Investments in Urban Transit

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.

Investing in urban transit as a solution for traffic congestion has been given renewed prominence in recent years as governments at all levels have made significant investments. Much of the focus has been on the construction of large and costly new transit infrastructure projects, such as light rail, subway, commuter rail and bus rapid transit.

This briefing investigates two strategies that are generally underexplored in Canada that could improve the cost effectiveness of our existing urban transit systems: delivering the same or better service at lower cost. In particular, this briefing examines ridesharing supplementing transit and open (fare) payments. To the extent savings can be realized while maintaining or improving service, more funding could become available for other urban transit investments or other investments related to relieving traffic congestion.[1]

This briefing investigates two strategies that are generally underexplored in Canada that could improve the cost effectiveness of our existing urban transit systems: delivering the same or better service at lower cost.

[1] *All dollar figures in this briefing are in Canadian Dollars. US Dollars have been converted to Canadian Dollars at a rate of $1.25 US Dollars per Canadian Dollars.*

PROBLEM: TRANSIT IS NOT ALWAYS A VIABLE OPTION, PARTICULARLY IN SPARELY POPULATED AREAS

POTENTIAL SOLUTION: RIDESHARING AND CARPOOLING SUPPLEMENTING TRANSIT

How does it work & what are the benefits? Ridesharing and carpooling, either conventional services like vanpools (where a group of commuters share a van, usually provided by a public agency) or new options like a subsidized Uber product, can complement transit services in areas where population density is insufficient to support conventional transit service.
Examples: Innisfil Uber Transit (Ontario), Way to Go Vanpool (Denver, Colorado)
Uber Transit is new and no benefit estimates are yet available. The cost of a pilot project in Innisfil is $100,000 for the first 6-9 months to provide subsidies. Annual vanpool costs can range from $11,000 to $24,000 per van, significantly less than conventional transit on a per ride basis.

CONSIDERATIONS:

- **While quite efficient under the right conditions, supporting a ridesharing or vanpool program can be an afforability issue for governments, as it still has a cost and has to compete with other trasportation spending priorities.**
- **Vanpools work best in areas with little transit service, inadequate parking and where a group of people regularly travel along the same route.**
- **Public transit agencies tend to see ridesharing and carpooling as lying outside of their purviews, sometimes seeing these services as competing rather than complementary offerings. Riders may have similar perceptions about ridesharing and carpooling not being part of transit.**
- **Ridesharing as a complement to trasit can help to reduce per rider subsidy costs, relieve overcroweded services and avoid the need for the construction of additional parking at transit stations.**

PROBLEM: COSTLY AND INCONVENIENT FARE COLLECTION

POTENTIAL SOLUTION: OPEN PAYMENTS

How does it work & what are the benefits? Pay transit fares with bank cards (credit or debit) or mobile pay (e.g. Android Pay, Apple Pay, Samsung Pay) instead of proprietary smart cards (e.gg Opus, Presto, Compass).
Examples: Lavel, London, UK, Chicago.
Open payments have only a short history and results are not yet in on cost savings relative to proprietary smart cards, but the convenience benefits for transit riders or open payments are well established: riders no longer need to have a separate transit card and account to manage nor do they need to lock up funds in a card that can only be used for a single purpose.

CONSIDERATIONS:

- **While a potential cost saing from open payments seems possible, savings will likely be limited until open payments can replace substantially all other forms of payment and associated infrastructure.**
- **The challenge today is that not all transit users have access to smart phone or bank cards, necessitating the maintenance of alternative means of payment in parallel with open payments. As well, not all bank cards in Canada are yet contactless.**
- **Getting out of, or substantially reducing involvement in, fare media management can free up transit agency time to focus on other areas, improving performance.**
- **Riders will benefit from not having money "locked up" in propriety payment cards. This could be a particular benefit to lower income riders, provided they have access to bank cards or smart phones.**

RIDESHARING SUPPLEMENTING TRANSIT

While ridesharing and transit have both existed for a long time, they are rarely integrated. For example, as of 2010, there were 384 ride-matching programs in the United States, but only 32 were operated by public transit agencies. Likewise, most public transit agencies do not consider ridesharing as an alternative when studying the extension of commuter rail or bus service.[2] In some ways this is surprising, as ridesharing, with its low costs, seems a natural way for transit agencies to extend their services to areas that do not have the characteristics (population density, transit-oriented development) to economically support more costly conventional transit service.

