Montreal Economic Institute
Ideas for a More Prosperous Nation

ECONOMIC NOTE

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Bringing back tolls on Quebec highways

The scope of roadwork announced in February by the Quebec Department of Transport ($12 billion from 2008 to 2012) suggests the extent to which the maintenance of highway infrastructure has been neglected in recent years. Last October, the Montreal Economic Institute published an Economic Note outlining tolls' efficiency in financing the highway network.[1] The Note showed that this type of revenue collection best respects the user-pay principle.

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No highway or bridge in Quebec is currently covered by tolls, unlike the situation that prevailed until the 1980s.[2] This will soon change, however, with the new Highway 25 bridge and the extension of Highway 30. The government has also made it known that tolls would play a bigger role in the near future.[3]

This Economic Note presents four scenarios in greater detail to show that a return to tolls is realistic: a) on Montreal Island bridges; b) in the Montreal metropolitan area; c) in a group of urban areas; or d) on all of Quebec's main highways. In each scenario, it is assumed that electronic tolls will be used since this costs less and minimizes disruption to traffic flow. We will then raise the issue of how the funds collected should be used.

The various scenarios

Since this hypothesis often comes up in Montreal political and business circles, the first scenario to be assessed is that of installing tolls on Montreal Island bridges (Scenario A). If average tolls were equal to those planned for the Highway 25 bridge,[4] they would have generated about $449 million in income in 2007,[5] taking account of collection costs (15% of gross income) and irrecoverable debts (5%).[6]

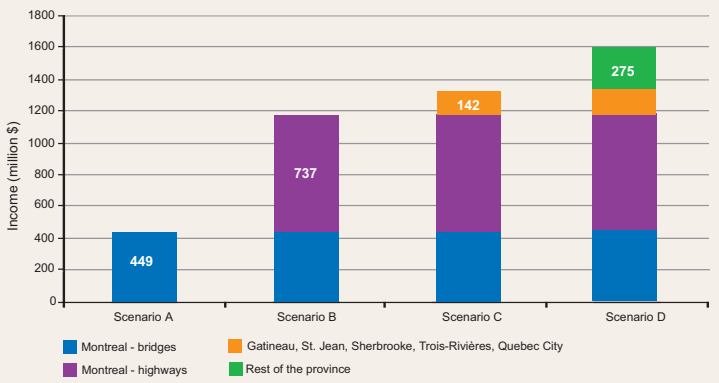
The tolls charged to users would vary based on time of day and type of vehicle. The rush hour minimum would be $0.80 for a regular car, and the maximum would be $2.40. Outside rush hours, the minimum would be $0.60 and the maximum $1.80. These amounts were set by the government with the aim of maximizing the number of vehicles on the bridge while avoiding traffic jams. Higher tolls would be applied to trucks to take account of the extra wear and tear on roads caused by heavy vehicles, thereby avoiding hidden subsidies to the trucking industry.[7]

The need for variable tolls reflects the complex nature of highway infrastructure. Roads have a high fixed construction cost,

1. See Mathieu Laberge, *Tolls as a solution for financing the road network*, Montreal Economic Institute, October 2007.
2. Fred Nix, *Alternative Road Financing Arrangements*, 2001, p. 8.
3. Denis Lessard, "Les péages vont se multiplier", *La Presse*, October 19, 2007, p. A-2.
4. Department of Transport, *Projet pour la conception, la construction, le financement, l'exploitation et l'entretien d'une portion du parachèvement de l'autoroute 25 dans la région métropolitaine de Montréal*, Entente de partenariat, September 13, 2007, p. 131.
5. Estimates of bridge use were based on annual average daily traffic flows issued by the Department of Transport for 2006. Figures were reduced by 9% to take account of tolls' impact on demand. The Lachapelle and Viau bridges were left out of the calculations because traffic flow figures were unavailable. Estimates of traffic flow on federal bridges were based on data from the 2006-2007 annual report of the Federal Bridge Corporation (p. 14).
6. Studies find collection costs varying between 5% and 20% of income generated by tolls for a variety of projects, including electronic and manual tolls. See Washington State Department of Transportation, *Comparative Analysis of Toll Facility Operational Costs*, 2007. Also see Siemens Electronic Tolling, *Road User Charging Schemes in Europe: Current Experiences and Future Trends*, 2007. Britain's Parliamentary Office of Science and Technology assesses the cost of maintaining collection equipment at 10% of income (House of Commons, *Electronic Road Charging*, 1998). Irrecoverable debts were evaluated based on a 1% to 2% rate of equipment failure and a 2% to 3% rate of non-payment.
7. Department of Transport, *op. cit.*, footnote 4, p. 128. As an example, the toll per axle charged to Category 2 vehicles could be double the amount charged to regular cars for using the Highway 25 bridge.

