Energy/environmental taxation in the EU and Spain: Effectiveness and equity

Xavier Labandeira
Universidade de Vigo and Economics for Energy

Waseda University, 9 January 2020

Universidade Vigo

economics for energy

My objectives

- A brief outlook to EU climate policies
- What's the role of energy/environmental taxation?
- Transport taxation (in the EU): Crisis and reform
- Spanish paradox
- Taxes, incidence and compensations
- Taxes and salience
- (Taxes and energy efficiency)

What is European Climate Policy?

- Explicit (eg EU ETS) and implicit instruments (eg RES promotion)
- EU, national and subnational strategies (eg taxes)
  - Linked/related or not

Aims/evaluation

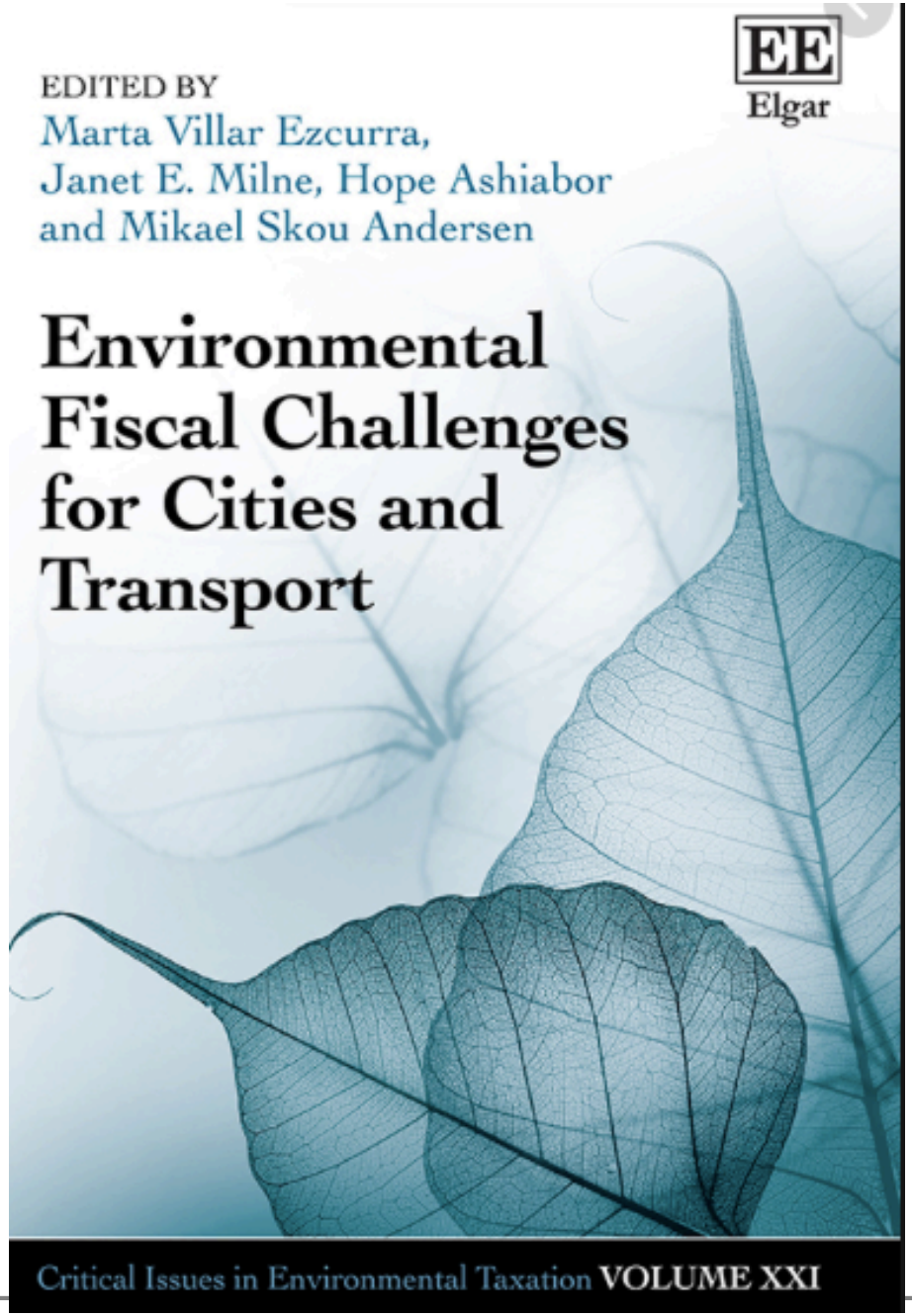
- Complying with its GHG mitigation objectives
- Cost-effectiveness
- Distributional issues
- Contribution to international agreements (Böhringer, 2014)

Why is it important?

- A very relevant experience (the *'Grand Policy Experiment'*)
  - In comparative terms
  - Sophisticated (role of Economics) and complex approximation
  - Increasing academic literature
  - In a moment of intense policy change/debate
- Relevance for post-Paris?
  - A prototype?
  - Learning by doing for the world? NDCs

Main issues nowadays

- Stringent objectives: 2050 (decarbonization); 2030: -55%?
- EU ETS and prices: Market Stability Reserve
- Competitiveness
  - Exemptions?
  - Linking
- Border tax adjustments?
- Non-EU ETS: Transport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EDITED BY
Marta Villar Ezcurra,
Janet E. Milne, Hope Ashiabor
and Mikael Skou Andersen
Environmental Fiscal Challenges for Cities and Transport
Critical Issues in Environmental Taxation VOLUME XXI

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%

THE WALL STREET JOURNAL.
THURSDAY, JANUARY 17, 2019

ORIGINAL CO-SIGNATORIES INCLUDE

4 Former Chairs of the Federal Reserve (All)

27 Nobel Laureate Economists

15 Former Chairs of the Council of Economic Advisers

2 Former Secretaries of the U.S. Department of Treasury

Economists' Sign-On Form

ECONOMISTS' STATEMENT ON CARBON DIVIDENDS

Global climate change is a serious problem calling for immediate national action. Guided by sound economic principles, we are united in the following policy recommendations.

I. A carbon tax offers the most cost-effective lever to reduce carbon emissions at the scale and speed that is necessary. By correcting a well-known market failure, a carbon tax will send a powerful price signal that harnesses the invisible hand of the marketplace to steer economic actors towards a low-carbon future.

II. A carbon tax should increase every year until emissions reductions goals are met and be revenue neutral to avoid debates over the size of government. A consistently rising carbon price will encourage technological innovation and large-scale infrastructure development. It will also accelerate the diffusion of carbon-efficient goods and services.

