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THE FREE RIDE IS OVER: WHY CITIES, AND CITIZENS, MUST START PAYING FOR MUCH-NEEDED INFRASTRUCTURE†

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SUMMARY

Canada's roads, bridges, wastewater treatment centres and sewer systems are already past their prime. On average, and across the country, these key elements of municipal infrastructure are now past the halfway point of their useful lifespans. In the next 10 to 15 years, Canadian cities will face some very expensive bills for replacing critical infrastructure. But there are better means of funding needed infrastructure than raising local taxes or pleading with the provincial and federal governments for more transfers. A better solution, for many reasons, is user fees.

Municipal governments have already managed to extract a great deal of infrastructure funding out of higher levels of governments. In the last 50 years, the portion of municipal revenues provided by federal and provincial transfers has increased from under 30 per cent to roughly 45 per cent, while the portion of revenues representing local property taxes has fallen from over 50 per cent to roughly 35 per cent.

Yet, federal-provincial government funding is a seriously flawed means of funding local infrastructure. Money gathered at the federal and provincial level is placed in municipal coffers, breaking the chain of political accountability for the outcomes. This alters the spending priorities of municipal governments as they are inclined to favour those projects with federal or provincial subsidies attached. Such subsidies lower the political costs for local governments allowing municipalities to maintain artificially low taxes for their constituents by spending federal or provincial tax revenue. This is essentially having their cake and eating it too, and on a policy level, we are left to wonder how decision making surrounding municipal priorities is affected. These projects come at a discount to local governments, but not their constituents who will ultimately pay through federal or provincial income taxes. Most importantly, this kind of funding results in unpriced infrastructure access and contributes to the over-usage of infrastructure. It is only rational for residents to live further from work by taking full advantage of underpriced highways, bridges, transit and other infrastructure that someone else pays for, exacerbating congestion and commuting times in Canada's major cities.

If Canadian cities are serious about replacing aging infrastructure and, just as importantly, alleviating the ever-growing problem of traffic congestion and urban sprawl, then cities must begin making proper use of user fees, and charging citizens for the use of the infrastructure they value. As it stands, while urban centres around the world increasingly embrace user fees, Canadians remain stuck in their old ways. Aside from international crossings, in 2012, Canada had only eight tolled bridges, and less than 0.25 per cent of Canada's paved public roads were tolled. In Alberta, across the five largest cities, user fees (combined with sales) only make up an average of less than 25 per cent of municipal program operational revenues.

User fees would bring a predictable and dedicated revenue stream that would allow municipalities to responsibly take on the debt required to invest in much-needed infrastructure projects. Canadian city governments already have the tools they need to keep up with their pressing infrastructure needs; they need only find the creativity and political will to make use of them.

† We wish to thank Robin Lindsey and Harry Kitchen for their comments, which helped us improve this paper. We would also thank all those who offered their comments and feedback when the paper was presented at the University of Calgary's School of Public Policy's Urban Growth and Finance Symposium in October 2013, as well as Bev Dahlby and anonymous referees.

INTRODUCTION

Municipal infrastructure spending on urban transportation, sewage, water and other capital requirements has been a significant focus for public policy in recent years with the continuing urbanization of the Canadian economy. With recent federal and provincial support for urban infrastructure to offset the difficult-to-measure infrastructure deficit — the difference between actual and an undefined "optimal" expenditure — the age of public infrastructure has at least reversed itself in the past decade after reaching its zenith in the 1990s.

Whether or not one can measure an infrastructure deficit, many Canadians living in large urban centres have been facing long commute times and would no doubt agree that infrastructure spending seems inadequate.[1] Demands are imposed on municipal governments to increase transit spending, since infrastructure costs fall primarily on taxpayers — including those in other jurisdictions, through federal and provincial transfers — rather than the users themselves. The prevalence of under-priced transportation networks and subsidized neighbourhood infrastructure contributes to urban sprawl and excessive demand for infrastructure spending as residents trade off longer commuting times with lower housing costs at the perimeter of urban areas.

The contrast between urban infrastructure problems and other infrastructure issues in Canada is quite striking. Communication, power, commercial rail and air transport infrastructure seem adequately provided in Canada. Prices generally cover costs, a necessity for private ownership, as in the case of commercial rail and communications, but also in the case of non-profit supply, such as local airport authorities. Regulated pricing controls the demand for services, and revenues obtained cover the cost of infrastructure.

In this paper, we shall argue that the lack of pricing for urban infrastructure in Canada is at the heart of the current underfunding of municipal infrastructure. Governments struggling for infrastructure funds look for various revenue sources for the cost of infrastructure outlays that local taxpayers are unwilling to pay for directly. Residential property taxes are politically challenging since they fall more heavily on the urban core where taxpayers demand less infrastructure spending. Increased reliance on property taxes and other tax bases unrelated to infrastructure costs potentially hollow out the inner city as people and businesses move to other nearby towns with lower taxes, while still using subsidized roads and transit to commute into the city.

Municipalities are therefore left to look for other revenue sources with lower political costs. This includes heavily taxing immobile businesses that have less voting power than residential property owners, or campaigning for increased capital transfers from provincial and federal governments, who have the power to provide urban funding garnered from taxpayers elsewhere.

If governments moved towards more optimal pricing for infrastructure — tolls for major roads, transit fees and other infrastructure charges — a more efficient allocation of resources would prevail. Commuters would make wiser choices between housing and commuting costs, which

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[1] Commuting times in large metropolitan centres are over 30 minutes each way on average. One-quarter of commuters in Montreal and Toronto spend over 45 minutes commuting to work. Commuting by public transit takes on average 46 minutes, compared to 23 minutes by automobile, in the six largest metropolitan centres. Most commuters are satisfied with their commuting time, although dissatisfaction is highest for those taking more than 45 minutes (45 per cent). See: Martin Turcotte, "Commuting to Work: Results of the 2010 Social Survey" (Ottawa: Statistics Canada, August 2011), http://www.statcan.gc.ca/pub/11-008-x/2011002/article/11531-eng.pdf; and for similar 2011 census data, see: http://www12.statcan.gc.ca/nhs-enm/2011/as-sa/99-012-x/2011003/tbl/tbl02-eng.cfm.

would be less subsidized, thereby reducing urban sprawl. Governments would make wiser budgetary and tax-policy decisions, trading off infrastructure demands relative to demands for other municipal services, including protection, parks and social services.

Greater reliance on infrastructure pricing would also provide two other major benefits. It would impose a higher standard on local spending decisions and it would contribute to accountable decision-making, by creating a direct link between the localized costs that users face for infrastructure and the quality of services that they receive. Governments would be pressured by users to de-politicize appointments to governing boards in favour of those more familiar with service and financing issues. A private supply of capital could be more forthcoming if infrastructure investment offered a more predictable, dedicated revenue stream to cover infrastructure costs. Other creative approaches to providing infrastructure funding could also be possible to fund multiple projects by leveraging public funding sources to attract private-equity and pension-fund capital.

This paper is divided into four parts. In the next section, we review the current pricing and funding arrangements for municipal infrastructure services in Canada. Given the quality of data, we specifically look at Alberta with respect to funding arrangements for infrastructure. The following section looks at the economic-efficiency issues arising from infrastructure pricing, or the lack of it, as a guide to appropriate policy. We then look at options for financing. The final section concludes with our recommended policies.

THE IMPORTANCE OF INFRASTRUCTURE AND TRENDS IN SPENDING[2]

The World Economic Forum's (WEF) *Global Competitiveness Report 2012-13* identifies 12 "pillars" of competitiveness, representing the primary determinants of a nation's productivity and economic prosperity. Among this list of 12 prerequisites for economic competitiveness, infrastructure development was ranked second, surpassed only by fairness in the character of a nation's legal and administrative framework.[3] A brief excerpt from the report highlights the foundational role of infrastructure in the economy and society:

> "Extensive and efficient infrastructure is critical for ensuring the effective functioning of the economy, as it is an important factor in determining the location of economic activity and the kinds of activities or sectors that can develop in a particular instance. Well-developed infrastructure reduces the effect of distance between regions, integrating the national market and connecting it at low cost to markets in other countries and regions. In addition, the quality and extensiveness of infrastructure networks significantly impact economic growth and reduce income inequalities and poverty in a variety of ways"[4]

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[2] A significant part of this material is taken from P. Bazel, "The State Infrastructure Bank Finance Model: Potential for a Canadian Application," Capstone Paper for Partial Fulfillment of the Master of Public Policy, School of Public Policy, University of Calgary, 2013.

[3] World Economic Forum, *Global Competitiveness Report 2012-2013*, http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2012-13.pdf

[4] ibid., 5.

As the WEF report affirms, investment in public infrastructure represents an essential investment in Canada's economic development and standard of living. A commitment to providing adequate physical infrastructure is essential for health, public safety and economic growth. To this end, it is critical that governments establish institutions, policies and practices that contribute to sound decision-making, efficient levels of capital investment, and an optimal distribution of infrastructure resources.

Defining relevant concepts

Finance: In much of the literature related to infrastructure provision, the term "finance" is used as a general umbrella term, which includes tools for generating revenue, such as taxes and user fees, along with tools for amortizing debt financing. For the purposes of this paper, it is important to draw a clear distinction between these two very different fiscal tools. While debt is a means of financing, it also implies the creation of a liability. This liability will inevitably lead to the appropriation of tax revenues, which fall on the general public, or alternately it may be funded through fees paid by users who benefit from the infrastructure it affords. These are two very different approaches to financing infrastructure with debt and, as discussed below, they have very different economic implications.

Economic Efficiency and Public Expenditure: Economic efficiency is traditionally associated with equilibrium in a free market; it denotes the level of consumption and corresponding production, whereby the standard of living is maximized by the best allocation of resources. In the case of a market failure, the market will not adequately provide certain goods and services, which due to their nature, cannot be appropriately monetized and so do not sufficiently reward investment.[5] When markets are not able to achieve the best allocation of resources, governments provide public services, pay subsidies or impose taxes on private producers to ensure a provision of critical goods and services essential for public welfare.

In the case where governments undertake the provision of a public good, they must do so according to some estimation or judgment about the level of a particular good or service that would be efficient — i.e., provide benefits above or equal to the cost — and so serious efforts to estimate the collective benefits accruing to a particular good or service are essential for efficiently allocating public resources. This estimation requires a certain amount of capacity and competence, and the degree to which it is appropriately undertaken will determine the degree to which public funds are efficiently employed.

It is equally important in the efficient provision of public goods that the most cost-effective means to an end are pursued in order to maximize the return to public investment. As efficiency sets benefits off against costs, economic efficiency will be well served, and public benefits maximized, if the cost of public-good provision is minimized.

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[5] Market failure is often associated with public goods, which are defined by being non-excludable and non-rivalrous. The classic example is a lighthouse. It provides an essential service, but by its very nature it is difficult to recoup the cost associated with its provision from the individuals who benefit from its existence. This is a good definition of what is meant by a non-monetized benefit, which improves the standard of living.

Finally, efficient public investment should allocate the costs associated with a given benefit as best it can to the base that enjoys that particular benefit. To this end, the provision of a public good — such as infrastructure — that spawns a stream of benefits over an extended period should be financed in a way that allocates the costs associated with the good to those individuals who benefit over its lifespan. This implies that amortized liabilities are an appropriate and efficient means by which public goods may be acquired, insofar as costs associated with debt can be sufficiently allocated to the base that benefits from the existence of a public good or service.

Infrastructure: Based on the survey of the literature undertaken for this study, the City of Edmonton's definition of infrastructure seemed relatively complete, including most if not all of the major and minor asset classes generally present in discussions of infrastructure. A recent release[6] by the City of Edmonton defines infrastructure as: *"The physical assets developed and used by a municipality to supports its community's social and economic activities."* and continues on to identify and define 12 asset classes shown in the table below.[7]

TABLE 1: URBAN INFRASTRUCTURE CLASSIFICATION

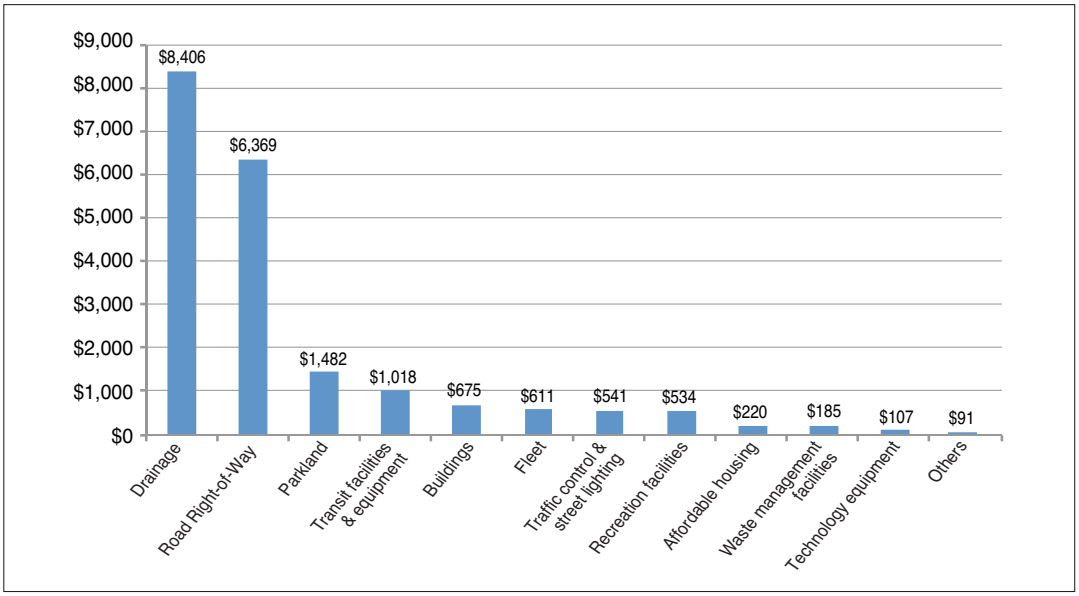
Drainage	Includes sanitary, storm and combined sewers (incl. manholes, catch basins) and wastewater treatment.
Road Right-of-Way	Includes roads (arterials, collectors, local; and curb and gutter), sidewalks, bridges and auxiliary structures (such as gates, streetscapes and others).
Parkland	Includes horticulture, trails, hard surfaces, playground, sports fields, park infrastructure and parks.
Transit facilities & equipment	Includes Light Rail Transit (LRT) system facilities and equipment (including cars), transit centres, bus equipment and systems, trolley system.
Buildings	Includes civic offices, public works and operation facilities (e.g., yards), emergency-response buildings, police buildings and libraries.
Fleet	Includes transit buses, city vehicles and shop equipment.
Traffic control & street lighting	Includes traffic signals, signs, markings, street lighting and parking meters.
Recreation facilities	Includes all major recreational facilities (e.g., arenas, leisure centres, Fort Edmonton Park) and amenities.
Affordable housing	Includes non-profit housing, community housing and senior lodges/cabins.
Waste management facilities	Includes operation and administration facilities, transfer stations and public facilities, processing facilities, and operating landfills and appurtenances.
Technology equipment	Includes servers, network, all communication equipment.
Others	Includes emergency response and police equipment, and library contents and materials.

