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Sharing Cars: A Legal and Economic Analysis of B2C Car Sharing Models

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Abstract

Recently, shared mobility has become a hot topic in urban mobility discussions. Shared transportation models, like Ofo in Paris and Car2go in Madrid, affect people's travel behaviour, generating social, environmental and land use impacts. Notably, they can reduce car ownership, increase the use of alternative transportation modes, diminish fuel consumption, greenhouse gas emissions and the number of kilometres driven by car, and raise environmental awareness. Through a multidisciplinary approach combining law and economics, we analyse how business to consumer (B2C) car sharing models defy a number of selected taxes: motor vehicle taxes – mainly the registration tax and the annual circulation tax – and (future) road charges. We depart from the observation that these taxes and charges have been conceived in a context of car ownership, whereas new car sharing models are based on providing access to cars for personal use. The first part of this article provides a literature review on car sharing. It briefly points at the rise of new consumption models, it highlights car sharing's main features, and it summarizes its potential benefits for sustainable mobility. The second part explores the recent policy shift in the use of motor vehicle taxes and road charges in Europe, with particular emphasis on Belgium. Finally, the third part gives an overview of the challenges posed by B2C car sharing to these tax instruments. We conclude with several policy recommendations with respect to these challenges.

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Introduction

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impacts. Notably, they can reduce car ownership, increase the use of alternative transportation modes, diminish fuel consumption, greenhouse gas emissions and the number of kilometres driven by car, and raise environmental awareness. Through a multidisciplinary approach combining law and economics, this contribution aims to analyse how business to consumer (B2C) car sharing models defy a number of selected taxes: motor vehicle taxes – mainly the registration tax and the annual circulation tax – and (future) road charges. We depart from the observation that these taxes and charges have been conceived in a context of car ownership, whereas new car sharing models are based on providing access to cars for personal use.

The first part of this contribution provides a literature review on car sharing. It briefly points at the rise of new consumption models, it highlights car sharing's main features, and it summarizes its potential benefits for sustainable mobility. The second part explores the recent policy shift in the use of motor vehicle taxes and road charges in Europe, with particular emphasis on Belgium. Finally, the third part gives an overview of the challenges posed by B2C car sharing to these tax instruments.

1. B2C Car Sharing: A Literature review

New consumption models have proliferated in the past years, enabling access to a wide range of services. Consumers' attitude tends to shift from buying and owning goods to paying for temporarily accessing them; they prefer to consume a particular quantity at a particular time and place (Wilhelms et al. 2017). While ownership remains a reality, access-based services, defined as « transactions that can be market mediated but where no transfer of ownership takes place » (Bardhi et Eckhardt 2012), occupy an increasingly large share of market transactions. In such models, access is obtained by sharing / pooling of goods, resources and services, facilitated by advanced technologies and peer-to-peer communities (Belk 2010; Botsman and Rogers 2010; Gansky 2010). Car sharing is one of these alternative modes of consumption; it causes (disruptive) changes to the transport sector.

Car sharing is a form of shared mobility, alongside other modes like ridesharing, bike sharing and ridesourcing. It consists of a « short-term vehicle access among a group of members who share a vehicle fleet that is maintained, managed, and insured by a third-party organization. It is typically provided through self-service vehicle access on a 24-h basis for short-term trips. » (Shaheen 2015). In such a scheme, « individuals gain the benefits of private-vehicle use without the costs and responsibilities of ownership » (Shaheen, Cohen et Roberts 2007). Car sharing users access vehicles by joining an organization that maintains a fleet of cars deployed in lots located in different places (within neighborhoods, at public transit stations, employment centers, universities, etc.). Generally, the car sharing operator provides gasoline, parking, and maintenance, while participants pay a fee each time they use a vehicle (Shaheen, Cohen et Roberts 2007). Although the earliest experiences of car sharing can be traced back to 1948 in Europe, growth has been particularly remarkable during the past few years, thanks to advances in information and communication technologies, and to the scaling up of platforms (Franck et Mayeres 2016; Hildebrandt et al. 2015), especially in Belgium, Germany and the Netherlands (Marsden et al. 2015).