III. A sufficiently robust and gradually rising carbon tax will replace the need for various carbon regulations that are less efficient. Substituting a price signal for cumbersome regulations will promote economic growth and provide the regulatory certainty companies need for long- term investment in clean-energy alternatives.

IV. To prevent carbon leakage and to protect U.S. competitiveness, a border carbon adjustment system should be established. This system would enhance the competitiveness of American firms that are more energy-efficient than their global competitors. It would also create an incentive for other nations to adopt similar carbon pricing.

V. To maximize the fairness and political viability of a rising carbon tax, all the revenue should be returned directly to U.S. citizens through equal lump-sum rebates. The majority of American families, including the most vulnerable, will benefit financially by receiving more in "carbon dividends" than they pay in increased energy prices.

ORIGINAL CO-SIGNATORIES

George Akerlof Nobel Laureate Economist	**Alan Greenspan** Former Chair, Federal Reserve Former Chair, CEA	**Eric Maskin** Nobel Laureate Economist	**William Sharpe** Nobel Laureate Economist
Robert Aumann Nobel Laureate Economist	**Lars Peter Hansen** Nobel Laureate Economist	**Daniel McFadden** Nobel Laureate Economist	**Robert Shiller** Nobel Laureate Economist
Martin Baily Former Chair, CEA	**Oliver Hart** Nobel Laureate Economist	**Robert Merton** Nobel Laureate Economist	**George Shultz** Former Treasury Secretary
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Angus Deaton Nobel Laureate Economist	**Daniel Kahneman** Nobel Laureate Economist	**Christina Romer** Former Chair, CEA	**Michael Spence** Nobel Laureate Economist
Peter Diamond Nobel Laureate Economist	**Alan Krueger** Former Chair, CEA	**Harvey Rosen** Former Chair, CEA	**Lawrence Summers** Former Treasury Secretary
Robert Engle Nobel Laureate Economist	**Finn Kydland** Nobel Laureate Economist	**Alvin Roth** Nobel Laureate Economist	**Richard Thaler** Nobel Laureate Economist
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Martin Feldstein Former Chair, CEA	**Robert Lucas** Nobel Laureate Economist	**Myron Scholes** Nobel Laureate Economist	**Paul Volcker** Former Chair, Federal Reserve
Jason Furman	**N. Gregory Mankiw**	**Amartya Sen**	**Janet Yellen**

Conventional approach

- Revenue Raising (Ramsey)
- Externality correction
  - Global and local environmental problems
  - Congestion
  - Accidents, etc.
- Energy dependence

Taxes on registration, circulation, fuels + congestion charges

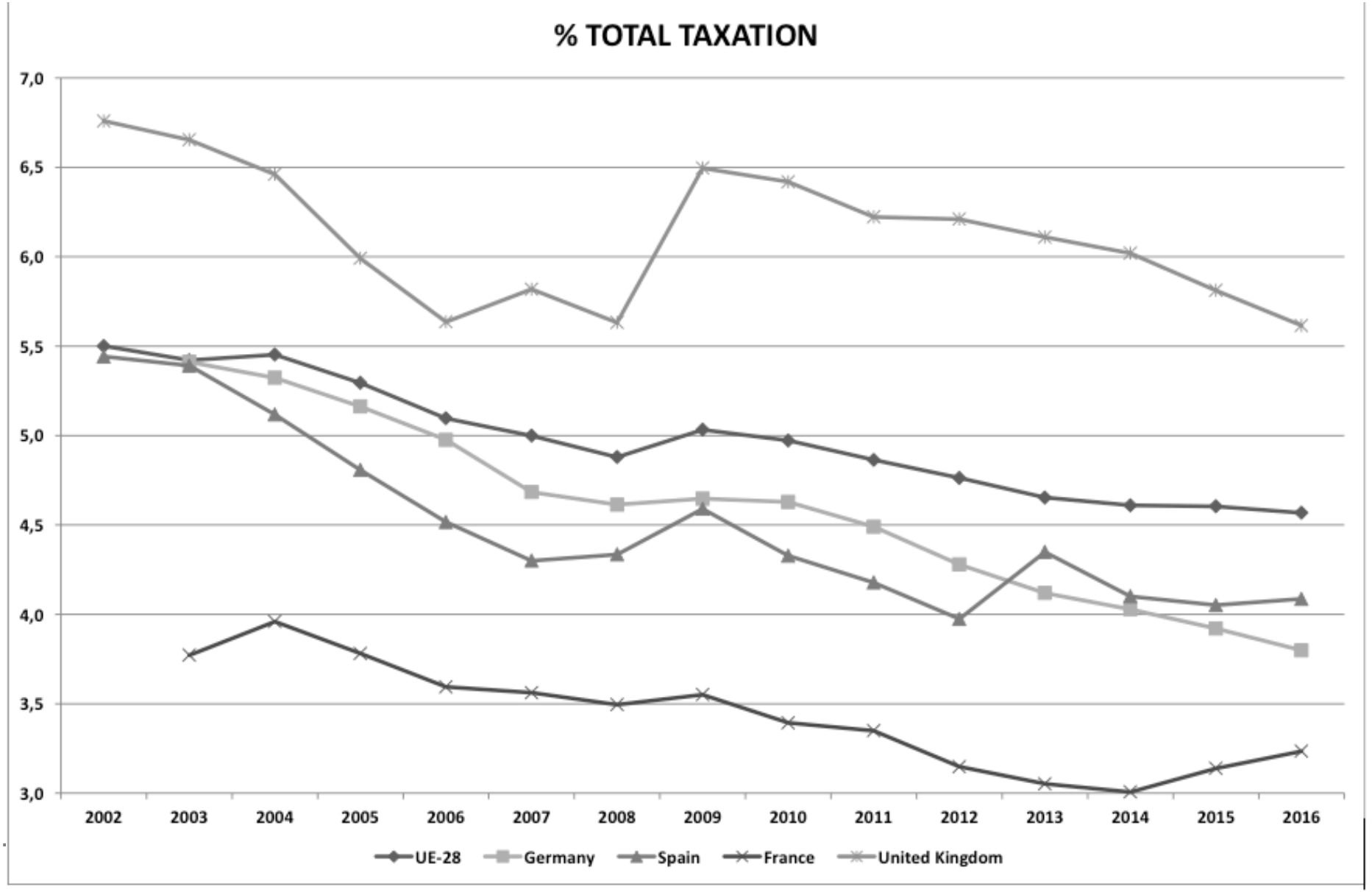
Externalities and tax correction

- How to combine different tax instruments?
- Which tax levels?
- New proposals on access and congestion
- Distributional effects
  - Are they relevant?
  - How to compensate them?
- Taxes in a wider context:
  - Subsidies
  - Standards: synergies?
  - Plate-access; bans