[6] City of Edmonton website, "Fact Sheet: Edmonton's infrastructure – What do we own?" 2013, http://www.edmonton.ca/city_government/documents/Fact_Sheet_3.pdf.

[7] Harry Kitchen provides a more succinct definition of infrastructure as: "buildings, structures, facilities, equipment, rolling stock, furnishings, development and purchase of land, as well as the associated items to bring the foregoing into operation." See: Harry Kitchen, "How to Fix the Financing of Municipal Infrastructure in Canada," C.D. Howe Commentary 241 (2006), 2.

The City of Edmonton also presents the replacement cost estimates for the various asset classes above. This distribution is informative as it gives context to the relative importance of the various municipal asset classes, and associated expenditures for each.

FIGURE 1: EDMONTON CITY ASSET CLASS: REPLACEMENT VALUE 2005 ($ MILLIONS)

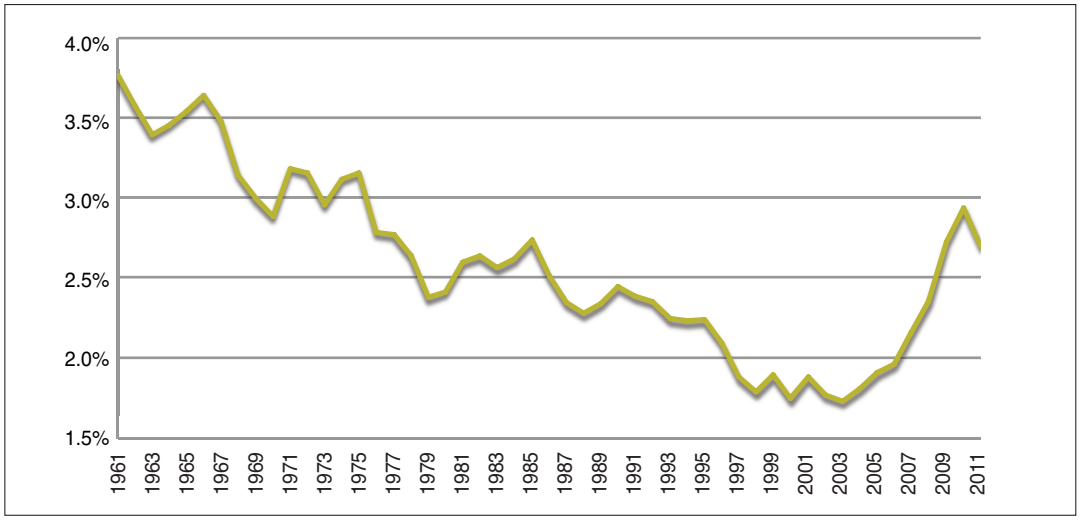


Public Infrastructure in Canada: Trends

The British North America Act of 1867 (later named as the Constitution Act of 1967, and eventually the Constitution Act of 1982), prescribes two levels of sovereign governments in Canada: federal and provincial. The federal government's role in infrastructure is related to its responsibilities set out in Section 91 of the act, including postal service, defence, navigation and shipping, ferries between two provinces, and fisheries. Provincial responsibilities are set out in Section 92, and include public and reformatory prisons, education, hospitals, local works (excluding shipping and canals), provincial courts and municipal institutions. Municipal powers are those granted by the provinces through various provincial acts. Thus, federal and provincial governments are primarily responsible for infrastructure policy, although significant expenditure decisions are taken at the municipal level.

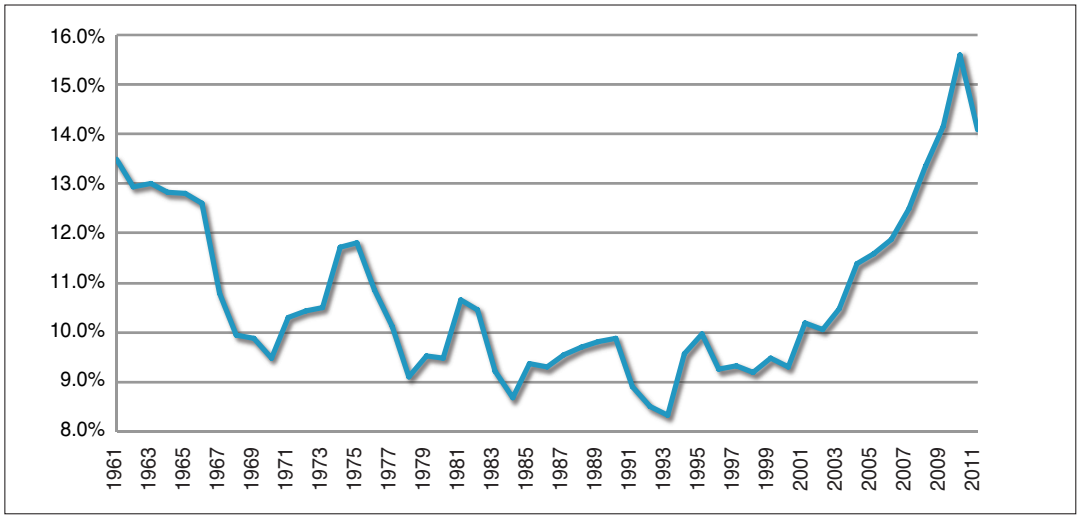
Over the past 60 years, municipalities have become increasingly responsible for the management, maintenance and provision of infrastructure. As such, the challenge of improving Canada's infrastructure is a weight that falls most heavily on the shoulders of governments at the local level. In the last half century, public infrastructure spending as a share of GDP fell from the post-Second World War expansion rates of over 3.7 per cent, to below two per cent by 2000, with increased spending in recent years (Figure 2). Municipal government public capital expenditure has followed this trend: public capital expenditures as a share of municipal revenues dropped from 13.5 per cent in 1961 to just over nine per cent by 2000 (Figure 3). In the last decade, municipal public capital expenditure has once again reached a share of revenues similar to 1961.

FIGURE 2: TOTAL CANADIAN PUBLIC CAPITAL INVESTMENT AS A PERCENTAGE OF GDP



Source: Cansim table 031-0002 – Flows and stocks of fixed non-residential capital
Cansim table 380-0017 – Gross domestic product, expenditure-based

FIGURE 3: MUNICIPAL PUBLIC CAPITAL INVESTMENT AS A PERCENTAGE OF MUNICIPAL REVENUES



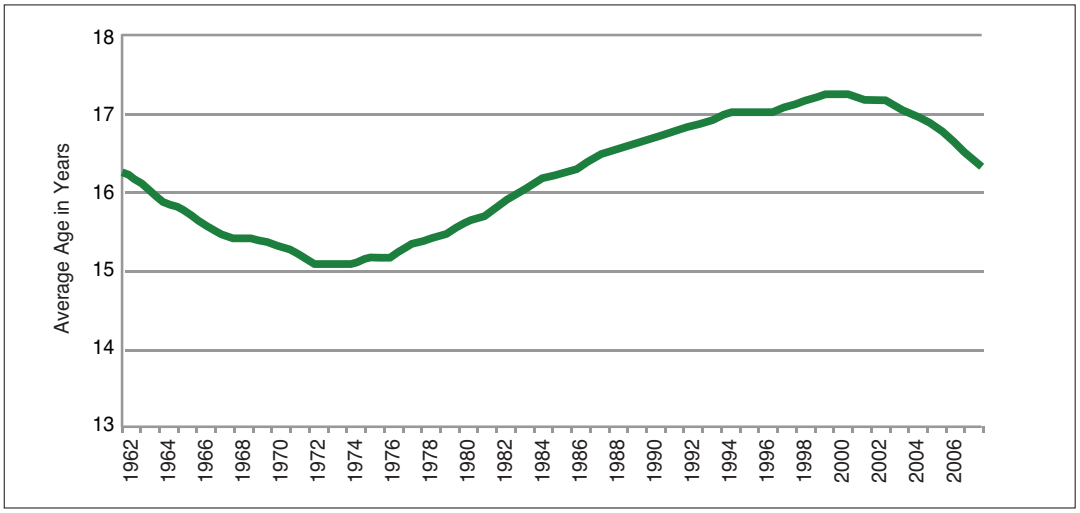
Source: Cansim table 031-0002 – Flows and stocks of fixed non-residential capital
Cansim table 380-0035 – Income and expenditure sub-sector accounts, local governments

Available data on the average age of public infrastructure give an indication of the effect that reductions in spending have had over this period. Figure 4 shows the average age of public infrastructure, beginning at 16.2 years in 1961, falling to 15 years by 1972, and steadily increasing thereafter to roughly 17.3 years by 2000. Today, the average public infrastructure age has returned to just over 16 years, similar to a half-century ago. These data give us some idea regarding the overall impact of infrastructure spending trends over this period. As infrastructure spending slows, fewer additions are made and the average age of infrastructure increases, allowing for some lag between the spending pledge and when major infrastructure projects with lengthy construction periods come "on line." However, this measure is quite ambiguous and tells us little about the operational state of infrastructure, which is the function of the asset's maximum useful lifespan in relation to its maintenance and upkeep. For instance, a bridge that has been maintained according to its established optimal maintenance schedule may have a maximum lifespan upwards of 50 to 60 years. On the other hand, one that has fallen into disrepair may see

its useful lifespan significantly diminished. We must also consider the intended useful lifespan of different asset classes such as a major sewer expansion versus a section of municipal road; respectively these may be 100 and 20 years. In addition, the rate of decommissioned infrastructure will have an impact on this measure. When considering all of these factors and how — or whether — they are reflected by an aggregate measure such as the national average age of infrastructure, we may conclude that the national average age of infrastructure is a measure that reflects budgetary decisions and the rate of acquisition for additional infrastructure assets, not just the overall state or operational adequacy of existing infrastructure.

If we disaggregate the infrastructure data and look at the average age by asset class, we see that Canadian roads, bridges, wastewater treatment centres and sewer systems are generally over half of their expected useful lifespans (Table 2), which suggests that a significant amount of capital will need to be replaced in the next 10 to 15 years.

FIGURE 4: AGE OF PUBLIC INFRASTRUCTURE IN CANADA (1962-2008)



Source: Statistics Canada, Investment and Capital Stock Division, special tabulation.

TABLE 2: AVERAGE AGE OF PUBLIC INFRASTRUCTURE AS A PERCENTAGE OF USEFUL LIFE, BY PROVINCE AND ASSET (2007)

	Highways and roads	Bridges and overpasses	Water supply systems	Wastewater treatment	Sewer systems
Canada	**53**	**57**	**40**	**63**	**53**
Newfound land and Labrador	58	48	39	62	62
Prince Edward Island	49	36	40	81	60
Nova Scotia	58	66	46	60	59
New Brunswick	54	49	45	65	55
Quebec	54	72	50	68	54
Ontario	49	56	36	60	54
Manitoba	61	52	42	66	51
Saskatchewan	59	54	41	62	61
Alberta	51	53	38	63	49
British Columbia	56	53	31	61	50

Source: Statistics Canada, Investment and Capital Stock Division, special tabulation.

