Ontario Infrastructure Investment:
Federal and Provincial Risks & Rewards

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CANADIAN CENTRE FOR
ECONOMIC ANALYSIS

About the Centre for Economic Analysis

The Canadian Centre for Economic Analysis (CANCEA) provides objective, independent and evidence based analysis dedicated to a comprehensive and collaborative understanding of the short and long term risks and returns behind policy decisions and economic outcomes.

CANCEA's clients include all 3 levels of government, non-profit and private sector organizations that seek a best-of-breed understanding of the issues facing them using expertise combined with a many variable computational socio-economic policy evaluation platform.

About This Report

The design and method of research, as well as the content of this study, were determined solely by CANCEA. The research was conducted by David Stiff and Paul Smetanin.

Statistics Canada data and relevant literature were used to inform the computer simulation models used to produce the results of this report.

Forecasts and research often involve numerous assumptions and data sources, and are subject to inherent risks and uncertainties. This information is not intended as specific investment, accounting, legal, or tax advice.

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CANADIAN CENTRE FOR ECONOMIC ANALYSIS

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EXECUTIVE SUMMARY

BACKGROUND

Public infrastructure investment is crucial to the prosperity of a region – it supports the quality of life of its residents and the productive capacity of industries. Without sufficient investment in public infrastructure, future economic growth and prosperity would be at risk. Therefore it is important to understand the risk and rewards of public infrastructure investment, and have the tools to evaluate policy options effectively. A recent analysis by the Canadian Centre for Economic Analysis (CANCEA) (1) highlighted the risk of not sufficiently acknowledging the importance of public infrastructure investment, and showed that Ontario's economic growth would lag significantly if investment in public infrastructure is not maintained. A complementary analysis released in 2014 (2) outlined how "fair" infrastructure policies that maximize returns and minimize risks affect the cost/benefit balance of infrastructure investment to various tiers of government.

Recent changes to the Canadian economic outlook, driven largely by the major depreciation in the Canadian dollar (relative to the US dollar) and fall in oil prices, have raised the question of whether the expected short-term economic slowdown/downturn in 2015 would revise any of the conclusions reached in previous reports. The objective of this analysis is not to recommend policy on how revenues should be shared across levels of government, but to simply achieve a better understanding of the ways in which the costs and benefits (risks and rewards) are shared across the various levels of government.

RESULTS AT A GLANCE

The analysis demonstrates that an imbalance in public infrastructure investment levels by tier of government continues to exist, and that infrastructure investment still remains below optimal levels. The current level of collective investment in Ontario's public infrastructure, at 3.1% of Ontario's GDP, is below the current optimum of about 5%.[1]

The updated analysis indicates that under optimal conditions, the Province and municipalities would collectively be expected to fund about 62% of total infrastructure investment, while the Federal Government would fund the remaining 38%. However, the current breakdown of investment by government tier has Ontario and its municipalities covering 89% of the investment (49% from the Province and the remaining 40% from municipalities), with Ottawa providing the remaining 11%. The federal share is slightly lower than the earlier analysis due to the reduction in federal stimulus spending over the last several years.

The relatively long time-frame of infrastructure investment policy (50 years or more) means that the overall conclusions from previous studies (2; 3; 4) remain similar, and long-term structural changes to the

[1] While expressing optimal infrastructure investment flows as a percentage of GDP assists in standardizing and contextualizing the level of investment, what is most important from an economic development point of view are the services provided or enabled by the stock created and maintained. Furthermore, the optimal level is expressed as a long term average, while the decade to decade targets may vary with economic conditions.

economy would have a larger impact than current short-term economic conditions. The long lifespan of public infrastructure assets mean that decisions today will affect the economy for many years in the future and so it is important that decisions around infrastructure investments are based on solid evidence.

CONCLUSIONS

While public infrastructure investment is critical to support economic growth and prosperity, the current balance of investment and rewards between the Federal Government and other levels of government in Ontario appears to be unfair. The Federal Government is contributing too little relative to the amount of revenue that it generates from infrastructure investment in Ontario. The result is that the Province is in a risky predicament: increasing infrastructure investment (via debt financing) results in continued long-term deficits, but rolling back infrastructure investment would result in greater economic setbacks.

In contrast, the Federal Government benefits with increased revenue when Ontario governments invest. If the Federal Government were to increase funding of public infrastructure in Ontario to 1.9% of Ontario's GDP, and increase the funding share from its current 11% to 38%, both levels of government could maintain healthy surpluses over the next 50 years[2]. In conjunction with the federal contribution, the Province and Ontario's municipalities would have to collectively invest the equivalent of 3.1% of Ontario's GDP into infrastructure.

Investment Contributor	Proportion of Ontario GDP	Relative Contribution
CURRENT LEVEL OF INVESTMENT (Over last 5 years)		
Provincial and municipal governments	2.8%	89%
Federal Government	0.3%	11%
OPTIMAL LEVEL OF INVESTMENT		
Provincial and municipal governments	3.1%	62%
Federal Government	1.9%	38%

In dollar terms, these optimal levels would mean an additional real annual investment in Ontario of $7.5B from the Federal Government (and $1.4B from the other orders) over the next 10 years.

