Replacing Italy's RES-E surcharge with a carbon tax: A macroeconomic analysis

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Introduction

RES-E support in Italy

- Range of RES-E support mechanisms (feed-in tariffs, tradable green certificates, tender schemes, etc.)

➔Growing RES-E capacity and generation

- 2011 investment boom in photovoltaics (PV)

➔Cost rise

- Cost recovery through the A3 surcharge on electricity consumption

Cost recovered through the A3 (€b)

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
4.4	6.5	10.4	11.0	11.0	11.2	11.4	11.5	11.5	11.5	11.5

Note: 2010-2012 historical, 2013-2020 estimated (Ministry of Economic Development)

Regressive financing

A3 rates (c€/KWh) - Households

User type*	Annual consumption (KWh) <1800	1800-2640	>2640
D2	2.907	4.363	6.322
D3	6.322	6.322	6.322

*D2 if committed capacity <3KW and place of residence; D3 otherwise

➔A3 ≈ 18% of final price paid by average household

- RES-E support is justified by public policy objectives (environmental protection, energy security, etc.)

➔~~Should be State funded~~ *Not an option*

- Financed through A3

➔Cost allocation is regressive (electricity is a necessity good)

Regressive financing of a public good !

A better alternative exists

Replace the A3 surcharge with
a carbon tax
in the non-ETS sector

Distributional impact
less regressive
(different consumption patterns
of motor fuels and home fuels
across income distribution...)

Greater
CO_2 abatement
(carbon tax more effective
at reducing emissions than
energy tax...)

We test this tax swap using a macro-econometric model

Simulation

The E3ME model

(*Cambridge Econometrics*)

(1)

- Macro-econometric, input-output, multi-region model for Europe
- Main dimensions: 33 regions, 69 sectors, 43 consumption goods, 12 fuels, 22 fuel users, 14 emissions, 14 socio-economic groups
- 29 sets of stochastic equations, standard macro identities
- Dynamic (year frequency)
- Imperfect competition, unemployment
- Endogenous technological change
- Top-down, bottom-up (electricity sub-model)
- Data sources: Eurostat, IEA, ...

The E3ME model

(*Cambridge Econometrics*)

(2)

Sets of equations	Dimension
Aggregate consumption	1x33
Disaggregate consumption	43x33
Industrial investment	69x33
Investment in dwellings	1x33
Exports outside EU	69x33
Imports outside EU	69x33
Exports within EU	69x33
Imports within EU	69x33
Export prices	69x33
Import prices	69x33
Industrial prices	69x33
Normal output	69x33
Industrial employment	69x33
Industrial average earnings	69x33
Hours worked	69x33
Labour participation rate	33x33
Residual (non-wage) income	1x33
Aggregate energy demand	22x33
Disaggregate energy demand – Coal	22x33
Disaggregate energy demand – Oil	22x33
Disaggregate energy demand – Gas	22x33
Disaggregate energy demand – Electricity	22x33
Domestic material consumption – Food	16x33
Domestic material consumption – Feed	16x33
Domestic material consumption – Forestry	16x33
Domestic material consumption – Construction minerals	16x33
Domestic material consumption – Industrial minerals	16x33
Domestic material consumption – Non-ferrous ores	16x33
Domestic material consumption – Ferrous ores	16x33