With rapid advances in technology in particular, ridesharing has begun supplementing, and in some cases replacing, traditional public transit services. This can be informal or it can involve transit agencies directly working with a ridesharing provider to offer services, which is the focus of the discussion below.

EXAMPLES

Uber Innisfil Transit

The Town of Innisfil, north of Toronto, has partnered with Uber to provide on-demand ridesharing services. The scheme involves subsidized flat rate fares from local transit hubs and the matching of riders heading the same direction to share vehicles.

In 2016 the Town considered implementing a transit service with one bus (for $270,000 annually) or two buses (for $610,000), but determined that either option would be too costly relative to the level of service that could be provided. Following a public procurement for an on-demand service, Uber was selected as only company with an app-based platform (i.e. UberPool) that would facilitate ridesharing and the matching of two or more passengers on trips across the entire town.

There are three options for users:

- **Flat rates** range from $3 to $5 for specific trips within the town, e.g. $3 from the recreation complex to anywhere in the town.
- **Custom destination requests.** A standard Uber trip with a $5 discount for trips within Innisfil's boundaries.
- **Accessible vehicle request.** For residents who are required to remain seated because of a mobility device, they may request an accessible taxi and pay the equivalent Uber rate.

For 13-17 year olds, a consent form is required to use the service. Residents without a credit card can load an Uber gift card on to the app.

[2] *Murray, et al. (2012)*

In addition to cost savings, the service serves all residents at all times as opposed to conventional fixed-route bus transit. Uber also provides the Town with detailed trip information which can be of significant value in planning.

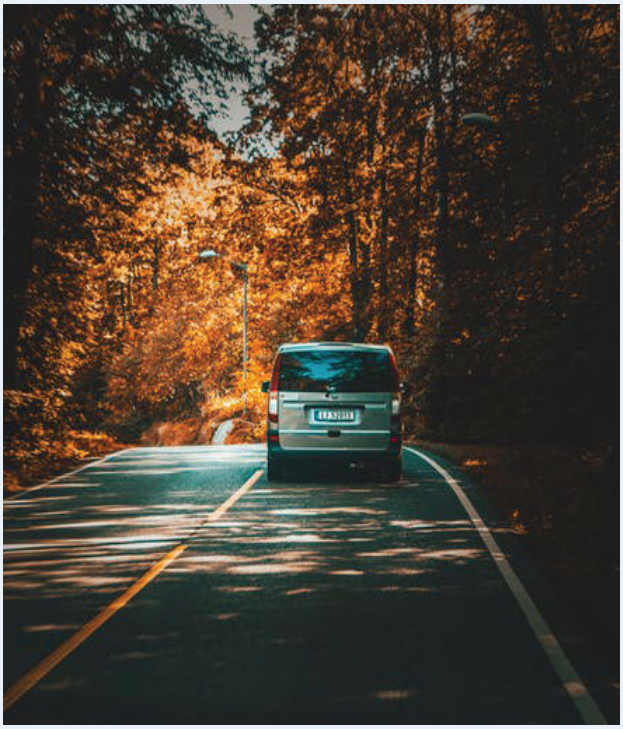
The service cost the Town $150,000 for May-December 2017 (Stage 1). The funding is solely used to subsidize the fares, not capital costs. The average subsidy is $5.62 per passenger. In contrast, the Town estimates a subsidy of $33 per passenger would have been required to provide a one-bus transit service.[3] The Town has allocated $500,000 for Stage 2, which includes new destinations.