The slope of the results at current levels indicates that the economy and Ontario's fiscal health are very sensitive to Federal Government contributions. A small increase in Federal Government contributions generates significant benefits for the Ontario economy and fiscal health, while small decreases magnify the risks to the Ontario economy and its fiscal health. As such, the current level of federal infrastructure contribution appears to have placed the Ontario economy and Ontario governments on a risky slope.

The pledge of the recently-elected federal Liberal government to increase Canada's public infrastructure investment funding is likely to move infrastructure investment towards a slightly more balanced position, assuming that infrastructure investment from other levels of government remains constant. Until the

[2] Note that the analysis assumes no changes to other government tax or expenditure policies. If non-infrastructure government expenses were to grow more quickly than the overall economy or revenues to decrease due to external factors such as an international recession, surpluses could be reduced.

details of the plan are more fully presented in conjunction with provincial and municipal infrastructure plans, a detailed analysis of the impact of new federal infrastructure investments remains uncertain.

1.0 INTRODUCTION

Public infrastructure plays a critical role in supporting the economic and demographic growth of a region. Sufficient investment in roads, water and wastewater, and transit is required to adequately meet the needs of the growing population. In addition, public infrastructure is crucial to supporting and attracting industry through providing the means to produce and deliver Ontario's goods and services.

Earlier analyses of infrastructure policy in Ontario (3; 4) indicated that approximately 5% of Ontario's GDP could be invested by all governments annually to maximize the Province's long term economic growth over a 50-year period by bringing Ontario's level of infrastructure stock up to the levels required to support the maximum economic activity. It is important to note that the target of 5% of GDP is based on starting from today's current level of infrastructure stock in Ontario, and would likely change over time as investment levels change. Additional analysis of the risk and reward benefits that accrue to various tiers of government from infrastructure investment (2) highlighted an imbalance; the imbalance refers to a situation in which the Federal Government is receiving a disproportionate portion of the benefits of public capital relative to its level of investment.

Evaluating the impact of infrastructure investment is an ongoing endeavour in which the outcomes depend on current as well as future changes in technology and demographic characteristics. Given the fall in 2015 of the Canadian dollar relative to the US dollar and the significant reduction of capital investment in the energy sector (that is consistent with the drop in oil prices), The Canadian Centre for Economic Analysis (CANCEA) is updating and extending the previous analysis (1) that examined the risks and benefits of infrastructure investment in Ontario.

In this regard, the aim of the study is to examine the effects of different infrastructure funding scenarios in Ontario and the consequences for the economic prosperity of Ontarians. In particular, it investigates how infrastructure funding from the federal and Ontario governments could affect long term GDP growth in a scenario whereby the benefits of infrastructure investment are proportionate to the levels of investment made.

The analysis is completed using CANCEA's Prosperity at Risk (PaR) platform, outlined in Section 1.1. Section 2.0 examines the historical funding of infrastructure in Ontario. Section 3.0 presents the results of the updated risk and rewards analysis. Section 4.0 briefly touches on the newly-elected Liberal government's infrastructure investment plan. The conclusions of the analysis are presented in Section 5.0.

1.1 THE PROSPERITY AT RISK (PAR) PLATFORM

To examine how different combinations of contributions made to Ontario's public infrastructure affect the economic prosperity of Ontarians, an agent-based socio-economic and systems platform called Prosperity at Risk (PaR) was used in conjunction with historical evidence to simulate the behaviour of economic agents under different scenarios. For this purpose, it was assumed that taxation rates do not

change into the future, and Ontario was viewed as a single economy with one provincial government (investment data for the provincial government and all municipal governments are grouped) and one federal government. The key technical details of the PaR platform can be obtained by following the instructions contained in Appendix C.

The PaR platform is based on a bottom-up, agent-based modelling and systems approach where computational agents represent individuals, businesses of all types (incorporated, financial and non-financial, and unincorporated), and the levels of government (federal, provincial, and municipal) whose activities are aggregated to estimate the state of the economy from the present day out to 50 years into the future.

The PaR platform includes over 50 processes that estimate the interactions and evolution of agents in the system. Three primary demographic processes – birth, death, and migration – govern the overall population growth. Three labour-force processes – hiring, firing, and retiring – control the evolution of the labour force and wages. Numerous other processes model the purchase, sale, and issue of financial assets and liabilities for households, industries, governments, and non-residents. Several processes describe the direct transfer of currency between agents such as government transfers to people, or personal donations to non-profit organizations. Another key process governs the production of goods and services within the platform. The ability of an industry to produce a product depends on the availability of intermediate goods and services, sufficient labour force, capital equipment, and underlying infrastructure support.

The PaR platform also includes governments (federal, provincial, and municipal) and non-residents. The role of the government is to provide services to businesses and individuals as well as to specify policies (such as public investment strategies). Governments collect taxation revenues from all agents based on their income (from the productive process), dividends, and interest as well as from consumption of produced goods and services (such as HST) before redistributing money to individuals and governments through transfer payments. Non-residents are included to allow for the international flows of goods and money. In the platform, all quantities such as currency and goods are conserved and accounted for. This prevents the injection of money into the system without fully tracking its sources and consequences.

