Reforming the fiscal treatment of company cars: the CoCaTax micro-simulation model

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1. Introduction

Belgium's highways are increasingly coming to a standstill, the air quality in its major population centers often reaches alarming levels and its public transport system struggles with delays and overcrowded vehicles during rush hours. In its 2017 country report, the European Commission (2017) singles out Belgium as the European Union's most congested country and identifies congestion and delays in transport as one of the principal strains on Belgian economic growth and as a key priority for the Belgian governments. Van Essen et al. (2011) estimate the economic costs of congestion at 1-2% of GDP, but congestion has worsened considerably since then. Besides its enormous economic costs, our congested transport system also entails major damages to public health and the individual well-being of its citizens: according to the OECD (2014), 5,811 Belgians died in 2010 because of air pollution.
The situation in Belgium is exacerbated by a number of factors. First, the spatial organization of Belgium is such that its heartland is densely populated but in a rather diffuse fashion. This is due to a long tradition of subsidies to personal mobility and political choices (see e.g. De Block and Polasky (2011), or Driesen et al. (2013)). Since jobs are largely concentrated in and around major population centers, this sparse spatial organization creates a large demand for mobility, which the network of highways, regional roads and public transport has increasing difficulties to cope with. Second, the highly complex political and legal landscape in Belgium slows down or blocks many needed investments and policy reforms (OECD, 2017). A number of important policy reforms have been proposed or realized recently, but their factual implementation often proves insufficient to turn the tide. Third, the fiscal pressure on labor income in Belgium is very high. In its 2018 report on the fiscal pressure on labor (Taxing Wages, 2018), OECD singles out Belgium as the country with the highest net personal average tax rate (40.4%, compared to an OECD average of 25.5%) and with the highest marginal tax rate (numbers), for a single worker with the country's average salary. Similarly, the tax wedge (the difference between the wage cost to the employer and the employee's net labor income, i.e., the sum of the personal income tax related to labor income and of employer's and employee's social security contributions) for a single employee with the country's average income equals 39.5% on average in the OECD, and is the highest in Belgium with 53.9%. This high tax burden on labor reflects to some extent a societal choice to organize a substantial part the economy and life through the public sector, giving priority to high quality public services and social protection. It also reflects the limited use of some other fiscal instruments, such as wealth or environmental taxes.

In practice, the high nominal tax burden on labor income in Belgium is often alleviated by a myriad of different deductions, reductions, tax credits and other specific fiscal rules. All these instruments can result in an effective tax rate on labor income that is substantially below the nominal rates mentioned above. A favorable fiscal treatment of company cars provided to the employees for their private use is one way to reach this objective. The use of a company car for private purposes is a payment in kind, rather than monetary. In Belgium, as in most OECD countries, this in-kind

part of an employee's salary is fiscally attractive (cfr. infra). The state therefore implicitly subsidizes the employees' car expenditure. Some argue that this fiscal treatment of company cars is a critical policy to maintain the competitiveness of the Belgian private firms, and to preserve the access of Belgian companies to internationally mobile high skilled workers. Others say that this generosity towards company cars benefits mostly high-income earners, and undercuts our fiscal system's ability to redistribute income. Whatever one's stance on this issue, the current system becomes increasingly problematic in light of the increasing congestion and associated economic losses, of growing awareness of the costs of air pollution and of global efforts to fight climate change. Two recent reforms, 'cash for cars' and the 'mobility budget', aim at maintaining the fiscal advantage of the current treatment of company cars while at the same time being more appropriate considering the congestion issues.

The present chapter outlines a general framework to assess different fiscal reforms with respect to company cars and mobility. The chapter is structured as follows. The next section will sketch the playing field by presenting a brief introduction to some economic principles of taxation and criteria to compare fiscal systems or reforms. In the third section, we analyze some key elements of the current fiscal treatment of company cars in Belgium. In the fourth section, we present in detail the reforms 'cash for car' and the 'mobility budget'. In the fifth section, we introduce CoCaTax (for Company Car Taxation), an interactive online simulation tool by which users can evaluate fiscal reforms w.r.t. company cars (www.CoCaTax.be). We use it to analyze the proposed reforms in the sixth section and then conclude.

2. Some principles of taxation

In this section, we briefly sketch some important economic principles of taxation and key elements of the Belgian fiscal system. Readers that are familiar with this matter may want to skip immediately to the next section. Taxes are compulsory monetary contributions to the state with no direct counterpart nor predetermined goal. Their main role is to collect the necessary funding for the functioning of the state. We will first distinguish the main different categories of taxes, and then discuss important normative principles to assess the virtues of a tax system.

Taxes come in many shapes and forms. In practice, they can either take the form of a uniform 'lump sum' tax, in which case all taxpayers have to pay the same amount of taxes (e.g., Margaret Tatcher's 'Poll Tax'), or they can depend on a taxpayer's behavior and characteristics. In the latter case, which is most often used in practice, the amount of taxes due by a taxpayer is a function of his tax base, e.g., his income or his purchases. Taxes can be levied directly or indirectly. The main examples of **direct taxes** in Belgium are the personal income tax and the corporate income tax. These taxes are due on an annual basis, and are computed on the basis of a tax declaration that taxpayers have to submit. Direct taxes can be adapted to the individual situation of the taxpayers. Two arbitrary employees can thus be subject to a different average personal income tax rate. This occurs if they report a different taxable income while the rate structure is progressive (i.e., if the average tax rate increases with the declared taxable income). It also happens if the average tax rate depends on other individual characteristics (e.g., household composition) or on socially desirable behavior (e.g., pension savings or energy efficient housing investments). This possibility to adapt the tax rate to the individual situation of a taxpayer is the main virtue of a direct tax system, as it allows for a distribution of the tax burden that is deemed fair. But it also comes at the cost of requiring an expensive and complicated administration.
The tax bases for the corporate income tax corresponds to a firm's profits (its revenue minus its costs), either reserved or distributed. In practice, the costs that can be deducted from corporate revenue to establish the taxable profits are determined by tax law. Similarly, households are allowed to deduct certain expenditures from their revenue (e.g., professional expenses) in order to establish

their taxable income. Deductions play an important role in the fiscal treatment of company cars, as will be explained in the third section of this text.

The most important **indirect taxes** in Belgium are the Value Added Tax (VAT), registration fees, inheritance and excise taxes. These taxes are paid on the occasion of particular economic transactions, rather than on an annual basis in function of a tax declaration. The VAT is a tax on general consumption, whereas excise taxes are due on specific categories of goods that cause undesirable side-effects (important examples in Belgium: alcohol, tobacco, energy and sugar-containing beverages). The VAT and excise taxes are included in the price that an end-user pays, and are thus collected by the seller who transfer that amount to the state (after deducing the taxes paid on intermediate goods for the VAT). In principle, the tax rate of indirect taxes cannot be adapted to the 'size' of the tax base or personal characteristics. If the tax rate was not identical for all individuals, consumer prices of goods or services would differ among buyers, and secondary markets would emerge where those facing low tax rates would sell to those facing high tax rates. In most cases, this kind of arbitrage would be prohibitively expensive to prevent. Some durable consumption goods such as housing or cars form an exception, in that the indirect tax rate on such goods can be tailored in function of the tax base or of the characteristics of taxpayer.

Social security contributions violate the above definition of a tax in at least two respects, and as such are not part of the fiscal system. First, the administrations of the social security are institutions that are independent from the state even though they are managed in practice by the federal government. Second and more importantly, social security contributions have a direct counterpart and predetermined goal. Social security contributions are compulsory insurance premia paid on labor income to fund a mutual insurance system for the protection against social risks (unemployment, illness, disability, old age, etc.). Since high income earners typically contribute more than what they get in return, whereas the opposite holds for low income earners, social security plays a redistributive role.

In the remainder of this section, we discuss several important criteria to assess different taxes or fiscal systems: efficiency, equity, simplicity, transparency and robustness w.r.t. fraud. Some of these criteria will lead to opposing recommendations, resulting in a tradeoff between different objectives, e.g., the classical tradeoff between efficiency and equity (cfr. infra). The relative weight given to each of these criteria depends one's individual values and preferences. For this reason, the assessment of a fiscal measure or reform often results in a discussion that cannot be resolved by rational arguments alone, because the assessment rests upon normative positions. The present chapter attempts to clarify the different aspects of the fiscal reform under consideration as well as the normative tradeoffs that are to be made.

We examine first **efficiency**. Taxes typically entail a welfare loss, because they disturb the role of market prices in coordinating the choices of the households and firms. In a market economy, firms sell each unit of the good or service for which the cost of production is smaller than the price perceived, and consumers buy each unit of the good or service that they value more than the price paid. When there are no taxes, the price perceived by the firms is equal to the price paid by the consumers so that all the potential gains of trade are realized: the production of another good or service would be more costly than the value a consumer would attach to it. For an economy as a whole, this mechanism guarantees an efficient use to resources. And even if the real world is more complicated than the above stylized example, its logic remains valid. Taxes drive a wedge between the price perceived by the producer and the one paid by the consumer. Consumers now have to pay the 'producer price' and the tax, implying that some consumer will refrain from buying the good once it is taxed. Taxes introduce a source of inefficiency since some mutually beneficial trades are not realized anymore.

