Chapter 6. Tax reform simulations to stabilise revenues

This chapter studies options for tax policy reforms designed to stabilise tax revenues in the road transport sector at current levels, in the long run. It simulates the potential impact of tax reform on revenues for the main technology scenario, considering behavioural adjustments. The focus is on the passenger car segment of the market, where the erosion of the fuel base is expected to be at its highest. The following tax reforms are considered: increasing conventional fuel or carbon taxes on gasoline and diesel, adapting the taxation of motor vehicles and charging based on distances-driven.

The scenario analysis of the road transport sector in Slovenia shows that tax revenues from fuel excise levied on passenger cars may significantly decline under current policies (baseline scenario) when fuel-efficiency improves and the uptake of alternative fuel vehicles increases. The present chapter studies options for tax policy reform that aim at stabilising revenues from passenger cars in the longer run. It simulates the potential impact of tax reform on revenues for the IEA 2DS scenario. The focus lies on the passenger car segment of the market, where the fuel base erosion is likely highest.

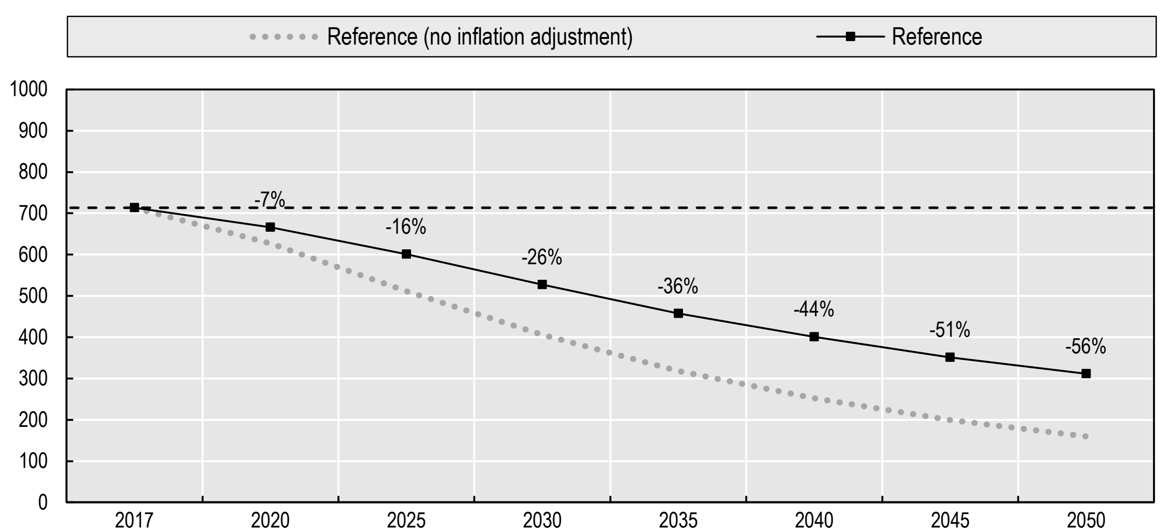
The decarbonisation of tax bases is assumed to be exogenous to this analysis. While policy instruments considered in the analysis will affect the speed at which tax bases decarbonise beyond their effect on tax revenues, this relationship is not accounted for in the calculations. Linking the effect of tax reform to emissions could be an interesting extension for further analysis.

Tax reform in the transport sector can take different angles and affect the three tax bases (energy use, vehicle stock, road use) differently. To counteract a drop in fuel tax revenues several margins exist. For example, revenues may be sustained by increasing conventional fuel taxes on gasoline and diesel, by eliminating vehicle tax exemptions for electric cars or by charging distances. Tax reform outside road transport may be another efficient way to generate additional revenue, but that is beyond the focus of this analysis.

6.1. Fuel and carbon taxes

Figure 6.1. Fuel and carbon tax revenue from passenger cars for baseline scenario, 2017-2050

Baseline scenario (current policy); tax revenue in million EUR.



Note: Model results for fuel and carbon tax revenue for the IEA 2DS and under current policies. Results are presented for situations where tax rates are adjusted for inflation (black line) and where they are not (grey dotted line).
Source: OECD/ITF calculations.

