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Federation of Canadian Municipalities

Municipal Infrastructure

Macroeconomic Impacts of Spending and Level-of-Government Financing

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EXECUTIVE SUMMARY

This project measures the impact on the economy of additional spending on infrastructure. The method employed focuses on how the additional demand on economic resources is transferred through from construction of the new infrastructure to the rest of the economy. Estimates include "multiplier" effects that account for linkages from the construction industry to all others, and the extent to which additional wage and business incomes induce further spending. Included in this is an examination of the "fiscal offsets" to different orders of government of investment in local infrastructure. In this respect, this project updates earlier studies for the Federation of Canadian Municipalities (FCM) and others, including the federal Treasury Board. As a new focus, this project considers the relative economic impacts of funding infrastructure investments from different revenue bases (e.g. income taxes, sales taxes, and property taxes).

Key findings are:

- An increase in municipal infrastructure spending of $1 billion (at nominal prices and allocated to a representative mix of types of infrastructure) in 2008 should increase the size of the real economy by about 0.13 per cent in 2008, or by $1.3 billion in nominal terms. If the same amount is added in each of the following four years, the real effect erodes over time, and is about 0.6 per cent from 2010 through 2012 (averaging $1.4 billion at nominal prices in each of the following years). In 2008, this adds 11,500 to overall employment, with the impact eroding to 7,700 in 2012 and averaging 8,800 in 2009-12.
- The most significant effect is on construction, with the annual impacts on the industry's GDP steady at 0.6 per cent. Average annual impacts of 5,400 in construction employment in 2008-12 account for almost 60 per cent of total employment effects. Positive effects should be expected across all industries in the economy. Aside from construction, impacts on suppliers of construction materials and services (e.g., architects and other professions) would be notably strong.
- We have measured the extent to which investment in different kinds of infrastructure (e.g., buildings, transportation, waterworks, waste management) would produce different impacts. As a general characterization, distinctions are not strong. But our results suggest the largest impacts would be investment in buildings with slightly less significant impacts for spending on waterworks. Variations in backward linkages and in the extent to which there is import content in different kinds of spending partially explain this, but it is also sensitive to the extent to which underlying prices for the kinds of construction and materials may differ.
- Assuming that the municipal governments undertake the spending (and financing) solely, we estimate that positive effects on the balances of the federal and provincial-territorial governments would average more than $315 million annually (equivalent to 32 per cent of municipal spending) in 2008-12. We estimate that effects would be distributed about evenly between the federal and provincial/territorial governments.[2] These benefits are derived from increased revenues, reduced spending for Employment Insurance and welfare, and, over time, lower debt charges.[3] In contrast, municipal borrowing would increase by more than $4 billion over 2008-12, allowing for capital consumption accounting.
- The most recent estimate places the funding "gap" for municipal infrastructure at $123 billion. Closing a gap would almost certainly require increases to spending of more than $1 billion. Our results suggest that the impact we have reported can be linearly increased to estimate effects of a large addition to spending. A $10-billion annual increase would generate ten times as much an increase in GDP, employment and federal-provincial balance impacts.

As a new research focus, we have also posed the question of whether economic effects are sensitive to the nature of government financing. As will be widely known, property taxes account for the majority of revenues that municipalities can generate on their "own account". The federal and provincial governments have access to a wider range of taxes. Like property taxes that can directly affect prices of operating the economy, the federal and provincial-territorial governments also levy indirect taxes (e.g., the GST, general sales taxes, employment contribution programs), but a large proportion of their revenues are derived from direct income taxes on people and business.

As a "first cut" at this, our results suggest there is not much distinction in the longer run, but reliance on the municipal revenue base appears to be at least equivalent to the most economically damaging revenue package, and initially, clearly has the most severe negative effect on the economy. This appears to follow from varying effects on saving rates, but will also be sensitive to the extent to which spending impacts have different import content, the extent to which property tax (and other indirect taxes) are passed through to prices, and many other considerations.

Finally, we note that these results do not exhaust the set of considerations that are relevant to discussions about how much to increase infrastructure spending and how to finance that. Also important are:

- the extent to which improved infrastructure adds to the productive potential of the business economy through reduction of producer costs, which have been estimated

[1] Gross Domestic Product (GDP) at 1997 prices.