From May-December 2017, 3,500 different people used the service to take 26,700 trips. 77% of those completing a survey indicated they were satisfied or very satisfied. From September to December the number of monthly trips increased from 3,000 to 5,300.[4]

Way to Go Van Pool, Denver Regional Council of Governments, Colorado

Vanpools are relatively common in the United States, and transit-operated vanpools seem to be the most common form of ridesharing-transit integration.[5] Way to Go Vanpooling involves groups of 5 to 15 people travelling at least 24 km on similar routes sharing anything from a seven-passenger minivan to a 15-passenger van. Each rider pays a monthly fare based on distance. Vanpool riders volunteer to drive, track maintenance, submit paperwork and collect fares. Volunteer vanpool drivers must be at least 25 years old, pass a motor vehicle check, and sign a driver agreement. Approved drivers are covered under the vanpool insurance. The program provides the van, maintenance and repairs, insurance, fuel, bike racks and Guaranteed Ride Home, which provides a free taxi ride home from the office for employees who have an emergency arise (e.g. an unexpected schedule change or a sick child).[6]

Figure 1: Vanpool can offer an efficient complement to conventional transit services

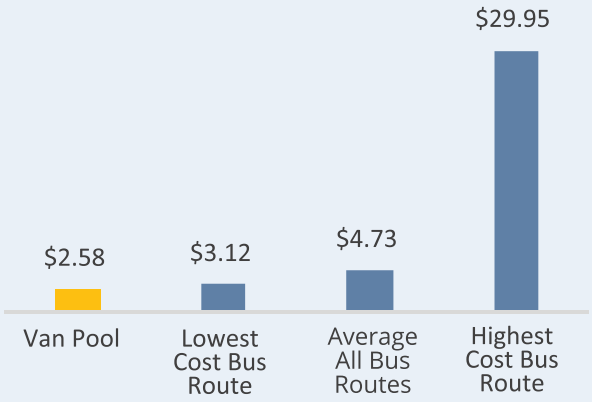


Source: Pexels

[3] *Town of Innisfil (2018)*
[4] *Town of Innisfil (2018)*
[5] *Murray, et al. (2012)*
[6] *Way to Go (2017)*

The Regional Transportation District (RTD) in Denver operates express bus service on 25 routes with an average subsidy cost of $4.73 per boarding. The lowest cost route subsidy was $3.12 and the highest cost subsidy was $29.25 (Figure 2). The subsidy for a complementary vanpool program was only $2.58. On this basis, RTD provided a subsidy to the Way to Go Vanpool program to reduce the monthly fare.[7]

Figure 2: Average Subsidy per Boarding, Regional Transportation District, Denver



Source: CPCS analysis of Murray, et al. (2012)

IMPLEMENTATION CONSIDERATIONS

While ridesharing might be quite efficient under the right conditions, it still typically involves a subsidy, so affordability is an issue, and ridesharing has to compete in transit agencies for scarce budget dollars. Most vanpools receive government subsidies. Total annual costs (2010 data) ranged from $11,000 to $19,000 per van when owned by a local government or transit agency and $19,000 to $24,000 when the van was owned by a third-party contractor. The vanpool is often assigned a primary driver who gets a break on her or his fare and may sometimes be allowed some personal use of the van.[8]

Vanpools work best in environments with little transit service, inadequate parking, and where a group of people regularly travel the same route over a relatively long distance, usually to a work place. Vanpools can also be more appealing when vans receive preferential access to managed lanes (e.g. high-occupancy vehicle or toll lanes) and park-and-ride lots.[9]

As evidenced by very limited integration of public transit and ridesharing, public transit agencies tend to see ridesharing as lying outside of their missions or mandates. In some cases, transit agencies see ridesharing as a competing, rather than complementary, service. Similarly, transit users do not tend to consider ridesharing part of transit.[10] This historical, cultural and institutional situation can be a barrier to the success of integrating transit and ridesharing.

In contrast to the above, transit agencies can realize tangible benefits from ridesharing, not only in terms of improving mobility, but also in terms of relieving pressure on overcrowded services and in avoiding costs associated with the construction and operation of park-and-ride lots, such as at commuter rail stations.

7 *Murray, et al. (2012)*
8 *Texas A&M (N.D.)*
9 *Texas A&M (N.D.)*
10 *Murray, et al. (2012)*

OPEN PAYMENTS

The use of contactless smart cards to pay transit fares is no longer new. Most transit riders in Quebec can tap Opus cards, in much of Ontario Presto cards, and in the British Columbia Lower Mainland Compass cards. Such cards are known as propriety or closed-loop systems, although such systems, notably Presto, can often be adapted to accept open payments as well.[11] A non-proprietary alternative to such systems has emerged with the potential for cost savings and increased convenience for riders.

