

Kalinowska, Dominika; Keser, Kerim; Kunert, Uwe

Article

CO2 Based Taxation on Cars Is Rising in Europe

Weekly Report

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Weekly Report

CO₂ Based Taxation on Cars is Rising in Europe

In recent years, CO₂ emissions have become the leading basis of assessment for car taxes in most European countries. In July 2009, with a view to pursuing climate policy goals, also Germany began using this factor to assess taxation on cars. The DIW Berlin has carried out a systematic and quantitative comparison of car taxation in Europe.¹ The results reveal high tax rates in over ten countries that levy CO₂ based tax components and significant differences across vehicle segments. Other observations are periodic adjustments of the assessment basis with regard to fuel-consumption benchmarks.

The German reform of the annual vehicle tax (Kraftfahrzeugsteuer) in favour of assessment based on CO₂ emissions is weak compared to other countries—too weak to create incentives to buy more fuel efficient vehicles. Moreover, the revision in July 2009 was introduced too late, given that the CO₂ emissions of newly registered vehicles have been significantly decreasing since 2006 and given that the new EU directive on reducing the CO₂ emissions of cars will directly impact car manufacturers effective 2012.

Various duties and taxes on cars are an important source of tax revenue in Europe. Tax revenue from registration fees, ownership taxes, energy taxes and related value added tax accounts for up to 5% of GDP.² In addition to its significance for tax revenue, the taxation of ownership and use of cars is also increasingly designed to pursue environmental objectives. Whereas environmental objectives were initially pursued by promoting compliance with EU emission standards,³ the focus has now shifted to the promotion of fuel efficiency, and thus reduced emission of carbon dioxide.⁴ Following the reform of annual taxes for new cars implemented in July

¹ Including the 27 member states of the EU, Switzerland and Norway.

² See OECD Revenue Statistics, 2008 Edition, Paris: OECD.

³ In the process of type approval, motor vehicles must comply with the emission thresholds specified by EU directives, which have been gradually reduced in accordance with technically viable standards. Limits have been set on the permitted quantities of carbon monoxide, hydrocarbons, nitrogen oxides and particles (measured in grams per kilometre) emitted by passenger cars and light commercial vehicles for levels Euro 3 (as of 2000), Euro 4 (as of 2005), Euro 5 (2009) and Euro 6 (as of 2014), as well as on CO₂ measurement procedures. See Commission Directive 2003/76/EC and Regulation (EC) No. 715/2007 of the European Parliament and of the Council of 20 June 2007.

⁴ Among other gases, fuel combustion produces carbon dioxide or CO₂. The combustion of one litre of petrol produces approximately 2,380 grams of CO₂, while the combustion of one litre of diesel produces approximately 2,660 grams of CO₂. The terms "fuel consumption" (e.g., in litres per 100 kilometres) and "CO₂ emissions" (e.g., in grams per kilometre) can thus be used synonymously for both diesel and petrol.

Dominika Kalinowska
dkalinowska@diw.de

Kerim Keser
keser@web.de

Uwe Kunert
ukunert@diw.de

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Duties on cars in Europe—a systematic comparison

The initial duty payable in all European countries¹ on the purchase and first-time registration of a new car by private owners is value added tax (Table 1). Car owners also pay moderate fees in 22 countries and a registration tax in 19 countries.

All in all, at least twelve different factors serve as a basis for registration taxes in Europe. Moreover, these factors are combined in different ways.² The most frequently used factors are the car's purchase price, CO₂ emissions or fuel consumption, and cylinder capacity. Of the 19 countries that levy a registration tax, 15 directly take ecological aspects into consideration in their assessment basis.

In ten countries, registration tax is an ad valorem tax levied either on the car's net or gross price. In these countries (apart from Slovenia), the technical characteristics of the vehicle also influence the amount of tax, while in seven countries the vehicle's CO₂ emissions influence the registration tax. This charge is formulated as a specific tax in nine countries, i.e., it is directly based on technical characteristics. The annualized registration tax for a vehicle of the compact segment may amount up to approximately EUR 2,500 per year.³ In 22 countries, an administration fee of up to EUR 180 is charged upon the registration of a car.

Owners of registered cars pay periodic taxes in almost all countries under review. Only Estonia, Lithuania, Poland and Slovenia do not charge annual taxes on cars at all, whereas France, the Czech Republic and Slovakia do not charge private car owners with an annual tax.⁴

In Europe there are eight different factors of assessment for annual car taxes, which may be combined in a number of different ways. The annual car tax is in all countries a unit tax.⁵ Usually the engine type (Diesel or Petrol) or cylinder capacity are considered, while different tax schemes may apply to petrol and diesel-powered cars. Currently, fuel consumption or CO₂ emissions are considered for tax purposes in more than a third of the countries. The car's weight, and occasionally its age or the engine power may also be relevant. The annual tax schemes of six countries reward cars with low exhaust gas emissions. A vehicle of the compact segment is subject to annual car tax of up to EUR 1,200.

In addition, 21 of the countries under review levy taxes on third-party insurance. These tax rates can amount to over 40% of insurance premiums and are in some countries supplemented by parafiscal charges (Table 1). Only in Estonia, the Czech Republic and Poland privately owned cars are not subject to any periodic taxes.⁶

The taxes directly related to the use of motor vehicles include energy tax, other taxes on mineral oil and value added tax (Figure 1). In the countries analysed, the tax rate on unleaded petrol currently ranges between EUR 0.30 and EUR 0.70 per litre, compared to a range of EUR 0.25 and EUR 0.57 for diesel. In addition to energy tax, value added tax rates range from 7.6% in Switzerland to 25% in Denmark, Norway and Sweden (Figure 1). At current prices for unleaded eurosuper petrol,⁷ these taxes in total account for 48% to 69% of the final selling price. The equivalent proportion for taxes on diesel ranges between 43% and 66%.

¹ Defined as the 27 EU member states, Switzerland and Norway.

² In two countries, the technical characteristics of the vehicle (engine rating) are converted to create a modified basis of assessment (e.g. fiscal horsepower).

³ This corresponds to a one-off tax on registration of approximately 18,000 Euros.

⁴ In France, passenger cars with CO₂ emissions in excess of 250 g/km are subject to an annual charge.

⁵ The result of the "engine rating" is also taken into account in three countries in the calculation of road tax.

⁶ Apart from a nominal charge of 1 euro on insurance premiums in Poland.

⁷ As at 18.05.2009, or 24.04.2009 for Norway and Switzerland.