[2] Public pension systems would also benefit. We estimate the annual positive effect on the CPP/QPP balances would average more than $325 million.

[3] We have assumed there are no other changes to government spending; that is, increased spending on infrastructure is not "paid for" by changes to health, education, public administration or spending other than that specified above.

by Statistics Canada to amount to 17 cents per $1 increase in the capital stock;

- the extent to which closure of an infrastructure gap reduces the operating expense of maintaining an aged and aging infrastructure; and
- the extent to which property taxes are "regressive" to further reinforce the argument that impacts on economic activity of the municipal tax base is especially damaging to economic activity and that these unduly impact the incomes of those least able to pay.

1 Background

Informetrica has been engaged by the Federation of Canadian Municipalities (FCM) to measure the impact on the economy of additional spending on municipal infrastructure. Three questions are posed.

- Additional spending requires materials and labour to put the new infrastructure in place. This spending 1) directly affects the construction industry, 2) through its use of materials and services, indirectly impacts the activity of suppliers, and 3) by paying labour and businesses for their inputs, provides incomes to households and businesses, which induces further spending on consumption and investment. Considering this chain of impacts, what are the effects on employment and real economic activity?
- Given the economic consequences, what are the effects on the finances of each of the three orders of government – federal, provincial and municipal?
- Additional spending increases the amount of economic activity. Paying for it has a negative effect since increasing revenues for this purpose reduces incomes and the spending of households and businesses. Do the real economic effects vary with which level of government provides the financing?

Measuring the effects on the economy of additional spending in this analysis is confined to assessing how the added demand for economic resources is translated into economic activity, accounting for full "multiplier" implications. It does not, however, account for how the additional public capital that is put in place affects the activity of those who use it.

Thus, for example, an improved urban road system will reduce congestion, providing a direct benefit (reduced costs of operation) to delivery services. Considering that reduced costs directly and through induced effects lower the unit costs of production throughout the economy, this provides trade "competitiveness" effects and directly improves the real incomes of households, leading to increased consumption and associated economic activity. Others have assessed this effect and conclude that "a $1.00 increase in the net capital stock (of infrastructure) generates approximately 17 cents of 'cost saving' producer benefits per year."[4] We have no basis at this time for distinguishing these effects for spending on infrastructure by municipalities, school boards, post-secondary educational institutions, or by provincial or federal governments and no basis for distinguishing such effects by type of infrastructure.

Other economic effects are more difficult to quantify. An improved water and sewage system should lead to improved health outcomes of the population. Through reduced demand for health care this would reduce economic output, but positive effects on labour force participation and worker productivity would provide offsetting positive impacts.

In short, this analysis provides answers to one part of the puzzle about how infrastructure affects the economy. Informetrica delivered similar analysis to the FCM in 1985 and in 1987, and provided a detailed analysis of this kind to Treasury Board in 1995 as part of a mid-term review of the Canada Infrastructure Works Program. In some measure, then, this is an update to previous work that should confirm there are positive effects on real economic activity and employment with varying effects on balances by order of government that would at least partly offset the cost of spending. Given that it is widely recognized that infrastructure spending has a relatively strong short-term effect on economic activity, the focus of the study is particularly appropriate at the current time as concerns about the possibility of a recession increase.

An earlier report of this project reviewed the current intelligence about recession prospects, provided measures that report spending by municipalities on infrastructure in the broader context of spending by governments and other public institutions, and provided an initial estimate of economic effects.[5] This report finalizes the impact measures and examines the extent to which the tax base available to each of the orders of government has an effect on the economy.

2 Effects of Additional Infrastructure Spending

2.1 Cases and Method of Analysis

The FCM has regularly (1985, 1992, 1996) surveyed municipal officials to determine the state of infrastructure. Among other uses, measures from these surveys are used to determine the costs that would be incurred were the infrastructure to be restored to a state of service deemed appropriate by survey respondents. The most recent survey (2007) estimates that the cost of closing this gap amounts to $123 billion.[6] As a broad description of types of assets to which funds might be allocated, this is decomposed into spending for four types of infrastructure:

[4] Tarek M. Harchaoui, Faouzi Tarkhani, and Paul Warren, **Public Infrastructure in Canada: Where do we stand?** Statistics Canada, November 2003.

