

Does sharing cars really reduce car use?

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Summary

The average car sits unused for more than 90% of the time,¹ carries on average just one and a half people and costs on average €6.500 a year to own and run². Each car occupies 150m² of urban land and still this is not the full bill – congestion costs the EU economy €100Bn annually³. The convenience that made the car a 20th century icon has been eroded by its popularity. Now digitisation and the sharing economy provide the opportunity to reduce the number of vehicles in our cities by up to an order of magnitude and end the appalling costs of pollution, accidents and congestion caused by excessive car ownership and use. One US study⁴ indicates the global car fleet could be reduced by a third if sharing schemes were widely adopted. Another in Lisbon⁵ shows just 10% of the vehicles could maintain the same level of mobility if shared. But the transition will not be a painless or easy one as shared and privately owned cars initially compete for space and utilisation producing positive but modest benefits. However the ultimate prize, to reclaim our streets from car domination, would transform the quality of urban living.

Concerns that sharing schemes do not deliver a net reduction in car use are not supported by the overwhelming majority of the evidence that shows:

- Ride-sharing apps do reduce the numbers of vehicles on the road and vehicle kilometres driven; but as importantly also encourage a behavioural shift towards multi-modal, sustainable transport which complement public and active forms of transport (cycling and walking);
- Car sharing schemes, whether point to point or free floating also lead to reduced car ownership with studies indicating 5 - 15 cars are replaced for each shared car added to the fleet.
- Long-distance car-sharing services do compete with rail and coach services, however, they also significantly increase car occupancy and reduce emissions per kilometre.

The evidence upon which these conclusions are reached does, however, lack independence and often transparency about how the data has been compiled; most studies also lack a baseline against which to properly measure the impact of sharing schemes particularly because the impacts will also vary between cities and schemes. Improving the current research base is important to independently verify company claims of the benefits of sharing. The evidence also suggests that the current transitional period in which shared vehicles compete for road space with private cars reduces their benefits. To ease and accelerate the transition to shared vehicles the

¹ [ITF OECD, 2016](#)

² [BEUC, 2016](#)

³ [European Commission](#)

⁴ [UC Davis, 2017](#)

⁵ [The International Transport Forum, 2016](#)

legacies of car domination must be progressively erased. There are four key steps:

1. First, we must introduce congestion charges into cities and road pricing onto highways with differential charges for private and shared cars and exemptions for public transport. The recent Commission proposal is an important step in this direction for cars.
2. Second, highly polluting cars must be banned from cities and drivers offered mobility budgets if they are willing to scrap their dirty car in favour of public transport and shared mobility options. There are 35 million grossly polluting Euro 5 and 6 diesel cars on EU's roads - a legacy of the Dieselgate scandal.⁶ This appalling legacy is contributing to nearly 500 thousand premature deaths from the associated air pollution every year⁷.
3. Third, the systematic over supply of parking in cities must be reduced. More parking spaces cause more driving and cities that progressively add more parking experience a growing share of cars commuting. As roadside parking is reduced so can this space be reused for bike or bus lanes, wider pavements, pick up and drop off areas for shared vehicles and other people centred urban developments.
4. Finally, we need to get legislation at the national and city level right to embrace and enable innovation and ensure regulatory burdens are not used to protect incumbent operators. New mobility companies need to be provided with an opportunity to compete and achieve a scale that will enable them to replace significant numbers of private cars in urban areas. Public transport providers have had a century to substitute for the car and in most instances have done so with limited success. It would be a missed opportunity if regulatory burdens led to the still-birth of new mobility providers and indirectly the continuation of the dominance of the private car in our cities.