2009, the CO₂ emissions of vehicles have now also become a direct factor of assessment in Germany.⁵

In order to assess the components of the tax burden for cars, a systematic overview was performed with

respect to the types and amounts of duties levied on motor vehicles in Europe.⁶ We examined the 27 member states of the EU as well as Switzerland and Norway.⁷ The following duties are found in European countries:

⁵ See Deutscher Bundestag, Drucksache 16/11742, 16. Wahlperiode 27.01.2009, Entwurf eines Gesetzes zur Neuordnung der Kraftfahrzeugsteuer und Änderung anderer Gesetze (Draft law on the Restructuring of Annual Vehicle Tax and on the Amendment of Other Laws).

⁶ This report updates elements of previous studies carried out by the DIW on behalf of the German Federal Ministry of Finance and Volkswagen AG. The conclusions represent the opinions of the authors.

⁷ The abbreviations of the countries in the tables correspond to international licence-plate codes.

Table 1

Taxes on the Purchase, Registration, Ownership and Use of Private Cars in Europe

	International licence-plate code	Value added tax	Registration tax	Registration fee	Road tax	Insurance tax	Parafiscal charges on insurance premiums	Energy tax
		(in %)	(R resp. R-CO ₂)	(RF)	(RT resp. RT-CO ₂)	(RT resp. RT-CO ₂)	(in % resp. Euro)	(E)
Austria	A	20	R-CO ₂	RF	RT	11	–	E
Belgium	B	21	R-CO ₂	–	RT	9.25	17.85	E
Bulgaria	BG	20	–	RF	RT	–	–	E
Switzerland	CH	7.6	–	RF	RT	5	–	E
Cyprus	CY	15	R-CO ₂	RF	RT-CO ₂	5	1.71 Euro	E
Czech Republic	CZ	19	–	RF	–	–	–	E
Germany	D	19	–	RF	RT-CO ₂	19	–	E
Denmark	DK	25	R-CO ₂	RF	RT-CO ₂	42.9	14	E
Spain	E	16	R-CO ₂	RF	RT	6	3.3	E
Estonia	EST	18	–	RF	–	–	–	E
France ¹	F	19.6	R-CO ₂	RF	RT-CO ₂	18	15.6	E
Finland	FIN	22	R-CO ₂	–	RT	22	–	E
Great Britain ²	GB	17.5	–	RF	RT-CO ₂	5	–	E
Greece	GR	19	R	–	RT	10	8	E
Hungary	H	20	R	–	RT	–	1.5	E
Italy	I	20	R	RF	RT	12.5	12.85	E
Ireland	IRL	21.5	R-CO ₂	–	RT-CO ₂	2	1 Euro	E
Luxembourg	L	15	–	RF	RT-CO ₂	4	–	E
Lithuania	LT	19	–	RF	–	15	–	E
Latvia	LV	21	R	RF	RT	–	–	E
Malta	M	18	R-CO ₂	–	RT-CO ₂	10	–	E
Norway	N	25	R-CO ₂	RF	RT	–	–	E
Netherlands	NL	19	R-CO ₂	RF	RT-CO ₂	7.5	–	E
Portugal	P	20	R-CO ₂	RF	RT-CO ₂	9	4.95	E
Poland	PL	22	R	RF	–	–	1 Euro	E
Romania	RO	19	R-CO ₂	RF	RT	–	2	E
Sweden	S	25	–	RF	RT-CO ₂	32	–	E
Slovakia	SK	19	–	RF	–	8	–	E
Slovenia	SLO	20	R	–	–	6.5	–	E

Status: May 2009.

R: Registration tax.

R-CO₂: CO₂ based registration tax.

RT: Road tax.

RT-CO₂: CO₂ based road tax.**1** Only cars with CO₂ emissions exceeding 250 g/km are subject to an annual tax (RT).**2** Value added tax has been temporarily reduced to 15%.

Sources: ACEA; CEA; European Commission.

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- one-off duties related to the purchase and registration of vehicles (value added tax, registration tax, registration fees),
- duties imposed periodically in relation to ownership and tenure of vehicles (road tax⁸, insurance tax),
- duties that arise in relation to the use of vehicles (energy tax, value added tax).⁹

8 Hereafter, "road tax" will be used as a synonym for "annual car tax" and "annual vehicle tax".**9** These duties do not include avoidable charges related to use (e.g., tolls and parking fees).

Substantial variation in the tax burden across Europe

The most important market segment for passenger vehicles in Germany is the “compact segment”, which accounts for almost one million newly registered vehicles per year, or a quarter of all new registrations.¹⁰ Considering all cars, the compact market segment accounts for one third of the EU market. Our calculations have been based on the Volkswagen Golf, which is the car with the highest number of registrations for both diesel and petrol engines.

We calculated the average annual taxes and duties of the Golf, based on the taxes incurred over a four year period, assuming a car remains in the possession of its first owner for that period.¹¹ The one-off taxes on purchase and registration are amortised over the first four years in proportion to the car’s average depreciation.¹² The price differential for new cars across the various countries is taken into account in the calculation of value added and registration tax.¹³

Germany in the middle range for taxes on petrol-powered cars in the European comparison

Based on the Golf with petrol engine and assuming 15,000 kilometres travelled per year, the average amount of tax paid per year in the first four years ranges from EUR 850 in Romania to EUR 4,600 in Denmark. The eight countries with the highest tax burden have high registration taxes in common (Table 2 and Figure 2). For example, the registration tax accounts for half of the total tax burden in Norway and for almost 60% of the tax burden in Denmark. Registration tax is the component that shows the widest variation across the 29 countries under review. By contrast, the amounts of the value added tax on car purchases are much more similar.

¹⁰ The statistics released by the Kraftfahrt-Bundesamt (German Federal Motor Transport Authority) break the passenger car market down into eleven segments; see Kraftfahrt-Bundesamt, Fahrzeugzulassungen—Jahr 2008, Flensburg 2009.

¹¹ Temporary tax concessions, such as those currently granted in Germany for Euro 5 diesel cars, are not taken into account.

