

Myths of Infrastructure Spending in Canada

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Executive summary

As the federal government and several provincial governments plan on collectively spending hundreds of billions of dollars over the coming decade on infrastructure, this report dispels five common myths used to argue for why now is a good time to ramp up government infrastructure spending.

Myth 1

Government must ramp up infrastructure spending to make up for past neglect

Proponents of large-scale increases in infrastructure spending often argue that governments have not spent enough in recent decades to expand, or even to maintain, the value of infrastructure that exists in Canada. However, the stock of government infrastructure per person (total value net of depreciation) has been growing steadily over the past 15 years and is now at the highest level since 1971. After adjusting for inflation, the net stock of government infrastructure per person has grown 27.3 percent, from \$16,394 per person in 2000 to \$20,876 per person in 2015 (all in 2015 dollars). Since 2008, annual spending to acquire new public infrastructure has been particularly high, with Canada ranking relatively high on international comparisons of government capital spending.

Myth 2

Infrastructure is largely the domain of governments

There is a misperception that Canada's infrastructure is largely provided by governments, with minimal contributions from non-government organizations such as businesses and charities. As a result, those who argue that Canada would benefit from increased infrastructure spending usually focus on making the case for more government spending on infrastructure, overlooking the major contribution made by the private sector. For over 40 years, the net stock of infrastructure per person from non-government organizations has exceeded that of the government sector. In 2015, the net stock of non-government infrastructure represented 72.6 percent of Canada's total infrastructure stock, up from 63.4 percent in 1971.

Myth 3

Increased infrastructure spending will spur economic growth

The argument that infrastructure spending will spur economic growth is one of the most prominent arguments made in favour of increased infrastructure spending. In principle, sound infrastructure spending (a high-in-demand road, railway, or port) can increase long-term economic growth by improving the economy's productive capacity through more efficient transportation corridors that move people and goods across our country and to borders and ports. In practice, however, not all public infrastructure spending fits this bill. For instance, just 10.6 percent of what the federal government plans to spend on new infrastructure will be on trade and transportation infrastructure. Most is on so-called "green" and "social" infrastructure, the latter including projects such as social housing, community centres, and hockey arenas. Although these initiatives may be appreciated by the community in which they are built, they are unlikely to provide productivity gains. Moreover, infrastructure spending generally fails to stimulate the economy in the short-term because of considerable delays and because the spending may not target the sector of the economy most in need.

Myth 4

With interest rates low, now is the time to ramp up government infrastructure spending

Low interest rates have been used to argue for increased government spending on infrastructure. However, interest rates are only one factor in assessing the costs of increased infrastructure spending. Failing to account for other relevant fiscal and economic costs exaggerates the opportunity provided by low interest rates. Other fiscal considerations include the future operation and maintenance costs of a new infrastructure asset, which can be up to 80 percent of the total lifetime cost and are not influenced by current interest rates. In addition, the economic costs of the taxes that fund the infrastructure spending add considerably to the overall costs and should be properly accounted for. A more fundamental problem is that the interest rate argument wrongly assumes that infrastructure spending should always be largely or completely financed by debt.

Myth 5

The federal government should take the lead on infrastructure

A recurring argument in Canada is that the federal government should take on a greater role in provincial and local infrastructure, primarily through conditional infrastructure grants. Such grants give the federal government influence over which projects are undertaken and how they are managed, imposing federal priorities that may not reflect the particular needs of every region. Conditional grants distort local decision making in counterproductive ways

by encouraging recipient governments to undertake projects that are more likely to receive funding over others that may be of higher priority to the local region. Federal infrastructure grants can also lead to a deterioration of accountability of the recipient government to taxpayers. If provincial and local governments wish to spend more on infrastructure, they can prioritize the use of available revenue for that purpose rather than calling for additional resources from the federal government. Tellingly, provincial and local government own-source revenues (total revenue minus transfers from other governments) have grown faster than federal own-source revenues over the past 15 years.

Introduction

The federal government and several provincial governments collectively plan on spending hundreds of billions of dollars in coming years on infrastructure. From 2016/17 to 2027/28, the federal government plans to spend over \$180 billion on infrastructure (Canada, Department of Finance, 2016a). This is on top of sizable spending commitments already made by several provincial governments, particularly Ontario and Alberta. Specifically, the Ontario government is planning to spend \$160 billion on infrastructure over 12 years (starting in 2014/15) and the Alberta government is planning to spend \$39 billion¹ over five years starting in 2016/17 (Ontario, 2016a; Alberta, 2016a).²

Infrastructure spending of this magnitude is notable not just because of the scale of the plans but because it comes at a time when most Canadian governments are struggling with chronic budget deficits and growing debt (Lammam et al., 2017). Despite the precarious state of government finances, several arguments have been put forward for why now is a good time to ramp up government infrastructure spending. These arguments, however, do not withstand scrutiny. This report examines five common arguments (or “myths”) used to justify large increases in government infrastructure spending.³

- Myth 1** Government must ramp up infrastructure spending to make up for past neglect
- Myth 2** Infrastructure is largely the domain of governments
- Myth 3** Increased infrastructure spending will spur economic growth
- Myth 4** With interest rates low, now is the time to ramp up government infrastructure spending
- Myth 5** The federal government should take the lead on infrastructure

1. The Alberta figure includes capital spending by government agencies outside of the core government, such as schools, universities, colleges, and hospitals. Due to how the data is presented in the budget, the table in Appendix 2 includes only core government infrastructure spending.

2. Other provincial government multi-year infrastructure or capital plans include \$88.7 billion in Québec (2016/17-2025/26), a total of \$31.5 billion in British Columbia and \$17.8 billion in taxpayer-supported spending (2016/17-2017/18), and \$4.4 billion in Saskatchewan (2016/17–2019/20) (Quebec, 2016; British Columbia, 2017; Saskatchewan, 2015).

3. This report is partly inspired by a *Financial Post* article by University of Calgary economist Jack Mintz (Mintz, 2015).

Myth 1

Government must ramp up infrastructure spending to make up for past neglect

Proponents of large-scale increases in infrastructure spending often argue that governments have not spent enough in recent decades to expand, or even to maintain, the value of infrastructure that exists in Canada.⁴ To compensate for this alleged neglect of our infrastructure, they contend that governments must ramp up infrastructure spending now and in the future. Such claims are not supported by the aggregate data, either in terms of the amount of government infrastructure that exists in Canada (the “stock”) or in terms of annual spending on government infrastructure.

The stock of government infrastructure

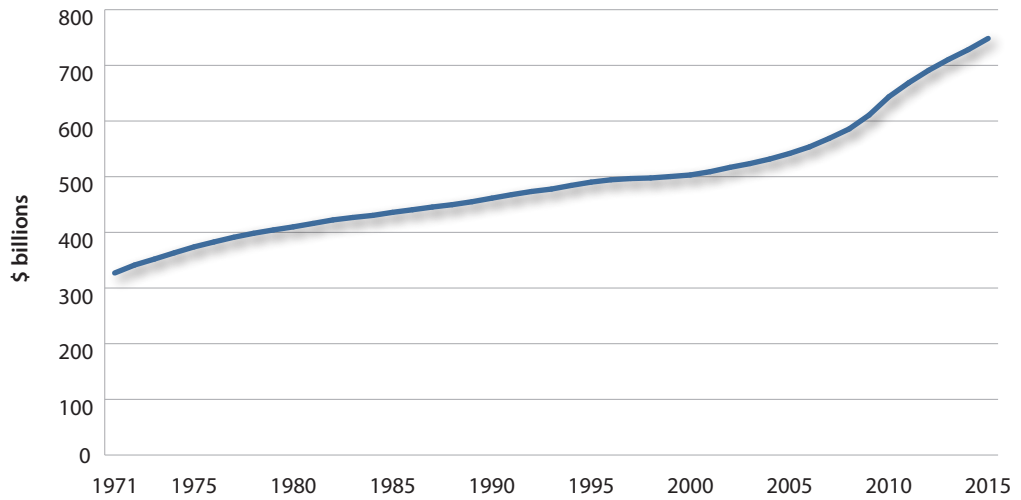
Figure 1 presents the net stock of federal, provincial, and local government infrastructure in Canada from 1971 to 2015 (adjusted for inflation in 2015 dollars).⁵ The net stock is the dollar value of all existing infrastructure at a particular time after accounting for depreciation. As infrastructure ages, it deteriorates physically or becomes obsolete, which is often referred to as depreciation.⁶ Infrastructure is defined here, drawing on the work of Baldwin and Dixon (2008), as non-residential buildings and engineer constructions (see Appendix 1 for a discussion on defining infrastructure).

4. See for example Wood (2015, August 27) and Mackenzie (2013).

5. This time period is selected because the 1971 start date allows for a comparison between infrastructure stock and the Canadian population, which is presented in figure 2. The year 2015 is the most recent year of available data.

6. In this paper, depreciation is assumed to decline slowly at first and then more rapidly as the asset ages. This is known as “hyperbolic depreciation” and is in line with how net infrastructure stock is reported by Infrastructure Canada (Canada, Infrastructure Canada, 2015: 22).

Figure 1: Net stock of government infrastructure in Canada, 1971 to 2015 (2015 dollars)



Notes: 1) Federal, provincial, and local governments are included. The data does not include government owned enterprises. For more information, see <http://www.statcan.gc.ca/eng/nea/gloss/gloss_g#Government>.

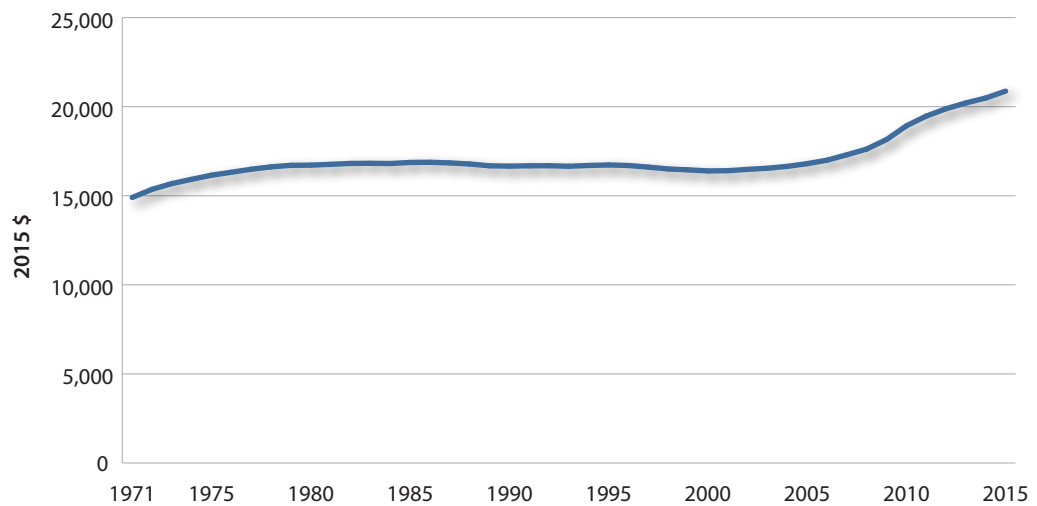
2) Infrastructure stock includes non-residential buildings and engineer constructions such as roads and bridges.

3) Net stock is the gross value of capital assets minus depreciation due to physical deterioration and becoming obsolete. Depreciation is assumed to decline slowly at first and then more rapidly as the asset ages (hyperbolic function), in line with how net infrastructure stock is reported by Infrastructure Canada (Canada, Infrastructure Canada, 2015: 22). The trend line is similar under other depreciation assumptions (linear and geometric).

4) The inflation adjustment is calculated using an index derived from data available from Statistics Canada (2016a). Specifically the index is a ratio of capital assets in 2007 constant prices and in current or unadjusted prices. This method was developed in correspondence with Statistics Canada.

Source: Statistics Canada, 2016a; calculations by authors.

Figure 2: Net stock of government infrastructure in Canada per person, 1971 to 2015 (2015 dollars)



Please see notes to figure 1.

Source: Statistics Canada, 2016a, 2016b; calculations by authors.

