Ridesharing and Carpooling

Volume 1

THE PROBLEM OF URBAN CONGESTION IN CANADA

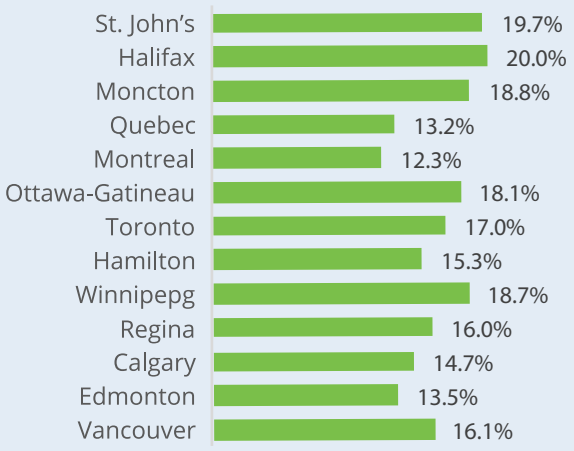
The recent CAA study *Grinding to a Halt: Evaluating Canada's Worst Bottlenecks* took a new perspective on a problem that Canadians know all too well: urban congestion is a growing strain on our economy and well-being. Canada's worst traffic bottlenecks are almost as bad as bottlenecks in Chicago, Los Angeles and New York. Bottlenecks affect Canadians in every major urban area, increasing commute times by as much as 50%.

This CAA briefing on investments in active transportation is one in a series that explore potential solutions to the problem of urban congestion in Canada. These briefings delve into solutions not only to highway congestion, but also to congestion on urban streets. Taken together the solutions explored in these briefings represent a toolkit to address this problem. The objective is to inform policy makers and the public about options to reduce congestion and key considerations for when and where a particular solution might be the right fit.

Ridesharing and carpooling has long been areas of interest for urban planners and policy makers, but for the most part, cities have made very little headway in increasing carpooling rates over time. The result is that there is, at any given time, a significant amount of untapped capacity on our roads in the form of empty seats in light vehicles. In 2016, of the four out of five Canadians who drove to work in a light vehicle, 85% drove alone and 15% carpooled.[1] The carpool rate varied across Canadian cities, but never exceeded the 20.0% seen in Halifax (Figure 1).

The savings potential from increasing the average number of people per vehicle is very large. Taking Toronto as an example, at present for every 100 vehicles on the road only eight are carrying a second person. If 12 more of these drivers carried a passenger, we would save $750 million a year in operating and infrastructure costs.[2]

Figure 1: Share Light-Duty Vehicle Commuters who Carpool



Source: CPCS analysis of Statistics Canada 2016 Census data, selected Census Metropolitan Areas.

Emerging technologies and changing preferences have the potential to generate a significant increase in carpooling rates. These technologies have for the most part been provided by and promoted by the private sector. This briefing investigates whether governments are missing out on generating significant public benefits by not partnering on these initiatives.

[1] *CPCS analysis of Statistics Canada (2017).*
[2] *CPCS (2017).*

PROBLEM: CONGESTION IN URBAN AREAS

POTENTIAL SOLUTION: RIDESHARING COMPANIES (I.E. UBER, LYFT, TAPPCAR)

How does it work & what are the benefits? Ridesharing companies have the potential to increase the average number of riders per vehicle, including with their carpool services UberPool and LyftLine, reducing single occupant vehicle travel and, portentially, congestion.

Examples: Uber, Lyft, TappCar (Edmonton, Calgary)

The impact of ridesharing companies has yet to be determined conclusively. While there appears to be significant benefits to users, the effect on congestion is highly dependant on details of the specific urban area and how these services are being used. This represents an opportunity for governments to influence congestion impacts.

CONSIDERATIONS:

- **Ridesharing companies have exploded onto the urban transporation scene with a service that can be faster, more convenient, cheaper, more reliable and more comfortable than personal auto use, taxis and/or public transit.**
- **While ridesharing services offer many benefits, they may have adverse impacts on certain groups including taxi license owners, taxi drivers and those without access to the smart phones and credit cards required to access ridesharing.**

PROBLEM: CONGESTION AFFECTING WORKERS AT A PARTICULAR COMPANY OR WORKPLACE

POTENTIAL SOLUTION: EMPLOYER CARPOOL PROGRAMS

How does it work & what are the benefits? Employer carpool programs, typically sponsored by a government, involve a package of services to increase carpooling at specific employer locations. Services can include site assessments to understand employee commuting behaviour, customized actions plan and tools to facilitate carpooling like ride-matching programs and emergency ride home (a service that offers a free taxi ride in the event of emergency).