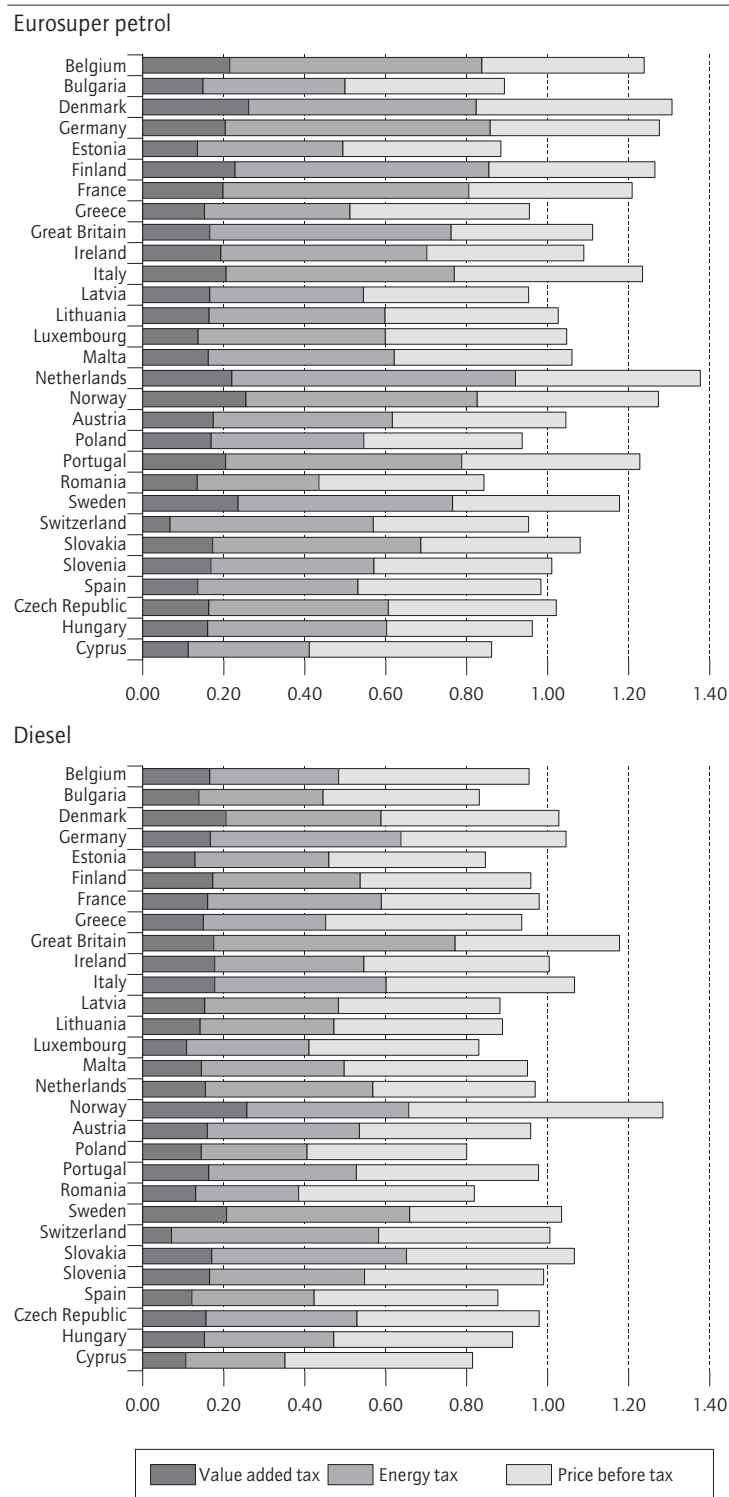
¹² Where a registration or transfer tax is levied on additional changes of ownership, the full amount of tax imposed is attributed to the first owner. Recurrent registration or licensing fees are also attributed to the first owner. In order to calculate the tax burden, additional data related to the vehicle as well as other information and assumptions are required; including: technical specifications of the vehicle, average fuel consumption, cost of insurance premium, depreciation in value over four years following first-time registration, fuel prices, and annual mileage.

¹³ See the European Commission’s periodic press releases: <http://ec.europa.eu/competition/>.

Figure 1

Price Components of Fuel in Europe

in Euro per litre



Sources: European Commission; DIW Berlin calculations.

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Annual taxes on privately owned cars also vary significantly. There is no annual tax in seven of the countries under review, while the remainder of the

Table 2

Comparison of Car Taxes Across Europe—Golf 1.6 petrol engine¹

in Euro per annum

	Total charges	of which:						therein:
		Registration tax ²	Value added tax on purchase price ²	Road tax	Tax on insurance premium	Energy tax	Value added tax on mineral oil	CO ₂ related duties ² not incl. energy tax
Austria	1,690	210	440	340	50	470	190	200
Belgium	2,260	590	430	240	110	660	230	560
Bulgaria	1,110	20	380	180	0	370	160	0
Switzerland	1,240	40	160	410	20	530	70	0
Cyprus	1,050	210	280	100	20	320	120	50
Czech Republic	1,070	10	410	0	0	470	170	0
Germany	1,520	10	400	120	80	700	220	90
Denmark	4,600	2,650	440	410	230	600	280	1,420
Spain	1,270	210	310	140	40	420	140	190
Estonia	900	40	330	0	0	380	140	0
France	1,510	110	410	0	140	650	210	110
Finland	2,090	560	400	130	90	670	240	560
Great Britain	1,390	10	350	200	20	630	180	200
Greece	1,550	370	350	200	70	380	160	0
Hungary	1,290	240	370	30	10	470	170	0
Italy	1,630	110	400	200	100	600	220	0
Ireland	2,670	1,040	430	450	10	540	210	1,480
Luxembourg	1,110	30	300	120	20	490	150	120
Lithuania	1,050	0	350	0	60	460	170	0
Latvia	1,100	110	390	20	0	400	180	0
Malta	2,140	910	350	180	40	490	170	860
Norway	3,360	1,590	580	310	0	610	270	640
Netherlands	2,620	670	380	560	30	750	230	680
Portugal	1,980	540	400	140	60	620	220	340
Poland	1,110	80	450	0	0	400	180	0
Romania	840	10	350	10	10	320	140	10
Sweden	1,540	0	470	130	130	560	250	90
Slovakia	1,180	20	400	0	30	550	180	0
Slovenia	1,160	140	390	0	30	430	180	0

Status: May 2009, rounded figures.

¹ Assumptions: 15,000 km travelled per year; fuel consumption 7.1 l/100 km.² First time registration of a new car, average duties per year.

Sources: ACEA; ADAC; CEA; European Commission; DIW Berlin calculations.

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countries charges up to approximately EUR 550 per year. Similarly, insurance tax varies substantially across countries and may amount to approximately EUR 200. Assuming an average of 15,000 kilometres travelled per year, energy tax is the highest levy in 25 of the 29 countries. This tax varies between approximately EUR 300 in Cyprus and EUR 750 in the Netherlands under the assumptions listed above. Energy tax in Germany amounts to almost EUR

700, which places Germany among the countries with the highest duties.

The sixth and final component of vehicle-related taxation is value added tax on fuel. Value added tax accounts for a greater share of the total tax burden than annual car tax in almost two thirds of the 29 countries.

The amount of total tax paid in each country is illustrated in Figure 2, which shows that in more than half of the 29 countries, the average annual tax burden ranges between approximately EUR 1,000 and EUR 1,700. Figure 2 further demonstrates that registration tax determines the position of the more expensive countries in the European comparison.

In relation to taxes levied on the purchase and ownership of cars, Germany is the third cheapest country in Western Europe, after Luxembourg and Great Britain, while the tax burden on fuel consumption in Germany is similarly high only in Belgium, Norway and Finland, and only higher in the Netherlands. Germany's total tax burden ranks in the middle in the European comparison. Specifically, 16 countries impose lower taxes, while twelve countries levy (in some cases significantly) higher taxes.

