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# **Energy Taxation and Salience: Evidence and Implications**

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UniversidadeVigo

economics for  
energy

- Why energy taxes?
- Salience and taxation
- Salience in transport taxation
- Electricity
- Summing up: Accuracy, and policy trade-offs

# Why energy taxes?

- Revenue; Environment; Energy dependence
- Supply: Innovation and dynamic efficiency
- Demand: Habits, Investments and Distribution
  - Crucial for decarbonization: 50% abatement related to EE
  - Really? Low price elasticities
- Sizable transport fuel taxes...
- but, what about electricity (again key to decarbonization)?

# Selected energy taxes in the EU, 2016

|               | Fueóleo ligero para hogares (por cada 1000 litros) |         |        |  | Gasóleo de automoción para uso no comercial (por litro) |         |       |  | Gasolina sin plomo (95 octanos) (por litro) |         |       |  | Gas Natural para hogares (por cada MWh GCV) |         |       |  | Electricidad para hogares (por MWh) |         |        |  |
|---------------|--|---------|--------|--|---|---------|-------|--|---|---------|-------|--|---|---------|-------|--|-------------------------------------|---------|--------|--|
|               | Accisa   | IVA (%) | Total  | % carga fiscal media ponderada de la UE-22 | Accisa  | IVA (%) | Total | % carga fiscal media ponderada de la UE-22 | Accisa                                      | IVA (%) | Total | % carga fiscal media ponderada de la UE-22 | Accisa                                      | IVA (%) | Total | % carga fiscal media ponderada de la UE-22 | Accisa                              | IVA (%) | Total  | % carga fiscal media ponderada de la UE-22 |
| Alemania      | 77,66  | 19      | 177,01 | 47,66%                                     | 0,59  | 19      | 0,81  | 84,50%                                     | 0,83  | 19      | 1,09  | 94,69%                                     | 6,96  | 19      | 20,82 | 95,93%                                     | 140,13                              | 19      | 200,13 | 219,53%                                    |
| Austria       | 133,15   | 20      | 256,82 | 69,14%                                     | 0,50  | 20      | 0,71  | 73,89%                                     | 0,60  | 20      | 0,83  | 71,75%                                     | 9,28  | 20      | 24,63 | 113,49%                                    | 53,62                               | 20      | 94,63  | 103,81%                                    |
| Bélgica       | 22,76  | 21      | 120,53 | 32,45%                                     | 0,58  | 21      | 0,82  | 85,83%                                     | 0,75  | 21      | 1,03  | 89,60%                                     | 4,76  | 21      | 16,10 | 74,16%                                     | 59,39                               | 21      | 108,78 | 119,33%                                    |
| Dinamarca     | 329,73   | 25      | 540,53 | 145,53%                                    | 0,42  | 25      | 0,64  | 66,57%                                     | 0,61  | 25      | 0,88  | 76,47%                                     | 28,48                                       | 25      | 42,72 | 196,83%                                    | 118,00                              | 25      | 179,02 | 196,38%                                    |
| Eslovaquia    | n.d.   | n.d.    | n.d.   |  | 0,74  | 20      | 1,09  | 113,45%                                    | 1,03  | 20      | 1,44  | 124,79%                                    | 0,00  | 20      | 16,48 | 75,92%                                     | 0,00                                | 20      | 51,00  | 55,95%                                     |
| Eslovenia     | 406,67   | 22      | 620,44 | 167,04%                                    | 0,80  | 22      | 1,12  | 116,95%                                    | 0,94  | 22      | 1,30  | 112,43%                                    | 10,84                                       | 22      | 28,81 | 132,71%                                    | 35,28                               | 22      | 83,94  | 92,08%                                     |
| España        | 131,94   | 21      | 277,46 | 74,70%                                     | 0,55  | 21      | 0,81  | 84,67%                                     | 0,69  | 21      | 0,99  | 85,62%                                     | 3,49  | 21      | 24,36 | 112,22%                                    | 13,13                               | 21      | 61,34  | 67,29%                                     |
| Estonia       | 198,13   | 20      | 384,38 | 103,48%                                    | 0,70  | 20      | 1,01  | 105,40%                                    | 0,76  | 20      | 1,07  | 92,98%                                     | 6,27  | 20      | 18,11 | 83,42%                                     | 25,18                               | 20      | 48,21  | 52,89%                                     |
| Finlandia     | 230,14   | 24      | 383,66 | 103,29%                                    | 0,55  | 24      | 0,79  | 82,08%                                     | 0,73  | 24      | 1,02  | 88,12%                                     | n.d.  | n.d.    | n.d.  |  | 24,19                               | 24      | 55,99  | 61,41%                                     |