Example: Smart Commute (Ontario). Metrolinx's $4-million per year Smart Commute program was estimated to generate roughly $6 in benefits for every dollar spent, reflecting a 1.7% reduction in lone drivers and a 1.3% increase in carpooling.

CONSIDERATIONS:

- **Given the benefits, there are few reasons not to implement employer carpool programs in congested areas. However, to the extent these programs are publicly funded, they would have to compete for scarce program dollars with other priorities.**

THE TRADITIONAL
CARPOOL MODEL

The traditional carpool model involves groups of people commuting together in individually owned vehicles.

The Benefits

The benefits for individuals are primarily financial: sharing the costs of owning and operating vehicles. The broader benefits to society are the avoided negative impacts of congestion including time wasted, pollution and accidents. Recognizing these benefits, governments have invested in both infrastructure such as carpool (high-occupancy vehicle) lanes and carpool parking lots (where individuals can meet to begin a carpool). Employers can also benefit from carpools, particularly in areas with limited or no transit service, as the pool of workers to which they have access is broadened. For instance, in lower wage occupations and industries, it can be very difficult to attract workers, as many cannot afford to drive alone to work.

The Costs

Carpool has traditionally faced a number of barriers:[3]

- **Personal safety concerns:** relates to a lack of information for passengers about the driver or vehicle, including related to driving skills, potential for criminality or vehicle condition.
- **Lack of flexibility or control:** lack of ability to adjust timing of trip or stops on route (e.g. to pick up groceries on the way home from work).
- **Effort required to organize a carpool:** even among coworkers, coordinating busy schedules can be time consuming and potentially unsuccessful, making many question whether it is worth the effort.

As described below, new technologies and trends have significantly reduced these barriers. The sections that follow explore models for how governments can leverage carpooling and ridesharing to help solve the problem of urban congestion in Canada.

[3] *Transport Canada (2010)*

RIDESHARING COMPANIES

Ridesharing companies have been around for a long time and most large urban areas in Canada have carpool matching services of varying levels of sophistication. What's new is the integration of ridesharing with mobile devices, their geolocation systems, and electronic payments. In Canada, the best known brand is Uber; TappCar operates in Edmonton, Calgary and Winnipeg, and Lyft has recently entered Ontario.

EXAMPLE: UBER

Many Canadians are now familiar with and frequently use the mobile application-based peer-to-peer ridesharing services of Uber. Lyft, a competitor to Uber, has recently launched in Ontario. TappCar is another mobile application-based peer-to-peer ridesharing service operating in Edmonton and Calgary. Uber is currently available in most large urban areas in Alberta, Ontario and Quebec.[4]

Figure 1: Figure 2: The impact of ridesharing on urban congestion is still uncertain

Source: Pexels

From a rider perspective, Uber is downloaded as a mobile application. Riders sign up for the service and provide credit card information. When a rider wants a ride, she or he has only to open the application, select the type of vehicle (options vary by city, but include a regular UberX, a shared UberPool, larger vehicles, accessible vehicles and traditional taxis), enter the destination (origin is detected automatically through the mobile device's geolocation system), receive an estimate of the fare, and then accept this estimate. Before the driver arrives, the rider receives the driver's name, photo, car make, model and plate number, as well as the driver's star rating reflecting the reviews of previous riders. When they arrive at their destination, riders simply exit the vehicle and their credit card is charged automatically.

In order to balance supply and demand, Uber prices vary, with higher "surge" pricing occurring when demand rises or supply falls, incenting more drivers to get on the road. Base Uber prices tend to be cheaper than taxi (or black car) services, but surge prices may be much higher.

Drivers must supply a vehicle and meet a variety of requirements which vary to some degree by city, but include a minimum age of 21, having a driver's license, having proof of insurance, vehicle registration and inspection, and having completed a background screening including a criminal record check.[5] Before accepting a fare, a driver receives a rating for the rider, based on past driver experience.[6]

[4] *Uber (2017)*
[5] *Uber (2017)*
[6] *Hahn and Metcalfe (2017)*

UberPool is the Uber product (LyftLine is a similar Lyft product) that offers the lowest cost to riders and most closely resembles traditional ridesharing and carpooling. UberPool functions in the same way as Uber described above, except that rides are shared and therefore routings are not necessarily direct or non-stop, given the need to potentially pick up and drop off riders along the way. Prices are lower than the standard UberX product, typically in the range of 50%-80% of the UberX price. An UberPool fare covers only two riders, whereas the fare for other Uber products covers as many riders as can be accommodated in the vehicle type selected.