Canada's net stock of government infrastructure has increased in value every year after accounting for inflation. From 2005 to 2015, the net stock of infrastructure grew at an average annual growth rate of 3.2 percent, compared to an average rate of 1.5 percent over the rest of the period.

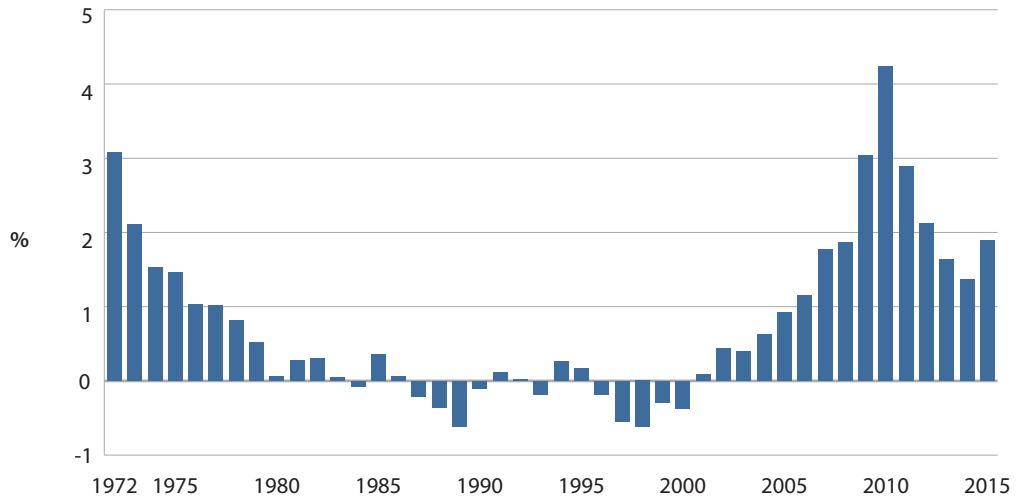
Although the net stock of government infrastructure has been growing, how does the growth compare to changes in the population? **Figure 2** presents the inflation-adjusted net stock of government infrastructure per person in Canada in 2015 dollars. For the first part of the period, from 1971 to 1986, the net stock of public infrastructure per person increased by a total of 13.3 percent, demonstrating that the stock of infrastructure grew faster than population growth, inflation, and the depreciation of assets. From 1986 to 2000, the net stock per person was largely flat, with the level decreasing slightly by 2.9 percent. Despite this slight decline, the level of net infrastructure stock per person was, on average, higher in the 1990s (\$16,639) than in the 1970s (\$16,019). Since 2000, however, the net stock of public infrastructure per person steadily increased, growing from \$16,394 per person in 2000 to \$20,876 per person in 2015. This represents total growth of 27.3 percent over 15 years. Far from being neglected, the recent growth in the net stock of infrastructure has resulted in Canada now having the highest stock of infrastructure per person in over 40 years.

The inflation-adjusted annual growth in net infrastructure stock per person from 1972 to 2015 tells a similar story (**figure 3**). From 1972 to 1979, the average annual growth was 1.4 percent, then growth stalled in the 1980s (average of 0.0 percent) and the 1990s (average of -0.1 percent). After the year 2000, annual growth in net infrastructure stock per person began picking up again, reaching a height of 4.2 percent in 2010. Over the period of 2000 to 2015 the average annual growth was 1.5 percent, slightly faster than growth in the 1970s.

Another approach to measuring the state of government infrastructure in Canada is to consider the change in the average age of infrastructure assets. An aging (older) stock of infrastructure would suggest that the renewal of infrastructure has been neglected. **Figure 4** presents data from Infrastructure Canada and shows the average age of public infrastructure owned by all levels of government. Infrastructure Canada uses a definition of infrastructure termed "core public infrastructure" that includes roads, bridges, transit, water, wastewater, culture and recreation, and sports infrastructure (Canada, Infrastructure Canada, 2015). The average age of core public infrastructure in Canada has fallen from 17.8 years in 2000 to 14.7 years in 2013. According to Infrastructure Canada, that is the youngest average age since data was first collected in 1961 (Canada, Infrastructure Canada, 2014).

Figure 4 also presents an alternative measure of infrastructure age: the average age of infrastructure as a percentage of the total useful life of the infrastructure at the time it was acquired. This measure accounts for the

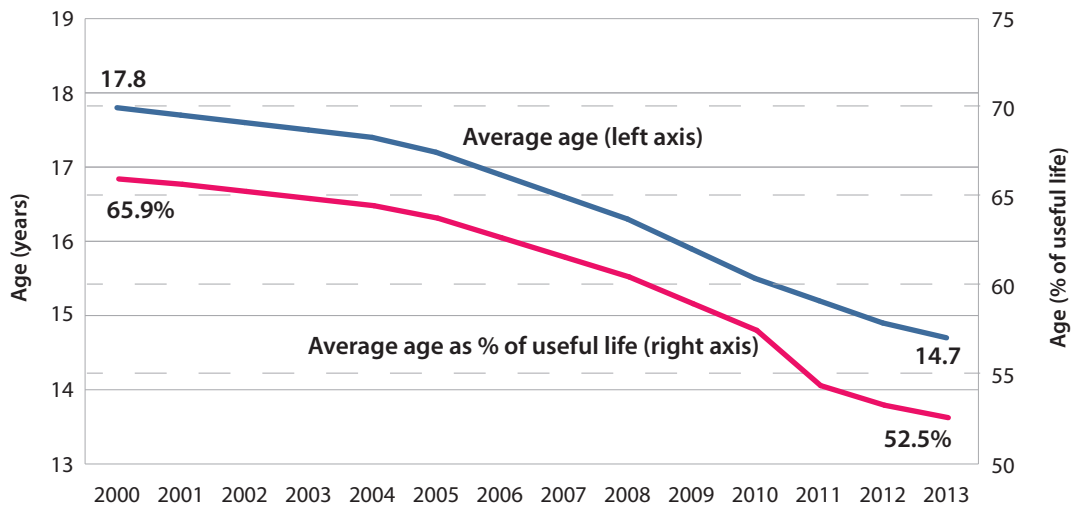
Figure 3: Annual percent change in net infrastructure stock per person, 1972 to 2015 (2015 dollars)



Please see notes to figure 1.

Source: Statistics Canada, 2016a, 2016b; calculations by authors.

Figure 4: Average age of core public infrastructure in years and as a percentage of useful life, 2000 to 2013



Notes: Core public infrastructure includes roads, bridges, transit, water, wastewater, culture and recreation, and sports infrastructure.

Includes government owned enterprises and provincial agencies.

Source: Canada, Infrastructure Canada, 2016a.

lifespan of infrastructure—that is, how long the current stock will usefully last. Again, data from Infrastructure Canada shows that the ratio has been declining from 2000 to 2013, from 65.9 percent to 52.5 percent (Canada, Infrastructure Canada, 2016a). This confirms that Canada’s infrastructure is generally getting younger, relative to the total lifespan of infrastructure assets, which runs contrary to the argument of neglect.⁷

Government spending on infrastructure

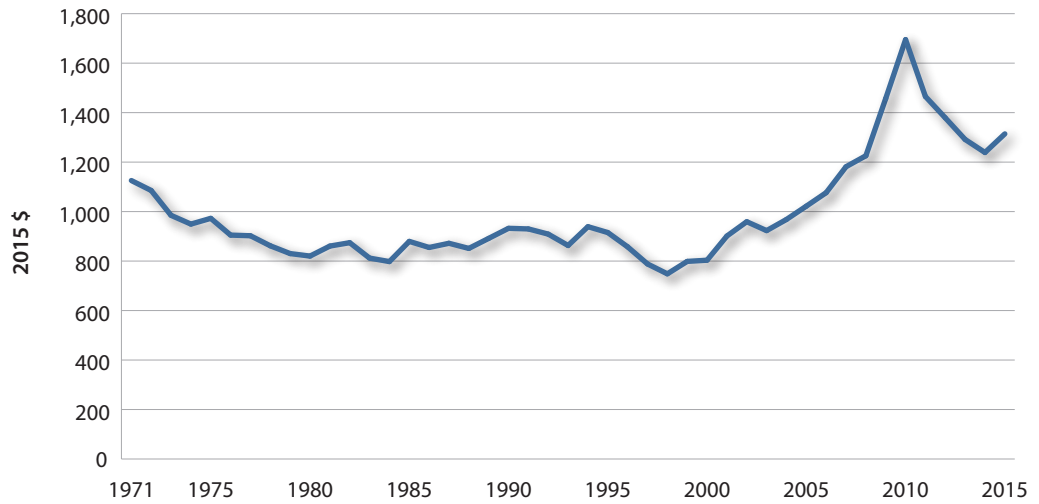
The increase in the stock and the decline in the average age of infrastructure coincide with a period of considerable increases in annual spending on government infrastructure. Spending on infrastructure can include spending to acquire new infrastructure assets or to upgrade and/or expand the life of existing infrastructure. However, annual spending excludes the maintenance cost of existing infrastructure. **Figure 5** presents annual government spending on infrastructure per person, adjusted for inflation, from 1971 to 2015. Critically, annual infrastructure spending alone does not tell us whether the level of spending is too high or too low, since lower levels of annual spending may be sufficient to maintain previous increases in the stock. Nonetheless, figure 5 provides a historical perspective on government infrastructure spending in Canada relative to the size of the population over a 40-year period, after adjusting for inflation.

Starting in the late 1990s, government infrastructure spending per person steadily increased, going from \$748 in 1998 to \$1,695 in 2010 (all data in 2015 dollars). From this peak, infrastructure spending fell to \$1,314, but even this level of infrastructure spending surpasses the level in any year from 1971 to 2008. Indeed, infrastructure spending over the past 15 years has generally been higher than the previous three decades. Specifically, the average infrastructure spending per person from 2000 to 2015 is \$1,181 and the average from 1971 to 1999 is just \$890.

The results are similar when examining infrastructure spending as a percentage of GDP, a common measure of infrastructure spending over time. **Figure 6** displays this measure from 1981 to 2015, the years of available data. Starting in 2000, the level of government spending on infrastructure increased nearly every year as a share of the economy, reaching a peak of 3.1 percent of GDP in 2010. This increase in infrastructure spending is reflected in the growth in the stock of infrastructure in figures 1 and 2.

7. Yet another, albeit subjective, measure of the state of Canada’s infrastructure comes from the World Economic Forum’s Global Competitiveness Report (Schwab, 2016). Based largely on a survey of 14,723 business executives, the report finds that Canada ranks 15th out of 138 countries in terms of the quality of its infrastructure.

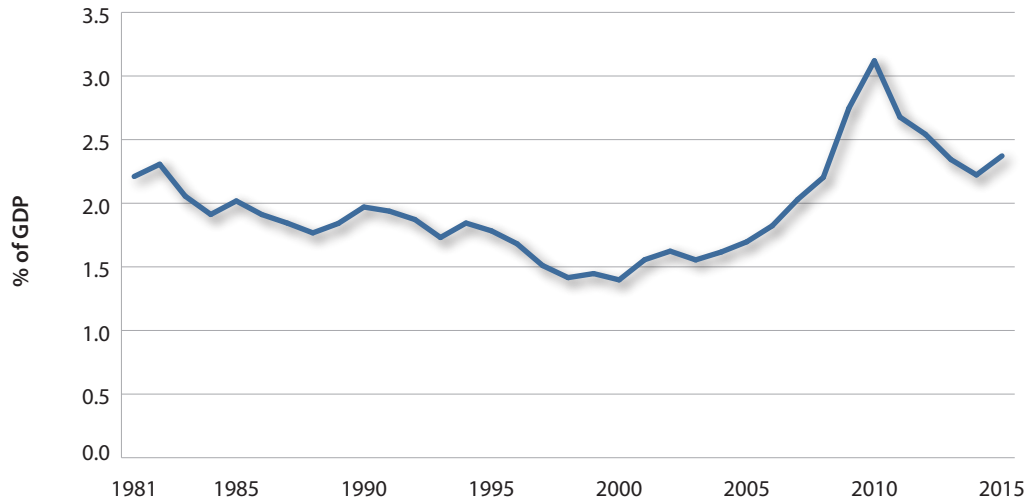
Figure 5: Government spending on infrastructure in Canada per person, 1971 to 2015 (2015 dollars)



Please see notes 1, 2, and 4 of figure 1. Government infrastructure spending is measured by spending to acquire new infrastructure assets or spending on increasing the value and/or lifespan of existing assets.