In summary, the entire economy (of Ontario and Canada) is composed of agents (industries or people) who:

- Produce commodities;
- Earn wages (for their role in the productive process);
- Change employment levels in response to production demands;
- Consume the produced (or imported) commodities and services;
- Save and invest into financial and non-financial assets;
- Borrow funds;
- Receive dividends from investments and pay interest on liabilities; and
- Pay taxes.

Within the PaR platform, all transactions between agents are recorded in forms consistent with the System of National Accounts (SNA) from Statistics Canada. This provides a complete portrait of the aggregate economic activity within Canada, the provinces, and even on the municipal level. The SNA consists of production, income and expenditures, financial stocks and flows, and balance of payments information. Each account provides a different perspective of the economy and the economic activity within the production and labour models. This ensures that all simulated results collectively provide a consistent picture of the overall economy.

The PaR platform is then used to investigate the economic impacts by varying the sources of public infrastructure investment funding from the Federal Government and Ontario-based governments which in turn changes individual agent behaviour either by constraint or by opportunity. For this analysis, the model assumes tax rates (income, corporate, and consumption) are constant at recent trends and do not respond to changes in government surpluses or deficits. Increased funding levels would be sourced from debt if required. For each level of public infrastructure investment, government revenues are identified and used to apportion risk to both Ontario-based governments and the Federal Government.

2.0 FUNDING SOURCES OF PUBLIC INFRASTRUCTURE CAPITAL IN ONTARIO

The level of public infrastructure investment in Ontario by all tiers of government has varied considerably over the past 50 years. As a percentage of Ontario's GDP, it has ranged from a high of 4.5% in the mid-sixties to lows of 2% in the mid-eighties. As shown in Figure 1, the trend has been reversing, with increased investment throughout the 2000s, peaking with the stimulus spending in 2009 before falling again. Note that Figure 1 includes capital investments in buildings, engineering, machinery and equipment, but excludes investment in intellectual property (i.e. software, research and development). The non-locality of intellectual property makes assignment to a particular region difficult. For example, a license for software need not reside in the region where the software is used. As a result, intellectual property for the Federal Government disproportionally lies in Ottawa which can skew "intellectual property" statistics for Ontario.

In general, investment in Ontario's public infrastructure has been considerably less than the national average. In addition, as shown in Figure 2, Ontario has seen less investment than the national average on repair and rehabilitation to maintain the state of good repair of its infrastructure assets. Repair and rehabilitation is considered the work required to keep an asset operating at its designed level of performance.

Figure 1 Infrastructure investment in Ontario and Canada as a percentage of Ontario GDP

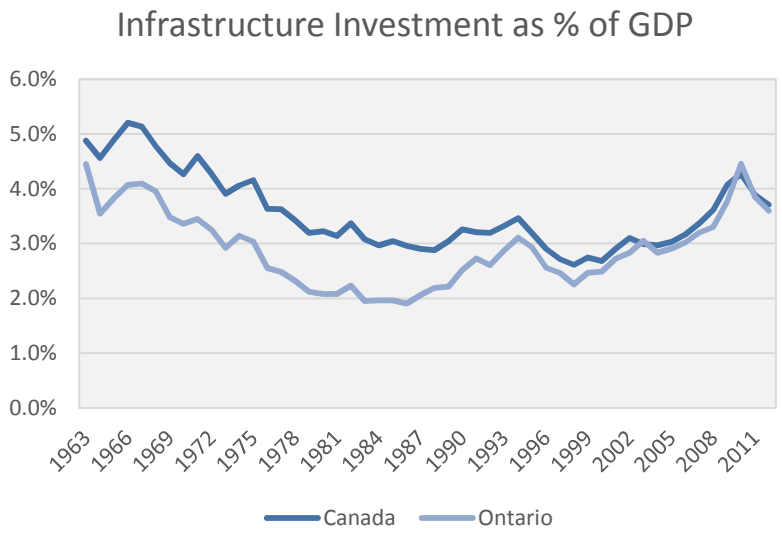
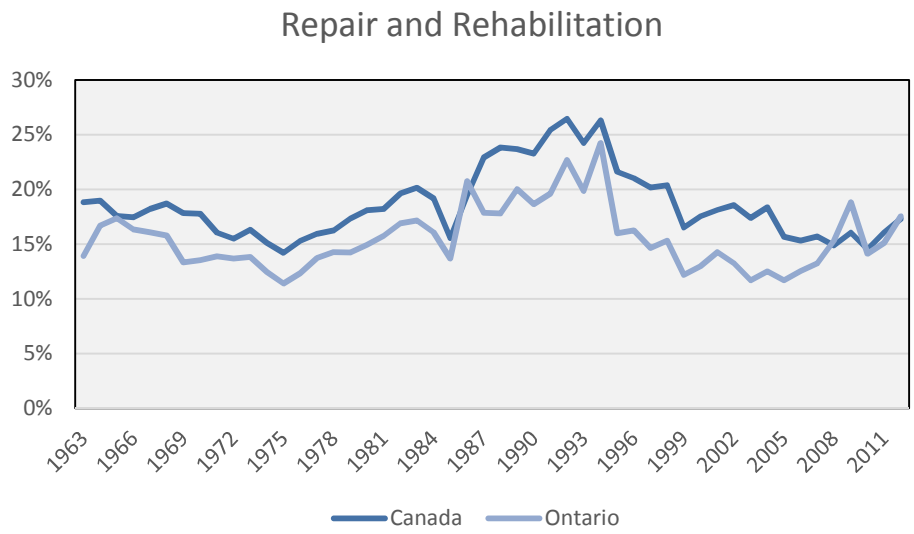