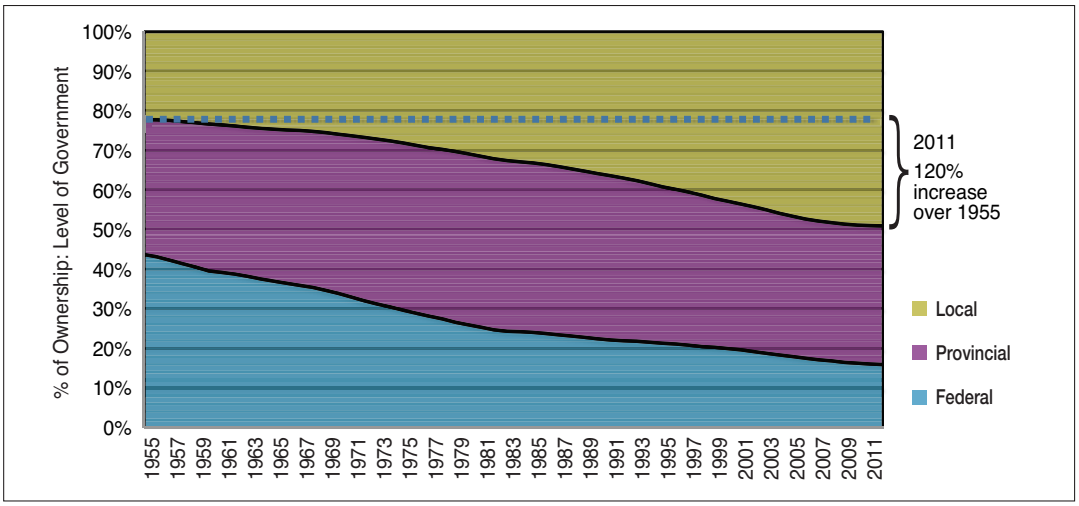
Public Funding of Urban Infrastructure

The shifts in public infrastructure spending over the last half-century reflect the financing and budgetary decisions made by Canadian governments at the federal, provincial and municipal level. There are three primary factors that have shaped municipal revenues, and thus, infrastructure spending over the past 50 years:

- Fiscal transfers
- Debt reduction/reluctance
- Reluctance to embrace user-pay models

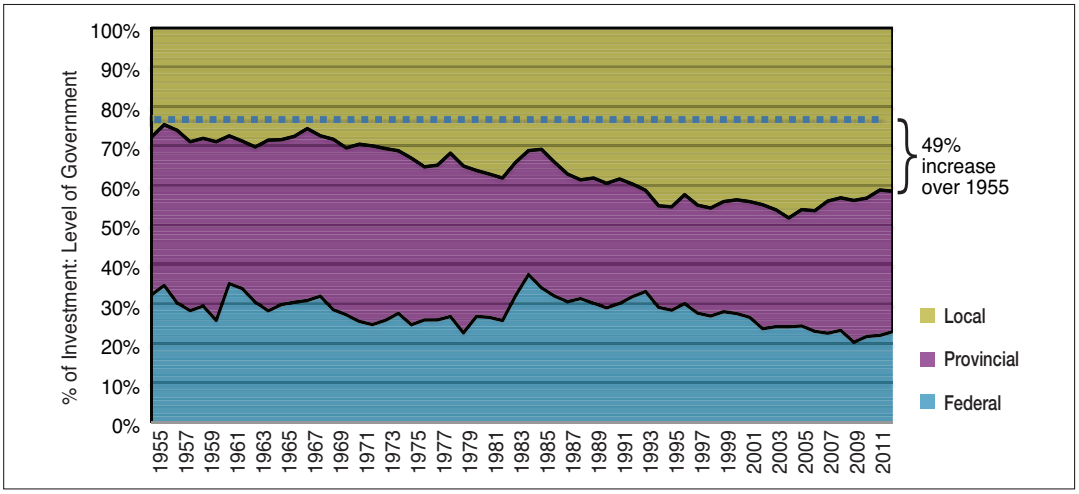
Figures 5 and 6 illustrate the shift in capital stock held by each order of government. Over this period, the municipal share of the total public capital stock rose from roughly 22 per cent to 49 per cent. Over the same period, this shift of assets took place primarily from the federal level to the municipal level,[8] with municipal budgets becoming increasingly defined by federal and provincial transfers.

FIGURE 5: CAPITAL-STOCK ASSET SHARE BY ORDER OF GOVERNMENT



Source: Cansim table 031-0002 – Flows and stocks of fixed non-residential

FIGURE 6: CAPITAL-INVESTMENT SHARE BY ORDER OF GOVERNMENT

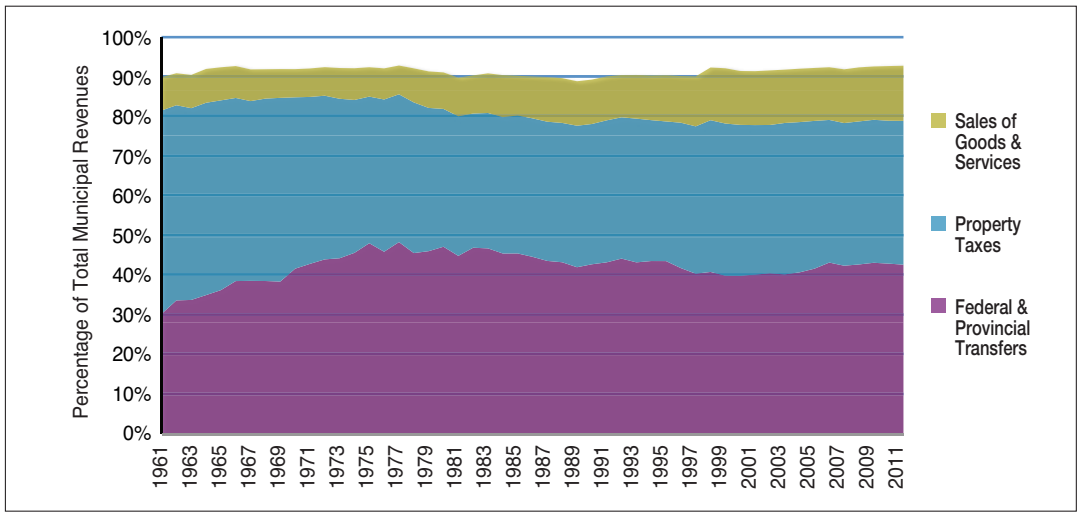


Source: Cansim table 031-0002 – Flows and stocks of fixed non-residential

[8] Over this period, the provincial share of total public capital stock held relatively constant, with a slight expansion in the early '80s, followed by a period of contraction to 1960s levels.

Public Funding Trends: While municipal responsibility for infrastructure steadily expanded between 1961 and 2011, municipalities became increasingly reliant on intergovernmental transfers. As illustrated by Figure 7, federal and provincial transfers played a more prominent role in municipal revenues following the 1960s, when they represented only 30 per cent of total revenue. Transfers climbed from 30 per cent to nearly 50 per cent in the mid-1970s, and have largely remained in the mid-40 per cent range since. Over the same period, property taxes — traditionally the primary own-source revenue tool for municipalities — have fallen from over 50 per cent of revenues into the mid-30 per cent range. Growth in the prominence of federal and provincial transfers in municipal budgets — along with reluctance on the part of municipalities to garner additional own-source revenues through increased use of tolling/user-fees (discussed below) — saw municipal budgets, and thus, infrastructure expenditure more heavily dependent on federal and provincial transfers.

FIGURE 7: COMPOSITION OF MUNICIPAL REVENUE (CANADIAN AVERAGE)

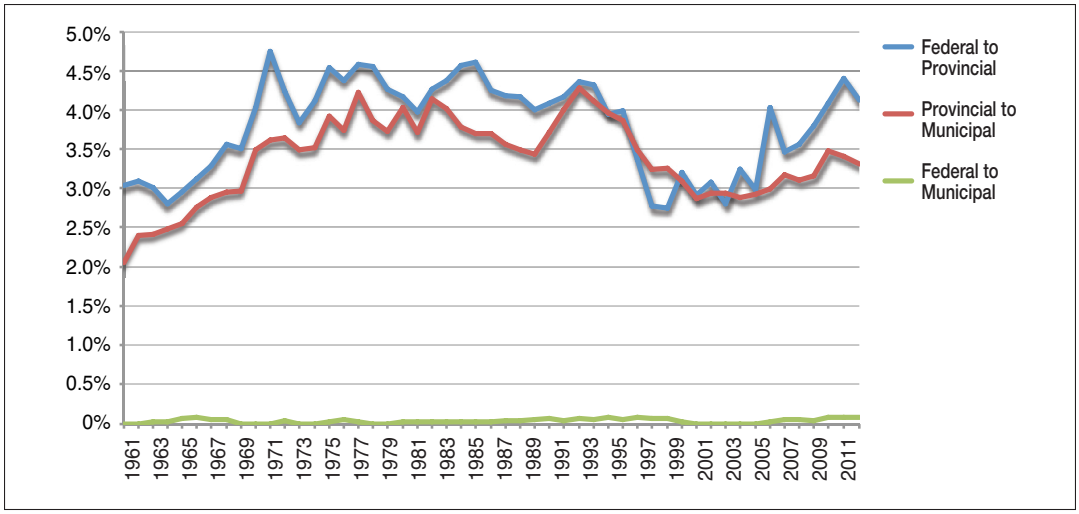


Cansim table 380-0035 – Income and expenditure sub-sector accounts, local governments

Since 2000, federal infrastructure transfers have trickled down to municipalities in the form of the Green Municipal Fund (2000), the gas-tax-sharing arrangement (2005), the Building Canada Plan (2007), and the stimulus-spending program (2008), in an effort to support municipalities in infrastructure maintenance and development. As Figure 8 illustrates, this translated to a significant uptick in funding from the provincial government — through which federal transfers often flow — between 2005 and 2010. Following 2010, stimulus funds had run their course, and municipal transfers were in decline once again. In 2013, the federal government renewed its commitment to infrastructure funding by extending the gas-tax-sharing arrangement expected to generate $21.8 billion for municipalities over 10 years, and committed an additional $27 billion of funding between 2013 and 2023.[9]

[9] Infrastructure Canada website, "The New Building Canada Plan," 2013, http://www.infrastructure.gc.ca/plan/plan-eng.html.

Figure 8: Intergovernmental Transfer Payments as a Percentage of GDP



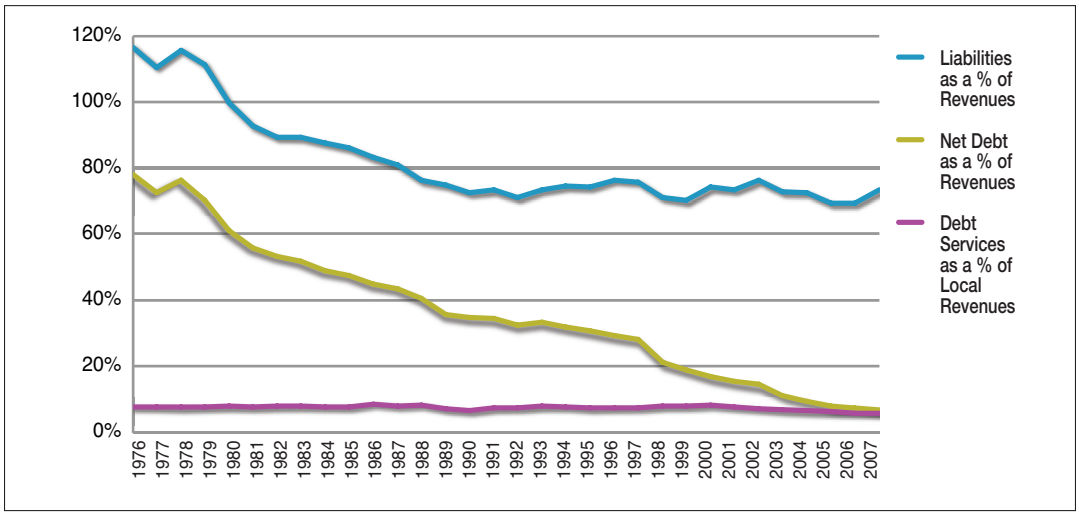
Source: Cansim table 380-0022 – Sector accounts
Cansim table 380-0017 – Gross domestic product, expenditure-based

Federal infrastructure grants are often presented as "economic stimulus" funds designed to create jobs and push forward shovel-ready projects. This raises questions about the effectiveness and efficiency of federal infrastructure funds targeted for stimulus. Recent work by Kneebone and Gres[10] makes a strong case that such forms of stimulus are largely ineffective, are slow acting and lack effective regional targeting. Kneebone and Gres argue that such stimulus funds are inferior to auto-stabilizers, such as unemployment insurance, in addressing recessionary effects on job markets. Furthermore, it is unclear if projects slated for stimulus funding are chosen first on merit and second as stimulus, or vice versa. This concern ties into a larger question about the current state of urban project selection and resource prioritization in Canada, explored below.

Trends in municipal debt: Canada's declining investment in municipal infrastructure through the period 1960-2000 was compounded by municipal reluctance to utilize debt spending, as indicated by the continual trend of gross and net debt reduction seen in Figure 9 (interest and repayment service was constant due to higher interest rates on long-term debt in earlier years). Though municipalities across Canada face binding debt limits imposed by provincial governments, it is unlikely that the vast majority of municipalities have been effectively constrained by these limits for some time.

[10] Ron Kneebone and Margarita Gres, "Trends, Peaks, and Troughs: National and Regional Employment Cycles in Canada," *The School of Public Policy Research Papers* 6, 21 (2013).

Figure 9: Net and Gross Debt as a Percentage of Local Government Revenue (Canadian Average)



Source: Cansim table 380-0035 – Income and expenditure sub-sector accounts, local governments
Cansim table 385-0014 – Balance sheet of local governments

Table 3[11] provides the specifications for municipal debt limits in seven provinces and two territories.

