CUTA ACTU
CANADIAN URBAN TRANSIT ASSOCIATION
ASSOCIATION CANADIENNE DU TRANSPORT URBAIN

THE OPTIMAL LEVEL OF SUPPLY AND DEMAND FOR URBAN TRANSIT IN CANADA

Clockwise from top left: City of Edmonton, GO Transit, City of Ottawa, TransLink, Réseau de transport de la Capitale, Société de transport de Montréal

Has Canada invested properly in transit? Should its transit systems provide more service, or less?

To answer these questions, CUTA commissioned new research by HDR Decision Economics that applies conventional, peer-reviewed methods of economic analysis. The final report, *The Optimal Supply and Demand for Urban Transit in Canada,* quantifies the amount of transit service needed to create an economically optimal balance between transit and automobile use in urban areas. An optimal balance is one that maximizes the benefits of urban transportation (including personal access and mobility, productivity, economic development) over its costs (including facilities, equipment, operations, collisions, congestion delays, air pollution, greenhouse gases).

For the economically optimal level of service, the study projected the shift in travel patterns that would result. It also identified the necessary investments in transit infrastructure and operations and their benefits over a 30-year timeframe.

Research highlights

Compared to actual 2006 levels, an economically optimal scenario for transit supply and demand would involve:

- a 74% increase in annual transit service
- a 37% increase in annual transit use
- a 4% decrease in annual automobile use

Expanding national transit infrastructure to enable optimal service levels would require an investment of $78 billion (2006 dollars).

Over 30 years, optimal levels of transit supply and demand would have incremental costs of $120 billion and benefits of $239 billion (2006 dollars), yielding a 12.5% economic rate of return.

About 70% of the projected benefits of optimal transit supply and demand arise from congestion management including reductions in delay, vehicle operating costs, collisions and emissions.

Note: Information in this issue paper is drawn from *The Optimal Supply and Demand for Urban Transit in Canada* (HDR Decision Economics, August 2008) unless otherwise noted. Further details are available at www.cutaactu.ca.

Study approach

Economic theory holds that, in a fully competitive market, consumer prices would reflect the true costs of goods and services. Consumer choices would minimize waste, shortages, queues and surpluses, and permit an optimal use of resources in meeting market needs.

Following this idea, in an economically optimal urban transportation system, individuals would pay the full cost to society for each trip they make by road or transit. In fact, however, automobile users pay far less than the true social costs of their travel. For example, they do not pay the costs of delay, lost mobility, diminished productivity, collisions and environmental and health problems that arise from traffic congestion, and that have been estimated to be worth at least $3.7 billion a year.[a]

If automobile users paid the full social cost of each trip, fewer people would use cars and more would use transit. This would lead to a more efficient allocation of resources between road and transit systems. However, the implementation of congestion pricing to charge a fee for road use remains impractical and politically challenging. Economically speaking, a "second-best" approach is to hold transit fares below their full cost and improve transit service until enough car users switch to transit and an optimal balance is created.

Key findings

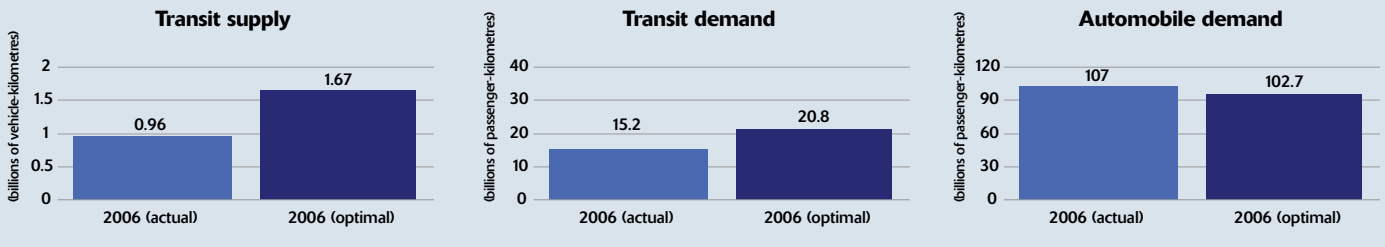
Optimal supply and demand. Based on statistics for the benchmark year of 2006, the research found that economically optimal urban transportation in Canada would require a 74% increase in transit service levels, boosting transit use by at least 37% and reducing automobile use by 4% (see Figure 1 for absolute numbers). Total transit and automobile travel would increase by about 1% over current levels, due to greater transit use by current customers. It is worth noting that less conservative assumptions (particularly with regard to auto users' propensity to switch modes, and the social costs of congestion) would have yielded a much different finding—namely, the need for a 171% increase in transit service levels rather than a 74% increase.

Halifax Regional Municipality

Figure 1

Optimal vs. actual transit supply and demand (2006)

Element	Actual	Optimal	Difference
Transit supply (billions of vehicle-kilometres)	0.96	1.67	+0.71 (+74%)
Transit demand (billions of passenger-km)	15.2	20.8	+5.6 (+37%)
Automobile demand (billions of passenger-km)	107.0	102.7	-4.3 (-4.0%)
Total demand (billions of passenger-km)	122.2	123.5	+1.3 (+1.1%)



TransLink

Implications for capital investment. The analysis found that a one-time investment of $78 billion in transit infrastructure expansion would have been needed to enable the economically optimal level of transit service in 2006 (i.e. 74% more than the actual supply, as shown in Figure 1). To put this figure into context, in 2006 Canadian transit systems were able to invest about $2 billion in transit infrastructure. In a recent survey, those same systems identified $28 billion of infrastructure expansion needs over the five years from 2008 through 2012.[b] Clearly, Canada's levels of transit infrastructure investment—both actual and desired—are far from adequate to support the economically optimal scenario. It should also be noted that these investment figures do not include the necessary costs of replacing or renewing transit infrastructure that already exists.