Source: Statistics Canada, 2016a, 2016b; calculations by authors.

Figure 6: Government spending on infrastructure in Canada as a percentage of GDP, 1981 to 2015



Please see notes 1, 2, and 4 of figure 1. Government infrastructure spending is measured by spending to acquire new infrastructure assets or spending on increasing the value and/or lifespan of existing assets.

Source: Statistics Canada, 2016a, 2016c; calculations by authors.

Moreover, figure 6 shows that infrastructure spending has been particularly high since the 2008/09 recession. In fact, from 2009 to 2015, the annual average government infrastructure spending as a percentage of GDP is 2.6 percent, compared to an average of 2.0 percent in the 1980s and 1.7 percent in the 1990s.

Tellingly, data suggests government spending on infrastructure in Canada since the 2008/09 recession has been high by international standards. Although a comparable measure of public “infrastructure” is not available across countries, government spending on capital is often used as a proxy for infrastructure spending and can provide some indication of how Canada compares with other countries. Capital is broader than infrastructure and refers to assets that are used for producing goods and services.

Figure 7 displays average government capital spending (as a percentage of GDP), for the five-year period from 2010 to 2014, for Canada and 33 other OECD countries.⁸ Of the 34 countries, Canada’s government capital spending (4.1 percent) is ninth highest—well above the OECD average of 3.5 percent for the period 2010 to 2014. Canadian government spending on capital, most of which is on infrastructure, is therefore relatively high by international standards in recent years.⁹

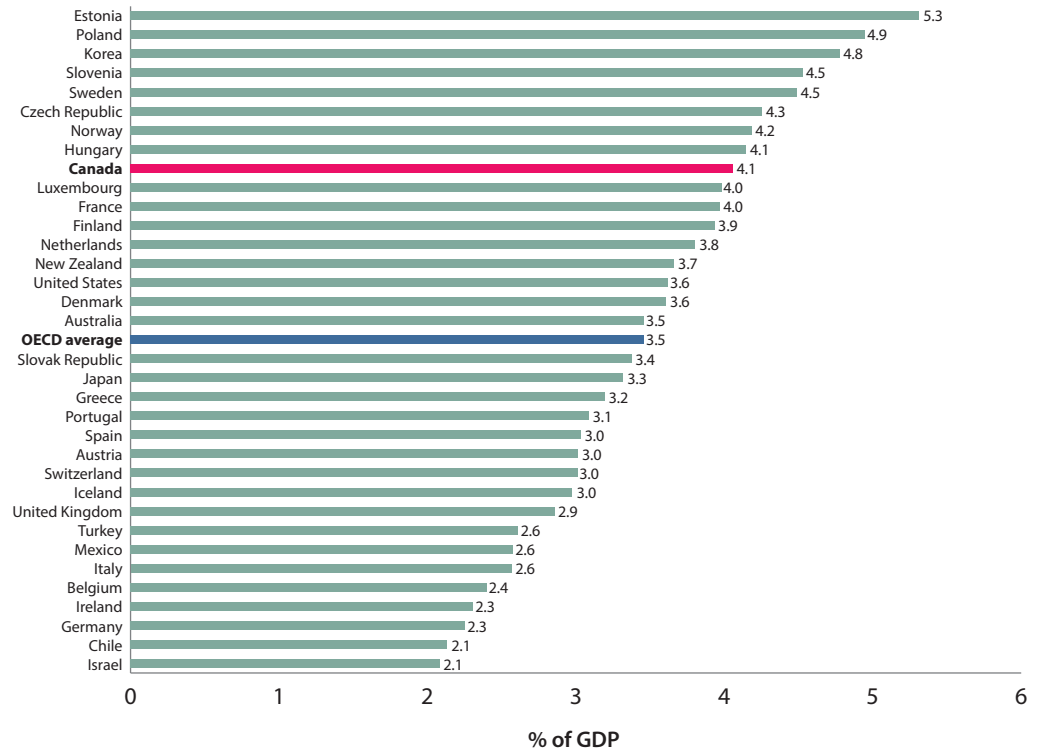
Of course, the aggregate data presented above on both the net stock of government infrastructure and the annual spending on government infrastructure do not tell us anything about the quality of infrastructure being undertaken by governments. It is possible that some infrastructure provides little in economic value. For example, building a bridge to nowhere would increase the total level of government infrastructure but would not actually be money well spent. The aggregate data, however, do show that Canadian governments have expanded the stock of infrastructure to more than keep up with inflation, population growth, and the normal deterioration of existing infrastructure.

Certainly, there are likely cases where spending is needed to renew existing infrastructure or to build new infrastructure. But overall the available data show that over the past decade or so there has been a relatively high level of infrastructure stock and spending.

8. At the time of writing, data for 2015 was not available for all OECD countries.

9. Over the period of 2009 to 2014, an average of 62.5 percent of government spending on non-residential capital accumulation went towards infrastructure assets (Statistics Canada, 2016a; calculations by authors).

Figure 7: Spending on government capital by OECD country, average for 2010 to 2014



Notes: Government capital spending is measured by gross fixed capital formation, which is defined as acquisition less disposals of fixed assets intended for use in the production of other goods and services for a period of more than a year.

Data includes capital formation by central, subnational, and local governments.

Source: OECD, 2015; calculations by authors.

What about the so-called “infrastructure deficit”?

Still, proponents argue in favour of large-scale infrastructure spending increases because of a so-called “infrastructure deficit,”¹⁰ generally described as the difference between the existing level or quality of infrastructure and some measure of what is considered adequate. However, the infrastructure deficit is not a useful indicator of whether governments should pursue infrastructure spending for a number of reasons.

For starters, what precisely constitutes adequate infrastructure is subjective and often differs from study to study. For example, one study assumes that Canadian governments should maintain a net capital stock that is worth 30 percent of the economy, solely on the basis that this was the ratio in the early 1980s and without clearly explaining why it is optimal (Mackenzie, 2013).

10. See for example Mirza (2007) and Advisory Council on Economic Growth (2016).

Another example is a report by Dodge (2015) for the Alberta government that argues the government should increase the level of provincial government infrastructure to match the average stock as a share of GDP in the other non-Atlantic provinces (16 percent). McMillan (2015) points out this benchmark is inappropriate, in part due to differences in Alberta's economy compared to other provinces such as its relatively high level of GDP per person. Another report does not use the stock relative to GDP as a benchmark but instead measures the replacement cost of municipal infrastructure reported to be in "very poor" and "poor" condition in a survey of Canadian municipal officials (Canadian Infrastructure Report, 2016).

The lack of clarity and consistent measurement has led to a wide range of estimates of the size of the infrastructure deficit. A report by the federal government's Advisory Council on Economic Growth (2016) says that estimates can range from \$150 billion to \$1 trillion. Given the uncertainty on the meaning and extent of the infrastructure deficit, it is not a useful metric for how much governments should be spending on infrastructure.

Bazel and Mintz (2015) point out another reason why the "infrastructure deficit" is not a useful way to determine the optimal level of infrastructure spending. After a certain point, the benefits of additional infrastructure spending are less than the economic costs, even if a perceived demand for more infrastructure spending remains. While Bazel and Mintz acknowledge it is difficult to determine the optimal amount of infrastructure spending, they argue that the framework for making decisions should be based on the marginal economic costs and the marginal benefits. Asserting that there is demand for more infrastructure spending or that there is an "infrastructure deficit" is not sufficient justification for additional infrastructure spending. While an infrastructure asset may be in poor condition, it may not be worth the economic cost of replacing or upgrading that asset.

Myth 2

Infrastructure is largely the domain of governments

There is a misperception that Canada’s infrastructure is largely provided by governments, with minimal contributions from non-government organizations such as businesses and charities. As a result, those who argue that Canada would benefit from increased infrastructure spending usually focus on making the case for more government spending on infrastructure, overlooking the private sector’s contribution. However, the reality is that businesses and other private organizations play a major role in providing infrastructure in Canada.

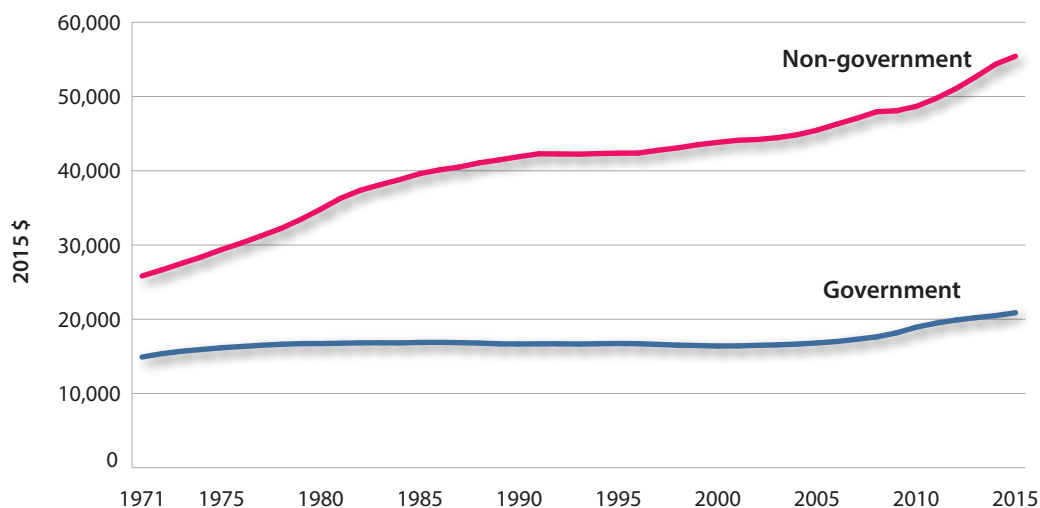
For instance, private organizations contribute to Canada’s telecommunication infrastructure, allowing Canadians to connect to the internet and make calls from their cell phones. The private sector also contributes to electricity generation, distribution, and transmission, helping power the everyday activities of Canadians. Private organizations build and maintain railways and pipelines, enabling Canadians to send and receive commodities to and from international markets. Since private infrastructure is critical to the functioning of Canada’s economy, any assessment of the state of Canada’s infrastructure would be incomplete without considering the extent provided by non-government organizations.

Figure 8 compares the net stock of government and non-government infrastructure assets per person from 1971 to 2015 (in 2015 dollars). Non-government infrastructure includes infrastructure owned by businesses and non-profit institutions. It also includes infrastructure owned by government business enterprises (GBEs)—otherwise known as “crown corporations”—because such organizations are categorized as part of the “business sector” by Statistics Canada.¹¹ GBEs, however, are arguably part of the government sector.¹²

11. Vicky Wu, Data Dissemination Officer, Statistics Canada, personal communication, August 16, 2016.

12. Data on the share of non-government sector made up of GBEs are not readily available. However, an alternative, now terminated, series from Statistics Canada’s CANSIM tables provide an indication of the impact that GBEs have on the non-government sector

Figure 8: Net stock of government and non-government infrastructure per person, 1971 to 2015 (2015 dollars)



Please see notes 2, 3, and 4 to figure 1. Federal, provincial, and local governments are included in government but not government business enterprises. For more information, see <http://www.statcan.gc.ca/eng/nea/gloss/gloss_g#Government>.

Source: Statistics Canada, 2016a, 2016b; calculations by authors.

