CARBON TAXATION IN THE WORLD

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Carbon taxes and climate policy in AR5

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Carbon taxes and climate policy in AR5

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Carbon taxes and climate policy in AR5

- Chapter 15 (National and subnational policies): effective in practice, attractive instruments, less applications than expected, important role of non-explicit carbon taxes, difficulties for empirical assessment
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Issues for actual implementation

- Tax base: potentially most GHG emissions, carbon emissions; product; upstream/downstream; the role of exemptions (competitiveness, interactions, etc.)
- Tax rate: Pigouvian approach; exogenous target; evolution
- Revenues: Budget; earmarked; revenue-neutral
- Jurisdictional allocation

- Border tax adjustments
- Carbon taxes and pre-existing energy taxes

Issues for actual implementation

- Three generations of green tax reforms:
  - Scandinavian model (1990s): Carbon taxes and income taxation
  - German model (2000s): Energy taxes and labour taxes
  - New approaches (2008-): Variable recycling

- Assessing carbon taxes and GTRs:
  - Environmental effectiveness
  - Economic effects
  - Distribution

Experiences

- Finland (1990)
  - Fossil fuels
  - Tax rate: 35€/tCO2e (2013)
  - -4 million tCO2 between 1990-1998

- Netherlands (1990)
  - Mineral oil excises, energy taxes (heating & motor fuels), motoring (sales of motor vehicles, user taxes)
  - -(1.7-2.7) million tCO2 in 2000 (5% of emissions covered)

Experiences

- Norway (1991)
  - Gasoline, light and heavy fuel oil, and oil and gas in the North Sea
  - Tax rate: 4.69 $/tCO2e (2013)
  - The tax cover approximately 68% of Norway's CO2 emissions

- Sweden (1991)
  - Natural gas, gasoline, coal, light and heavy fuel oil, LPG, heating oil
  - Tax rate: 168 $/tCO2e (2014)
  - -15% CO2 emissions between 1990-1995

Experiences

- Denmark (1992)
  - Fossil fuels
  - Tax rate: 31€/tCO2e (2014)
  - -15% carbon emissions per capita between 1990-2005

- Costa Rica (1997)
  - Fossil fuel
  - Tax rate: 3,5% of the market value of fossil fuels
  - Payment for Environmental Services program

Experiences

- United Kingdom (2001)
  - Natural gas, coal, electricity and LPG
  - Tax rate: 15.75 $/tCO2e (2014)
  - Carbon price floor (2013) on fossil fuels used to generate electricity

- Boulder, Colorado (2007)
  - Electricity
  - Revenues: climate action plan that pomotes energy efficiency, renewable energy, and reductions in vehicle miles traveled

Experiences

- Quebec (2007)
  - Gasoline, diesel, propane and coal
  - Green fund which supports reductions in GHG emissions and improvements to public transportation

- British Columbia (2008)
  - Transportation fuels, natural gas, fuels used in industrial processes
  - Tax rate: 30 Canadian $/tCO2e (2012)

Experiences

- Switzerland (2008)
  - Fossil fuels (except transportation fuels)
  - Tax rate: 68$/tCO2e (2014)
  - Lump-sum transfers, funding renovation and insulation of buildings

- Ireland (2010)
  - All energy products except electricity
  - Tax rate: 20 €/tCO2e (2013)
  - Fiscal consolidation

Experiences

- Iceland (2010)
  - Liquid fossil fuels
  - Tax rate: 10€/tCO2e (2014)
  - 75% EU ETS price

- Australia (2012)
  - Coordinated energy-environmental taxes and ETS
  - Revenues: income tax cuts, protecting industrial competitiveness, funding renewable and energy efficiency investments, R&D
  - Abolished in 2014

Experiences

- Japan (2012)
  - Fossil fuels
  - Tax rate: 2 $/tCO2e (2014)

- Mexico (2012)
  - Fossil fuels sales and imports
  - Additional amount of emissions relative to natural gas emissions
  - Tax rate: 10-50 Mex$/tCO2e (2014)

Experiences

- France (2014)
  - Household use of gas, heating oil and coal (transport fuels in 2015)
  - Tax rate: 7€/tCO2e (2014)
  - Revenues: funding energy transition