[5] Informetrica Limited, **Infrastructure and the Economy: Framing Several Issues**, February 6, 2008.

[6] FCM-McGill Municipal Infrastructure Survey, **Danger Ahead: The Looming Collapse of Canada's Municipal Infrastructure**, 2007. The report also identifies new needs that reflect growth of the population and economy estimated to be $115 billion.

- Buildings[7]
- Transportation and Transit
- Water and Wastewater systems
- Waste Management.

This corresponds to four types of government capital formation available in the econometric model we are using for this analysis. We develop separate cases that allocate spending shared out among the four types of assets and separate cases for each of the four types. The latter four cases are compared to each other to determine whether development of different kinds of infrastructure lead to significantly different economic effects.

This paper develops impacts that reflect annual spending of $1 billion in each of 2008-12. Impacts are reported for each of the five years to illustrate the extent to which there are dynamic implications – effects in one year impact on those of succeeding years. Cases are reported for additional spending of $1 billion in nominal terms and $1 billion at 2008 prices. The difference illustrates the extent to which future commitments are sensitive to spending that is and is not "inflation adjusted". Finally, we report a case in which the additional spending amounts to $10 billion to illustrate the extent to which users of this report may use the $1 billion as rules of thumb that can be increased by any multiple of the $1 billion expenditure.

Impacts for seven cases are reported for 2008-12[8]:

	Cases	Notes
	$1 Billion, Nominal	
1	Mix of 4 Infrastructures[9]	
2	Building	
3	Transportation	
4	Waterworks	
5	Waste Management	
	$1 Billion, 2008 prices	**Nominal $ spending rises from $1 Bn in 2008 to $1.045 Bn in 2012**
6	Mix of 4 Infrastructures	
	$10 Billion, Nominal	
7	Mix of 4 Infrastructures	

To develop the impacts, we employ The Informetrica Model (TIM), where the Base Case economy has been tuned to project overall Gross Domestic Product (GDP) growth in 2008-12 at close-to the pace reported as the "private sector" consensus forecast in the federal economic update of October 2007.[10] Consistent with this, in the Base Case, we project that government spending on buildings and engineering assets in 2020 will be 15 per cent larger (in real terms) than in 2007. In short, at most this growth simply accommodates "normal" increases in real demand and escalation of construction and related costs, and such "gap" as deemed to exist is not closed.[11]

Given this Base Case, we add to government capital formation as is indicated in the case list above. Full multiplier effects are assessed.

- Direct impacts – An increase of $1 billion in capital formation constitutes a direct demand on the Canadian construction industry, with this varying by type of asset being built. Measured as the impact on industry GDP, this varies from a low of 39 per cent for development of transportation infrastructure to a high of 50 per cent for "other engineering" assets. Increased GDP is reflected in additions to the industry's employment and in income terms, to the industry's wage bill, returns to corporations and unincorporated income.[12] We effectively assume that all of these direct effects are delivered by Canadian resources.
- Indirect impacts – The balance of the costs ($500-$600 million) are delivered by suppliers of materials (e.g., cement, asphalt, fabricated metals) and services (e.g., architects and other professional services, wholesale trade). Some of this demand (mainly for goods) is satisfied by imports, but on the whole, this "leakage" of the demand to foreign suppliers is relatively small. Almost all of the almost 280 industries that are separately identified in TIM are

[7] In *Danger Ahead: The Looming Collapse of Canada's Municipal Infrastructure* the municipal infrastructure deficit includes transportation and transit, water and wastewater systems, waste management, and a fourth broad catch-all category. This category includes a broad range of publicly owned capital assets, including most municipally-owned buildings, and social, cultural, and sports and recreational facilities. For the purposes of this paper this category is treated as consisting entirely of "building" assets.

[8] We also report the simple average impact of cases 2 through 5. Where shown, the "average" impact is the same or very close to the "mix of 4 infrastructures" impact, one more indication of the low variability in impacts among the four infrastructure categories.