Figure 8 nonetheless illustrates the important role that non-government organizations, as defined by Statistics Canada, play in providing infrastructure to Canadians. Throughout the period, the net stock per person of non-government infrastructure exceeded the stock of government infrastructure.¹³ In 2015, the net stock per person of non-government infrastructure was 2.7 times higher than the stock of government infrastructure. Moreover, from 1971 to 2015, the net stock of non-government infrastructure per person increased at nearly three times the rate of government infrastructure stock per person. Specifically, the inflation adjusted value of the net stock of non-government infrastructure increased by 114.7 percent compared to an increase of 40.1 percent in the government sector. Moreover, the annual growth in the net stock of infrastructure per person was higher in the non-government

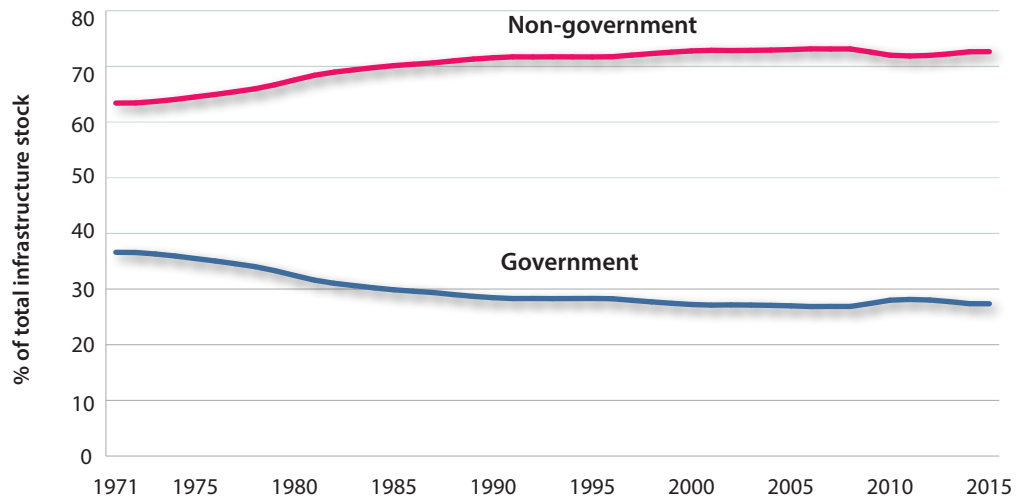
(Statistics Canada, 2012a, 2012b, 2012c, 2012d). The market value of non-residential structures, which is similar to the definition of infrastructure, owned by GBEs constitutes an average of 22.7 percent of non-government non-residential structures from 1971 to 2011 (last year of available data). Moreover this percentage falls over time, from 22.6 percent in 1971 to 17.2 percent in 2011.

13. The composition of government and non-government infrastructure differs throughout the period. On average, 51.9 percent of government infrastructure from 1971 to 2015 is engineer structures and the rest is non-residential buildings. By contrast, the average share of non-government infrastructure that is engineer structure is 63.1 percent. Engineer construction includes pipelines, highways, power generating stations, communication towers, and similar structures.

sector in 35 out of 43 years. The data in figure 8 does not indicate what is the optimal net stock of infrastructure in the government or non-government sectors; it does, however, show that non-government organizations have played an increasingly important role in providing infrastructure over the past four decades.

Figure 9 displays the percentage of Canada's total net stock of infrastructure coming from both the government and non-government sectors from 1971 to 2015. At the beginning of the period, non-government infrastructure represented just under two-thirds (63.4 percent) of the total infrastructure stock. By the end of 2015, that percentage had increased to 72.6 percent. This is despite the fact that the net stock of government infrastructure per person is at a 40-year high in that year.

Figure 9: Share of net infrastructure stock from government and non-government sectors, 1971 to 2015

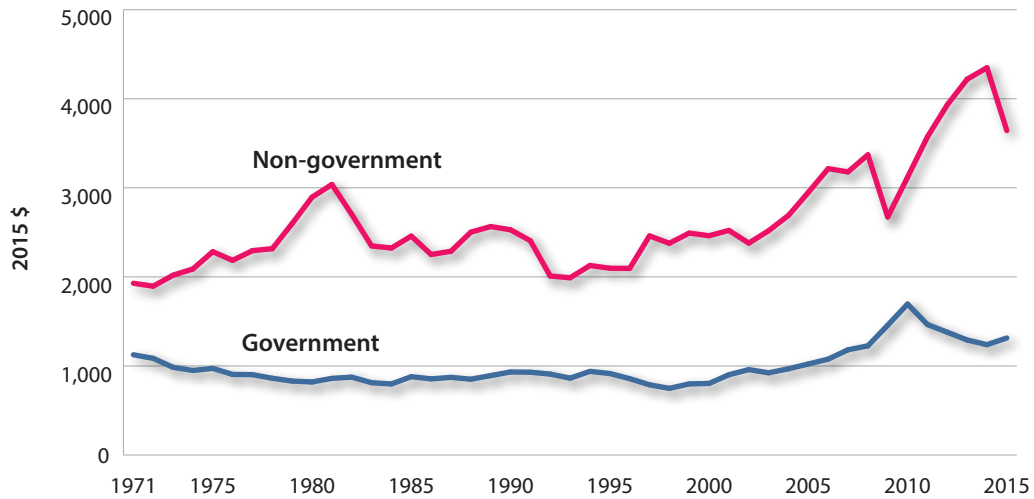


Please see the note to figure 8.

Source: Statistics Canada, 2016a; calculations by authors.

In addition to providing the bulk of Canada's infrastructure stock, non-government organizations also spend considerably more on acquiring new infrastructure than governments. **Figure 10** presents inflation-adjusted infrastructure spending per person from 1971 to 2015, for both government and non-government organizations (in 2015 dollars). Throughout the period, infrastructure spending by non-government organizations amounted to a larger share of the economy than that of governments. On average, non-government organizations spent \$1,634 more per person each year on infrastructure than governments. Notably, since 2008, there appears to be a negative correlation between the two sectors—that is, as infrastructure spending by governments increased, infrastructure spending by non-government organizations decreased (and vice versa).

Figure 10: Government and non-government spending on infrastructure in Canada per person, 1971 to 2015 (2015 dollars)



Please see notes to figure 5.

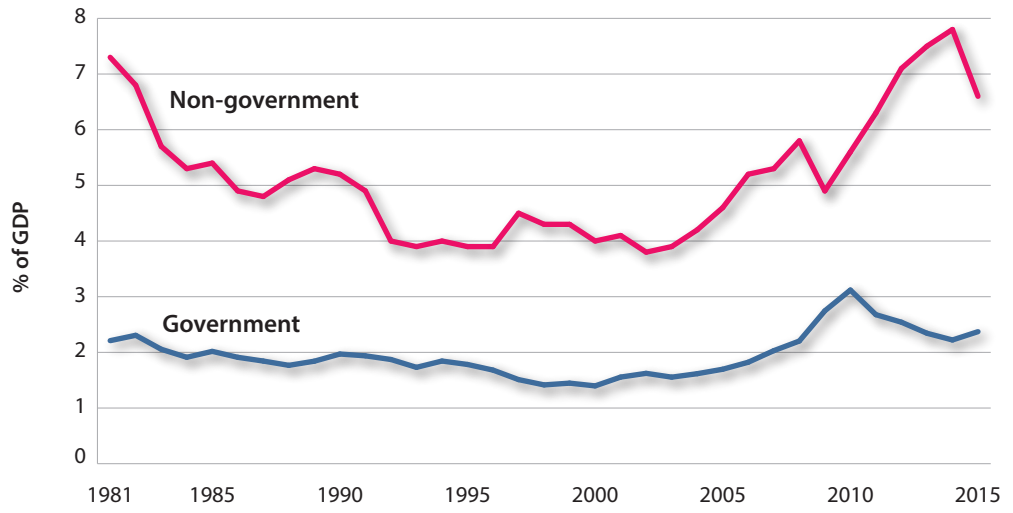
Sources: Statistics Canada, 2016a, 2016b); calculations by authors.

Figure 11 presents annual infrastructure spending for both sectors as a percentage of GDP from 1981 to 2015. The trends are similar to figure 10. The average spending gap between government and non-government organizations is 3.2 percentage points of GDP.

The data in this section highlight the important role that the private sector plays in providing infrastructure in Canada. Unfortunately, this role is often overlooked in public debates about infrastructure, with the emphasis solely being on government infrastructure spending. While the array of infrastructure assets owned by the private sector differs from those provided by governments, there is significant overlap. Bazel and Mintz (2015) point out that infrastructure assets generally thought of as being publicly owned have been privatized, including railways, roads, and telecommunication infrastructure. They further argue that there is scope for private involvement in providing traditionally public infrastructure given appropriate government regulations over pricing and standards to protect consumers.¹⁴

¹⁴ Bazel and Mintz (2015) also point out that an advantage of private infrastructure is that users are typically charged a fee. The pricing of infrastructure is important for determining the return to infrastructure, which in turn helps a private organization determine how much to spend on infrastructure.

Figure 11: Government and non-government spending on infrastructure in Canada as a percentage of GDP, 1981 to 2015



Please see notes to figure 5.

Source: Statistics Canada, 2016a, 2016c.

Myth 3

Increased infrastructure spending will spur economic growth

A common argument in favour of increased infrastructure spending is that this type of spending will lead to higher rates of economic growth. Indeed, a regular refrain from the current federal government is that its infrastructure plan will boost economic growth in the future.¹⁵ It is also sometimes argued that infrastructure spending can be a short-term stimulus to the economy. This section discusses why Canadians should be skeptical of infrastructure spending delivering on the promise of economic benefits, both in the long and the short term.¹⁶

When infrastructure spending fails to spur long-term growth

In principle, sound infrastructure investments can help increase the economy's productive capacity, allowing us to produce more and/or reducing the costs to deliver goods and services to market.¹⁷ For instance, sound infrastructure spending can increase our economic productivity by enabling firms to more efficiently transport goods and services to consumers and international markets, and by improving the mobility of individuals commuting to and from work. Partly on this basis, governments often claim that infrastructure

¹⁵. See for example the 2016 budget and the 2016 fiscal update (Canada, Department of Finance, 2016a, 2016b).

¹⁶. For more discussion on the limitations of infrastructure spending, see de Rugy and Mitchell (2017).

¹⁷. Several studies have found a high rate of return in the form of economic growth for infrastructure spending (Gu and MacDonald, 2009; Pereira and Andraz, 2013). However, Harvard University economics professor Edward L. Glaeser (2016) points out that “high estimated returns often vanish when researchers control for common state trends or other economic variables.”

spending will lead to increased future economic growth.¹⁸ However, not all public infrastructure spending fits this bill. Although some infrastructure projects can improve our long-term economic potential, not all do.

When ordinary citizens think about infrastructure spending they tend to think about roads and bridges. Yet when governments talk about infrastructure spending, their definition of infrastructure is often much broader than what the public typically assumes. For instance, as part of the federal government's commitment to infrastructure spending, it has committed to spending in broad categories such as public transit, social infrastructure, and green infrastructure (Canada, Department of Finance, 2016a).¹⁹ According to this metric, infrastructure also includes subsidized housing, senior facilities, child care,²⁰ and cultural and recreational facilities.

A high-in-demand road, railway, or port has very different economic implications than a new community centre or hockey arena.²¹ While both can be classified as infrastructure by governments, the former could actually improve the economy's productive capacity while the latter, although appreciated by the community in which it is built, is unlikely to provide productivity gains.²² Without any significant productivity improvement, the latter should not be viewed in the same growth-enhancing light as the former.

In some cases, low productivity infrastructure can actually hamper the economy after accounting for the taxation used to fund it. Critically, taxation imposes economic costs. Taxes reduce economic activity by discouraging work, saving, investment, and entrepreneurship. The tax dollars used to fund an infrastructure project represent an economic cost for undertaking that project.

18. Governments often refer to spending on infrastructure as “investing” (e.g., Canada, Department of Finance, 2016a; Ontario, 2016a).

19. Social infrastructure and green infrastructure are not clearly defined by the federal government in its most recent budget or fiscal update. However, social infrastructure effectively amounts to support for social and educational services and recreational amenities such as parks or arenas. Green infrastructure can include projects related to water and waste management as well as projects designed to reduce greenhouse gas emissions and adapt to climate change.

