Self-driving cars could lead to a significant increase in traffic[1]

By Arie Bleijenberg[2]

Although the car is the dominant means of transport in the Netherlands, it also incurs significant social costs. Until now, these costs have been limited by how much time people are willing to spend on mobility. However, the arrival of self-driving cars, which can drive empty, could change this. This requires extra attention from the government.

In brief

- Although car use per inhabitant has remained stable since 2000, traffic has increased because cars are being shared less frequently.
- Without government regulation, the introduction of fully self-driving cars would lead to increased congestion and reduced accessibility.
- One way to ensure accessibility could be dynamic road pricing with a surcharge for empty cars.

Introduction

The Netherlands is a car-dominated society (Jeekel, 2011). In 2023, 44 per cent of journeys were made by car, accounting for 69 per cent of the total distance travelled (CBS, 2024). Just as urban density or proximity is essential for good accessibility, so too is the car (Bastiaanssen and Breedijk, 2022; 2024; Bleijenberg, 2021).

However, there were 684 fatalities and 7,400 serious injuries in traffic accidents in 2023 (Oude Mulders, 2024). Furthermore, CO_2 emissions from passenger cars increased by 10% between 1990 and 2019 (the last year before the dip caused by the Coronavirus pandemic), while total Dutch emissions decreased. Passenger cars currently account for 11% of total CO_2 emissions (CBS, 2024). Road traffic in cities also largely contributes to the exceeding of air quality and noise standards (Smokers and Vlessing, 2023).

Nevertheless, cars are not simply something that happens to us; the government has a significant influence on them and on car mobility. In 2018, public authorities spent over ten billion euros on constructing, renovating and maintaining road infrastructure (Schroten et al., 2022). They also paid 4.3 billion euros in subsidies to public transport in 2019 and determine the financial scope of local authorities for transport facilities. Furthermore, the treasury collected €16.8 billion in car taxes in 2019 (KiM, 2022). The level and structure of these taxes influence income distribution and the affordability of mobility (KiM, 2024a).

Given the government's significant interests and dominant role in relation to cars, it is crucial to understand current trends and potential disruptions, such as the advent of self-driving cars. In this article, I outline the most important developments relating to cars and how policy can address them.

Developments in car ownership and use

The number of passenger cars in the Netherlands grew from 0.5 million in 1960 to reach 9.4 million by the start of 2024 (BOVAG and RAI, 2024). Until 2000, growth averaged six percent per year; however, after the turn of the century, this slowed to only one to two percent. The average weight, height and width of new petrol cars has increased by 64, 58 and 30 per cent respectively since 1980.

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The proportion of SUVs sold has increased from 13 per cent in 2014 to 50 per cent today (BOVAG and RAI, 2024).

This shift towards larger, more luxurious vehicles has coincided with a doubling of the average new car price, rising from €23,000 in 1980 to €46,000 in 2023 (price level 2023; BOVAG and RAI, 2024). This price increase has gone hand in hand with the increase in disposable income (Figure 1). Expenditure on mobility is growing roughly in line with income. This is consistent with international statistics, which show that the budget share for mobility in developed countries remains fairly constant at between 10 and 15 per cent (Schafer and Victor, 2000).