TABLE 3: PROVINCIAL DEBT LIMITATIONS FOR MUNICIPALITIES

Province	Restrictions
Nova Scotia	30 per cent of own-source revenues.
New Brunswick	Two per cent of assessed real property value.
Prince Edward Island	10 per cent of the assessed value of real property.
Ontario	Debt service cannot exceed 25 per cent of revenue funds.
Manitoba	Total debt: maximum seven per cent of municipal assessment. Annual debt service: maximum 20 per cent of annual revenue.
Alberta	Debt limit of 1.5 times revenue; debt-service limit of 0.25 times revenue.
Yukon	Three per cent of the current assessed value of all property.
Northwest Territories	Debt service must not exceed 20 per cent of the municipality's revenues; for villages, the maximum is 10 per cent.
Saskatchewan	Municipalities: 100 per cent of previous year's revenue. Cities: Determined in consultation with Saskatchewan Municipal Board and expressed as a percentage of revenue (ad hoc in nature).

A closer look at Alberta confirms that, on average, Alberta's municipalities have in fact not faced binding debt limits for roughly 25 years. Given a debt-to-revenue ratio limit of 1.5, and a debt-service-to-revenue ratio of 0.25, additional debt has been available to finance infrastructure in Alberta since before 1988.[12,13]

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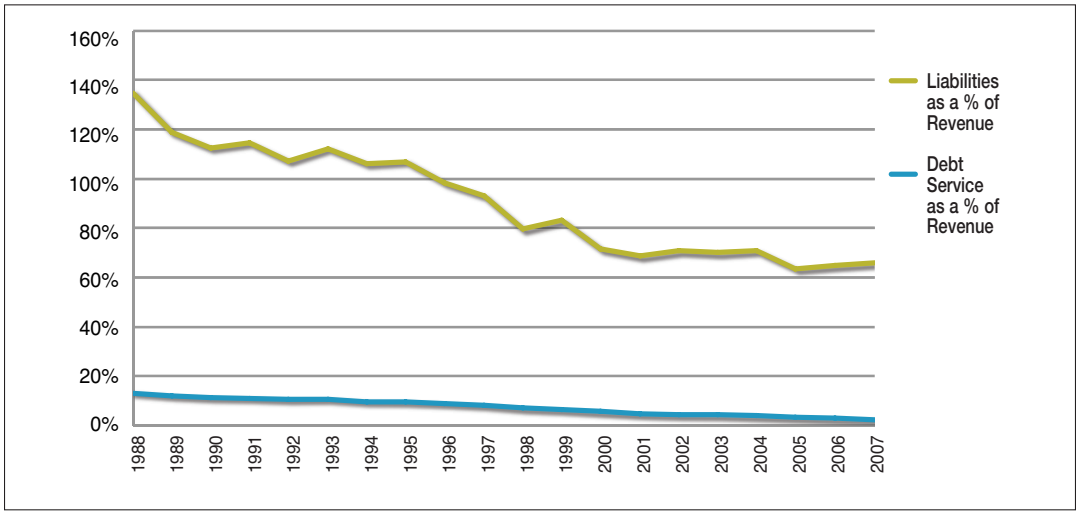
[11] David Amborski, "The context of municipal borrowing in Canada," PowerPoint presentation, School of Urban and Regional Planning (Toronto: Ryerson University, 2013), http://munkschool.utoronto.ca/imfg/uploads/226/context_of_municipal_borrowing_in_canada_col.pdf.

[12] This time frame is all that is currently available from Cansim data. Given the trend, it is highly likely that Alberta is currently below half of its legislated debt capacity.

[13] It is entirely possible that Alberta's faster-growing communities have been, or are currently effectively constrained by provincial debt limits. Unfortunately, due to limitations in the Statistics Canada data sets used, we are unable to undertake this analysis at the municipal level.

FIGURE 10: ALBERTA LOCAL MUNICIPAL DEBT AS A PERCENTAGE OF REVENUE (AVERAGE)



Source: Cansim table 380-0003 – Income and expenditure sub-sector accounts, local governments
Cansim table 385-0014 – Balance sheet of local governments

This raises the question of why municipalities are not taking full advantage of debt to address the decline in infrastructure. Two reasons seem plausible. First, political incentives discourage municipal politicians from taking on debt. Debt has negative connotations in the public mind and has come to be associated with a lack of fiscal prudence. Politicians may therefore be reluctant to fully utilize debt on grounds of self-preservation, even when it would contribute to efficient public investment. Second, debt implies future liabilities, and in the absence of additional revenue streams to fund such liabilities, piling on debt would, in fact, display a degree of fiscal imprudence. However, given the availability of additional revenue streams, taking on additional liabilities proportionate to expected revenue could be both prudent and efficient,[14] regardless of political tides or public perception. This further raises the question: Have municipal governments under-utilized available revenue streams such as user fees and tolls, which could have funded a responsible increase in debt liability to address infrastructure decline?

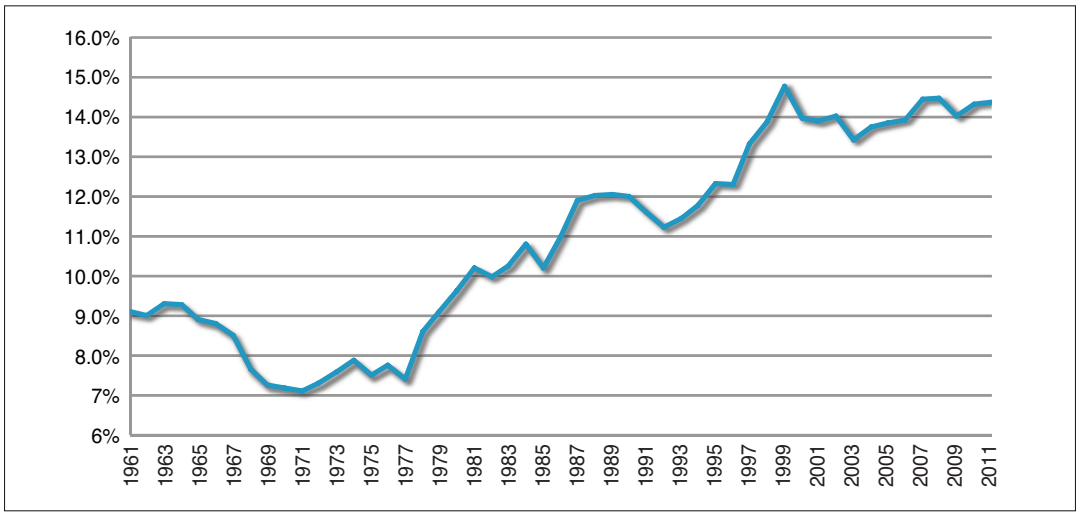
Municipal utilization of user charges: Unfortunately, data on the role of user fees in the composition of municipal revenues across Canada are not directly available, but rather are aggregated into a standardized Statistics Canada accounting category, "sales of goods and services," which includes licensing fees and other government services. As such, the "goods and services" measure may serve as a proxy for user fees to give us a rough idea of the utilization *trend* by municipalities over time, but it is ultimately imprecise as a *proportion* of revenues given its aggregation with the activities of municipal corporations.

Again, being careful not to draw overly concrete implications from the trend in Figure 11, we can say that revenues from the sale of goods and services as a proportion of total municipal revenues has likely increased by roughly half since the 1960s. However, Canadians know from the anecdotal evidence of their everyday lives that municipalities have not fully embraced

[14] Assuming revenue would be spent toward the provision of a public good and a stream of associated benefits for those who bear the costs.

tolling or user fees for the majority of transportation infrastructure and other large-scale infrastructure. Though user fees are prevalent for public transit, water and waste, Canadian municipalities — and indeed the federal and provincial governments — have largely refused to embrace road and congestion tolling, or adopt a larger base for user-pay models to fund new projects, maintenance or additional capacity for existing infrastructure. Aside from international crossings, Canada had only eight tolled bridges in 2012, and less than 0.25 per cent of Canada's paved public roads were tolled.[15]

FIGURE 11: LOCAL MUNICIPAL SALES OF GOODS AND SERVICES AS A PERCENTAGE OF TOTAL OUTLAY (CANADIAN AVERAGE)



Source: Cansim table 380-0035 – Income and expenditure sub-sector accounts, local governments

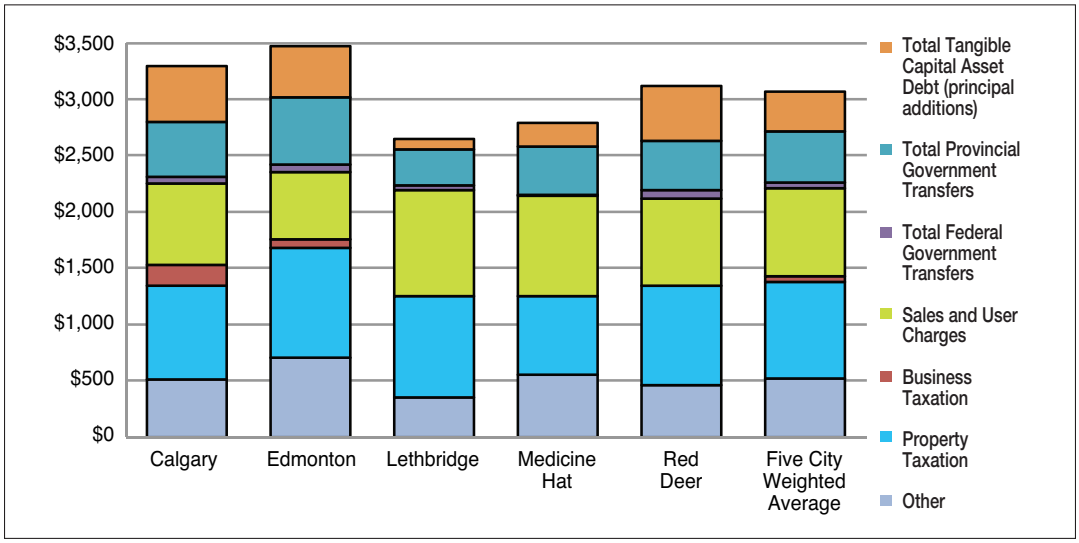
Financing Municipal Infrastructure: The Case of Alberta

Taxes, debt, development charges and transfers from federal and provincial governments finance municipal capital costs. The operating expenses of infrastructure projects are covered by user fees and the sale of goods and services, or operate at a deficit covered by municipal property taxes and other tax revenues. In this section, we focus on infrastructure financing in Alberta given the quality of available data for comparisons.

In Figures 12 and 13, we provide per capita sources of municipal finance for five cities and towns, as well as the average for the five cities. Alberta municipalities fund roughly one-third of their budgets with residential and non-residential property taxes. Calgary and Edmonton also levy an additional business tax, representing six and two per cent of municipal revenues respectively. On average, about 22 per cent of budgets are funded by sales of goods and services (including user fees), although there is a great deal of variation from city to city, with sales of goods and services representing 31 per cent of municipal revenues in Lethbridge but just 19 per cent in Edmonton. Another one-fifth is composed of federal and provincial transfers. The balance, about 18 per cent, is largely capital financing supported by debt.

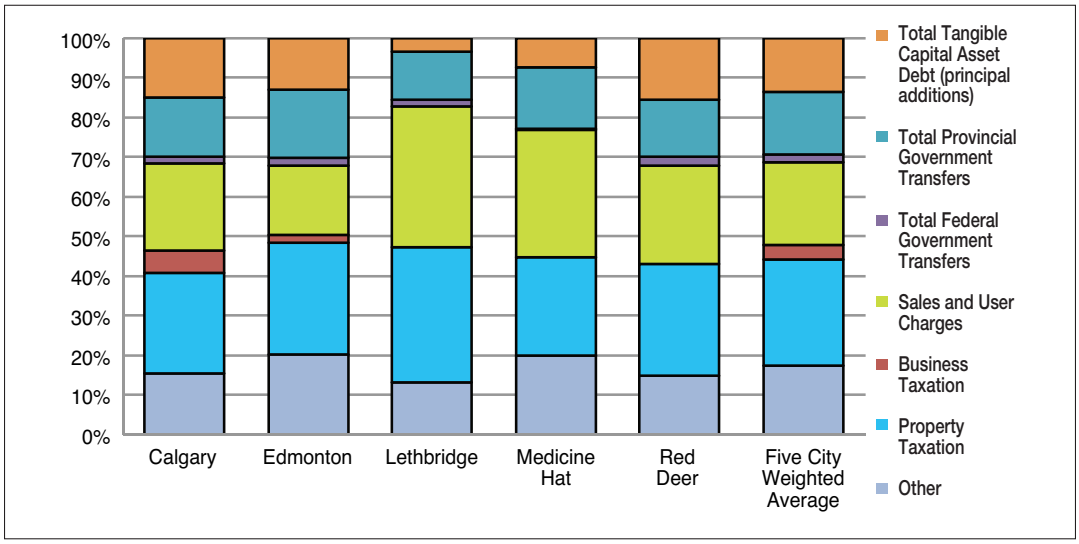
[15] Authors calculations based on: Transport Canada, "Table RO2A: Toll Bridges/ Roads in Canada", 2011- 2012. Calculated as tolled distance over total distance of paved road network—where the total distance of the paved network is given as a 'Two-lane equivalent' measure—one arrives at a figure of roughly 0.05%. As much of the tolled distance in Canada is accounted for by the 407 highway, a five lane highway, one might argue that this measure could be as high as 0.25 of one percent.