Figure 2 Percent of infrastructure investment spent on repair and rehabilitation

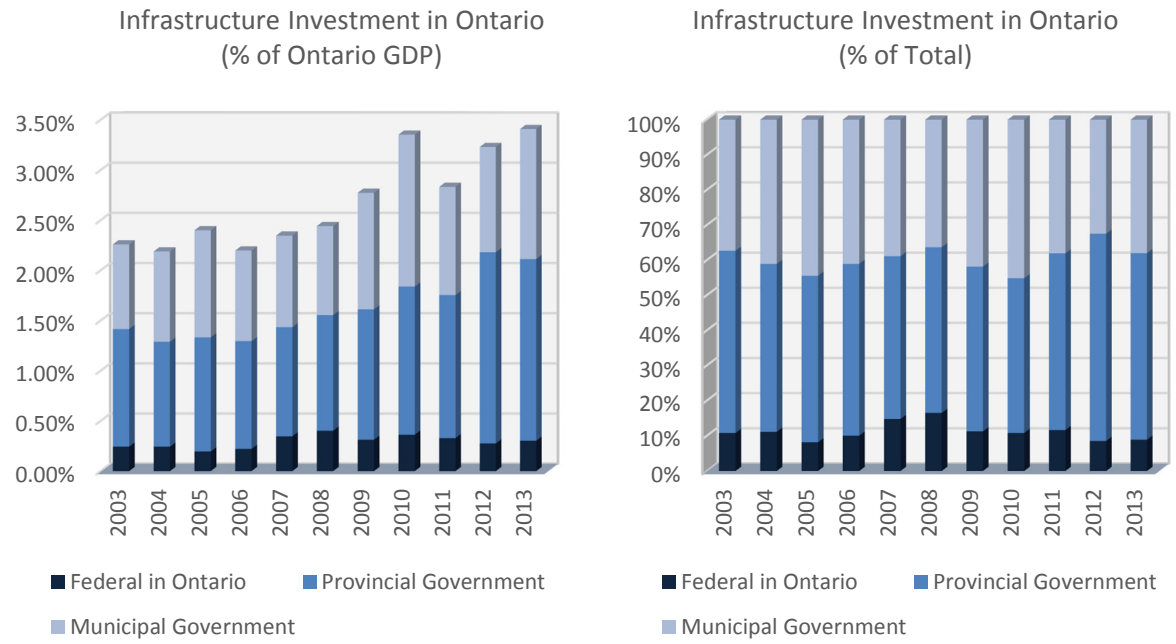


Note that since this is a percent of total investment, and Ontario's total investment is already below the national average, over the last 10 years the amount spent on maintenance averages 43% of the national average when considered as a fraction of GDP.

The responsibility of public infrastructure in Canada is divided among multiple levels of government. Figure 3 highlights the infrastructure investment (non-residential buildings, engineering and machinery and equipment). On average, over the last 10 years, the Province has contributed just over 50% of the total funding, while the municipalities followed with about 40%. Finally, the Federal Government funded

10% of the total building and engineering infrastructure in Ontario, though the average has increased due to federal stimulus spending in 2008 and 2009.

Figure 3 Sources of public infrastructure (non-residential construction and engineering construction) investment in Ontario

