The Feasibility of Implementing a Congestion Charge on the Halifax Peninsula: Filling the "Missing Link" of Implementation

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Les frais de congestion posent un dilemme en politiques publiques, sur le plan du nécessaire équilibre entre d'une part la gestion d'un bien quasi public et la réduction des externalités négatives, et d'autre part le besoin de croissance économique, démographique et urbaine ainsi que l'adhésion citoyenne. On trouve dans la littérature de nombreux arguments en faveur de l'utilisation des frais de congestion, mais peu d'éléments sur la façon de les mettre en œuvre. L'objectif de cet article est donc de présenter des questions techniques et administratives liées à la mise en œuvre de ces frais. Nous avons recours à une étude de cas, celui de la péninsule de Halifax, pour éclairer notre propos. Nous en tirons *ex ante* 10 critères qui peuvent être utilisés pour évaluer la mise en œuvre de frais de congestion dans n'importe quel contexte.

Mots clés : congestion routière, frais de congestion, frais d'utilisation, mise en œuvre de politiques, Halifax

Congestion charges pose a policy dilemma because of the need to balance the management of a quasi-public good along with the correction of negative externalities on the one hand against the needs of economic, demographic, and urban growth along with citizen acceptance on the other. The literature provides detailed rationale for congestion charges but minimal consideration on how to implement such charges. The purpose of this article is to expose some of the technical and administrative issues that come with implementing congestion charges. The Halifax Peninsula is used as a case study to illuminate the topic. Drawing on this case, we spell out ten *ex ante* implementation criteria that can be used to assess implementation considerations in any given congestion charge context.

Keywords: traffic congestion, congestion charge, user fees, policy implementation, Halifax

Introduction

Congestion charging, a user fee charged to motorists for travelling on roadways in peak periods, has been advocated for nearly a century (Knight 1924; Pigou 1920) as an economically efficient solution to the traffic congestion problem. While some cities have successfully implemented such charges, others have rejected them after public consultations. These failed cases demonstrate that far from being a mundane policy area, congestion charges represent a controversial issue relevant to the pressures of modern urban planning: the demands of the modern city are forcing many governments to decide whether or not to move ahead with congestion charges and, if so, how.

Congestion charges pose the policy dilemma of balancing several factors: the management of a quasi-public good (i.e., transport corridors); the correction of negative externalities (e.g., travel delays, lost productivity, greenhouse gas emissions, accidents, and wear and tear on road infrastructure); the needs of economic, demographic, and urban growth; and citizen acceptance. The literature (e.g., Banister 2003; Blythe 2005; Glaister and Graham 2006; Lindsey 2007; Maddison et al. 1996; Newbery 1988; Sandholm 2002; Stopher 2004; Vickrey 1963; Yin and Lawphongpanich 2006) provides a detailed rationale for congestion charges but little direction as to how to implement such a charge once the decision to proceed has been made. The purpose of this article is to explore key technical and administrative issues that present implementation challenges.

Building on the literature, we expound ten generalizable implementation criteria that demand consideration during both congestion charge design and implementation. As the exact application of these criteria is dependent on context-specific factors, we use the Halifax Peninsula as a case study to illuminate the criteria, where applicable, and extract *ex ante* implementation lessons. Halifax Regional Municipality (HRM) was chosen because officials have been examining policies and actions designed to ease its serious traffic congestion problem.[1] The derived implementation lessons apply both to jurisdictions contemplating congestion charge regimes and to those willing to undergo reviews of already implemented regimes. The unique contribution of our approach is that we have simultaneously developed and applied a "smart practice" (Bardach 1998, 2005) guide on *ex ante* implementation issues associated with congestion charging by melding public administration, public policy, law, and economic issues and literature that have traditionally been separate. The case study illuminates the reality that implementation of government fiscal policy is "path-dependent and context-specific … [and] politics … deserves close attention by those interested in improving tax policy" (Bird 2009, 12).

Literature Review

Some existing congestion charge implementation literature must be acknowledged. Albalate and Bel (2009) use experience from cities (London, Singapore, Stockholm, Norway, and Edinburgh) that have implemented a congestion charge to explore lessons of success and failure, but they focus only on (a) fee structure and operational technology, (b) revenue uses and investments, and (c) political impacts. Their work provides important factors that define congestion charge policy implementation, but fails to detail other technical and administrative components of the implementation challenge.

Consultation, communication, and revenue use are additional implementation issues addressed by Gaunt, Rye, and Ison (2006) and Rye, Gaunt, and Ison (2008), who outline reasons behind the 2005 Edinburgh "no" referendum vote against congestion charging. The lack of clear communication regarding congestion charge functionality contributed to the public's rejection of the charge. The authors argue that negative press coverage directly influenced community perceptions, highlighting

the important distinction between *consultation* and *promotion*. Implementers in Edinburgh focused on consulting at the expense of communicating policy rationale and failed to capitalize on the positive economic rationales for the charge. Community and political sentiment for congestion charging is said to be "inversely proportional" to the consensus of support among economists regarding its desirability (De Palma et al. 2005). How the issue is framed, however, can turn this proportionality on its head (Albalate and Bel 2009). Albalate and Bel (2009, 964) suggest that if the revenue is invested back into the majority's welfare, it will help make the charge politically feasible and increase community acceptance.

Other important implementation factors identified in the literature relate to politics and governance. Rye, Gaunt, and Ison (2008) suggest that the presence of a political champion was lacking in the Edinburgh case, leading directly to the choice of a referendum—a political tool that more often than not spells doom for a policy option. Leape (2006) explains that Mayor Ken Livingstone's champion status was a critical force behind uptake and implementation of London's congestion charge. London also benefited from the Road Charging Options for London (ROCOL) Working Group that developed and provided resources, advice, and expertise during the development of the congestion charge. The lack of a centralized administrative agency for implementation, on the other hand, created disaster in the Edinburgh case, a point Gaunt, Rye, and Ison (2006) argue is generalizable across other congestion-charging contexts.

As demonstrated above, much of the existing literature focuses on *ex post* implementation regimes. Lindsey (2007, 2008), however, studies three cases (Toronto, Montreal, and Vancouver) that could implement a congestion charge but have not yet. He addresses a few additional implementation elements that we also identify, but notes his work "does not identify an optimal implementation path for any city, let alone for Canada; its focus is limited to determining how road pricing might be introduced in the next few years using established technologies" (2008, 245).