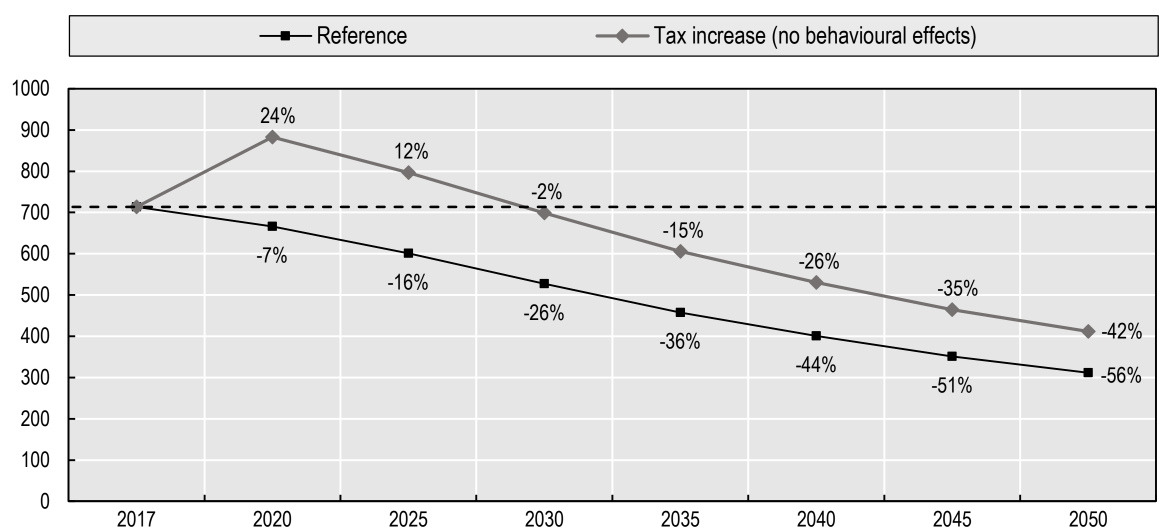
StatLink http://dx.doi.org/10.1787/888933923526

Tax revenue from fuel used in passenger cars drops significantly in the IEA 2DS scenario and much more strongly when tax rates are not adjusted to inflation. The black line in Figure 6.1 shows the evolution of tax revenue from fuel used in passenger cars as derived by the model in the baseline scenario (see Chapter 5): revenues decline steadily reaching –56% in 2050 compared to 2017 levels. This baseline scenario assumes that the real level of current fuel taxes persists over time and that rates are indexed to inflation. That is to say, a total of EUR 0.5763 and EUR 0.5024 are levied per litre of gasoline and diesel respectively (including fuel excise[1], carbon and additional taxes). Conversely, the grey dotted line in Figure 6.1 represents fuel tax revenues, where current tax rates persist but are not adjusted with inflation and when inflation averages at 2% over the years. If nominal tax rates do not rise with inflation, real tax rates decline and gradually erode tax revenue even further than in the baseline scenario.

Increasing conventional fuel taxes on diesel and petrol can delay the revenue loss from tax base erosion, as shown in Figure 6.2. However, a one-time increase does not necessarily cover the revenue loss in the long run. The grey line depicts results from a simulation in which tax rates on diesel and petrol increase to the level of Slovenia's most ambitious neighbour in terms of fuel taxation for private car use, Italy. As of 2020, rates are set to EUR 0.728 and 0.617 per litre respectively and are inflation adjusted in later years. While the simulation shows that a one-time increase in tax rates pushes revenues up in the short to medium term (2020-2030) relative to the baseline, the revenue loss is not fully covered in the longer run (2030-2050).

Figure 6.2. Simulation of fuel and carbon tax revenue from passenger cars after tax increase, 2017-2050

Most ambitious neighbour, no behavioural effects; tax revenue in million EUR.



Note: Simulation of fuel and carbon tax revenue for the IEA 2DS assuming real tax rates increase to EUR 0.728 per litre of petrol and EUR 0.617 per litre of diesel as of 2020. Revenues from the baseline scenario (black line).
Source: OECD/ITF calculations.

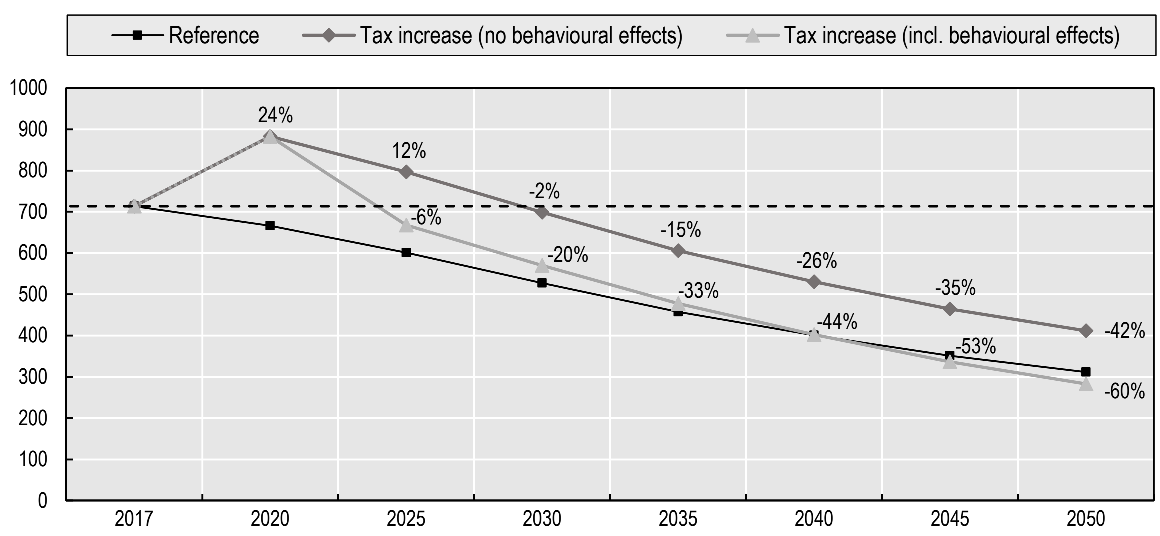
StatLink http://dx.doi.org/10.1787/888933923545