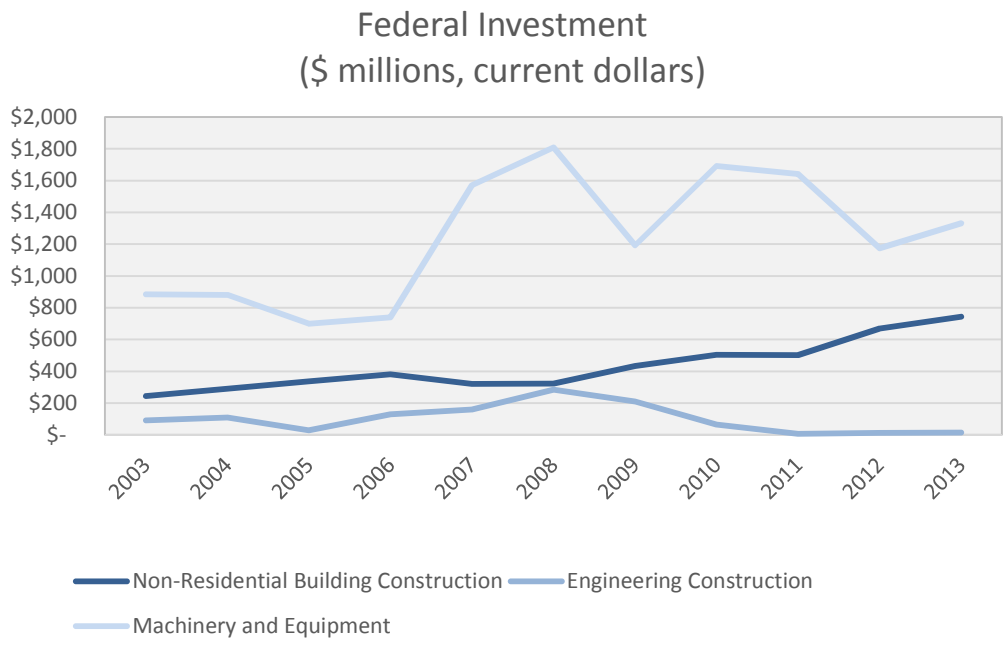


The Province's direct responsibility includes investing largely, but not exclusively, in major highways, buildings for health and education, and other provincial administrative buildings. Transfers to municipalities to fund municipal projects are not included in the provincial totals. The municipalities are primarily responsible for local engineering investment such as waterworks, wastewater, and local roads. Note that in multi-tier municipalities, the upper-tier municipalities are generally responsible for region-wide assets such as the waterworks, while the lower-tier municipalities focus on more local aspects such as local roads.

2.1 Federal Government Investment in Ontario

The Federal Government makes a relatively small direct contribution to infrastructure investment in Ontario (from lows of 0.2% of GDP in 2005 to highs 0.4% of GDP in 2008 over the past decade). Figure 4 clearly shows the stimulus spending on engineering construction assets in 2008 and 2009. Investment in non-residential construction has continued to increase slowly over the past several years, while investment in engineering assets has fallen to almost zero.

Figure 4 Federal investment in Ontario's public infrastructure



2.2 Provincial Government Investment in Ontario

The provincial and municipal governments are the primary investors in Ontario's infrastructure, with both averaging around 1.2% of GDP annually over the last 10 years. However, in recent years, the provincial government has been increasing its investment to reach almost 2%. The provincial government's direct investment is largely on non-residential construction for institutional buildings in areas of provincial jurisdiction such as health care and engineering assets such as primary highways.

2.3 Municipal Government Investment in Ontario

In contrast to the provincial government's investment, municipal investment is dominated by engineering construction investments such as waterworks, waste water, public transit and local roads. Non-residential building construction is largely limited to administrative building, and smaller municipal-funded buildings such as local libraries and museums. A component also addresses social housing[3].

In Ontario, local public transit engineering construction is also mostly the responsibility of the municipality, though it and other municipal infrastructure investment could be partially funded through grants from the Ontario government (such as the Ontario Community Infrastructure Fund). However, the Province invests heavily in interregional transit such as through Metrolinx.

[3] For a detailed examination of the impact of investment in social housing, see (9)