Changes in transport

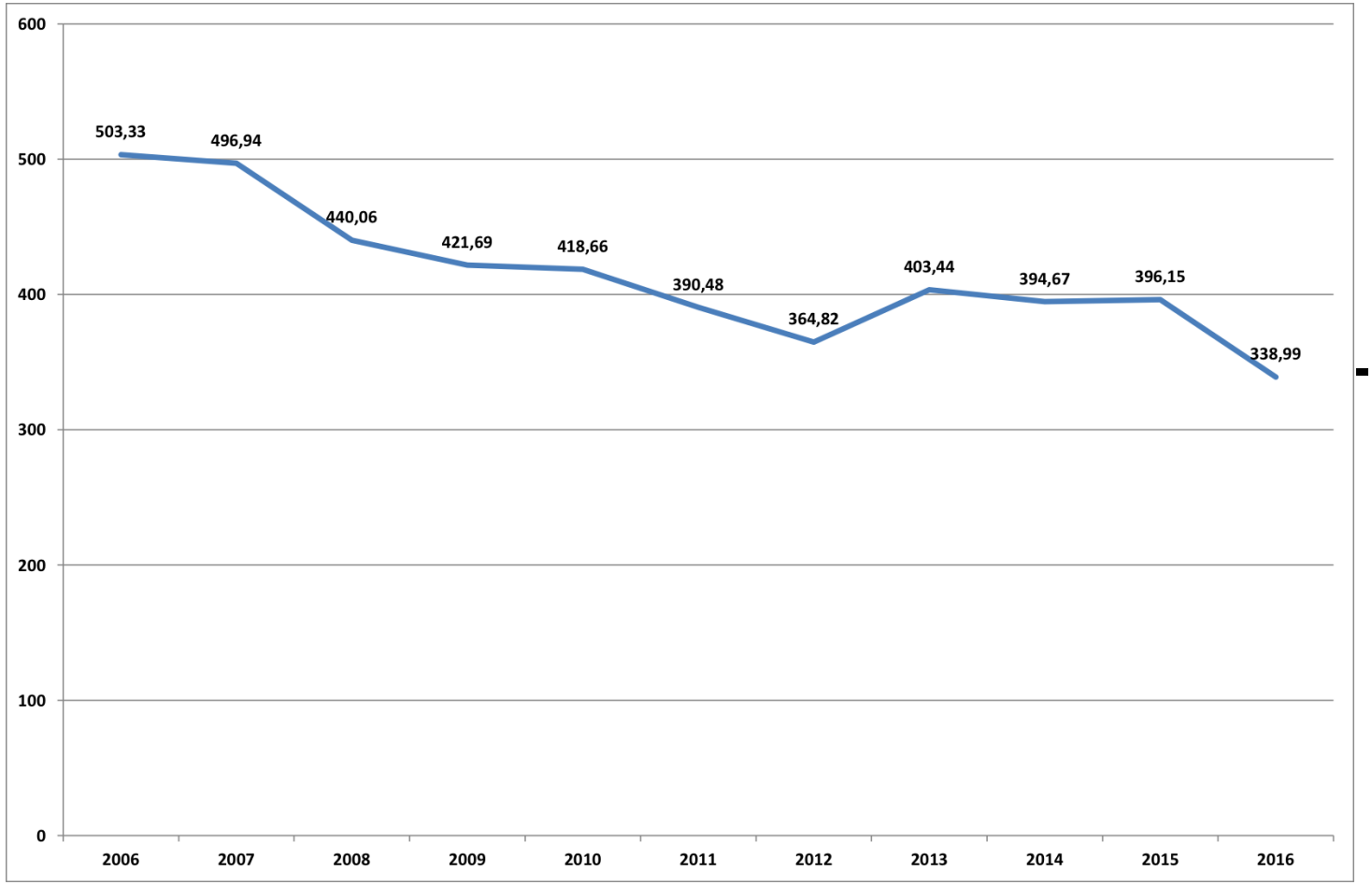
- Energy efficiency remarkable improvements (and potentials)
- Alternative technologies (EV, etc.)
- Less interest in property?
- Digitalization and new transport alternatives:
  - Car sharing
  - Self-driving cars

Crisis



European Commission, 2017

Tax revenue per car, Spain



- 33%

Agencia Tributaria, 2018

External costs of transport

Type		Paper	Year	Country	% GDP
Congestion		Delucchi (1997)	1991	U.S.	0.55-**2.36**
		Winston and Langer (2006)	1996	U.S.	0.32
		Van Essen et al. (2011)	2008	EU, Norway and Switzerland	1.10-1.80
		Cravioto et al. (2013)	2006	Mexico	1.04-1.05
		BITRE (2015)	2010	Australia	0.94
		BITRE (2015)	2015	Australia	1.13
		Schrank et al. (2015)	1982	U.S.	0.59
		Schrank et al. (2015)	2014	U.S.	0.92
		Keller (2018)	2015	Switzerland	**0.29**
Air Pollution	**Local**	DMT (2004)	2000	Denmark	**0.15**
		Fisher et al. (2007)	2001	New Zealand	0.24
		Van Essen et al. (2011)	2008	EU, Norway and Switzerland	0.39
		Cravioto et al. (2013)	2006	Mexico	0.61-0.62
		OECD (2014)	2010	OECD	**1.97**
		Guo et al. (2010)	2004	China	0.52
		Guo et al. (2010)	2008	China	0.58
	Global	DMT (2004)	2000	Denmark	**0.11**
		Van Essen et al. (2011)	2008	EU, Norway and Switzerland	0.97
		Cravioto et al. (2013)	2006	Mexico	0.99-**1.00**
		Ivkovic et al. (2018)	2013	Serbia	0.20
	Total	GEA (2018)	2008	Germany	**1.93**
		GEA (2018)	2014	Germany	**1.78**
Accidents		López et al. (2004)	1997	Spain	1.35
		DMT (2004)	2000	Denmark	**0.49**
		Van Essen et al. (2011)	2008	EU, Norway and Switzerland	**1.75**
		Cravioto et al. (2013)	2006	Mexico	1.32-1.34
Noise		DMT (2004)	2000	Denmark	**0.65**
		Van Essen et al. (2011)	2008	EU, Norway and Switzerland	**0.13**
		Cravioto et al. (2013)	2006	Mexico	0.42-0.43

How to proceed?