FIGURE 1

Toll revenues in 2006
based on various scenarios



whereas the cost associated with each vehicle using a road is relatively low. Since infrastructure is used at full capacity during rush hours, to benefit from economies of scale it would have to attract more vehicles the rest of the day to spread fixed costs over a greater number of users.

Optimal tolls would thus vary based on the cost of wear and tear for different types of vehicles and users' sensitivity to the presence of tolls.[8] In the case of highway tolls, the various market segments are: (1) users who must travel at rush hours and who are required to pay more in tolls, reflecting higher demand during these periods; and (2) users who can travel outside rush hours and who can be enticed to modify their habits so as to benefit from lower tolls. Using this type of toll structure encourages highway use outside rush hours, helping fight traffic jams.[9]

Putting tolls only on Montreal Island bridges poses a problem, however. The amounts collected in the projected tolls would greatly exceed the annual cost of maintenance, depreciation and administration of the tolled infrastructure. For example, this cost came to $34 million in 2007 for Jacques-Cartier and Champlain Bridges Incorporated for all the structures it manages.[10] In comparison, the three Montreal bridges the corporation is responsible for would generate $155 million in annual income based on our hypotheses. The case of bridges is an exception, however, since highway tolls generally do not provide enough income to be fully self-financing.

The concept of a return to tolls with a "network" approach, as opposed to the "project" approach adopted up to now involving tolls only on new infrastructure, would allow for tolls to be considered on a broader range of infrastructure and would avoid the trap of causing large transfers of traffic from toll roads or bridges to those with no tolls. It would thus be appropriate to place tolls on the entire highway network in the Montreal metropolitan area (Scenario B).[11] By including bridges, income of about $1.2 billion a year would be obtained.[12]

Tolls could also be extended to the main highways in other urban areas such as Gatineau, Saint-Jean-sur-Richelieu, Sherbrooke, Trois-Rivières and Quebec City (Scenario C).[13] This scenario would generate about $142 million in annual income for a total of $1.3 billion, including the Montreal metropolitan area.[14]

A final possibility would consist of extending tolls to all main highways with annual average daily flows of 10,000 vehicles and over (Scenario D). In addition to highways near urban areas, this plan would encompass most portions of Quebec's major highways.[15] Overall toll income in this case would climb to $1.6 billion. Most of this amount (74%) would come from the Montreal metropolitan area, while 9% would come from other urban areas and 17% from the rest of the province.

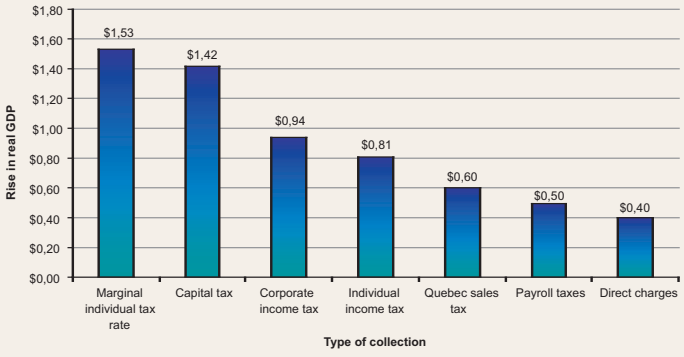
This scenario is the one that would have the lowest economic impact on individual behaviour. By putting tolls on most of

Time-varying tolls encourage highway use outside rush hours, helping fight traffic jams.