The differences between the countries also depend on the type of car. If the analysis is extended to include several car segments (assuming the same kilometres travelled per year) there is very little change in the ranking of the countries. It is worth noting that total taxes paid in Germany become relatively lower, compared to other countries, as car-size increases. While Germany is one of the more expensive countries in the "mini" segment, the amount of tax paid for a car in the luxury segment is relatively low.

Taxes generally lower for diesel-powered cars

Because of its major importance in the transport industry, all countries except Switzerland and Great Britain tax diesel fuel at a lower rate than petrol. In many countries, the resulting tax benefit for cars with diesel engines is however offset by higher annual taxes. About ten of the 29 countries charge higher annual taxes for diesel-powered cars in the compact segment than for a comparable petrol-powered car, while five countries impose lower annual taxes.¹⁴ The tax savings, in terms of fixed costs of a petrol-powered car, is substantial in some countries and may amount to more than EUR 500 per year in the compact segment (Table 3 and Figure 2).

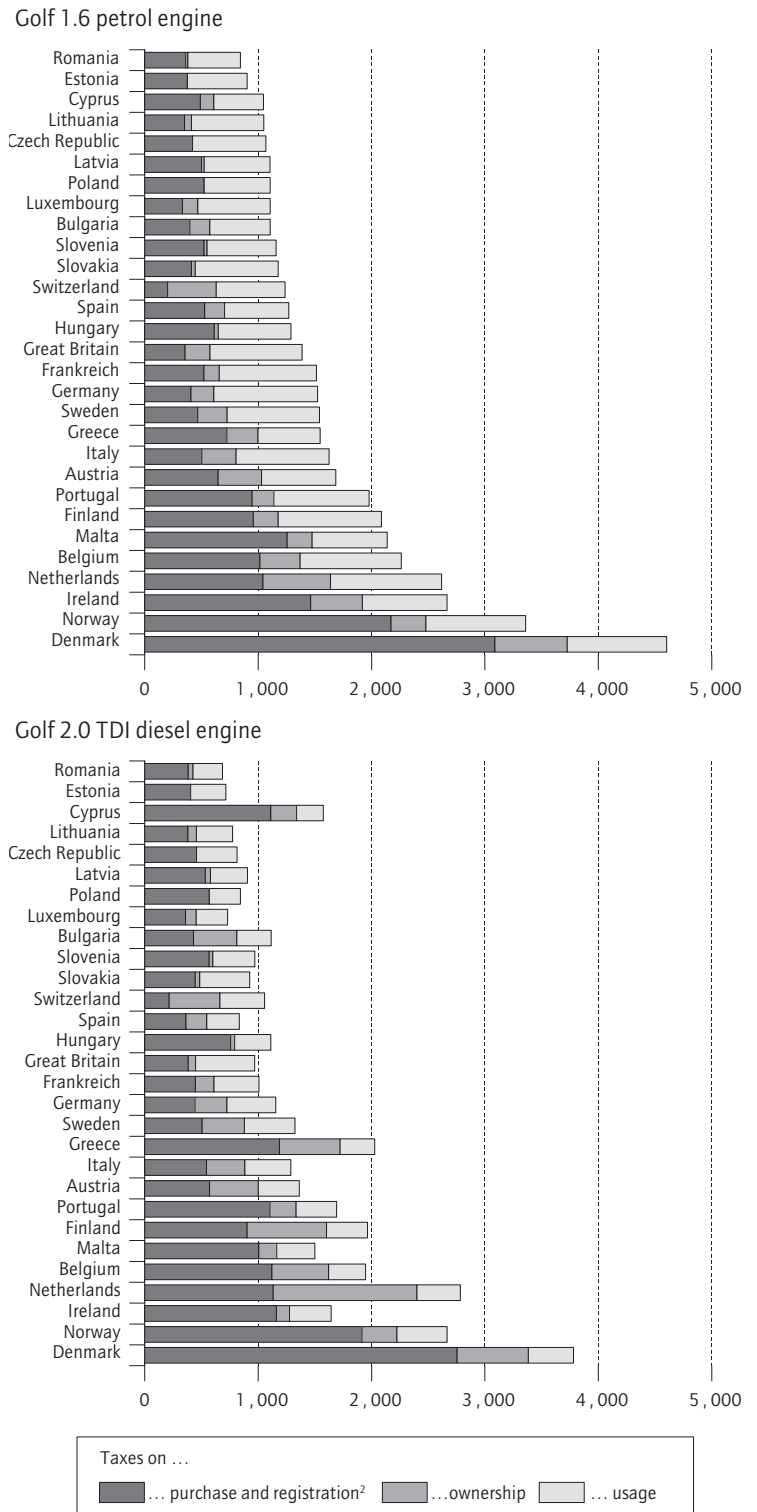
On the other hand, the average burden due to energy tax and value added tax on fuel purchases is always higher for cars with petrol engines than for diesel-powered cars because of the higher energy tax and a

¹⁴ Such comparisons are by nature, limited by the fact that despite identical car models, there are no identical petrol–diesel equivalents in relation to the technical characteristics of the vehicle. Further, the ranking of some countries in terms of total taxes is not significantly influenced by the engine type (diesel or petrol), but by registration and annual car taxes result from differences in cylinder capacity or engine power.

Figure 2

Comparison of Car Taxes across Europe—Compact Segment¹

in Euro per annum



¹ Assumptions: kilometres travelled per year 15,000; fuel consumption Diesel engine 4.5 l/100 km, Petrol engine 4.5 l/100 km.

² First time registration of a new car, average duties per year.

Sources: ACEA; ADAC; BMF; CEA; European Commission; DIW Berlin calculations.