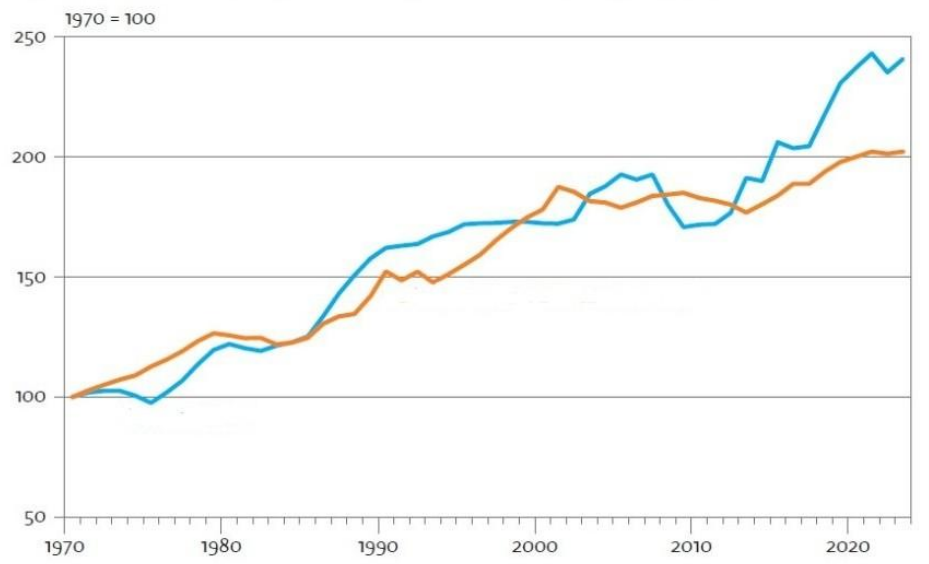

Figure 1: Average real price new passenger cars (blue) and nett available household income (orange). Sources: BOVAG and RAI, 2024; CBS, 2017.

Between 1960 and 2000, car mobility (i.e. the average number of kilometres travelled per day by drivers and passengers) grew significantly, increasing from 3 to 22 kilometres (PBL, 2014). However, this growth stagnated around the turn of the century, and between 2005 and 2019, there was even a slight decline (see Figure 2). Nevertheless, car traffic per person increased by six per cent because the average car occupancy rate decreased from 1.50 to 1.37 during that period. Since the population also grew by six per cent during this period, passenger car traffic increased by 12 per cent.

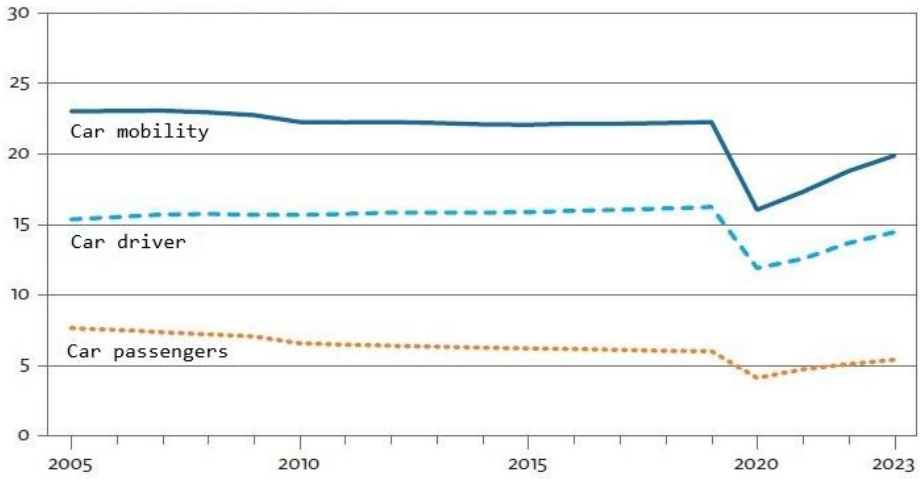

Figure 2: Average car mobility per person in kilometre per day (Source: KiM, 2024b)

The flat trend in car usage per inhabitant, as shown in Figure 2, is likely to persist over the next few decades. In its latest forecast's baseline scenario, KiM (2024b) predicts that car use in 2029 will be slightly lower than in 2019. My own forecast up to 2050 indicates a similar trend: a slight decline in car usage by drivers and passengers combined (Bleijenberg, 2017). Given the expected modest population growth, passenger car traffic is likely to remain relatively stable.

The future volume of car traffic can be influenced to some extent by policy measures. For example, urban densification and limiting the expansion of motorway capacity could lead to a few percent less traffic (Bleijenberg, 2024).

Affordability and luxury

Mobility companies and organisations are concerned about the affordability of mobility (Mobility Alliance, 2023). However, it seems that only multi-person households with an income around or below the median have insufficient funds to fulfil their mobility needs to a 'normal' extent (Nibud, 2024). The KiM (2024a) reaches similar conclusions, stating that problems with mobility affordability mainly affect people on low incomes, welfare , the unemployed, and large families. According to one of the indicators used by the KiM, this concerns five per cent of households in the Netherlands.

