An International Comparison of Energy Taxation in 2015

In modern economies across the globe, energy use is of crucial importance to production and consumption. A central socio-economic issue is that of limiting the detrimental environmental effects of energy use whilst ensuring sufficient and stable energy supplies. In this respect, price signals are central to economic agents' efficient decision-making, since their behaviour is influenced strongly by energy taxation, which ideally leads them to internalise the negative external effects of energy use. Thus, it is our goal in this report to analyse differential energy taxations and their effects on the respective economies.

In order to do so, we consider a sample of 41 countries comprising the OECD countries as well as selected economic partners. These countries account for 80 percent of global energy use, with China being the most prominent and the US the second most prominent user. A rising trend can be seen in the percentage share of global energy use taken up by the emerging economies: Chinese energy use is forecasted to rise from 19 percent in 2013 to 28 percent in 2030 and 29 percent in 2050. This is partly due to the growing use of transport energy. The OECD countries' shares of world energy use, however, are likely to decline from 62 percent in 2013 to 49 percent in 2030 and 43 percent in 2050 (OECD 2015).

Although countries pursue a common goal of pricing in negative effects to use resources efficiently and to provide incentives to search for alternative cleaner technologies, their taxation policies differ considerably in terms of the tax levels for different energy sources and uses. Comparing taxation in terms of GJ (Gigajoule) allows us to draw conclusions on taxation in terms of energy value, whilst a comparison of taxation with regard to CO2 enables us to focus on the social cost of carbon emissions, one of the goals of energy taxation. As can be seen from the DICE table on "Energy taxation" (DICE Database 2016), the overall economy-wide level of energy taxation ranges from EUR 0 per GJ (Gigajoule) and tonne CO2 in Indonesia and Russia to EUR 6.58 per GJ in Luxembourg and EUR 107.3 per tonne CO2 in Switzerland. The highest effective tax rates are found in EU countries. These countries' energy taxation policies are significantly shaped by the EU Energy Tax Directive, implementing minimum rates for energy taxation. Chinese and American energy taxation are comparatively low at EUR 0.31 per GJ and EUR 3.4 (China) and EUR 4.83 (US) per tonne of CO2. This is in line with these countries' high share of world energy use, thus indicating that their low effective tax rates on energy use incentivise a high use of resources. Generally, countries with a higher level of GDP per capita tend to use more energy per capita and to tax energy use at higher effective rates.

However, we can observe common patterns across our sample countries from Table 1 and 2, which show weighted average effective tax rates on energy by fuel type and use in energy and carbon terms. On average, one unit of energy is taxed at EUR 1.1 per GJ and EUR 14.8 per tonne of CO2, but these values vary for energy from different fuels and for different users. Transport energy is taxed more highly than energy derived from other fuels. As opposed to average values, for transport energy average, effective tax rates are EUR 5 per GJ and EUR 70.1 per tonne of CO2. The reason for this lies in the broader range of policy goals that governments typically attach to taxing transport energy, as well as revenue purposes. Many governments want to use revenues from transport energy taxation for infrastructure and aim to internalise the externalities from transport

Table 1

Weighted average effective tax rates on energy by fuel type and use (EUR per GJ)

Effective tax rates on fuels (EUR per GJ)		Oil products	Coal & peat	Natural gas	Biofuels & waste	Renewables & nuclear	All fuels
	% of base	27%	34%	20%	9%	11%	100%
Transport use	18%	5.20	0.00	0.12	3.74	0.00	4.96
Heating & process use	42%	0.82	0.05	0.21	0.00	0.00	0.26
Electricity production	40%	0.50	0.13	0.43	0.65	0.38	0.27
Total use	100%	3.52	0.10	0.28	0.30	0.38	1.11

Source: Adopted from OECD (2015).