| Francia       | 117,44   | 20      | 245,89 | 66,20%                                     | 0,62  | 20      | 0,85  | 88,42%                                     | 0,79  | 20      | 1,05  | 91,54%                                     | 5,43  | 20      | 14,16 | 65,23%                                     | 42,40                               | 20      | 72,98  | 80,06%                                     |
| Grecia        | 323,94   | 24      | 516,23 | 138,98%                                    | 0,46  | 24      | 0,74  | 77,49%                                     | 0,94  | 24      | 1,31  | 113,43%                                    | 7,61  | 13      | 24,22 | 111,59%                                    | 50,85                               | 13      | 79,44  | 87,14%                                     |
| Hungría       | n.d.   | n.d.    | n.d.   |  | 0,83  | 27      | 1,35  | 140,55%                                    | 0,91  | 27      | 1,43  | 123,94%                                    | 0,00  | 27      | 17,74 | 81,73%                                     | 0,00                                | 27      | 56,22  | 61,67%                                     |
| Irlanda       | 143,86   | 13,5    | 221,88 | 59,74%                                     | 0,59  | 13,5    | 0,84  | 87,30%                                     | 0,72  | 13,5    | 0,99  | 86,34%                                     | 4,35  | 13,5    | 14,82 | 68,27%                                     | 0,00                                | 13,5    | 31,18  | 34,20%                                     |
| Italia        | 537,61   | 22      | 796,60 | 214,47%                                    | 0,82  | 22      | 1,13  | 117,79%                                    | 0,97  | 22      | 1,32  | 114,13%                                    | 20,29                                       | 22      | 34,81 | 160,39%                                    | 92,00                               | 10      | 122,67 | 134,56%                                    |
| Letonia       | 86,86  | 21      | 283,59 | 76,35%                                     | 0,69  | 21      | 1,01  | 105,49%                                    | 0,87  | 21      | 1,24  | 107,20%                                    | n.d.  | n.d.    | n.d.  |  | 52,55                               | 21      | 107,84 | 118,30%                                    |
| Luxemburgo    | 11,11  | 14      | 71,08  | 19,14%                                     | 0,37  | 17      | 0,52  | 54,17%                                     | 0,51  | 17      | 0,69  | 59,69%                                     | 1,20  | 8       | 4,90  | 22,57%                                     | 27,22                               | 8       | 40,67  | 44,61%                                     |
| Países Bajos  | 593,34   | 21      | 782,11 | 210,57%                                    | 0,59  | 21      | 0,83  | 86,43%                                     | 0,94  | 21      | 1,24  | 107,90%                                    | 31,71                                       | 21      | 47,60 | 219,31%                                    | -1,20                               | 21      | 32,05  | 35,16%                                     |
| Polonia       | 128,89   | 23      | 391,85 | 105,50%                                    | 0,81  | 23      | 1,23  | 128,30%                                    | 0,93  | 23      | 1,37  | 118,99%                                    | 0,00  | 23      | 22,04 | 101,53%                                    | 11,11                               | 23      | 74,43  | 81,64%                                     |
| Portugal      | 588,14   | 23      | 887,63 | 238,97%                                    | 0,77  | 23      | 1,12  | 117,10%                                    | 1,13  | 23      | 1,57  | 135,96%                                    | 3,59  | 23      | 32,53 | 149,85%                                    | 1,69                                | 23      | 76,10  | 83,48%                                     |
| Reino Unido   | 161,45   | 5       | 189,47 | 51,01%                                     | 0,84  | 20      | 1,10  | 114,92%                                    | 0,84  | 20      | 1,10  | 95,33%                                     | 0,00  | 5       | 3,15  | 14,51%                                     | 0,00                                | 5       | 10,58  | 11,61%                                     |
| Rep. Checa    | 50,00  | 21      | 377,60 | 101,66%                                    | 0,83  | 21      | 1,18  | 123,70%                                    | 0,97  | 21      | 1,34  | 116,72%                                    | 0,00  | 21      | 20,78 | 95,72%                                     | 2,12                                | 21      | 52,27  | 57,34%                                     |
| Suecia        | 428,26   | 25      | 720,26 | 193,92%                                    | 0,59  | 25      | 0,87  | 91,28%                                     | 0,66  | 25      | 0,94  | 81,60%                                     | 29,92                                       | 25      | 52,92 | 243,82%                                    | 30,23                               | 25      | 61,45  | 67,40%                                     |
| Media ponder. | 216,04   | 18,70   | 371,43 | 100,00%                                    | 0,68  | 20,96   | 0,96  | 100,00%                                    | 0,84  | 20,96   | 1,15  | 100,00%                                    | 7,76  | 18,56   | 21,71 | 100,00%                                    | 50,51                               | 17,10   | 91,16  | 100,00%                                    |