- 29 Stochastic equations

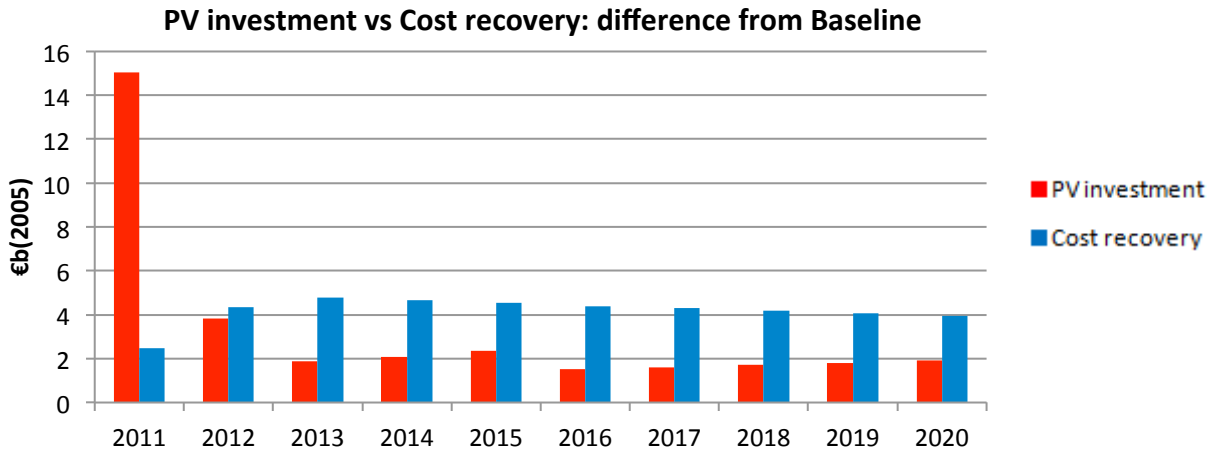
- Error Correction Model for cointegrating variables

- Estimation period: 1970-2010; forecast period: **2011**-2050

- Model fully documented www.camecon.com

Scenarios

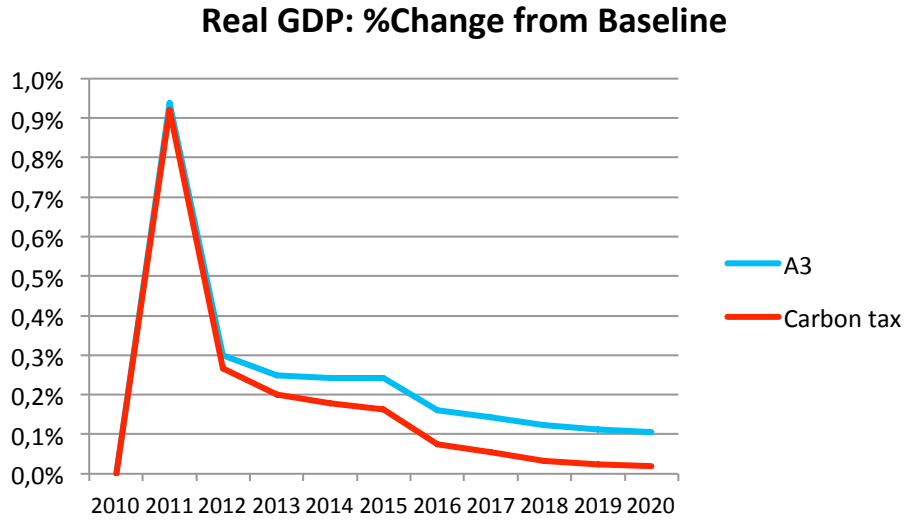
Scenario	PV boom	A3 increase	Carbon tax (in non-ETS)	ETS
Baseline	N	N	N	Y
A3	Y	**Y**	N	Y
Carbon tax	Y	N	**Y**	Y