- South Africa (2016)
  - Fuel input tax
  - Tax rate: 120 Rand/tCO2e (2016)
  - 10% per year increase until 2019

Experiences

COUNTRY	CHARACTERISTICS
Finland (1990)	Tax rate: 35€/tCO2e (2013) Fossil Fuels
Netherlands (1990)	Mineral oils, energy, motoring -5% emissions covered in 2000
Norway (1991)	Tax rate: 4.69$/tCO2e (2013) Gasoline, light & heavy fuel oil, oil & gas in the North Sea
Sweden (1991)	Tax rate: 168$/tCO2e (2014) NG, gasoline, coal, light & heavy fuel oil, LPG, heating oil
Denmark (1992)	Tax rate: 31$/tCO2e (2014) Fossil fuels
Costa Rica (1997)	Tax rate: 3,5% of market value of fossil fuels Payment for Environmental Services program
United Kingdom (2001)	Tax rate: 15.75$/tCO2e (2014) NG, coal, electricity and LPG
Boulder, Colorado (2007)	Electricity Promotion energy efficiency, renewable energy, reduction in VMT
Quebec (2007)	Gasoline, diesel, propane and coal Green fund to reductions in GHG and improvements to public trans.
British Columbia (2008)	Tax rate: 30 Canadian $/tCO2e(2012) Transportation fuels, NG, fuels used in industrial processes
Switzerland (2008)	Tax rate: 68$/tCO2e (2014) Fossil fuels (except transport fuels)
Ireland (2010)	Tax rate: 20€/tCO2e (2013) All energy products except electricity
Iceland (2010)	Tax rate: 10€/tCO2e (2014) Liquid fossil fuels
Australia (2012)	Coordinated energy-environmental taxes and ETS Abolished in 2014
Japan (2012)	Tax rate: 2$/tCO2e (2014) Fossil fuels
Mexico (2012)	Tax rate: 10-50 Mex$/tCO2e (2014) Fossil fuels sales and imports
France (2014)	Tax rate: 7€/tCO2e (2014) Household use of gas, heating oil and coal (transport fuels in 2015)
South Africa (2016)	Tax rate: 120 Rand/tCO2e (2016) Fuel input tax

Experiences

Table 2. Overview of Carbon Tax Policies

Country/ Jurisdiction	Start Date	Tax Rate ($USD unless noted otherwise)	Annual Revenue	Revenue Distribution
Finland	1990	$30/metric ton CO_2 (€20)	$750 million (€500 million)	Government budget; accompanied by independent cuts in income taxes
Netherlands	1990	~$20/metric ton CO_2 in 1996	$4.819 billion[a] (€3.213 billion)	Reductions in other taxes; Climate mitigation programs
Norway	1991	$15.93 to $61.76/metric ton CO_2 (NOK 89 to NOK 345)	$900 million (1994 estimate)	Government budget
Sweden	1991	Standard rate: $104.83/metric ton CO_2 (910 SEK) Industry rate: ~$23.04/metric ton CO_2 (~200 SEK)	$3.665 billion (25 billion SEK)	Government budget
Denmark	1992	$16.41/metric ton CO_2 (90 DKK)	$905 million	Environmental subsidies and returned to industry
United Kingdom	2001	$0.0078/kWh for electricity; $0.0027/kWh for natural gas provided by gas utility; $0.0175/kg for liquefied petroleum gas or other gaseous hydrocarbons supplied in a liquid state; and $0.0213/kg for solid fuel	$1.191 billion (£714 million)	Reductions in other taxes
Boulder, CO	2007	$12-13 per metric ton CO_2	$846,885	Climate mitigation programs
Quebec	2007	$3.20 per metric ton of CO_2 (C$3.50)	$191 million (C$200 million)	Climate mitigation programs
British Columbia	2008	$9.55 per metric ton of CO_2 in 2008 (C$10), increasing $4.77 (C$5) annually to $28.64 (C$30) in 2012	$292 million (C$306 million)	Reductions in other taxes
BAAQMD, California	2008	$0.045 per metric ton of CO_2e[b]	$1.1 million (expected)	Climate mitigation programs
France	proposed	$24.74 per metric ton of CO_2 (€17)	$4.499 billion (€3 billion) expected	Reductions in other taxes
CARB, California	proposed	$0.155 per metric ton CO_2e in FY 2010-11, dropping to $0.09 per metric ton CO_2e in 2014	$63.1 million 2010-2013; $36.2 million starting in 2014, expected	Climate mitigation programs

[a] Revenue in the Netherlands is from all environmentally related taxes, of which carbon taxes are the clear majority.
[b] CO_2e is carbon dioxide equivalent.