It would be unwise to address these mobility restrictions for people with limited financial resources by reducing car costs in general, as this would primarily benefit those on higher incomes. Higher-income individuals tend to drive larger, more expensive cars and can afford to switch to a cheaper model when replacing it. According to RVO (2024), monthly car costs can be halved by trading in an SUV for a family car. On average, people in the highest income quintile spend more than six times as much on their cars as those in the lowest quintile (CBS, 2017). In percentage terms, high-income earners also spend the most on their cars, making them a luxury good in economic terms (Figure 3). As high-income earners drive more on average than those on low incomes, postponing the increase in fuel duty mainly benefits high-income earners (Bleijenberg, 2022b; CPB, 2025).

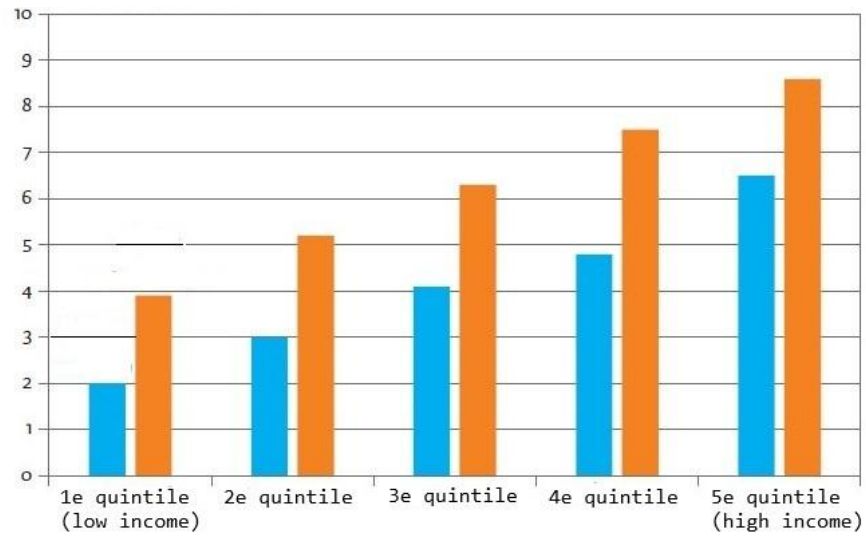

Figure 3: Expenditure on purchase (blue) and use (orange) of cars as percentage of household income. Source: CBS, 2017.

Therefore, policy should focus more on generic measures to reduce poverty, such as raising the minimum wage and social benefits. If mobility measures are considered, they must be targeted specifically at the aforementioned groups; otherwise, they will be ineffective and inefficient. For instance, a new bus route could be introduced between residential areas with a low average income and industrial estates where many people in practical professions work (Voerknecht, 2021).

Social costs and car taxation

The social costs of passenger cars are considerable. Traffic accidents cost 11.1 billion euros per year, infrastructure costs amounted to 6.8 billion euros, and the costs of health damage and environmental pollution were estimated at 3.9 billion euros (Bleijenberg, 2023a; 2023b). In 2019, the total amount of car taxes paid – including excise duty, motor vehicle tax, purchase tax and parking fees – amounted to 16.8 billion euros (KiM, 2022), of which an estimated 13.8 billion came from passenger cars (Bleijenberg, 2023a). Therefore, on balance, the total social costs of passenger cars in 2019 were approximately €8 billion higher than the car taxes paid. This corresponds to eight eurocent per car kilometre.

In addition to cost allocation – 'the user and polluter pays' – tax considerations also play a role in car tax policy, as tax revenues are important for the treasury (Rijksoverheid, 2024).

Like wage and income tax, taxes on cars are somewhat 'progressive': on average, you pay a higher percentage of tax as your income increases (CPB, 2025). The extent to which vehicle tax and purchase tax are progressive depends on the degree to which the rate is higher for large and expensive cars (Rijksoverheid, 2024). As total taxes in the Netherlands are slightly regressive (CPB, 2022) and those with higher incomes spend more on car-related expenses, car taxes could help to make the tax system more 'progressive'. This was also the rationale behind introducing the purchase tax as a 'luxury tax' (Rijksoverheid, 2024).