Car sharing services can be provided by automakers (e.g. Car2Go and Drivenow) and car rental companies, but also by non-profits companies, under the form of peer-to-peer (P2P), business-to-consumer (B2C) or business-to-business (B2B) relations (Le Vine et al. 2014). There are two main service types. The first one is station-based, which implies that cars are parked in designated parking lots/ pick-up stations, and must be parked in the same space (one-way car sharing) or in another designated pick-up station (two-way car sharing) at the end of the journey. A second type is free-floating. In this case, the cars are freely parked in public spaces within the operational area, and the journey can start and finish in any point within this area (Ferrero et al. 2018). Car sharing models also differ regarding other features, such as the type of vehicle used (fuel, electric, CNG), whether or not the operating company has established partnerships with public authorities or private companies, and the pricing structure of their services. User prices can be set in different ways, such as a fixed fee (per day/month/year), a unit price per kilometre, a unit price per minute, or a two-part tariff that combines a subscription fee with a unit charge.

Car sharing services potentially contribute to a shift towards sustainable mobility. Several studies have indeed reported evidence that car sharing generates transportation, land use, environmental, and social benefits (Shaheen 2009, Chen et Kockelman 2016). For instance, Kopp et al. (2015) indicate that car-sharing members are more

multimodal than non-members. Other publications show that car sharing reduces the number of vehicles kilometres travelled and, as a consequence, congestion (Martin, Shaheen, et Lidicker 2010, Lane 2005). Since cars employed in car sharing programs are used more intensively, there is also a quicker turnover of the fleet, which implies that older models are replaced faster by (presumably) cleaner new models (Franck et Mayeres 2016). Furthermore, one car used in car sharing replaces several vehicles (between 3 and 13 for roundtrip car sharing) among car sharing members, which diminishes the volume of cars and, hence, the public space (roads, parking, etc.) they use (Franck et Mayeres 2016). Another advantage is that vehicle size can be adapted to the trip purpose and the number of passengers. Finally, a number of authors have emphasized the benefits of car sharing for the market penetration of electric cars (Firnkorner et Müller, 2015; Wappelhorst et al. 2014; Le Vine et al. 2014).

2. Motor Vehicle Taxes and Road Charging Policies

The government's objectives when designing motor vehicle taxes have shifted over the past decades. Initially, vehicle taxes generally pursued budgetary objectives; more recently, they have become instruments of environmental and transport policy. In addition, transport policy has recently moved towards the introduction of road charges in order to better internalize transport externalities, such as environmental pollution and congestion. We review these issues both at the European Union (EU) level (2.1.) and at the level of an individual country, using Belgium as our main example (2.2.). Doing so will provide insight into the tax framework in which B2C car sharing operates.

2.1. Passenger Transport Tax Policy at the EU Level

Motor vehicle taxes have some common features in European Member States' tax system. In the EU, every single Member State levies a registration tax on vehicles. In addition, most European countries levy a tax on car ownership, for instance an annual circulation tax, with the exception of Estonia, Lithuania and Poland (ACEA 2018a). Although there have been some attempts, vehicle taxes have not been harmonized at the European level. In the different Member States, they depend on a variety of criteria, including the cylinder capacity, the fuel used, the age, Euro standards, CO₂ emissions, and the price of the vehicle (invoice value, purchase or retail price). Progressively, vehicle taxes have been used as an environmental policy tool, providing appropriate incentives to use more environmentally friendly cars. Moreover, European institutions have encouraged the use of road pricing instruments, based on the "user pays" and "polluter pays" principles, promoting financially and environmentally sustainable and socially equitable road transport (De Borger et Proost 2017). In this context, transport taxes have a double function: on the one hand, they raise revenues; on the other hand, they correct market failures associated with the external costs generated by road transport (pollution, CO₂ emissions, congestion, accident risks). The common economic premise is that transport taxes should aim to internalize externalities.

2.1.1. Motor Vehicle Taxes

The European Commission has attempted several times to harmonize passenger car ownership and car use taxes. In 1997, a study "Vehicle Taxation in the European Union" has been published at the European Commission's request, in which the main elements of Member States' vehicle taxes are reported and discussed (Commission 1997). The report observes a deep disparity between domestic taxes, as well as large differences in the overall strategy followed by Member States. A new study on Member States' vehicle taxes was released in January 2002 in order to assess the economic and tax effects of such levies (TIS 2002; COWI 2002).