The personal income tax and social security contributions create an important wedge between the gross labor cost that employers pay for each hour of labor, and the net hourly salary employees receive. In 2017, 53.9% of the labor cost of a single worker with an average income constituted labor income taxes and social security contributions (OECD, 2018).[1] Jobs that produce an added value that exceeds what workers require as a compensation for their labor can no longer be executed if the added value is insufficient to cover together the wage, the personal income tax and social security contributions. This constitutes a clear welfare loss for society. Higher labor costs decrease the quantity of work executed in the economy in different ways. Labor income taxes make working less rewarding compared to leisure, inducing households to supply less labor.[2] At the other side of the market, labor income taxes and social security contributions make labor relatively more expensive for employers than other production factors, reducing the demand for domestic labor. At the one hand, the high relative price of labor compared to capital causes employers to opt for machines and automation to reduce labor, even if such substitution would be inefficient in the absence of labor taxes. At the other hand, the high relative price of domestic labor compared to foreign labor encourages firms to move labor intensive activities to countries with cheaper labor, and makes it more difficult for domestic firms to attract internationally mobile talented workers.[3]

The favorable fiscal treatment of company cars is substantial in most OECD countries, and Belgium is certainly not an exception. Copenhagen Economics (2010) estimates that in Belgium for the year 2008, company car users had to pay on average between and 30% and 40% less for their car use than if they had to pay it themselves (compared to an EU average between 22% and 27%). Harding (2014) estimates that only between 44% and 58% of the total taxable benefit from a company car use is actually taxed in the OECD countries. For 29 OECD countries, this results in an average subsidy for company cars of about 1600€ per year. This implicit subsidy to car use causes consumers to adapt their behavior. Van Ommeren and Gutiérrez-i-Puigarnau (2013) estimate that the fiscal treatment of company cars in the Netherlands increases car ownership for about 20% of households, whereas Gutiérrez-i-Puigarnau and Van Ommeren (2011) find that it explains a substantial part of the higher price and size of the car fleet. Laine and Van Steenberghen (2016) find similar effects for Belgium.

In some cases, it is desirable that taxes change the prices of goods or services. This is in particular the case if the consumption or production of certain goods or services cause **external effects**. Externalities or external effects are unwanted side-effects of economic decisions. The external costs associated to car use include congestion costs, air pollution, noise pollution, effects on climate change, an increased risk of traffic accidents for other users of transport, wear and tear of the transport infrastructure, etc. Calculating these external costs and expressing them in monetary terms is illustrated for the environmental effects by Ermans, Hooftman and May in chapter 4 of this book. Monetarizing all these external costs can be a tedious exercise, but for practical purposes we can rely on the guidance of the European Handbook of External Costs (Ricardo-AEA, 2014). De Borger and Proost (2017) estimate the marginal external costs of road transport in Belgium, presented in a simplified form in Table 1.

1 Piketty and Saez (2013) cite OECD evidence to argue that labor income taxes make effectively up to about 75% of fiscal revenue in OECD countries on average.

2 On the short term, the individual labor supply reactions are often relatively moderate, especially for main income earners, see, e.g., Piketty and Saez (2013) for a literature survey.

3 Note, however, that the difference in tax wedge with our neighboring countries and main trade partners is rather limited, because their fiscal system resembles ours.

Table 1: Relative importance of different modes and external cost estimates (De Borger & Proost, 2015), in eurocent per vehicle-kilometer (€ct/vkm)

	Urban (20%)		Medium and long distance (80%)
	Car (70%)	Bus & other (30%)	Car (80%)
Climate cost	0.8	2.1 (bus)	0.5
Air pollution and noise cost	4.3	21.4 (bus)	0.1
External accident cost	0.3		0.1-0.2
External marginal congestion cost	0.6-242.6	1.2-578.3 (bus)	0-139.2
Wear and tear infrastructure	0.8	2.7 (bus)	0.2

The time and place of car use is of crucial importance for congestion costs. In rush hours, whose time span has increased significantly in the last decades, these are the main external cost in urban areas, being evaluated on average at €2.43 per vehicle kilometer. The place of car use also affect considerably the air pollution and noise cost. Many pollutants, such as small particles and ultra-small particles, cause most damage in the local environment of their emission, such that the external air pollution costs are estimated at 4.3€ct/vkm for cars in urban areas, compared to 0.1€ct/vkm for medium and long distances).[4]
Although transport is responsible for the emission of about 20% of greenhouse gases in the EU, it is frequently argued that the transport sector should not be a priority in tackling climate change. Because of excise taxes on fuel, road vehicle engines are already relatively efficient, such that reducing 1 ton of CO_2 emissions in transport is much more expensive than reducing 1 ton of CO_2 emissions in the industry or in the heating of houses. Proost and Evers (2018) argue that if we pay about €1 in taxes on a liter of gasoline, and if one liter of gasoline corresponds to about 2.5 kg of CO_2 emissions, then a ton of CO_2 emissions is currently taxed at about €400, which is much more expensive than the €20 to €25 paid in the industry for an ETS permit to emit a ton of CO_2.[5] Since the origin of greenhouse gases is of no importance for their effect on climate change, efficient policies to combat climate change should primarily focus on other sectors than transport.

When deciding on their transport use, transport users do not consider the external costs that their behavior imposes upon others. Solutions to the problem of externalities must therefore induce the transport users to 'internalize' the external costs. Pigouvian taxes are production or consumption taxes designed to implement such a solution. To do so, the tax on the good or service that causes the externality is set to the monetary value of the external cost that one additional unit of consumption or production causes (where the cost is evaluated at the socially optimal quantity). The socially optimal quantity is such that the total costs for society (private and external) of the last unit of production or consumption equal its total benefits for society. A Pigouvian tax leads the market to the social optimum since consumers (or firms) buy (sell) as long as their monetary evaluation of the good exceeds the producer price plus the Pigouvian tax (as long as the price exceeds their private cost plus the Pigouvian tax).

[4] Based on recent figures of real-world emissions rather than emissions in laboratory conditions, Baldino et al. (2017) show that the real-world emissions of NOx of Diesel engines are higher than the official laboratory tests indicate (up to 7,5 times higher for euro 6 Diesel vehicles).
[5] The EU Emission Trading System (EU ETS) is a cornerstone of the European Union policy to combat climate change. Firms in industries that are covered by the EU ETS system must be able to present a permit for each ton of CO_2 they emit. Profit maximization by the firms implies that they will reduce greenhouse gas emissions up to the point that the reduction costs equal the market price of an ETS permit. For this reason, the ETS permit market prices constitute an accurate estimate of the current CO_2 reduction costs in the industry.

Pigouvian taxes constitute a decentralized solution to problems of externalities. This reduces the need to impose and enforce certain behavior and diminishes the costs of monitoring compliance. However, the above table indicates that most of the external costs depend on the place and time of car use. In our current fiscal system, excise taxes come closest to the idea of a Pigouvian Tax, in the sense that they are only levied on goods that cause negative externalities (fuel, alcohol, tobacco, high sugar beverages...). Thus, the principal form of a Pigouvian tax on transport is at present the excise tax on fuel. These excise taxes are proportional to the amount of fuel a car consumes, and thereby with its CO_2 emissions. The excise taxes on fuel do not vary, however, with the time or place where the fuel is consumed, and are thus not efficient to remedy the other external costs of road transport, principally congestion and air pollution, which depends a lot on time and place. On the contrary, intelligent kilometer charges vary with the time and place of road use. They are therefore more efficient, and are each year technologically more competitive and less costly.

Equity, i.e. the fairness of how the benefits and burdens of a fiscal reform are distributed is a second important criterion. When assessing fiscal policies in terms of equity, we distinguish in general between horizontal and vertical equity. Horizontal equity stipulates that similar cases should be treated similarly, i.e. the fiscal system should treat all individuals according to the same rules. The practical implementation of this notion of fairness is not always as straightforward as it may appear at first sight. In the real world, no two people are identical, and therefore the definition of the categories of individuals that must be treated similarly leaves a lot of space for discussion. Should the fiscal system treat workers with the same socio-demographic profile and the same income similarly, irrespective of the economic sector in which they are active, or is it fair that it treats, e.g., public and private sector workers differently?

Vertical equity refers to a fair distribution of the tax burden and of benefit policies over different kinds to households and firms. Should the rich contribute relatively more to the financing of the state than the poor, and if so, how much? Although most people would consider it fair that the rich pay more taxes than the poor, opinions on how much more will most often not coincide. The answer to this question depends on personal values and preferences. If citizens with stronger shoulders have to carry a larger share of the fiscal burden, then the state must be able to identify who has stronger shoulders. The state cannot observe innate talent but may scrutinize citizens' income. Unlike innate talent, however, incomes are largely the results of individual decisions. If income is taxed, citizens can change their behavior, creating inefficiencies. Therefore, equity comes in many cases at the price of efficiency. The question of how much efficiency one is willing to trade for a more equitable income distribution depends again on personal preferences and values. Equity does not, of course, justify all forms of inefficiency. An optimal fiscal regime or policy reform realizes the desired level of equity at the lowest feasible cost.
In practice, we often assess a tax or fiscal reform in terms of its effect on socio-economic inequality or in function of its effect on the worst off. In the former case, we study how the tax burden is divided over the different households, in function of their income level, household composition, schooling level, ethnic of social background, etc. In the second case, a focus on the worst-off studies how a tax or fiscal reform affects the poor. For this purpose, one may study the effect of a fiscal reform on poverty measures, or on the disposable income of the poorest households.
The current fiscal treatment of company cars is not only controversial from an efficiency point of view (by increasing congestion and air pollution as a negative, reducing the fiscal pressure on labour as a positive). It also divides the public for equity reasons, as company car users have on average a higher income and education level than the population at large, as explained by Ermans, Hooftman and May in chapter 4 of this book. The advantageous treatment of company cars is deemed unfair by some because it reduces the progressivity of the fiscal system, and is applauded by others for the same reason.

