micro data ...
- ... allowing for differences across electricity/heating/transport & households
- Simulate effects of carbon taxes on energy demand and emissions

Results

- Energy elasticities: roughly -0.4 in short run (monthly), -1.2 in long run
- Carbon taxation is regressive
- Poorer households respond somewhat more strongly to carbon taxes:
  - Reduce electricity and transport fuels demand by 50–60% more
  - Still face higher $\uparrow$ total consumption (energy makes up higher share of their total C)

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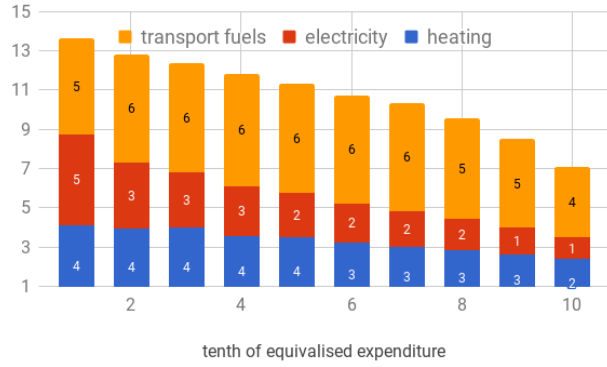
Italian micro data: energy share by consumption decile



- Monthly time series of detailed micro data on consumption items, HBS 1997–2018
- Households in top decile have 50% lower energy share on total C (because of electricity and heating): 7% vs 14%

Estimation specification

Regression of energy quantity of group s $Q^z_{s,t}$ on its price P^z_t:

$$\log Q^z_{s,t} = \lambda_s \log Q^z_{s,t-1} + \beta_s \log P^z_t + \text{controls}_{s,t} + \epsilon_{s,t}$$

- β_s short-run price elasticity of energy demand
- $\beta_s/(1-\lambda_s)$ long-run elasticity
- Controls include total consumption
- Can be estimated for each group (quasi-panel, 36 groups)
- OLS and IV (instrumented with wholesale prices)

Estimation results: energy elasticities

Short run price elasticities

	LS	stratum-level LS	2SLS	long run
Electricity	-0.36***	-0.29*	-0.40***	-1.17***
Heating	-0.40***	-0.44**	-0.44***	-1.23***
Transport	-0.17**	-0.45**	-0.66***	-1.46***

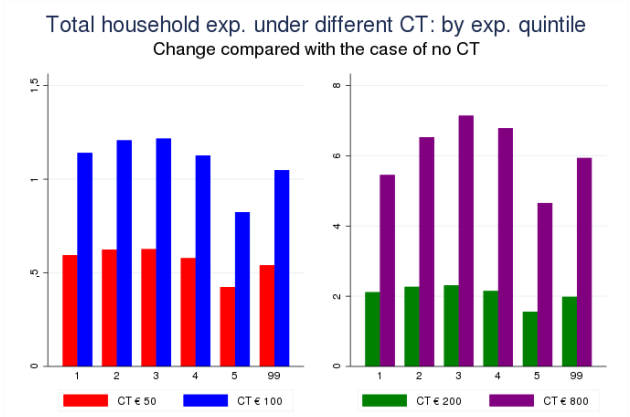
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Price elasticities

- Elasticities: around -0.4 in short run (monthly), b/w -1.5 and -1.2 in long run
- Poorer households respond more strongly to higher prices:
  Reduce electricity and transport fuels demand by 50–60% more (response of heating similar across households)

Simulation results: regressive impact of carbon taxes

- How do households respond to carbon tax? (EUR 50–EUR 200 per ton of CO_2) EUR 50 per ton $\Rightarrow$ 6% increase in price of electricity (0.7% in HICP inflation)
- Poorer households cut energy demand more, but still face higher increase in total consumption expenditures (energy makes up higher share of their total C)



Comments

Comment 1: Estimated demand elasticity is quite high

Labandeira et al. (2017): short-run -0.2, long-run -0.5

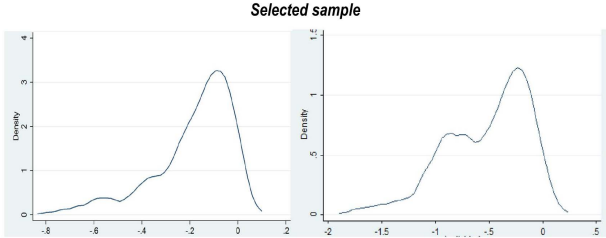


Fig. 1. Density of the price elasticities. Total and selected samples.

Table 6
Average energy products elasticities in the empirical literature.

	Short term	Long term
Electricity	**−0.126***	**−0.365***
Natural Gas	**−0.180*****	**−0.684***
Gasoline	**−0.293*****	**−0.773*****
Diesel	**−0.153****	**−0.443*****
Heating oil	**−0.017**	**−0.185**

*** Significant at the 1% level.

Comment 2: Price level vs price surprises

$$\log Q^z_{s,t} = \lambda_s \log Q^z_{s,t-1} + \beta_s \log P^z_t + \text{controls}_{s,t} + \epsilon_{s,t}$$

- Estimation is in levels
- Prices are persistent $\Rightarrow$ substantial(?) part of price changes are expected
- Should estimate regression in differences (as check)

3: Focus on one partial equilibrium channel of energy prices

- Energy prices affect households also via general equilibrium effects
  eg lower aggregate demand and employment (skewed toward some sectors)
- Känzig (AER, 2021) aggregate evidence

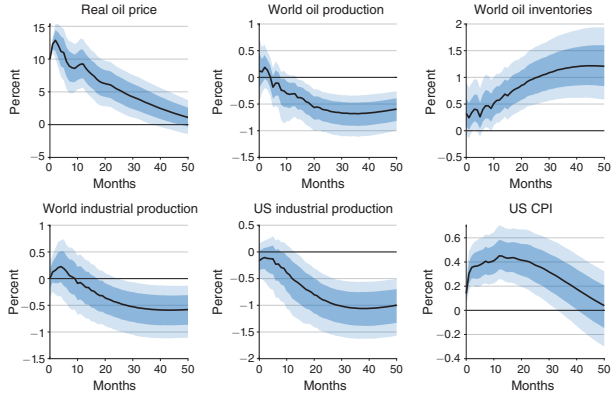


FIGURE 3. IMPULSE RESPONSES TO AN OIL SUPPLY NEWS SHOCK

Comment 4: Quibbles about estimation

$$\log Q^z_{s,t} = \lambda_s \log Q^z_{s,t-1} + \beta_s \log P^z_t + \text{controls}_{s,t} + \epsilon_{s,t}$$

- Dynamic panel: Should use Arellano Bond (1991)
- Quasi-panel (unfortunately HBS is not panel): Should check that there are limited movements between groups
- HBS collects data on expenditures $\Rightarrow$ P^z_t not group-specific (measurement error)
- Limited information on control variables in HBS (no income, wealth)
- Should include time fixed effects, (perhaps) drop time trends

Summary

- Nice, timely work with detailed micro data
- Very relevant currently, with high/volatile energy prices
- How does elasticity differ at high levels of energy prices?
  Elasticity even higher in very long run?