⁶ [Transport & Environment, 2017](#)

⁷ [EEA, 2016](#)

Introduction

Cars are staggeringly inefficient, sitting parked for more than 90% of the day and costing on average €6.500 a year to own and run.⁸ A typical car weighs 1.4 tonnes but carries just 1.6 people with a measly 2% of the energy consumed typically moving the driver and any passengers. Each car occupies 150m² of urban land and still this is not enough - congestion costs the EU economy €100Bn annually. Building a car produces around 5 tonnes of CO₂ equivalent emissions. So for many people, especially in urban areas, it makes more sense to share cars and use these in combination with walking, cycling and public transport for daily mobility.

Sharing vehicles is a growing trend but still a niche estimated to represent just 1-4% of passenger-kilometres globally.⁹ Despite the current value of shared mobility services in Europe is estimated to be €5.1 billion which is forecast to grow to more than €100 billion by 2025.¹⁰ But doubts are frequently expressed about the real environmental benefits of sharing cars. This paper seeks to explore whether these concerns are genuine or manufactured by incumbent transport operators keen to limit competition.

1. Ways of sharing

The digital revolution has enabled the development and deployment of many different forms of car-sharing and ride-sharing services that provide the benefits of car use without the costs and responsibilities of ownership. There are two principal types: the first shares both a vehicle and driver such as app-based short-distance ride-sharing, like Uber; and long-distance ride-sharing services such as BlablaCar. The second type shares the vehicle that is self-driven. These include peer to peer schemes (like Car Amigo); point to point station based systems (like Cambio); and free-floating car sharing such as Car2Go or Zen Car that only uses electric cars. Finally these schemes can operate as part of new mobility services as used by Mobility as a Service (MaaS). With the advent of autonomous vehicles both driven and self-driving ride-sharing services will progressively align and compete.

There are few independent studies of the impacts of current sharing schemes and even less comparative information. This makes assessment of the relative benefits of different sharing schemes difficult – not least because the impacts will also vary between cities. In particular some of the most independent and comprehensive assessments are based upon US data that may not be representative of Europe. Companies are understandably protective of trip data for both competitive and customer privacy reasons; and most of the assessment of the impacts of their operations has been generated by businesses and used for marketing purposes. These studies rarely include detailed descriptions of their methodologies and lack independence – cautious interpretation of the results is therefore needed. This paper examines the evidence to date of the impact of shared mobility schemes and considers how these can be scaled quickly to make a sizable impact upon private car use without creating unwanted side-effects.

1.1. Ride-sharing

App-based short-distance ride-sharing services, such as those provided by Uber, have stimulated considerable public debate whether they create a positive environmental impact and complements traditional public transport services by providing a viable alternative to individual car ownership; or, worsen existing congestion and car dominance? Research¹¹ suggests apps that match drivers to riders reduce the required number of vehicles compared to traditional taxi services. UberX achieves a 4% higher utilization in taxi-heavy cities like New York and at least 40% more in cities like Seattle or Boston. However the downside for licenced taxi operators will offset some or all of these benefits

⁸ [BEUC, 2016](#)

⁹ [McKinsey, 2017](#)

¹⁰ [PwC, 2016](#)

¹¹ [The National Bureau of Economic Research, 2016](#)

A key question is the extent to which ride-sharing competes with, or complements, city public transport systems? Uber emphasises that public transport cannot cover all areas and times leaving little choice for people to use their car. They claim ride-sharing services extend the reach of public transportation by providing reliable services for areas that are traditionally underserved. Their arguments are supported by evidence; in London, Paris and Brussels approximately 30% of Uber rides begin or end within 200 meters of a tube or train station. Furthermore, since the London Night Tube began operation Uber journeys starting within 200 meters of Night Tube stations during the hours when the Night Tube is operational have increased by 22%. Outside of central London, there has been an increase of 63% in Uber journeys starting near Night Tube stations.¹²