The last criteria for the assessment of a fiscal system or tax reform that we want to treat in this chapter are **simplicity**, **transparency** and robustness to **fraud**. The simplicity of fiscal reforms is important to limit the administrative costs of the measure. More complicated tax schemes can be desirable if they allow to reduce the inefficiency costs of taxation, or allow a tax to produce more equitable outcomes. Hence, simplicity is a virtue of the fiscal system in its own merit, but must be put in the balance against other normative criteria. Besides increasing the administrative costs of taxes, complicated fiscal systems come at the expense of transparency. Such a lack of transparency creates, for some individuals, the perception that the fiscal system is not fair and disproportionately beneficial to some (other) people, or harmful to them. Such a perception can erode the legitimacy and public support for the tax reform under consideration.
The perceived injustice of the fiscal system is also an important determinant of tax fraud. Citizens who believe that the tax system is treating them unfairly find it easier to justify for themselves that they are committing tax fraud. In that respect, a tax system that is perceived as fair can help to prevent tax fraud without implying monitoring costs. Besides, a simple and transparent tax system, defined on tax bases that are easily detectable and using calculating rules that are easily verifiable, reduces both the opportunities for tax fraud and the monitoring costs for the state.

The above list of normative criteria to assess a tax system or fiscal reform from the society's point of view is by no means exhaustive. Legal arguments can play an important role in evaluating a tax system, and one may also prefer a fiscal system that promotes the macro-economic stabilization of business cycles, etc. Moreover, the practical genesis of a tax depends to a large extent on how the different concerns are counterbalanced in the political deliberation process. Some of these concerns can resemble the above criteria, but some other may be more idiosyncratic in nature, such as short-term electoral gains or serving particular interest groups.

3. The fiscal treatment of company cars in Belgium

The term company car is used here in the narrow sense to denote cars that are made available by a company or employer to a private person working for the former, and that can also be used for private trips. In chapter 2 of this book, May reports that between 550 000 and 670 000 company cars were in use in Belgium in 2015, and comes to a careful estimate of about 625 000 company cars, or 11% of the total number of cars. These company cars have come to be a standard part of the salary package of workers and self-employed in many economic sectors in Belgium. Firms may want to provide their employees with a company car for several reasons: employees may need a car for professional trips, the image of the firm may be associated to the car of (some of) their employees or it may be fiscally attractive. Copenhagen Economics (2010) estimates that in Belgium and the Netherlands, only between 20% and 30% of the use of company cars was for professional purposes, the remaining company car use being for commuting or other private trips.

The generous fiscal treatment of company cars has come under scrutiny on the basis of many of the normative concerns that were elaborated in the previous section. Criticisms of the fiscal advantage for company cars state that it hampers allocative efficiency by steering consumption and production towards car mobility and that it encourages a form of mobility that causes important external costs (air pollution, congestion etc.). The fiscal treatment of company cars is also criticized on equity and transparency grounds: the system is said to be benefiting mainly high-income households and creates a perception of horizontal unfairness for those that do not benefit from it.

In this section, we analyse the current fiscal treatment of company cars to identify where and how the system can be considered generous. Copenhagen Economics (2010) suggests that the fiscal

system can create fiscal advantages for company cars and car mobility in general trough different elements:

- The personal income tax: by allowing for a low taxable income equivalent of an in-kind benefit such as a company car, or by allowing for generous rates at which travelling costs can be deducted from taxable income.
- Social security contributions: by requiring lower social security contributions on in-kind labour income such as a company car than on monetary labour income
- The corporate income tax and VAT: by allowing companies to deduct VAT payments on car related expenses, whereas employees would have to pay VAT on these expenses if their car were private.
- Advantageous depreciation rates for company cars (in practice of a lesser importance in the E.U.).

To establish the size of the fiscal advantage, one must compare all these elements of the current fiscal treatment of company cars to a tax-neutral reference case, where this fiscal advantage is absent. The choice of tax-neutral reference case is not as obvious as it may seem at first sight, and affects the estimate of the fiscal advantage granted to a company cars. Copenhagen Economics (2010) distinguishes in this context two principles:

- the opportunity cost principle (or tax-neutrality for the employee): the tax system is neutral in this sense if the fringe benefit reported to the fiscal authority is equal to the costs the employee would have supported to have the same car and car use.
- the firm cost principle (tax-neutrality for the employer): the tax system is neutral in this sense if the fringe benefit reported to the fiscal authority is equal to the actual costs of the car for the employer.

The second principle typically leads to lower fringe benefits because firms can on average negotiate better prices than employees for the purchasing of the car, the interest charge, the maintenance and insurance costs, fuel etc.

In the remainder of this section, we focus on the fiscal treatment of company cars regarding the personal income tax, the corporate income tax and social security contributions.

3.1. From the perspective of the employee – Personal income tax

The personal income tax is computed on the basis of the sum of net professional income, net income from movable property, net real estate income and net miscellaneous income, where "net" means after the deduction of the expenses needed to generate the income. For each category of income, the Income Tax Code (hereafter "ITC") sets specific rules to determine the net income.[6] Company cars are typically linked to professional income, since they result from the professional activity of the worker. In this sense, they are relevant in the determination of the net professional income in two regards; on the one hand they may interfere in the assessment of the deduction for commuting expenses, on the other hand, they represent a taxable income, under the form of a benefit in kind.

We first focus on the **deduction for commuting expenses**. From a theoretical viewpoint, the fiscal treatment of commuting expenses is somewhat ambiguous. If an increase of commuting costs results from an employer's change of location, this increase in expenses would logically fall under (deductible) professional expenditure by the employee. If the increase results from the employee moving to a more pleasant house, the increase in costs should count as (non-deductible) private

[6] Income Tax Code of April 10, 1992, Belgian Official Journal July 30, 1992.

expenditure. Commuting expenses are a function of the localisation decisions of employers and employees, and this ambiguity has led different European countries to treat commuting expenses differently. In practice, the Belgian taxpayer may choose between real expenses deductions or flat rate deductions. Flat rate deductions over all professional expenses (including commuting expenses) depend on the amount and the type of income[7] (e.g. 3% of the income for employees with an income larger than 20.360 euros) and are limited to 4,240 euros.[8] Under the flat rate regime, a company car user benefits from an exemption of 380 euros, which is applied on the amount of the benefit in kind. An additional flat rate deduction can be granted to employees when the distance between their home and their workplace exceeds 75 km. When the taxpayer opts for deduction of actual expenses, the following rules apply.[9]

According to Art. 49, lid 1 ITC, real expenses that the taxpayer has incurred during the assessment period with a view to acquiring or preserving taxable income may be deducted, provided he can establish the reality and the amount of such expenditures. As regards commuting expenses, they can in principle be deducted from the tax base, as a professional charge. Three categories of travel expenses must be distinguished: private travel expenses, home-work travel expenses and professional travel expenses. As regards expenses falling into the first category, no deduction is allowed, as they consist of purely private expenses. With respect to home-work travel expenses, the ITC distinguishes between the modes of transport used to make the journey. When a car is used, expenses are set at a flat rate of 15 cents per kilometer (Art. 66, § 4 & § 5, ITC). This rule applies upon condition that the employees who ask for the deduction own the vehicle, rent or lease it on a regular basis, or if the vehicle is registered in their name or is the property of their employer or company. Therefore, company cars also fulfil this condition. The number of kilometers between the home and the workplace is assessed based on a "normal" journey, considering congestion, roads conditions etc.; it must not be the shorter possible journey. When the car used for home-work trips is a company car, travel expenses may not exceed the value of the benefit in kind. Taxpayers who are provided with a company car may also deduct incurred professional commuting expenses they incur themselves (other than those between the home and the workplace). For instance, the deductible costs include fuel expenses when access to the cars is not accompanied by a fuel card. Other eligible expenses encompass the registration tax, the annual circulation tax, the amortisation of the car, maintenance and reparation costs, non-deductible VAT, etc. The share of those costs that may be deducted as expenses for professional trips is based on the kilometers travelled for this purpose relative to the total number of kilometers driven. Until January 1, 2018, these were deductible at a rate of 75 percent, accordingly with Art. 66, § 1, ITC. From January 1, 2018 (taxable year 2019), the deduction rate of these expenses is harmonised with the rate applicable for the purpose of the corporate income tax (based on CO2 emissions, see below). For reasons of legal certainty, the reform does not apply to cars that were purchased or ordered before January 1, 2018.

As regards the tax regime of the employee, the provision of a company car for private use (including commuting trips) represents a **taxable fringe benefit**. Fringe benefits consist of a professional income, supplementing normal wages or salaries, which can be given in the form of a money allowance or in the form of benefits in kind. Such an income is taxable for the purpose of the personal income tax. When the fringe benefit takes the form of a company car, Art. 36, § 2 ITC determines how to assess its value on a flat-rate basis.

[7] The ITC distinguishes different categories of professional income: employees' salaries and wages, company managers' remunerations, assisting spouses' remunerations, profits from agricultural, industrial and commercial activities, proceeds from a liberal profession, profits and proceeds from former professional activities and replacement income (Art 23 ITC).