20. The 2016 federal budget included \$500 million to support the creation of a National Framework on Early Learning and Child Care. Although this funding is included in the government's infrastructure spending envelope, it is not clear if the money is meant to be spent creating child care facilities or more directly in providing child care services.

21. It should be noted that a road or railway does not necessarily provide large improvements to productivity if it is built in an area of low demand. A “bridge to nowhere,” for example, would not provide the long-term economic benefits of a roadway that connects a factory and an outlet store.

22. Because it is unlikely to offer productivity gains, under a more narrow definition of infrastructure, a project like a hockey rink may not even be considered an infrastructure investment but rather a capital intensive form of consumption.

If the productivity gains from the infrastructure are less than the economic costs of taxes, then the infrastructure spending produces (net) harm to the economy (Leeper et al., 2010). For this reason, an infrastructure plan that contains a large number of low productivity infrastructure projects may ultimately harm our economic potential, rather than improve it.

For example, consider the makeup of the federal government's infrastructure spending plan announced in the 2016 budget and the fiscal update released in November 2016 (**table 1**). In addition to the \$91 billion of infrastructure spending already announced by the previous government, the current government's plan calls for \$95.6 billion in new infrastructure spending over a 12 year period. Of that spending, only 10.6 percent, or about one in every 10 dollars, is being spent on trade and transportation projects.²³ This is important because infrastructure projects that focus on moving people and goods across Canada and to ports that provide access to world markets are the types of projects that will actually increase Canada's long-term economic potential.²⁴

Table 1: New federal infrastructure spending announced by the current government, 2016/17 to 2027/28

Type of infrastructure	Billions (\$)	Share of total
Public transit	28.7	30.0%
Social infrastructure	27.3	28.6%
Green infrastructure	27.0	28.2%
Trade and transportation	10.1	10.6%
Rural and northern communities	2.5	2.6%
Total	95.6	100.0%

Note: The categories listed here are largely what is provided in the federal government's most recent fiscal update. The category of post-secondary institutions, which amount to \$2 billion, is added to social infrastructure because its description fits in this general category. Similarly, the \$500 million in rural broadband spending was added to rural and northern communities.

Combining the spending announced by the current and former federal governments, the government plans on spending over \$180 billion on infrastructure over this time period.

Source: Canada, Department of Finance, 2016a.

23. Over the federal government's five-year fiscal plan, \$28.6 billion is being spent on infrastructure, \$2.4 billion (or less than 10 per cent) of which is for trade and transportation infrastructure (Canada, Department of Finance, 2016a).

24. It can also be argued that public transit has the potential to improve productivity by reducing commute times. However, it should be noted that there is evidence that increasing the supply of transit or commuter roads does not actually reduce congestion because usage increases in response to increased supply (Duranton and Turner, 2011).

Meanwhile the federal government has indicated that it plans on funding a host of projects that are much less likely to spur economic growth, such as projects related to community amenities, federal properties and buildings, water treatment, social housing, and reducing greenhouse gas emissions. Table 1 shows that 28.6 percent is being spent on social infrastructure. This loosely defined category amounts to building infrastructure to support social and educational services and recreational amenities such as parks or arenas. Moreover, the federal government has also announced that projects related to tourism, culture, and recreation will now be eligible for infrastructure spending that was already planned under the previous government's New Building Canada Fund (Canada, Infrastructure Canada, 2016b).²⁵

It is important to reiterate that these projects may provide services that are valued by the community. However, they are unlikely to provide the economy-wide, productivity-enhancing benefits that an effective road or railway would offer. David Dodge, former Governor at the Bank of Canada, has expressed skepticism that "social" infrastructure would achieve the government's economic growth objectives.

"It's a consumption item," he said. "It may need to be done for social reasons, but it's not going to be growth-enhancing in the way that investment in transportation infrastructure or trading or innovation would be." (Starr, 2016)

The federal government's focus on non-productivity-enhancing infrastructure is unfortunately not unique. **Table 2** delineates the Ontario government's 10-year infrastructure plan. Of the total \$138 billion being proposed, only 18.8 percent will be spent on highways, while 21.7 percent will be spent on a nebulous "other" category that includes infrastructure related to affordable housing, tourism, and cultural centres. Similarly, the Alberta government plans to spend only \$7.2 billion out of its \$34.8 billion core government capital plan on roads and bridges (see Appendix 2).²⁶ Despite the fact that transportation infrastructure projects have a greater potential to improve economic productivity, Canadian governments are giving such projects relatively low priority.

There is an important political economy dimension that helps explain why governments tend to focus infrastructure spending on low-productivity projects. Political leaders are concerned with gaining and maintaining elected office.

²⁵. According to a news report, the tourism and recreational projects were previously not eligible for funding under the New Building Canada Fund because "such projects do little much to boost long-term economic productivity" (Careless, 2016).

²⁶. The \$7.2 billion includes spending on new projects (\$4.6 billion) as well as maintenance and renewal (\$2.5 billion).

Table 2: Ontario's infrastructure plan, 2016/17 to 2025/26

Type of infrastructure	Billions (\$)	Share of total
Public transit	55.0	39.9%
Other (affordable housing, tourism, and cultural centres)	30.0	21.7%
Highways	26.0	18.8%
Child care and education	12.0	8.7%
Health	12.0	8.7%
Post-secondary	3.0	2.2%
Total	138.0	100.0%

Source: Ontario, 2016b.

As a result, political considerations may override economic ones in decisions about the type of infrastructure projects to pursue.²⁷ A project such as a community centre may receive priority over a productivity-enhancing project because the community centre will help secure support from key segments of the electorate. Even when it comes to transportation infrastructure, governments may select projects with less potential for improving productivity simply to help secure political support.

Indeed, research shows there is a relationship between the voting patterns of an electoral district and infrastructure spending. For instance, a recent academic study examined the distribution of spending on road infrastructure in Quebec from 1986 to 1996 and found a statistically significant correlation between electoral districts that demonstrate electoral support for the government and the distribution of spending on road infrastructure (Joanis, 2011). This result was found after controlling for other factors such as the population level and unemployment rate of an electoral district.²⁸ If political concerns motivate governments to select low-productivity infrastructure projects over high-productivity ones, the promised economic gains are unlikely to materialize. It is notable that private sector forecasts have been increasingly pessimistic about economic growth in Canada, despite the infrastructure plans of various governments (**box 1**).

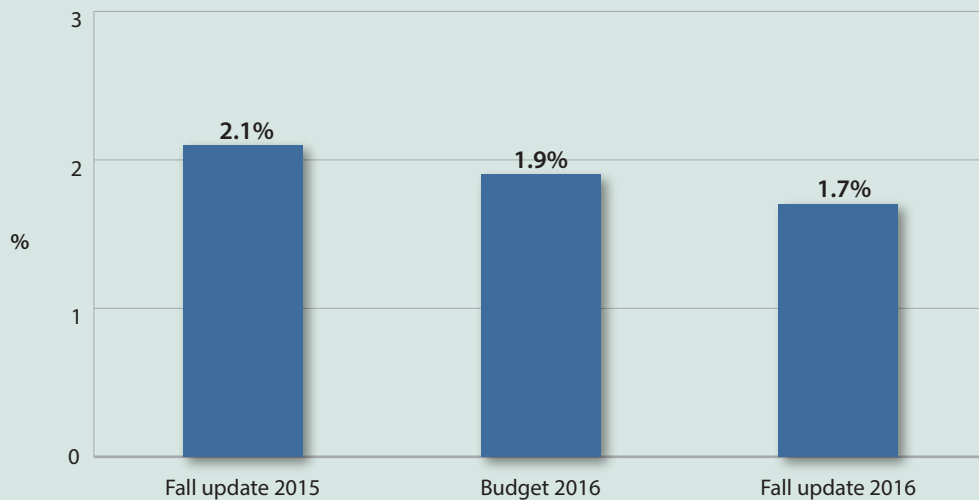
²⁷. This is an insight of Public Choice Economics. For a discussion of Public Choice Economics, see Lammam, MacIntyre, Clemens, Palacios, and Veldhuis (2013).

²⁸. Similarly, a *Globe and Mail* analysis of the distribution of funding from the federal government's Community Infrastructure Improvement Fund found that electoral districts that had voted for the government party in the 2011 federal election received on average 48 percent more infrastructure funding than opposition electoral districts (Hannay, 2015). However, this analysis apparently did not control for other factors that could be driving decisions on where to build infrastructure.

Box 1: Economic growth forecasts more pessimistic, despite federal infrastructure plan

Although economic forecasts can be influenced by a host of factors, some of which are outside the government's direct control, it is telling that private sector forecasts have generally become more pessimistic since the federal government announced its infrastructure plan. **Figure 12** shows projections for average annual economic growth from 2016 to 2020 as delineated in the federal government's 2015 Fall Fiscal Update, 2016 budget, and 2016 Fall Fiscal Update. The projections are based on an average of private sector forecasters. In the 2015 Fall Fiscal Update, average annual economic growth over this period was projected to be 2.1 percent. A year later that figure fell to 1.7 percent in the 2016 Fiscal Update. That represents a lower projected income for Canadians in 2020 of \$38.6 billion, relative to the 2015 projection.

Figure 12: Private sector forecast of annual economic growth in Canada, average from 2016 to 2020



Note: Forecast of economic growth for each year is an average of private sector forecasts provided by the Department of Finance.

Source: Canada, Department of Finance, 2015, 2016a, 2016b.

Why infrastructure spending is unlikely to provide short-term stimulus

Although most serious discussions about the benefits of infrastructure spending generally focus on the potential to stimulate long-term economic growth, some invoke infrastructure spending as a short-term economic stimulus (see, for example, Wingrove, 2016). There is, however, reason to be skeptical of the ability of infrastructure spending to actually deliver on the hopes of short-term stimulus.²⁹

A major problem with infrastructure spending as a short-term stimulus relates to timing (see de Rugy and Mitchell, 2017). One of the conditions for an effective stimulus measure is that the stimulus should be enacted during or immediately after a recession takes place (Taylor and Castillo, 2015). However, there are often considerable delays. For starters, economic data is available with a considerable lag which means governments typically realize the economy is in recession many months (or even quarters) after the fact. In addition, there can be further delays from the announcement of infrastructure spending to when the spending actually takes place (i.e., when shovels hit the ground). Sound infrastructure projects typically require time for planning and debate (both publicly and within government).³⁰ In cases where multiple levels of government are involved, it can take additional time to coordinate.

For instance, recent reports by the Parliamentary Budget Office (PBO) call into question the federal government's ability to deliver infrastructure spending on the timeline laid out in the government's budget. One PBO analysis found that of the \$13.6 billion of planned infrastructure spending for 2016/17 and 2017/18, only \$4.6 billion worth of infrastructure projects have been identified (PBO, 2017a). To clarify, this does not mean the government has spent \$4.6 billion, it means the government has merely decided which projects will receive that amount of funding. In other words, halfway through the two-year timeline, there is \$9 billion worth of infrastructure funding that has yet to be earmarked for a specific infrastructure project.

29. A discussion on the efficacy of other forms of economic stimulus is beyond the scope of this paper. For a literature review on this topic see Veldhuis and Lammam (2010). Moreover, as Glaeser (2016) points out, despite “staggering” levels of spending on infrastructure, the Japanese economy has barely grown since 1991. This observation should at least give pause to the idea that a large amount of spending on infrastructure is a sure ticket to economic growth.

30. Some commentators have suggested that governments get around delays in infrastructure spending by maintaining a list of possible “shovel-ready” infrastructure projects that can be quickly implemented when there is a downturn in the business cycle. This would, however, require governments to forgo undertaking worthwhile infrastructure projects now in favour for some uncertain time in the future when there is a recession.

Moreover, an earlier PBO report found that spending on transfers to provincial governments (and other third parties) for infrastructure is taking place slower than expected (PBO, 2017b). In fact, the federal government may not spend all of the planned \$3.5 billion in infrastructure transfers in 2016/17. The PBO also found that provincial governments have not increased their capital budgets to match all of the expected increase in federal infrastructure transfers.