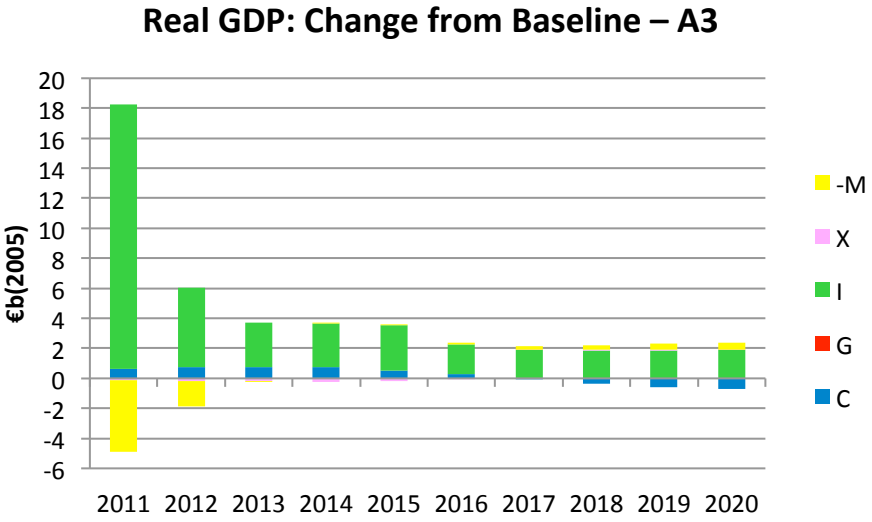


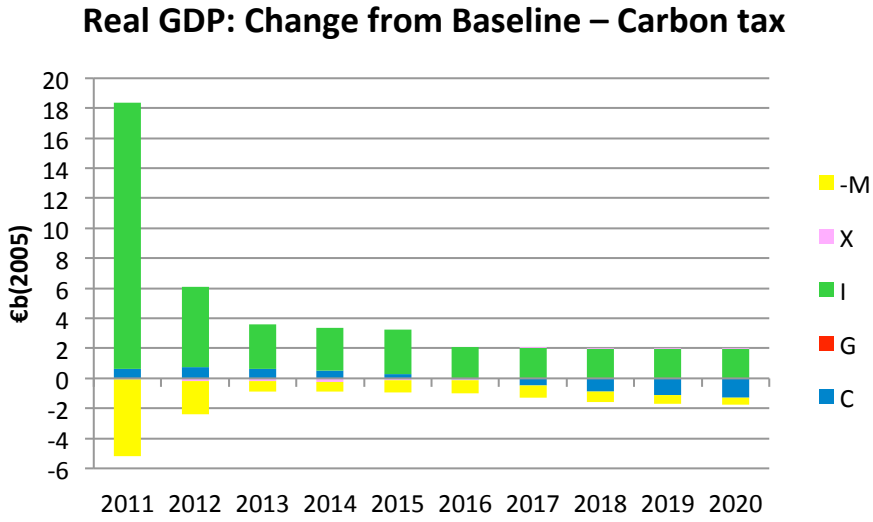
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
A3 increase, c€/KWh	1.2	2.0	2.2	2.1	2.0	1.9	1.8	1.8	1.7	1.6
Carbon tax, €/tCO2	10.4	18.5	20.4	19.9	19.4	19.0	18.6	18.2	17.7	17.3

Results

GDP

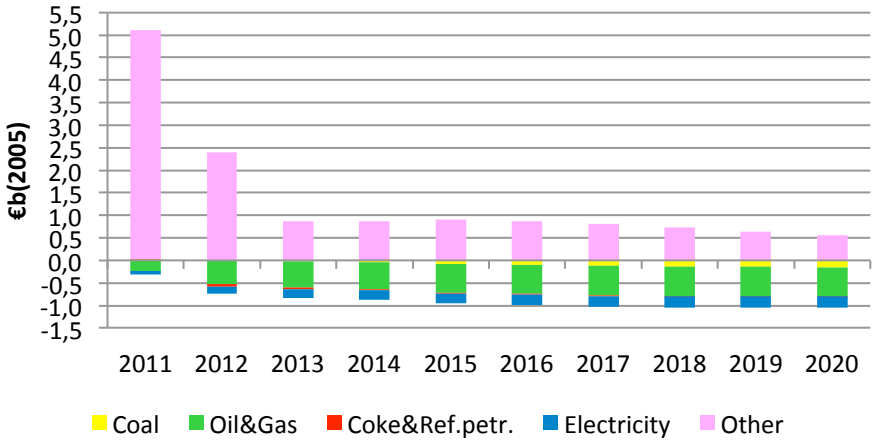

Real GDP: %Change from Baseline
1,0%
0,9%
0,8%
0,7%
0,6%
0,5%
0,4%
0,3%
0,2%
0,1%
0,0%
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
A3
Carbon tax