A 2016 London study¹³ examining changes in the licensed taxis and private hire vehicles (PHV) market in London following the launch of UberX in 2013 concluded that the demand for Uber's service increased demand for PHV and resulted in more registered drivers and vehicles, especially in Central London. However there was also a 'substitution' for privately owned vehicles and therefore no contribution to additional congestion. In a second study INRIX also studied London's congestion trends between 2012 and 2015 and its report confirms¹⁴ there was a 93000 increase in registered vehicles over the period in London but that roadworks and vans were the primary source of the increased congestion. The study also noted that the primary Uber usage times did not coincide with congestion peak periods and concluded Uber has a positive impact on mobility in London as vehicles complement the London transport mix and provide additional travel choices for consumers during times when public transport is limited or unavailable and when roads are quieter. The benefits of ride-sharing can be increased even further if customers can be persuaded to share. The UberPOOL service reports that customers share 20% of the time in the 33 cities where Uber offers POOL service. In the more mature San Francisco market riders choose POOL 50% of the time. This service further blurs the distinction between public transport and ride-sharing.

Other studies such as one by BCG¹⁵ also confirm that even in cities with high number of Uber drivers (such as Paris) substitution for public transport is minimal; whilst an independent study by the American Public Transit Association¹⁶ found "supersharers" (people who routinely use several shared modes, such as ride-sharing, car-sharing and bike-sharing) are less likely to own a car and more likely to take the metro or bus. A 2016 McKinsey report¹⁷ commented that while mass public transit will remain essential to avoid untenable congestion, ride-sharing could progressively replace underutilised public transit routes in the process reducing their environmental impact. A recent poll of 1,000 Uber users in London¹⁸ found that 28% of those who used to own a car no longer do so because they can use alternatives like Uber instead; and 1 in 5 Londoners are less likely to buy a car in future because of alternatives like Uber. Concerns that ride-sharing services are undermining public transport do not seem to be supported by the evidence (and is also the conclusion of the 2017 European Parliament Research Service study¹⁹). However, the increased availability of ride-sharing services does appear to be shifting behaviour from car ownership to access and multi-modal travel and suggests shared mobility might be an important complement to future increases in mass-transit ridership.

¹² [Uber, 2016](#)

¹³ [Transport for London, 2016](#)

¹⁴ [INRIX, 2016](#)

¹⁵ [The Boston Consulting Group, 2016](#)

¹⁶ [The American Public Transport Association, 2016](#)

¹⁷ [McKinsey, 2016](#)

¹⁸ [The Pew Research Center](#)

¹⁹ [The European Parliament Research Service, 2017](#)

1.2. Long-distance ride-sharing services

Ride-sharing service aimed at increasing vehicle occupancy are offered by a number of companies including BlaBlaCar that now has 40 million registered users worldwide and 12 million travellers using the platform every quarter. The service is especially popular during holiday periods and the company calculates that 10 billion km were driven in 5 years with the average trip length of 300 km. The average car occupancy rate for BlaBlaCar is 2.8 person per car compared to Europe's average of 1.7 person per car and the company has estimated the environmental impact to have saved 1 million tonnes of CO₂ saved in past 12 months.

One potential concern with long-distance ride-sharing services, is its impact on inter-urban public transportation. The recent European Parliament study²⁰ concluded carpooling, driven by online platforms, does substitute for the use of mass transit services, thereby reducing the revenue of existing long distance transport providers. It stated “that substitution has reached significant volumes in the more advanced markets” and estimated that SNCF had lost 6% of the domestic long distance passengers in 2015. That most carpooling passengers were previously traveling by train or coach demonstrates that to some extent long-distance carpooling is competitive with mass-transit transportation. However, it could be argued that if carpooling was to replace long distance coach travel there would be a net positive environmental benefit; and that the impact of substituting rail trips is likely to depend on whether the service is electrified. Competition between modes is something that should be encouraged – however, competition should be on a fair basis.