[8] The amount expressed in euros are valid for the taxable year 2018.

[9] In this case, it is not possible to benefit from the exoneration of the reimbursement of commuting trips

Originally, until January 1st, 2010, the value of the benefit was assessed on the basis of the number of kilometers travelled, for personal purposes, multiplied by a fixed term (in euro) per kilometer travelled, depending on the engine power (in fiscal horse power) of the car. Therefore, in this system, the actual use of the car was taken into account. In addition, the criterium of the engine power was consistent with that used to determine the amount of the (regional) motor vehicle taxes.

The engine power parameter was replaced in 2009, by CO_2 emissions and the type of fuel. The value of the advantage was calculated as follows: the number of kilometers travelled, for personal purposes, multiplied by the CO_2 emission rate, and again multiplied by a CO_2 coefficient (in euro), which varied according to the type of fuel used.
From January 1st, 2012 onwards, new parameters are applied. These consist of CO_2 emissions of the vehicle and its catalogue value, according to the following formula.[10] Therefore, the reference to the kilometers travelled is forgone.

Fringe benefit value = catalogue value x (5,5 + 0,1 x (CO2 emission per kilometer – CO_2 reference rate)) x corrective (age) coefficient x 6/7

First, one multiplies the catalogue value with a coefficient of 6/7. This catalogue value is defined as the price of the vehicle, in new condition, as sold to individuals, including options and value added tax effectively paid, and regardless reduction, diminutions, rebates and discounts. Note that in light of the above distinction between the firm cost principle and opportunity cost principle, the legislator could have taken the actual purchasing/leasing costs of the car as a basis for the fringe benefit calculation, in accordance with the firm cost principle. This is a formula chosen by several other OECD countries, but not by Belgium. The use of the catalogue value reflects the price that a household would pay, and thus aligns with the opportunity cost principle. But the coefficient 6/7 can be interpreted as bringing the fringe benefit closer to the actual vehicle costs, given that the employer is likely able to negotiate a better price than the catalogue value.
A second important factor refers to the CO_2 emissions of the vehicle are compared to a reference rate, which is considered to represent the CO_2 emission average of newly registered vehicles and which is determined every year by the King (read the federal government). When the CO_2 emissions of the vehicle exceeds this amount, the basis percentage is increased by 0,1% per gram of CO_2, with a maximum of 18%. By contrast, when the CO_2 emissions of the vehicle is lower than this average, the basis percentage (5,5%) is reduced by 0,1% per gram of CO_2, with a minimum of 4%. This average corresponds, for the year 2018, to 86g of CO_2/km for cars fuelled by diesel, and of 105g of CO_2/km for cars fuelled by petrol, natural gas and liquefied petroleum gas[11]. Note that a company car's CO_2 performance is a good measure of its impact on climate change, but the last section argued that for reasons of cost efficiency efforts in other economic sectors (air & sea transport, construction & housing, industry...) should probably take priority to achieve the necessary global reduction of CO_2 emissions to reduce climate change. However, to the extent that air pollution is correlated with CO_2 emissions, fighting local pollution can also be achieved within the current formula.
Finally, this expression is then multiplied by a corrective percentage, which takes into account the age of the vehicle – i.e. the elapsed period since its first registration (Art 36, § 2, lid 2). This last element is determined as follows:

[10] Law of December 28, 2011 introducing diverse provisions, *Belgian Official Journal* December 30, 2011, as modified by the Program Law of March 29, 2012, *Belgian Official Journal* April 6, 2012.
[11] Royal Decree of December 13, 2017, modifying, with respect to benefits in kind, the Royal Decree executing the ITC, resulting from the private use of a vehicle provided for free, *Belgian Official Journal* December 19, 2018.

Period elapsed since the first registration of the vehicle	Percentage of the catalogue value to be taken into account in the calculation of the advantage
0 – 12 months	100%
13 – 24 months	94%
25 – 36 months	88%
37 – 48 months	82%
49 – 60 months	76%
From 61 months	70%

In any case, the advantage may never be below 820 euro – to be indexed (this becomes 1310 euro in 2018). When the benefit is not provided for free, the intervention of the employee must be deduced from the value of benefit in kind, as calculated according to the above-mentioned formula.

In addition, special rules apply to clean vehicles. With respect to electric vehicles the CO_2 rate to be applied is 4% (minimum rate). Regarding plug-in hybrid vehicles purchased after January 1st, 2018, new rules apply from January 1st, 2020, in order to limit their deduction and modify the calculation of the benefit in kind. The objective was to modify the tax treatment for cars that the legislator considers as "fake" hybrids[12]. For such vehicles, the CO_2 parameter used to calculate the benefit in kind is supposed to equal that of a corresponding vehicle using the same fuel type, regardless the existence of a battery. When there is no corresponding vehicle, the CO_2 emission parameter is that of the hybrid car, multiplied by 2,5.

3.2. From the perspective of the employer - Corporate income tax

Firms pay a corporate income tax on their profits, both the distributed profit (dividends) and reserved profit. The textbook definition of a firm's profit stipulates that it equals the firm's revenue minus the costs made to gain that revenue. As such, the firm deducts its different expenses from its tax base, such as its employees' salaries, the costs of raw materials etc. Some expenses, however, cannot be (fully) deducted.

Car expenses are generally classified in a category of expenses which is called "disallowed expenses". These are expenses that are not totally or partially deductible, although they fulfil the conditions of Art. 49 ITC to be characterised as professional charges. Because in the accounts, which are used to determine the tax base for the purpose of the corporate income tax, all charges are posted in costs accounting and are thus deducted from the taxable profits. However, tax rules exclude certain of these charges, which must but reintegrated into the tax base. Car expenses that may be supported by the firm, and therefore subject to a deduction, are composed of car depreciation, its accessories and equipment, insurance premiums, motor vehicle taxes, parking fees, non-deductible VAT, car hire expenses and fuel expenses.

The deduction rate of car expenses depends on the type of fuel used by the vehicle and on its CO_2 emissions per kilometer, with the idea that the least pollutant the vehicle, the highest the deduction percentage (see art. 198 bis).

Type of fuel/ CO_2 emissions per km		Deduction	Disallowed expenses
Diesel	Petrol		
0g	0g	120%	0%
< 60g	< 60g	100%	0%
> 60g – 105g	> 60g – 105g	90%	10%
> 105 – 115g	> 105g – 125g	80%	20%
> 115g – 145g	> 125g – 155g	75%	25%

[12] Law of December 25, 2017, reforming the corporate income tax, *Belgian Official Journal* December 29, 2017, in particular Art. 3.

> 145g – 170g	> 155g – 180g	70%	30%
> 170g – 195g	> 180g – 205g	60%	40%
> 195g or no available data	> 205g or no available data	50%	50%

Electric vehicles are assimilated to the category of vehicles emitting 0g of CO_2 per kilometer and, therefore, can be deducted at a level of 120%. Regarding hybrid vehicles, CO_2 emissions and the fuel are assessed on the basis on the data applicable to the combustion engine. Nevertheless, this rule is modified from January 1st, 2020, for plug-in hybrid vehicles purchased after January 1st, 2018, as commented in the section of this chapter related to the benefit in kind. In addition, there are certain exceptions to this rule. In particular, fuel expenses are always deductible at 75 percent, regardless the type of fuel used by and the CO_2 emissions per kilometer of the vehicle. This means that 25% of fuel expenses must be reintegrated into the tax base. Fuel expenses also include electricity used to charge electric vehicles.

From the fiscal year 2021 on, the deduction rate formula for car expenses will be modified as follows:

120% - (0,5 % * fuel coefficient * CO_2/km)
Coeff. Diesel: 1
Coeff. Petrol: 0,95
Coeff Gas (engine power < 12 fiscal horses): 0,90

For particularly pollutant cars – those emitting 200 gr CO_2/ km or more – the deduction will be limited to 40 percent. Furthermore, electric vehicle expenses deduction will be limited to 100 percent, instead of 120 percent previously.

Car expenses corresponding to the *private use* of the vehicle are considered as professional charges, normally deductible at a rate of 100 percent, just like salary expenses. Indeed, as mentioned, from the perspective of workers, benefiting from a company car for their private and home-work trips is qualified as a benefit in kind. However, Art. 198, § 1st, 9°-9°bis characterize a share of the amount of the benefit in kind resulting from the private use of a company car as a disallowed expense. It is assessed on the basis of the following formula:

Disallowed expenses: **17/100 x Fringe benefit value**

The underlying purpose of this provision is that the employer should bear a part (1/7) of the fiscal cost associated with the benefit in kind of the employee.

However, from January 1st, 2017, when the company also provides the fuel necessary to the company car, the expense is calculated as follows:

Disallowed expenses: **40/100 x Fringe benefit value**

Finally, the amount of disallowed expenses must be reduced by the intervention of the employee when the vehicle is not provided for free (Art. 36 ITC).

3.3 Social Security contributions

For the purpose of social security law, providing a company car is not qualified as a remuneration and, therefore, does not give rise to the payment of ordinary social security contributions. However, a solidarity contribution (CO2 contribution) for the use of a company car is due by the employer

on the benefit resulting from the private use of a company car, regardless the possible financial contribution of the employee[13]. This contribution aims to finance national social security.

There is a presumption that the company car is provided to the employee for private usage, unless the employer demonstrates either of the following conditions:

- That the private use exclusively benefits to a person who is not included in the scope of the social security scheme for salaried workers;
- That the use of the vehicle is strictly professional.