Figure 3: Contactless payment logo - for debit and credit cards

Source: TfL

Open payments (also called open-loop payments) means using contactless bank cards (debit or credit) as well as mobile devices (also called mobile pay, e.g. Android Pay, Apple Pay, Samsung Pay) to pay for transit. But how does this work and is it likely to save money that can then be re-invested in other transit priorities?

The focus here is on the costs and benefits of open payments relative to closed-loop smart cards and not on comparing open payments with legacy fare media such as tokens, paper tickets and magnetic stripe cards. In the latter case, the costs and benefits are fairly well established. Up-front capital costs are higher, but operating costs are much lower.[12]

EXAMPLES

Laval, Quebec[13]

Laval is the first city in Canada to pilot open payments. Starting in April 2017, the Société de transport de Laval partnered with Desjardins Group, a financial institution, to offer open payments using credit cards. Six bus routes are part of the pilot project. Debit cards cannot be used and only single fares (not passes) can be paid. At the time of writing, open payments were also being studied in Montreal and Quebec City and other pilots are underway.

London, United Kingdom[14]

Transport for London (TfL) was a pioneer in contactless closed-loop fare payment with its Oyster Card. Starting with buses in 2012 and system-wide in 2014, TfL began accepting bank cards and mobile devices for payments. Several features are noteworthy:

CAPPING. TfL offers daily and weekly capping for pay-as-you-go riders, limiting the amount paid (for example adults only pay for the first three bus journeys per day). Capping requires that users pay for each journey with the same card or device. Similarly the same card or device must be used on journeys that require a tap off in addition to a tap on.

At the time of writing, TfL did not offer monthly passes through open payments, but this issue is greatly mitigated by the capping feature of TfL fares.

[11] *Metrolinx (2017)*
[12] *See for example Perotta (2015)*
[13] *Desjardins (2017)*
[14] *Transport for London (2017)*

NO DISCOUNT AVAILABLE. Discounts, e.g. for children and seniors, are not available through open payments, so riders eligible for discounts must carry an Oyster Card.

CARD FLASH. Riders must separate the card they wish to use for payment from other contactless cards and devices, so that only the right card is charged.

PROOF OF PAYMENT. Whatever card or device is used for payment becomes the rider's proof of payment for the trip and must be touched to an inspector's reader when asked.

Figure 4: Open payment with bank card

Source: Pexels

BATTERY LIFE. For riders paying with a mobile device, they must ensure that their battery lasts until the end of the journey so that they can either tap off or show an inspector proof of payment.

People attempting to board buses with insufficient Oyster Card balances, and therefore being unable to travel, was a significant problem in London. On a daily basis this problem affected 30,000 riders.[15] It can be greatly reduced with open payments as there is no need to top up a payment card, provided a user has funds in their bank account.

As of 2016, around 30% of trips on TfL buses, subways and commuter rail were being paid for with open payments. The adoption of open payments and initiatives enabled by open payments are expected to reduce the cost of fare collection from 9% of revenue in 2012 to around 6%. The initial business case for the TfL open payments system showed that benefits were anticipated to be twice the value of costs.[16] However, no evaluation based on actual costs has yet been released.

Chicago

The Chicago Transit Agency (CTA) and suburban bus operator Pace launched open payments in 2013 which supported both agency-issued Ventra smart cards, and contactless bank cards and mobile devices. The cost of the system was around $650 million over 12 years.[17]

At the time of writing, bank cards and mobile pay could be used for single fares, transfers and multiday (including monthly) passes. Transfers and passes could only be added at Ventra vending machines and retail locations, but web-based functionality is planned so that bank cards can automatically be loaded with passes. Ventra cards could also be used to make payments on the debit MasterCard network.[18]

[15] *Cubic Transportation Systems Inc. (2015)*
[16] *Mastercard and LEK (2016)*
[17] *Hikevitch (2015)*
[18] *Ventra (2017)*

CONSIDERATIONS

Why move to open payments?