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Table 3

Comparison of Passenger-Car Taxes Across Europe—Golf 2.0 TDI diesel engine¹

in Euro per annum

	Total charges	of which:						therein:
		Registration tax ²	Value added tax on purchase price ²	Road tax	Tax on insurance premium	Tax on insurance premium	Value added tax on mineral oil	CO ₂ related duties ² not incl. energy tax
Austria	1,360	110	460	380	50	250	110	90
Belgium	1,950	660	460	370	130	210	110	530
Bulgaria	1,110	20	410	380	0	210	90	0
Switzerland	1,060	40	170	420	20	340	50	0
Cyprus	1,580	800	310	200	30	170	70	0
Czech Republic	810	10	450	0	0	250	110	0
Germany	1,160	10	430	190	90	320	110	0
Denmark	3,780	2,280	480	350	280	260	140	1,200
Spain	830	20	340	140	50	200	80	0
Estonia	710	40	360	0	0	220	90	0
France	1,010	0	440	0	160	290	110	0
Finland	1,960	470	430	590	110	250	120	470
Great Britain	970	10	380	40	20	400	120	40
Greece	2,030	810	380	450	90	210	100	0
Hungary	1,110	350	410	30	10	220	100	0
Italy	1,290	110	430	210	120	290	120	0
Ireland	1,640	700	460	100	10	250	120	800
Luxembourg	730	30	330	70	20	200	70	80
Lithuania	770	0	380	0	70	220	100	0
Latvia	910	110	430	50	0	220	100	0
Malta	1,500	630	380	110	50	240	100	490
Norway	2,670	1,300	620	310	0	270	170	230
Netherlands	2,780	720	410	1,230	40	280	100	940
Portugal	1,690	660	440	160	70	250	110	240
Poland	840	80	490	0	0	180	100	0
Romania	690	10	380	30	10	170	90	0
Sweden	1,320	0	510	220	160	310	140	100
Slovakia	930	20	430	0	40	320	110	0
Slovenia	970	150	420	0	30	260	110	0

Status: May 2009, rounded figures.

¹ Assumptions: kilometres travelled per year 15,000; fuel consumption: 4.5 l/100 km.² First time registration of a new car, average duties per year.

Sources: ACEA; ADAC; CEA; European Commission; DIW Berlin calculations.

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higher level of fuel consumption. Assuming an average of 15,000 kilometres travelled per year, energy taxes alone are twice as high for petrol-powered cars as for diesel-powered cars in more than half of the countries, with differences ranging from EUR 200 to almost EUR 500.

The total relevant taxes show a lower burden (by up to approximately EUR 1,000) for vehicles equipped with diesel engines in the majority of the 29 countries.¹⁵ Only in four countries is the total tax burden on cars with diesel engines higher than for petrol-powered cars.

¹⁵ Given larger cylinder capacity and more power of the diesel engine.

However, this tax benefit also depends on the intensity of use of the vehicles, because fixed and variable charges vary across countries. Assuming an average usage between 10,000 kilometres and 20,000 kilometres per year, diesel cars are taxed lower in most countries.¹⁶ As diesel cars consume less fuel, they become in all countries more beneficial from a tax perspective as annual usage increases.

CO₂ taxation of cars widespread in Europe

For about the last ten years, the European Commission has been promoting initiatives to reduce carbon dioxide emissions of cars. The reduction of CO₂ emissions is intended to be achieved partly by tax measures; however the EU Commission's work towards a directive on the alignment of car taxes in the EU has ceased.¹⁷ Nonetheless, most European countries are changing their car taxation schemes autonomously to favour fuel efficient cars. Either CO₂ emissions or fuel consumption are now part of the assessment basis for taxation of cars in 17 countries. In Great Britain and Ireland, CO₂ emissions are in fact the only assessment basis for road taxes.

In the last twelve months alone, three European countries (D, M, RO) have changed the taxation of cars such that CO₂ emissions are part of the basis of assessment. France has introduced an annual tax for vehicles with particularly high emissions. During the same period, another eight countries (B, DK, FIN, NL, IRL, P, UK, N) revised their existing CO₂ based tax regimes by placing even greater emphasis on CO₂ emissions.

The countries that consider CO₂ emissions in the calculation of one-off duties related to the purchase and registration of vehicles include A, B, CY, DK, E, F¹⁸, FIN, IRL, M, N, NL, P and RO (Table 1). Eight countries (A, CY, E, FIN, IRL, M, P, RO) base the calculation of registration tax directly on CO₂ emissions or fuel consumption, whereas five countries (A, DK, F, N, NL) apply a bonus-malus system. Belgium offers a cash incentive of up to

EUR 4,540 when purchasing a vehicle with particularly low CO₂ emissions.

CO₂ based charges on vehicle registration vary substantially, amounting to up to EUR 1,000 per year in Denmark and Ireland for a Golf with petrol engine. Other countries impose lower charges on a Golf, in some cases even less than EUR 50.

Eleven countries (CY, D, DK, F, GB, IRL, L, M, NL, P, S) now consider CO₂ emissions or fuel consumption for purposes of road taxation. Great Britain and Ireland are the only countries that base the calculation of annual taxes exclusively on CO₂ emissions. France and Cyprus apply a bonus-malus system for this tax.

Recurrent CO₂ based charges on the ownership of a petrol-powered Golf may amount to EUR 450 per year. Germany levies less than EUR 100 and is therefore among the cheaper countries with a CO₂ based road tax. Many countries use tax concessions or other mechanisms to promote cars that are powered with alternative fuels (e.g. liquefied petroleum gas, compressed natural gas, biogas, E85 fuel, electricity) or that have other environmentally friendly characteristics.¹⁹

Relatively minor tax savings in Germany for fuel efficient cars

In addition to the absolute CO₂ based duties on cars, the relative tax savings for fuel efficient cars compared to fuel inefficient cars have to be considered to assess the tax incentive designed to increase demand for low-emission vehicles. The following provides the taxes (except energy tax, which depends on vehicle usage) on a representative car of each the mini, compact and SUV segment across the 29 countries (Figures 3 and 4).²⁰ The total average taxes per year range between EUR 250 and EUR 1,400 for the mini segment, EUR 350 and EUR 3,700 for the compact segment, and EUR 1,000 and EUR 13,500 for the SUV segment.

The largest total differences (over EUR 10,000) between taxes on cars of the mini and SUV segment

¹⁶ In Cyprus, registration and annual car taxes are levied in progressive rates that rise in proportion to cylinder capacity. Therefore, the discrepant position of comparable vehicles is not directly a result of the engine type, but of the difference in engine volume.

¹⁷ See Commission proposal for a Directive COM (2005) 261 final, and Uwe Kunert and Hartmut Kuhfeld: The Diverse Structures of Passenger Car Taxation in Europe and the EU-Commissions Proposal for Reform. In: Transport Policy 14 (2007), 4, S. 306-316.

¹⁸ France also imposes a CO₂ based charge (Surtaxe sur les émissions de CO₂) when a car changes ownership. However, this tax is calculated according to a different method and its rate is much lower than the charge for initial registration; therefore registration tax in France was considered a one-off charge for purposes of this study. See www.carte-grise.org.

¹⁹ Promotion of cars powered with alternative fuel systems such as hybrid, electrical, Liquefied Natural Gas and Natural Gas Vehicle (biogas) technologies. The most common incentives include tax concessions, reduction of the tax base or cash incentives for scraping old vehicles and simultaneously purchasing a new car (car scrapping bonus). Many countries subsidise the fitting of diesel particle filters on diesel vehicles, both for new and used cars, for example by granting tax concessions or reimbursement of costs in the case of retrofitting.