[9] For all calculations of the "mix of 4 infrastructures", this paper relies on proportional needs identified in *Danger Ahead: the Looming Collapse of Canada's Municipal Infrastructure*: Transportation and Transit (36.1%); Water and wastewater systems (25.1%); Waste Management (6.2%); and Buildings (32.6%). Of course, the specific impact of any given investment will be determined not by relative need but by where the funds are actually spent. Nonetheless, as the paper notes, variance in the impact of investments in different categories is relatively minor: more important than where the money is invested is the *amount* of money invested.

[10] Department of Finance, Strong Leadership. A Better Canada: Economic Statement, October 30, 2007 p. 37.

[11] More properly, the size of the gap would increase.

[12] There will be additional revenues from indirect taxes for governments, but the amounts are small.

affected because of the interdependence of industries in the supply chain. Technically, GDP of these industries leads to increased employment and to wage and business incomes.

- Induced impacts – The increases in wage income in the directly and indirectly affected industries, and increases in dividends associated with improved returns in the corporate sector add to the incomes of households. This induces additional consumer spending while the improved net incomes of corporations and unincorporated enterprises induces further investment in their equipment and structures. Import content is assumed to be a notable amount of this added demand[13], so effects on domestic GDP are dampened by this "leakage". Another form of "leakage" occurs at this point. Additional incomes may be spent, which increases GDP and employment, or saved, which has no such effect. In our results, about three-fourths of the increase in disposable income of households is initially spent with this proportion rising to almost 90 per cent by the fifth year of impact.

One final area of potential effect is considered here. To isolate the effect of additional capital spending on governments, we have assumed that that there is no change to their spending on current operations, or put otherwise, the additional capital spending is not "financed" through cuts to other operations, and the additional capital spending requires no addition to employees or other operations to administer the program. Technically, spending for goods and services, including government employees, subsidies to business, and transfers to other levels of government are unchanged from Base Case amounts. We have allowed transfers to persons to react to changing economic circumstances to reflect the fact that increased employment and other effects should reduce government payments for Employment Insurance and welfare.

Government revenues respond to the change in economic activity. Thus as the private income bases for taxes change, government revenues respond.[14] This effectively constitutes a major "leakage" to government saving since improved government balances do not induce either further spending or equivalently, a reduction in taxes.[15]

2.2 Economic Impacts

Table 1 reports the effect of the additional spending on infrastructure on total economic activity as measured by Canada's GDP.[16] Highlights include the following.

- The GDP of the Canadian economy is currently $1.6 trillion. A $1-billion addition to demand is a small amount in this context, and produces a small proportionate effect on total activity.
- We expect that impacts of a multi-year program of spending would be initially larger than in later years. This follows from inventory and residential spending adjustments, the prospect that imports would provide a larger share of the added demand after initially small amounts, and from smaller productivity and real wage (and household income) impacts after the first year.

Table 1 GDP Impacts of Additional Infrastructure Spending

Total-Economy Gross Domestic Product, $97 (per cent impact)

	2008	2009	2010	2011	2012
$1 Billion, Nominal					
Mix of 4 Infrastructures	0.13	0.07	0.06	0.06	0.05
Building	0.14	0.08	0.06	0.06	0.06
Transportation	0.13	0.08	0.06	0.06	0.06
Waterworks	0.11	0.05	0.04	0.04	0.04
Waste Management	0.12	0.06	0.05	0.05	0.05
Average of Four	0.13	0.07	0.05	0.05	0.05
$1 Billion, 2008 prices					
Mix of 4 Infrastructures	0.13	0.07	0.06	0.06	0.06
$10 Billion, Nominal					
Mix of 4 Infrastructures	1.29	0.84	0.66	0.62	0.59

- The impact on the economy varies with the kind of infrastructure asset being put in place. Our results suggest that differences are modest. Impacts of spending on buildings and transportation infrastructure would be largest.[17] This partly reflects distinctions in backward linkages and varying import content, but impacts are also sensitive to varying Base Case aggregate unit costs for each of the asset types. The investment deflator (1997=1) in 2008 for transportation engineering is 1.22 and for waterworks is 1.26.
- If the spending is in nominal terms, expect the magnitude of the real effect on the economy to dissipate as price/cost inflation dampens the real direct demands on the economy. Under likely circumstances of the next few years, the effect of this escalation consideration should be modest, although as is illustrated by recent increases in construction costs in western Canada, this effect may be regionally important. Put otherwise, if municipalities are seeking financing support from other levels of government, it would be prudent for the program to build in an escalator to the program.