This survey suggests that while congestion charge implementation has begun to be explored, much is still missing from the current analysis of implementation factors. The significance of implementation for any policy, let alone congestion charges, must not be underrated. Authors across public policy disciplines continue to be united in their conclusion that implementation remains "the missing link," a tagline coined by Hargrove in 1975 (Hill and Hupe 2009; Robichau and Lynn 2009). Pressman and Wildavsky (1973) bemoan the lack of an implementation focus; Gunn's (1978) seminal—if criticized—"top-down" approach to "perfect" implementation endures as a dominant model highlighting the challenges of achieving successful policy implementation; and Pal (2009, 241) suggests "policy is initially nothing more than ideas or conceptualizations, while implementation is the specific needs of execution and elaboration in practice." The missing link of implementation has also begun to be mirrored in the economics literature, with Bird (2009, 31) stating that good fiscal policy planning and formulation "pays close attention to detail and implementation."

The Halifax Peninsula

The Halifax Peninsula, while small geographically and demographically, is considered to be HRM's cultural, historical, educational, political, and economic centre, thereby making efficient access to the area a necessity. However, the geography combined with commuting patterns has resulted in the Peninsula becoming heavily congested during weekday morning and evening commutes.

Geographically, vehicle access to the Peninsula is constrained due to limited road options, with

the Macdonald Bridge (1), the MacKay Bridge (2), Bedford Highway / Kempt Road (3), Bayers Road (4), Mumford Road (5), Chebucto Road (6), and Quinpool Road (7) as the only road access points (Figure 1). Most of these seven roads are one or two lanes in each direction and are easily congested.

Regarding commuting patterns, nearly 40 percent (80,000) of the jobs in HRM are located on the Peninsula (McCormick Rankin Corporation [MRC] 2008, 4), yet less than 20 percent of the population lives there, resulting in many people commuting to the Peninsula daily for work. In addition, Haligonians are highly reliant on their cars with "65 percent of the working population in HRM commut[ing] to work using their car on a daily basis" (Statistics Canada 2008, 27). Settlement patterns and employment growth suggest the congestion problem will only worsen: most of the region's population growth is expected to occur off the Peninsula and employment growth on the Peninsula is expected to increase more than in any other area in HRM (MRC 2008, 12).

The Port of Halifax and reliance on the Peninsula as a strategic transportation centre compound traffic

FIGURE 1
Seven Access Points to Halifax Peninsula

Source: Halifax Regional Municipality (2009).

congestion. The Port of Halifax, one of the largest deepwater ice-free ports in the world and one of the top three ports in Canada in terms of traffic, has two container terminals that generate "686 truck movements in and out of the south end container terminal each day" (MariNova Consulting 2006, ii). These vehicles, which travel along the congested routes, serve to strain transportation infrastructure. The Atlantic Gateway initiative, which is expected to increase cargo container shipment and attract business investment into the Port, will further exacerbate traffic congestion.

These factors place pressure on traffic planners to find viable policy solutions to address the traffic congestion problem. HRM has made congestion reduction a priority, acknowledging that "the current system is not sustainable … and the municipality must look at ways to improve public transit and encourage people to leave their cars at home" ("Better Transit" 2008, para. 8). HRM's (2006) approved 25-year Planning Strategy articulated a number of policies to encourage drivers to travel other than by vehicle to improve traffic congestion, including congestion charges designed "to provide a pricing signal to commuters that will trigger a market response" (77-78).

The Ten Implementation Criteria Applied to Halifax Peninsula

We now turn to the implementation criteria which, we argue, furnish generalizable factors specific to congestion-charging policy once the political decision has been made to proceed. These criteria are interconnected and need to be addressed simultaneously should governments wish to have a chance of success in implementing a congestion charge. Because consideration of these criteria may force policy-makers to review and potentially reevaluate policy design, these criteria also possess characteristics worthy of design elements. We leave the specifics of classification to policy-makers themselves; suffice to say these issues demand attention prior to making any final decision.

Two outstanding issues must be mentioned upfront. First, congestion-charging policy should take place within a broader framework of city and urban planning, including consideration of the type and style of city living that is desired for any particular jurisdiction. Second, for efficiency and equity reasons congestion charges need to be embedded in a suite of accompanying policy measures, such as earmarking revenues for public transit service, reforming parking charges, and reviewing tax and expenditure programs. The significance of implementing congestion charges as part of a suite of initiatives is stressed in Stockholm where it became clear that people are more positively inclined to congestion charging if such an approach takes place (Winslott-Hiselius et al. 2009).

Jurisdictional Authority

Since traffic congestion is a local phenomenon, congestion charges are likely to be pursued by municipal governments rather than at the provincial/state or national level. As "creatures of the provinces," municipalities in Canada cannot legally do anything that has not been authorized through their enabling provincial legislation. For HRM, the relevant legislation is the *Halifax Regional Municipality Charter* (S.N.S. 2008, c. 39). At a minimum, the relevant authorities for a congestion charge relate to a municipality's ability to establish the charge itself and to make decisions regarding its road networks. Similar to most municipalities in Canada, HRM is unable to impose taxes other than property and deed transfer taxes but can establish user chargers (section 102) and has the power to make bylaws related to transport and transport systems (section 188(1)(e)) on most roads within its boundaries.[2] This suggests that HRM, and other Canadian municipalities, is likely to have the jurisdictional authority to pursue a congestion charge, provided the charge could be considered a user charge and it will apply only to municipal roads. Regardless, it would be prudent for jurisdictions to carry out a detailed legal analysis prior to proceeding and to consult with the province throughout implementation.

Clear and Agreed Objectives

Road pricing can be implemented for at least three purposes: congestion relief, reduction of other traffic-related externalities (e.g., the environment), and revenue generation. This leads to two cautions. First, while all three purposes of road pricing hold merit and may tempt governments to design a road-pricing scheme that pursues all three, there is a danger the public will become confused by multiple objectives, as occurred in London and Stockholm.[3] In addition, the benefits from considering traffic-related externality pricing depend directly on the severity of the externality. For example, while traffic-generated pollution can be severe in some cities, in HRM an environmental goal is questionable since air quality in the area is generally good, even with the traffic congestion.[4]

Second, decision-makers need to be clear about why they have selected a congestion charge policy and to reflect this clarity into agreed, transparent objectives that serve as a guide for policy design and implementation. In the case of HRM, the primary objective is to reduce congestion by incentivizing individuals to use public and other alternative transit rather than their vehicles. Unlike road tolls, which are aimed at recouping road infrastructure costs (including maintenance and future investment in the road network), congestion charges are aimed at reducing vehicle use in heavily congested areas at heavily congested times. The price for using the road needs to be raised from zero to some positive amount in order to reduce demand for road space back to an efficient (i.e., non-congested) level. That is, the primary objective of a congestion charge is not to raise revenues or improve the environment but rather to relieve traffic congestion by incenting individuals, via a pricing mechanism, to reduce vehicle use in predictably heavily congested areas at heavily congested times. This primary objective needs to be paramount during design and implementation of a congestion charge, as well as be communicated to the public to provide coherence to the entire scheme.