The amount of the monthly contribution is calculated as follows, with a minimum of 26,47 euros:

Fuel	Formula	Index coefficient
Petrol	[(CO_2 x 9) – 768] / 12	X 1,2708
Diesel	[(CO_2 x 9) – 600] / 12	X 1,2708
LPG	[(CO_2 x 9) – 990] / 12	X 1,2708
Electric	20,83 euros	X 1,2708

Taken all together, these elements of the current fiscal system make that rewarding labour in the form of a company car is more advantageous than a compensation in monetary terms. The reader will be able to change all the above parameters (and more) in the online simulation tool CoCaTax, which is presented in section 5, and use it to evaluate the consequences of such a reform. One possibility would be to supress the fiscal advantages for company cars and reduce the overall fiscal pressure on (labour) income. This would imply that beneficiaries of a company car, mainly active in the private sector, lose their fiscal advantage in exchange for a reduction in fiscal pressure for a far larger subset of the population. The recent political consensus seems to prefer fiscal reforms that limit the reduction in fiscal pressure to the part of the population that currently benefits from the fiscal advantages for company cars, as the two reform scenarios in the next section illustrate.

4. Reform scenarios: Mobility allowance (or 'cash for car') and the mobility budget

The generous fiscal treatment of company cars has come to be under scrutiny in Belgium as it is in most other OECD countries. On the one hand, the acute congestion problems that Belgium faces and increasing awareness of the health damages due to air pollution mean that the implicit subsidies to car mobility implied by the current fiscal treatment of company cars loose political support. On the other hand, the high fiscal pressure on labour incomes makes it difficult to entirely abandon the fiscal advantages currently provided to those having a company car. For these reasons, the federal government has taken several initiatives in the past years that try to reconcile a reduction of the fiscal pressure on labour income, especially in the private sector, with a decrease of the fiscal advantages for car mobility. In this section, we discuss two of these reforms: the mobility allowance and the mobility budget.[14]

4.1 The mobility allowance

The mobility allowance – also known as "cash for car" – was introduced by the law of March 30, 2018[15]. This new scheme enables workers who are provided with a company car for a certain duration to exchange this car against a mobility allowance that benefits from the same advantageous

[13] Administrative instruction of the NSSO, 2018/1 and Art. 38, 3 quarter of the Law of June 29, 1981 setting general social security principles for paid employees, July 2, 1981.
[14] The following paragraphs concern the « normal » tax framework that applies to the benefits of corporations. Specific schemes, which apply for instance to investment companies are not considered here.
[15] Law introducing a mobility allowance, *Belgian Official Journal* May 7, 2018.

tax and social status than that of a company car. The purpose of this measure is to reduce the level of congestion on Belgian roads. Based on this background, it is aimed to provide an alternative, comparable to company cars in terms of remuneration costs, under the form of an amount of money, benefiting from the same advantageous scheme as a company car. In other words, the purpose of the reform was to enable a reduction of company cars through the substitution of this benefit in kind by a favourably taxed amount of cash.

The **legal regime** of the mobility allowance applies to workers who return their company car. For this purpose, the concept of worker is given a broad meaning; they are referred to as any person who provides work under the authority of another person, even though these benefits are provided in the public sector or for free. Company cars are defined as vehicles, as referred to at Art. 65 ITC (cars, mix cars, minibus, etc.), which are registered in the name of the employer or which are subject to a contract of use (leasing, hiring, etc), concluded in the name of the employer and put at the disposition of the employee for its personal use (home-work commuting and/or purely private commuting). The regime relies on a voluntary basis; it results from the voluntary agreement between the employer and the employee. On the one hand, the employer may take the initiative to instore a mobility allowance and to determine the possible conditions that need to be fulfilled. On the other hand, the employee is free to accept or reject this offer.

In the current framework, the mobility allowance is limited to companies in which the employer has been providing company cars for a certain duration. In addition, employees must also fulfil the following conditions. At the moment of the demand, they must have benefitted from a company car for at least three months without interruption. Moreover, during the past 36 months before the demand, they must have benefitted from a company car during at least 12 months with their current employer. This provision was deeply criticised by the Council of State as it was a source of discrimination.[16] Granting the mobility allowance generates, in principle, the removal of the company car and all other advantages that are linked to it (e.g. the fuel card), as well as the exemptions allowed for the commuting trips. The law of March 30, 2018 also regulates the cases in which the mobility allowance must be disqualified.

The amount of the mobility allowance is calculated on the basis of the catalogue value of the returned company car, as computed for the evaluation of the benefit in kind. This corresponds to the price of the vehicle, in a new condition, as sold to individuals, including options and value added tax effectively paid, and regardless reduction, diminutions, rebates and discounts. The mobility allowance equals, per year, twenty percent of 6/7 of this catalogue value, except when the employer took over fuel expenses for the private use of the returned vehicle. Then, the percentage is set at twenty-four percent. The amount effectively perceived is not subject to the personal income tax. However, the taxpayer should declare of fringe benefit of 4% of 6/7 of the catalogue value.

Mobility allowance, company car without fuel card: **catalogue value * 6/7 * 20 %**
Mobility allowance, company car with fuel card: **catalogue value * 6/7 * 24%**
Mobility allowance, fringe benefit: **catalogue value * 6/7 * 4%**

The amount obtained is reduced by the possible personal intervention paid by the employee to benefit from the company car. The personal intervention is assessed on the basis of the amount paid during the last month before the company car return, and then multiplied by twelve, in order to obtain the annual basis. Specific calculation methods apply for a number of particular cases. The amount obtained represents a fixed value that does not vary during the entire employee's career but that is indexed. As regards the tax regime of the employer, 17 percent or 40 percent of the

[16] Council of State, advice n°62.233/1/3 of November 14, 2017, *Parl. Doc.,* Chamber of Repr., 2017-2018, 54-2838/1, p. 63 and f.

mobility allowance is qualified as a disallowed expense, depending on whether fuel expenses of the returned car were paid by the employer or not. In addition, the mobility allowance is deductible at a rate of 75 percent. For the purpose of social security law, the mobility allowance is not characterized as a remuneration. Hence, it does not give rise to the payment of social security contributions. Nevertheless, just like in the case of company cars, a CO2 solidarity contribution is due. It is computed on the basis of the amount of the last solidarity contribution paid, as calculated for the vehicle replaced by the mobility allowance.

Bringing these elements together, a few things stand out with respect to the mobility allowance. First, this reform maintains the fiscal advantage for company cars, by making only a fraction of the allowance taxable and keeping the social security contributions equivalent to those on a company car. The allowance is also specifically targeting current users of a company car, thus excluding, e.g., the largest part of public sector workers, who are paid at legally fixed monetary salaries. This construction raises some questions about horizontal equity in the public debate. Second, the amount of the allowance is based on the catalogue value of the company car and not on the total costs of the actual use of the company car. This feature will be highlighted in the analysis in section 6 of this chapter. Third, this particular formula to fix the amount of the mobility allowance also risks encouraging forms of strategic behaviour by the employees and employers. Because the amount is determined on the basis of the company car's catalogue value at the time of switching to the mobility allowance, employees (and employers) have an incentive to wait for a career stage that implies a large and expensive company car. Moreover, since the solidarity contribution paid on the mobility allowance depends on the engine type of the company car handed in, employees and employers have an incentive to invest in a clean car for two years to reduce to social security contributions in the remainder of the career. A two year reduction in car emissions can thus come at considerable overall cost for social security.

4.2 The mobility budget

The implementation of a mobility budget was discussed at the Chamber of the Representatives, prior to the adoption of the mobility allowance (or 'cash for car'). This option was actually supported by the Council of State, different organisations (the NLC and the CEC) and by a number of deputies. The objective seems now, a few months after the adoption of the law of March 30, 2018 introducing the mobility allowance, to complete the mobility allowance scheme. Indeed, given that the mobility allowance represents an "all or nothing" solution, because the company car is either returned or retained, the government considers it appropriate to offer a second alternative to employees, under the form of a mobility budget.

The mobility budget could be used to finance a company car that is respectful of the environment and / or alternative and sustainable modes of transport. The remaining amount is given in cash to the worker. The eligible company cars are either electric cars or cars emitting maximum 95g of CO_2, while the sustainable modes of transport include "soft" mobility, collective transport and shared transport. The choice for employees to live close – within a perimeter of maximum 5 kilometer – to their place of work is also encompassed in this category.

Just like the mobility allowance, the mobility budget is based on the agreement between the employer and the employee, and should be non-discriminatory. The amount of the mobility budget is calculated on the basis of the gross yearly cost for the employer generated by a company car, including the fiscal and para-fiscal expenses and other expenses such as financing costs, fuel costs and the solidarity contribution. It is also provided that the mobility budget, contrary to the mobility allowance, evolves with the position of the employee.

From a tax perspective, the mobility budget is treated as follows. The first pillar – the "clean" company car – is taxed like a 'traditional' company car. This notably implies that a solidarity contribution must be paid by the employer, and that this advantage represents a taxable benefit in kind for the worker. Nevertheless, these financial contributions will generally be lower than those due for traditional company car because these clean vehicles will emit less CO_2. The second pillar – sustainable mode of transport - is totally deductible by the employer and exonerated from taxes for the employee. By contrast, the third pillar - cash - is subject to an *ad hoc* social contribution of 38,07 percent. This amount corresponds to the sum of social contributions due by the employer (25 percent) and those due by the employee (13,07 percent) on the 'ordinary' salary. The underlying purpose is to discourage the use of the third pillar, and favor the second one.