The pattern at which revenues erode follows the speed at which alternative fuel vehicles penetrate the car stock and fuel-efficiency improves. Countries that aim to keep tax revenues stable by focusing uniquely on fuel and carbon tax reform would thus need to increase tax rates on gasoline and diesel continuously – mimicking the speed and extent at which the fossil fuel base erodes. Simulation shows that tax revenues in 2050 may reach similar levels as in 2017 under a tax reform that raises the carbon tax gradually to reach a tax rate of around EUR 80 per tonne of CO_2 in 2030 and EUR 340 per tonne in 2050, keeping everything else equal. (This translates into a tax rate of EUR 0.178 per litre of petrol and EUR 0.198 per litre of diesel in 2030.) An increase in tax rates to this extent would likely speed up the penetration of alternative fuel vehicles.

The revenue potential from fuel and carbon tax reform depends significantly on how strongly fuel demand reacts to price increases. The above-mentioned simulations assume no behavioural adjustments following tax reform, while results presented in Figure 6.3 derive from a simulation that includes precisely such behavioural effects. More specifically, the simulation assumes that tax rates on gasoline and diesel rise to the Italian level in 2020 and that the entire fuel tax base shrinks in 2025 in response to the rate increase. Following the literature (discussed in Section 2.2.1) the simulation applies a long-run elasticity of -0.5 indicating that a 10% increase in fuel prices reduces fuel demand by 5% all else equal.

Figure 6.3. Simulation of fuel and carbon tax revenue from passenger cars including behavioural adjustments, 2017-2050

Most ambitious neighbour, including behavioural effects; tax revenue in million EUR.



Note: Simulations for fuel and carbon tax revenue for the IEA 2DS assuming tax rates increase to EUR 0.728 per litre of petrol and EUR 0.617 per litre of diesel as of 2020. Simulations include a one-time behavioural effect in 2025 following a price elasticity of -0.5 (light grey line) and no behavioural effect (dark grey line). Revenues from the baseline scenario (black line).
Source: OECD/ITF calculations.

StatLink http://dx.doi.org/10.1787/888933923564

When accounting for behavioural effects, the revenue potential from fuel and carbon tax reform shrinks considerably. A strong increase in fuel or carbon taxes risks eroding fuel tax revenue more rapidly than in the absence of tax reform. As shown in Figure 6.3, the light grey line (representing tax revenues from a simulation that considers a behavioural effect of -5% for a 10% increase in prices) drops below the levels of the dark grey line (representing tax revenues from the same simulation but excluding behavioural adjustments). As of 2040, revenues even drop below the baseline scenario (black line). Note that the -0.5 elasticity derives from backward-looking analysis and may be seen as a lower bound of the behavioural response. Technological progress may increase the sensitivity of the fuel base to tax rates.

In conclusion, the simulations show that fuel or carbon tax increases can delay the potential revenue loss from fuel base erosion in passenger cars in the short or medium run, but that the potential is limited in the long run. Over time, a steady increase in rates would be required to counteract the likely fuel base erosion from changes in car technologies. These increases need to be substantial to keep revenue streams at current levels. Fuel use may further decrease in response to such price changes (both because higher prices may accelerate the uptake of alternative fuel vehicles and because consumers may drive less and more efficiently). A smooth adaptation to the potential revenue erosion may require tax reform that goes beyond fuel taxation.

Increasing fuel tax rates substantially may also raise distributional and political economy concerns. In particular, it raises questions about the level of fuel and carbon taxes that can be implemented and sustained and what measures are designed to support those parts of the economy that encounter challenges in adjusting to higher prices in the short run (e.g. people facing tight budget constraints or those living in areas where public transport is not readily available). This ultimately raises questions on how revenues from fuel and carbon taxes are used. Marten and Van Dender (2019[1]) argue that broad and flexible constraints on revenue use can strengthen support for carbon pricing if the revenues from the tax are put to socially beneficial use.

From an economic efficiency standpoint, fuel or carbon taxes should cover the external costs that one litre of fuel use entails – but not be levied above that level (see Section 2.2.3). Estimates of the external costs from fuel use in rural areas, where congestion as well as population exposure to air pollution is low, differ largely from those in an urban context, where congestion and air pollution costs are much higher (Parry, Walls and Harrington, 2007[2]; Van Dender, 2019[3]). Because these externalities relate more directly to driving than to fuel use, taxes related to driving will manage such costs more efficiently.