8. This segmented price structure consists of adopting a pricing policy of the Ramsey-Boiteux type, since price elasticity is not the same for different types of vehicles. See Marcel Boyer, Michel Moreaux and Michel Truchon, *Partage des coûts et tarification des infrastructures*, CIRANO, 2006, p. 299; François Fournier and Robert Simard, "The DRAG-2 Model for Quebec", in Marc Gaudry and Sylvain Lassarre, *Structural Road Accident Models*, The International DRAG Family, 2000, pp. 37-66.
9. See Robin Lindsey, *Congestion Relief: Assessing the Case for Road Tolls in Canada*, C.D. Howe Institute, 2007.
10. Federal Bridge Corporation, *op. cit.*, footnote 5, p. 41. The Jacques-Cartier and Champlain Bridges Incorporated manage the following structures: the Champlain Bridge and its ice control structure, the Jacques-Cartier Bridge, the Honoré-Mercier Bridge and the Melocheville Tunnel.
11. In addition to the above-mentioned bridges, this plan includes portions of autoroutes 10, 13, 15, 19, 20, 25, 30, 40, 440, 520, 640 and 720 as well as of highways 116 and 132.
12. The average toll on highways would be $0.10 per kilometre, or 58% of the average toll for cars on the 407 Expressway in Toronto. Figure for use were reduced by 9% to take account of the price elasticity of demand.
13. Outside the Montreal metropolitan area, portions where tolls are charged would be those with average daily use by 10,000 vehicles and over. Only provincial highways with two-digit route numbers and their three-digit extensions would be included in this model. The average toll outside the Montreal metropolitan area would be $0.05 per kilometre. Figures for use were reduced by 4.5% to take account of price elasticity of demand.
14. In addition to the bridges and highways included in Scenario B, this scenario includes portions of autoroutes 5, 35, 50, 55, 73 and 540 as well as of highways 173 and 573.
15. In addition to the bridges and highways included in Scenario C, this scenario includes autoroutes 10 as far as Sherbrooke, 15 as far as Mont-Tremblant, 20 as far as La Pocatière, and 40 as far as Sainte-Anne-de-Beaupré, as well as autoroutes 50 and 73.

Figure 2

Impact on real GDP per dollar of tax reduction



Source: Quebec Department of Finance (2007).

Quebec's main highways and affecting most Quebec motorists, this toll plan would help reduce implicit subsidies to motorists living away from large urban areas. It follows the principle of tax collection being more effective if it applies to a broad base and involves a low rate of taxation.

For example, a round trip between Montreal and Quebec City would cost about $30. For a suburbanite crossing a bridge in the morning and evening rush hours, the daily cost would be $4.80, for an annual total of $1,200. These amounts may seem large, but they reflect the value of the service received by motorists, with the cost usually hidden in government indebtedness. Moreover, these amounts represent only a fraction of the average cost of using an automobile, which is about $10,000 a year.[16]

Toll income should be used exclusively for maintenance and rebuilding of toll highways, to avoid undermining their legitimacy among taxpayers.

How to use the amounts collected

The amounts collected through tolls under the plan presented in the previous section obviously raise the question of how they are to be used. Up to now, it has been taken for granted that toll income would be used exclusively for maintenance and rebuilding of toll highways. This is justified by a number of factors.

This model would initially help limit growth in Quebec government indebtedness linked to its highway network. In 2005-2006, the sums in the road network conservation and improvement fund, matching annual spending on maintenance and upkeep of the Quebec highway network, were estimated at $1.18 billion.[17] This fund is 87% financed by long-term debt.

This use of toll income is also more efficient than financing maintenance and rebuilding work from general tax funds from all sources. Direct charges constitute the form of tax collection with the least negative effect on economic activity. As a way of illustrating this, a one-dollar reduction in the highest personal income tax rate would produce a real GDP rise of $1.53.[18] Conversely, a one-dollar reduction in direct charges would raise real GDP by just $0.40.