The report "Fiscal Measures to Reduce CO₂ Emissions from New Passenger Cars" assessed the extent to which vehicle-related taxes (mainly acquisition taxes and ownership taxes) can represent effective means to reduce CO₂ emissions from new cars. This was the basis for a Communication "Taxation of passenger cars in the European

Union - options for action at national and Community levels”^b, which was followed by a directive proposal^c. The proposal’s purpose was twofold: to improve the functioning of the Internal Market, and to implement the Community’s strategy to reduce CO₂ emissions from passenger cars by restructuring motor vehicle taxes. The proposal contained three main measures: the gradual phasing out of the registration tax, a refund system to apply during a five to ten year long transitional period, and the introduction of a new tax structure linked totally or partially to CO₂ emissions^d. Nevertheless, in spite of the support expressed by the European Parliament, the European Council could not reach the required unanimity to adopt the directive, and the proposal was removed in 2015. Despite this failed attempt, twenty-two Member States currently base – totally or partially – their registration tax or/and their annual circulation tax on environmental criteria (CO₂, Euronorm, etc.)^e. After 2015, efforts of the European Commission have mainly focused on road charges.

2.1.2. Road Charges

Many Member States have implemented a system of passenger car use charges, either under the form of time-based charges (vignettes) – which are often levied on the full primary network – or distance-based charges (tolls), typically levied on only a limited number of road sections. There is currently no distance-based system levied on the whole road network, although the European Commission recommends that Member States move towards distance-based road charging systems based on actual kilometres driven.

The EU initially emphasized the conditions in which Member States can impose taxes, tolls and user charges to heavy goods vehicles (HGVs)^f. In 2017, the European Commission has endeavoured to extend HGVs charges to passenger car use, which was, until then, left unaddressed. Considering *inter alia* that passenger cars are « at the source of about 2/3 of external costs », which include the cost of climate change, air pollution, noise and accidents generated by road transport, the overall objective of the Directive proposal is « to make progress in the application of the 'polluter pays' and 'user pays' principles, thereby promoting financially and environmentally sustainable and socially equitable road transport »^g. With the extension of its scope, the directive should ensure a more consistent tax policy across the road transport sector, and to further reflect external costs into road charges^h. In particular, the proposal distinguishes three forms of charges, the use of which is regulated and encouraged: user charges, external cost charges and congestion chargesⁱ. In addition, the proposal aims to « phase out the use of time-based user charges (vignettes) first for HGVs and buses/coaches, then, at a later stage, for passenger cars and vans, on the networks used by international transport »^j.

This initiative echoes a number of other documents in which the Commission encourages the use of instruments allowing to internalize externalities associated with transport, under the form of road charges. For instance, the White Paper of March 2011 considers the use of road charges « as an alternative way to generate revenue and influence traffic and travel behaviour »^k. Similarly, in the communication « A European Strategy for Low-Emission Mobility », the Commission addressed the issue of « fair and efficient pricing in transport », indicating that « [a]cross the EU, charging should move towards distance-based road charging systems based on actual kilometres

^b Communication of the European Commission on the Taxation of passenger cars in the European Union – options for action at national and Community levels, COM/2002/0431 final.

^c Proposal for a Council Directive of 5 July 2005 on Passenger car related taxes, COM/2005/0261.

^d In particular see p. 4 of the proposal.

^e Austria, Belgium, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Latvia, Luxembourg, Malta, Netherlands, Portugal, Slovenia, Spain, Sweden, United Kingdom (ACEA 2018b)

^f Directive 1999/62/EC of the European Parliament and of the Council of 17 June 1999 on the charging of heavy goods vehicles for the use of certain infrastructures.

^g Proposal of May 31, 2017 for a Directive of the Parliament and of the Council, amending Directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures, COM(2017) 275 final.

^h Proposal of May 31, 2017, op. cit., p. 3.