Note that the mobility budget remedies some potential weaknesses of the mobility allowance, by making the total amount a function of the actual costs and by allowing the mobility budget to evolve throughout an employee's career. This reduces the scope for the kind of strategic behaviour that was discussed above. However, to the extent that the systems of mobility allowance and mobility budget co-exist and that lawmakers leave it up to citizens to choose between both systems, the combination of systems will result in higher fiscal advantages than if only one option was available. This is because, if given the choice, mainly employees that make very little use of their company car stand to gain substantially from a mobility allowance. More intensive company car users benefit more from the mobility budget or from keeping their company car. Section 6 illustrates how CoCaTax can be used to study these reforms.

5. CoCaTax: A micro-simulation model for Company Car Taxation

The previous sections of this chapter have illustrated that the fiscal regime with respect to company cars is relatively complicated, because it is affected by several fiscal instruments. These instruments are mainly the personal income tax, the corporate income tax, the VAT and excise taxes, social security contributions. Reforms of the fiscal treatment of company cars may either target the tax base of these instruments or their rate structure. We have constructed an online interactive simulation tool, which we baptized **CoCaTax** (for Company Car Taxation) and which is available on www.CoCaTax.be, to analyze such reforms.[17] This simulation tool allows the users to specify themselves the reform they want to analyze, by allowing them to change the parameters concerning the treatment of company cars in the different fiscal instruments. CoCaTax also includes the 'Cash for Cars' and 'Mobility budget' scenarios, as well as a number of parameters indicating how the user expects the individuals in the dataset to react to these reforms. For each simulated scenario, CoCaTax presents a detailed graphical analysis of the consequences of the reform on the revenue of the different levels of the state (for each instrument), on the disposable income of individuals (per region, sectors, age, etc.), on measures of poverty and inequalities, on mobility, on labor costs, etc.

CoCaTax is a **micro-simulation model** of the fiscal instruments regarding company cars, i.e., a model that simulates the fiscal system on micro-data. Figure 1 illustrates the construction and functioning of a micro-simulation model such as CoCaTax. The different steps in the construction and functioning of a micro-simulation model are indicated by the numbers in the heptagons next to the flow arrow.

[17] CoCaTax was written in the statistical language R using the Tidyverse collection of packages for data analysis, Shiny package for the web interface, the ineq and gglorenz packages for the inequality analysis, and fBasics, xtable, reshape2 and scales for basic mathematical and statistical operations. The website www.CoCaTax.be runs on DigitalOcean servers using Docker and Shiny Server.

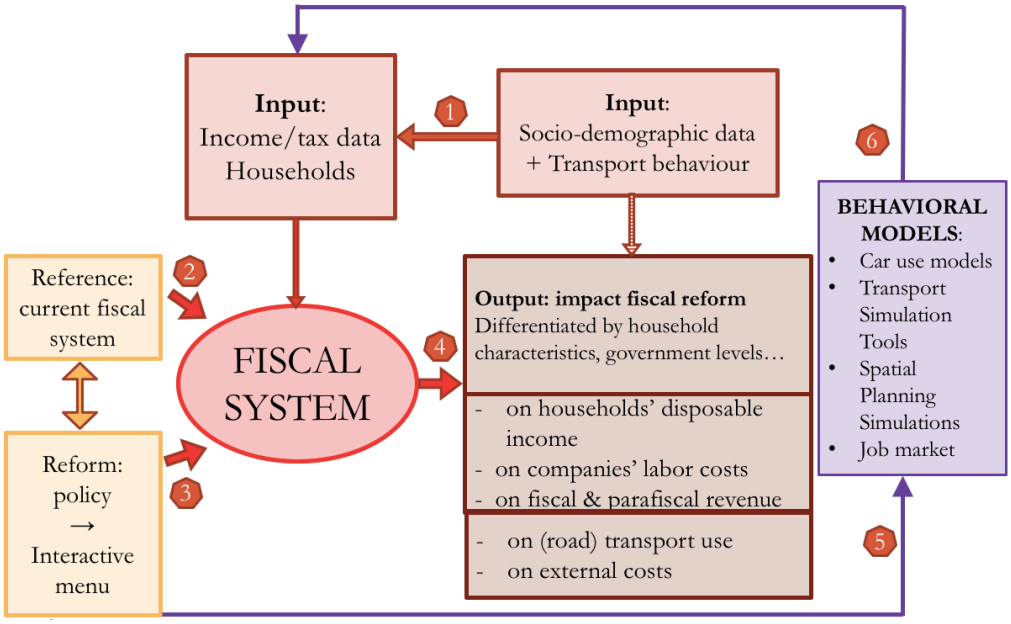

Figure 1: Schematic summary of a micro-simulation model

The first step (arrow 1) in the construction of a micro-simulation model consists of building a suitable **micro-dataset**. The model uses data on the socio-economic background of each individual, the information needed to compute their fiscal and para-fiscal revenue (different income sources, household composition, etc.), and detailed information related to their fringe benefits in general, and company car in particular (characteristics of the cars, fuel card, kilometer driven for professional and private use, etc.). To our knowledge, no existing representative dataset covers all these required pieces of information for Belgium. We therefore merge different existing datasets, each containing parts of the required information, into one single dataset with all the necessary information by means of statistical matching techniques. The foundation for the synthetic dataset on which CoCaTax runs is the latest round of the EU-SILC dataset, the European Survey on Income and Living Conditions. This dataset contains a lot of information on the socio-economic background, income sources and major expenditures for a representative sample of about 27 000 Belgian citizens. The EU-SILC dataset does not, however, contain information about transport behavior in general and company car use in particular. To this end, we employ a second dataset (the "donor dataset") that contains detailed information about company car use and mobility, and use it to complete the EU-SILC data. We identify for each individual in the EU-SILC data the individual that is the most similar in the donor dataset, and use the information on this individual's mobility and company car use to fill the EU-SILC data. To find the best fit, we use a technique called 'minimal distance random hot deck matching'. We identify a range of socio-economic variables that are present in both datasets, and select two subsets of variables for our statistical matching procedure. The first set contains categorical variables, such as gender, employment status, region, economic sector of activity (public sector, private sector) and education level. When searching for the best match for an individual in the EU-SILC data, we only consider individuals in the donor dataset with the same characteristics over these categorical variables. A second set of common variables (e.g. labor income, age, number of children) is then used to determine the most similar individual in the donor dataset, and use the information w.r.t. the company car and mobility in the donor dataset to complete the EU-SILC data in this respect. After doing this for all individuals, we verify whether the resulting dataset fits on the aggregate level with the real-world data, and we correct the matching procedure where it seems necessary. Note that merging two datasets by statistical matching should result in a synthetic dataset that corresponds statistically to the real world on average, but not at the level of an individual observation. Figure 2 illustrates this

process for only 3 variables, with 'education' as a categorical variable, 'income' as a continuous variable and 'car' as the variable that is missing in the receiving dataset. For individual 12 in the receiving dataset, we look amongst the individuals in the donor dataset with the same education level for the one that is most similar in terms of income, and copy the car information of this individual into the receiving dataset.

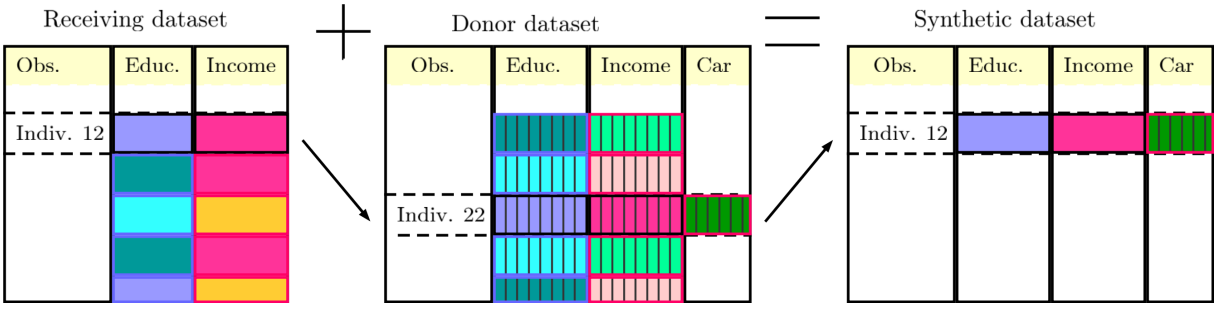

Figure 2: Hot deck minimal distance statistical matching

We then feed the resulting synthetic dataset in CoCaTax to simulate core elements of the personal income tax, corporate income tax, the VAT and the social security contributions. CoCaTax computes a simplified version of the fiscal system, but includes the elements related to the treatment of company cars in much more detail. For the personal income tax, CoCaTax considers the details of the basic rate structure and zero rate band as well as the fiscal treatment of fringe benefits and company cars but it makes abstraction of most deductions, reductions or tax credits that are unrelated to company cars. CoCaTax models the general rate structure of social security contributions for employees and self-employed, and include the details of the solidarity contribution associated to the company cars. Similarly, CoCaTax only computes the elements related to the treatment of company cars in detail for the corporate income tax and VAT.
The model simulates the above elements of the fiscal system twice. CoCaTax first applies the current fiscal system (Figure 1, arrow 2), computing for each individual in the synthetic dataset the different tax contributions, disposable incomes etc. Next, CoCaTax allows its users to define a fiscal reform w.r.t. the treatment of company cars in its interactive user interface, compares the results of the baseline and reformed fiscal system and summarizes the effect of the reform in a broad range of tables and graphics (Figure 1, arrow 4). Because the analysis in CoCaTax focuses on the differences before and after the fiscal reform, the fact that large parts of the different fiscal instruments are only computed in a highly stylized version in CoCaTax is less of an issue. Since the details of the fiscal instruments that are unrelated to the treatment of company cars do not change in the reform, they would cancel out anyway when CoCaTax computes the difference between the situation before and after the fiscal reform.