Real GDP: Change from Baseline – A3
€b(2005)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
-M
X
I
G
C

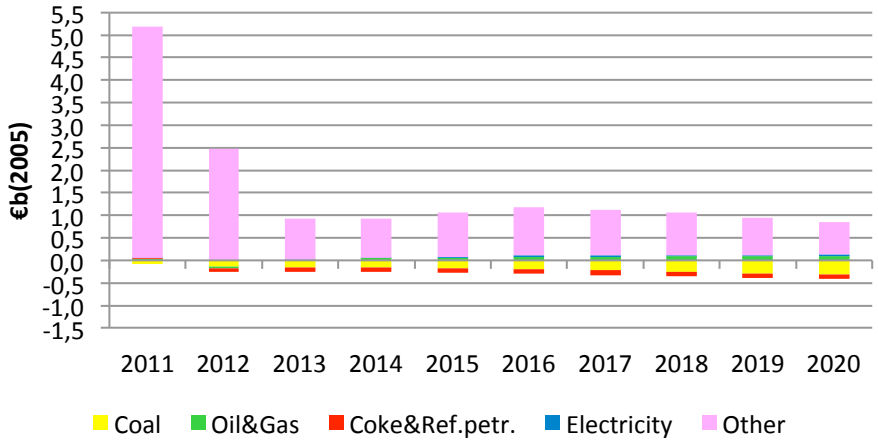

Real GDP: Change from Baseline – Carbon tax
€b(2005)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
-M
X
I
G
C

Imports and Consumption

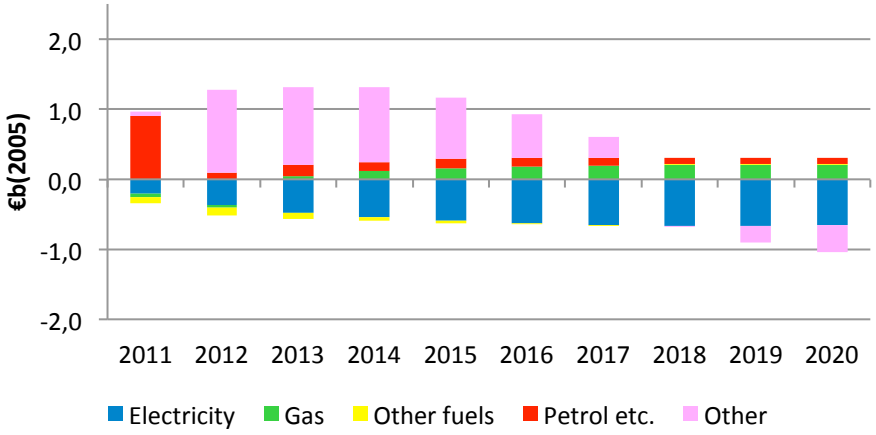
Imports: Change from Baseline – A3



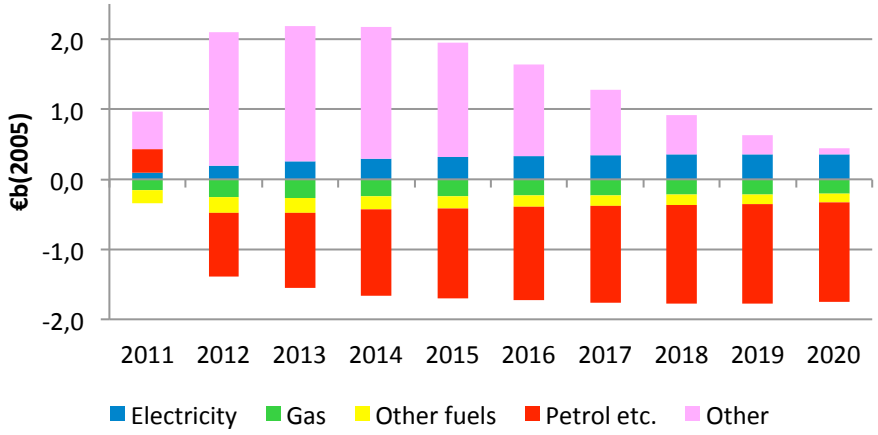
Imports: Change from Baseline – Carbon Tax