ⁱ Art 7-7 *quinquies* of the Proposal of May 31, 2017, op. cit., p. 3. The two first categories already existed in the Directive 1999/62/EC.

^j Proposal of May 31, 2017, op. cit., p. 11.

^k White Paper of March 28, 2011, Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system, COM/2011/0144 final, p. 15.

driven, to better reflect better the polluter-pays and user-pays principles »¹. However, the lack of Member States' enthusiasm regarding the proposal could actually jeopardize its widespread adoption.

Interestingly, at least some Member States have considered, or are considering, the adoption of a kilometre tax (also on passenger car use), applicable on their whole territory. For instance, the Netherlands have discussed the introduction of such measures as early as in 1988 (Van Wee 2010). These discussions led to a draft legislation in 2009, in which a kilometre tax was based on three parameters: a flat rate per kilometre, a CO₂ component and a modulation varying in time and place^m. However, the collapse of the Government in 2010 impeded its adoption. Similarly, Finland has envisaged a substitution of taxes on vehicles ownership by a tax based on kilometres travelled and CO₂ emissions (Finish Ministry of Communication and Transport 2014). Finally, two of the three Regions in Belgium, as will be further detailed below, are considering the introduction of a “smart kilometre charge”.

2.2. Domestic Passenger Transport Tax Policy: the Case of Belgium

In Belgium, the decision-making power related to motor vehicle taxes has been transferred to the three Regions (the Flemish Region, the Walloon Region, and the Region of Brussels-capital) (see Bourgois, Darte, Bayenet 2017); regional entities are thus exclusively responsible for reforming the tax base and the tax rates of these taxes as well as introducing tax exemptions or rebates (Art. 4, § 3 Special Financing Law)ⁿ. After this transfer, vehicle taxes have evolved toward environmental objectives in the Flemish Region, and to some extent the same happened in the Walloon Region. In a longer-term vision, the Flemish Region and the Region of Brussels-capital, notably considering the high congestion problems they face, have envisaged the introduction of a “smart kilometre tax”. In what follows, we provide more details on the recent policies related to these taxes in the various regions.

2.2.1. Motor Vehicle Taxes: the Registration Tax and the Annual Circulation Tax

In Belgium, there are two types of motor vehicle taxes: the registration tax and the annual circulation tax. The registration tax is a fixed acquisition tax, due one time, when the car is registered. On the contrary, the annual circulation tax is a tax on ownership. It is due by periods of twelve consecutive months, the first period starting on the first day of the month in which the vehicle is or shall be registered in the repertoire (Art. 22 ATC). These taxes are associated with the ownership of the vehicle, regardless to what extent and with what intensity it is used.

The taxable object with respect to the car registration tax is defined as the use of public road by motor vehicle^o, which is presumed when the (new or second-hand) car is registered with the vehicle registration department (Art. 99, § 1st of the so-called Code of Taxes with equivalent effect to income taxes, hereafter “ATC”). The same presumption applies to the annual circulation tax, whose taxable object is characterized as the registration of cars^p. The taxable person with respect to these taxes is the individual or the legal entity which is mentioned in the vehicle registration document (Art. 6; 100 ATC). The place where the taxable person is established determines which regional regulation should be applied. It also indicates which Region benefits from the tax proceeds and which tax authorities are entitled to administer the levy (Art. 5, §1, 10 & 11^o Special Financing Law). For instance, if the owner of the car is resident of the Flemish Region, he will have to pay the Flemish registration tax to the benefit of the Flemish tax authorities.

In Belgium, the tax base and rate of the motor vehicle taxes considerably vary across the Regions. The Flemish Region and, to some extent, the Walloon Region have used these taxes as environmental policy tools. In the Walloon Region, the registration tax depends on two criteria: first, the cylinder capacity of the car (expressed in

¹ Communication from the Commission of July 20, 2016, A European Strategy for Low-Emission Mobility, COM/2016/0501 final, p. 4.

^m These were based on the report of the committee « Anders Betalen voor Mobiliteit »; Advice of June 24, 2005, available at <https://www.rli.nl/sites/default/files/andersbetalenvoormobilitiet6-2005briefadvies.pdf> (accessed 6 August 2018).