As the PBO (2017a) points out, delays in infrastructure spending have consequences for the government's estimates of the economic impact of that spending. The federal budget estimated that infrastructure spending will raise Canada's GDP by 0.2 percent in 2016/17 and 0.4 percent in 2017/18 (Canada, Department of Finance, 2016b). Taking the government's estimates at face value (and there is reason to be skeptical of them), if the infrastructure spending does not fully materialize as planned, then neither will the economic stimulus.

The time required to plan and coordinate infrastructure projects is often why governments are unable to get infrastructure projects started in a meaningful way as a timely response to an economic downturn. As a result, governments instead focus their "stimulus" efforts on so-called "shovel-ready" projects that can be started in a shorter timeframe. But there is a problem with focusing on shovel-ready projects. Even if such projects can be started relatively quickly, they may not be the best projects for spurring economic growth.³¹ Worse still, they may not spur growth at all. Without appropriate analysis and consideration, infrastructure dollars may be wasted or spent on very low productivity projects.

Still, delays in infrastructure spending could mean that the economy *has already recovered* by the time the spending actually takes place. The 2009 federal stimulus plan provides an informative example (Karabegovic et al., 2010). The economy began to recover from the 2008/09 recession in the second half of 2009 and government investment played a negligible role in that economic turnaround.³² This is not surprising, given that most of the intended infrastructure stimulus spending took place after the second half of 2009 (PBO, 2010).

31. Several organizations have raised concerns about shovel-ready projects. For example, a report summarizing a conference on Canadian infrastructure, hosted by the C. D. Howe Institute, states that "governments should ensure they are investing in the right projects with highest long-run returns, not necessarily the shovel-ready ones" (C.D. Howe Institute, 2015: 19). In addition, a report published by the Public Policy Forum argues that "[t]here is no term more dangerous than 'shovel ready' when it comes to infrastructure" (Fagan and McLean, 2016: 5). That report goes on to say that "[i]nfrastructure can only be done well when it is done with due deliberation."

32. Karabegovic et al. (2010) also measured the impact of government consumption (i.e., spending other than capital spending) on the economic recovery and found that it too played a negligible role.

Research shows that delays in government capital investment can actually hamper the economy in the short run. As Leeper et al. (2010) note, private sector investors may hold off on making investments until after government capital investments have taken place. Private sector investors may do so if they expect that the new or improved government infrastructure would increase the value of their investments. For example, it may be more profitable for a business to wait to expand production until after a new or improved government road is completed. A postponement of private sector investment can impede an economic recovery.

Finally, yet another problem with infrastructure spending as a short-term stimulus is that it may not be targeted to those areas of the economy that have been hardest hit by an economic downturn (de Rugy and Mitchell, 2017). For example, infrastructure projects may require workers with specialized skills, but these workers are not necessarily the ones that find themselves unemployed during a downturn. As a result, infrastructure stimulus may lead to poaching workers from existing projects rather than creating new jobs for those who are unemployed.

Summary

The argument that infrastructure spending will spur economic growth is one of the most prominent arguments made in favour of increased infrastructure spending. While, in principle, sound infrastructure spending can increase long-term economic growth by improving the economy's productive capacity, it is not the case that all infrastructure projects will actually lead to higher productivity. The idea that infrastructure spending can increase long-term economic growth relies on government's ability to select sound, productivity-enhancing projects, something that governments have not always succeeded in doing. Moreover, infrastructure spending generally fails to stimulate in the short-term because of considerable delays and the spending may not target the sector of the economy most in need.

Myth 4

With interest rates low, now is the time to ramp up government infrastructure spending

Low interest rates have been used to argue for increased government spending on infrastructure (Canada, Department of Finance, 2016a). While it is true that borrowing costs are relatively low in historical terms, that alone is not a sufficient argument for increased spending on infrastructure. Interest rates are only one factor in assessing the costs of increased infrastructure spending. Failing to account for other relevant fiscal and economic costs will exaggerate the opportunity provided by lower interest rates for higher infrastructure spending.

The costs of interest on outstanding debt

Despite being in a low interest rate environment, governments must service their outstanding debt with annual interest payments, which are not discretionary. When public resources go to paying interest on outstanding debt, there is less available for the services and priorities that matter to Canadians, including health care, education, or a more competitive tax system. Taking on more debt for infrastructure can ultimately come at the expense of these other things, even in a low interest rate environment.

This is an important trade-off to consider, especially since the amount of government resources currently consumed by debt interest payments is not trivial. The federal government and many provinces have collectively accumulated over half-a-trillion dollars since 2007/08 (Lammam et al., 2017).³³

33. Importantly, very little of this new debt has been to fund infrastructure spending. As University of Calgary professor Jean-François Wen (2015) found, two-thirds of the new debt that the Ontario government accumulated since the recession was simply to pay for government operations (such as the wages and benefits of government employees), not infrastructure investments.

In 2016/17, combined federal and provincial net debt (gross debt minus financial assets) will total \$1.4 trillion.

Collectively, all Canadian governments—including federal, provincial, and local governments—spent \$62.8 billion on interest payments in 2015/16. That’s roughly equivalent to the total amount spent on public K–12 education in Canada (\$63.9 billion) in 2013/14, the latest year of available data. If we were to distribute the total annual cost of servicing Canada’s government debt equally, each Canadian’s share would be \$1,752. That’s more than \$7,000 for a family of four. Clearly, there’s a cost to government debt, despite low interest rates.

Consider the debt interest payments of three Canadian governments (federal, Ontario, and Alberta) that have committed to major infrastructure spending plans in the years ahead. In 2016/17, the federal government expects to spend \$24.9 billion on debt interest payments, or 8.7 percent of federal revenues, which is more than what Ottawa plans to spend on transfers to Canadian families in the form of children benefits (\$21.8 billion).

The Ontario government expects to spend \$11.4 billion on debt interest in 2016/17, or 8.6 percent of all provincial revenues, which is nearly what the province spends on physicians (\$13.1 billion in 2015). Notably, in Ontario, debt servicing costs are set to increase rapidly in coming years compared to other areas of provincial spending. As delineated in the 2016 provincial budget, Ontario’s debt servicing costs are expected to grow at an average annual rate of 5.4 percent from 2014/15 to 2018/19. This is, in fact, the fastest growing line item in the budget, far outpacing the projected annual growth in health spending (1.8 percent) and education spending (1.2 percent).

Alberta, thanks to its historically low debt burden, is currently in a better position when it comes to the cost of servicing debt, but that is changing as the province is set to continue racking up debt in the years ahead (Lafleur et al., 2016). Debt servicing costs now constitute 2.4 percent of total provincial revenues, which is up from 1.8 percent in the previous year (Alberta, Ministry of Finance, 2016b). According to the latest budget, debt servicing costs are projected to increase to 4.0 percent of provincial revenues by 2018/19 (Alberta, Ministry of Finance, 2016a). Although Alberta’s debt servicing costs are relatively low today, debt servicing costs are consuming increasingly more resources that could otherwise be used for other government priorities.

Critically, these substantial interest payments exist despite historically low interest rates. If interest rates were to rise, the cost of government borrowing will go up as well, putting upward pressure on debt interest payments. Indeed, higher interest rates can adversely affect government finances (Wen, 2016). This is an important consideration given that the infrastructure spending plans of several governments span a decade or more. Over such a long time horizon, it is possible that interest rates could revert back to normal levels rather than remain at historical lows. Given this concern and the

fact that interest payments already consume a large amount of government resources, today's low interest rate environment is a much less compelling argument for increased infrastructure spending.

The costs of operating and maintaining infrastructure

The fiscal costs of infrastructure extend beyond the construction and related interest on borrowed money. Once an infrastructure project is completed, governments are responsible for the costs of operating and maintaining that infrastructure. For example, such costs include repairs to a highway as a result of ordinary wear and tear from traffic and weather. The operation and maintenance costs can make up a large portion of the total cost of an infrastructure project. According to a 2015 report by the House of Commons Standing Committee on Transport, Infrastructure, and Communities, for some projects up to 80 percent of the total cost over the lifetime of the project can be attributed to operation and maintenance costs (Miller, 2015). In determining the cost of an infrastructure project, focusing solely on the borrowing costs to finance construction misses a large portion of the cost to taxpayers. Spending on new infrastructure projects will translate to higher operation and maintenance costs in the future, meaning that current interest rates play a much smaller role in determining the total fiscal cost of higher infrastructure spending.

Moreover, higher operation and maintenance costs in the future could result in fewer resources available for other government activities such as health care and education. Decisions to spend on infrastructure today should take into account the future costs required to operate and maintain the infrastructure, and the effect these costs will have on other areas of spending, taxes, and further debt. In other words, governments should consider the long-term fiscal implications of infrastructure spending, not just the immediate costs.

The costs of raising taxes to fund infrastructure

Beyond the fiscal cost, there is an economic cost of the taxation required to pay for expanded infrastructure spending and service any debt that is acquired.³⁴ Taxation changes people's behaviour in ways that reduce productive economic

³⁴ When governments borrow to finance infrastructure spending, it is ultimately taxpayers who pay. That is, debt incurred today plus interest is money that will have to be repaid by taxation in the future. Indeed, one way to think of government debt is as delayed taxation. For seminal work on debt as future taxes, see Barro (1974). For less technical work, see Law and Clemens (1998).

activity including people's willingness to work, save, invest, and be entrepreneurial. This hinders economic efficiency and overall economic output. Economists refer to this as the "deadweight loss" of taxation to society. The loss comes in the form of lower levels of economic well-being or prosperity.³⁵ A complete assessment of the cost of debt-financed infrastructure spending should include the cost of raising government revenue.

The economic cost of taxation to fund higher infrastructure spending could be offset if the infrastructure facilitates productive economic activity. However, as discussed above, not all infrastructure projects do so in practice. Infrastructure spending could ultimately come at a high net economic cost when the costs of taxation are accounted for. Lower interest rates do not negate these costs.

Bazel and Mintz (2015) provide an example that illustrates how much higher the cost of financing government infrastructure can be after incorporating the negative effects of taxation. They calculate the cost of financing government infrastructure as a function of interest rates and the tax rate on capital (a marginal effective tax rate of 19 percent).³⁶ Their calculation implies that the cost of financing government infrastructure via taxation would be 23 percent above the market interest rate. Arguing that low interest rates present an opportunity to spend more on infrastructure overlooks the significant wider economic costs, particularly if the infrastructure fails to expand economic possibilities through greater productivity.

The cost of compressing decades of infrastructure spending into the next few years

Although the interest rate is only one factor that affects the costs of debt-financed infrastructure projects, some will still argue that low interest rates are an opportunity for governments to undertake projects more cheaply. If we assume there is a set amount of infrastructure projects that is necessary for governments to undertake over the next few decades, all else equal, it would be cheaper for governments to carry out the bulk of these projects when interest rates are low. In other words, one could argue that governments

³⁵. Some forms of taxation imposes greater economic costs than others (see Clemens et al., 2007). For example, work done by Professor Bev Dahlby of the University of Calgary has found that corporate income taxes are generally more economically damaging in Canada than personal income taxes and sales taxes (Ferede and Dahlby, 2016).

³⁶. The specific formula that Bazel and Mintz used is $CF = R/(1-tE)$, where CF is the cost of financing government infrastructure, R is the interest rate, t is the marginal effective tax rate on private capital, and E is the elasticity of private capital stock demand with respect to the tax rate.

should compress decades of necessary infrastructure spending into the next few years to finance projects at low interest rates.

However, there are a number of problems that would come with a compressed timeframe. First, in the short term it will have negative consequences on the economy as the private sector competes with the government for resources. Compressing long-term infrastructure spending needs into a shorter period requires large scale use of resources in the form of material and workers. As governments consume more of these resources, it leaves fewer resources available for the private sector. This increase in government spending would likely put a damper on private sector investment and consumption (Furceri and Sousa, 2011). It could also mean that resources are reallocated from more productive to less productive economic projects. While the Keynesian model would suggest that the displacement of resources is not a problem during a recession when there are idle resources (de Rugy and Mitchell, 2017), the increase to infrastructure spending by Canadian governments is being proposed during a period of economic growth.