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Sumner et al. (2009)

Evaluating experiences

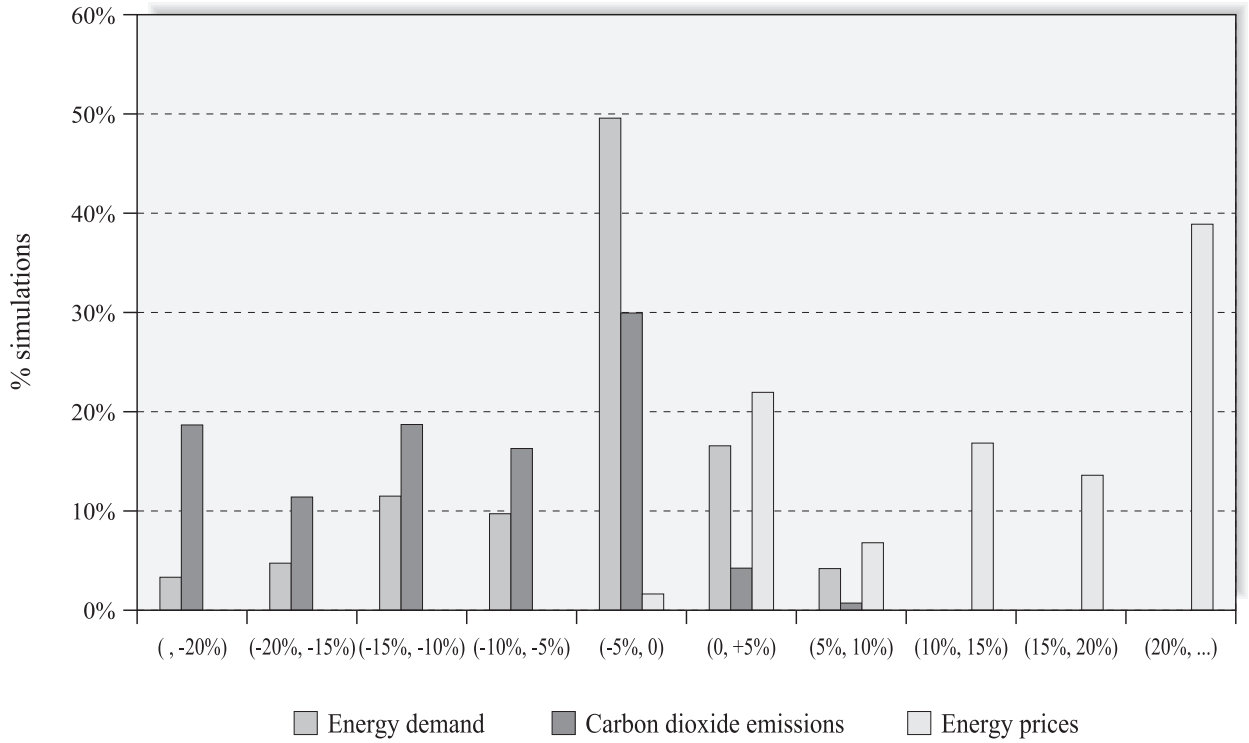

Figure 4. Effects of energy taxes on energy demand, energy prices and CO_2 emissions

Source: The authors from the empirical literature

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Gago et al. (2014)

Evaluating Experiences

Table 6. Estimated Emissions Reductions in Jurisdictions with Carbon Taxes [a]
Unless otherwise noted, decreases in emissions represent total emission reductions, not emission reductions that are due to a carbon tax.