ⁿ Special Law of January 16, 1989, on the financing of Communities and Regions, Belgian Official Journal January 17.

^o Bill of Special law of May 25, 2001, on the re-financing of the Communities and extension of regional tax competences, Chamber of representatives 2000-2001, 1183/7, p. 159.

^p Ibid.

fiscal horsepower or in kilowatts) combined with the age of the vehicle (the amount decreases with the age of the vehicle) and, second, the Ecomalus, which depends on the CO₂ emissions of the car. Such a scheme pursues a twofold objective: a social or redistributive objective, based on the first component (cylinder capacity and age) and an environmental objective, pursued by the second component (CO₂ emissions)⁴. The Flemish Region bases its registration tax solely on environmental criteria: the CO₂ emissions of the vehicle, the type of fuel used and the Euronorm^f. In the Region of Brussels-capital, the registration tax depends on the cylinder capacity and the age of the vehicle; the tax diminishes when the age of the vehicle increases. Hence, it merely pursues social or redistributive objective. The same tax base is used for the annual circulation tax in the Walloon Region and in the Region of Brussels-capital, whereas the Flemish annual circulation tax depends on environmental parameters^g. The Walloon Region and the Region of Brussels-capital are currently considering to reform their vehicle taxes, notably due to the negative effects on air quality and other environmental indicators associated with the ageing of the car fleet. To this end, two reports have been commissioned to assess how the structure of these taxes can be modified in an environmental perspective. Nevertheless, no bill has been proposed yet.

2.2.2. A “Smart Kilometer Tax”

In Belgium, the introduction of a “smart kilometre tax” for passenger cars has been discussed in the Flemish Region over the past decade, complementing the kilometre charge on HGVs already in place. Recently, in July 2018, the Flemish government has repeated its willingness to introduce such a levy, which would replace the annual circulation tax. In the Region of Brussels-capital, a task force was asked to issue a report, which was discussed on June 2018 in Parliament, on how to modify current vehicles taxes to pursue environmental objectives^l. The purpose was primarily to address problems of air quality and of climate change, but congestion was also taken into account, in a long-term perspective. The taskforce proposed a reform of the vehicles taxes’ current tax base, based on three criteria: the CO₂ emissions, the type of fuel used and the Euronorm. In the long-term, the experts suggested moving towards a “smart kilometre tax”, which would replace the current vehicle taxes. In particular, a “mobility” component would be added to the aforementioned tax base; a modulation in time, place and direction was recommended, in order to address the current problems of congestion faced in Brussels. The conclusion of a cooperation agreement between the three Regions seems to be the preferred approach in that regard, but such a process is often laborious and time-consuming in the Belgian institutional framework.

3. Motor Vehicle Taxes and B2C Car Sharing Models

Motor vehicle taxes have been conceived as instruments allowing for taxation of the ability-to-pay related to car ownership. Therefore, because B2C car sharing models are characterized by accessing/ using the vehicles without transfer of ownership, they affect the structure of such taxes. In particular, B2C car sharing affects the taxable object, incurring a risk of tax revenue erosion (3.1.), as well as the taxable person (owner vs. user) (3.2.). It may also engender tax competition (3.3.). An additional challenge for the future is how B2C affects the design of road charges, if these were to be introduced (3.4.).

3.1. Taxable Event: Risk of Tax Revenues Erosion

As noted, car sharing is assumed to reduce the number of cars on roads, as one car used in car sharing is predicted to replace several vehicles. To the extent that car sharing leads to fewer cars registered, one expects revenues derived from motor vehicle taxes to decline.

There are several options to compensate for this revenue loss, the size of which can at this moment not easily be

⁴ Art. 97-98 ATC.

^f Art. 2.3.4.1.2 of the Flemish Tax code.

^g I.e. on the cylinder capacity of the car, but the amount increases or decreases based on the CO₂ emissions, the type of fuel used and the Euronorm.