Cons.: Change from Baseline – A3

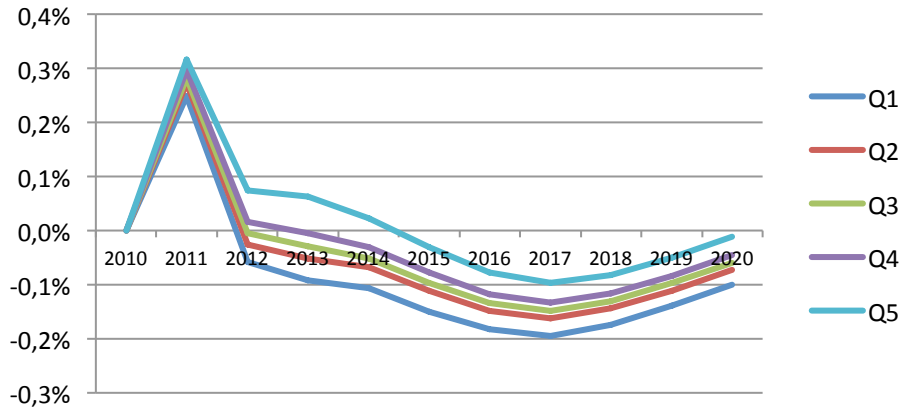


Cons.: Change from Baseline–Carbon tax

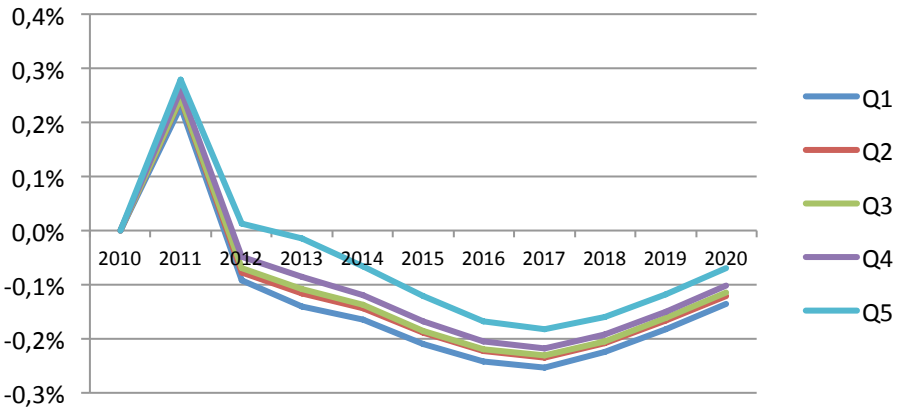


Household income

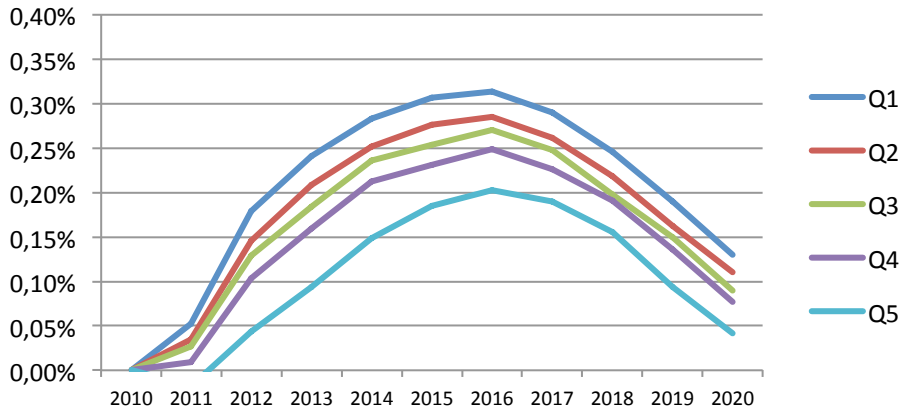