²⁰ The following vehicles were taken as examples: Smart fortwo coupé 1.0 mhd pure softip (mini segment) with a CO₂ emission of 103 g/km; Volkswagen Golf 1.6 Trendline (compact segment) with a CO₂ emission of 166 g/km; and Mercedes ML 350 (SUV segment) with a CO₂ emission of 266 g/km. See ADAC cost calculator for cars, www.adac.de.

are found in Denmark and Norway. Four countries show differences between EUR 5,000 and EUR 10,000, twelve countries are found in the middle range between EUR 1,500 and EUR 5,000, while this difference is less than EUR 1,500 in ten countries. Germany is positioned in the bottom third of the ranking with a difference of approximately EUR 1,300. Interestingly, none of the five countries with the lowest total tax differential take CO₂ emissions into account in their taxation systems.²¹

Figure 4 illustrates the relative taxes paid in each country for the representative cars of the mini and SUV segment compared to the car of the compact segment. Denmark, the country with the highest absolute tax difference across the car segments, shows only an average relative difference. Cyprus has the largest relative difference in charges on vehicles from the mini and SUV segment, followed by Greece and Poland, which do not impose a CO₂ related tax. The Netherlands are the only country where the relative increase in charges from the mini to the compact segment is higher than the increase from the compact to the SUV segment. All other countries increase taxes progressively. Despite the recent introduction of CO₂ based taxes—to create an incentive to buy low-emission vehicles—Germany is one of the countries with the lowest relative difference.

New car taxation misses the mark in Germany

Effective 1 July 2009, after a lengthy reform process, Germany introduced a new method to calculate annual taxes on new cars.²² The new system combines the previous taxation based on cylinder capacity (although now at a lower rate) and a CO₂ component, which charges a tax of EUR 2 per gram of CO₂ emissions per kilometre (g/km) if those exceed a threshold of 120 g/km. The two components are taxed on a linear scale.²³ Under the new tax scheme, cars with higher cylinder capacity or fuel consumption are taxed higher than under the previous tax scheme: A petrol-powered car in the mini segment with low fuel consumption (i.e., CO₂

²¹ See ACEA Tax Guide 2009.

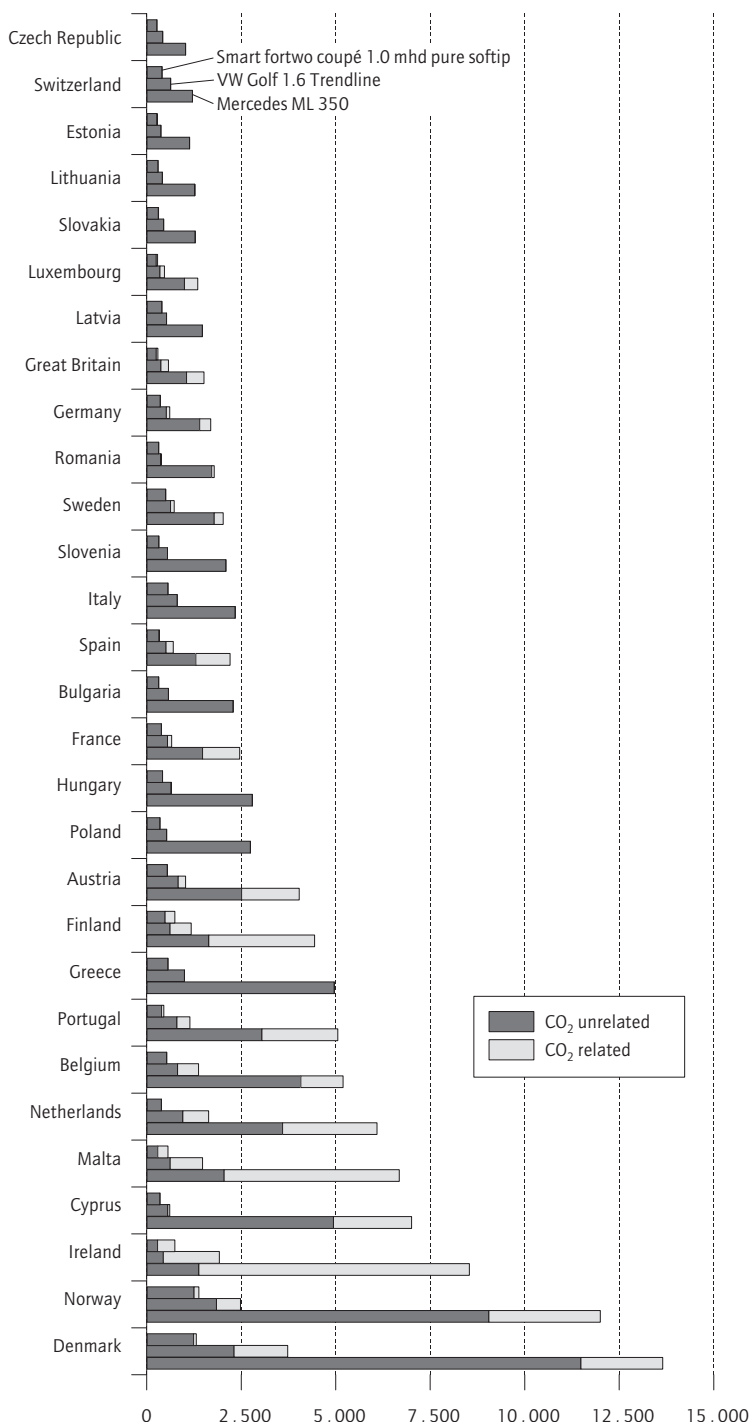
²² This measure had already been part of the 2002 coalition agreement between the SPD and the Green parties as step towards an ecological tax reform: "In collaboration with the federal states, annual car tax will continue to be adjusted in an ecological sense with neutral effects on tax revenue", www.upi-institut.de/Koalitionsvereinbarung_02.pdf.

²³ Cylinder capacity is taxed per 100 cubic centimetres or part thereof at a rate of EUR 2 for spark-ignition and EUR 9.50 for auto-ignition engines. The purpose of the higher base rate for diesel engines is to compensate for the lower energy tax on diesel fuel. For further details and future changes of the annual vehicle tax, see the law on the restructuring of annual vehicle tax and the amendment of other laws: BGBl 2009 I, p. 1170, and www.bundesfinanzministerium.de.

Figure 3

Car taxes across Europe: Comparison of cars from three vehicle segments¹—petrol-powered

in Euro per annum²



Status: May 2009.

¹ First time registration of a new car, average duties per year, does not include taxes depending on vehicle usage (energy tax).

² Sorted by the tax difference between the car of the mini and SUV segment.

Sources: ACEA; ADAC; BMF; CEA; European Commission; DIW Berlin calculations.