## A meta-analysis on the price elasticity of energy demand

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<https://doi.org/10.1016/j.enpol.2017.01.002>

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### Highlights

- An updated and wider meta-analysis on price elasticities of energy demand.
- Energy goods are shown to be price inelastic both in the short and long-term.
- Results are relevant for a proper design and implementation of energy policies.
- Our results refer to energy, as a whole, and specific energy goods.

## **Salience and taxation**

- Tax salience, ie simplicity to observe and calculate prices inclusive of taxes, is very relevant for demand (Chetty et al., 2009; Colantouni and Rojas, 2015)
- Consumers pay especial attention when tax rates, price elasticities and expenditure share are large
- Ad valorem and unit taxes have different effects, depending on how they are seen in prices (Goldin and Homonoff, 2013)
- Optimal tax rates should take this into account

# Salience and transport taxation

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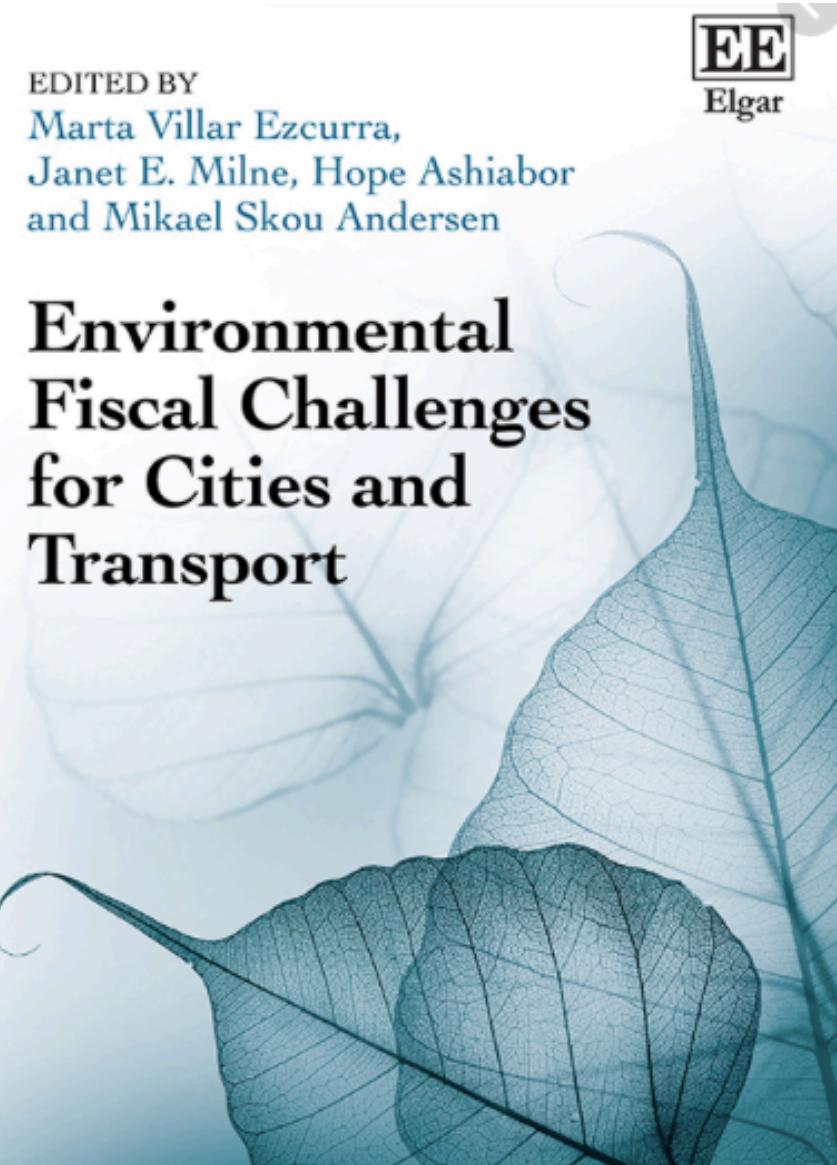
- Sizeable literature on car fuel taxes
  - Davis and Kilian (2011) show that policy assessments based on price elasticities are not reliable due to tax salience:
    - High presence in media
    - Persistence (vs volatility in prices)
  - Robust empirical evidence: Scott (2012), Baranzini and Weber (2013), Li et al. (2014)
  - Similar results from carbon taxes (on transport) in Sweden (Anderson, 2017) and British Columbia (Rivers and Schaufele, 2015; Bernard and Kihian, 2018; Lawley and Thivierge, 2018)
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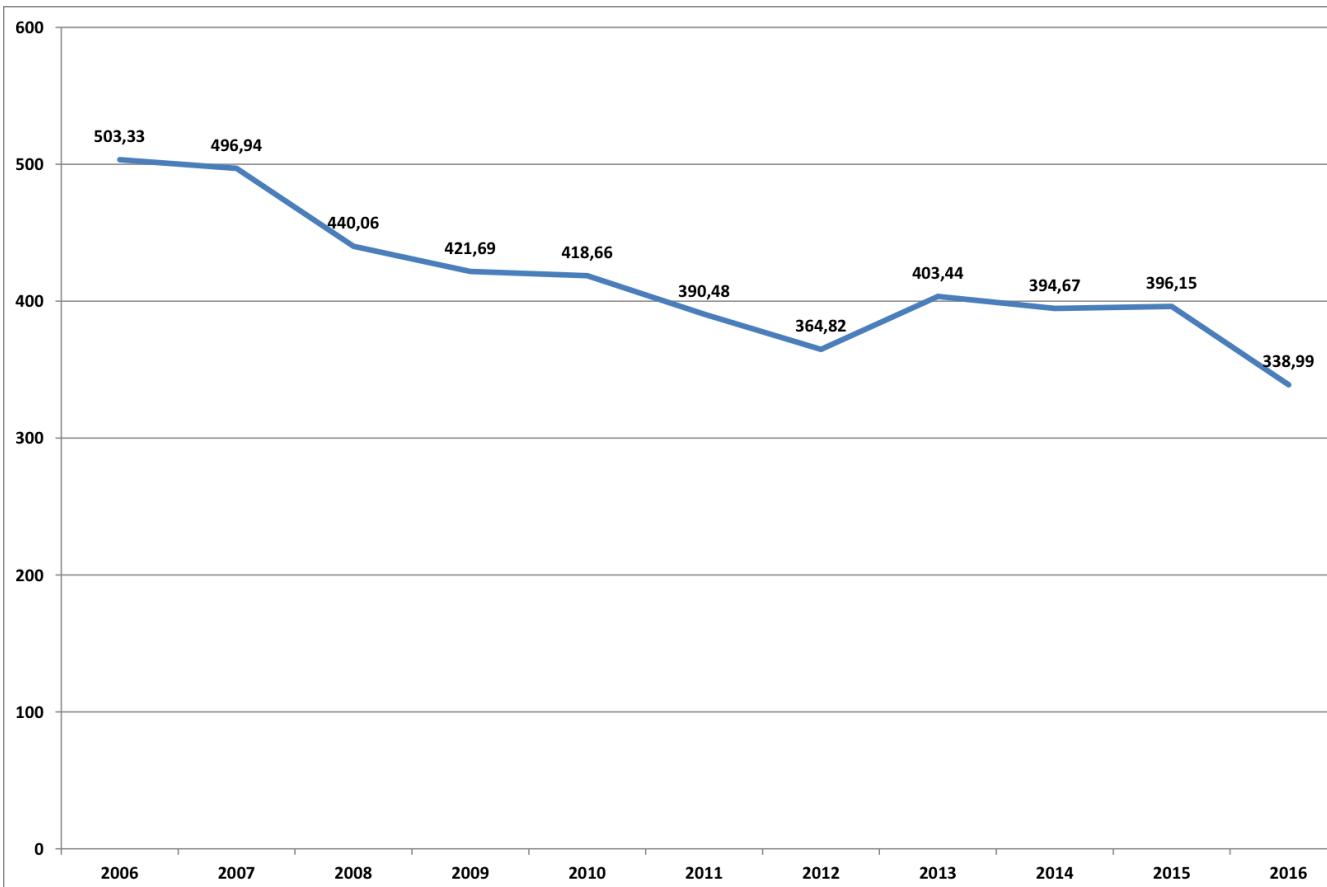
# **Environmental Fiscal Challenges for Cities and Transport**



