

Discussion of

Faiella and Lavecchia:

Households' energy demand and carbon taxation in Italy

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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)

Key contributions

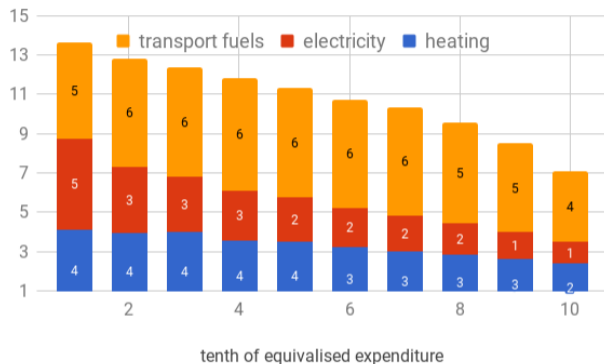
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Italian micro data: energy share by consumption decile



- ▶ 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 $Q_{s,t}^z$ on its price P_t^z :

$$\log Q_{s,t}^z = \lambda_s \log Q_{s,t-1}^z + \beta_s \log P_t^z + \text{controls}_{s,t} + \epsilon_{s,t}$$

- ▶ 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			long run
	LS	stratum-level LS	2SLS	
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***

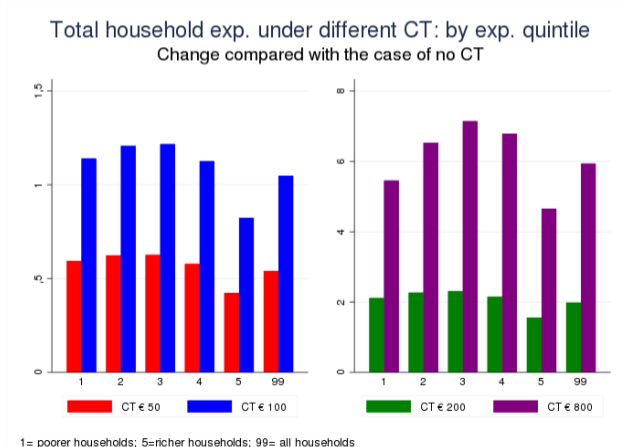
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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 CO₂)
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

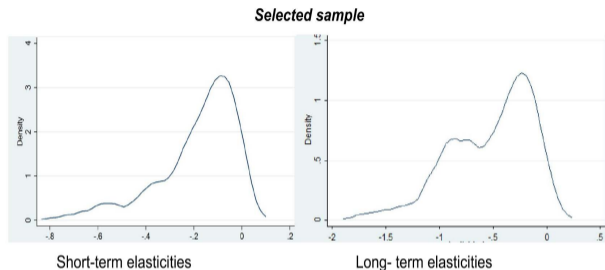


Fig. 1. Density of the price elasticities. Total and selected samples.

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.

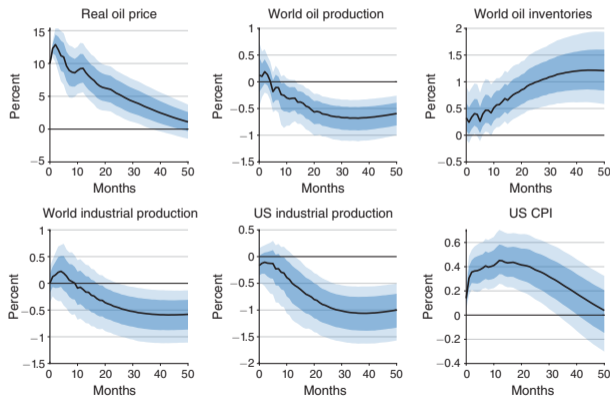
Comment 2: Price level vs price surprises

$$\log Q_{s,t}^z = \lambda_s \log Q_{s,t-1}^z + \beta_s \log P_t^z + \text{controls}_{s,t} + \epsilon_{s,t}$$

- ▶ 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



First-stage regression: $F: 22.67$, robust $F: 10.55$, $R^2: 4.22\%$, Adjusted $R^2: 4.04\%$

FIGURE 3. IMPULSE RESPONSES TO AN OIL SUPPLY NEWS SHOCK

Comment 4: Quibbles about estimation

$$\log Q_{s,t}^z = \lambda_s \log Q_{s,t-1}^z + \beta_s \log P_t^z + \text{controls}_{s,t} + \epsilon_{s,t}$$

- ▶ 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 $\Rightarrow P_t^z$ 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?