The above scheme describes the bare essence of a micro-simulation model of the fiscal system. It is arithmetic in the sense that it applies the rules of the baseline and reformed fiscal system to each individual in the micro-dataset, assuming that they do not alter their **behaviour** after the reform. This sort of analysis is sometimes referred to as an analysis of the "day after effects" of a fiscal reform. i.e., the effects of the reform before the individuals adapt their behavior to their new environment. However, (one of) the main argument in favor of a reform the fiscal treatment of company cars is precisely the expected behavioral changes they would induce. The fiscal treatment of company cars cause socially undesirable impacts, among others in terms of congestion or air pollution. Reducing (the growth of) car use, making people switch from more polluting Diesel engines to gasoline or other engines, making people trade heavier company cars with bigger engines for smaller ones, are crucial aspects of the evaluation of reforms of the fiscal treatment of company cars.

Simulating behavioral reactions to fiscal reforms is *stricto sensu* not a part of micro-simulation models, but is managed by behavioral modules that can be integrated in the simulation model. In CoCaTax, the behavioral module uses an estimation of how individual (company) car users react to changes in the fiscal treatment, i.e. to changes in relative price, of a (company) car (Figure 1, arrow 5). Behavioral changes may occur in terms of the modal choice among car, train, bus, bicycle etc., in terms of the choice of different car models, of the total distance covered etc. Based on the the changes in the relative prices of the different mobility options, the behavioral module then reconsiders the (mobility) behavior of each individual in the synthetic micro-dataset (Figure 1, arrow 6). If the behavioral model indicates that an individual who currently drives a BMW 320 D company car is most likely to switch to a Toyota Prius hybrid car and use his bicycle half of the time to commute to work, then the behavioral module changes the data for this individual accordingly in the synthetic dataset. In doing so for each individual, CoCaTax creates a second counterfactual dataset that considers the estimated behavioral reactions to the fiscal reform. Cocatax then computes the outcomes of the reformed fiscal rules applied on the new dataset, and compares it to the benchmark scenario.

CoCaTax is designed as a polyvalent and modular platform to allow for further **updates and upgrades**. Some of the modules that represent elements of the fiscal system in a simplified form in early versions of CoCaTax will be developed later on to cover the fiscal system in more details. The design of CoCaTax allows for such upgrades without significant interference in the remainder of the simulation model. The most recent information about what is included in the latest version of CoCaTax can be found in the version release notes, which can be found in the Documents section of CoCaTax.

Note that CoCaTax has an important number of **limitations**. These limitations are related to the limited reach of the micro-dataset on which CoCaTax runs and to the highly stylized fashion in which most fiscal instruments are modelled and analyzed in this model. Data limitations are a consequence of different factors. First, the EU-SILC is a representative dataset, but all in all a relatively limited sample of the entire population, and thus subject to potential sampling errors. Second, although EU-SILC data are relatively rich when it comes to income variables, the data are not detailed enough to fill in all fields of, e.g., a personal income tax form, such that we have to rely on approximations on many instances. Third, the EU-SILC are based on survey, and respondents can lie or refuse to answer (especially on their income, debt etc.). Fourth, the statistical matching procedure to merge different datasets is necessarily imperfect, and will generate some additional distortions in the data. Fifth, in order to protect the confidentiality of our micro-data while making to interactive simulation tool available online, the data used in the online version of CoCaTax are simulated from the original data. These simulated data are drawn according to the precise joint distributions of the original data, and the online version of the simulation tool is extensively compared to the simulation tool on the real data to validate it, but this process is bound to generate some extra noise on the results as well.

Nevertheless, CoCaTax computes a broad range of elements of the fiscal treatment of company cars, for a broad and representative sample of society, and shows the final results of these computations in a transparent fashion. In this sense, although far from perfect, it should provide anyone interested in this issue with a far more detailed and broad view of the impact of a fiscal reform than the usual computations done for a few 'representative' cases (typically, a single person with average income and a married couple with 2 children and average income).

6. Cash for car and the mobility budget: preliminary results

In this section, we use CoCaTax to study the effect of the mobility allowance and the mobility budget on public finance, firm profits and workers' disposable incomes. At the time of the redaction of this chapter, CoCaTax still runs on test data dating from 2006-2008, so the figures of this section should be interpreted with care. Furthermore, the simulation tool does not yet include a proper behavioural module to predict which individuals choose to trade in a company car for the mobility allowance or the mobility budget.[18] Rather, CoCaTax users choose the probability with which a worker turns in a company car. Workers can therefore trade in a company car in the present simulation results while it is disadvantageous in terms of disposable income. Similarly, a firm may lose money if a worker turns in his car and therefore might decide to refuse such a request. That being said, the workers' decisions depend on their utility, not only on their disposable income; e.g., environmental concerns matter as well. It is possible that workers who lose in monetary terms by turning in a company car do anyways in reality. In the same spirit, a firm whose costs would increase if a worker returns his company car may be in favour of it, e.g., to develop its image.

We will limit our attention in this chapter to the average effects of the reforms per turned in company car for the employers, the employees and the state. We only analyse a benchmark scenario where the reforms - mobility allowance and mobility budget - are imposed on all company car users rather than left to the discretion of employees and employers. The results should however be qualitatively similar if only a fraction of company cars were abandoned, since we only look at the average effects. Finally, we also restrict ourselves to the default parameters of the two reforms, i.e., as currently foreseen by law or law project. Readers are invited to test a broad set of variations on this scenario themselves on www.CoCaTax.be.

The net profits of employers are affected by the reforms for many reasons: the total costs of providing a company car can disappear or change if a smaller car is provided; the mobility allowance or mobility budget have to be paid; the solidarity contribution is replaced by a social contribution on the cash received under the mobility budget; the financial contribution of the workers for the private use of a company car disappears and, finally, the VAT paid on the professional trips cannot be reimbursed anymore. When a car is turned in, the firm continues to pay the costs of professional trips. For the present exercise, we assume that these costs are on average 25% lower if the company car is replaced by a smaller and cheaper car. Where we compute the variation in employee's disposable income, this is defined as the sum of monetary incomes (salary, mobility allowance and the cash of the mobility budget) net of taxes and of the monetary value of private mobility services provided by the firm (sum of company car costs associated with private trips and the part of the mobility budget spent on durable transports). Finally, we will assume for the sake of simplicity that VAT and corporate income tax revenues are fully allocated to the federal government, while the personal income tax revenue is split between federal, regional and local governments.[19]

In CoCaTax, the reforms increase the pie to be shared amongst employees, employers and the state because cheaper cars are used for professional trips. This also implies a change in how the pie is shared among those agents. Table 2 contains the results presented and analysed in this section, by providing the decomposition of the effects of the reform through the different mechanisms.[20]

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[18] Other behavioral modules will also be added at a later stage (e.g. multimodal transport choices, labour demand and supply, consumption model...)

[19] 24.957% of the State Tax (i.e., the "Impôt État", "Belasting Staat") is allocated to the regional governments. In line with the EUROMOD country report for Belgium (Hufkens et al., 2017, p. 57), we further assume that the local tax rate is set at 7.5%.

20 The first lines are devoted to the variables that determines the employees' consumption, followed by firms profits and fiscal and parafiscal revenues. The numbers in the column "mobility allowance" and "mobility budget" represent the difference, for each variable of interest, between the company car regime and the reform scenario. The numbers represent the effect of the reform in € per turned in car per year. Positive numbers indicate that the reform is favourable.