FIGURE 12: ALBERTA PER CAPITA SOURCES OF FINANCE (AVERAGED 2007-11)



Notes: Excludes electrical- and gas-utility revenues and presentation is consistent with pre-2009 municipal accounting standards. Average was taken from nominal dollar values. "Other" revenues consist of a series of aggregated revenues including: some forms of targeted municipal taxation; licenses and permits; fines and penalties; franchise and concession contracts; insurance proceeds; disposal of capital property; developers' agreements and levies; and other revenues.

FIGURE 13: ALBERTA: SOURCES OF MUNICIPAL FINANCE (AVERAGED 2007-2011)



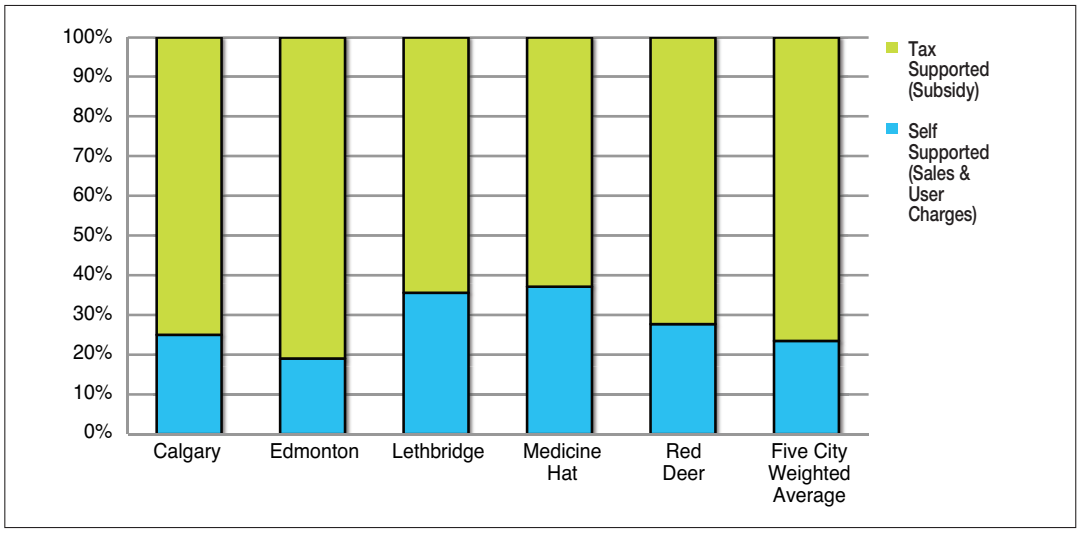
Notes: Excludes electrical- and gas-utility revenues and presentation is consistent with pre-2009 municipal accounting standards. Average was taken from nominal dollar values. "Other" revenues consist of a series of aggregated revenues including: some forms of targeted municipal taxation; licenses and permits; fines and penalties; franchise and concession contracts; insurance proceeds; disposal of capital property; developers' agreements and levies; and other revenues.

Of more interest, we focus specifically on the financing of infrastructure. We consider two aspects of this issue: (i) the portion of costs funded by user fees and the sale of goods and services, where marginal benefits from municipal services and infrastructure require individuals to make a trade-off, and (ii) the proportion funded by taxes, provincial transfers and other charges, those revenues for which the link between marginal costs and benefits is severed. Using these values, we can derive an implied subsidy rate for the operating costs and

revenues for municipal services and capital assets. This measure tells us about the mix of financing sources for municipal programs and capital, and also tells us about the relative use of municipal revenue tools that encourage efficiency in the allocation of municipal resources.

Overall, Alberta taxpayers fund the largest share of municipal operations, as opposed to users. In Figure 14, self-supported sales and user charges only account for less than one-quarter of the municipal operational revenues, with the lowest ratio being about 19 per cent in Edmonton. Taxpayers, whether in the form of municipal taxes or transfers from the provincial and federal governments, largely cover the balance of operational revenues.[16]

FIGURE 14: ALBERTA MUNICIPAL PROGRAM OPERATIONAL REVENUES – ALL SCHEDULE C CATEGORIES (FIVE-YEAR AVERAGE, 2007-11)



Notes:

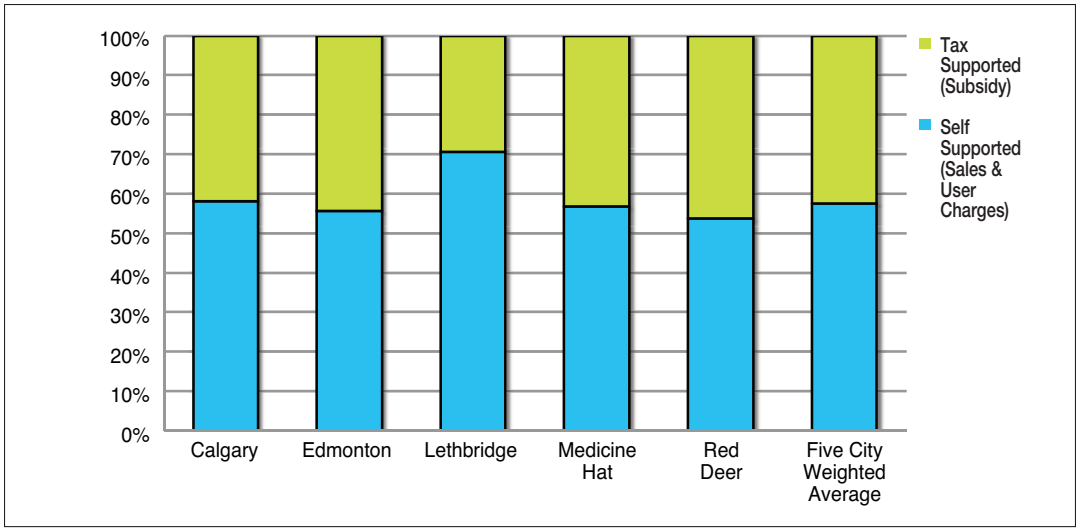
1) *Schedule C (revenues by function) include: council and other legislative; general administration; other general government; police, fire, disaster and emergency measures; ambulance and first aid; bylaw enforcement; other protective services; common and equipment pool, roads, streets, walks, lighting, airport, public transit, storm sewers and drainage; other transportation; water supply and distribution; wastewater treatment and disposal; waste management; other environmental use and protection; family and community support; day care; cemeteries and crematoriums; other public health and welfare; land-use planning, zoning and development; economic/agricultural development; subdivision land and development; public housing operations; land, housing and building rentals; other planning and development; recreation boards, parks and recreation; culture: libraries, museums, halls, convention centres, other recreation and culture; and other revenue.*
2) *Average was taken from nominal dollar values.*
3) *Excludes electrical- and gas-utility revenue.*

[16] The subsidy rate for operational revenues is calculated as the ratio of revenue from sales and user charges, over the value of total operational revenue for that particular function. Total general revenue by function (FIR schedule 9C) is defined by the Alberta Municipal Affairs Financial Information Return Manual as revenues consistent with Schedule 9D revenue by object, including: taxation and grants in place; sales to other governments; sales and user charges; penalties and costs on taxes; licenses and permits; fines; franchise and concession contracts; returns on investments; rentals; insurance proceeds; net gain on sales of tangible capital assets; contributed and donated assets; federal, provincial, and local government transfers; developers' agreements and offsite levies; and other revenues. The revenues correspond to expenditures in schedule 9D, and include: salaries, wages and benefits; contracted and general services; purchases from other governments; materials, goods, supplies, and utilities; transfers to other governments; transfers to local boards and agencies; transfers to individuals and organizations; bank charges and short-term interest; interest on operating long-term debt; interest on capital long-term debt; amortization of tangible capital assets; net loss on disposal of tangible capital assets; and other expenses.

For specific forms of infrastructure spending, the sales and user charges account for a larger share of operational revenues. In Figure 15, we calculate the implied subsidy rate as a proportion of revenues for public infrastructure programs in five Alberta cities averaged for the period 2007-11.[17] Users cover roughly 58 per cent of combined operational revenues for roads, transit, water and waste treatment, with the balance covered by taxpayer-funded subsidies.

Figure 16 provides specific subsidy rates for various forms of infrastructure. Roads, streets, walks and lighting are highly subsidized, with taxpayers covering roughly 85 per cent of revenues, followed by storm sewers and drainage (in the smaller cities, both categories are 100 per cent funded by taxpayers). About 40 per cent of transit operational revenues are taxpayer funded, the highest level in Medicine Hat (53 per cent) and Calgary (45 per cent).[18] About one-third of water-supply and waste-treatment operation revenues come from taxpayers in Edmonton, the highest level of public subsidy in Alberta for this category.

FIGURE 15: ALBERTA MUNICIPAL PROGRAM OPERATIONAL REVENUES FOR AGGREGATE INFRASTRUCTURE CATEGORIES: ROADS, TRANSIT, WATER, WASTE – USER AND TAXPAYER FUNDED (FIVE-YEAR AVERAGE, 2007-11)

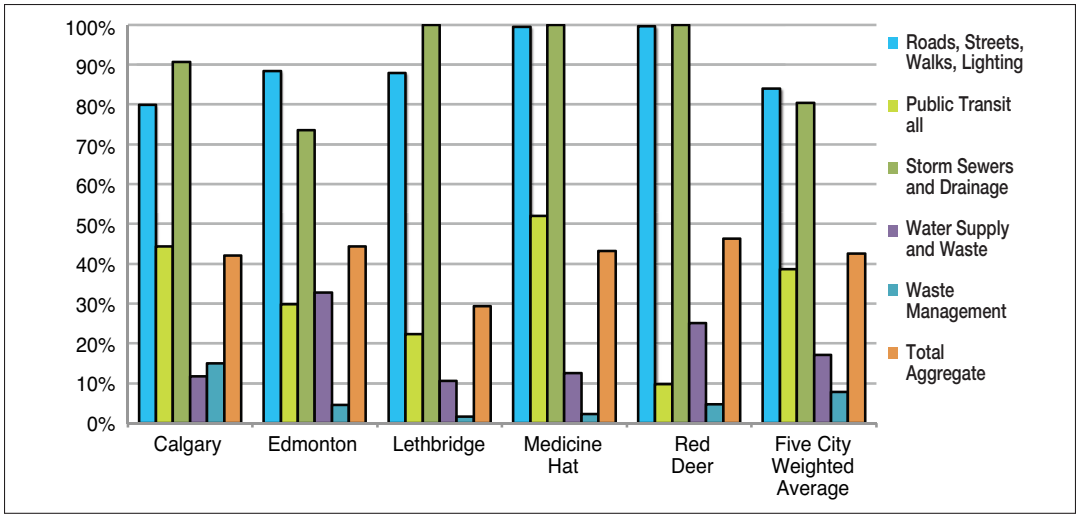


Notes: Average was taken from nominal dollar values.

[17] See footnote 16.

[18] Calgary relies in part on an honour system for its light-rail transit (LRT) system, since the only check is an infrequent checking of payment that could lead to a fine for non-payment.

FIGURE 16: ALBERTA MUNICIPAL PROGRAM OPERATIONAL TAXPAYER SUBSIDY RATES (FIVE-YEAR AVERAGE, 2007-11)



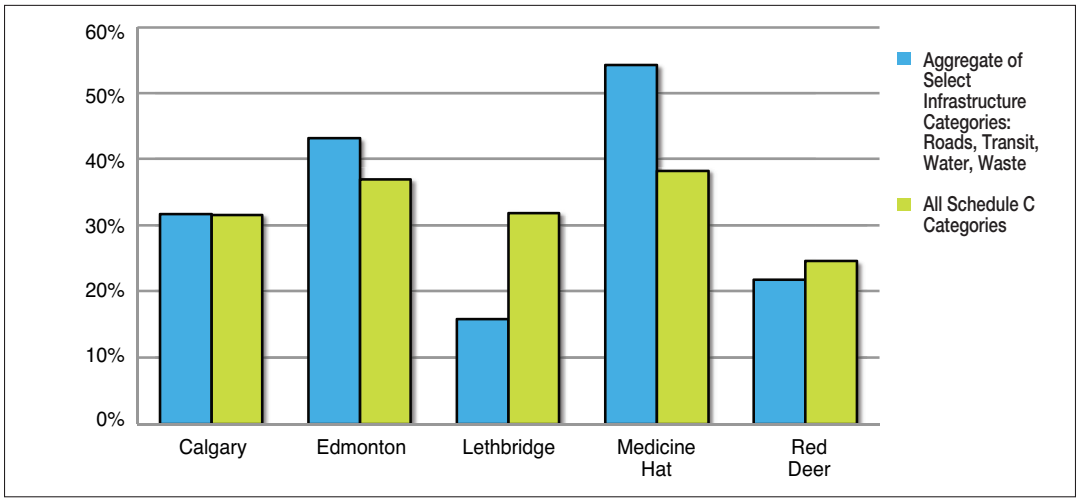
Note: Average was taken from nominal dollar values.

Thus, with respect to operations, infrastructure projects require significant taxpayer support as user charges and sales cover only a part of infrastructure operational revenues and costs. The other side is municipal capital expenditures, which are also covered by user charges, taxpayer funding, debt, and transfers from provincial and federal governments.