6.1.1. Fuel tax competition

The revenue potential from fuel tax reform in Slovenia is limited further by the interaction with tax policies in neighbouring countries. As discussed in Section 2.2.2, studies find that countries in interconnected geographical areas may keep fuel taxes at low levels in an attempt to attract foreign drivers that can cross the frontier easily to take advantage of lower fuel prices in neighbouring countries. The European Energy Tax Directive (2003/96/EC) establishes minimum excise rates to avoid a race-to-the bottom of taxes on fuels in European member states. It sets a minimum rate of EUR 0.359 per litre of petrol and EUR 0.330 per litre of diesel.

Excise taxes are not the only component of the price that end-users pay at the pump and may induce fuel tourism. The retail fuel price depends on other taxes and duties, such as carbon taxes and VAT, but also on the wholesale price of oil, and on mark-ups that service stations charge. The overall fuel market structure, the size of the specific supplier and the exact location of service stations matters for their price setting behaviours. Regulation may matter too. For example, in Slovenia, the government regulates the price of fuel sold at service stations that are located on motorways. Overall, taxes and duties represent 63% and 61% of the average retail price for petrol and diesel in Slovenia in 2017 (Table 6.1 and Table 6.2).

Retail prices for fuel used in passenger cars vary widely in the area comprising Slovenia and neighbouring counties, as reported in Table 6.1 and Table 6.2. For example, the relatively large price differential between Italy and Slovenia (approximately EUR 0.26 and 0.20 per litre of petrol and diesel) may incentivise mobile Italian households that live in the border region to fill up their tank in Slovenia.

Table 6.1. Petrol prices in Slovenia and neighbouring countries, 2017

Prices and excise are expressed in EUR per litre of fuel, yearly averages.

	Price at the pump	Pre-tax price	VAT rate	Excise duty and other indirect taxes	Tax as a share of total price
Austria	1.18	0.488	20%	0.493	59%
Croatia	1.27	0.496	25%	0.517	61%
Hungary	1.15	0.505	27%	0.401	56%
Italy	1.53	0.524	22%	0.728	66%
Slovenia	**1.27**	**0.465**	**22%**	**0.576**	**63%**

Note: Fuel for private use; price quotes for Euro-super 95 from the main retail operators in each country.
Source: Weekly Oil Bulletin, 2017 (European Commission, 2018[4]).

Table 6.2. Diesel prices in Slovenia and neighbouring countries, 2017

Prices and excise are expressed in EUR per litre of fuel, yearly averages.

	Price at the pump	Pre-tax price	VAT rate	Excise duty and other indirect taxes	Tax as a share of total price
Austria	1.11	0.511	20%	0.410	54%
Croatia	1.17	0.529	25%	0.410	55%
Hungary	1.16	0.541	27%	0.378	53%
Italy	1.38	0.516	22%	0.617	63%
Slovenia	**1.18**	**0.462**	**22%**	**0.502**	**61%**

Note: Fuel for private use; price quotes for gasoil from the main retail operators in each country.
Source: Weekly Oil Bulletin, 2017 (European Commission, 2018[4]).

Raising fuel taxes in Slovenia would increase the revenue potential per litre of fuel sold and establish a level playing field with neighbouring countries that charge higher taxes, with the likely effect that some of the Slovenian fuel tax base from foreign driving shifts back to the drivers' country of origin. Calculating the potential tax base loss requires precise information on the number of cars that travel in and out of Slovenia for that purpose, their fuel-efficiency and the associated price elasticities. A simple back-of-the envelope calculation shows the diesel and petrol sold in Slovenia to citizens of the Italian border municipalities may represent 1.3% of current fuel tax revenues.[2] This calculation assumes that Italian households in the border municipalities resemble the Slovenian average in 2017 regarding vehicle ownership, usage and fuel use and uses elasticities derived in Rietveld, Bruinsma and van Vuuren (2001[5]).[3]

While the foreign fuel tax base in terms of private cars is relatively modest, tax competition for fuel tax bases may be more relevant for trucks. Because trucks can carry large amounts of fuel and may cross many countries in Europe on their routes, fiscal planning can reduce production costs significantly. Trucks are eligible for a reduced excise rate in some European countries and are eligible to claim refunds on VAT.

In Slovenia, the revenue potential from international truck traffic is significant. The Statistical Office of the Republic of Slovenia estimates that foreign trucks cover more than 74% of all kilometres driven by trucks on Slovenian motorways (Table 6.3). The large number of kilometres driven on motorways in Slovenia transforms directly into significant toll revenue (Figure 5.11), but also fuel tax revenue. For example, in 2016, at least 32% of all diesel purchased in Slovenia for road transport was used in trucks, as measured by the amount of litres for which a tax refund for commercial diesel was claimed (Ministry of Finance of Slovenia, 2018[6]).[4] Trucks registered outside of Slovenia covered one quarter of these refunds – with the top origins being Romania, Hungary and Slovakia.

Table 6.3. Road traffic by trucks on Slovenian territory, 2016

In vehicle-kilometres

	All roads	Motorways	Other roads
Domestic vehicles	32%	26%	63%
Foreign vehicles	68%	74%	37%

Note: Only trucks heavier than 3.5 tonnes are considered.
Source: Statistical Office of the Republic of Slovenia (2018[7]).