Implications for operating investment. The analysis also found that the optimal level of service in 2006 would have increased net operating costs (i.e. total operating costs less fare revenues) by almost 130%, from $1.8 billion to $4.1 billion. Over 30 years, these additional costs would have a total present value of about $49 billion. The analysis assumed that fares would remain constant despite the fact that growth in transit service would exceed ridership increases. As a result, Canada's national rate of operating cost recovery from fares in 2006 would have decreased from the actual 60% figure to 47%—which is more in line with other OECD nations—although operating efficiencies linked to greater service levels could lessen this decline.

Benefits, costs and risks. To assess the economic value of the optimal investment levels, the study applied a cost-benefit and risk analysis model called TransDEC that Transport Canada recommends for the evaluation of urban transit investments. TransDEC users can forecast the economic value of transit benefits related to mobility, economic development, and reductions in congestion and environmental effects, as well as life-cycle capital costs and incremental operating costs.

The model results (see Figure 2) show that investment in an optimal transit supply over 30 years would have a net economic benefit of almost $120 billion, equivalent to a 12.5% internal economic rate of return. The projected economic benefits would have a present value of about $239 billion, and the projected costs would have a present value of about $120 billion (i.e. the previously described additional net operating costs of $49 billion, plus infrastructure costs of $71 billion equivalent to the present value of $78 billion spread over five years).

The projected benefits of optimal transit supply and demand arise 70% from congestion management (i.e. reductions in delay, vehicle operating costs, collisions and emissions), and about 30% from improvements to personal mobility and economic development. The analysis also found significant macro-economic benefits from the optimal investment in new transit infrastructure and services. Over a five-year capital investment schedule, Canada could expect to see 3.3 million full-time equivalent construction jobs. The operation of transit systems at optimal service levels would also be expected to create about 65,000 permanent full-time jobs in the transit sector.

Clockwise from top left: Kamloops Transit System, York Region Transit, City of Fredericton, Société de transport de l'Outaouais

Looking ahead

This study takes a national perspective, and offers no recommendations on how to finance new transit investment or allocate it among regions and municipalities. However, it does make two suggestions about government roles:

- Provincial and municipal governments should follow a coordinated and continuous process of identifying regional and local transit alternatives, analyzing them in terms of benefits and costs, and selecting projects on the basis of economic and social merit.
- Federal and provincial governments should offer financial assistance to offset the limited fiscal capacity of municipalities, support research, develop economic evaluation tools, and perform due diligence on their financial commitments.

References:

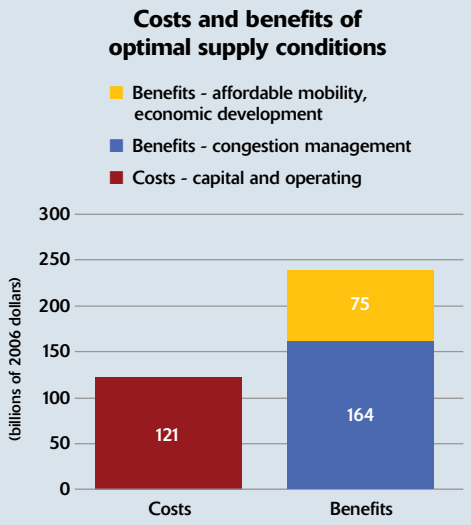
a) Conference Board of Canada, *Sustainable Urban Transportation: A Winning Strategy for Canada*, 2007 (available from www.conferenceboard.ca)

b) Canadian Urban Transit Association, *Transit Infrastructure Needs for the Period 2008-2012*, 2008 (available from www.cutactu.ca)

Figure 2

Economic analysis of optimal supply and demand conditions for 2008-2038
(billions of 2006 dollars, present values using 5% real discount rate)

	Mean	Minimum	Maximum
	Most likely range (80% probability)		
BENEFITS			
Congestion management			
Time savings	$110.2	$70.7	$157.1
Savings in vehicle operating costs	$31.2	$21.0	$43.4
Emission savings	$0.9	$0.4	$1.7
Accident cost savings	$21.6	$7.0	$45.4
Subtotal	*$163.9*	*$99.1*	*$247.6*
Affordable mobility			
Value to low-income travelers	$36.1	$24.6	$49.0
Cross-sector benefits	$1.2	$0.5	$2.0
Subtotal	*$37.3*	*$25.1*	*$51.0*
Economic development			
Residential development	$33.2	$18.6	$46.5
Commercial development	$4.2	$2.4	$6.5
Subtotal	*$37.4*	*$21.0*	*$53.0*
Total benefits	*$238.6*	*$145.2*	*$351.6*
COSTS			
Capital expenditures	$71.3	$64.7	$77.9
Operating and maintenance costs	$49.4	$47.5	$51.4
Total costs	*$120.7*	*$112.2*	*$129.3*
BENEFIT-COST ANALYSIS			
Net benefits	**$117.9**	**$33.0**	**$222.3**
Rate of return	**12.5%**	**8.2%**	**16.6%**



The Canadian Urban Transit Association (CUTA) is the voice of Canada's public transit industry. For additional information including research reports, industry updates, news bulletins and more, please contact us or visit our website.

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