Figure 5 Provincial investment in public infrastructure

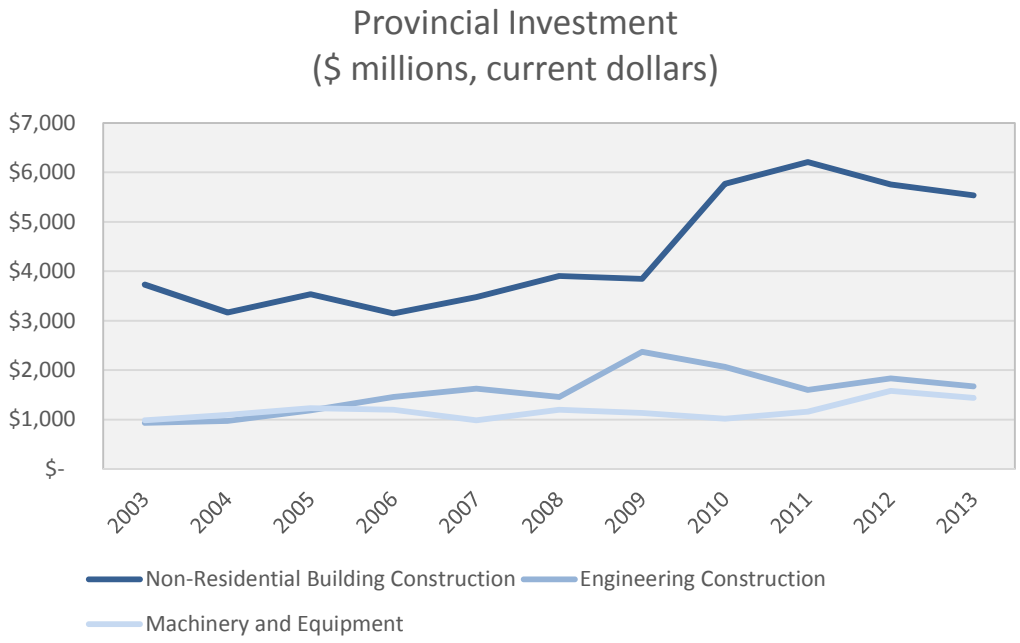
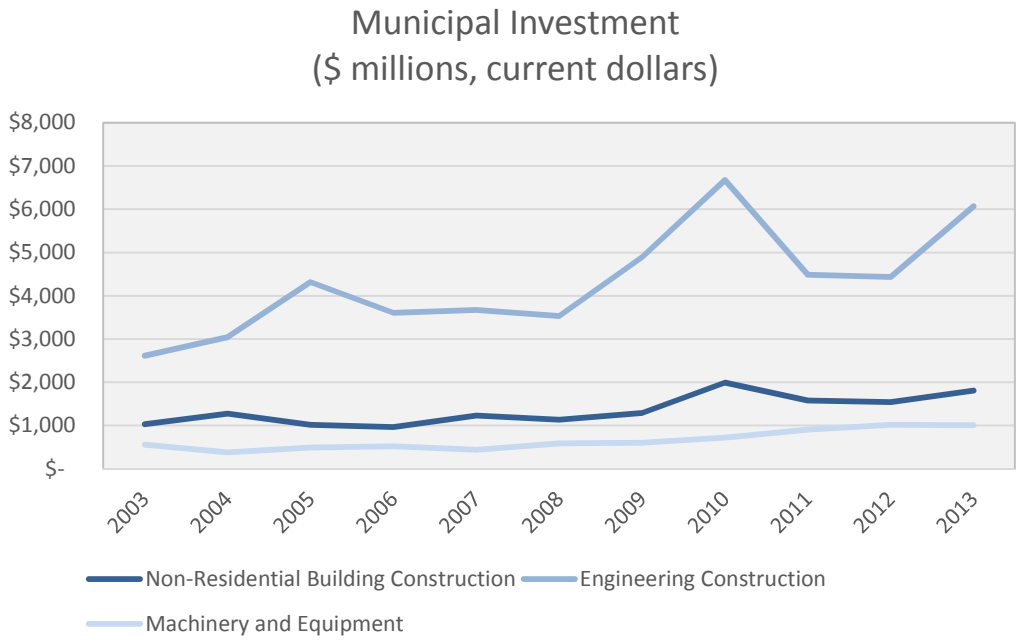


Figure 6 Municipal investment in public infrastructure



3.0 BENEFITS AND COSTS OF PUBLIC INFRASTRUCTURE INVESTMENT

Public infrastructure plays a critical role to support the prosperity of a region. Without sufficient infrastructure, the ability of the population to grow is constrained, of private and public industries to produce is reduced, of potential industrial attraction is reduced, and quality of life could deteriorate. However, excessive investment in infrastructure can also be detrimental in the sense that it crowds out private consumption and investment, and puts governments' fiscal sustainability at risk.

Therefore, governments are required to strike an effective balance between investing enough in public infrastructure to support and attract economic prosperity, and over-investing. Previous CANCEA studies (1; 2; 3; 4) indicated that there has been systemic under-investment by all levels of government, with long-term investment in Ontario being around 3%; this compares to the collective 5% optimal threshold (given Ontario's current stock of infrastructure) before over-investing becomes a concern.

Prior to considering the results, it is helpful to keep in mind that while expressing optimal public infrastructure investment flows as a percentage of GDP assists in standardizing and contextualizing the level of investment, what is most important from an economic development point of view are the services provided or enabled by the stock of public capital created or maintained. Furthermore, the relationship between the appropriate infrastructure stock and the economy is dynamic, and the optimal levels expressed in this report are the results of long-term averaging over a 50-year period, while the decade to decade optimal areas may vary with economic conditions.