DIW Berlin 2009

emissions of less than 120 g/km) is subject to an annual tax of approximately EUR 20 only, while a luxury car with a relatively high cylinder capacity and fuel consumption is subject to charges between approximately EUR 300 and EUR 400.²⁴ The differences in taxation on these two vehicle segments have approximately doubled compared to the previous tax scheme. The change is less substantial in the case of diesel cars because of the higher tax rate on cylinder capacity (to compensate for the lower energy tax on diesel fuel).

This reform of car taxation has the sole aim of reducing CO₂ emissions from road traffic. Therefore, the question arises if this tax scheme is able to influence the purchase decisions with respect to new cars, given that incentives can arise on the basis of the total amount of tax and on the basis of the tax differential between vehicles.²⁵ The revenue from car taxes currently amounts to almost EUR 8 billion (the total taxes on road vehicles amount to approximately EUR 8.8 billion), at an average tax of EUR 200 per car. Also, the tax on vehicles registered prior to 1 July 2009, which are not subject to the new tax rules, varies substantially depending on the engine type (petrol/diesel), cylinder capacity and European emission standard.²⁶ In this reform, it was decided to maintain the annual tax revenue constant. Under the new system, the approximately three million new registrations per year are subject to annual taxes of EUR 120 on an average petrol-powered vehicle, and EUR 300 on an average diesel-powered vehicle.²⁷

Notwithstanding the larger difference in the amounts of tax paid, the lack of monetary significance of car taxes might prevent a considerable incentive to buy fuel efficient cars. Depending on the vehicle, the share of annual taxes in total car levies ranges between less than 10% and 15% for petrol-powered cars and between 15% and 25% for diesel-powered cars. In relation to total costs of cars, the road tax accounts for between 1% and 5%. In other words, the absolute amount of tax remains small compared to the total costs for the ownership and use of vehicles. In addition, Figures 3 and 4 show that Germany is one of the European countries with the lowest tax differential across car segments. Further, the share of CO₂ based taxes in the total tax burden is relatively small.

²⁴ Luxury cars with higher engine capacities and/or higher fuel consumptions than the examples considered in this analysis can attract charges over EUR 400.

²⁵ See Deutscher Bundestag, Drucksache 16/11742, 16. Wahlperiode 27.01.2009, Entwurf eines Gesetzes zur Neuregelung der Kraftfahrzeugsteuer und Änderung anderer Gesetze (Draft Law on the Restructuring of Annual Vehicle Tax and on the Amendment of Other Laws).

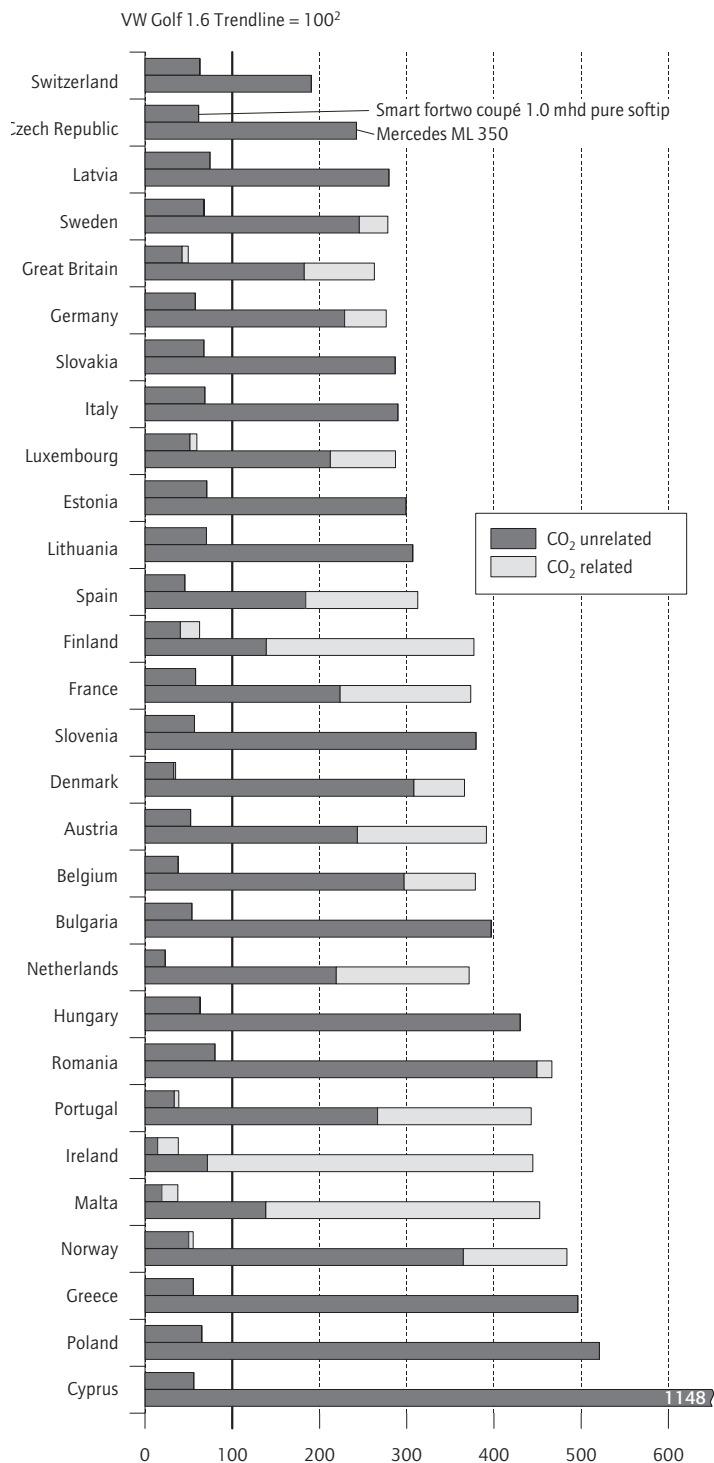
²⁶ Apart from short-term tax exemptions and tax concessions.

²⁷ Calculated on the basis of average values for the cylinder capacity and CO₂ emissions of newly registered vehicles in 2008. See www.bundesfinanzministerium.de.

Figure 4

Car taxes across Europe: Relative comparison of cars from three vehicle segments¹—petrol-powered

VW Golf 1.6 Trendline = 100²



Status: May 2009.

¹ First time registration of a new car, average duties per year, does not include taxes depending on vehicle usage (energy tax).

² Sorted by the tax difference between the car of the mini and SUV segment.

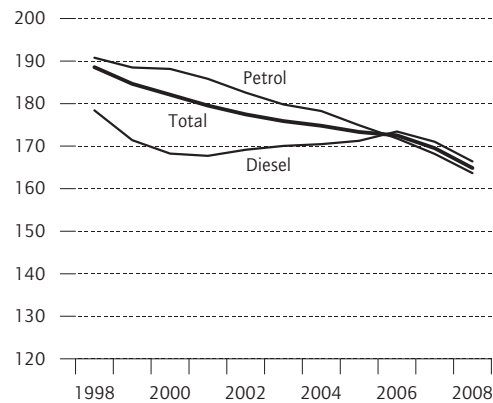
Sources: ACEA; ADAC; BMF; CEA; European Commission; DIW Berlin calculations.