- (1) Giving up
- (2) Trying to fix the current system
  - Adjusting fuel taxes to all pollutants
  - Salience through registration tax? Feebates?
  - Extending congestion charges
- Still, not an easy task: Spain these days…
  - Low tax levels but…
  - Diesel taxes seen as unfair, sometimes affecting ‘clean’ cars
  - Huge exemptions advanced

Meta-analyses of price elasticities of car fuels

Study	Product	Elasticity
Espey (1996)	Gasoline	-0.65 (LT)
Espey (1998)	Gasoline	-0.16 (ST) -0.81 (LT)
Hanly et al. (2002)	Car fuels	-0.76 (ST) -1.16 (LT)
Graham y Glaiter (2002)	Car fuels	-0.25 (ST) -0.77 (LT)
Brons et al. (2008)	Gasoline	-0.36 (ST) -0.81 (LT)
Havranek et al. (2012)	Gasoline	-0.09 (ST) -0.31 (LT)
Labandeira et al. (2017)	Gasoline	-0.15 (ST) -0.77 (LT)
	Diesel	-0.29 (ST) -0.44 (LT)

How to proceed?

- (3) A new system for taxing road transport
  - Heavily based on vehicle characteristics
  - Able to discriminate in time and location
  - Able to act as a km tax
  - Able to keep revenues
- Not writing on a blank sheet:
  - Singapore (1975): Technical feasibility
  - Stockholm (2006): How to get public support
  - Oregon (2015): The importance of testing and transition

Marginal external costs of vehicle use

Externality	Fuel	Type of road	MEC (€ct/vkm)
Congestion	All	Motorway (metropolitan)	26.8-61.5
		Main (metropolitan)	141.3-181.3
		Other (metropolitan)	159.3-242.6
		Main (urban)	48.7-75.8
		Other (urban)	139.4-230.5
		Motorway (rural)	13.4-30.8
		Main (rural)	18.3-60.7
		Other (rural)	42.0-139.2
Local pollution	Diesel	Urban	0.7-10.3
		Sub-urban	0.3-3.4
		Rural	0.2-1.2
		Motorway	0.2-1.3
	Gasoline	Urban	0.4-3.8
		Sub-urban	0.1-3.5
		Rural	0.1-2.8
		Motorway	0.1-3.5
	Electricity	Urban	0.72
		Rural	0.99
Global pollution	Diesel	Urban	1.6-3.0
		Rural	1.1-2.3
		Motorway	1.2-2.7
	Gasoline	Urban	2.4-3.9
		Rural	1.4-2.3
		Motorway	1.5-2.3
	Electricity	Average	1.7
Accidents	All	Motorway	0.1
		Uban	0.3
		Other	0.2
Noise	Conventional	Urban (day)	0.88-2.14
		Urban (night)	1.61-3.89
		Rural (day)	0.01-0.02
		Rural (night)	0.01-0.04
	Electricity	Urban (day)	0.88-2.14
		Urban (night)	0.80-1.95
		Rural (day)	0.01-0.02
		Rural (night)	0.01-0.03

Korzhenevych et al., 2014; Jochem et al., 2016

Comprehensive and Automated Vehicle Tax (CAVT)

	Zone 1 (urban)	Zone 2 (semi-urban)	Zone 3 (non-urban)
Vehicle type A	*Peak* Access charge 1 Time charge 1a (...) km charge	*Peak* Time charge 2a (...) km charge	km charge
	Non-peak km charge	*Non-peak* 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

The Spanish anomaly

- Every reason to have higher taxes
  - Energy dependence
  - Sizable emissions/local pollution
  - Need of public revenues
- But among the lowest in the EU. Why?
- Our proposal and simulations (2019/2020)
  - Focused on transportation, also including aviation
  - Paying a lot of attention to distributional impacts and compensations

Offsetting distributional effects from higher energy taxes

- Direct vs indirect (eg via economic activity) effects
  - (Competitiveness issues)
- Just in these taxes or integral tax reform?
  - (Generations of Green tax reforms)
- Generalized or targeting groups?
- Price subsidies? Decreasing levels?
- Just transfers or also subsidies to change of stock?

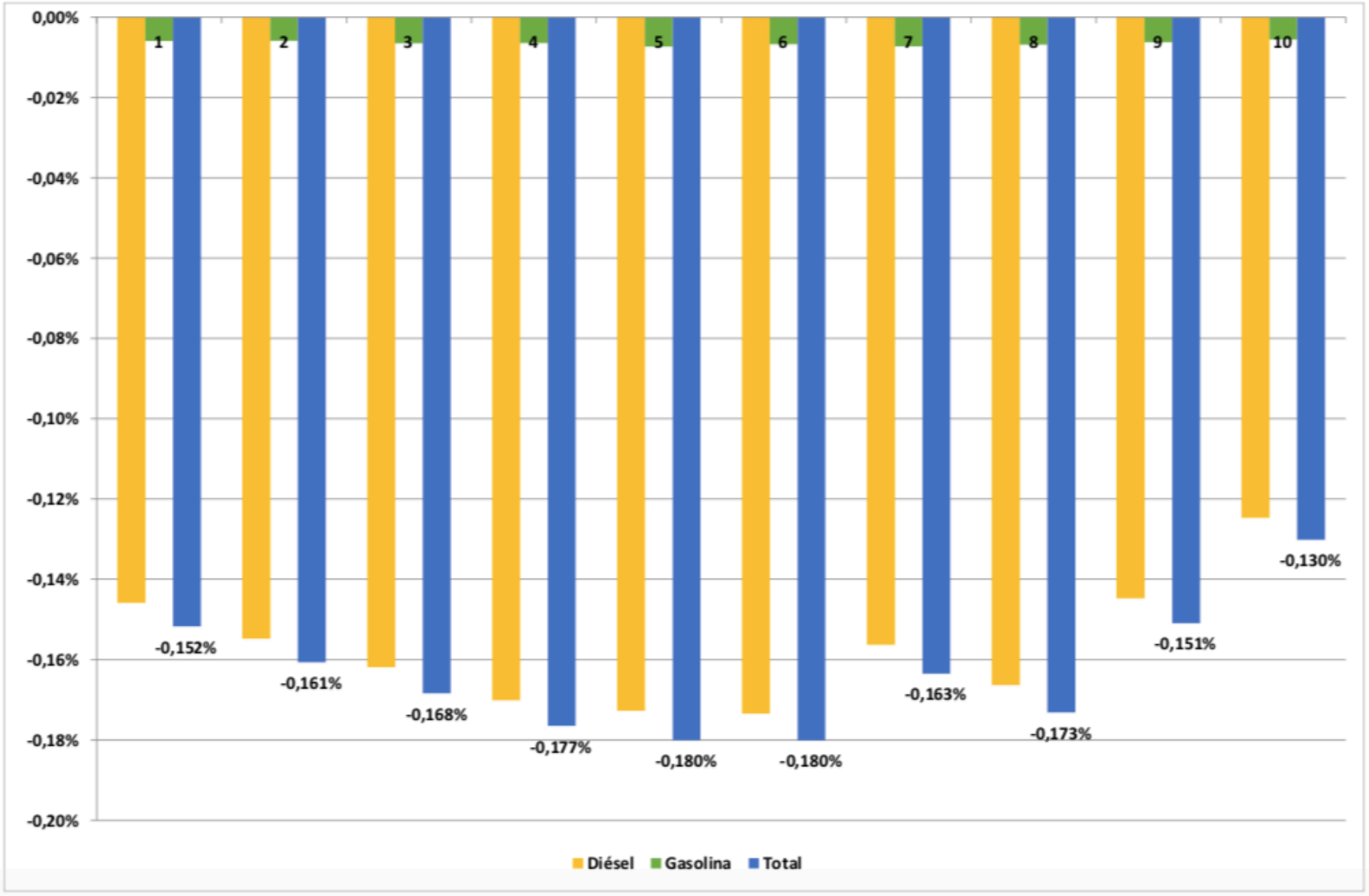
Distributional effects from a proposal for Spain