[13] The import content is estimated in the modeling framework by linking the import of approximately 60 categories of goods and services to specific demands or other measures of activity in the Canadian economy. That this would be "significant" is indicated by the fact that imports in recent years have been equivalent to about one-third of domestic Canadian demand.

[14] Tax rates are assumed to be unaffected.

[15] To isolate the chain of demand and producer/income effects, we have assumed there are no impacts on the exchange rate or interest rates. There will be impacts, but their magnitudes and the effect of these "macro" changes on the economy are matters of contention. In any event, $1-billion additions to infrastructure spending should not change these economic variables by much.

[16] GDP at Basic Prices, $1997.

[17] Note that the transportation infrastructure spending is limited to spending on roads, sidewalks, etc, and although transit is included, this does not include spending on equipment, which would typically include relatively large direct or indirect import content.

- Impacts are roughly linear. A $10-billion increase in spending produces an economic impact that is approximately ten times the size of a $1-billion spending increase. A $5-billion increase would produce an economic effect that is five times larger. The potential for cost inflation is higher, which we have recognized in these impacts.[18]

Table 2 Impact on the Construction Sector

Construction & Materials Gross Domestic Product, $97 (per cent impact)

	2008	2009	2010	2011	2012
$1 Billion, Nominal					
Mix of 4 Infrastructures	0.6	0.6	0.5	0.5	0.5
Building	0.5	0.4	0.4	0.4	0.4
Transportation	0.7	0.6	0.6	0.6	0.6
Waterworks	0.7	0.6	0.6	0.6	0.6
Waste Management	0.7	0.6	0.6	0.6	0.6
Average of Four	0.7	0.6	0.6	0.6	0.6
$1 Billion, 2008 prices					
Mix of 4 Infrastructures	0.6	0.6	0.6	0.6	0.6
$10 Billion, Nominal					
Mix of 4 Infrastructures	6.1	5.5	5.2	5.2	5.2

For some sectors of the economy, impacts will be more "meaningful". As Table 2 indicates, the effect on the construction sectors is proportionately about ten times as significant as for the economy as a whole. Here we include impacts on the construction industry, and on non-metallic minerals mining and manufacturing. Note that a $10-billion increase in spending would increase the size of this broad construction sector by about five per cent.

Table 3 Major Impact Industries

Industry Specific Impacts of $10 billion Infrastructure Increase (average % impact, 2008-12)

Other Engineering Construction	39.4
Transportation Engineering Construction	37.6
Sand, Gravel, Clay, & Ceramic & Refractory (21232)	12.6
Other Plate Work & Fabricated Structural Product (332314, 332319)	10.0
Other Concrete Product (32732, 32733, 32739)	8.7
Stone Mining & Quarrying (21231)	8.4
Ready-mix Concrete (32732)	8.3
Asphalt Materials (32412)	7.1
Cement (32731)	5.5

[18] In the $1-billion case, the construction wage rate is increase by only 0.06 per cent. In the $10-billion case, the impact is 1.6 per cent.

[19] Productivity impacts in construction are larger than those for other sectors. In the $10-billion case, output per employee in construction is increased by 1.4 per cent in 2008 and by an average of 0.8 per cent in the following four years. The effect for other sectors (combined) is 0.6 per cent in 2008 and then an average of just 0.1 per cent in the following four years.

Table 3 draws from our detailed (280) list of industries and reports those for which a $10-billion increase in infrastructure spending would be a "major" increase in their market. As this indicates, for about ten industries, this would increase the size of the industry by five per cent or more. Effects would be especially large for several sub-components of the construction industry. This suggests that in planning for any major infrastructure program, it would be prudent to consider what might be done to ensure that labour and other inputs to the industry are available.