Unfortunately, this main objective is often unstated, conflated, or misunderstood, causing opponents to levy accusations that the charge constitutes nothing more than a "tax grab." Though some revenue will be generated, the main rationale for a congestion charge is to promote greater efficiency through the correction of a market failure created by the overconsumption of an underpriced good. It is therefore important that decision-makers, policy-makers, and the public understand the distinction between a road toll, an environmental levy, and a congestion charge.

A User Fee or a Tax?

The objective of the congestion charge is an important consideration for classifying the charge. Since economists call a congestion charge a Pigouvian tax,[5] many people assume it is a tax. This assumption may be misguided, as congestion charges can be considered a user fee, depending on design. Determining whether or not a congestion charge is a tax or a user fee is important from an implementation standpoint since most municipalities have the authority to impose user charges but cannot implement taxes beyond those granted to them within enabling legislation. Interestingly, detailed consideration of this issue has been overlooked in the congestion charge literature, with the exception of Powell (2009).

As noted previously, HRM is limited to imposing property and deed transfer taxes.[6] To expand its fiscal authorities to include the collection of an additional tax, HRM would need to lobby the provincial government to have its enabling legislation modified. Expanding municipal tax authorities would set a potentially undesirable precedent and get lukewarm reception since provincial governments have traditionally been unenthusiastic about granting additional authorities to municipalities. In addition, such expansion may result in decreased payments to the province under the equalization program. Hence, there may be little political appetite in the province to implement a local congestion charge as a tax, making the question of how to design the charge so that it is classified a user fee of paramount importance. If congestion charges can be considered user

fees, then pursuing the tax authority route becomes an unnecessary complication.

As Bird and Tsiopoulos (1997) note, a tax is a compulsory payment while a user fee is paid only when one seeks to consume the associated good or service on which the fee is levied. Since congestion charges are only imposed on individuals who seek to consume road space at peak times, these charges would appear to satisfy this basic criterion of a user fee. Case law provides some additional determining guidance. *Lawson v. Interior Tree Fruit and Vegetable Committee of Direction*, [1931] S.C.R. 357 (Supreme Court of Canada) at paragraph 10 defines a tax as enforceable by law, levied by a public body, imposed under the authority of the legislature, and intended for a public purpose. Saying that something is "intended for a public purpose" means that its main objective is to raise revenue. This means for a charge to be considered a user fee, the purpose of the charge must be to defray or recover the costs of providing a service from those who benefit. Monies collected from a user fee, therefore, cannot be deposited into general revenues to offset general expenditures, but instead should be earmarked and spent purposefully, thereby increasing the likelihood of the charge meeting the legal criteria of a user fee. This is important not only from an implementation perspective but also politically and economically. Politically, while governments may seek flexibility in the allocation of revenues generated from user charges, the palatability of such flexibility needs to be weighed against public perceptions and legal ramifications.

Another criterion that the courts have used in the past to distinguish a user fee from a tax is the size of the fee (*Eurig Estate (Re))*, [1998] 2 S.C.R. 565 (Supreme Court of Canada). Notably, for a user fee, the amount charged cannot exceed the cost to government of providing the service. This criterion places a substantial burden on a government to establish a defensible charge. Fortunately, the court in *Eurig Estate (Re),* [1998] 2 S.C.R. 565 at paragraph 3 provided a caveat: "Courts will not insist that fees correspond precisely to the cost of the relevant service. As long as a reasonable connection is shown [between the cost of the service provided and the amount charged], that will suffice."

These legal criteria suggest that for a congestion charge to be considered a user fee as opposed to a tax, the fee should be carefully developed and rationalized according to costs of congestion and that the monies collected should be earmarked and dedicated to expenditures related to reducing or mitigating the effects of congestion. Ironically, a well-designed congestion charge tightly adheres to these principles leading to the conclusion that congestion charges are user fees. As it is by no means simple to design a user fee with the legally stipulated criteria that will stand the test of a court challenge, it is essential to carry out detailed legal analysis at the design *and* implementation stages. In the case of Halifax, the province implemented road user fees on several bridges in HRM (discussed in more detail in the Pricing Technology section below), and HRM would likely benefit from the province's experience and expertise in this area, keeping in mind the objective of the existing user fee on the bridges is to generate revenues and not to ease congestion.

Revenue Uses

While the primary objective of congestion charging is not to produce revenue, the literature demonstrates that congestion charges can generate substantial revenues. There may be some political desire in having the charge be revenue neutral, possibly by implementing a corresponding decrease in property taxes or, perhaps more appropriately, a reduction in public transit fares. The ability to achieve this outcome is hampered by the constraints of designing a user fee noted in the previous section and by the expected revenue declines from the charge over the medium and long term as behaviour is modified. Pursuing a revenue-neutral objective in designing a user fee may be palatable politically and may ease the distributional effects. However, implementers will have to weigh this against the

need for additional revenues in the short term to ensure the success of the congestion charge.

While a portion of the revenues generated from a charge will be required to administer and operate the charging system, remaining revenues would likely need to be directed to specific expenditures related to the purpose of the congestion charge to meet the criteria of a user fee. Congestion reduction expenditures include the construction of additional roads, bridges, and tunnels as well as road maintenance. What specific expenditures may be required, however, is context-specific. In the case of HRM, the building of new—or the expansion of existing—road infrastructure is constrained by land costs, space, and public opposition yielding limited opportunity to address congestion through additional road infrastructure.[7] Perhaps the only opportunity for construction is a third bridge crossing between the Peninsula and Dartmouth, but such an endeavour would be expensive, would require the involvement of the province,[8] and would address congestion only in a portion of the congested road network. Moreover, based on predicted employment and population growth, an additional bridge would only temporarily relieve traffic congestion (MRC 2008, 22).

Instead, revenues from a congestion charge can be used to fund public transit infrastructure.[9] If the real objective of congestion charging is to get people out of their cars, it is essential there be viable alternatives. As noted by Lindsey (2008), the case for a congestion charge rests on two factors: severe traffic that regularly imposes costs on motorists, and the scope for commuters to modify their travel decisions. As such, a jurisdiction should not invoke a congestion charge without first giving serious consideration toward how it will develop comprehensive, integrated, and quality transport options. Alternatives include buses, bikes, and ferries, among other modes. The issues of access, scheduling and pricing, quality, coordination, and a comprehensive transit plan are all important. Such investments make it easier for commuters to see the value of the congestion charge, which assists in public acceptance of the charge, and are consistent with the charge being considered a user fee. Indeed, as noted by Farrell and Saleh (2005), voters in Edinburgh were more accepting of a congestion charge when informed that the revenues were going to be spent on bus service improvements.