Excise rates for commercial diesel vary across the region and are set at, or close to, the EU minimum rate in Hungary and Slovenia (Table 6.4). This lends support to the empirical finding that diesel excise levels in Europe are set strategically in response to tax rates in neighbouring countries (Evers, De Mooij and Vollebergh, 2004[8]; Paizs, 2013[9]) and to the theoretical finding by Kanbur and Keen (1993[10]) according to which small countries charge lower rates in the presence of tax competition. However, when including the carbon tax and other additional taxes on fuel use, the total tax rate on commercial diesel in Slovenia exceeds the Italian rate.

Table 6.4. Tax rates for commercial diesel in Slovenia and neighbouring countries, 2018

Excise rates are expressed in EUR per litre of fuel.

	Austria	Hungary	Italy	Slovenia	EU minimum rate
Commercial diesel rate	0.425	0.337	0.403	0.330	0.330
Commercial diesel rate incl. additional taxes				0.406	

Source: Excise Duty Tables (European Commission, 2018[11]).

The minimum excise rate established at the European level keeps tax rates on diesel in check in the region and avoids a race-to-the bottom, yet some strategic behaviour seems to continue. A co-ordinated approach at the European level may achieve a more efficient tax system while containing tax competition further. Depending on the exact policy objective, such a co-ordinated approach could, for example, index minimum rates to inflation and progressively increase minimum rates to reflect the level of climate costs associated with fuel use. From an external cost perspective, lower rates for diesel than petrol are not justified. Santos (2017[12]) finds that current petrol and diesel taxes in Slovenia (and most European countries) are too low to cover marginal external costs from driving.

6.2. Vehicle taxes

Vehicle tax reform is another channel through which additional tax revenue in the transport sector could be raised. As detailed in Section 2.2.1, the type of vehicle tax matters for the stability of the revenue stream: while revenues from one-off registration taxes depend on fleet-turnover and the business cycle, annual taxes on circulation generate a more stable revenue stream. Because vehicle taxes apply to users of cars registered in Slovenia only, vehicle tax reform can only cover the domestic tax base.

Setting an annual tax at the level of EUR 40 per car registered in Slovenia in 2020 (that increases gradually to EUR 306 per car in 2050) would cover the revenue loss from fuel taxes on passenger cars as derived for the IEA 2DS. The tax equivalent considered in the calculation does not differentiate along other dimensions, such as the air pollution and carbon emissions profile or the fuel type of a vehicle. It compares to a current annual tax that amounts to EUR 40 for the average gasoline car and to EUR 62-100 for the average diesel car (BEVs are currently exempt).

Table 6.5. Annual vehicle tax equivalent to cover revenue loss from fuel taxes on cars, 2020-2050

One vehicle tax per car; no differentiation along car dimensions; no behavioural effects.

	2020	2025	2030	2035	2040	2045	2050
Fuel tax revenue loss from passenger cars for IEA 2DS (million EUR)	47.6	112.5	186.1	256.1	312.7	362.4	402.1
Annual vehicle tax equivalent (EUR per car)	39.6	93.4	150.0	202.2	243.1	279.6	306.0

Note: The vehicle tax equivalent is derived by dividing the revenue loss from fuel used in passenger cars by the number of cars registered in Slovenian in each year as calculated in the model for the IEA 2DS.
Source: OECD/ITF calculation.

Reforming vehicle taxes implies a tension between the government's objectives to raise additional revenue and to engage in a low-carbon transition, as higher vehicle taxes (which would apply to all vehicles regardless of their environmental impact) may limit the switch towards more efficient or alternative fuel vehicles. For example, high registration taxes may reduce fleet turnover, because they incentivise households to forego buying a new car. In addition, taxes based on the sales price of a vehicle, as the registration tax in Slovenia, may slow down the take-up of new technologies further, because they incentivise households to choose relatively cheaper or second-hand cars instead of cars with new and relatively more expensive technologies.

Differentiated vehicle taxation based on technological or environmental performance may support the rollout of alternative vehicles, but a gradual phase-out of tax exemptions for electric vehicles will be necessary to sustain revenues once the technological transformation is on its way. Currently, Slovenia exempts battery electric vehicles (BEV) from the annual vehicle tax and applies the lowest rate of the vehicle registration tax. With the increased take-up of electric vehicles, revenues from these taxes will shrink significantly (see Figure 5.11).

Differentiated vehicle taxation has an effect on purchasing behaviour, however, often at substantial additional revenue cost. Studies find that consumers react to one-off registration or purchase taxes that differentiate according to CO_2 emissions, by buying more fuel-efficient cars (D'Haultfœuille, Givord and Boutin, 2014[13]; Gerlagh et al., 2018[14]; Yan and Eskeland, 2018[15]). However, this differentiation has often led to revenue forgone (e.g. in the case of France and Israel (D'Haultfœuille, Givord and Boutin, 2014[13]; OECD, 2016[16]). Also in Norway, preferential vehicle tax treatment and other benefits have spurred demand for electric vehicles in recent years, but have led to a significant drop in government revenues from vehicle taxation (Norwegian Ministry of Finance, 2018[17]). The consumer response to periodic vehicle taxes, on the other hand, is less clear and may be smaller (Alberini and Bareit, 2017[18]; Gerlagh et al., 2018[14]).