1.3. Round-trip car-sharing

The users of round-trip car-sharing services hire a vehicle and begin and end their trip at the same vehicle pickup point. The car is reserved for one or more hours and the rental time usually specified in advance. Zipcar operates this type of service and its impact has been studied in the US by the University of California, Berkeley’s Transportation Sustainability Research Center (TSRC). TSRC found²¹ 42% respondents to a college market study said they are less likely to acquire a car in a next few years as a result of using Zipcar. However, asked about their desire to acquire a car after graduating (most respondents were students), 27% claimed decreased desire and 18% that their desire had increased. Just 5% of respondents had sold or avoided buying a private vehicle as a result of using Zipcar. A second TSRC study focused on business use of Zipcar²² produced more positive results with 49% saying they were less likely to buy a car in the near future since joining Zipcar. TSRC estimated that 20% of users driving Zipcar vehicles for business had sold a personal car after becoming a member, and another 20% avoided buying a car or postponed a vehicle purchase.

A Wharton University of Pennsylvania’s article²³ assessing the number of cars taken off the road by people using Zipcar services highlighted divergent results. Whilst Zipcar has said that every one of its cars takes at least 20 personally owned vehicles off the road; reports from the Transportation Research Board (TRB) and TSRC estimate 5 and 9 to 13 vehicles respectively. The TSRC college market study reports that the vehicle miles travelled (VMT) is reduced by -1% to -5% depending on location with the greatest reduction in urban areas.²⁴ For business users there is an estimated 13% induced demand effect (representing additional trips that would not have otherwise occurred with 11% of respondents stating they would not have made the trip at all, and 2% stating they would have accomplished the task online.²⁵

²⁰ [The European Parliament Research Service, 2017](#)

²¹ [University of California, Berkeley’s TSRC: college market study, 2016](#)

²² [University of California, Berkeley’s TSRC: business use of Zipcar, 2015](#)

²³ [The Wharton University of Pennsylvania, 2015](#)

²⁴ [University of California, Berkeley’s TSRC: college market study, 2016](#)

²⁵ [University of California, Berkeley’s TSRC: business use of Zipcar, 2015](#)

Zipcar has calculated that car-sharing vehicles emit 20% less CO₂ per km than average vehicles but overall the TSRC college market study estimated that the GHG emissions reduction due to Zipcar's activities was between 0,1% to a 2,6% with higher savings in urban campus areas than suburban and rural areas. Carbon savings arise from both reductions in kilometres driven per day; and from making fewer trips overall. The TSRC college market study also found only 9% respondents used public transport more but 31% used it less; 7% biked more, 8% less; 12% walked more, 12% less; and 10% used more Uber or Lyft whereas 34% said they used these services less. This suggests Zipcar primarily competes with Uber/Lyft and public transport. The business users of Zipcar report was more positive finding that the 41% members who eliminated car ownership entirely used public transport more often and 41% walked more. Just 13% confirmed they took public transport less and 7% walking less.

1.4. Point-to-point car-sharing

The point-to-point free-floating car-sharing, (also known as “flexible” car-sharing), allows cars to be picked up and collected from any (or nearly any) on-street parking space within the given city limits. Car2go is such a service that claims a range of green benefits including that: over 50% of car sharing members used to be vehicle owners and that every Car2go car serves up to 30 people and lead to 15 fewer cars. Car2go states their customers are discriminated in their vehicle use as they pay per hour and that their customers drive approximately 70% less than they did when they were vehicle owners. In 2015 in Milan, a study found there were 9,200 hires with an average use once per month and 28 minutes per day, with trips an average of 6 km and an average speed of 30 km per hour. The study concludes that 30,000 less private cars were purchased since car-sharing debuted in Milan and 42% used the service in combination with public transport suggesting car sharing is part of multimodality. However, none of these figures have been independently verified. The Berkeley TSRC was more modest in its findings stating just 2% to 5% of the Car2go users sold their vehicle across 5 cities; with a further 7% to 10% of respondents not acquiring a vehicle. It concludes each Car2go vehicle removes between 7 to 11 vehicles from city roads and an average of 11% reduction in vehicle-kilometres (6% - 16%) and 10% reduction in greenhouse gas emissions (4% to 18%). This is an average removed of GHG emission of between 5.5 to 12.7 metric tons of GHG emissions per car2go vehicle annually.