In Halifax, one deserving recipient of congestion charge revenues is Metro Transit, HRM's public transportation agency, which does not receive provincial funding.[10] Metro Transit "has operated in a constrained fiscal environment" and needs have "just barely been met with nothing going toward future expansion" (Wells 2008, para. 16). Evidence clearly shows that HRM's transit system is operating at or above capacity, with the incidence of standing loads and passenger pass-ups increasing, and that additional capacity must be provided to increase ridership (IBI Group 2009, 19 and 37). Even HRM acknowledged the problem: "To be an attractive alternative to the automobile, Metro Transit must not only consider new higher order services such as fast ferries and bus rapid transit … but also enhance its regular routes that feed these services and serve a wider population base" (HRM 2006, 72). An additional complexity is that commuters often need to travel within the Peninsula or to Dartmouth for employment activities. If there are no suitable transit alternatives to make these journeys, commuters will not have the option of leaving their vehicles at home. Peninsula-specific transit alternatives, such as the availability of taxis, passenger ferries, hop-on/hop-off buses, also need to be considered.

Whether investments in transit alternatives should be made before implementing a congestion charge will need to be carefully considered. It is noteworthy that the success of the London and Singapore congestion charges was due to pre-existing excellent, area-wide public transport systems that provided a viable alternative to commuters upon implementation of the congestion charge. In Stockholm, a seven-month trial period took place only after a public transit funding injection and upgrades had

occurred, which helped ensure citizens' post-trial acceptance of congestion charging (Eliasson 2008; Schuitema, Steg, and Forward 2010). HRM has already committed to investing in public transit. In 2008, a $115 million five-year Transit Plan was approved. The plan includes the addition of new buses to the existing fleet of 265 buses starting with 15 buses in 2008–2009 and 10 buses in each of the financial years 2010–2013 (HRM 2008, 13). In addition, new routes and rapid transit alternatives are being created throughout HRM's suburban and rural areas. This expansion demands evaluation to determine whether or not HRM will need further improvements.

Pricing Technology and Strategy

The collection of congestion charges is another piece of the implementation puzzle. The advent of a number of electronic tolling devices and technologies has made it possible to collect the charge from drivers more efficiently and effectively than traditional methods and without imposing delays. Pricing technology and pricing strategy selection should occur by weighing the relative costs and benefits, along with the objectives of the congestion charge itself, to determine the best scheme for each case.

With respect to technologies, several electronic systems are currently available and use one of the following three technologies: Global Positioning System (GPS), Global System for Mobile (GSM), and Automatic Vehicle Identification (AVI). AVI systems, which are currently in place in many locations, are preferred for their simplicity and feasibility.[11] In fact, three of the most successful congestion charge systems are based on AVI technology: the systems in London and Stockholm, which are based on cameras,[12] and the gantry system in Singapore.

What system and configuration is best depends on context-specific factors. In HRM, an AVI system is already being used that could potentially be extended for use in a congestion charge scheme, thereby minimizing the technological investment for both commuters and the municipality.[13] As noted earlier, a provincially levied toll already exists on the Macdonald and MacKay bridges, which provides a useful precedent for charging in the area as well as experience with charge collection. The MACPASS is an electronic device that works in conjunction with an electronic tolling system used on these two bridges: it enables toll collection by using an AVI system based on transponders attached to windshields containing information identifying a driver's account, which automatically deduct the charge from the account associated with the vehicle. This system allows vehicles to pass without stopping. The fact that these two bridges constitute two of the seven entry points onto the Peninsula begs the question why a new separate system should be developed for the congestion charge when the existing system appears to work and is accepted.

Related to the system are the forms of payment that will be accepted and how payment will be collected. In Singapore, it is mandatory for vehicles entering the congested area to be fitted with smart cards. Stockholm initially used a similar transponder system but abandoned the transponder in favour of camera identification because it worked so well (Eliasson 2008, 398). However, unlike in London where the system merely checks for payment, in Stockholm the camera system is used to decide and register a charge for payment (similar to Highway 407 in the Greater Toronto Area), thus facilitating a variable charge regime. Alternatively, accepting cash payments at the access points is a possibility but doing so requires additional infrastructure and can disturb traffic flows. Allowing payment by post, via a call centre or website, or at various retail sites is also possible but there would need to be a way to record a license plate and link it to the payment. London provides an example for how this can be implemented, though flexible payment arrangements have added to collection costs. Moreover, cameras are essential to any congestion charge system in order to record those not paying the charge and to ticket violators and impose penalties. Enforcement for non-payment will need to be strict and the

penalty high to ensure compliance, particularly in the early days of the charge.

Related to the pricing *technology* is the pricing *strategy,* or where the charge will be imposed and collected. Currently, there are four types of congestion pricing strategies: facility, network, area, and cordon. Facility pricing applies the charge on an individual highway. Examples include Highway 407 in the Greater Toronto Area and California's 91 Express Lane, both of which serve as user-pay bypasses to the often congested highways that run parallel to the charged routes. Network pricing applies the charge to a network of similar highways. The highway systems around Bergen, Oslo, and Trondheim in Norway offer excellent examples where charges apply along all the main highways leading to these cities. Area and cordon pricing are suited for well-defined areas with multiple access points as the charge applies to people entering a whole area. The key difference between these latter two strategies is that an area charge is levied on vehicles that travel within a defined area whereas a cordon charge is levied on vehicles entering or exiting a defined area. This implies the role of road geography is crucial to selecting a pricing strategy.

In the context of HRM, the aim is to limit vehicle access to and from the Peninsula during peak hours at the seven access points. Given its geography and road infrastructure, the cordon or area-based systems appear better suited to the Peninsula. Unfortunately, there is little guidance in selecting between these two systems; "the choice between a cordon and an area charge has not been systematically examined in the literature" (Lindsey 2007, 13). However, Santos and Newbery (2001) and Safirova et al. (2006) argue cordon-based systems are more cost-effective as they are relatively simple to implement, administer, and enforce. Lindsey (2007) further notes that a cordon-based system is preferred if traffic within the designated area is of less concern than traffic accessing it. With respect to Halifax, a cordon-based system would mean vehicles located on the Peninsula would not be charged if they do not leave the Peninsula but nonetheless drive within the downtown core, which could decrease (though by no means eliminate) public opposition to a congestion charge.