Several countries have implemented *feebates*, where a tax for high-emission vehicles ensures revenue to provide rebates to purchases of low-emission vehicles (e.g. France, Japan, Norway, Sweden, and Switzerland). The French feebate was designed to be revenue neutral, but ex-post revenue collected on high-emission vehicles did not cover the cost of the rebate (D'Haultfœuille, Givord and Boutin, 2014[13]). Regularly adjusting the pivot point of the feebate (i.e., the emission rate at which the fee turns into a rebate) may help stabilise revenues while the fleet is transforming. Implementing smooth rate schedules, as opposed to step-wise schedules, will avoid excessive bunching and provide a uniform and ongoing incentive to improve the emission profile of each vehicle (Anderson and Sallee, 2016[19]).

Several questions over the benefits of vehicle taxation remain. First, vehicle taxes appear not to be a particularly equitable tool to raise revenues (Chatterton et al., 2018[20]; Eliasson, Pyddoke and Swärdh, 2018[21]). It will be necessary to assess carefully the distributional impact of vehicle taxes in Slovenia and potentially design support measures accordingly. Second, vehicle taxes are not an efficient tool to manage external costs either, because they cannot properly incorporate the external costs related to driving behaviour – in contrast to fuel taxes and distance-based charges. To increase the efficiency of vehicle taxation in Slovenia, one would need to tailor tax rates more closely to the average environmental impact of vehicles, including the damages from air pollution. Raising rates over time to the appropriate level may help create support for such a reform.

6.3. Distance-based charging

Charging distances by the kilometre can constitute a promising long-term strategy to collect stable revenues. The tax base from driving is less affected by technological change in the vehicle fleet, as driving is typically less elastic than fuel use (see Section 2.2.3) and as tax competition with neighbouring countries is limited in countries that are not easily bypassed. For example, the distance-based charge levied on trucks in Slovenia appears to be much more resilient to impacts of a decarbonising vehicle fleet than the vignette system for passenger cars, which does not account for the actual number of kilometres driven (see model outputs presented in Figure 5.11). Well-designed, distance-related pricing schemes also align better with the principles of an efficient system of road taxation than *all you can drive* vignettes (Van Dender, 2019[3]).

Going forward, a relatively low tax on the kilometres driven that gradually increases over time can generate significant amounts of revenue in Slovenia. Table 6.6 shows the rate per kilometre driven on Slovenian roads that would cover the revenue loss from fuel taxes on passenger cars as derived for the IEA 2DS. If all passenger car kilometres driven on any road in Slovenia were covered, such a tax would amount to EUR 0.0025 per kilometre in 2020 and EUR 0.018 in 2050. If the tax was restricted to motorway kilometres but included all vehicles (passenger cars and trucks), its level would increase to EUR 0.007 per kilometre in 2020 and EUR 0.046 in 2050. No behavioural adjustments of driving patterns related to the increase in distance-based charges are considered in this calculation.[5]

Table 6.6. Kilometre tax equivalent to cover revenue loss from fuel taxes on cars, 2020-2050

No differentiation along vehicle dimensions; no behavioural effects.

	2020	2025	2030	2035	2040	2045	2050
Fuel tax revenue loss from cars for IEA 2DS (million EUR)	47.6	112.5	186.1	256.1	312.7	362.4	402.1
Km-equivalent; all car kilometres; any road (EUR per vkm)	0.0025	0.0057	0.0091	0.0123	0.0148	0.0168	0.0182
Km-equivalent; car and truck kilometres; motorway only (EUR per vkm)	0.0071	0.0158	0.0247	0.0330	0.0389	0.0433	0.0458

Note: The kilometre tax equivalent is derived by dividing the revenue loss from fuel used in passenger car by the number of kilometres driven by passenger cars on all Slovenian roads (second row) and by the number of kilometres driven by all vehicles (passenger cars and trucks) on Slovenian motorways (third row).
Source: OECD/ITF calculation.

Differentiating distance-based charges along several dimensions may be desirable to promote the efficiency of the road tax systems, but these are not considered in the calculations above for the sake of simplicity. First, a differentiation according to vehicles' emission profiles (including air pollution) can strengthen incentives to use more fuel-efficient or alternative fuel vehicles. The Slovenian toll system currently accounts for the EURO class of a truck, while the existing vignette does not apply a similar differentiation for passenger cars. Second, tax levels may also reflect an area's population density, thereby accounting for exposure to emission and noise. Third, differentiating taxes along places and time provides an effective tool for traffic and congestion management; for example, via charging higher rates when and where roads are congested. The current toll system for trucks in Slovenia uses microwaves that communicate with gantries built on the motorway, a technology that can rather easily implement toll rates that vary with population density and congestion rates. Although both tolling systems are not directly comparable, a differentiation of vignette rates with EURO classes of cars can help to take vehicles' environmental characteristics into account.

