

Energy Efficiency of Residential Buildings in the European Union

An Exploratory Analysis of Cross-Country Consumption Patterns



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MOTIVATION

Despite common EU directives, levels of energy efficiency vary vastly across countries of the European Union.

Which factors of energy policies are most effective and are able to explain differences in energy efficiency across European countries?

Quantitative Analysis:
Identifying more energy efficient countries
- Country specific effects
- Plotted residuals

Qualitative Analysis
(country case studies of the identified, more successful countries)

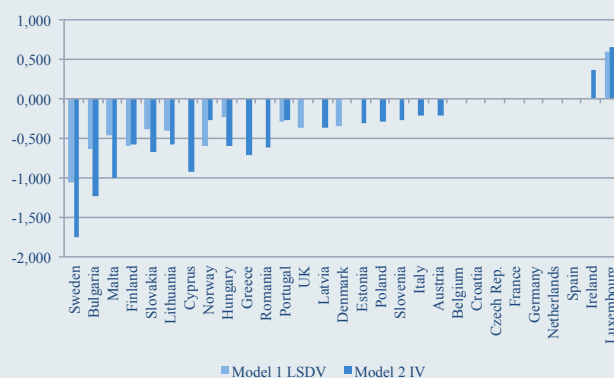
MODEL, ASSUMPTIONS

$$e_{consumption_{it}} = \beta_0 + \beta_1 \bar{X}_{it} + \beta_2 WAPI_{tax_{it}} + \beta_3 longitude_i + \beta_4 latitude_i + \beta_5 country_i + \beta_6 year_t + \varepsilon_{it}$$

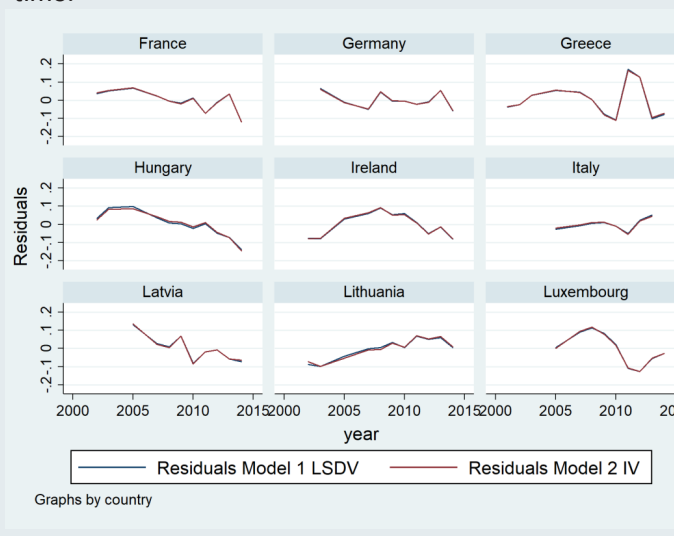
Variable	Variable name
log_hdd	Heat Degree Days
age, age ²	Median age of the population
floor_area, floor_area ²	Average floor area
gdp_capita, gdp_capita ²	GDP per capita
home_ownership	Share of homes being own opposed to being rented
Apartment_share	Share of apartments opposed to free standing houses
Share_post80	share of buildings constructed after 1980

RESULTS

Sweden has the highest level of energy efficiency. Ireland and Luxembourg consume more energy than expected.



Latvia and Hungary display decreasing residuals over time.



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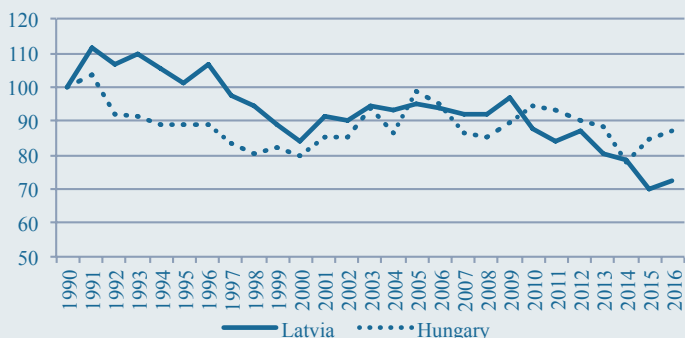
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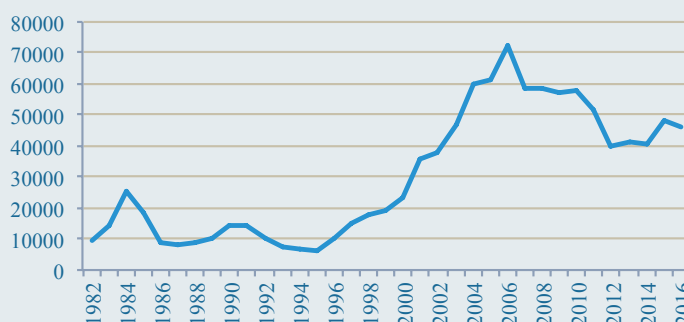
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RESULTS

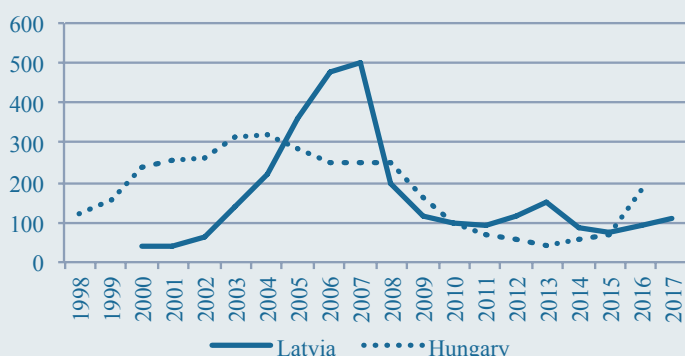
a) Energy consumption in Latvia & Hungary



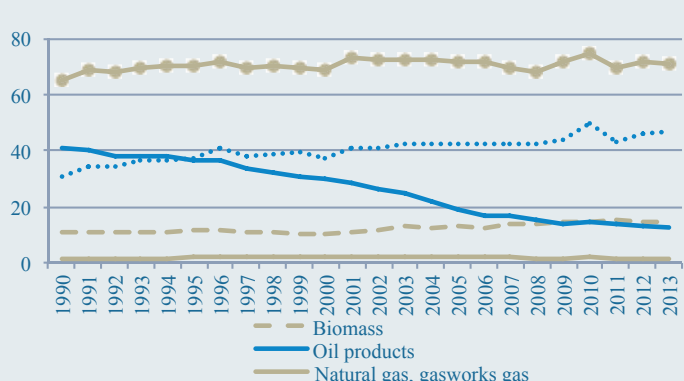
c) Sales of heatpumps in Sweden



b) Construction activity of new dwellings



d) Energy consumption by energy carrier in Sweden



CONCLUSION

1. Building part regulations are an effective policy instrument for reducing energy use.
2. Stringent building regulations are only effective in the long run.
3. Tighter regulations are most effective when followed by high construction activities in the residential sector.
4. Carbon and energy taxes are highly effective in improving energy efficiency.
5. The effectiveness of carbon taxation is highly dependent on its scope.