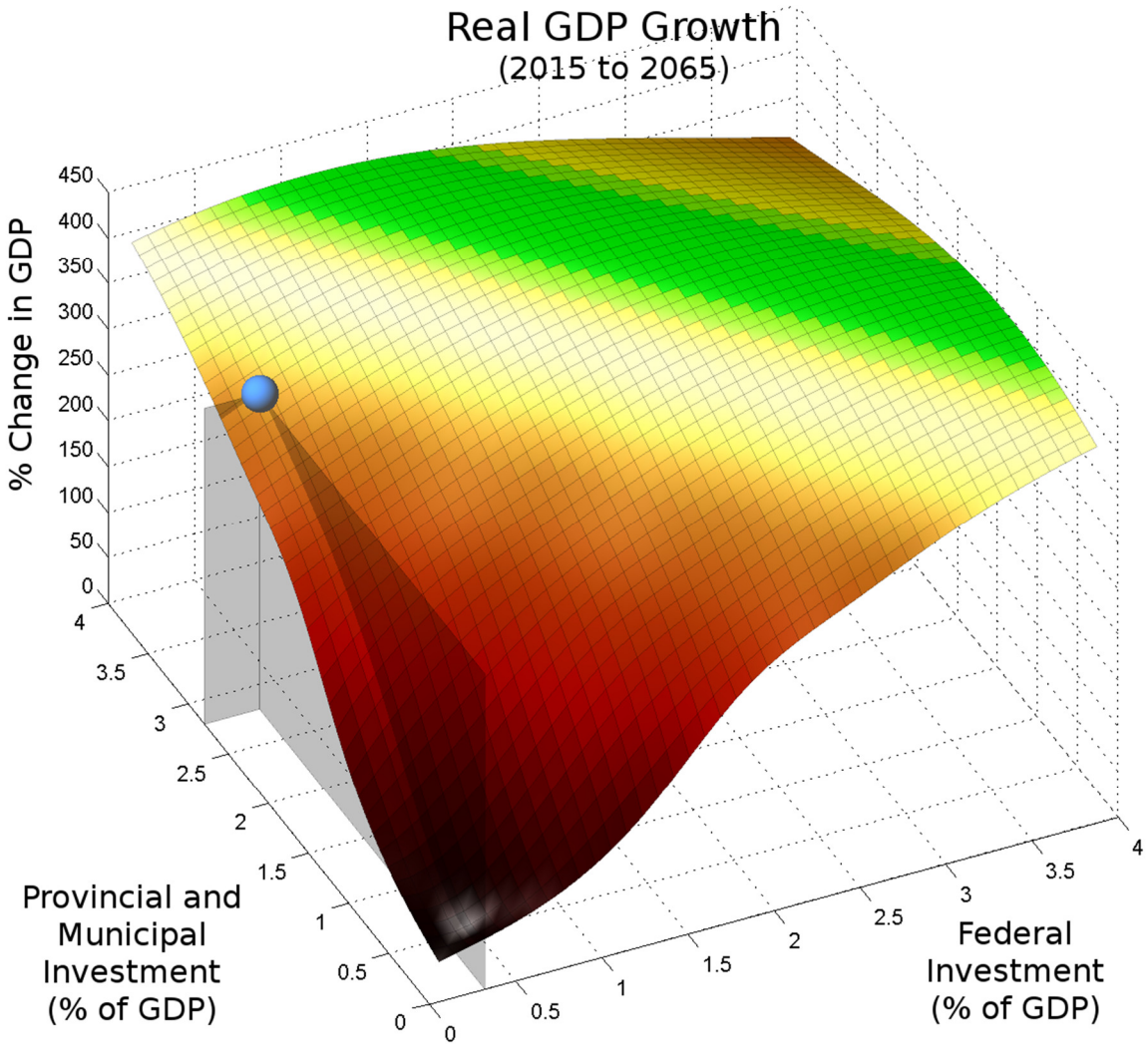
Figure 7 shows the expected real GDP growth over the next 50 years as a function of the public infrastructure investment share of different tiers of government. The green band indicates the region of maximum economic growth, given the current public infrastructure stock in Ontario. The diagonal nature of the green band indicates that, from a GDP point of view, who provides the funding for the same infrastructure investment is not significant in this analysis[4], as long as the total is around this current collective target of 5% of GDP.

The blue dot in the figure indicates current levels of funding: the Province and municipalities together invest about 2.8% of GDP, with the Federal Government investing about 0.3% of GDP. The combined investment of 3.1% of GDP is well below the levels required to maximize economic growth in Ontario given Ontario's current stock of infrastructure. Either the Province and municipalities, or the Federal Government, or a combination of all three could increase their investment to the collective 5% of GDP target. However, greater economic activity also yields additional tax revenue (consumption, income, and corporate taxes) to the various levels of government. The question then becomes what combination of

[4] Note that in this analysis government policies are assumed not to change in response to changing levels of debt or surpluses. If government revenue or expenses policies were to change, the economic outcomes might vary depending on who provides the funding in addition to the total investment.

additional investment in infrastructure would balance the risk (the cost of infrastructure investment) and rewards (additional tax revenue).

Figure 7 Real GDP impacts of various public infrastructure investment strategies by 2065 as a function of public infrastructure investment (measured as a % of GDP)