Moreover, this option is the most likely to win the support of voters. According to a recent poll, nearly eight out of 10 Quebeckers are favourable to installing electronic tolls "if the amounts where access rights were collected were returned and used to repair highways."[19]

As we have already mentioned, international experience shows that it is rare for tolls on highways to produce sufficient revenue for self-financing of annual maintenance and rebuilding expenses. However, if this situation were to arise (in particular for Montreal bridges), the question of how to use the remaining amounts remains crucial. In keeping with the user-pay principle, any surplus collected by the government should be fully devoted to reducing the costs paid by motorists who have used the infrastructure that produced this "profit" in proportion to the amount paid annually (rather than in proportion to the number of times used). This "dividend" could easily be paid[20] in the form of discounts on the licence and registration fees paid to the Société de l'assurance automobile du Québec (SAAQ), since identifying the user for billing purposes would already require the registration number to be known.

In its transport plan released in May 2007, the City of Montreal looked at using tolls to finance public transit. Toll-paying users of the road network would thus be subsidizing public transit users. This would constitute cross-subsidization between

16. Canadian Automobile Association, *Driving Costs*, 2007.
17. Mathieu Laberge, *op. cit.*, footnote 1, p. 2.
18. Quebec Department of Finance (2007). Simulations conducted without effects on government income, compensating reductions with an undistorted theoretical lump-sum tax.
19. Léger Marketing (for the Montreal Economic Institute), *Opinion of Quebeckers on Road Network Funding*, September 2007, p. 9.
20. This type of refund (applying to the gasoline tax) has already been put into effect in Massachusetts, for example. See Robert W. Poole and Kevin Soucie, *Rebuilding the Marquette Interchange Via a Public-Private Partnership*, Reason Foundation, January 2003, p. 24.

different modes of transport and would go against the user-pay principle. One category of citizens would thereby be obliged to assume the cost of other people's transportation, which would be neither fair nor efficient. Moreover, the issue of pollution cannot be invoked in support of this measure because motorists already pay amply for the cost of their greenhouse gas emissions through the fuel tax.

As well, granting part of the toll income to municipalities to maintain their local road networks, or paying it directly into the Quebec government's consolidated fund, would have the same negative effects. Tolls would then become a hidden form of taxation, undermining their legitimacy among taxpayers.

It would be logical to extend tolls gradually to all highways with sufficient traffic volume.

A "network" approach to tolls

Designing a toll plan is complex and requires detailed analysis. The figures presented in this document, while realistic, should be seen only as an approximation of the real income generated by the return of tolls to the Quebec highway network. More detailed modelling will be needed to reach an enlightened decision.

It should be emphasized that a "network" approach is fairer and economically more efficient since it avoids two types of cross-subsidization. The first type is geographic, with motorists from one area paying for a service received by motorists from another area. For example, putting tolls only on roads in the Montreal area or in urban areas generally would amount to cross-subsidizing motorists in the rest of the province or in rural areas if the amounts collected were used to finance maintenance of the entire network. The second is sectorial in nature, with the amounts collected in tolls being used for purposes other than the maintenance and rebuilding of roads. For example, paying toll income to public transit or straight into the consolidated fund would be equivalent to subsidizing all taxpayers with money taken from motorists.

It is better to take a "network" approach to the return of tolls rather than linking it to the completion of particular projects. It would thus be logical to extend tolls gradually to all highways with sufficient traffic volume, as is done in a number of countries.[21] To lower risk, to promote innovation and, above all, to avoid the government being tempted to reach into toll revenues for purposes other than maintaining and rebuilding infrastructure, it would be desirable for new tolls to be set up in the form of public-private partnerships.[22]

A return to tolls would thus be presented as a solution to financing the maintenance and rebuilding of the highway network as well as to dealing with the maintenance deficit accumulated over the years.

21. To look into the various forms and systems of tolls in Europe, consult ASECAP, *Tolled infrastructures within ASECAP*, 2007, and Siemens Electronic Tolling, *Road User Charging Schemes in Europe: Current Experiences and Future Trends*, 2007. For Washington State's experience, consult Washington State Department of Transportation, *Comparative Analysis of Toll Facility Operational Costs*, 2007.
22. See Mathieu Laberge, *Road repairs and public-private partnerships*, Montreal Economic Institute, October 2007.

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