Table 4 Aggregate Employment Impacts

Total-Economy Employment (impact in 000s)

	2008	2009	2010	2011	2012
$1 Billion, Nominal					
Mix of 4 Infrastructures	11.5	10.4	8.3	7.6	7.2
Building	11.8	11.0	8.6	7.8	7.3
Transportation	11.9	10.9	8.8	8.2	7.7
Waterworks	10.8	9.1	7.2	6.6	6.3
Waste Management	11.2	9.6	7.7	7.1	6.8
Average of Four	11.4	10.1	8.1	7.4	7.0
$1 Billion, 2008 prices					
Mix of 4 Infrastructures	11.5	10.7	8.7	8.1	7.7
$10 Billion, Nominal					
Mix of 4 Infrastructures	117.6	114.5	95.8	85.6	79.0

There are impacts on output per employee, but these are minor or, for the $10-billion case, moderate. Put otherwise, proportionate effects on employment are similar to those reported in Table 1 for GDP. Table 4 reports impacts as the change to employment in 000s of person years.

Initial impacts are reduced for the reasons noted earlier – increasing import penetration, dynamics in inventory and housing markets, dampening of real wage gains. Impacts for a $1 billion spending increase may be described as modest, but for a $10 billion increase, the impacts may reasonably be described as "large". An impact of 100,000 or more is equivalent to about one-third of the annual additions to employment that were registered in 2001-2007. Compared to a recession year (2001) when the increase for the year was only 180,000, the $10 billion impacts would be a "major" addition to employment gains that would otherwise be expected.

Table 5 reports impacts on employment in the construction industry. These initially account for about one-half of the overall employment effects with this proportion rising over time. This suggests that in employment terms, indirect and induced effects are modest.[19]

Table 5 Construction Employment Impacts

Construction Employment (impact in 000s)	2008	2009	2010	2011	2012
$1 Billion, Nominal					
Mix of 4 Infrastructures	5.5	5.3	5.2	5.1	5.1
Building	5.2	4.9	4.8	4.7	4.6
Transportation	5.6	5.4	5.3	5.3	5.2
Waterworks	5.7	5.6	5.5	5.4	5.4
Waste Management	5.7	5.6	5.5	5.5	5.4
Average of Four	5.6	5.4	5.3	5.2	5.2
$1 Billion, 2008 prices					
Mix of 4 Infrastructures	5.5	5.4	5.4	5.4	5.3
$10 Billion, Nominal					
Mix of 4 Infrastructures	53.9	52.8	51.6	50.9	50.3

2.3 Government Balance Impacts

For purposes of this study, we have assumed that local governments undertake the additional spending on infrastructure, and finance it by assuming additional debt. The federal and provincial governments do not figure in either the spending or financial consequences. For them, effects on their balances reflect impacts on current operations (revenues and current spending), while for the municipalities, in addition to these effects on saving, expenses associated with servicing the additional debt also play a role. We illustrate these by comparing effects on the balances of each of the three orders of government for two cases.

Table 6 summarizes effects on balances. The following two tables focus respectively on the revenues and expenditures of the governments.

The central message for government finances is that in the event municipalities increase spending on infrastructure and are solely responsible for its financing, there will be substantial benefits to each of the federal and provincial governments. Given the assumptions we have made (no change to most of government current spending), the benefit to the two orders of government combined is equivalent to about one-third of the additional spending.[20] Our results suggest the benefit would be equally distributed to the federal government and to provincial/territorial governments (seen as a single group).

[20] There are positive effects for public pension plans as well.

Table 6 Impact on Government Balances

Government Balances ($ millions, nominal)	2008	2009	2010	2011	2012
$1 Billion, Nominal					
Mix of 4 Infrastructures					
Federal	168	153	141	141	149
CPP & QPP	18	35	42	42	41
Provincial	153	191	165	160	161
Municipal, Lending	-603	-625	-589	-572	-566
Saving	6.2	-25.1	-43.8	-69.4	-97.2
$10 Billion, Nominal					
Mix of 4 Infrastructures					
Federal	1832	1763	1669	1665	1740
CPP & QPP	213	381	450	456	448
Provincial	1730	2300	2130	2101	2110
Municipal, Lending	-6141	-6666	-6229	-6024	-5920
Saving	112	-182	-395	-649	-930

Impacts on municipal government balances will be negative. Net of impacts on revenues and current spending, we expect that there will be increasing negative effects on municipalities. In addition to this impact on borrowing, municipalities would be borrowing (reducing lending in the table) to pay for the investment net of accounting benefits from capital consumption.