A compressed timeframe for necessary infrastructure spending would also suggest that at some point in the future infrastructure spending will be withdrawn. Otherwise the increase in infrastructure would be permanent, and the policy cannot be justified by current interest rates which may increase in the future. There is a risk that infrastructure spending could be withdrawn during an economic downturn, which, according to the Keynesian model, could then deepen a recession. This is a potential problem that is difficult to predict, but must be confronted by proponents of the idea that infrastructure should be increased in light of low interest rates.

Finally, there are practical difficulties for compressing infrastructure spending into a shorter period. For one thing, managing and planning the large number of infrastructure projects would be logistically challenging and could worsen the delays involved in a typical infrastructure project. There is also the issue of selecting the right projects that would not only enable economic growth through higher productivity but also fit the infrastructure needs of future decades.

Not all infrastructure spending should be financed through debt

Aside from failing to account for all the associated costs, there is a more fundamental problem with arguing that low interest rates are a reason to borrow for increased infrastructure spending. It wrongly assumes that proposed infrastructure spending should be largely or completely financed with government debt. As a number of economists have pointed out, it is not always the case that infrastructure projects should be debt financed (Dahlby and Smart, 2015; Mintz and Smart, 2006).

An alternative to debt financing is to pay for infrastructure using existing revenues.³⁷ Whether a project should be financed with debt, existing revenues, or some combination of the two depends on a number of factors. For example, the fiscal situation of the government, particularly its pre-existing level of debt, should influence the decision about how much more debt the government should take on for infrastructure spending (Easterly et al., 2007). Other considerations are whether the infrastructure project is self-financing³⁸ and the extent to which future generations of taxpayers will receive significant benefits (box 2). Since it is not always the case that government infrastructure projects should be financed through debt, lower borrowing costs are not a compelling reason alone to pursue increased infrastructure spending.

Box 2: Problems with the intergenerational argument for debt-financed infrastructure

A common argument for why infrastructure projects should be debt financed is that future generations of taxpayers will receive a portion of the benefit from that project and debt financing ensures that these future taxpayers will pay a portion of the cost. In principle, the share of benefits enjoyed by each generation should be in proportion to the cost that they pay. There are a number of problems with this line of argument (see e.g., Dahlby and Smart, 2015; Mintz and Smart, 2006).

First, future taxpayers do not have an opportunity to participate in the decision to spend on a particular infrastructure. This makes it difficult, perhaps impossible, to gauge whether future generations value a project enough to justify the cost that is being imposed upon them. Debt financing also provides the current generation with an opportunity to reduce its own cost by pushing a disproportionate share of the cost on future taxpayers.

Second, it is difficult to determine what share of the total benefit of an infrastructure project will go to future generations compared to the current generation. The intergenerational distribution of benefits will depend on factors such as the lifespan of the infrastructure asset, how quickly it will deteriorate, and whether it will become obsolete or otherwise damaged.

37. One approach to debt financing that spreads the cost of repayment over a longer period of time is a “sinking fund,” whereby tax revenues over a given time span are explicitly set aside to pay back the borrowed money for an infrastructure project.

38. A self-financing infrastructure project is one in which the project provides a revenue stream to pay for the full cost of the project (user fees, for example). Dahlby and Smart (2015) argue that debt financing under this circumstance is not controversial but the case for debt financing is less clear in other instances.

Myth 5

The federal government should take the lead on infrastructure

A recurring argument in Canada is that the federal government should take on a greater role in provincial and local infrastructure. And indeed, the federal government is pursuing a large increase to the funding that it provides for provincial and local infrastructure projects, a move that is supported by several national organizations and stakeholder groups.³⁹ However, federal influence over provincial and local infrastructure planning is problematic for a number of reasons. Moreover, provincial and local governments can prioritize the use of their own existing resources if they wish to spend more on infrastructure.

Federal role in public infrastructure—in principle

It is first important to discuss what role, in principle, the federal government should play in providing public infrastructure compared to that of provincial and local governments. Canada’s fiscal federalism means that government spending responsibilities and revenue raising authority is divided between different levels of government. One of the principles of fiscal federalism is the “subsidiarity principle”—the idea that government functions should generally be exercised by the level of government that is most local or “closest to the people” (Shah, 2007). Functions should only be assigned to the federal level of government if there is a strong case made for why it cannot be properly performed by a lower level of government (national defence is a classic example).

One advantage of decentralizing decision making to provincial or local governments is that these levels of government are more likely to know what the people of their jurisdiction require or prefer, and are better able to respond to changing conditions within their boundaries (Clemens and Veldhuis, 2013).

³⁹. See for example, Brodhead et al. (2014), Canadian Chamber of Commerce (2015), and FCM (2016).

Decentralization also provides the opportunity for jurisdictions to learn from the policy decisions and innovations of other jurisdictions within the same country. And finally, provincial or local decision making avoids problems associated with a national one-size-fits-all infrastructure plan that may not reflect the particular needs of the population in every region.

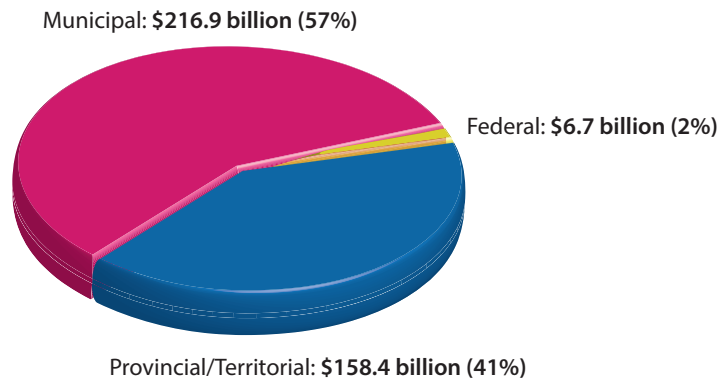
According to the subsidiary principle, the default position is for local or provincial governments to make decisions regarding infrastructure projects within their own jurisdictions. This, however, does not imply there is no proper role for the federal government in providing public infrastructure (Dahlby and Jackson, 2015; Boadway and Kitchen, 2015; Dachis, 2016). In principle, the federal government should provide infrastructure related to its responsibilities, such as international trade (ports, border crossings, etc.). The federal government may also have a role in funding particular projects that are of a national interest or where multiple jurisdictions stand to benefit.

Federal role in public infrastructure—in practice

In practice, there are two ways in which the federal government plays a role in providing public infrastructure in Canada. The first is through direct ownership of infrastructure assets. Ownership of government infrastructure is divided between the three levels of government (federal, provincial and local). Each level of government owns some infrastructure assets and has ultimate responsibility for the operation and maintenance of that infrastructure. The role that the federal government plays as a direct owner of infrastructure is relatively minor given that the share of infrastructure owned by the federal government is considerably smaller than the share collectively owned by provincial and local governments.

Figure 13 displays the share of core public infrastructure (roads, bridges, transit, water, wastewater, culture and recreation, and sports infrastructure) owned by each level of government in 2013. The total stock of core public infrastructure in 2013 was \$382 billion. Of that amount, the federal government owned only \$6.7 billion or 1.8 percent. Municipalities collectively owned more than half of the core public infrastructure stock (56.8 percent) and the remainder was owned by provincial and territorial governments (41.4 percent).

The second, and more prominent, role that the federal government plays in providing public infrastructure is by partially funding the construction or improvement of provincially and locally owned infrastructure. Since the early 2000s, the federal government has played a growing role in funding provincial and local infrastructure through grants to other levels of government (Dahlby and Jackson, 2015). The way that such funding typically works is that the federal government provides a conditional grant to a provincial or local government that will fund a portion of an approved infrastructure

Figure 13: Share of core public infrastructure stock by level of government, 2013

Note: Core public infrastructure includes roads, bridges, transit, water, wastewater, culture and recreation, and sports infrastructure.

The value of infrastructure stock is net of depreciation, which is calculated using a hyperbolic function.

Source: Miller, 2015.

project (Boadway and Kitchen, 2015). The grant is known as a conditional grant because the recipient government must spend the money on the project that is approved by the federal government. Criteria for being eligible for funding could require a project to be of a certain type (transit infrastructure, for example) and a certain minimum size. There can also be conditions on how the recipient manages the project.⁴⁰ In exchange for adhering to certain conditions, the recipient government receives additional revenue that does not have to be taxed or otherwise collected by that government. Gaining access to the additional revenues offered by conditional grants, however, means that the federal government has greater sway over which projects are undertaken by recipient governments and how they are managed.⁴¹ Indeed, these arrangements give the federal government considerable influence over which projects are undertaken and how they are managed. In effect, through increased conditional grants, the federal government would take on a greater role in setting priorities for projects undertaken at the provincial and local levels.⁴²

⁴⁰. For example the federal government used to have a condition that projects that cost over \$100 million must consider using a private-public partnership procurement process. This requirement has recently been removed.

⁴¹. There are several ways in which federal conditional grant programs can influence the priorities of recipient governments. For example, if the federal government is offering more funding for large public transit projects than for bridge projects, then a provincial/municipal government would have an incentive to prefer undertaking public transit projects because it is more likely to receive federal funding.

⁴². It is telling that in the mandate letter published early in the government's term, the Prime Minister Justin Trudeau instructed the Minister of Infrastructure and Communities to accommodate provincial and local priorities, but then set out a list of federal priorities for the type of infrastructure projects that will receive funding (Trudeau, 2015).

Negative consequences of conditional infrastructure grants

There are a number of reasons why greater federal influence over provincial and local infrastructure is problematic. For starters, some of the benefits of decentralized policy making would be lost as the federal government would have more influence in setting priorities and practices. With conditional infrastructure grants, the federal government can impose its own priorities, which may not reflect the particular needs of every region.

For example, the federal government may view public transit as a priority, but some regions lack the population density to support more public transit or they may be adequately served by existing transit infrastructure. Still, if the federal government offers conditional grants for transit infrastructure, the local government may undertake a transit project to capture the additional revenue at the expense of a more pressing local priority. This raises an important concern about how conditional transfers from other levels of government could distort local decision making in counterproductive ways (Dachis, 2016; Bazel and Mintz, 2014; Kitchen, 2006).

As Slack (2009) points out, conditional grants encourage recipient governments to undertake projects that are likely to receive funding over projects that are less likely to be funded. This becomes a problem if recipient governments are overspending on some types of projects at the expense of others. For instance, federal grants (and provincial grants to local governments) tend to support highly visible projects that typically mean higher future operating and maintenance expenses for the recipient (C. D. Howe Institute, 2015). This can come at the expense of important repair and renewal projects that the recipient government would otherwise have undertaken. There is also the concern that recipient governments may behave in counterproductive ways, such as delaying a project in anticipation of future funding, as a strategy to receive larger grants (Gramlich, 1994).

In addition, federal infrastructure grants can lead to a deterioration of accountability by the recipient government to taxpayers (Dachis, 2016; Bazel and Mintz, 2014; Kitchen, 2006). Receiving a transfer from another level of government means that government leaders do not have to face a political cost of raising that revenue directly and therefore have less of an incentive to spend it responsibly. It also means that governments have less of an incentive to control other government spending if they know they can lobby higher levels of government for more funding (Vignault, 2007).⁴³

⁴³ It is also possible that transfers from other levels of government replace, rather than add to, the pre-existing level of spending by the recipient government. However, empirical research has found that intergovernmental transfers tend to increase overall spending by the recipient government, a phenomenon known as the “flypaper effect” (Smart, 2007; Gamkhar and Shah, 2007).

Federal, provincial, and local government resources

If provincial and local governments wish to spend more on infrastructure, they can prioritize the use of available revenue for that purpose rather than calling for additional resources from the federal government.⁴⁴ Tellingly, provincial and local government own-source revenues (total revenue minus transfers from other governments) have been growing faster than federal resources.