Figures 17, 18 and 19 provide the proportion of capital funded by provincial capital transfers, long-term debt and developer levies.

Some clear results are derived from Alberta's municipal financial data. The first is that roads, transit, water and waste projects are about one-third funded by the Alberta government, with the largest government share in Medicine Hat (over 50 per cent) and the lowest in Lethbridge (16 per cent). When considering all Schedule C categories[19] (a wider definition of public capital), Red Deer's capital expenditures are the least funded.

FIGURE 17: ALBERTA PROVINCIAL CAPITAL TRANSFERS AS A PERCENTAGE OF CAPITAL ASSET PURCHASES (AVERAGED 2007-11)



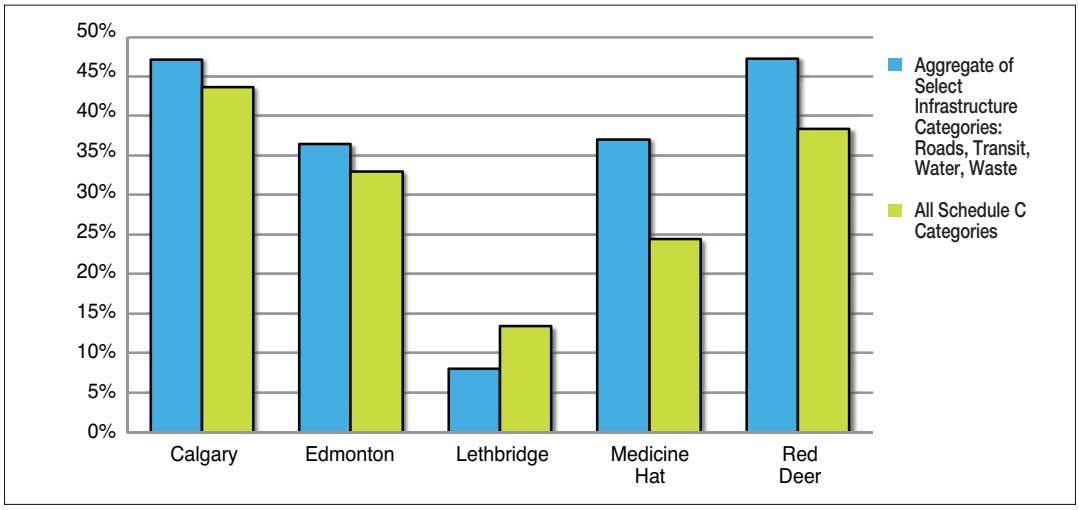
Note: Average was taken from nominal dollar values.

[19] See figure 14 for a complete list of schedule C functions.

As shown in Figure 18, roughly two-fifths of Schedule C municipal capital-asset expenditures are funded by long-term debt (a higher portion for selected infrastructure categories).

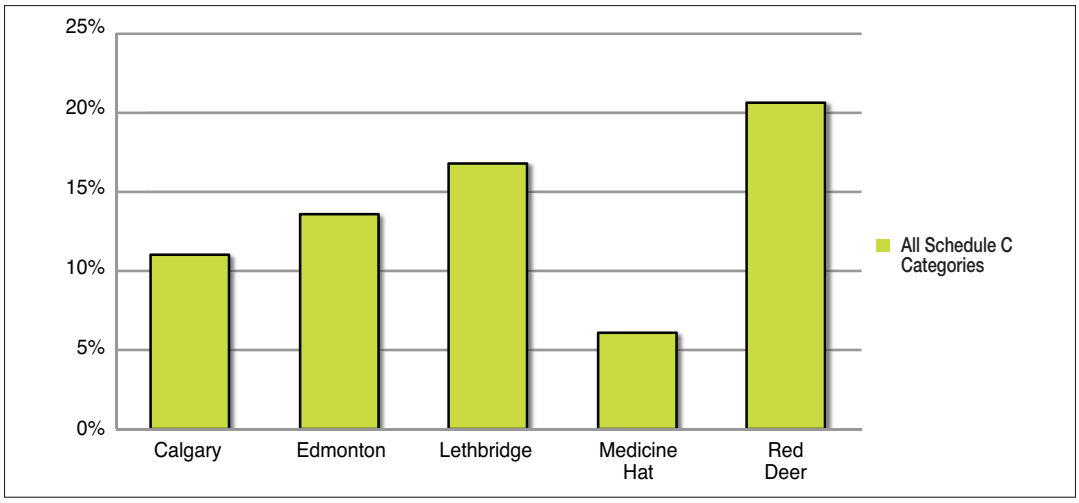
In Figure 19 we look at the proportion of total capital-asset additions — the sum of purchases and contributions — acquired as a result of developer agreements. These contributions are made by developers and represent capital assets that are purchased and constructed by developers and then turned over to the city as transfers in kind. These arrangements function as a complement and alternative to paying development levies. The construction cost of this infrastructure is then incorporated into housing prices within the development. Developer contributions thus function as a user charge. We can see from Figure 19 that developer contributions represent between 12 and 21 per cent of total capital additions in Calgary, Edmonton, Lethbridge and Red Deer over the period (although we had to rely on a shorter time period here due to limitations with the data).

FIGURE 18: ALBERTA MUNICIPAL LONG-TERM DEBT FINANCING AS A PERCENTAGE OF CAPITAL-ASSET PURCHASES (AVERAGED 2007-11)



Notes: Average was taken from nominal dollar values. Debt shown represents yearly additions to principal long-term debt.

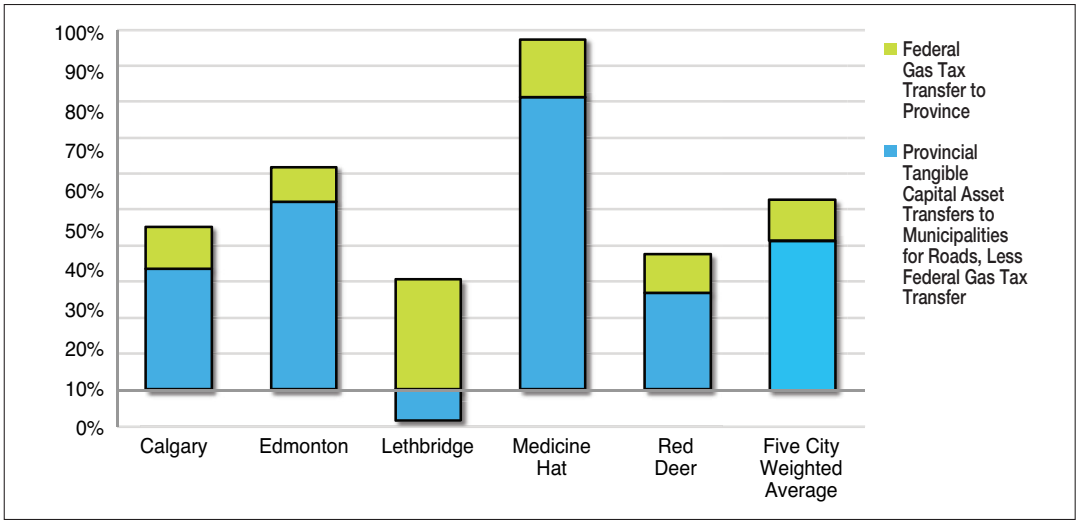
FIGURE 19: ALBERTA DEVELOPER LEVIES (CONTRIBUTIONS IN KIND) AS PERCENTAGE OF CAPITAL-ASSET ADDITIONS (AVERAGED 2009-11)



Note: Average was taken from nominal dollar values.

The federal gas-tax transfer and other tax revenues cover the remainder of capital infrastructure spending (about 12 per cent). Arguably, the gas tax transferred from the federal government and provincial fuel taxes paid to the Alberta government are surrogate user charges for transportation, since the amount paid rises with distance travelled. Motor-vehicle licenses can be viewed as covering some of the fixed cost of infrastructure spending. In the case of the federal gas tax, it is in principle used to fund infrastructure projects at the municipal level. For the five Alberta cities presented (Figure 20), the federal gas tax covers 10 per cent of the cost of road transportation, assuming that funds are only used for this purpose (in actual fact, the gas tax can be used for other infrastructure projects including transit). Provincial fuel-tax revenues could also cover transfers paid to municipalities. However for Alberta, 2013-14 fuel taxes of $900 million per year and motor-vehicle license revenues of $470 million are well below the average $1.9 billion provincial operating and capital cost incurred to operate provincial highways and roads, let alone municipal transportation.

FIGURE 20: ALBERTA: PROVINCIAL CAPITAL TRANSFERS FOR ROADS AS A PERCENTAGE OF ROAD CAPITAL-ASSET PURCHASES (FIVE-YEAR AVERAGE, 2007-2011)



Notes:

1) *The federal gas tax is transferred to the province, not directly to municipalities. As such, the provincial capital transfers for road infrastructure to municipalities are shown net of the federal gas-tax transfer. This is intended to illustrate the component of provincial road capital transfers accounted for by the federal gas tax. In the case of Lethbridge, the provincial road capital transfer is less than the full value of the federal gas-tax allotment for the city.*
2) *Average was taken from nominal dollar values.*

Thus, overall sales and user fees only cover 58 per cent of infrastructure operational revenues in Alberta's cities and a relatively small portion of the capital costs, even when developer contributions are counted as surrogate user charges. Taxpayer subsidies are especially high for road transportation and storm sewer and drainage, followed by public transit.

OPTIMAL URBAN INFRASTRUCTURE AND URBAN GROWTH

A critical question faced by policy-makers is how to determine the optimal level of public infrastructure. A normative view based on cost-benefit analysis is that governments should invest in public infrastructure until the point that marginal returns equal the marginal cost of providing a service. Marginal returns can be significant since infrastructure improves the productive capacity of the economy. The cost borne by governments will include labour and capital costs incurred in the provision of infrastructure; the ultimate cost depends on managerial and technical efficiency.

While the cost-benefit approach to analyzing infrastructure projects provides a useful guide to determining infrastructure spending, politics can be a different matter. Politicians facing upcoming elections prefer programs with immediate benefits compared to those with longer-run benefits that go beyond the election cycle. Filling potholes rarely attracts strong political support, but cutting ribbons to announce major projects will garner support. Generally, Canadian governments, at least prior to 2000, tended to support the expansion of social programs over infrastructure.[20]

Nonetheless, it is important to lay out economic considerations for optimal infrastructure spending for an urban setting. While we shall address some particular political issues at a later time, we consider here optimal infrastructure decision-making and urban growth in the presence of pricing policies.[21]

Optimal Infrastructure Spending with User Fees

An analysis of infrastructure first begins with a model of urban development whereby households choose to live near a city core or near city limits. A monocentric city has one city core, while a polycentric city will have several cores.

In a large city, residents choose a location by trading off their consumption of housing with commuting costs. The marginal individual is indifferent to the trade-off between housing prices and commuting costs — housing prices near a city core are highest, and fall as travelling distance and commuting costs increase — locating where the perceived "value" margin of housing is equal to the perceived cost of commuting to the core. Those preferring better housing will live further from the core even though the cost of commuting is higher. Those who dislike commuting prefer to live near the core and pay more for housing.

Therefore, housing prices fall and commuting costs rise as distance increases from a core. The cost of commuting includes not just direct travel costs, such as maintenance of roads or transit, automobile maintenance, gasoline costs and transit fees, but also congestion costs.

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[20] See: J. Mintz, Most Favored Nation, Policy Study 36 (Toronto: C. D. Howe Institute, 2001).

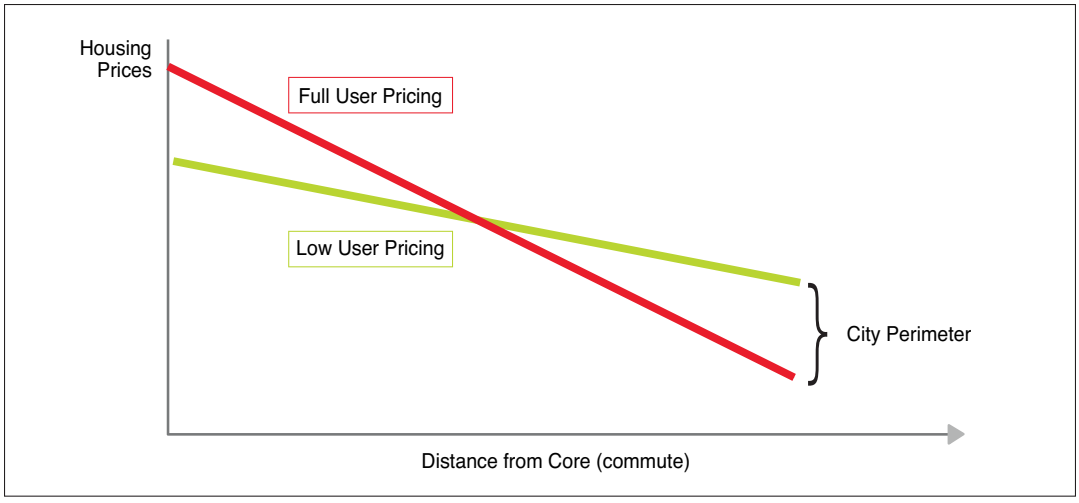
[21] For a comprehensive discussion on infrastructure and urban development, see: Y. Papageorgiou and D. Pines, *An Essay on Urban Economic Theory* (AA Dordrecht, the Netherlands: Kluwer Academic Publishers, 1999).