Table 2: Impact of the reforms on the differents actors

	Mobility allowance	Mobility budget
Workers	**-247**	**159**
Consumption (VAT included)	-299	193
Financial contribution	*585*	*585*
Mobility allowance	*4 830*	*0*
Mobility budget	*0*	*5 997*
Cash	0	923
Sustainable transport	0	923
Company car and fuel card	0	4 151
Initial fringe benefits	*-5 785*	*-5 785*
Total cost of company car and fuel card	-6 582	-6 582
Cost of business trips	797	797
Employee contributions	*0*	*-102*
PIT	*70*	*132*
Business trips after the reform	*0*	*-634*
VAT	52	-33
Firms	**81**	**5**
Labour cost (including business trips)	532	-103
Financial contribution	*-585*	*-585*
Mobility allowance	*-4 830*	*0*
Mobility budget	*0*	*-5 997*
Company car	*5 474*	*5 474*
Fuel card	*1 108*	*1 108*
Ordinary employer contributions	*0*	*-195*
Solidarity employer contributions	*0*	*91*
Business trips after the reform	*-634*	*0*
Recoverable VAT	-450	-166
CIT	0	275
Government	**300**	**-235**
PIT	-70	-132
Federal	*-49*	*-93*
Regional	*-16*	*-30*
Local	*-5*	*-9*
CIT	0	-275
VAT	370	172
Workers	*-52*	*33*
Firms	*422*	*138*
Social Security	**0**	**205**
Employee contributions	0	102
Employer contributions	0	103
Ordinary	*0*	*195*
Solidarity	*0*	*-91*
Total	**134**	**134**

6.1 Mobility allowance

We first analyse the effect of the mobility allowance on disposable income. First, the reform induces, on average, a reduction in personal income taxes of 70€ per year for those who turn in

their company car. Under both regimes, the gross salary is kept identical in CoCaTax,[21] but a change occurs in the fiscal value of the fringe benefit, i.e. the amount of fringe benefits reported in the fiscal declaration. It is equal to 4% of 6/7 of the catalogue value of the returned car (without fuel card) under the mobility allowance, and on average more than that under the current company car regime.[22] Second, however, the value of the company car for the employee, which we assume to be equal to the cost supported by the firm for the private trips (opportunity cost principle), is on average higher than the cash obtained under the reform (respectively 5785€ and 4830€). Since the latter effect dominates the personal income tax effect and the reform does not change social security contributions (both for employees and employers), we find that the disposable income of the employees is reduced by 299€ per year for those who turn in their company car. Figure 3 depicts the effect of the reform on each individual as a function of their commuting distance, which can be understood as a measure of the importance of private use of the company car. The reform benefits on average those living close to their work (less than 15 kilometers), and thus having a relatively low private use of the company car, while it reduces the disposable income of the others. The reason is that the amount of cash obtained under the mobility allowance does not depend on the kilometers driven for private purpose.

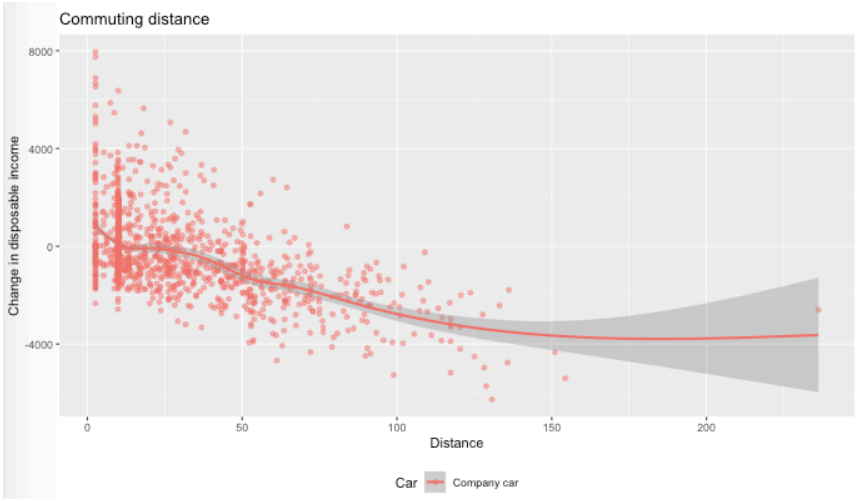

Figure 3: Change in disposable income in function of commuting distance

For the fiscal and parafiscal revenue, we find that the fiscal revenue increases globally. It increases for the VAT, decreases for the personal income tax (see above) and does not change significantly for the corporate income tax (respectively 370, 70€ and 0€ per turned in company car). The VAT revenues are affected by two channels. First, the VAT due on business trips can only be recovered by the firm when made by company car. Under the mobility allowance, the firm thus contributes more to the VAT. Second, the VAT paid by the employees on their own consumption decreases due to a reduction in disposable income. We find that the first effect dominates (422€ and 52€ per returned car respectively), resulting in a higher amount collected by the state.[23] Corporate income taxes are nearly not affected. On the one hand, both the deductible sums (the cash and the cost of the company car, respectively) and the rate applied to these sums decrease under the reform. On the other hand, firms can deduct their additional VAT expenses under the reform. Adding up these

[21] The current version of CoCaTax lacks a general equilibrium model that can predict such changes in labour costs in the market equilibrium.

22 This proportion would be equal to 6/7 of 4.84% for a gasoline vehicle with CO2 emissions of 105 g/km and aged between 2 and 3 years. Notice however that the personal income tax may increase for individuals that were paying a deductible financial contribution or for those having and electric vehicle.

[23] The 52€ should however be seen as an upper bound on the expected effect on VAT as we assume that the cash obtained in return of the car is entirely spent on expenditures that are taxed at a VAT rate of 21%.

effects, the employees pay on average 0.19€ less of corporate income taxes per turned in company car. The overall effect on the federal government is slightly positive while the other levels of the state see a small reduction of their revenue. Finally, for the parafiscal revenue we see no change, because social security contributions are by construction kept constant in the mobility allowance reform.

The employers' profits increase on average by 81€ per year per turned in company car. The main reason is that the additional VAT paid is more than compensated by the reduction of the labour cost.

6.2. Mobility budget

We now turn to the mobility budget, an amount paid by the employer to the employee who turns in his company car and which can be allocated on (cleaner) company car expenses, sustainable transport expenses and cash. The mobility budget is the difference between the total cost of the company car and the financial contribution of the employee, and amounts on average to 5997€ for our test data. We assume that 80% of mobility budget beneficiaries keep a company car after the reform and that the fraction of the remaining budget allocated to cash is drawn from a uniform distribution on 0%-100%.

In this case, the disposable income increases on average by 193€ per year per person. Even though the employees' social contributions increase (they are due on the cash pillar but not on the declared fringe benefits), they pay lower personal income taxes (the part of the mobility budget that is not spent on a company car is exempt from personal income taxation) and benefit from the cheaper car used for professional trips.[24]

The fiscal revenue of the federal government shrinks. In addition to the reduction in personal income taxes discussed above, the higher amount of VAT collected is more than compensated by a reduction of corporate incomes taxes (172€ and 275€ per turned in car respectively). VAT revenues increase both because the costs incurred for business trips are deductible for company cars but not for private ones, and because disposable income, and therefore most likely consumption, increases. The corporate income tax revenues decrease since the mobility budget is equivalent to the cost of the company car, but only a fraction of company car expenses are deductible while the cash and the sustainable transport expenses can be fully deducted by the employer. Parafiscal revenues increase as well, because the higher ordinary (i.e., employer and employee) social contributions collected on the cash part of the mobility budget outweigh the reduction in solidarity contributions paid on the company cars in the current setup.
The employers' profits increase on average by 5,06€ per year per turned in company car. The main reason is that the additional VAT paid and the higher labour cost are compensated by a reduction in corporate income tax.

7. Conclusions

This chapter has depicted the current fiscal treatment of company cars in Belgium as well as two recent fiscal reforms w.r.t. company cars. It has also sketched the theoretical framework and has introduced CoCaTax, an online simulation tool to analyze reforms of the fiscal treatment of company cars. In some ways, the problem with company cars is more acute in Belgium than in other OECD countries. The European Commission (2017) singles out Belgium as the European

[24] The amount of the mobility budget is equivalent to the entire company car costs, not only the private ones. Therefore, we assume that the mobility budget beneficiaries pay the professional trips. Since they use a smaller car, they get the surplus associated to the cost difference of the professional trips (854€ and 692€ on average before and after the reform)

Union's most congested country and identifies congestion and delays in transport as one of the principal strains on Belgian economic growth. At the same time, the tax burden on labor income is very high in Belgium, and in many respects the highest in the OECD (OECD, 2018). The two recent reforms, 'cash for cars' and the 'mobility budget', aim at maintaining the fiscal advantage of the current treatment of company, while at the same time being more appropriate considering the congestion and air pollution issues.

CoCaTax allows the public at large to simulate and assess *ex ante* fiscal reforms in the treatment of company cars with respect to the personal income tax, social security contributions, the VAT and the corporate income tax. CoCaTax simulates the effect of a reform for each individual in a representative sample of Belgian society, based on the SILC data from Eurostat, and presents an extensive analysis and visualization of the consequences of the chosen fiscal reform to the users. As CoCaTax is currently running on outdated test data, we have only included a rough policy analysis to illustrate the potential of CoCaTax. In the near future, we will analyze in detail these two reforms and others with representative data. We will also enrich the model to include missing instruments such as excise taxes. Finally, we will model behavior. The proposed reforms explicitly aim at changing individual mobility behavior. We will integrate a proper multimodal transport model to predict individual reactions of car users (company and private car use, other transport modes, characteristics of the vehicles, etc.) and their effect on congestion and air pollution.

In a second step, we plan to enlarge the scope of the model to include the interaction between private and public transports, and to analyze the effect of the introduction of congestion charges. Public and private transport being substitute mode of transport, they are interconnected: a public policy affecting the price (fiscal treatment of company cars, public transport subsidies, excises, etc.) or the infrastructures (RER, carpooling or bus lane, etc.) in one segment affects the demand for mobility in both segment. Public transports cause fewer external effects than private ones, and as such should be accounted for in a model that aims at evaluating, among others, the effect of public policies on congestion and pollution. Being able to analyze the interaction of public and private transport policies in a microsimulation model also enables the policymaker to identify the effect of the policy at the individual level, and therefore helps understanding its distributive effects. In that respect, the kilometer or congestion charges, which are by many considered to be the most efficient solution to congestion and air pollution, also raises several interesting questions. If company car users can avoid paying (part of) their kilometer charges, then they will not adapt their commuting behavior in the same proportion as others. This would therefore limit the effect of the policy on congestion. In addition, company car users would then be among the main beneficiary of the higher fluidity of the road traffic, thereby fostering the debate on the equity effect of kilometer charges.

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