Ridesharing Companies and Congestion

Research on the impact of ridesharing companies on congestion is moving forward very quickly with new studies being released frequently. There are at least three arguments for ridesharing companies reducing congestion:

- **Ridesharing complements and encourages transit use.** The argument here, which Uber has made based on data from London, UK, is that ridesharing trips tend to complement public transit, taking riders between transit hubs and home.[7]
- **Less searching for parking.**[8] One study found that between eight and 74 percent of traffic is attributable to drivers looking for parking.[9] If people use ridesharing instead of driving themselves, the need for parking, and therefore the number of vehicles searching for parking could be substantially reduced, relieving congestion.
- **Less congestion caused by taxis.** Similarly there may be less congestion caused by taxis driving around looking for fares, to the extent that ridesharing companies replace taxis.[10]

On the other hand, there is an argument that **ridesharing is so popular that it might create congestion.** Given its low cost to riders relative to taking taxis and its improved convenience over driving a personal vehicle or taking transit, cycling or walking, ridesharing could increase the number of vehicles on the road and therefore, potentially, congestion. A recent US study based on a survey found that the introduction of ridesharing companies in major American cities has been associated with a 6% reduction in bus ridership, 3% reduction in LRT ridership, but a 3% increase in commuter rail services among ridersharing users.[11] That study also concluded that vehicle miles travelled are likely to increase because of ridesharing companies. Another recent study in Metro Boston found that 12% of ridesharing users would have walked or biked had ridesharing not been an option and 42% said they would have taken transit.[12]

However, the impact of ridesharing companies on congestion depends fairly specifically on both the location and time of day and week that the additional vehicle-kilometres are being added. A study by Uber in London, UK, found that two-thirds of weekday trips occur outside of the 7 am to 6 pm peak traffic period and one-quarter occur from 12 am to 5 am.[13] Growth of car trips in these periods would be far less likely to contribute to congestion.

7 *Uber (2016)*
8 *Hahn and Metcalfe (2017)*
9 *Shoup (2006)*
10 *Hahn and Metcalfe (2017)*
11 *Clewlow and Mishra (2017)*
12 *Gehrke, et a. (2018)*
13 *Uber (2016)*

However, a recent study in Metro Boston estimated that 40% of weekday trips take place during the morning or afternoon commute periods and that 15% of all ridesharing trips are substituting for a transit, walking or biking trip during these periods adding vehicles to the roads.[14]

UberPool would seem to exhibit many of the traditional congestion-reduction benefits of carpooling, if it draws users out of single-occupant vehicles. If, on the other hand, it draws riders away from transit, cycling or walking, then it could add to congestion. To add further complexity, as noted above, ridesharing companies may in some cases complement transit, rather than compete with it.

Implementation Considerations

There has been a very large amount written on ridesharing companies and the array of impacts of this innovation, but little comprehensive assessment of benefits and costs. A recent economic study of Uber in the United States, based on 2015 data for UberX alone (not including other ridesharing companies or other types of Uber service) estimated a benefit of around $8.5 billion annually to users.[15] Ridesharing companies are likely as popular as they are because they offer significant benefits relative to alternative transportation options: depending on which alternative they are being compared to, ridesharing companies offer faster, more reliable, more comfortable and/or lower cost transportation.

Ridesharing companies seem to offer significant user benefits, but like most major innovations, they can have adverse impacts on certain groups, and there has been little rigorous analysis of these impacts.[16] Groups that could be expected to be adversely affected by ridesharing are the owners of taxi licenses and possibly those without the smartphones or credit cards that are required to use a ridesharing service (although Uber does offer an option to order a ride for someone else), although these groups are shrinking. Research on the impact of ridesharing companies on taxi drivers is also in its early stages; one US study found that employment in the taxi industry has in fact expanded, with a shift towards self-employment, but that hourly wages for employee drivers have declined.[17]

[14] *Gehrke, et a. (2018)*

[15] *Cohen et al. (2016) estimated a measure of benefit called consumers surplus: how much people were willing to pay relative to how much they actually paid. For example, if someone was willing to spend $10 on a ride and only had to pay $5, then they received a $5 benefit from taking the ride. However, there are questions about whether this benefit is sustainable given that Uber has yet to be profitable. (Hook, 2017)*

[16] *Hahn and Metcalfe (2017)*

[17] *Berger et al. (2017)*

EMPLOYER
CARPOOL PROGRAMS

While the ridesharing companies described above often garner significant attention, there are more traditional approaches that in many regions and for many travelers remain underexplored. A good example is ***employer*** carpool programs. There is strong evidence that such programs have significant potential to relieve congestion at low cost.