DIW Berlin 2009

Figure 5

Average CO₂ emission of newly registered cars in Germany

in g/km



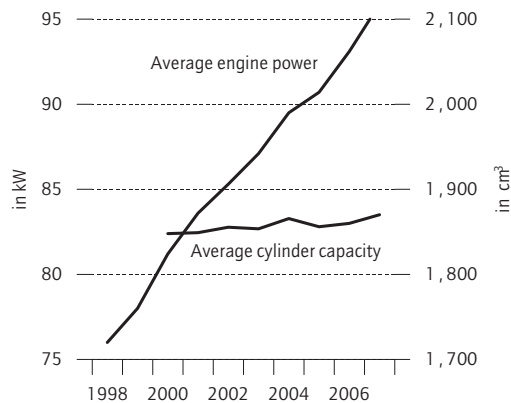
Source: Kraftfahrt-Bundesamt (Federal Motor Transport Authority).

DIW Berlin 2009

Figure 6

Engine power and cylinder capacity of newly registered cars in Germany

in kW



Source: Kraftfahrt-Bundesamt (Federal Motor Transport Authority).

DIW Berlin 2009

New registrations of cars will be the basis for future revenue from road tax, using the characteristics of cylinder capacity and fuel consumption. Average fuel consumption (and thus the CO₂ emissions of new cars) is decreasing, while cylinder capacity appears to be relatively stable (Figures 5 and 6). These two assessment bases are likely to diminish in 2009, because the scrapping bonus will trigger an increase in new registrations of cars mainly from the smaller car segments, which will have relatively low CO₂ emissions anyway.²⁸ This erosion of the tax base will be offset by the tax scale, whereby the threshold of CO₂ taxation will be set at 110 g/km as of 2012 and at 95 g/km as of 2014.²⁹ The incentives to use vehicles with low CO₂ emissions will therefore slightly increase.

The structure of road tax can undoubtedly support environmental goals; however, the potential effect of the new regulation to favour fuel efficient vehicles is weak overall.³⁰ An alternative might have been a tax schedule with a higher or progressive tax rates on CO₂ emissions. Additionally, if fuel taxes on petrol and diesel fuel for cars had been aligned, the

²⁸ In addition, the progress towards turbocharged engines with a smaller cylinder capacity will continue.

²⁹ Last year, 6.5% of newly registered vehicles fell below the initial taxation threshold of 120 g/km. See Kraftfahrt-Bundesamt 2009.

³⁰ In addition, in Germany approximately 60% of new cars are registered by commercial owners, whose decisions may be based to a lesser extent on cost factors (90% of the car stock is privately held; see Statistische Mitteilungen des Kraftfahrt-Bundesamtes, Flensburg). In some other countries (GB, B, F), CO₂ based taxation of cars is therefore structured much more progressively for company cars.

cylinder capacity component could have been abolished, and instead taxation could have been based entirely and more substantially on CO₂ emissions.³¹ The tax would then have been easier to understand for consumers, whereas now it has actually become more complicated.

There are further alternatives for the structure of car taxation, but each has other disadvantages or creates a greater administrative burden. For example, a CO₂ based registration tax to replace road taxes would give additional incentives to consumers to purchase vehicles with low fuel consumption. A bonus-malus system would have a greater tax benefit for fuel efficient cars compared to inefficient cars, and might therefore, over the long run, at least partly offset the higher purchase price of a more fuel efficient car. Furthermore, the increased demand for fuel efficient cars would also be an incentive for car manufacturers to invest in expensive new technologies and the development of more efficient cars.

Conclusions

Europe is characterised by very diverse taxation systems with respect to the purchase, registration, ownership and usage of cars. This is due to both

³¹ For details of fuel taxation, see Uwe Kunert and Hartmut Kuhfeld: The Diverse Structures of Passenger Car Taxation in Europe and the EU-Commissions Proposal for Reform. In: Transport Policy 14 (2007), 4, S. 306-316

the different types of duties imposed, and the numerous different bases of assessment and tax schedules. Contrary to the intentions of the European Commission, tax systems have become more diverse and complex in recent years. The result is a great disparity in tax rates and wide variations in the shares of fixed and variable tax components with respect to cars. However, one trend is clear: In recent years, the majority of the countries of the European Union have based their taxation of cars on fuel consumption, which represents at least one component in the calculation of registration tax or annual vehicle tax.

In summary, more than ten of the 17 countries that impose CO₂ based taxes are characterised by high total taxes with significant differences across vehicle segments. CO₂ based taxes often apply only if a certain CO₂ emission thresholds is exceeded; in other cases, tax brackets are linked to a specific level of CO₂ emission. The CO₂ emission level of 120 g/km is frequently applied. These systems further include dynamic components, either in the form of a periodically updated benchmark on which the tax is based (as in the case of the Dutch registration tax), or in the form of a system where the method of calculation changes over time by adjusting assessment bases or tax rates (as in the cases of the bonus-malus systems in France and Great Britain).

The German reform of road taxes based on CO₂ emissions is too weak to provide considerable incentives for consumers, also in comparison with other countries. Assuming average usage of cars, value added tax on fuel consumption is in most cases higher than the annual car tax. Moreover, the road tax has now a greater potential for revisions since its responsibility shifted from the states to federal level. Therefore the long-winded disputes with the federal states regarding the tax structure and its revenue are no longer necessary.³² Furthermore, the revision in July 2009 has come too late, given that the CO₂ emissions of new car registrations have already been declining since 2006 anyway (Figure 5) and given that the new EU directive on reducing the CO₂ emissions of cars will directly impact car manufacturers. This directive lays out specific CO₂ targets for car manufacturers and progressive “excess emissions premiums” that will create incentives for manufacturers to expand their product range of low-emission vehicles.³³

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DIW Berlin
Mohrenstraße 58
10117 Berlin

Tel. +49-30-897 89-0
Fax +49-30-897 89-200

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32 On the transfer of annual vehicle tax to federal jurisdiction, see “Gesetz zur Änderung des Grundgesetzes vom 19. März 2009” (Law on the Amendment of the German Constitution dated 19 March 2009) in BGBl 2009 I, p. 606.

33 See Regulation (EC) No. 443/2009 of the European Parliament and of the Council of 23 April 2009 setting emission performance standards for new cars as part of the Community’s integrated approach to reduce CO₂ emissions from light-duty vehicles, Official Journal of the European Union L 140/1 of 5.6.2009.