While a detailed assessment of the costs and benefits of a cordon versus an area charge, along with the selection of the technology, would have to be completed, in HRM's case combining AVI technology with a cordon-based strategy seems to be ideal given the nature of the problem and existing technology. In addition, the gantry system seems ideal given the limited number of access points and how easily it can be combined with the MACPASS system.

There are two additional complexities that now arise from the case study. First, two of the access points on the Peninsula are toll bridges, and due consideration must be given to how these tolls, which are collected by the Halifax-Dartmouth Bridge Commission (HDBC), and the congestion charge, which would be collected by the municipality, will function together, if at all. Second, not all of the roads forming the suggested charge points are municipal roads. Notably, the two toll bridges fall under provincial jurisdiction. HRM will need to determine whether it is able to impose a congestion charge on these roads and/or whether it can partner with the province to implement a congestion charge on these toll bridges. HRM could exclude the bridges from the congestion charge cordon, but doing so would likely raise equity issues from those individuals commuting to the Peninsula from the other side of the Halifax Harbour. Alternatively, HRM could impose the charge just outside of HDBC's authority over these bridges, which may result in an increased number of collection points. It is worthwhile to note that the commission that operates the two tolled bridges is "looking to reduce congestion and ensure efficient and reliable travel across the two harbour bridges. With this in mind in 2009 [the bridge commission] commissioned a study to investigate the impact peak period tolling … or one-way tolling might have on reducing congestion" (HDBC 2010,

9). As a consequence, the bridge commission may be receptive to working with HRM in the future to implement a congestion charge.

Fee Structure, Size, and Tailoring

In establishing the congestion fee, three questions arise. When is the charge going to be levied? How much is the charge going to be? Who pays (and does not pay) the charge? There exist multiple charging schemes based on static, variable, or dynamic pricing models, each of which can have varying complexities. Static means that the price is preset, usually according to usual traffic conditions, variable pricing means prices vary with time according to a predictable schedule, and dynamic pricing means prices can be updated in real time according to the level of congestion.

Dynamic pricing approaches require extensive technology to monitor traffic flow and to communicate this information to change commuting behaviour from the congested road to the uncongested roads and as congestion varies. While these dynamic schemes are desirable in theory because they adjust according to the effective marginal cost of driving at a point in time, there are shortcomings that may explain why there are few real-world applications of this approach. For example, as drivers will not know the exact cost of their decision to drive or the route they wish to select when they begin their trip, the charge will not effectively dissuade marginal drivers from entering the road. Given that congestion in HRM is predictable in terms of times (i.e., 7.30 to 9.30 a.m., 3.30 to 5.30 p.m.) and days it occurs (i.e., Monday–Friday), it is not clear this added complexity yields any discernible benefit. Perhaps either a uniform fee (London) or a predictable schedule (Stockholm) during the normal commuting times is an appropriate policy given the specific case study circumstances. Static or variable pricing based on this set-time-of-day approach should reflect usual traffic patterns and would not demand the same levels of technology, monitoring, or commuter communication needed for dynamic pricing.

Once it is determined when the charge will be levied, the amount of the charge needs to be set. Again, this appears simple in theory but is quite difficult in practice.[14] There are three elements to consider when setting the fee. First, the theoretically ideal charge would be set equal to the marginal cost, but these costs are difficult to define properly and nearly impossible to estimate quantitatively.[15] Taking a cue from London, which instead relied on extensive modelling of household behaviour and traffic patterns to determine the charge, it is clear that the undertaking required to determine a sustainable and economically efficient charge for the long term and not just for the short term should not be underestimated.[16] Second, once a charge is set, it may be politically and administratively difficult to modify, particularly to raise (Bird and Tsiopoulos 1997, 54), unless the charge is calculated according to well-defined and verifiable rules as was done in Singapore and on Route 91 in Orange Country, California. Third, the charge should cover the operating costs of the congestion-charging system. Fourth, the charge has to be high enough to elicit the desired behavioural change. Obtaining the desired behaviour change is dependent on three things: the price elasticity of demand (PED); the desired traffic reduction; and the cost of transit alternatives (which influences the PED), particularly public transit. An individual's choice among various modes of transportation is not simple nor based just on monetary costs; concerns such as transit times, waiting times, reliability, comfort, privacy, and security also factor into the decision. While on the surface it may seem transit fares would need to be less than the imposed congestion charge in order to incent commuters to switch to public transit, this may not be the case because the congestion charge is only one component of the monetary cost of driving.

The final consideration in setting the congestion charge concerns distributional effects along with discounts and/or exemptions. As noted by Ecola and Light (2009), who provide a comprehensive discussion of equity effects of congestion charges, "many proposals for a congestion charge have

been rejected based on worries that congestion pricing is inequitable" (iii). Some have argued that congestion charges are regressive (e.g., Flowerdew 1993), where the payment forms a larger proportion of total income as income decreases, but in reality the regressive impacts are dependent on the "socio-economic and geographical considerations of the town where the scheme is under consideration" (Santos and Rojey 2004, 23) as well as the current system for funding, fees, and taxation to support transportation infrastructure (Ecola and Light 2009, ix). For these reasons, assessing equity implications is not a simple task and will depend on "how we measure equity and define groups, the specifics of the location, and to what we compare congestion pricing" (Ecola and Light 2009, x).

In reality, any regressive or disproportionate effects can be minimized or even reversed with careful design, revenue uses, and compensation mechanisms, particularly discounts and exemptions for readily identifiable groups. Equally, consideration should be given to compensation mechanisms that can be put in place to ensure these select targeted groups are out of their cars without burdening them with prohibitive cost. For example, the congestion cost can be offset by subsidizing the cost of using alternative transport (e.g., subsidizing bus passes and tickets for low-income individuals). Governments need to determine their own social policy on these matters; however, it should be noted that "accounting and enforcement of tolls are easier if vehicles and individuals are treated equally; moreover, opinions can differ regarding who should be favored on grounds of efficiency or fairness" (Lindsey 2008, 250).

Other distributional aspects relate to the effects of a congestion charge on businesses located in the congestion charge area. In the short term, the main concern is that fewer people will enter the congestion charge area for shopping, eating, and other entertainment-related activities. These concerns are partially addressed if the charge is limited to peak commuting times. In fact, some activities may increase as people remain on the Peninsula after work and have dinner or do shopping in order to avoid the charge on the way home. Equally, the implementation of a congestion charge may improve public transport and reduce congestion, allowing for better access to the Peninsula thereby improving the attraction to travel to the area for pleasure purposes. The literature examining congestion-charging effects on retail business (Clark 2004; Daunfeldt, Rudholm, and Rämme 2009; Eliasson et al. 2009; Quddus et al. 2007) is unable to reach a consensus as to whether retail businesses are negatively affected by a congestion charge. In the long term, the concern swings to business flight. Some businesses may relocate from the congestion charge area so that their employees can avoid paying the congestion charge. While some business flight from the congested area might actually be optimal, incentives to keep businesses in the area may have to be considered (e.g., a property tax rebate).