RIDER CONVENIENCE is a major benefit of open payments:

- Riders always have the means of payment with them, no additional card is required. This is a particular benefit to visitors from out of town.
- Riders no longer have to obtain, register, load or otherwise manage a closed loop smart card. While some of these functions can be automated, it is one less thing to worry about.
- Riders no longer have value locked up in a closed loop smart card that cannot be used for other purchases. This may be a particular advantage to those who have little or no cash to spare, notably low income transit users.

COST SAVINGS. from moving to open payments could be significant, but public information is scare. In a closed loop smart card system, transit agencies must pay for the costs of card production and distribution, payment channel infrastructure, retail commissions and vending machine infrastructure. In an open payments model, all of these functions are performed by the retail banks, given their economies of scale, at a substantially lower cost. While the banks and credit card companies would derive profit from providing these services, the principle is that cost savings would be sufficient such that transit agencies could share in the savings, realizing substantially lower costs.

Why not move to open payments?

TO DATE, OPEN PAYMENTS ARE NOT A COMPLETE SOLUTION, SO COST SAVINGS ARE LIMITED. Open payments cannot fully replace existing closed loop smart card systems, because they are not yet available to all riders. At the time of writing, in both London and Chicago students must use a closed loop smart card to obtain discounts. In Chicago obtaining a child's fare requires an operator to push a button before an adult's card is tapped. Until these gaps are bridged, it seems unlikely that open payments will deliver its full potential cost savings.

NOT ALL RIDERS HAVE CONTACTLESS BANK CARDS OR MOBILE PAY. A basic impediment to a complete adoption of open payments is incomplete market penetration for contactless bank cards and mobile pay. While 95% of Canadians have at least one credit card[19] and in 2016 95% of credit cards were contactless, only 40% of debit cards were contactless.[20] Over 73% of Canadians aged 18 and over had a smartphone in 2015,[21] and this rate has no doubt risen. However, mobile pay has so far been relatively slow in being adopted by Canadians, with penetration rates in the low 50% for iPhones and high 40% for Android.[22] In addition, those Canadians without contactless bank cards or mobile pay likely include lower income or other disadvantaged groups, potentially raising equity concerns.

[19] *Canadian Bankers Association (2017)*
[20] *Boverman (2017)*
[21] *Canadian Radio-television and Telecommunications Commission (2016)*
[22] *Mobile Syrup (2017)*

TRENDS AFFECTING COSTS AND BENEFITS

Technological development is the overriding trend affecting the costs and benefits of open payments.

TREND	WHAT IS IT	POTENTIAL IMPACT ON OPEN PAYMENTS
Increasing smart phone penetration among all age groups	Smartphones are increasingly being adopted by older and younger demographics, who have not traditionally used these devices.	As smartphone penetration reaches almost all transit riders open payments will face fewer potential gaps.

CONCLUSION

A variety of tools are available for transit agencies to become more cost effective in their operations, freeing up funds to invest in new transit to relieve congestion. This briefing explored two potential solutions that are underexplored in Canada.

Ridesharing (e.g. Uber, vanpool services) can help transit agencies to extend service at low cost and into areas that could not be served cost effectively with conventional transit. Transit agencies can realize tangible benefits from ridesharing, not only in terms of improving mobility, but also in terms of relieving pressure on overcrowded services and in avoiding costs associated with the construction and operation of park-and-ride lots, such as at commuter rail stations. Key barriers to greater integration of ridesharing and public transit are likely cultural and historical notions of what is and what is not transit, as well as competition for scarce budget dollars.

Open payments for transit with either bank cards (credit or debit) or mobile pay (e.g. Android Pay, Apple Pay, Samsung Pay) are a rapidly emerging trend that have yet take hold in Canada. The convenience benefits for transit riders of open payments are well established and include not having a separate transit card and account to manage, and not having to lock up funds in a card that can only be used for a single purpose. At the same time, while a cost savings from open payments (relative to proprietary closed loop smart cards) seems possible, savings seem likely to be limited until open payments can replace substantially all other forms of payment and associated infrastructure. The newness of open payments and a lack of hard evidence of cost savings also complicate this assessment.

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