EXAMPLE: SMART COMMUTE

Smart Commute is a program run by Metrolinx, the regional transit agency in the Greater Toronto and Hamilton Area of Southern Ontario, and by municipal governments in the area. Smart Commute targets employers with the following services with the aim of increasing the proportion of trips taken by walking, cycling, transit and carpooling:

- Site assessments and surveys to understand employee commute behaviour
- Customized action plans to encourage employees to explore and try out smart travel options
- Tools to facilitate change including exclusive carpool ride-matching programs and Emergency Ride Home programs.

The Emergency Ride Home program helps to overcome one of the traditional hurdles to carpooling: what does a commuter do if he or she carpools in but then has an emergency and must leave. Emergencies include having to work late or the unplanned absence of a carpool partner. This program reimburses emergency transportation costs up to $75.

While Smart Commute involves more than carpooling, the overall efficiency of the program has been impressive, with an estimated $6.00 in benefits for each dollar spent,[18] significantly better than most transit expansion projects. Key benefits estimated included travel cost savings and improved health resulting from more walking and cycling. These benefits were reflected in a 1.7% reduction in lone drivers, taking 2.4 million car trips off the road per year (40 million vehicle-km traveled), and a 1.3% increase in carpooling, equivalent to 2.2 million carpool trips taken. It is also notable that carpooling can offer other business benefits such as reduced parking shortages or need for parking and cross-fertilization of ideas among staff who might not work together.[19]

The reality in Canada is that many employers choose to locate in suburban locations where transit service is significantly less frequent than in downtown cores or may be non-existent. Suburban locations can cut costs for employers, but sometimes employees end up with longer commutes and higher costs. Loblaw, which partnered with Smart Commute in 2011 to create a carpool program, offers an example of the potential benefits.

18 *Smart Commute (2015)*
19 *Metrolinx (2015)*

In 2006 Loblaw relocated its head office to Brampton, Ontario from a variety of locations along subway lines in the City of Toronto. Key initiatives of the program are the use of Smart Commute's online ride-matching service and the creation of 100 carpool parking spaces supported with an internally managed permit program. Transit and carpool promotion programs are also undertaken.

Within three years, Loblaw saw a decrease in the share of staff driving alone from 67% to 51%, an increase in staff who carpool from 27% to 47%, an increase in staff using transit from 3% to 5% and an increase in "commute satisfaction" from 63% to 75%. The costs to Loblaw have been very low, at one staff hour per month to support the program.

Another Smart Commute example is Enbridge Natural Gas Distribution, which replaced 18 conventionally fuelled single-occupant vehicles with two natural gas vans. Rather than driving their own vehicles, employees on similar routes share the vans. Enbridge also saved $19,000 per year not leasing 16 parking spots for employees.[20]

Region-wide, the Smart Commute program has an annual cost of $4 million paid by Metrolinx, area municipalities and employers who pay fees to participate in the program. In 2014, Smart Commute worked with 340 workplaces, employing 730,000 commuters.

Implementation Considerations

There seem to be few barriers to replicating the success of Smart Commute in other urban areas across Canada. Some urban areas already have in place employer carpool programs (e.g. Ottawa Ride Match, GoManitoba, or Jack Bell Ride-Share.com in Vancouver), but relatively little information is publicly available on the costs and benefits of these programs.

[20] *Smart Commute (n.d.)*

TRENDS AFFECTING
COSTS AND BENEFITS

Technological development is the overriding trend affecting the costs and benefits of ridesharing and carpooling. The table below describes two key aspects.

TREND	WHAT IS IT	POTENTIAL IMPACT ON RIDESHARING AND CARPOOLING
Increasing penetration of smartphones and ridesharing companies	The increasing penetration of smartphones coupled with the advent of ridesharing applications of all types is significantly reducing the traditional barriers to ridesharing and carpooling: personal safety, flexibility and effort required to organize. Ridesharing companies are expanding their services to more and more urban areas.	Significant growth in ridesharing and carpooling.
Potential for significant adoption of autonomous vehicles, particularly if electric	Autonomous vehicles, particularly if electric, have the potential to significantly reduce the cost of using ridesharing and carpooling. This cost reduction would result from reduced labour cost (no driver required), reduced fuel cost, and potentially from reduced insurance and vehicle capital cost.	If adopted in large numbers, autonomous electric vehicles could dramatically strengthen the advantages of ridesharing, particularly as offered by ridesharing companies (e.g. Uber, Lyft), relative to other modes of transportation.

Beyond benefits for riders, the growth of ridesharing is likely to have impacts on the traditional urban transportation providers: transit and taxis. The greater the uptake, the greater the potential for disruption, particularly to slower and more costly modes such as bus and taxi respectively. More capital intensive services such as subway and commuter rail, which offer faster speeds than bus and lower cost than taxi seem much more likely to be complemented by ridesharing and carpooling, rather than replaced by it.

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