A related complexity concerns business-related traffic and the constraints that limit the ability to shift this traffic. Delivery vehicles must access the congested area, their delivery schedules may be inflexible, and they may have limited ability to pass along the congestion charge through higher prices to their customers. Hicks (1977) suggested that in these cases the congestion charge should be levied on the business or individual requiring delivery during peak hours, and Holguin-Veras (2008) suggested tax incentives to encourage businesses to change their delivery schedules. A particular added complexity with the Halifax case is port traffic where changes in the timing regarding the loading and unloading of freight would be necessary. Evidence from the Ports of Los Angeles and Long Beach suggests a peak-hour congestion charge may incent cargo owners to change pickup and delivery times from peak hours to nights and weekends (PIERPASS 2010).

Another group that must be considered is through-traffic commuters.[17] For Halifax, through-traffic commuters would comprise commuters using the bridges to drive to and from Dartmouth. Their

use of the bridges occurs because there are no other access points to Dartmouth without going all the way around the inlet. It could be argued that these commuters should not be charged for congestion because they do not, as of yet, have any realistic alternatives. Relief for through-traffic commuters exists in London and Stockholm. In Halifax, the same might be accomplished by designating Joseph Howe Drive to Bedford Highway and onto the MacKay Bridge as a charge-free route. Alternatively, HRM could consider building or modifying road connections that exempt such drivers from these charges.

Parking and Park-and-Ride Lots

Parking access, location, and charges are also important components of a congestion charge scheme. Commuters will be tempted to drive just to the congestion charge boundary, park their car, and walk or take public transit into the zone. This can impose an extreme, negative spillover on residents and businesses in these boundary areas. On the other hand, it provides an opportunity for economic activity as residents and businesses could rent out parking space on their privately owned property. Municipalities will have to give consideration to parking rules, charges, and enforcement in a set perimeter around the boundary. Park-and-ride lots can reduce illegal or unwanted parking in residential areas and make public transit a more palatable option, particularly for commuters living in areas ill-served by public transit. In HRM, Metro Transit currently runs 12 such lots, most of which are free. There may be a need to expand not only the number of parking spots but also the number of sites.

There might be pressure to consider parking charges in the congested area, perhaps even in lieu of a congestion charge scheme. Parking fees, however, are both a poor substitute and a complement for well-designed congestion charges. Albert and Mahalel (2006) show that commuters are much more sensitive to a congestion charge as compared to a parking charge; they are willing to change their travel behaviour to avoid the charges yet more willing to pay parking fees. Bonsall and Young (2010) further note that parking charges have no direct effect on through traffic. In addition, parking charges can prolong the search for a parking spot and increase idling time and the volume of circulating traffic. It is also the case that parking fees have no effect on reducing delivery or freight traffic. Increasing parking fees in tandem with a congestion charge seems odd since a properly designed congestion charge should effectively address the congestion problem. An alternative strategy is to reduce or abolish parking charges at public parking sites in the congestion charge zone as a way to reduce "peak period congestion while preserving, perhaps enhancing, the role of the city centre as a location for retail activity and increasing equity" (Bonsall and Young 2010, 333). Such a scheme would increase the acceptance of the congestion charge and could be financially viable if there are far more people paying the congestion charge than parking in the public spaces.

Communication and Consultation

It is clear that decision-makers cannot just decide in favour of a congestion charge, announce its implementation, and think reduced congestion will automatically follow. Care and attention must be paid to incorporating the right timing, communication, and consultation strategy for each jurisdiction, circumstance, political will, and community mood.[18] *Before* embarking on implementation and enforcement, decision-makers must schedule time to install appropriate collection technology, to provide and communicate the desirability of alternative transit options, and to educate drivers on the costs and causes of congestion. Throughout this process, it is important to consider how to sell the idea since "there is a potential conflict between making congestion charging [economically] 'efficient' in the theoretical sense and making it easily understood" (Eliasson 2008, 397). The Stockholm trial exemplifies the need for the public to gain positive experiences (as opposed to just information) if support is to be secured (Eliasson 2008, 402-3; Winslott-Hiselius et al. 2009, 280). Not meeting expectations can result in the public becoming disenchanted by poor implementation

during the trial period, and this should be avoided (Eliasson 2008, 403). The communication process also needs to continue *after* implementation; Stockholm demonstrates the value of providing the public with independent, visible proof of congestion relief after the event.

The status of Halifax as a regional municipality means that it should pay careful attention to the communication of the policy from the region's own perspective. HRM is a mix of urban, suburban, and rural communities that all need to be engaged, and the diverse transit needs of individuals in each of these communities must be balanced to maximize the effectiveness of the congestion regime. HRM should exercise care in selecting which media and outlets best fit each of these community's communication needs. Data should be developed to show the exact implications for HRM and each of its diverse communities to stress the personal dimension. HRM officials may also be drawn to the idea of holding a referendum, but experience (especially that of Edinburgh as mentioned in the literature review) suggests such a strategy is ill-advised, unless a positively experienced trial has taken place. Lindsey (2007) indicates that while there is "scant evidence on which to propose a guideline … opposition to most road-pricing schemes tends to wane after they come into operation, the traditional explanation being that attitudes improve after people experience the benefits of the schemes" (19).

Political Impacts

Experience shows that implementation of congestion charges is highly political. It requires political vision and stamina to shepherd the process from concept to implementation in the face of vocal opposition. Several political-risk barometers that Althaus (2008) suggests should be addressed if the political-risk success or failure of any policy is to be managed apply particularly to the congestion charge case: concern for constituent and community impacts, reliance on politics over policy technicalities, and the presence of a champion politician.

Politicians who are able to manage the paradox of reading the community well and taking leadership action despite community sentiment are seen to be good at political-risk management (Althaus 2008). The capacity to deliver policy "on the ground" is, according to the principle of subsidiarity,[19] best met when decision-making occurs at the level of implementation responsibility (Vischer 2001). A municipality faces political forces that are different from subnational and national governments and must weigh its own political portfolio in its own way. Political-risk judgments across the jurisdiction's agenda need to be carefully considered and the place of congestion charging in this portfolio and within electoral and policy cycles contextualized and controlled accordingly (Althaus 2008, 231-35). Politicians at regional levels of government are often known "in person" to the voters on the street, and this close proximity promotes a personalized path for implementation rather than imposition of an insensitive, heavy-handed, top-down implementation regime. This is especially the case in HRM where use of the ward system for electoral representation means that a direct point of citizen access to councillors is a feature of HRM political life.