Congestion costs are equal to the total time-cost of commuting, a cost which is willingly incurred by the commuter, and also imposed on other commuters, as each commuter is added to all those travelling to a core. Thus, congestion costs include not just private costs for a commuter, but social and economic costs imposed on other commuters as productive hours are diminished by longer commutes on congested infrastructure. This is true whether on roads or public transit.

These time costs are either the pre-tax wages lost by time spent commuting rather than working, or the value of leisure sacrificed to commuting, or some average of the two, depending on how much work or leisure time is displaced by commuting. Congestion costs tend to be highest during peak times of travel and lowest when fewer commuters are travelling at non-peak times. A user fee designed to encourage efficient use of public infrastructure would be priced to account for both types of out-of-pocket costs: costs associated with the provision and maintenance of infrastructure and congestion costs. By utilizing a variable fee that adjusts over the course of the day, rising at times of congestion, municipal governments could fully cover the expenditures made on roads and urban transit while creating incentives that contribute to reduced congestion.[22]

When governments do not price infrastructure to charge households for the marginal costs associated with their commuting, households will be willing to live further away from the core. As shown in Figure 20, this causes housing prices to rise further from the city core, while housing prices fall near the city centre. This leads to urban sprawl as rural areas at the city's edge are converted into urban residence. Inefficiency is introduced whereby a greater share of the population is more willing to live near the city limits furthest away from a city core, thereby leading to more commuting than would occur if full user-fee pricing were in place.

FIGURE 21: RELATIONSHIP BETWEEN HOUSING PRICES AND DISTANCE COMMUTED



[22] Mohring and Harwitz argue that tolls including congestion costs will cover the cost of transportation network with constant average costs: H. Mohring and M. Harwitz, *Highway Benefits: An Analytical Framework* (Evanston, Ill.: Northwestern University Press, 1962). However, user fees need not just be related to distance (price per kilometre travelled). One could have an entry fee that helps cover fixed costs in constructing the transportation system with economies of scale so that the project is self-financing.

The social costs associated with commuting also include environmental costs, accident externalities and transit-service crowding costs. Increased commuting times in large centres also impose costs on individuals, which diminish urban agglomeration and the benefits individuals derive from shared facilities or goods, such as the arts.[23]

Typically, transit subsidies are justified as a means to increase transit utilization, thereby reducing the social costs associated with automobile travel. In the case of a transit subsidy, marginal commuters respond to incentives to utilize transit even though transit commuting times are typically higher than auto commuting times, as discussed above.[24] In the absence of such a subsidy, these marginal commuters would likely find themselves back on congested roads. From an economic perspective, this subsidy is justified if a net benefit is produced — that is, if the reduction of social costs associated with car usage outweighs the cost of the transit subsidy. However, transit subsidies intended to reduce the social costs associated with car travel are a second-best policy when compared to the pricing of road infrastructure. Full-cost pricing for roads would also have the effect of reducing car travel by eliminating the distortions associated with unpriced roads, distortions that diminish the relative cost-benefit value of alternative forms of transportation. The second-best policy approach is commonly argued to be the best approach given the administrative and logistic difficulties of pricing road infrastructure. Though this argument may have held water two decades ago, the rapidly declining cost and availability of technology that can be used to price road access invalidates such arguments.[25]

Transit subsidies have also often been justified as a distributional consideration intended to assist low-income earners who are significantly more likely to be dependent on public transit. Though a general transit subsidy undoubtedly reduces the burden of transit costs for low-income individuals, it does not assist those low-income households who must rely on autos instead. In terms of distributional concerns, it is better to address the overall income needs of households rather than just focus on only one type of expenditure such as transit (a better policy would be to provide income-tested wage subsidies). General income support for low-income households would eliminate transit-price distortions for the general public. A general subsidy may also reduce municipal revenues collected from higher-income individuals with a preference for transit, or for whom the full cost of public transit remains below that of alternatives.

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[23] The social benefits of agglomeration are estimated by B. Dachis to be at least $1.5 billion in the Greater Toronto Area. See: B. Dachis, "Cars, Congestion and Costs: A New Approach to Evaluating Government Infrastructure Investment," C. D. Howe Commentary 385, July 2013. However, as the urban-economics literature has pointed out, agglomeration should not be presumed to be beneficial if the saving in congestion costs is greater than the benefits of larger labour pools, etc.

[24] One estimate for Washington D.C., London U.K. and Los Angeles is that public-transit operating and capital costs should be subsidized more than 50 per cent, taking into account "congestion, pollution, and accident externalities from automobiles and from transit vehicles; scale economies in transit supply; costs of accessing and waiting for transit service as well as service crowding costs; and agency adjustment of transit frequency, vehicle size, and route network to induced changes in demand for passenger miles." See: I. Parry and K. Small, "Should Urban Transit be Subsidized," Resources for the Future RFF DP 07-38, July 2007 [Published as: Ian W.H. Parry and Kenneth Small, "Should urban transit subsidies be reduced?" American Economic Review 99, 3 (2009): 700-724]. Results would not be comparable for most Canadian cities, which are much smaller in size and have lower congestion costs on roads, except for the Greater Toronto Area. Also, Canada assesses much higher gasoline taxes than the United States, which would need to be taken into account as a surrogate user charge.

[25] For a recent discussion of the current technologies and opportunities for pricing road access, see: T. Fishman, *Digital-Age Transportation: The Future of Urban Mobility* (Deloitte University Press, 2012).

As discussed above, most Canadian cities are reluctant to fully embrace user-fee pricing for transportation. Thus, there is also an element of subsidization that encourages urban sprawl. A second-best policy in this regard is to assess a conversion tax at the city border to reduce the incentive to convert rural land into city land.[26] Many jurisdictions might, instead, impose the equivalent of a confiscatory tax by creating a "green belt" around the city, making it impossible to convert rural land into urban land. However, this policy can encourage the hollowing out of a city as property prices rise due to densification — households move to neighbouring jurisdictions and still travel to a city core without paying for the full cost of roads or transit. Indeed, if roads and transit infrastructure costs are covered by local property or other general taxes, such hollowing out can occur as commuters move to surrounding towns, still benefiting from the use of urban roads.[27]

With user-fee pricing, transportation infrastructure can therefore be optimally provided with a revenue stream from tolls and transit fees designed to cover private and social costs of travel. User fees should also be assessed in covering the cost of other forms of infrastructure related to housing development. Transit subsidies and the absence of tolling lead to urban sprawl and excessive commuting. Public infrastructure projects are more difficult to assess in terms of the net benefits, since revenues are well below infrastructure costs. This requires a cost-benefit analysis whereby non-monetized benefits such as commuting-time saved, congestion costs and other social benefits and costs — including the economic cost of tax-supported finance — are estimated to determine the value of an infrastructure project. Cost-benefit analysis, while useful, is an art in itself, and measures are sometimes subject to value judgments in supporting or not supporting infrastructure projects.

Thus, in our view, optimal infrastructure is tied closely to pricing policies. User pricing will create revenue streams to determine the value of an infrastructure project and cover the cost of projects. Users who pay for the cost of the service will demand providers be efficient, to keep fees low, and users will indicate their willingness to pay for new infrastructure. Otherwise, governments must determine the degree to which they will support infrastructure spending through tax and debt financing. The normative assessment then becomes part of the political decision-making process in urban cities, which might explain its constant underfunding.

OPTIONS FOR FINANCING INFRASTRUCTURE

As discussed above, urban governments in Canada use several approaches to financing infrastructure, including user fees, benefit taxes (such as gasoline taxes, motor-vehicle license fees, and development charges that are indirectly related to infrastructure costs), general taxes[28] including the property tax, and debt financing. In addition, governments receive funding from upper-level governments, privatize infrastructure projects in some instances (that could be price regulated), or enter into a public-private partnership, which involves both public and private contracting. We discuss each form of financing in turn.

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[26] Papageorgiou and Pines, An Essay.

[27] A. Anas and H-J. Rhee, "When are urban growth boundaries not second-best policies to congestion tolls?" *Journal of Urban Economics* 61 (2007): 263–286.

[28] In this paper, we will not focus on the different tax bases. For a recent discussion, see: R. Bird and R. Bahl, "Decentralization and Infrastructure: Principles and Practice," mimeograph, The World Bank, February 2013; and another upcoming paper by B. Dahlby and M. McMillan that was presented at the same conference for which this paper was initially prepared.

User Fees

We have already made the case that the best form of financing operational and capital infrastructure costs is to rely on user fees that improve both budgetary and economic decisions in an urban setting.[29] The technology for pricing roads, transit, water and sewage is increasingly cost-effective to employ, and has worked in a number of jurisdictions the world over, including Canada. User fees are arguably fair, since they are payments made by those who demand public services. They are also efficient to the extent that those individuals demanding the public service must pay for it. Several countries have introduced tolling for urban transportation, including the United States, United Kingdom and Singapore.

Yet, Canadian provincial and municipal governments have been reluctant to fund infrastructure through user fees. In the case of Alberta, roads and highways, storm sewers and water are especially underpriced when the full cost of provision is considered. Transit pricing is also far below the cost of provision, significantly subsidized with respect to both capital and operating costs; a formal assessment of the optimal subsidy rate would be required to determine the appropriate level. Even so, Canadian jurisdictions generally do not use zone or peak-time pricing, or charge for parking, which would help to both cover the cost of urban transit and encourage efficient use.

There are likely a number of reasons for the substantial political resistance to road and bridge tolls, and the potential political costs have contributed to a general reluctance on the part of governments across Canada to embrace a broader use of user-pay funding models.

- User fees as a proportion of income fall as a person's income rises, reflecting the extent to which the public service is a necessity for Canadians. Thus, user fees for air travel and commercial rail may be easier for politicians to impose, since demand for these services are less important to the poor.
- User fees are assessed on a cost-recovery basis by governments that do not feel the competitive pressures to achieve efficiencies to keep costs as low as possible. Thus, the public may view road tolls and other user fees as an additional form of taxation — amidst excessive government spending — rather than market-priced consumption.
- Users of infrastructure have made a number of personal consumption decisions — including investments in personal transport and the location of housing — based on existing arrangements. These decisions have been informed by the implicit, distortionary incentives in the unpriced infrastructure being used. Charging for the use of infrastructure will alter returns on significant investments and personal choices that people have already made. As such, charging for services and infrastructure previously unpriced, such as roads, may be viewed as unfair, as it would change the (currently underpriced) cost of commuting to the core. This cost would more than likely be capitalized and priced into the value of both urban and suburban housing, pushing prices in the core higher and suburban prices lower. This presents significant political barriers to full pricing for infrastructure, especially in jurisdictions where the majority of voters live in suburban areas, as these will be the areas where the realized full costs of commuting would likely translate to a reduction in housing prices.

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[29] See, also: R. Lindsey, "Congestion Relief: Assessing the Case for Road Tolls in Canada," C. D. Howe Institute Commentary 248 (Toronto: C. D. Howe Institute, 2007).

Governments can address these issues with various arrangements. In the case of user fees charged to low-income households, personal or property tax relief through an income tax credit could offset any impact on low-income households.

Efficiency can be addressed through good governance. For example, in the case of Nav Canada (the civil air navigation system), representatives of users sit on the board, thereby putting pressure on the agency to keep costs low. Certainly there is no reason that bodies composed of politicians who have less knowledge about operations and finance should govern authorities for transit and other infrastructure. An arm's-length relationship from the government, as with a board selected from the broad public, could potentially work better if given sufficient scope over administrative matters.

Finally, it is difficult to impose new user fees once households have made irreversible decisions over location without allowing for grandfathering, transitional payments or the phasing-in of policies. As in the case of tolling Highway 407 in Toronto, the approach to assessing user fees for only new infrastructure, while exempting older networks, would be one approach to transition. Thus, for example, Alberta could assess tolls for new projects, such as the twinning of the Grassland-Fort McMurray highway and the ring roads in Calgary and Edmonton. An alternative is to exempt existing-infrastructure operational costs from user fees, but raise fee levels over time with offsetting tax reductions elsewhere.

Gasoline and Other Infrastructure-Related Taxes

While not as effective as toll charges and other user fees for infrastructure spending, a second-best policy is to assess taxes that are related to demand for infrastructure. Gasoline taxes at least vary with distance travelled, although they cannot be altered to reflect peak-time demands, among other variables. Similarly, there is a good argument for allocating motor-vehicle license fees toward road infrastructure, and property charges toward sewage, water and other housing services respectively. But again, these are second-best policies, as they do not vary with the utilization of the service and therefore create incentives to over-consume in the absence of marginal costs. They are appropriate for cost recovery as a second alternative to user fees.

Gasoline taxes have been used in the Vancouver regional area to fund transportation costs. These could also be used in the Greater Toronto Area as well. Some tax-competition issues arise, since gasoline taxes may be avoided by consuming low-taxed fuel in neighbouring areas not subject to tax. However, these issues may not be significant if a large geographic area is involved.

Other Taxes

Other taxes, such as provincial sales, property or income taxes, are inferior for funding infrastructure when compared with user fees, since they are not related to the use of infrastructure. If applied generally at the provincial level to fund municipal infrastructure that spawns localized benefits, non-users in other parts of the province are effectively bearing the burden of urban infrastructure in other jurisdictions. However, if provinces assume the responsibility of infrastructure throughout the province, a province-wide tax would be appropriate.