A close-up photograph of several green leaves with prominent veins, arranged in a overlapping, organic pattern. The lighting highlights the texture and veins of the leaves against a soft, out-of-focus background.

Critical Issues in Environmental Taxation VOLUME XXI

## Tax revenue per car, Spain



Agencia Tributaria, 2018

# Comprehensive and Automated Vehicle Tax (CAVT)

|                | Zone 1 (urban)  | Zone 2 (semi-urban)                              | Zone 3 (non-urban) |
|----------------|---|--|--------------------|
| Vehicle type A | <i>Peak</i><br>Access charge 1<br>Time charge 1a (...)<br>km charge | <i>Peak</i><br>Time charge 2a (...)<br>km charge | km charge          |
|                | <i>Non-peak</i><br>km charge  | <i>Non-peak</i><br>km charge                     |                    |
| Vehicle type B | (...)   | (...)  | (...)              |

| Vehicle type A |            | Payment |            |                |          |           |                 |
|----------------|------------|---------|------------|----------------|----------|-----------|-----------------|
|                |            |         | Congestion | Local P/ noise | Global P | Accidents | Infrastructures |
| Access charge  | Euros      | X       | -          | -              | -        | -         | -               |
| Time charge 1a | Euros/hour | X       | X          | -              | -        | -         | -               |
| km tax         | Euros/km   | -       | X          | X              | X        | X         | X               |

# Salience, transport and transition...

- Will a CAVT be effective?
  - Finkelstein (2009) shows that optimal electronic tolls show a reduction in the elasticity of driving; therefore these tolls can obtain more revenues than conventional tolls (lower political costs)
- How to increase sales of cleaner cars?
  - Gallagher and Muehlegger (2011) show larger effects from VAT reductions wrt income tax deductions due to different salience
  - Through salient taxes wrt higher prices (Antweiler and Gulati, 2016; Rivers and Schaufele, 2017)
- Aviation: Substantial demand reaction to the 2012 US mandate to include taxes in final prices

# **Electricity**

- **Very limited literature:**
  - Salience might be low in complex tariff structures
  - Most papers focus on the provision on information to consumers (costs, relative consumption, etc.)
- As in transport, important changes in this domain: new EE technologies, measurement and information to consumers
- Salient taxes therefore might be particularly necessary in the electricity context