Increasing diesel taxation to the gasoline levels to offset 2018 GHG emissions increase

Fuel	Price (%)	Consumption (%)	CO_2 Emissions (%)	Extra Revenues (M Euros)		
				Hydrocarbons Tax	VAT	Total
Gasoline 95	0.48	-0.12	-0.12	27,1	4,7	31.9
Diesel-non commercial	9.90	-1.99	-1.99	1,591.4	287,3	1878.7
Diésel-commercial	9.90	-1.99	-1.99	907.3	-	907.3
Total	-	-1.66	-1.70	2,525.8	292	2,817.9

Effects on household income

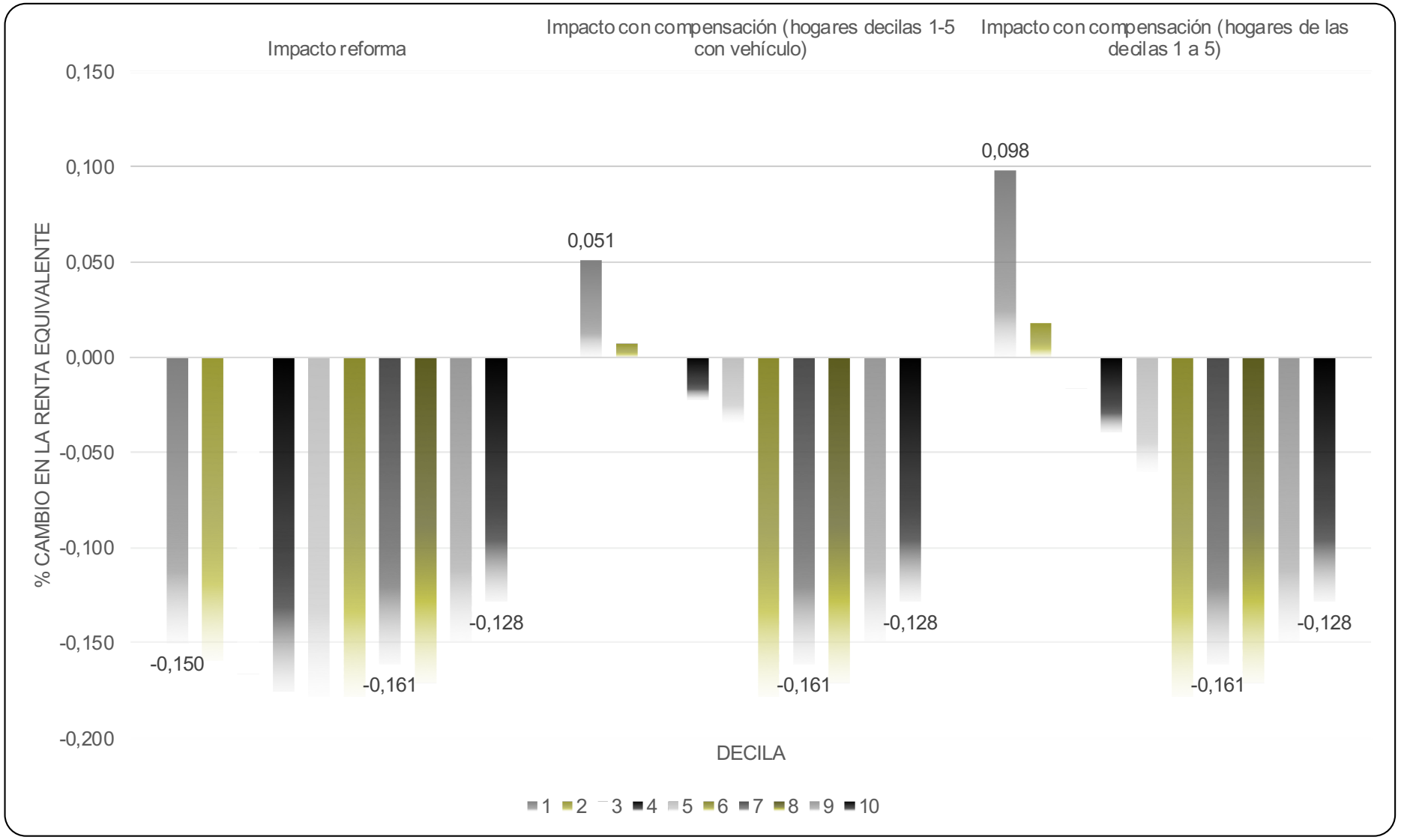
Figura 9. Impacto distributivo de la reforma por decilas de renta equivalente