Real income by income quintile: %Change from Baseline – A3



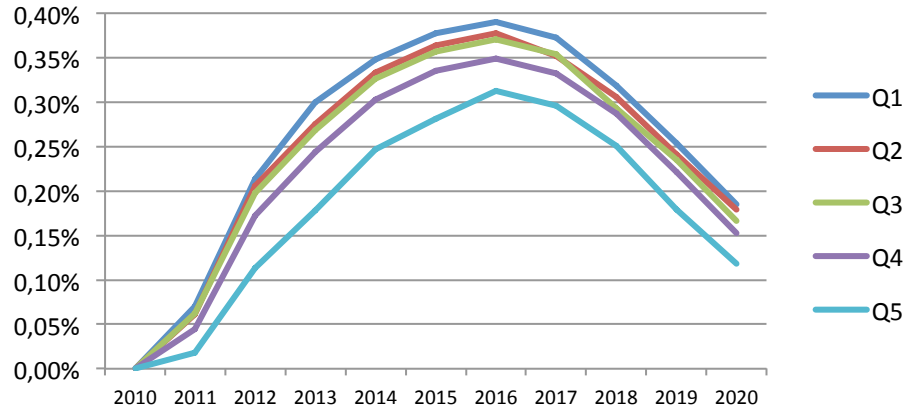
Real income by income quintile: %Change from Baseline - Carbon tax



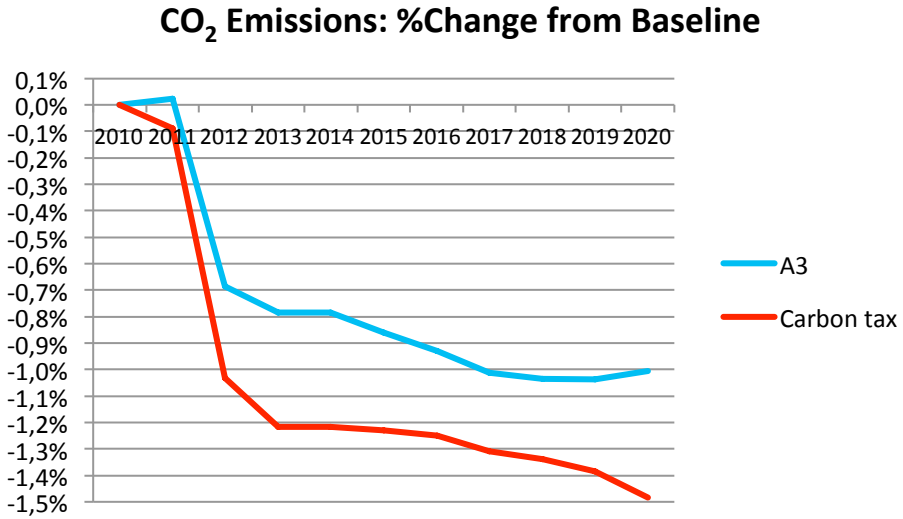
CPI by income quintile: %Change from Baseline – A3