Setting tax rates at the level of the external costs from driving will improve the efficiency of the Slovenian tax system, while ensuring that rates are not set so high as to distort the allocation of resources. Distance-based charges are more appropriate than fuel taxes to capture several external costs from driving; e.g. air pollution in the case of fossil fuel consuming cars, noise pollution, accidents, congestion and the use of public space.

There is a case to extend and improve the taxation of road use in Slovenia. An additional differentiation of truck tolls (e.g. based on vehicle characteristics, the population density of a location and congestion levels) would increase the efficiency of the current system and may be achieved at relatively low additional costs. Transforming the vignette system for passenger cars into an actual distance-based charge will achieve more stable revenues over time and better traffic management. Such a transformation may be facilitated by using the existing toll infrastructure but would need to consider the different technical, organisational and legal aspects of personal vehicles compared to trucks. It could also be complemented more gradually, by starting the assessment (and taxation) of kilometres driven per odometer readings at annual car inspections and transforming to the existing toll infrastructure with differentiated rates afterwards. (NB: This would not capture foreign vehicles.) Revisions of the vignette system need to be seen in the context of potential harmonisation efforts in the field at the EU level, so will take account of a broader set of considerations than those considered in this study. The results of the present analysis are one potential input into the broader.

Political and social resistance to tax reform that focuses on implementing and improving distance-based charges requires well-designed policies supported by a tailored and effective communication campaign. For example, gradually phasing-in distance-based charges in Slovenia while the fleet decarbonises will keep the tax burden stable over time for many drivers; it rather shifts the composition of taxes from fuel use towards driving. Recent advances mean that administrative burden and technological limits are becoming less of a hurdle (Van Dender, 2019[3]).

Even if the phasing-in of distance-based charges in a decarbonising environment will not raise the average tax burden, it will affect specific driving types differently. For example, taxes will shift from vehicles that are heavily reliant on fossil fuels towards vehicles that are driven longer distances. Distance-based charges that account for the efficiency level of a vehicle may contain the effect of such a shift.

Additional simulation of the distributional impacts of tax reform, along income and geographical dimensions, would be required to design an appropriate policy response and successful implementation through effective and tailored supporting communication strategies. For example, further analysis based on the present modelling tool could simulate the tax burden of different driving types in the future and determine those types that are most affected by a tax reform. This will support future efforts for designing appropriate policy responses, including support measures for those parts of the population that will be most adversely impacted because they may not be able to adjust their driving behaviour easily in the short run, due to external constraints such as an absence of travel alternatives (e.g. public transport) or financial constraints.

Notes

[1] The analysis uses excise duty rates as applicable throughout 2017, i.e., EUR 0.5078 per litre of gasoline and EUR 0.4261 per litre of diesel. As of 22 May 2018, the excise duty for gasoline and diesel is set at EUR 0.47829 per litre and EUR 0.39272 per litre respectively.

[2] This calculation assumes that all private households living in the Italian municipalities of Gorizia and Trieste (data from Italian National Institute of Statistics) purchase 25% of their fuel in Slovenia given the current price differential of approximately EUR 0.25. (Following Rietveld, Bruinsma and van Vuuren, it is assumed that for each EUR 0.05 price differential, Italian car owners purchase 5% of their fuel in Slovenia.)

[3] Rietveld, Bruinsma and van Vuuren analyse fuel purchase behaviour of Dutch households in the border region with Germany. Through a stated preference approach, the authors find that households living in the border region (30 km away from border) will purchase 5% of their fuel in Germany, when the price differential is at EUR 0.05.

[4] This number represents a lower bound for fuel used in trucks, assuming that some trucks may not claim a refund and because only trucks above a weight of 7.5 tonnes can claim a refund.

[5] The responsiveness to price increases is typically lower for the driving than for the fuel use base (see Section 2.2.1), which is due to the fact that few substitution possibilities exist in the short to medium run for driving, particularly in areas with poor public transport infrastructure.

References

Alberini, A. and M. Bareit (2017), "The effect of registration taxes on new car sales and emissions: Evidence from Switzerland", *Resource and Energy Economics*, https://doi.org/10.1016/j.reseneeco.2017.03.005. [18]

Anderson, S. and J. Sallee (2016), "Designing Policies to Make Cars Greener", *Annual Review of Resource Economics* 8, pp. 157-180, https://doi.org/10.1146/annurev-resource-100815-095220. [19]

Chatterton, T. et al. (2018), "Financial Implications of Car Ownership and Use: a distributional analysis based on observed spatial variance considering income and domestic energy costs", *Transport Policy*, Vol. 65, pp. 30-39, http://dx.doi.org/10.1016/j.tranpol.2016.12.007. [20]