Compensatory packages

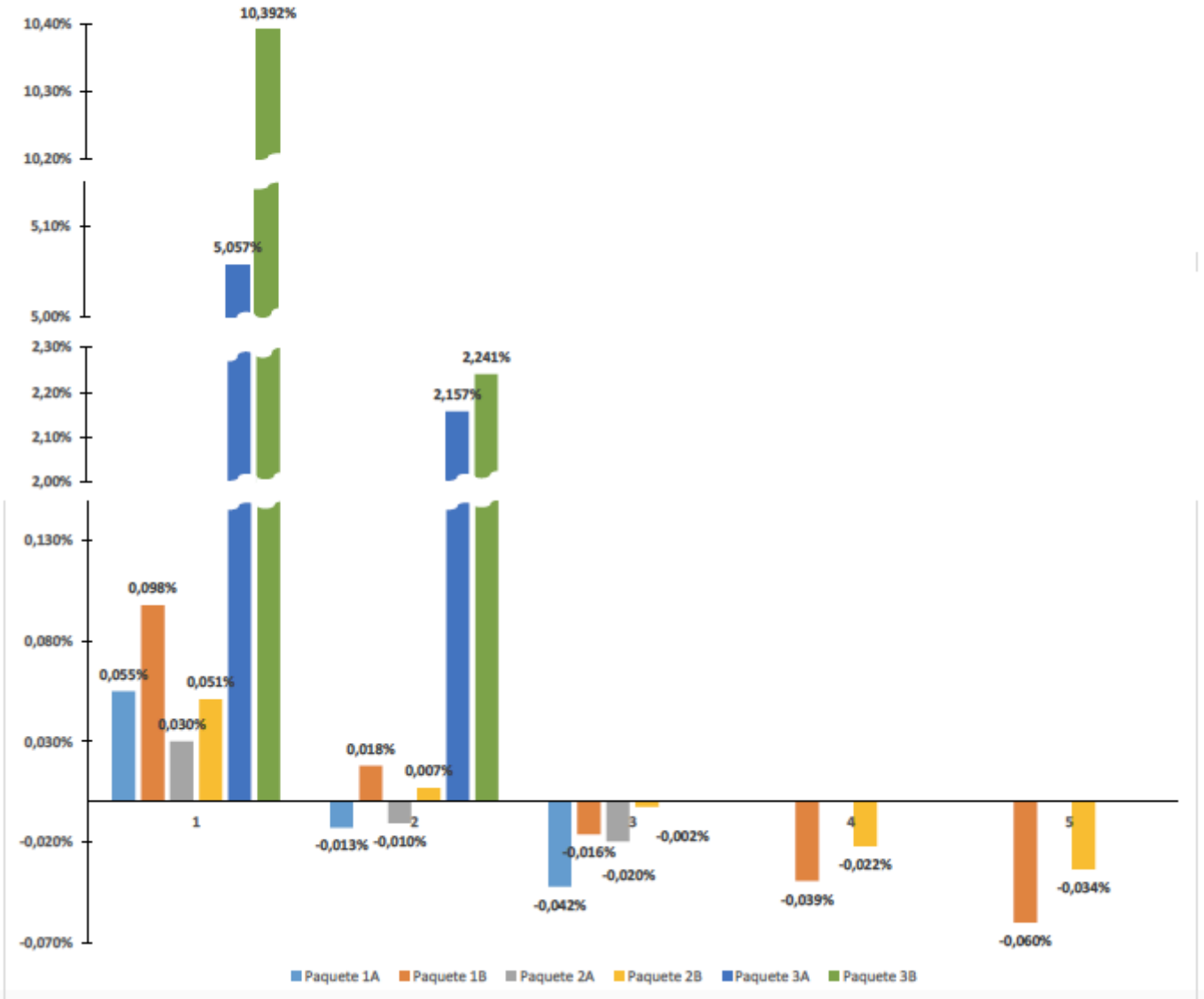
Package	Instrument	Targeted households	Transfer per household (€)	Cost (M €)
1A	Lump-sum transfer	3 first deciles	21.95	116.1
1B		5 first deciles	26.49	233.5
2A	Lump-sum transfer	3 first deciles with car	53.93	150.3
2B		5 first deciles with car	60.20	299.3
3A	Lump-sum transfer	Households below poverty line	553.15	1,561.4
3B	Transfer in inverse proportions to the household equivalent income		765.97 (average)	2,162.1

Effects from compensations



Effects from compensations

Figura 10. Impacto distributivo por decilas de renta equivalente con compensaciones



Salience and transport 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)
- Davis and Kilian (2011) show that policy assessments based on price elasticities are not reliable due to tax salience due to media presence and persistence
- Robust empirical evidence: Scott (2012), Baranzini and Weber (2013), Li et al. (2014)
- Similar results from carbon taxes (on transport) inSweden (Anderson, 2017) and British Columbia (Rivers and Schaufele, 2015; Bernard and Kihian, 2018; Lawley and Thivierge, 2018)