# economics energy

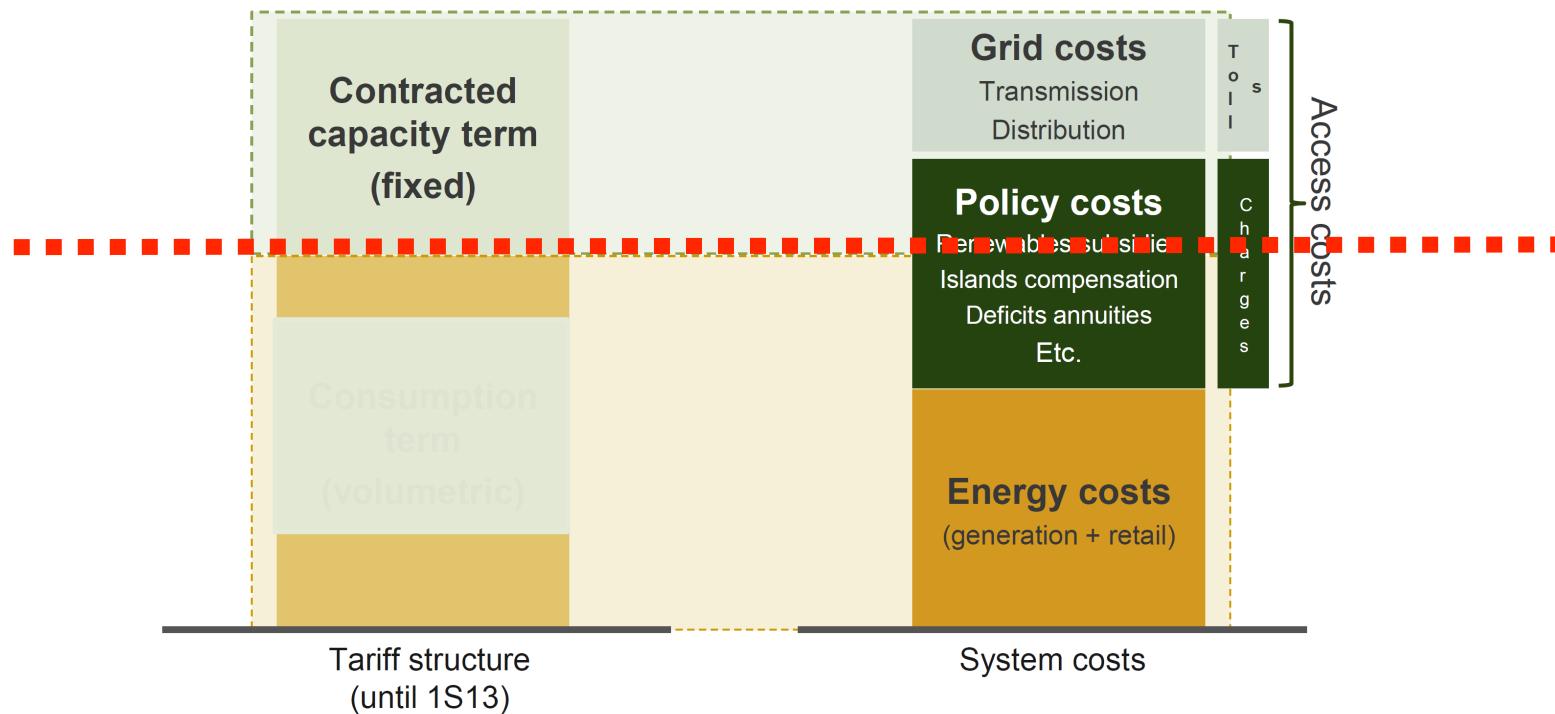
WP 02/2018

Deep reforms in electricity  
pricing: evidence from a quasi  
experiment

Xavier Labandeira  
José M. Labeaga  
Jordi Teixidó

# Soria's 2013 electricity reform

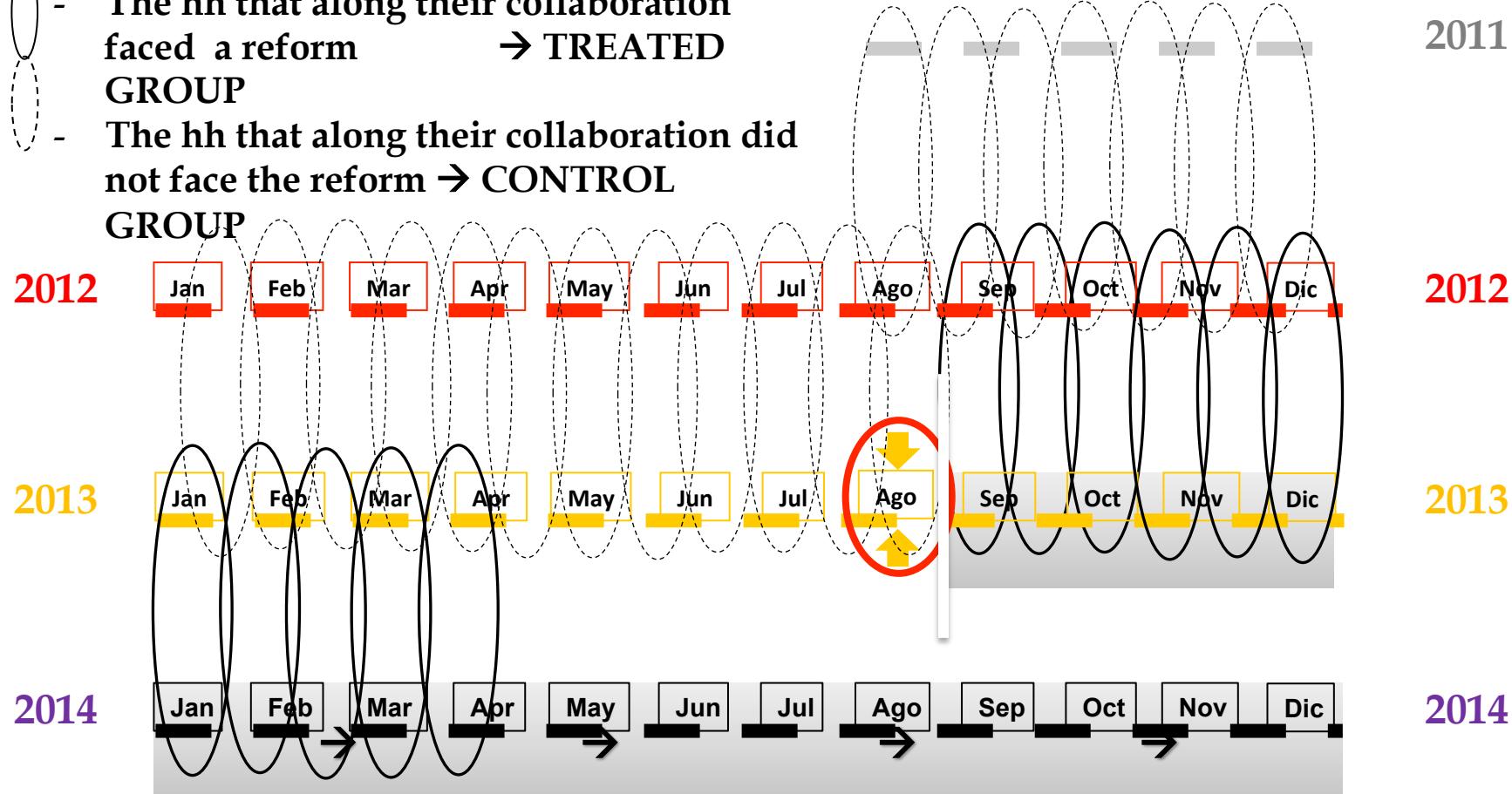
Consumers pay through the bill  
the energy cost and the access cost



# The quasi-experiment



- The hh that along their collaboration faced a reform → TREATED GROUP
- The hh that along their collaboration did not face the reform → CONTROL GROUP



$$\ln \square(q_{lit}) = \alpha + \beta \ln \square(p_{lit}) + \gamma \ln \square(y_{lit}) + \gamma X_{lit} + \delta T_{lit} + \theta_i + \epsilon_{lit}$$

$\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ ,  $\theta_i$

## **Summing up: Accuracy and policy trade-offs**

- Salient taxes may induce larger-than-expected behavioral changes: conventional price elasticities would have a limited validity for policy assessment
- Another reason to support the use of environmental taxation in energy transitions
- Tax salience should, in any case, be actively pursued
- More or less salient instruments would have clear revenue consequences

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**THANKS**

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