D'Haultfœuille, X., P. Givord and X. Boutin (2014), "The Environmental Effect of Green Taxation: The Case of the French Bonus/Malus", *The Economic Journal*, Vol. 124/578, pp. F444-F480, https://doi.org/10.1111/ecoj.12089. [13]

Eliasson, J., R. Pyddoke and J. Swärdh (2018), "Distributional effects of taxes on car fuel, use, ownership and purchases", *Economics of Transportation*, Vol. 15, pp. 1-15, http://dx.doi.org/10.1016/j.ecotra.2018.03.001. [21]

European Commission (2018), *Excise Duty Tables Part II Energy products and Electricity*, https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/excise_duties/energy_products/rates/excise_duties-part_ii_energy_products_en.pdf. [11]

European Commission (2018), *Weekly Oil Bulletin*, https://ec.europa.eu/energy/en/data-analysis/weekly-oil-bulletin (accessed on 27 February 2019). [4]

Evers, M., R. De Mooij and H. Vollebergh (2004), "Tax Competition under Minimum Rates: The Case of European Diesel Excises", *CESifo Working Paper Series*, No. 1221, https://ssrn.com/abstract=564142. [8]

Gerlagh, R. et al. (2018), "Fiscal Policy and CO2 Emissions of New Passenger Cars in the EU", *Environmental and Resource Economics*, Vol. 69/1, pp. 103-134, https://doi.org/10.1007/s10640-016-0067-6. [14]

Kanbur, R. and M. Keen (1993), "Jeux Sans Frontières: Tax Competition and Tax Coordination When Countries Differ in Size", *The American Economic Review*, Vol. 83/4, pp. 877-892, https://www.jstor.org/stable/2117583. [10]

Marten, M. and K. van Dender (2019), "The use of revenues from carbon pricing", *OECD Taxation Working Papers*, No. 43, OECD Publishing, Paris, https://doi.org/10.1787/3cb265e4-en. [1]

Ministry of Finance of Slovenia (2018), *Revenues from excise duties and carbon tax 2008-2017 (database)*. [6]

Norwegian Ministry of Finance (2018), *Correspondance with Norwegian Ministry of Finance, 20 November 2018*. [17]

OECD (2016), "Israel's Green Tax on Cars: Lessons in Environmental Policy Reform", *OECD Environment Policy Papers*, No. 5, OECD Publishing, Paris, https://dx.doi.org/10.1787/5jlv5rmnq9wg-en. [16]

Paizs, L. (2013), "Asymmetric competition in the setting of diesel excise taxes in EU countries", *Acta Oeconomica*, Vol. 63/4, pp. 423-450, https://doi.org/10.1556/AOecon.63.2013.4.2. [9]

Parry, I., M. Walls and W. Harrington (2007), "Automobile Externalities and Policies", *Journal of Economic Literature*, Vol. 45/2, pp. 373-399, http://dx.doi.org/10.1257/jel.45.2.373. [2]

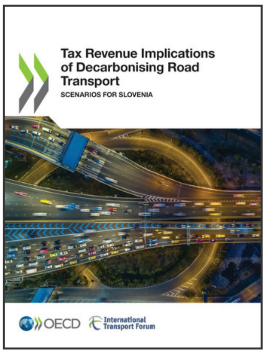
Rietveld, P., F. Bruinsma and D. van Vuuren (2001), "Spatial graduation of fuel taxes; consequences for cross-border and domestic fuelling", *Transportation Research Part A: Policy and Practice*, Vol. 35/5, pp. 433-457, https://doi.org/10.1016/S0965-8564(00)00002-1. [5]

Santos, G. (2017), "Road fuel taxes in Europe: Do they internalize road transport externalities?", *Transport Policy*, Vol. 53, pp. 120-134, https://doi.org/10.1016/j.tranpol.2016.09.009. [12]

Statistical Office of Slovenia (2018), *Vehicle-kilometres Slovenia 2015-2016 – provisional data*, https://www.stat.si/StatWeb/nk/File/NewsAttachment/2481. [7]

Van Dender, K. (2019), "Taxing vehicles, fuels, and road use: Opportunities for improving transport tax practice", *OECD Taxation Working Papers*, No. 44, OECD Publishing, Paris, https://dx.doi.org/10.1787/e7f1d771-en. [3]

Yan, S. and G. Eskeland (2018), "Greening the vehicle fleet: Norway's CO2-Differentiated registration tax", *Journal of Environmental Economics and Management*, Vol. 91, pp. 247-262, https://doi.org/10.1016/j.jeem.2018.08.018. [15]



From:

Tax Revenue Implications of Decarbonising Road Transport

Scenarios for Slovenia

Access the complete publication at:
https://doi.org/10.1787/87b39a2f-en

Please cite this chapter as:

OECD/International Transport Forum (2019), “Tax reform simulations to stabilise revenues”, in *Tax Revenue Implications of Decarbonising Road Transport: Scenarios for Slovenia*, OECD Publishing, Paris.

DOI: https://doi.org/10.1787/fd05bea3-en

OECD