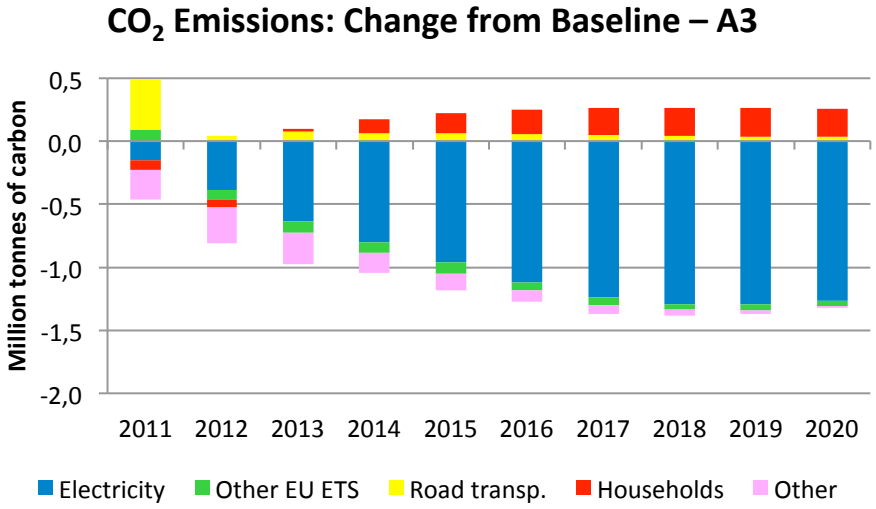


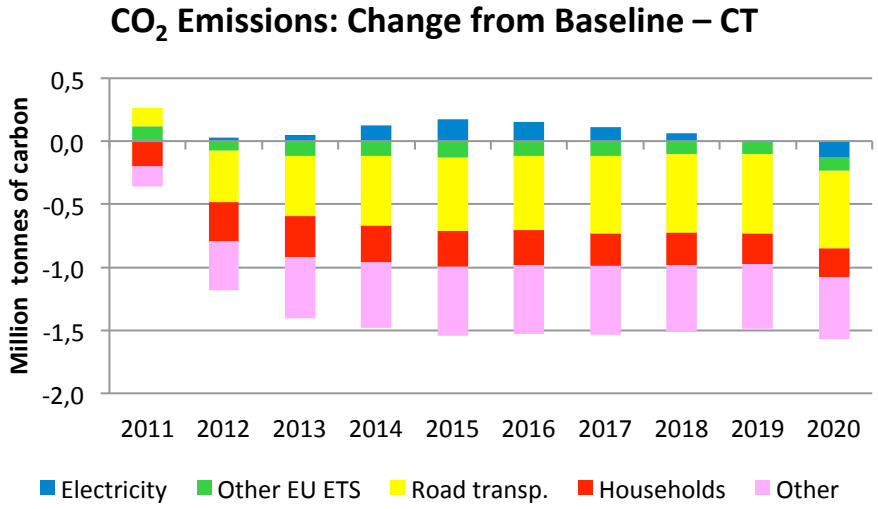
CPI by income quintile: %Change from Baseline – Carbon tax