The close proximity between politicians and officials at the municipal level and their ability to play a significant leadership role suggests the need for continual briefing and for local politicians to gather and exploit street-level intelligence so that the inevitable unintended consequences can be managed quickly and effectively (Barber 2008; Elmore 1979-80; Wanna, Butcher, and Freyens 2010). An important issue is confronting the question of whether to feature private sector operators—a separate and complex dilemma demanding its own analysis. Meanwhile, implementation issues associated with "place management" include paying due attention to the cultural and physical aspects of the Halifax region (Wanna et al. 2010, 227-28), including legacy issues associated with municipal amalgamation that occurred in 1996 (Vojnovic 1998). Congestion charging should be explained in

local terms and coordinated with other local issues, such as HRM's current tax reform review process.[20]

Congestion charging can draw sustained and, in some cases, misinformed opposition and public pressure to abandon congestion-charging plans. This pressure can often be meliorated by a political champion. London showed the benefits associated with having a champion politician, yet this factor cannot be viewed in isolation from other political forces. Livingstone, for example, benefited in many ways including being counter to Margaret Thatcher and an independent pitted against a Blair New Labour candidate. Together, these factors arguably improved his status with the electorate as being London-focused and not beholden to any party (Richards 2006), enabling him to champion congestion charging as a policy that would separate him as a genuine local candidate. However, a political champion is not a necessity for successful congestion-charging implementation. Singapore and Stockholm provide cases where no such individual can be clearly identified. Singapore, for example, chose political consensus by carrying out a year-long intense assessment and education program and responded to public reaction by making adjustments to the pricing program before implementation (K.T. Analytics 2008, 2.9). Currently there is no identifiable political champion in HRM, but this may change as a few HRM politicians have suggested that a congestion charge is an idea worth pursuing.

Centralized Administration and Governance Arrangements

In HRM, a number of players are relevant at the local and provincial levels including internal government agencies as well as the Halifax-Dartmouth Bridge Commission (HDBC) and the Strategic Joint Regional Transportation Planning Committee. HRM would be well advised to create a comprehensive congestion charge team involving the above-mentioned players and tasked with coordinating efforts and related policies and investments. The London experience is worth noting here: a team of up to 70 hand-picked government and consultant members were joined across a comprehensive subgrouping of six implementation taskforces (including specifically communications and public relations) to comprise a formidable implementation team with a significant budget (Richards 2006). Obviously once a congestion charge scheme is implemented, it is important to review and revise the system on a dynamic basis, necessitating HRM officials and their collaborating partners to consistently monitor performance and address issues of horizontal governance as part of the process (Bakvis and Juillet 2004; Bourgault and Lapierre 2000; Hopkins, Couture, and Moore 2001).

Several governance options exist including granting HRM jurisdictional authority to undertake alternative transit policy-making roles, or having the province work collaboratively with HRM. The transportation coordination component could come through the creation of a transportation authority, an option being urged by the Mayor of Halifax (Kelly 2010). In addition to such a body, changes could be made to the HDBC's mandate to reflect the role that it could play in reducing traffic congestion and improving public transit, such as reallocating part of the charges it makes to Metro Transit to invest in public transportation and using its experience with electronic tolling systems. Whatever the governance arrangement, the congestion charge must be part of a coordinated approach to increase the capacity, reliability, efficiency, quality, and integration of the entire transport system.

Conclusion

Economists have long advocated for congestion charges as a solution to traffic dilemmas being faced in most cities today. Despite the theoretical appeal of this policy solution, only a handful of cities have pursued such charges. This dichotomy suggests that there remain challenges surrounding the feasibility of implementing the congestion

charge recommendation, an oft-overlooked element in the economics literature. To help address this shortcoming, this article proposes ten implementation criteria that should be considered to harness positive aspects associated with congestion charging and to address potential drawbacks prior to any enactment of a congestion charge scheme should it be considered politically feasible. Paying attention to implementation should reap positive benefits for policy- and decision-makers who must attempt to generate optimal community welfare in a manner conducive to public sentiment. These criteria represent a mixture of top-down and bottom-up approaches toward the study of implementation as provided for in the policy implementation literature (Ison and Rye 2003, 224).

It is not suggested that the criteria will provide for "perfect implementation," but they can at least begin to allow policy- and decision-makers to explore the viability, desirability, and potential pitfalls and promises that congestion charge schemes might offer. In addition, it is vital that a detailed cost-benefit analysis be performed of congestion pricing, properly weighing both current and future benefits from congestion relief against the costs of implementing and operating a congestion scheme.

Many variables are at play in implementation and no amount of theoretical guidance will substitute for practical and context-specific application. However, awareness of potential implementation indicators promotes the assimilation of lessons to be learned from smart practices. While HRM poses *ex ante* case-specific issues for policy implementation, the ten criteria outlined in this paper represent generalizable implementation factors that merit the attention of policy-makers regardless of jurisdiction and circumstantial details. In presenting these criteria, it is our hope the "missing link" will begin to be filled and implementation of congestion charge schemes will prove a more successful exercise.

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Notes

[1] Traffic congestion is generally defined as a condition of traffic delay where the volume of vehicles attempting to access a road network exceeds road capacity. Transport Canada (2006, 5) goes further suggesting that traffic congestion is "the inconvenience and increased costs that travelers impose on each other while using their vehicles, attempting to use the road network at the same time, because of the relationship that exists between traffic density and speed (with due consideration of capacity)." According to transportation measurements taken by HRM transportation officials, the total vehicle capacity on the six roads leading to the Peninsula is 14,200 vehicles per day. The baseline number of all vehicles using the seven roads is 16,123, and all of the roads exceed their daily capacity. For example, HRM traffic studies have indicated that inbound traffic volumes on Chebucto Road during the morning rush hour exceed its capacity. Queues extend back from the Chebucto/Mumford intersection and cause traffic to back up into the Armdale rotary, located 0.7 km southwest of the intersection, which further affects traffic flow on neighbouring streets. In addition, a report by GPI Atlantic (n.d.) suggests that congestion costs Haligonians $7 million a year, and more than 90 percent of this cost consists of time delays to motorists.

[2] With the exception of private roads, provincial highways, and federal highways.

[3] In London, a proposed £25 additional charge to its congestion charge for high-emission vehicles and exemptions for low-emission vehicles were abandoned when the public became confused. Similar problems emerged in Stockholm, when high-occupancy toll lanes allowed hybrids to use toll lanes for free.

