# Simulating shared mobility in Helsinki

New types of ride-sharing services offered by companies like Uber, Lyft and Cabify have been gaining ground in recent years, especially in urban areas. The conflation of technology, both within and outside of the transport sector, with evolving societal trends around the production and consumption of services has been faster than anticipated by many authorities and has outpaced the speed of regulatory adjustments.

The International Transport Forum at the OECD has been looking at the potential of new shared urban mobility solutions leveraged by digital connectivity. In our studies we simulate replacing motorised road trips (private car, bus and taxi) with two types of on-demand and dynamically dispatched services – shared taxis and taxi-buses. We develop an agent-based model that reproduces the entire personal mobility and the interactions between users and the new shared services over the course of one working day for an urban region. The model outputs include a wide array of indicators measuring the impacts on accessibility, metro/rail ridership, required parking space, congestion and CO2 emissions, plus these new transportation modes' performance regarding service quality, productive efficiency and cost competitiveness.

**Table 1. Shared mobility services tested**

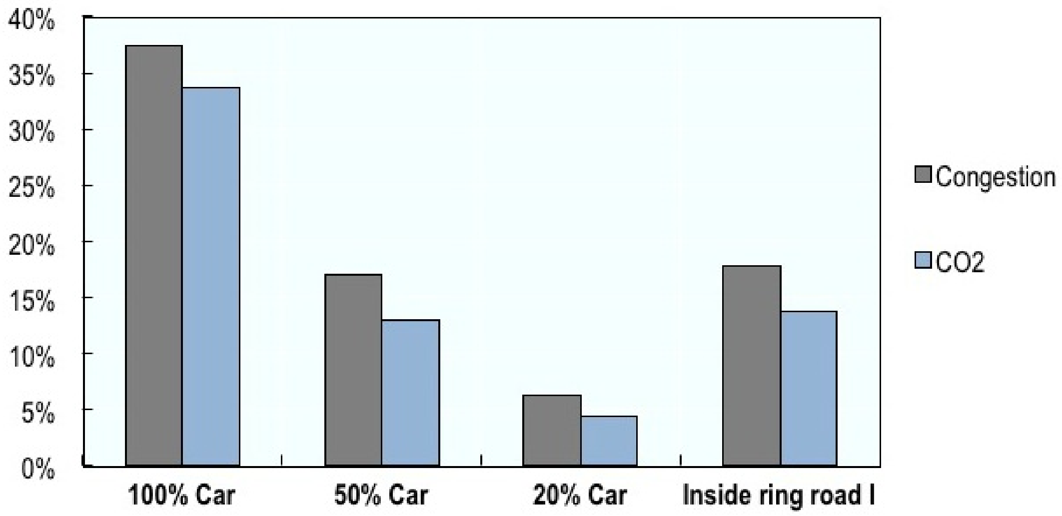
| Mode | Booking | Access | Vehicle type |
|---|---|---|---|
| Shared Taxi | Real time | Door-to-door | Minivan currently seating 8 rearranged to seat only 6, providing easy entry and exit |
| Taxi-Bus | 30 minutes in advance | Boarding and alighting up to 400 m away from door | Minibuses with 8 or 16 seats. No standing places |

Our previous simulations applied to the Lisbon case study (ITF 2016; 2017) provided extremely promising results. However, results from one city are never fully and directly transferable to another location and the ITF set out to test the transferability of the model to other regions around the world. The *Shared Mobility Simulations for Helsinki* report is the first that examines a different case study – there are additional forthcoming studies on Auckland, Dublin and Lyon. The results will be used by the Helsinki region in its long-term land use, housing and transport planning process. The main aim of the plan is to decrease emissions drastically by the year 2030.

Different scenarios were tested. These included the full replacement (100 per cent) of all car and bus trips or the partial adoption of the new shared services by targeting specific trips and users (e.g. only the 20 per cent of car trips more likely to shift to shared mobility are replaced). The current rail-based services (rail, metro and tram) were kept operating in all cases. In fact, shared taxis and taxi-buses can be employed to provide first/last mile connections to heavy capacity public transport. We found out that for the Helsinki Metropolitan Area the best results for emissions and congestion are obtained when all car trips are replaced and buses are kept. In this scenario:

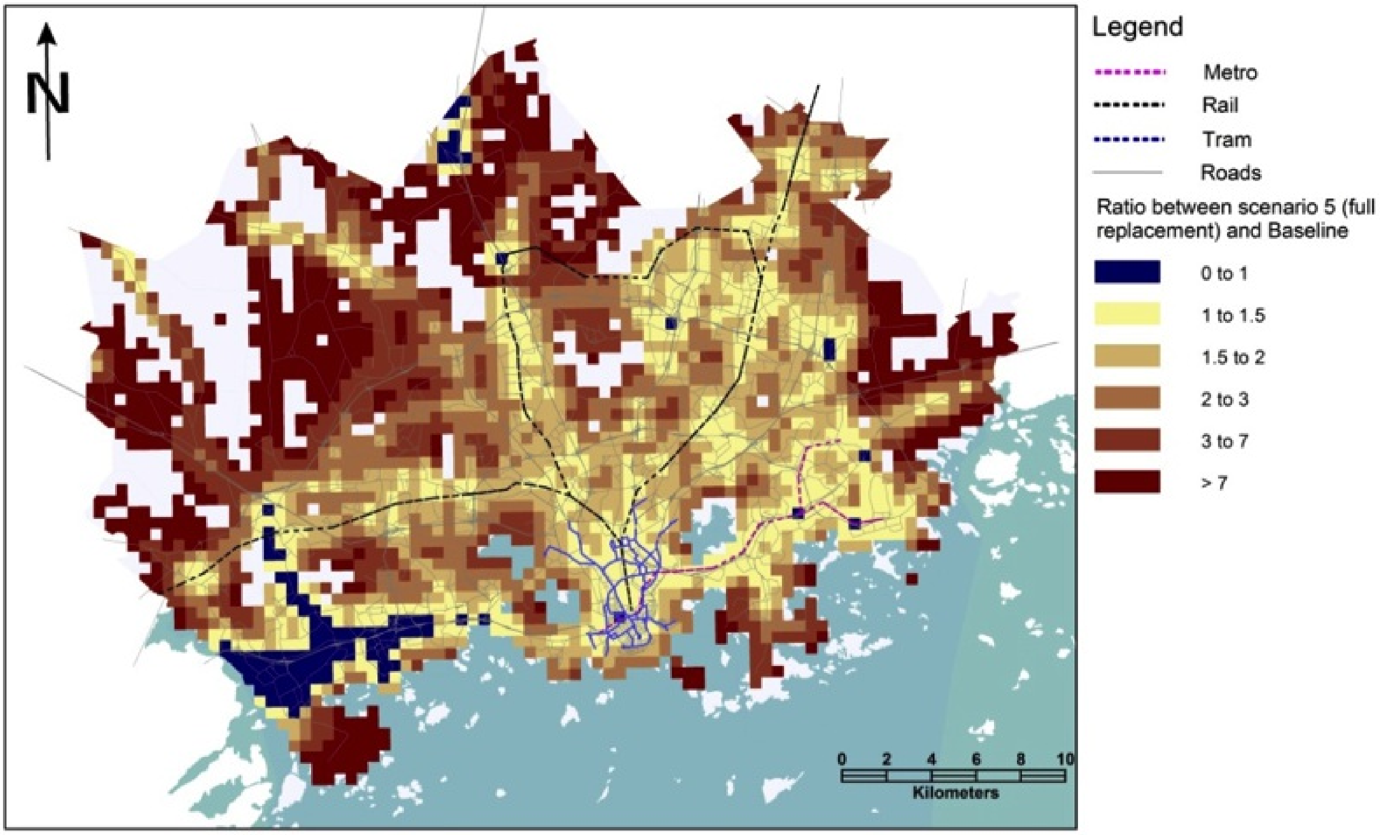
- CO2 emissions from passenger transport would fall 34 per cent;
- Congestion would be reduced by 37 per cent;
- Much of the space currently used for car parking could be used for other purposes;
- Metro and rail passenger-km increase by 16 per cent;
- All car travel could be provided with a fleet around 4 per cent of the current number of private vehicles.

**Figure 1. $CO_2$ emission and congestion decrease from current case**




Shared mobility also means fewer transfers, less waiting and shorter travel times compared to traditional public transport. The improved quality of the service could attract car users that currently do not use public transport and foster a shift away from individual car travel. The Helsinki study confirms the initial results for Lisbon that shared mobility improves access to jobs (and public services) notably for citizens in areas with few such offers. Shared mobility services thus can play an important role in creating more equitable access to opportunities for citizens.

**Figure 2. Accessibility to employment compared to baseline (100% car and buses replaced)**




Furthermore, the Helsinki study confirms that shared mobility can be highly effective feeder services for high-capacity public transport systems. As in the Lisbon case, scenarios providing first- and last-mile shared services showed that this can increase rail and metro ridership up to 23 per cent.

For the first time, a focus group and user survey complemented this shared mobility study. The feedback from potential users in the Helsinki region revealed that citizens are very positive about shared services as an additional tool to improve mobility in the Helsinki region. Potential users are very sensitive, however, to price and service quality. Respondents want shared services to be available in the entire metropolitan area, not just in the city centre. Shared services as feeders for rail and metro lines are seen as highly relevant. In the survey, participants chose shared mobility services for 63 per cent of all trips. There is some evidence, however, that public transport users in the Helsinki region are more willing than car users to adopt the new shared modes. Those aged 55 and above and those living far from the city centre also tend to favour shared mobility.

A fundamental insight obtained from our investigation is that these new shared mobility solutions need to be implemented at a sufficient scale. In the scenarios we simulated the minimum number of car trips replaced is 20 per cent. Actually, the results of previous ITF reports indicate that low replacement rates can lead to increases in congestion. Interestingly, in some urban areas where app-based ride services have been growing (e.g. New York and San Francisco) there is indeed a concern that registered vehicle-km and congestion increases are related to the emergence of these services. The elasticity between the car replacement rate and impacts on congestion and emissions is not constant. It can be negative for very low car replacement rates, but for higher substitution levels the elasticity becomes positive. One of the reasons this happens is because with a bigger pool of users the trips "matching probability" increases and higher vehicle occupancies along more direct routes can be achieved. Sufficient scale is also important to obtain manageable costs. The Finnish capital has already experimented with innovative services that share some similarities to the taxi-bus services, the on-demand buses known as Kutsuplus. One of the reasons this experiment was abandoned was its prohibitive cost.

Finally, a key takeaway from the Helsinki study is to target shared mobility solutions for suburban car users currently not well served by public transport. In the Helsinki simulations these services have maximum positive impact when they are adopted by private car users. For trips within the city of Helsinki the public transport offer is already robust. There is also good service for some radial axes connecting the outer areas to the city centre. However, in zones with lower accessibility to the trunk routes of the public transport network and for travel patterns that do not fit the radial-axis logic private car is the preferred option. Focusing on this shift would leverage the most out of the added flexibility and comfort provided by shared mobility, which combined with public transport would deliver a transport system that as a whole is more sustainable.

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*Notes:*

- *This blog post is based on the OECD report Shared Mobility Simulations for Helsinki, of which Francisco Furtado is the principal author.*
- *The post gives the views of its authors, not the position of LSE Business Review or the London School of Economics.*
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