Jurisdiction	Start Date	Change in CO_2 Emissions	Source
Finland	1990	Emissions were 7% lower in 1998 than they would have been without a tax.	Prime Minister's Office, Finland (2000)
Netherlands	1990	Emissions were expected to be reduced by 1.7 to 2.7 million metric tons $C0_2$ annually in 2000. In covered sectors, emissions were expected to be reduced by approximately 5%.	Netherlands Ministry of Housing, Spatial Planning and the Environment (n.d.)
Norway	1991	Emissions increased by 15%—and GDP increased 70%—from 1991 to 2008.	Abboud (2008)
Sweden	1991	Emissions were reduced by about 15% from 1990 to 1996 because of the carbon tax. Emissions decreased by 9% from 1990 to 2006. Emissions decreased by more than 40% from the mid-1970s to 2008.	Johansson (2000) Ministry of the Environment, Sweden (2008)
Denmark	1992	Emissions decreased by 15% per capita from 1990 to 2005.	Prassad (2008)
United Kingdom	2001	Emissions decreased by more than 58 million metric tons CO_2 from 2001 to 2005. Emissions are expected to be reduced by 12.8 million metric tons CO_2 per year (15% of commercial and public sector energy demand) in 2010 because of the Climate Change Levy.	Cambridge Econometrics (2005) cited in Her Majesty's Treasury (2008:101)
Boulder, CO	2007	Emissions in 2007 and 2008 decreased from 2006 levels. Greatest reductions due to programs funded by the carbon tax: • Renewable energy activities (60,000 metric tons CO_2e) • Transportation (33,000 metric tons CO_2e) • Energy efficiency (6,700 metric tons CO_2e)	City of Boulder (2009b
Quebec	2007	Emissions were expected to be reduced by 11.2 million metric tons $C0_2$ by 2012 due to the carbon tax.	Quebec (2008)
British Columbia	2008	GHG emissions were expected to be reduced emissions by up to 3 million metric tons CO_2 annually in 2020 due to the tax.	Ministry of Finance, British Columbia (2008)

[a] BAAQMD implemented a carbon tax in 2008 and is tracking data but has not issued a report. France and CARB each proposed but have not implemented a program.

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Sumner et al. (2009)

Evaluating experiences (ex post)

- Martin et al (2014). Climate change levy UK. Strong negative impact on energy intensity and use of electricity
- Vollebergh (2008). Energy tax reform in Netherlands. Considerable amount of environmental tax revenue
- Lin and Li (2011). Northern European carbon taxes. Stronger effectiveness of the Finish tax due to exemptions in other countries
- Rivers and Schaufele (2014). Carbon tax BC. No competitiveness effects on agricultural products

Evaluating experiences (ex post)

- Bruvoll & Larsen (2004). Carbon tax Norway. Reduction of emissions per unit of GDP, but limited in comparison to other factors
- Hammar et al (2013). Sweden's CO2 tax. Major impact on fuels used for heating purposes.
- Johansson (2000). Carbon tax Sweden. Reduction in emissions due to tax reform, increase of biomass use
- Bohlin (1998). Idem

Conclusions

- Carbon taxes: a preferred policy instrument for climate policies
- Easy to implement
- Several, heterogeneous, and limited applications
- Modest effects

- Importance of energy taxation…

Conclusions

In some countries, tax-based policies specifically aimed at reducing GHG emissions—alongside technology and other policies—have helped to weaken the link between GHG emissions and GDP (*high confidence*)**.** In a large group of countries, fuel taxes (although not necessarily designed for the purpose of mitigation) have effects that are akin to sectoral carbon taxes [Table 15.2]. The demand reduction in transport fuel associated with a 1 % price increase is 0.6 % to 0.8 % in the long run, although the short-run response is much smaller [15.5.2]. In some countries revenues are used to reduce other taxes and/or to provide transfers to low-income groups. This illustrates the general principle that mitigation policies that raise government revenue generally have lower social costs than approaches which do not. While it has previously been assumed that fuel taxes in the transport sector are regressive, there have been a number of other studies since AR4 that have shown them to be progressive, particularly in developing countries (*medium evidence, medium agreement*). [3.6.3, 14.4.2, 15.5.2]

IPCC (2014) Summary for Policymakers, AR5

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