Table 7 Impact on Government Revenues

Government Balances ($ millions, nominal)	2008	2009	2010	2011	2012
$1 Billion, Nominal					
Mix of 4 Infrastructures					
Federal	122	125	119	117	117
Provincial	137	173	147	143	141
Municipal	0	-4	8	11	11
$10 Billion, Nominal					
Mix of 4 Infrastructures					
Federal	1384	1423	1400	1396	1396
Provincial	1575	2096	1911	1890	1874
Municipal	45	26	135	189	200

The balance benefits for the federal and provincial-territorial governments are derived mainly from increased revenues, with these driven mainly by increased income taxes for people and indirect taxes (the GST and general sales taxes), and for provinces, royalty payments as well. The positive financial effect on municipalities of an enlarged general economy is small, since the main channel for revenue change is through property values and taxes derived from that. We have assumed that provincial transfers to local government and those of the federal government are unchanged.

For the federal and provincial-territorial governments, reduced expenditures also provide a balance benefit, although the effect is more moderate than is accounted for by revenue impacts. In both cases, there are initial small reductions in transfers to persons as increased employment reduces employment insurance and welfare payments. Longer term, the small inflationary impacts lead to higher payments for Old Age Security, transfers to non-profit organizations, and payments by workers' compensation boards. The substantial benefits to saving (and borrowing) noted earlier reduce debt for the federal and provincial-territorial governments. Thus, a notable and increasing benefit to them over time is reduced debt charges.

In contrast, for municipalities borrowing to finance the infrastructure increases debt charges. We estimate there would be benefits to the balance in the form of reduced welfare and other social assistance, but the magnitudes are small.

Table 8 Government Spending Impacts

Government Current Spending ($ millions, nominal)

	2008	2009	2010	2011	2012
$1 Billion, Nominal					
Mix of 4 Infrastructures					
Federal	-46	-29	-21	-23	-31
Goods & Services	0	0	0	0	0
Transfers to Persons	-46	-20	-4	1	0
Other Transfers	0	0	0	0	0
Interest Payments	0	-9	-17	-24	-31
Provincial	-16	-18	-18	-17	-19
Goods & Services	0	0	0	0	0
Transfers to Persons	-16	-11	-2	6	10
Other Transfers	0	0	0	0	0
Interest Payments	0	-7	-15	-23	-29
Municipal	-7	21	51	80	108
Goods & Services	0	0	0	0	0
Transfers to Persons	-7	-7	-5	-3	-1
Other Transfers	0	0	0	0	0
Interest Payments	0	28	57	83	108
$10 Billion, Nominal					
Mix of 4 Infrastructures					
Federal	-448	-340	-269	-269	-344
Goods & Services	0	0	0	0	0
Transfers to Persons	-448	-243	-80	4	12
Other Transfers	0	0	0	0	0
Interest Payments	0	-96	-188	-273	-356
Provincial	-156	-205	-219	-212	-236
Goods & Services	0	0	0	0	0
Transfers to Persons	-156	-127	-38	62	127
Other Transfers	0	0	0	0	0
Interest Payments	0	-78	-181	-274	-363
Municipal	-67	208	529	838	1130
Goods & Services	0	0	0	0	0
Transfers to Persons	-67	-78	-63	-36	-7
Other Transfers	0	0	0	0	0
Interest Payments	0	287	593	874	1137

3 Revenue Base Impacts

It is reasonable to argue that public sector capital formation does not require current financing from tax and other revenues, but in the long run, financing of borrowing costs will typically be regarded as a requirement. In this section we ask: does it matter who pays for the infrastructure, or specifically, are economic consequences sensitive to the revenue bases available to the different orders of government?

We assess this by increasing tax revenue by $1 billion in each year of 2008-12. These are allocated for each level of government to a representative share of its own-account revenue source.[21] As Table 9 details, indirect taxes (property taxes[22]) provide the entire revenue base for municipalities. Indirect taxes are significant for the federal and provincial governments, but are a smaller proportion of revenues.