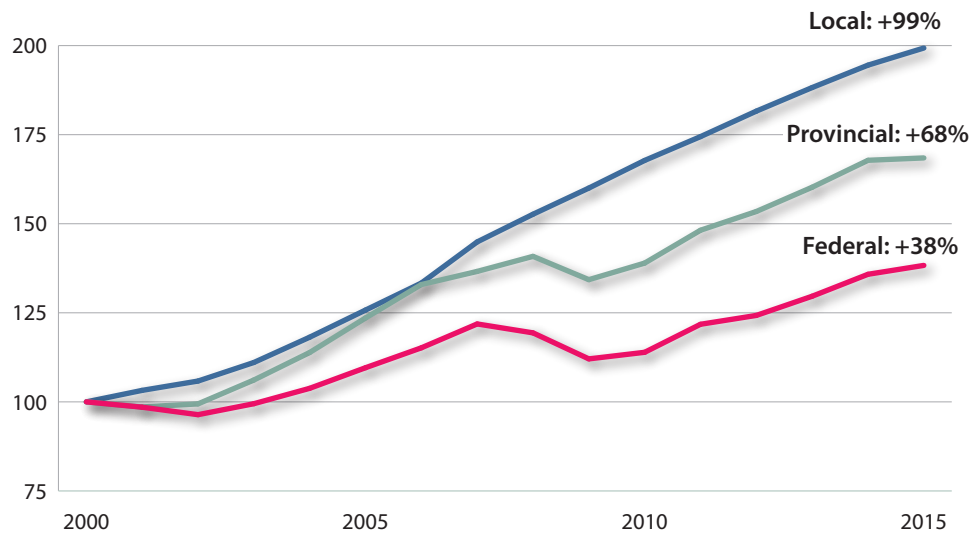
Figure 14 shows the growth in federal, provincial, and local own-source revenue starting in 2000, roughly when the federal government began playing a more active role in provincial and local infrastructure spending, and ending in 2015 (last year of available data). The figure is presented in the form of an index which captures changes in each variable in a comparative manner. By giving each variable an index value of 100 in the starting year 2000, we can more clearly see subsequent changes in relation to the initial year's value. Over the course of 15 years, federal own-source government revenue has increased in nominal terms by 38.3 percent. This growth is considerably lower than the growth in both provincial own-source revenue (68.5 percent) and local government own-source revenue (99.3 percent).⁴⁵ Figure 14 indicates that provincial and local governments generally have access to a pool of resources that is growing faster than the federal government.

Indeed, the federal government's share of the total government resources has declined. **Figure 15** displays federal government revenue as a percentage of total consolidated (federal, provincial, and local) government revenue from 2000 to 2015. Federal revenue as a share of total revenue has fallen from 42.2 percent in 2000 to 36.2 percent in 2015, indicating that the federal government's resources are shrinking relative to other governments. This is without taking into account the fact that transfers from the federal government to other governments further increase the relative fiscal capacity of lower levels of government. Federal transfers to the provinces and territories are higher now than at any other point in history, even after adjusting for inflation and population growth (Eisen et al., 2016). Figure 15 shows a marked decentralization of fiscal capacity in Canada's federation and suggests that further conditional grants from the federal government to fund infrastructure projects are not necessary.

44. If the federal government wishes to increase the resources available to other levels of government, an alternative is to reduce federal taxes with provincial and local governments concurrently increasing their own taxes.

45. Growth in total revenue at each level of government was similar to own-source revenue growth: 38.3 percent federally, 78.3 percent provincially, and 95.9 percent locally.

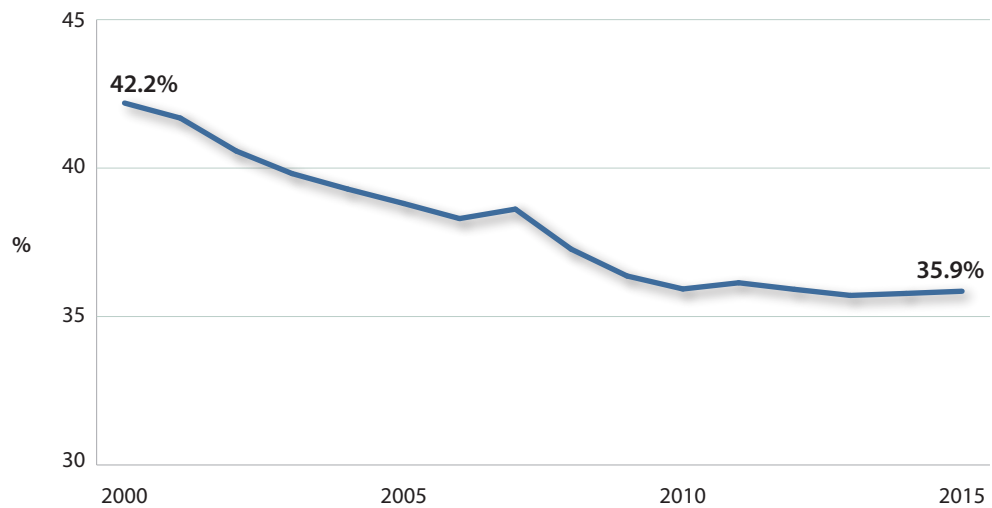
Figure 14: Growth in federal, provincial, and local government own-source revenue, 2000 to 2015 (index where year 2000 = 100)



Note: Local government includes municipal and other local public administrations, aboriginal governments, and school boards.

Sources: Statistics Canada, 2017; calculations by authors.

Figure 15: Total federal revenue as a percentage of consolidated government revenue, 2000 to 2015



Sources: Statistics Canada, 2017; calculations by authors.

Of course, the aggregate provincial and local data may overlook some jurisdictions that lack the own-source revenue to fund necessary infrastructure projects.⁴⁶ However, the federal government already transfers revenue to provinces (through equalization payments) with the goal of ensuring that they can offer a comparable level of services (Boadway and Kitchen, 2015). Moreover, there are alternative funding methods available to any provincial or local government that do not rely on transfers from the federal government. For instance, governments can fund infrastructure projects through user fees.⁴⁷

46. Most provincial governments have had chronic deficits for nearly a decade; this however is not necessarily a sign that they lack resources. The chronic deficits are generally due to a lack of spending restraint rather than a lack of revenue (Eisen et al., 2016).

47. There are a number of added advantages to user fees for funding infrastructure. For a discussion on these advantages, see Bazel and Mintz (2014).

Conclusion

The federal and several provincial governments are planning to ramp up infrastructure spending in the years ahead. However, as this paper has shown, many of the arguments made in favour of large infrastructure spending do not withstand scrutiny. The net stock of government infrastructure is at its highest level in four decades, after adjusting for population and inflation. Contrary to some misperceptions, a substantial amount of infrastructure is being provided by private organizations. The argument that a further expansion of government infrastructure will spur long-term economic growth relies on the dubious assumption that governments will select projects that actually enhance the economy's productive capacity. Historically low interest rates are not a compelling argument for an immediate increase in infrastructure spending given that this is just one factor that affects the total cost of a project. And finally, increased federal funding of provincial and local infrastructure projects has the potential to undermine the advantages of local decision making in Canada's federal system.

Appendix 1: Defining infrastructure

There is no universally accepted definition of what qualifies as infrastructure (Baldwin and Dixon, 2008). Some define it broadly to include a wide range of assets while others define it more narrowly.⁴⁸ This creates confusion, both for public debates about infrastructure spending and for research concerned with measuring the state of infrastructure in Canada. This appendix discusses the definition of infrastructure that is used in this paper when presenting data from Statistics Canada (2016a) and why this definition provides a reasonable measure of infrastructure.

Definition of infrastructure

There are several competing albeit generally overlapping definitions of infrastructure. For example, an International Monetary Fund (IMF) publication suggests that infrastructure includes “roads and other transportation facilities, power generation and other utilities, and communications systems” (IMF, 2014). Meanwhile, Infrastructure Canada’s definition is broader in that it includes physical structures related to culture, recreation, and sports (Canada, Infrastructure Canada, 2015). This means that when the IMF and Infrastructure Canada discuss infrastructure, they are not referring to precisely the same range of assets. Based on the different definitions, the IMF likely would not classify a hockey rink as infrastructure but Infrastructure Canada would.

To the greatest extent possible, the data presented in this paper uses a definition of infrastructure drawn from a Statistics Canada study, which describes the characteristics that can be used to delineate whether something qualifies as infrastructure (Baldwin and Dixon, 2008), including physical assets that are unmovable, have long useful lives, take a considerable amount of time to create, have no short-run or medium-run substitutes, and provide

48. Here, “asset” refers to a tangible object, construction, or resource that can be used to produce or store value for its owner.

a flow of goods and services that would be difficult to hold in reserve or to maintain inventories.

Infrastructure is also described by the Statistics Canada study as playing a “special foundational role” in that it supports the use of other inputs—such as labour or machinery—in the production of goods and services. Disruption of infrastructure leads to “dramatic consequences” on production. For example, an electricity plant plays a foundational role in the production of many goods and services since it would be impossible or extremely difficult in the short and medium term to produce these products if electricity was unavailable.

Available data on infrastructure

An advantage of the definition of infrastructure offered by Baldwin and Dixon (2008) is that there is readily available data from Statistics Canada on assets that generally fit this description of infrastructure. Statistics Canada (2016a) provides a breakdown of capital assets in Canada that fall into four categories: engineer construction, non-residential buildings, machinery and equipment, and intellectual property. Baldwin and Dixon argue that the first two categories, engineer construction and non-residential buildings, can broadly be called infrastructure.

Engineer construction includes pipelines, highways, power generating stations, communication towers, and similar structures. These structures can be classified as infrastructure because they are long-lived, not movable, and fit the other characteristics of infrastructure discussed above. A similar statement can be made for non-residential buildings, which include factories, office buildings, sports facilities, and more. One could argue that some particular engineer construction or building asset should not be classified as infrastructure—for example a hockey rink would be, perhaps controversially, labelled infrastructure under this definition—but together these categories provide a reasonable approximation to allow us to measure Canada’s infrastructure.

In contrast, machinery and equipment as well as intellectual property products do not generally have the characteristics of infrastructure. For one thing, machinery and equipment are typically moveable and do not play the same foundational role as infrastructure (Baldwin and Dixon, 2008). Intellectual property is also in a sense movable, and not a physical asset, so it does not fall under the definition of infrastructure.

Under this definition of infrastructure, an infrastructure asset can be owned privately as well as by the government. Non-residential buildings and engineer structures that are owned by private individuals or entities qualify as infrastructure. The type of infrastructure that is privately and publicly owned

often differs, but there is overlap. For example, both the private and government sectors own office buildings, which is considered infrastructure under the definition being discussed. In addition, the types of infrastructure assets that are traditionally thought of as being exclusively government-owned can be and are privately owned in Canada (Bazel and Mintz, 2015). An example would be private ownership of road infrastructure such as Highway 407 in Ontario.

In summary, there is no universally accepted definition of infrastructure and this complicates the debate and measurement of infrastructure spending. Statistics Canada research nonetheless offers a reasonable definition that broadly includes engineer construction and non-residential buildings.⁴⁹ Unless otherwise noted, this is the definition of infrastructure that is employed in this study.

49. Another example of a Statistics Canada study that uses this definition is Roy (2008).

Appendix 2: Alberta's infrastructure plan

Table A1: Alberta core government 5-year capital plan

Type of infrastructure	Millions (\$)	Share of total
Municipal infrastructure support	8,976	26%
Capital maintenance and renewal	6,233	18%
Roads and bridges	4,617	13%
Climate change, environmental protection and sustainability	4,084	12%
Schools	3,521	10%
Health facilities and equipment	3,473	10%
Government facilities, equipment and Other	1,248	4%
Adult education and skills	940	3%
Family, social supports and housing	892	3%
Sports, arts, recreation and culture	262	1%
Farming, natural resources and industry	239	1%
Public safety and emergency services	155	0%
Contingency	114	0%
Total	34,753	100%

Note: Of the \$6.2 billion being spent on capital maintenance and renewal, \$2.5 billion will be spent on roads and bridges.

Source: Alberta, 2016a.

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