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 and salience

- 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

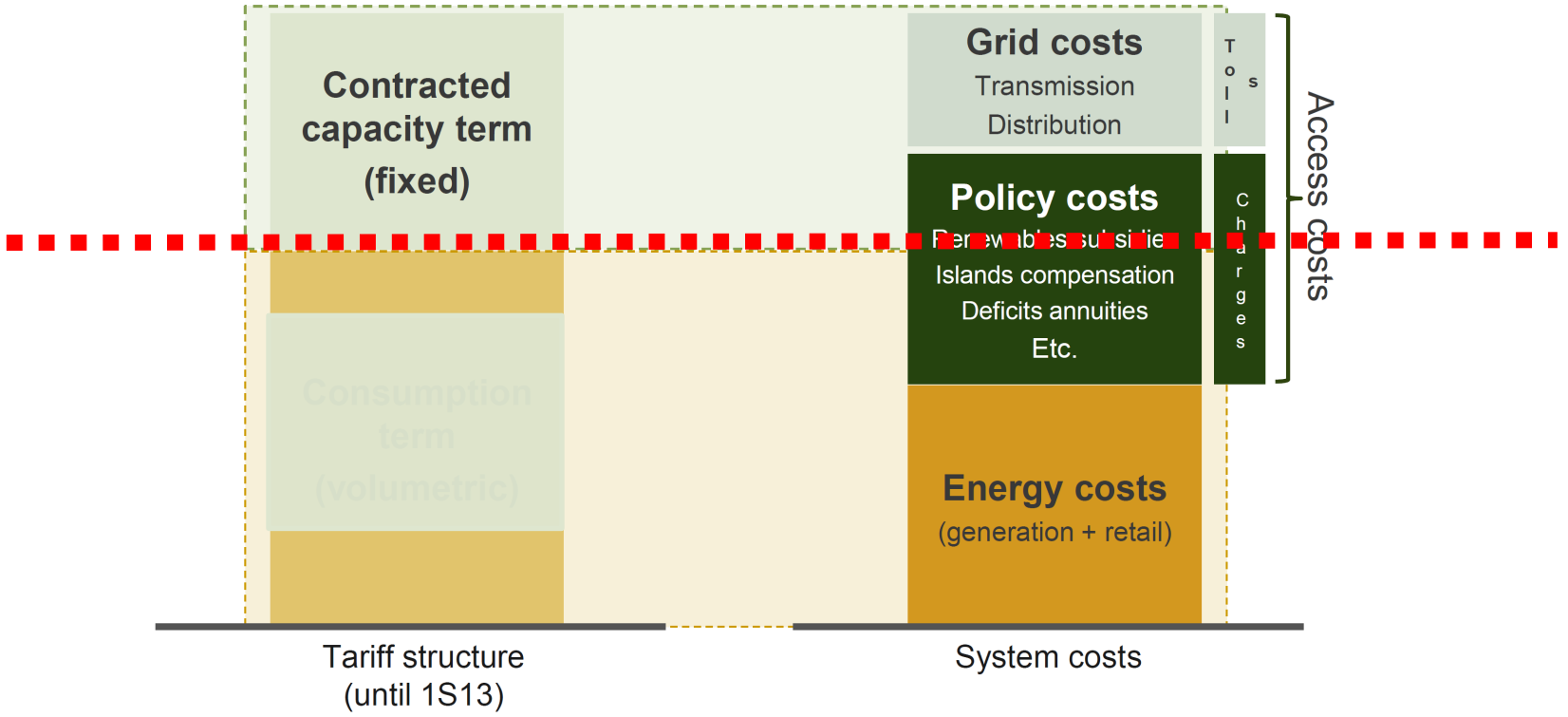
WP 02/2018

Deep reforms in electricity pricing: evidence from a quasi experiment

Xavier Labandeira
José M. Labeaga
Jordi Teixidó

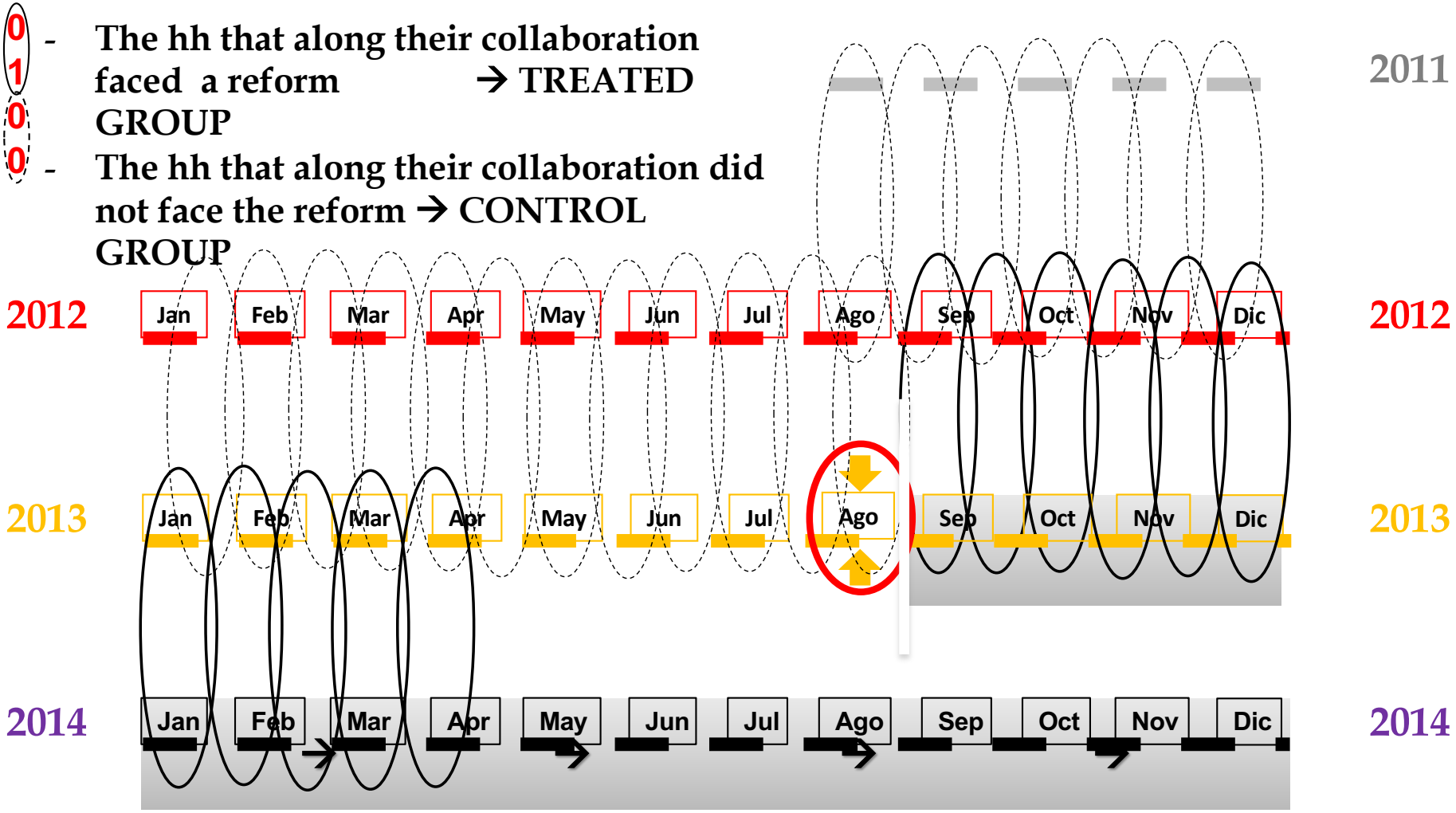
Soria's 2013 electricity reform

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



The quasi-experiment

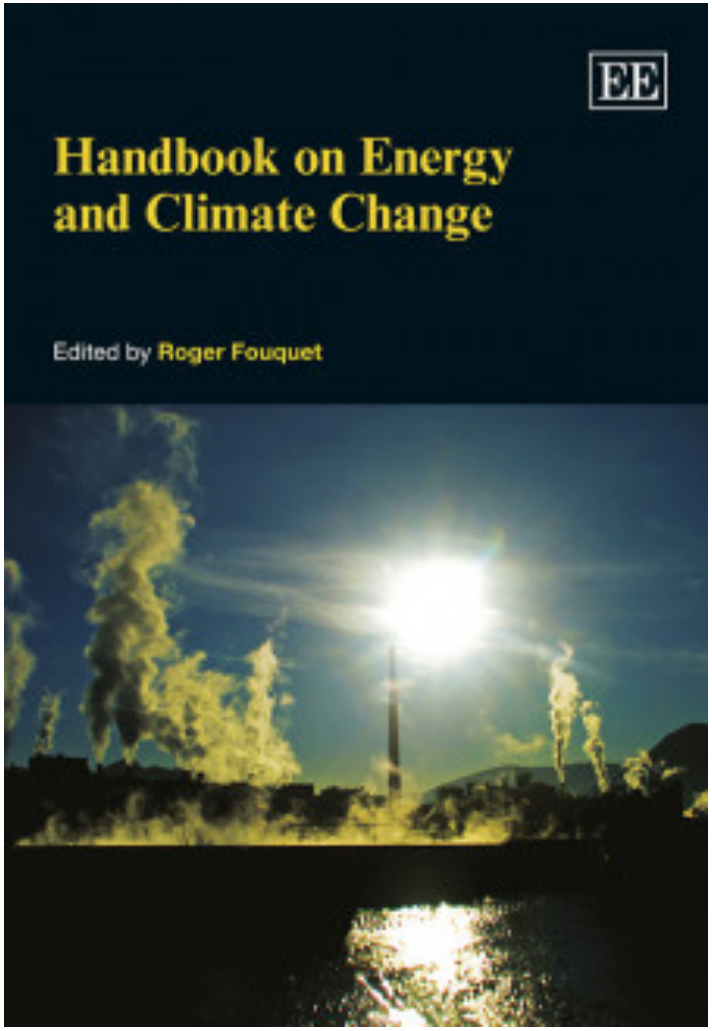
- The hh that along their collaboration faced a reform → TREATED GROUP
- The hh that along their collaboration did not face the reform → CONTROL GROUP

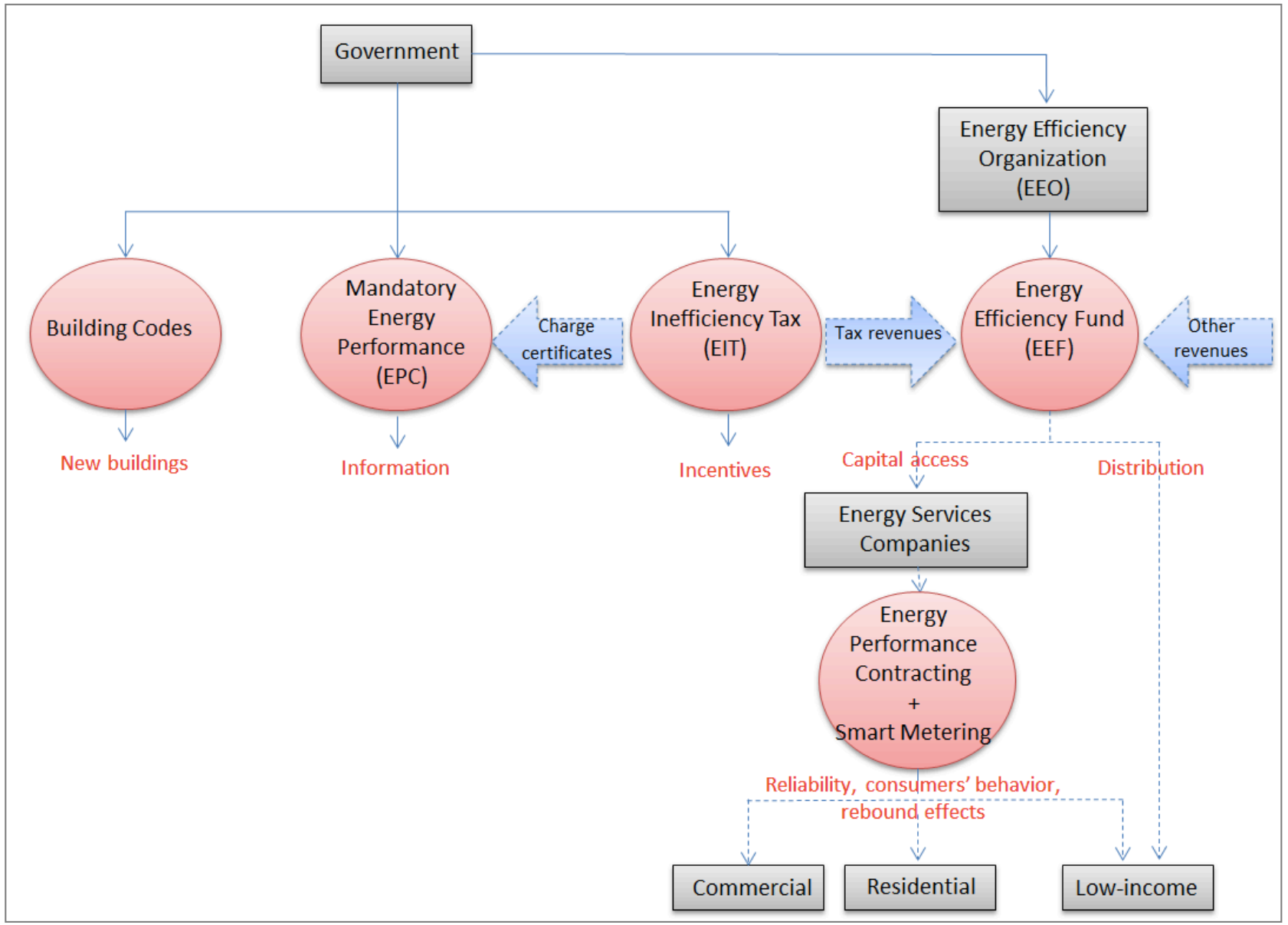


$$\ln\square(q\downarrow it) = \alpha + \beta\ln\square(p\downarrow it) + \beta\ln\square(y\downarrow it) + \gamma X\downarrow it + \delta T\downarrow it + \theta\downarrow i +$$

$$\varepsilon\downarrow t + \varepsilon\downarrow it$$

(Taxes and energy efficiency)




Government
Energy Efficiency Organization (EEO)
Building Codes
Mandatory Energy Performance (EPC)
Charge certificates
Energy Inefficiency Tax (EIT)
Tax revenues
Energy Efficiency Fund (EEF)
Other revenues
New buildings
Information
Incentives
Capital access
Distribution
Energy Services Companies
Energy Performance Contracting + Smart Metering
Reliability, consumers' behavior, rebound effects
Commercial
Residential
Low-income

THANKS

http://labandeira.eu

xavier@uvigo.gal