Table 2

Weighted average effective tax rates on CO2 emissions from energy use by fuel type and use (EUR per tonne CO2)

Effective tax rates on fuels (EUR per tonne CO2)		Oil products	Coal & peat	Natural gas	Biofuels & waste	All fuels
	% of base	26%	46%	15%	13%	100%
Transport use	17%	72.89	0.00	2.13	51.84	70.05
Heating & process use	48%	11.60	0.48	3.75	0.01	3.07
Electricity production	35%	6.87	2.31	5.85	16.36	3.37
Total use	100%	49.32	1.58	4.37	3.61	14.78

Source: Adopted from OECD (2015).

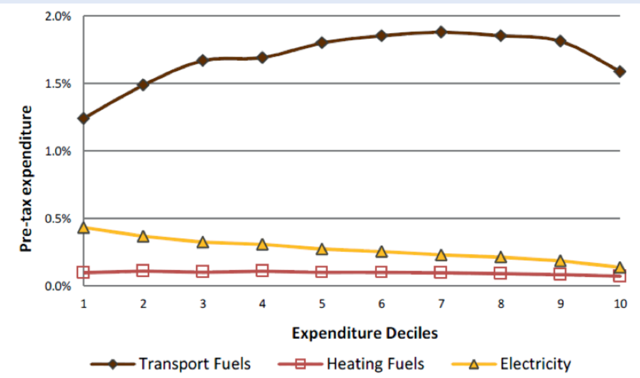
other than carbon emissions, e.g. congestions, accidents and noise. Heating and process energy, as well as energy used for electricity generation, are typically taxed at lower effective rates, with similar average values in energy and carbon terms. We observe a weighted average of EUR 0.3 per GJ and EUR 3.1 per tonne of CO2 (OECD 2015).

In addition, there are different weighted average effective tax rates for different fuels. Oil is more heavily taxed than other energy sources, mainly because oil accounts for a dominant share of energy for transport uses. However, very high effective tax rates are also seen for energy derived from oil in other categories. Other fossil fuels are often untaxed or taxed at very low effective rates. Natural gases, biofuels and waste are typically taxed at lower effective rates of EUR 0.3 per GJ and EUR 4.4 and EUR 3.6 per tonne of CO2. Energy derived from coal shows the lowest effective tax rates in both energy and carbon terms. On average, coal in the heating and process category shows the lowest rates (OECD 2015).

On the whole, these common taxation trends are evaluated by the OECD (2015) as not being in line with effective environmental taxation. Taxes on energy use for heating and process energy, as well as taxes on the energy used to generate electricity, are generally too low to reflect and price in the negative environmental effects, especially for highly polluting energy sources such as coal (OECD 2015). In addition, even though taxes on road transportation are sufficiently high, they often fail to reflect the differential effects of energy use on pollution that arise through differences in time such as rush hours versus night, and geographical differences such as urban versus rural areas. Furthermore, many governments in our sample pursue counteracting policy measures such as tradable carbon permits systems and differential rates of value added taxes. Even though governments' awareness of this issue has increased and many of them are reconsidering price signals and taxes on harmful forms of energy use, it is clear that current energy taxation policies still leave considerable scope for improvement (OECD 2015).

Figure 1

Average taxes on energy carriers as % of net pre-tax expenditure (21-country averages)



Source: Adopted from Flues and Thomas (2015).

The question that arises is why governments have often been reluctant to implement more effective energy taxation in the past. Firstly, governments face two opposing policy goals: economic growth and environmental protection, of which economic growth is often the more popular one. In addition, energy taxation comes along with distributional effects and the concern that the poor might be hit harder by taxation than the rich, i.e. that energy taxation is regressive. Across a sample of 21 OECD countries, we see that distributional effects differ by energy carrier, as shown in

Figure 1. Taxes on transportation fuels are not regressive on average; but this is heterogeneous across countries with some facing progressive and others facing proportional taxation. By contrast, taxation on heating fuels and electricity is slightly regressive. These results are dependent on socio-demographic characteristics: Larger households and households in rural areas spend larger shares of their expenditure on energy taxation, while households with a household head who is older than 60 years spend a lower share of their expenditure on energy taxation (Flues and Thomas 2015).

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