If municipalities are assessing property and other taxes to fund infrastructure, such taxes might be problematic for various reasons. First, general taxes fail to properly price infrastructure services and therefore encourage residents to over-consume seemingly free public services and goods for which they do not face marginal costs. Second, property and other taxes encourage residents to move to surrounding urban areas to avoid the tax, yet these non-residents still make use of municipal infrastructure during their daily commute to the city. Third, taxes impose economic distortions on the economy that increase the cost of providing infrastructure services.[30] Non-residential property taxes for example, are typically in excess of the value of municipal services, thereby imposing economic distortions depending on the extent to which the tax differentials are shifted forward to users or backwards to property owners.[31]

Debt Finance, Capital Budgeting and Fiscal Rules

Debt financing for current infrastructure-capital spending is another option, although it requires future revenues to finance the payment of interest and debt principal. "Good" governments have used debt finance to fund infrastructure that enables commerce and productivity, resulting in higher incomes in later years, less volatile taxes over time, and financing burdens more equally distributed across generations. However "bad" governments use debt finance for non-capital and capital spending to push costs onto future generations who have no voting power when current decisions are being made.

As government deficits during the 1980s ballooned, many countries began to introduce some form of fiscal rule to limit deficit finance in the 1990s or later (e.g., the European Union's Maastricht Treaty in 1992, the U.K., Finland, Canada, Sweden, Australia and New Zealand). Governments accounting for revenues and expenditures on a cash basis would have a bias against infrastructure spending in presence of these deficit rules. Given that infrastructure expenditures are lumpy, government would more likely postpone expensive infrastructure projects to satisfy fiscal rules applying to deficits. This would likely be supported by the electorate, which disproportionately benefits from public spending with immediate benefits compared to infrastructure that would provide benefits to voters in the future.[32]

It has become common for governments to introduce capital budgeting to reduce the bias against capital spending in the presence of fiscal limitations on operating deficits. Operating revenues and expenditures would be measured on an accrual basis including a charge for the depreciation of public capital goods. Typically, this would reduce the size of deficits, since public capital expenditures were initially more than depreciation expenses, making it easier to achieve deficit targets or balance budgets that would apply to operating accounts. Public infrastructure spending would be included in a capital account, which would be composed of assets and liabilities. Capital spending requirements would be financed by the sale of assets, issuance of debt, or payments from the operating account.

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[30] For a recent discussion of the economic costs of taxation, see: P. Bazel and J. Mintz, "Enhancing the Alberta Tax Advantage with a Harmonized Sales Tax," *The SPP Research Papers* 6, 29 (2013).

[31] See J. Mintz and T. Roberts, who have assessed the value of municipal services relative to property taxes paid by residents and businesses, province by province. Alberta was most egregious in most heavily taxing businesses relative to residents. For example, the current municipal property and business tax on non-residential property in Calgary is almost five times higher than the residential property rate. The excess property tax paid by businesses need not be capitalized in property prices but may be shifted forwards as some studies have shown. J. Mintz and T. Roberts, "Running on Empty: A Proposal to Improve City Finances," C.D. Howe Institute Commentary 226 (Toronto: C.D. Howe Institute, 2006).

[32] Much of this discussion borrows heavily from: J. Mintz and M. Smart, "Incentives for Public Investment under Fiscal Rules," The World Bank Research Papers, WPS3860 (Washington D.C.: World Bank, 2006).

When public capital accounts grow over time, the depreciation charged could swamp the investment costs. This could increase the size of deficits and push up debt-financing requirements. To avoid fiscal limitations on debt, "bad" governments push debt into off-balance-sheet public infrastructure agencies, or enter into public-private partnerships. They might also classify some expenditure as capital to reduce operational deficits.

Today, most provinces in Canada have accumulated operating deficits that are far less than consolidated debt, which includes capital financing.[33] Constraints on operational deficits have been avoided by pushing debt into capital accounts.

Thus, capital accounting was initially introduced to create an incentive for public capital spending in the presence of fiscal rules. However, some "bad" governments increased debt financing to avoid fiscal rules applied to operating accounts. To limit debt finance, consolidation of public accounts has been introduced and debt limits (i.e., debt relative to GDP) have been introduced, such as in New Zealand and the United Kingdom. The federal government in Canada has introduced a target of net debt being no more than 25 per cent of GDP by 2021.

For debt financing, the common use of limits across provinces (as discussed above) is appropriate. In some cases, as in Alberta, some room is available to issue more debt to finance large infrastructure projects.

Inter-Governmental Transfers

When mayors and city councillors face a voting public unwilling to pay more fees or taxes to support infrastructure funding, they have another recourse: seeking funding from higher levels of government. Given the advent of the gas-tax sharing arrangement introduced by the federal Liberal government in 2004, it seemed that local politicians' pleas for manna had finally succeeded.

However, federal involvement in municipal affairs is not necessarily good policy, even if it is good politics. As mentioned above, municipalities are creatures of a province and the provinces are fully responsible for municipal government. The assignment of spending and tax powers within the province is a constitutional responsibility of the province.

If the province wishes to take over full responsibility for infrastructure, it could do so using provincial revenue streams to support expenditures. In Alberta, for example, education is the responsibility of the province, which currently assesses provincial property taxes to fund the system. Local school boards operate within circumscribed administrative responsibilities.

Yet, municipal involvement in infrastructure decisions makes sense for a variety of reasons. Responsibility for public services is best decentralized, since municipal governments are "closest to the people" and therefore able to develop programs reflecting the interests of the electorate in accordance with regional needs and preferences. When provincial support is needed, it is to provide support for large public-service projects (with significant economies of scale), improve co-ordination among local jurisdictions in the presence of spillovers, or fund those governments with less capacity.

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[33] See: Quebec Budget, 2012.

Given the constitutional role of provinces, it makes sense for provinces to play an active role in both the provincial and municipal infrastructure decisions. Municipalities should be responsible for some of the funding, since the electorate should be faced with higher levies if they demand more infrastructure spending. The province can provide block grants (so municipal governments are responsible for incremental spending and revenues) or matched funding (implying that the province should play a role in determining how funds should be spent).

A more challenging question is whether the federal government should have a direct role in municipal infrastructure funding. While an argument can be made that better urban-infrastructure services improve the economy, thereby increasing revenues available to federal and provincial governments, the same argument can be made for almost any regional or local service. The danger involved with federal transfers paid directly to the municipalities is that it undermines political accountability. Federal and provincial governments can slough off their responsibilities to the local level of government to avoid accountability for infrastructure outcomes. On the other side of the coin, municipal governments receive large conditional transfers or matching grants slated for infrastructure projects that overshadow existing municipal priorities. In the eyes of municipal governments, this infrastructure can be had at a discount, and at a lower political cost than other priorities that must be fully funded from own-source revenues. Funds collected at the federal level come with low political costs for municipal governments who need not answer to voters in other jurisdictions. These funds enable local governments to reduce the amount of own-source revenue they must raise, revenue for which they are fully and visibly accountable. Cascading transfers allow a municipal government to impose costs on a tax base far broader than its constituency, localizing benefits and distributing costs without taking accountability for taxes levied. When this happens, voters lose sight of which government is responsible for decision-making, and is accountable for decisions made. Given that municipalities are not a sovereign level of government, it would be best for provinces to deal with municipal-funding issues. Besides, there is too much variation in the spending and taxing powers of provinces and municipalities across Canada, making it difficult for the federal government to intervene with a one-size-fits-all approach to municipal affairs.

This does not mean that the federal government does not have a role in infrastructure in Canada. Federal responsibilities include border infrastructure and international and interprovincial transportation linkages. The federal government also owns land in each municipality and, as with health and post-secondary education, provides financial support to the province in funding provincial responsibilities. It makes sense for the federal government to work with the provinces, but not to talk to mayors directly.

Private Approaches

Needless to say, not all infrastructure has to be publicly provided. Ontario's Highway 407 is an example of a privately operated toll road, with the owners receiving a return through tolls. Regulations are in place requiring maintenance and safety, and the Ontario government could also regulate toll rates given the quasi-monopoly provision of the service.

Therefore, deficit-constrained governments can look at the privatization of infrastructure to improve funding and efficiency of service delivery. Governments still play an active role in regulation to ensure that the public interest is protected.

Privatization has worked in other infrastructure contexts, including communications, water treatment, power and commercial railway. In some jurisdictions, such as Hong Kong, private supply of urban transit has worked efficiently with successful companies expanding globally in the provision of similar transit services elsewhere. In Canada, the building of the Canadian Pacific Railway as part of John A. Macdonald's National Plan to unite the country, involved private development, albeit with large public subsidies and right-of-way land grants.

Three arguments have been raised against infrastructure privatization.

First, that some projects are so large, competitive private provision is impossible without some form of government intervention, including price regulation and public subsidies. Such interventions have their own economic costs, as they distort private investment decisions.

Second, a government may have a lower cost of capital than private producers, as governments tend to borrow from international markets at rates lower than those available on private capital markets. This includes Canadian municipalities, which generally benefit from the borrowing power of provincially backed finance authorities. While this is often the case when comparing market rates, it ignores the implications that fiscal rules have on public finance. With debt and deficit limitations, the shadow price of debt for a government can be significantly higher than market interest rates, since the government runs up against fiscal limits. There are also distortionary costs associated with raising additional revenue necessary to repay debt and interest.

Third, municipal privatization of infrastructure potentially reduces the amount of revenue received, since a private company would pay corporate taxes to federal and provincial governments. This issue was particularly important when many provincial telecommunication companies were privatized in Canada, with some relief given by the federal government through reduced taxation of privatized entities. Today, several provinces, such as Ontario and Alberta, levy corporate taxes on provincial and municipal corporations as if they were subject to corporate taxes. However, the province, not the federal government, receives operating revenues, so privatization can lead to some loss in tax revenue for the province.[34]

An alternative to privatization is a public-private partnership (PPP). The PPP enables a private company to enter into an agreement with a government to build infrastructure partially financed by private capital. The private company might also administer the project after its completion, including maintenance and operation. PPPs are commonplace in the United Kingdom,[35] where they first developed, and are increasingly used across Canada. PPPs have been used to build transport networks, water-treatment facilities, hospitals, prisons and other public infrastructure.

PPPs are successful if there is a proper allocation of returns and risks. If a government guarantees losses or low rates of return, the private producer can take on too much risk, leading to cost overruns. Limits on high rates of return for risky investments can also undermine incentives for private firms to take on best practices. Without proper contract design, PPPs can underperform or fail.

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[34] J. Mintz, D. Chen and E. Zorotheos, "Taxing Issues with Privatizations: A Check-List," World Bank Research Paper 2348 (Washington D. C.: World Bank, 1999).

[35] For a review of Labour-government PPPs in the United Kingdom, see: P. Hare, "PPP and PFI: the political economy of building public infrastructure and delivering services," *Oxford Journal of Economic Policy* 29, 1 (2013): 95-112.

CONCLUSIONS

The absence of pricing leads to the over-utilization of public infrastructure, and diminishes incentives to ration publicly provided goods and services. This results in an elevated level of demand for private transport, sprawling suburban development, and accompanying municipal infrastructure that is simply not optimal or efficient. These demands — distorted by the absence of pricing — create political incentives for municipal politicians to allocate funding away from competing capital priorities and essential services, to satisfy the desires of users who do not themselves face the costs associated with their demands. Whether we want to encourage optimal levels of infrastructure investment by public and private entities or efficient infrastructure use at the individual level, the solution is the same. It is essential that prices reflect the full costs associated with individual demands, and inform the choices that individuals make.

Of critical importance is the understanding that pricing infrastructure access or road congestion is not an arbitrary charge. Rather, it is a reflection of the individual benefits derived, the societal costs incurred — as millions of productive hours evaporate in traffic — and the public cost of provision. It is equally important to remember that the redistribution of infrastructure demands in a priced network is not an objective to be pursued in itself, but rather the expected result of efficient pricing.

Pricing infrastructure changes the distribution of demands, and in doing so, the priorities for infrastructure funding. This is true whether governments or private developers and investors finance development. In either case, a more efficient distribution of resources prevails as resources are allocated in accordance with the trade-offs individuals are willing to make when they are informed by the true cost of infrastructure provision.

It is essential that users asked to bear the cost of infrastructure use are rewarded with localized and tangible benefits. There must be a clear link between the costs individuals face and renewed investment in the services and infrastructure they choose to use. This delivers value back to the users who fund a particular aspect of the infrastructure network, and allocates resources across competing alternatives in proportion to the value they produce.

Broader use of pricing for infrastructure would also create predictable and dedicated revenue streams that would allow municipalities to responsibly take on additional debt to invest in much-needed municipal infrastructure. On average, municipalities are currently well below provincial imposed debt limits, but as discussed, the creation of such liabilities necessitates a revenue stream. Embracing user-pay models would allow for the efficient generation of this revenue at the municipal level. What remains to be seen is the political will to undertake this change.

In the end, voters in urban areas want more roads, highways and other public infrastructure. Governments need money, especially when fiscal budgets are tight and debt burdens have become more substantial. It is as simple as that. The most fair and efficient way to fund public infrastructure is to increase reliance on user fees. It promotes better budgetary and fiscal decisions, reduces the need to raise more economically costly taxes, and contributes to a more optimal allocation of resources across competing public priorities.

To the detriment of their infrastructure, cities across Canada have made insufficient use of user pricing. It is time for a change.

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Jack M. Mintz was appointed the Palmer Chair in Public Policy at the University of Calgary in January 2008.

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