^l Parliament of the Region of Brussels-capital, Discussion on the Task Force on greening vehicle taxes’ report, session 2017-2018, n°703/1.

determined – it is likely to be limited in a first time but it may become sizeable if car sharing becomes more popular. They all have their problems, however. First, the effect of the reduction in the number of cars on circulation and registration tax revenues could be compensated by a higher tax rate. This seems undesirable, because these taxes are very weak instruments to tackle transport congestion and environmental externalities. Second, the loss in fixed acquisition (registration tax) and circulation taxes can be compensated by higher charges on car use. This would be economically much more efficient, as user taxes are much better at internalizing congestion and other externalities than fixed taxes. A problem in the Belgian context is, of course, that the most important current user tax (the fuel tax) is under federal jurisdiction. Therefore, if one wants to compensate the loss in fixed tax revenue for the regions by higher user charges, a deal has to be negotiated between the regions and the federal level. Alternatively, compensation has to be done via a future user tax (road pricing) over which the regions do have jurisdiction. Third, to compensate for tax revenue losses one might also consider differentiating the registration tax between personal ownership and car-sharing firms. However, there is no obvious economic basis for charging higher ownership taxes on car sharing firms (see De Borger, Russo and Verhoef 2018), and this could raise legal issues of (prohibited) discrimination.

3.2. The Taxable Person: Owner vs. User

In the case of B2C car sharing, the individual or the legal entity which is mentioned in the vehicle registration document will be the car sharing (or eventually the leasing) company. As such, it will be qualified as the taxable person for the payment of the registration and the annual circulation tax. Therefore, these taxes are not due by the car users but, depending both on the market structure of the car sharing industry and the pricing strategies of the car sharing companies, the taxes will be reflected in higher user charges, either via increases in the subscription fee or by higher unit charges per kilometre or per minute, or both.

This observation has potentially important consequences. This follows from the fact that firms and individuals are affected by taxes through different channels. To make this more precise, note that currently fixed acquisition and annual circulation taxes are borne by individual households, so what matters is the price elasticity of the demand for cars with respect to fixed acquisition and circulation taxes. Given that in Belgium (unlike in, for example, Denmark) these taxes currently constitute a relatively small share of the consumer price of cars, this elasticity is quite small, and the implications for car buyers and car manufacturers are relatively limited. With the introduction of car sharing, however, what matters is the price sensitivity of the car sharing firms with respect to these taxes. This in turn strongly depends on the degree to which the firms can transmit the charges into higher subscription fees and per unit charges to the customers, which in turn depends on the market structure of the car sharing industry and the price elasticities of demand by car sharers. If the car sharing industry becomes quite competitive over time and demand is highly price-sensitive, the car sharing companies will bear most of the burden of the taxes, not their clients; if, however, clients are not price-sensitive, they will face higher charges and be worse off. At this moment, as far as we know, there is no economic model that allows to empirically predict the behavioural consequences of the introduction of car sharing.

The introduction of car sharing does not affect the fact that, to the extent that in the future acquisition and circulation taxes remain relevant (they may be phased out if kilometre charges or full electronic road pricing take effect in the future), they have to reflect the environmental performance of the vehicle.

3.3. Risk of Tax Competition

Because in B2C car sharing models, the place of residence of the vehicle owner may differ from that of the vehicle user, vehicles taxes are not necessarily levied where the vehicle is used. Indeed, the car sharing company could be established for instance in Brussels or in Paris, while car sharing services are provided in Antwerp. Furthermore, users do not necessarily have their place of residence where the vehicle is used. This could lead to problems of

double taxation, eventually breaching European freedom of establishment,^u and to the risk of tax competition between Regions or between Member States. This last observation was actually the rationale of Art. 4, § 3 Special Financing Law, which requires the conclusion of a cooperation agreement between the Regions to modify vehicle taxes in the event that the taxable person is a leasing company. Surprisingly, this procedural obligation does not apply when the taxable person is a car renting company, although it was noted that the risk also exists in case of renting and leasing companies. Such considerations, although not taken in the specific context of car sharing, have also justified the afore-mentioned proposal of Directive on Passenger car related taxes^v.