The transition to electric cars will result in a loss of revenue from fuel duties, and the government is therefore seeking alternative car taxes. An increase in motor vehicle tax is therefore an obvious solution. This tax is ideal because it is non-distortive: motorists are unlikely to drive less as a result, and when they replace their car, they can buy a cheaper one that is also more economical in terms of energy, materials, and space. The lower 'bare' purchase and running costs then compensate for the higher car taxes (Rijksoverheid, 2024). Furthermore, the government can encourage the purchase of clean, fuel-efficient or electric cars primarily through the level and structure of the purchase tax.

Contrary to government forecasts, I do not expect changes in car costs to have a significant impact on future traffic volumes. For most people, driving is now so affordable that the maximum amount of time they are willing to spend on mobility is the main limiting factor (Bleijenberg, 2022a). Therefore, the effects of 'pay-as-you-drive' or the expected reduction in the cost of driving electric cars will probably be much smaller than the government predicts.

Trend reversal due to self-driving cars

Self-driving cars will soon appear in the Netherlands (Leesberg, 2025). Waymo, a Google subsidiary, already provides over 250,000 robot taxi rides per week in four American cities (Hope, 2025). Tesla is set to begin offering fully autonomous robotaxis for commercial use in Austin, USA, this year (Musk, 2025). The American electric car manufacturer has made a significant commitment to this, evidenced by its investment of ten billion dollars in self-driving cars in 2024. The Chinese company Baidu now has a fleet of over a thousand robotaxis on the road. Closer to home, Volkswagen is experimenting with self-driving minibuses in Hamburg, and Deutsche Bahn is starting a trial with self-driving taxis for traveling to train stations.

Our city streets and motorways cannot handle the expected increase in car traffic due to self-driving cars. Congestion will increase, as will competition for scarce road capacity between operators of robot taxis, owners of private self-driving cars, and traditional motorists. As a result, cars carrying passengers will also experience delays, which may cause them to choose nearby destinations.

Self-driving cars certainly have advantages; for example, they could benefit people who cannot drive. While the effects on car ownership and use are still uncertain, there are indications that the large-scale introduction of fully self-driving cars could cause a significant trend reversal. It is estimated that

car traffic will increase by 40 to 70 per cent (Snelder et al., 2019; Harb et al., 2022; Sun et al., 2024). Half of these journeys will be empty, i.e. without passengers. As an empty self-driving car does not represent a loss of time for a driver, the main barrier to increased car usage will be removed. Furthermore, public transport usage will roughly halve, and people will also cycle and walk less.

Government regulation is necessary to prevent accessibility from declining. One possible approach is the dynamic road pricing system that has been in place in Singapore for years. This system works by increasing the price per kilometre when the average speed on a road falls below a set standard (MOT, 2022). A surcharge on the price per kilometre could be levied for empty cars. Another option is a mobility system consisting exclusively of on-demand robot taxis and minibuses, in addition to trains, metros and trams. Model simulations show that this would be an inexpensive and space-efficient way to ensure good urban accessibility (ITF, 2025).

In addition to ensuring good accessibility, the government must prevent robot taxi operators from gaining monopoly power, as this would give them too much influence over infrastructure development and public space design.

Furthermore, as proposed by Bria et al. (2025), the independence of big tech and China must also be safeguarded. The United States has already threatened to take trade action if the European Union introduces AI regulations (EW, 2025; Peeperkoorn, 2025). Regulation of self-driving cars is likely to elicit a similar response. European and national regulations are needed to maintain control over our mobility system.

Conclusion

Car mobility per person will remain roughly the same over the next few decades. However, the introduction of fully autonomous cars could reverse this trend, as empty vehicles will also be able to use the roads. This presents the government with three options: heavily regulating the use of autonomous cars; accepting that private car use on the roads will be replaced by large robot taxi providers; or expanding road capacity by tens of percent.

Through the level and structure of car taxes, the government can significantly reduce cars' use of space, energy, and materials. This would increase prosperity without compromising accessibility or car mobility, and could be achieved in a way that keeps cars affordable for people on low incomes.

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