[4] Whether reduced congestion should be measured in terms of traffic volume or travel speeds, however, remains debated. While reduced traffic volumes are easy to communicate and measure, travel speeds are a better indication of the efficiency gains from a congestion charge (Eliasson 2008, 397).

[5] A Pigouvian "tax" is a tax levied on activities that generate negative externalities. Negative externalities occur when the social costs of the activity exceed the private costs of the activity thereby resulting in market inefficiencies. The "tax" operates as an incentive to reduce the activities to the efficient level.

[6] This is unfortunate since the status quo has transportation infrastructure funded through property taxes, the level of which has no link to the consumption of the funded services.

[7] Halifax's inability to address congestion through new road construction or expansion is a blessing in disguise since Duranton and Turner (2011) find confirmation for Downs's (1962, 1992) "fundamental law of highway congestion" that increased provision of "major urban roads is unlikely to relieve congestion of these roads" (Duranton and Turner 2011, 2616).

[8] Such a project would likely take place through the Halifax-Dartmouth Bridge Commission (HDBC), which is a commission of the provincial government that constructs, maintains, and operates bridges across the North West Arm (the MacKay and Macdonald bridges, see Figure 1) and approaches across the Halifax Harbour. The HDBC does not receive any financial assistance from the provincial government, instead relying on revenues from user charges (bridge tolls) levied on HDBC bridges. The revenue from these bridge tolls supports the operation of the user charge system used on the bridges (MACPASS) as well as general staffing and operations costs. HDBC also has the mandate "to investigate the sufficiency of the means of access to Halifax by the Bridges or the present or future need of a transportation project [across the Halifax Harbour and the North West Arm]" (HDBC 2010, 11). The costs of any new construction must be paid out of revenues generated by user charges on the bridges (HDBC 2010). See also note 7.

[9] Transit improvement programs in and of themselves are not likely to have any discernable effect on traffic congestion making them, independent of a congestion charge, a poor policy lever for tackling congestion (Duranton and Turner 2011).

[10] A transit tax is levied as part of HRM's property tax system. Until 2009–2010, the tax was levied at a rate of 13.1 cents per $100 of assessment for urban residents and 4.5 cents for rural residents. As part of a larger property tax reform, the system was changed to 4.5 cents per $100 of assessment for all residents (excluding resource and agricultural areas) to pay for regional transit services (MetroLink, Metro X, ferries) and an additional 8.8 cents per $100 of assessment for those living within 1 km of a local transit route (HRM 2011). The transit tax currently raises $29 million per year, similar to the amount of revenues generated from transit fares (IBI Group 2009, 138).

[11] In the long run, GPS and GSM systems may come to dominate the congestion charge landscape when the technology is projected to be ubiquitous. To base a congestion charge on GPS or GSM, however, the installation of such devices would need to be mandated in vehicles, which would require either provincial or federal legislation. Implementers would then have to wait until all vehicles can feasibly be equipped with such technology, which may take more than two decades. In addition, GPS and GSM systems raise numerous privacy concerns.

[12] One of the primary reasons why London chose the camera option is related to existing infrastructure and experience through the closed-circuit television (CCTV) system upon which the congestion charge system was built.

[13] The cost of the technology and associated infrastructure for a congestion charge is dependent on numerous factors, including whether the project will be a public works project or if a private firm will be engaged. The advantage of going the private sector route is that the project could be structured such that the private sector absorbs the costs of construction and reaps the benefits of the revenue stream, similar to the case of Highway 407 in Toronto. The disadvantage of this model is that the municipality would not have access to the revenues to invest in public transit, road maintenance, or infrastructure construction. HRM will have to carefully weigh the short- and long-term costs and benefits of either approach, along with public reaction and the resulting implications for public acceptance of the charge.

[14] While by no means a replacement for the extensive modelling that would need to be undertaken to determine the size of the optimal charge, it is nonetheless possible to perform "back of the envelope" calculations to estimate the optimal congestion charge for use on the Halifax Peninsula. Using a simple model from O'Doherty (2005) following the work of Foster, Lindberg, and McCarthy (2003) and using price elasticity of demand estimates, we calculate that the size of the charge needed to reduce the number of vehicles to road capacity levels ranges from approximately $1.50CDN to $5.00CDN a trip. For comparison, Singapore charges between 0.50SGD and 5.00SGD (or between $0.39CDN and $3.89CDN) depending on vehicle type and time of day for entering and exiting its congestion charge district, London charges £8 (or $12.93CDN) for entry into its congestion charging zone, and Stockholm charges between 10SEK and 20SEK (or between $1.52CDN and $3.04CDN) for each time a vehicle enters or exits the congestion charge area and depending on the time of day, up to a maximum of 60SEK a day ($9.11CDN).

[15] As noted by Leape (2006, 158), while calculating optimal charges using marginal cost pricing for a single road is relatively straightforward, the same is not true for a network of roads. Optimal marginal cost charges vary by road segment, intersection, day, and time of day, making the application of marginal cost pricing often not realistic.

[16] Political aspects regarding the size of the charge need to be considered. In London, "considerations in favour of a 5.00£ charge were undoubtedly reinforced by political concerns regarding public reaction should the charge be set as high as 10.00£" (Leape 2006, 160).

[17] There may also be interest in providing an exemption or discount to some or all of government and emergency vehicles (e.g., snowplows, refuse collection trucks, military vehicles, police, ambulance).

[18] The lack of a clear and detailed communication plan prior to announcement and implementation often spells disaster for fiscal policy changes, as recently demonstrated in the British Columbia GST harmonization fiasco.

[19] Vischer (2001) defines subsidiarity as "to seat ('sid') a service down ('sub') as close to the need for that service as is feasible." The principle of subsidiarity is the idea that a central authority should have a subsidiary function, serving to assist or supplement local authorities and only taking over responsibility if the local authorities prove ineffective. Thus, the principle encourages a hierarchy of service provision and responsibility whereby those closest to the need are given the responsibility for its provision. The principle, introduced in the Treaty of Maastricht, is used extensively in the European Union.

[20] In 2006, HRM formed a Tax Reform Committee to review the existing property tax system and to make recommendations for changes. The committee reported in 2008 and recommended that HRM adopt a service-based tax in place of the current assessment-based system. Council convened tax information workshops in November 2009, and in January 2010 Council agreed to continue to explore changing its current assessment-based tax system (HRM 2010). As this reform is still in its early stages, it is an ideal time to combine the property tax review with the potential adoption of a congestion charge, perhaps with an offsetting reduction in the transit tax or bus fares, to improve acceptance.

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