CO_2 Emissions

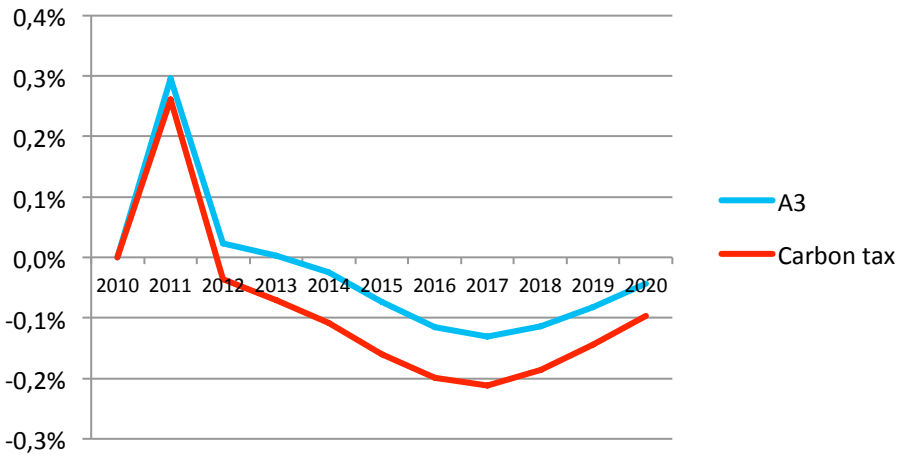




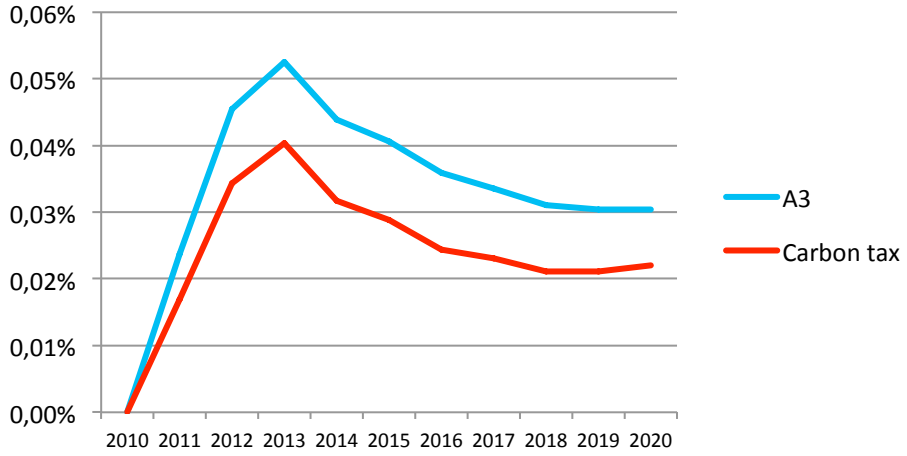


So, ultimately....

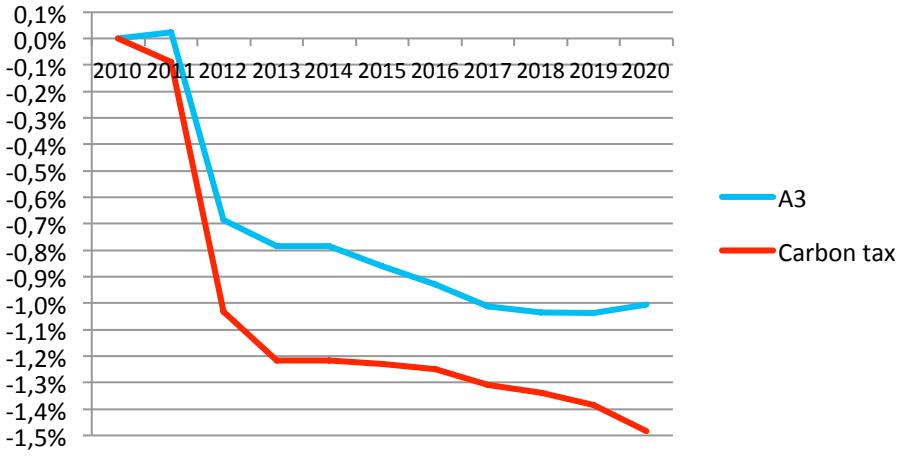
Household income: %Change from Baseline



Gini coefficient: %Change from Baseline



CO_2 Emissions: %Change from Baseline



Conclusions

Replacement of the A3 with a carbon tax in the non-ETS sector would be both more equitable and effective at reducing emissions, but would also be more inflationary.

What should the Government do?

There is a binding target for emissions reduction in the non-ETS sector: a carbon tax is what you need there.

Earmarking the revenues to replace the A3 guarantees a distributional improvement on the current situation.

Perhaps, not the most efficient use of carbon revenues? Yet, surely a remedy to something that needs a fix: the financing of public goods through most regressive taxation.