Table 9 Allocation of Tax Revenues

Own-Account Revenue Sources

	Federal	Provincial	Municipal
Income Tax on Persons	58	40	
Income Tax on Business	17	10	
Indirect Taxes	21	50	100
Tax on Non-residents	4		
	100	100	100

Other things equal, an increase in taxes of any kind will have a negative effect on economic activity because they lower the real income of households and businesses, thereby lowering consumer and investment spending. The channel for direct effects varies with the type of tax. The effect of the direct tax on households and business spending will depend partly on whether they reduce saving or spending. The main channel of effect on real incomes from indirect taxes is through increased prices. Also included as a distinguishing effect is the extent to which the affected spending of households and businesses contains import content.[23] For this analysis, we have assumed that the increased revenues do not lead to increased government spending for either current operations or capital formation.

Table 10 summarizes the results. These suggest that the reduction in economic activity associated with increased municipal taxes is initially notably more severe than if the standard package of taxes available to the federal or provincial-territorial governments is applied. Measured as the effect on GDP or employment, the impact on economic activity from

[21] Sales of goods and services, or "user fees" are excluded from consideration in this analysis.

[22] For purposes of this analysis , we have not considered the gas tax as an own-account revenue item.

[23] Investment spending by business includes a relatively high proportion of spending on machinery and equipment, which has high import content. Thus, the effect of reduced spending in this case on production is transferred to foreign economies.

increased federal taxes is the least damaging. In succeeding years, the effect on economic activity from increased federal taxes remains the most severe, but by a narrow margin. In this later period, there is little to distinguish between the effects generated by increased provincial or municipal taxes.

Table 10 Revenue Base Impacts on Economic Activity

Government Balances ($ millions, nominal)	2008	2009	2010	2011	2012
Real GDP (% impact)					
Federal Tax Package	-0.10	-0.07	-0.06	-0.05	-0.05
Provincial Tax Package	-0.13	-0.08	-0.08	-0.08	-0.08
Municipal Tax Package	-0.16	-0.08	-0.07	-0.06	-0.05
Employment (% impact)					
Federal Tax Package	-0.04	-0.04	-0.03	-0.02	-0.02
Provincial Tax Package	-0.04	-0.05	-0.04	-0.04	-0.03
Municipal Tax Package	-0.05	-0.05	-0.04	-0.03	-0.02
Employment (000s)					
Federal Tax Package	-6.1	-6.5	-5.2	-4.3	-3.6
Provincial Tax Package	-7.7	-8.2	-6.8	-6.3	-5.8
Municipal Tax Package	-9.3	-9.2	-7.1	-5.7	-4.2

Earlier, our analysis demonstrated that increased spending on infrastructure produces a larger economy with positive effects on government balances. Investments in local infrastructure produce significant fiscal offsets for federal and provincial-territorial governments. This section is an indication that reliance on municipal financing to fund those investments has a second consequence in that reliance on the tax base of municipalities has more severe consequences for the economy than financing by the federal government and possibly that of provinces.

These results should be regarded as a "first cut" look at the question of whether the tax base matters, and our results are presented to spur further careful consideration of the conclusion reported. Apart from initial year effects, impacts are not sharply distinguished, and the mechanisms that lead to the distinctions have not been fully decomposed. The main distinguishing effect appears to be impacts on personal saving rates. In all three cases, reduced saving partly absorbs the loss of household income (consumer spending is less negatively affected), with this absorption strongest in the case of the federal and provincial packages where income taxes on persons directly reduce the income of households. The property tax impacts (reduces) real consumer spending fully through price effects on consumer goods with second-round or induced effects altering personal saving.[24]

Our results may underestimate this distinction. Property taxes are otherwise considered to be regressive.[25] Other things equal, this would further limit saving reduction as a spending impact buffer in the case of the municipal financing package. Since this consideration is not included in our modelling, we expect that its inclusion would reinforce our finding. At this point, our results should not be regarded as definitive findings, but are presented to encourage further consideration of this as an effect on the economy of making local infrastructure investments.

[24] We assume that property taxes are "passed forward" into price except in the case of "price taking" (typically resource industries), where the consequence is reduced net income.

[25] Federation of Canadian Municipalities, "The Limits of Property Tax", **Building Prosperity from the Ground Up: Restoring Municipal Fiscal Balance**, June 2006, pp. 25-27.