3.4. Road Pricing

Currently, the most important tax on car use in Belgium is the fuel tax on gasoline and diesel. However, one expects that the role of fuel taxes will be diminished in the future with the expected increase in the market penetration of electric vehicles and with expected shift from fuel taxes to different forms of “road pricing” (kilometre charges, electronic road pricing, cordon charges in cities, etc). In this section we focus on this second issue: how does the introduction of road pricing in the future affects the desirable taxation of car sharing companies? The issue is highly complex, and little research is available. In what follows we point out a few important and preliminary findings^w.

In the absence of road pricing, the main user tax is the fuel tax which, in the case of car sharing, we assume to be paid by the car-sharing company. Suppose further that the company charges its users a per kilometre charge (and not, for example, a fee per minute). The kilometre tax on car sharing should then be such that the unit price per kilometre for car sharing users equals the company’s marginal cost per kilometre, plus a fraction of the marginal external cost per kilometre. This fraction captures the reduction in kilometres driven by car sharing users due to a small increase in the charge that is not replaced by kilometres driven by people using their own car. One easily shows that this fraction is zero when demand is perfectly elastic and one when demand is perfectly inelastic. If demand is totally inelastic then the higher toll does not reduce overall congestion. The fraction mentioned above equals one, and the toll on car sharing should equal the company’s marginal cost per kilometre, plus the full marginal external cost per kilometre. Now suppose instead that a higher toll per kilometre on car sharing use leads to a substantial reduction in overall car use. Then the fraction mentioned before is less than one and the toll on car sharers can be lower than in the first case.

If road pricing is introduced so that car kilometres are taxed on the road, these charges will be paid by car sharing users, not by the car sharing company. For people using their own car, the charge should reflect the marginal external cost per kilometre. In the case of car sharing kilometres, the sum of the road charge and the kilometre price paid to the car sharing company should be equal to the marginal external cost plus the resource cost of the car sharing company.

The above discussion summarizes the desirable characteristics of the tax treatment of car sharing (what economists call “second-best optimal taxes”). In practice, however, one should take into account the behaviour of the car sharing firm. This will strongly depend on the market structure of the car-sharing market (Are there few companies or many offering such services? Do they compete in prices or rather in quality or other product dimensions?) and on the size of the car sharing industry relative to the total number of cars on the road. If initially very few car sharing firms operate on the market, it is quite likely that the monopoly power they have induces them to charge unit prices well above production cost. If the sector becomes large relative to the total market but a limited number of firms dominate the market, the few operating firms will internalize the congestion effects imposed on their own customers and prices may decline. If the sector becomes highly competitive with a large number of firms offering quite similar services, prices will come even closer to marginal cost. The outcomes on real world markets remain to be studied in detail.

^u See for instance E.C.J. 14 January 2016, Commission v. Hellenic Republic, C-66/15.

^v COM/2005/261, *op. cit.*

^w The following discussion is very loosely based on De Borger, Russo and Verhoef (2018).

Conclusion

With the emergence of access-based offers, consumption patterns have changed. In particular, there is a shift from buying and owning goods to paying for temporary access and use. Platforms facilitating such services have reached a number of sectors, and transportation is no exception. In this paper, we focused on B2C car sharing models. Despite their potential benefits on sustainable mobility, we showed that such models imply challenges for motor vehicle taxes in several respects, especially if car sharing were to expand substantially. Firstly, B2C car sharing models could imply tax revenue erosion by reducing the number of cars registered. This loss in fixed acquisition and circulation taxes can be compensated by higher charges on car use. This may well be efficient from an economic point of view, as user charges are better at internalizing transport externalities than fixed charges. Secondly, the shift from car ownership to sharing means that the vehicle taxes mentioned are not due by the car users but by the car sharing firms. Policy makers should carefully consider that firms and individuals respond differently to these taxes. Moreover, taxes on consumers and firms may have very different welfare effects: depending both on the market structure of the car sharing industry and the pricing strategies of the car sharing companies, the taxes will be reflected in higher subscription fees or higher user charges, or both. Further studies are required to empirically predict the behavioural consequences of the introduction of car sharing. Thirdly, B2C car sharing creates a risk of tax competition and of double taxation, which could be addressed by the EU by harmonizing vehicle taxes. Finally, B2C car sharing models affect the way road charges should be designed if road pricing were to be introduced in the future.

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