The point-to-point station-based car-sharing allows customers to pick up the car from any dedicated parking station and park it wherever allowed within the coverage area, not necessarily at the starting point. Cambio represents such model. Cambio claims it is environmentally beneficial since each Cambio car replaces up to 14 private cars; also that users drive less and bike and use public transport more but have not provided evidence to substantiate these claims. Cambio also replace its car fleet after not more than 4 years and select “green” models. No independent studies have been found on the impact of such sharing schemes.

In December 2011, Paris together with 63 municipalities rolled out a **fully electric open-access car-sharing** scheme called Autolib' through the government tender in an attempt to relieve traffic congestion and bring a tangible impact on environment, reduce air pollution and noise. According to the key performance indicators, the service has already contributed to reducing CO₂ emissions by 15,000 tons since its inception. Autolib' not only believes to cut the drivers transportation costs by 90% but estimated that by 2023 its 4000 Autolib' fleet would replace more than 36,000 privately owned cars (meaning that one Autolib' vehicle would replace 9 privately owned vehicles), equivalent to 165 million kilometres driven per year by combustion engine vehicles. As a result of that, Autolib' expects to reduce CO₂ emissions by 75,000 tons. An important steps towards increased awareness and confidence in zero-emission vehicles among citizens, Autolib's charging points are also available for private EVs on a subscription basis.

2. Modelling studies

In addition to specific studies into the impacts of sharing vehicles there is a number of independent modelling studies that highlight the potential long-term benefits of developing shared mobility services. One recent study by the Institute of Transportation Studies at UC Davis suggested²⁶ that a world adopting shared, automated, electric vehicles could cut the current global stock of 750 million urban cars to 500 by 2050 and this shift in behaviour from owning to accessing cars could have significant benefits. A German Federal Environment Agency (UBA) study concluded²⁷ coordinated expansion of car-sharing and public transport services could lower transport CO2 emissions in Germany by about 4% and air pollutants by more than 6%. This can be achieved if flexible car sharing is used for short trips of about 7 kilometres mainly within urban areas. Under that scenario, the share of flexible car sharing would rise 1.4% of total traffic performance, public transport use would increase by about 5.2%, the cycling share would increase only marginally whilst pedestrian traffic would remain constant.

The International Transport Forum (ITF) modelled the impact on Lisbon of replacing privately owned cars with a fleet of six-seat “shared taxis” and “taxi-buses.” Model simulations show²⁸ Lisbon’s congestion disappeared, traffic emissions were reduced by one third, and 95% less space was required for public parking. The necessary car fleet was just 3% of the current size of today’s fleet. While the model showed remaining cars experienced dramatically increased utilization, with annual travel distance per vehicle up almost 10 times, total vehicle-kilometres fell and as did GHG by 62%.²⁹ A second study on the wider metropolitan area found total vehicle-kilometres in peak hours are reduced by 55% and 44% in the city.

3. Conclusions

The freedom and mobility provided through the car was undoubtedly one of the achievements of the 20th century. But these opportunities have been progressively offset as more cars have joined the jams in our cities and highways creating noise and pollution and squeezing space for people. Now digitisation and the sharing economy provide the opportunity to reduce the number of vehicles in our cities by an order of magnitude and end the appalling costs of pollution, accidents and congestion caused by excessive car ownership and use. The transition will not be a painless or easy one as shared and privately owned cars initially compete for space and utilisation – but the prize is substantial.

Whilst the reservations from regulators and cities regarding the short-term benefits of sharing vehicles are understandable (when you are up to your neck in alligators it is sometimes difficult to remember the purpose is to drain the swamp!). Furthermore, most of the studies of the impacts of sharing schemes lack independence and do not provide readily comparative data. However, even recognising this caveat, the studies do collectively show consistent but modest benefits from ride and car sharing schemes and that these do largely encourage beneficial behaviours which complement and support the use of public transport operations more than directly competing with them. Specifically:

- The evidence shows ride-sharing apps do reduce the numbers of vehicles on the road and vehicle kilometres driven; but as importantly also encourage a behavioural shift towards multi-modal, sustainable transport which complement public and active forms of transport (cycling and walking).
- Car sharing schemes, whether to point to point or free floating also lead to reduced car ownership with studies indicating 5 - 15 cars are replaced for each shared car added to the fleet.
- Long-distance car-sharing services do compete with rail and coach services they also significantly increase car occupancy and reduce emissions per kilometre.

²⁶ [UC Davis, 2017](#)

²⁷ [The German Federal Environment Agency, 2015](#)

²⁸ [The International Transport Forum, 2016](#)

²⁹ [The International Transport Forum, 2017](#)

Specifically most sharing approaches have a positive benefits both reducing car ownership (and therefore the impacts of parking and manufacturing the car); and lowering the vehicle kilometres driven (and hence environmental impacts of car use). Furthermore, a 10% reduction in car ownership is estimated to double demand for public transport so in the long term if there is a sizable shift from ownership to accessing cars could there will be substantial environmental and health benefits (as shown by the Lisbon modelling study).

The evidence also suggests that the current transitional period in which shared vehicles compete for road space with private cars reduces their benefits. To ease and accelerate the transition to shared vehicles the legacies of car domination must be progressively erased. Firstly, we need to see congestion charges introduced into cities and road pricing onto highways. Charging to access or drive in a town or city is the only way to manage the insatiable demand for private car mobility and can enhance shared models by lowering charges for shared vehicles to provide a financial incentive. By not charging for public transport healthy competition can be retained between transport modes. Only by charging a fee to drive in cities can the environmental costs of vehicle use be internalised. Road pricing can create an incentive for everyone to share space more efficiently, encouraging the development of shared mobility services and a speeding up shift away from the private car.

Secondly, we need to ban highly polluting car models from our cities and potentially offer mobility budgets for those drivers willing to scrap their car and make use of public transport and shared mobility options. There are 35 million grossly polluting diesel cars on the EU's roads³⁰ - a legacy of the Dieselgate scandal in which carmakers chose to turn down exhaust treatment systems. Many new Euro 6 models are little cleaner than the Euro 4 and 5 they replaced. This appalling legacy is contributing to nearly 500 thousand premature deaths from the associated air pollution every year³¹. If the cars can't or won't be cleaned up, banning them from city centres will make the air breathable and can support sharing schemes based upon zero emission electric or ultra-clean petrol-electric vehicles.

Thirdly, the systematic over supply of parking in cities must be reduced particularly where buildings are within a reasonable walking distance to transit. More parking spaces cause more driving according to a recent CITYLAB study³² which found cities that progressively added more parking experienced a growing share of commuters opting to drive to work. Not only can car parking spaces be reduced but companies charged more for providing parking places for employees. As roadside parking is reduced so can this space be reused for bike or bus lanes, wider pavements and other people centred urban developments.

Finally, we need to get legislation at the national and city level right to embrace and enable innovation and ensure regulatory burdens are not used to protect incumbent operators. New mobility companies need to be provided with an opportunity to compete and achieve a scale that will enable them to replace significant numbers of private cars in urban areas. Public transport providers have had a century to substitute for the car and in most instances have done so with limited success. It would be a missed opportunity if regulatory burdens led to the still-birth of new mobility providers and indirectly the continuation of the dominance of the private car in our cities.

Further information

Barbora Bondorová & Greg Archer
Transport & Environment
greg.archer@transportenvironment.org
Tel: +32(0)2 851 02 25

³⁰ [Transport & Environment, 2017](#)

³¹ [EEA, 2016](#)

³² [CITYlab, 2016](#)