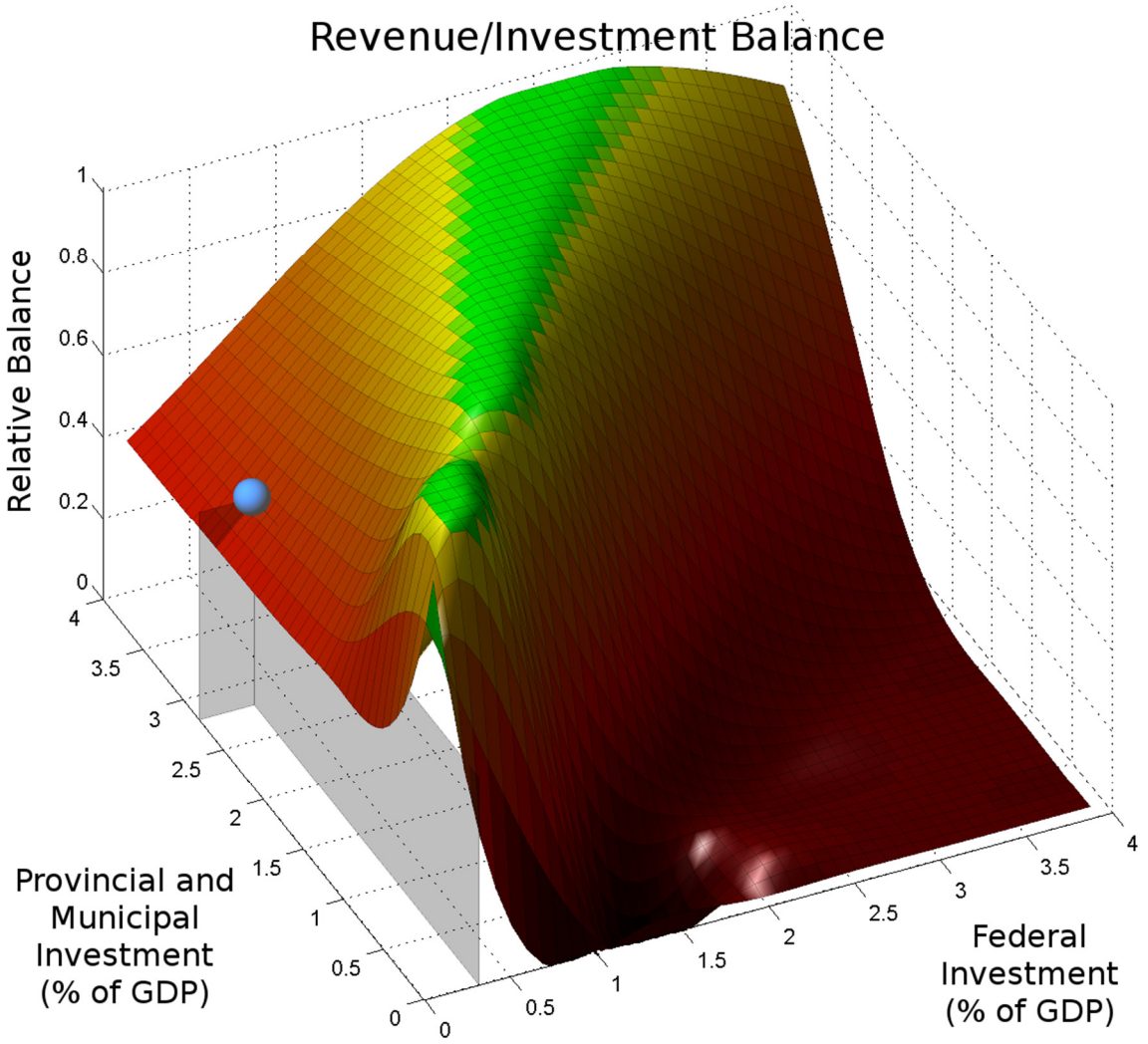
3.1 Balance of Risks and Benefits

Given their broad-based taxation sources, the fiscal benefits of public infrastructure investment in Ontario are most significant to the Province and the Federal Government. They directly reap the financial benefits (in the form of income, corporate, and consumption taxes) of increased industrial output that greater infrastructure investment would generate. Municipalities on the other hand, are largely limited to property taxes, user fees, and development charges, which constrain their ability to tap into the benefits

of growth. However, the ability of municipalities to attract industry and generate industrial development charge revenue is dependent on the overall quality and stock of public infrastructure.

The question then becomes how the rewards of public infrastructure investment (as measured by tax revenue) and the risk of investment (quantified by the amount invested in infrastructure) should be distributed among the different tiers of government. There are additional benefits to society and industry from public infrastructure investment, but from a public finance perspective, tax revenue is usually used as a measure to quantify the benefit.

Figure 8 Balance of public infrastructure investment and tax revenue arising from Ontario. Higher values indicate regions where public infrastructure investment and tax revenue are in increasingly similar proportion between the federal and provincial/municipal governments



One way to assess whether public infrastructure funding across government tiers is balanced is to determine whether the investment level by each tier of government is in the same proportion to the revenue it is accruing from the overall investment. For example, if 25% of the tax revenue generated from an investment were to go to a specific government then that government should be contributing 25% of the investment (with the other governments contributing 75% of the investment and receiving 75% of the revenue). The ratio of benefits and investment for both governments would be equal and the relative balance would equal 1. On the other hand, if a government were to contribute 10%, but receives 80% of the benefits, the ratio falls. The greater the mismatch, the smaller the ratio. [5]

Figure 8 shows the revenue/investment balance for the ranges of federal and provincial/municipal funding levels for infrastructure. Higher values represent scenarios where the revenue/investment ratios across government tiers are more balanced between tiers of government. Conversely, policies that represent disproportionate provincial and federal investment contributions are reflected by low values. Under the current investment policy, (represented by the blue dot in the figure) the Federal Government enjoys significant economic benefits despite providing only about 10% per cent of the total investment over the last 10 years. By this metric, in order for public infrastructure policies to be fairer over the long term, the revenue/investment balance should reside in the bright green area on the figure.

If one would like to maximize economic growth while maintaining a balance between public infrastructure investment and tax revenue across all government tiers, the results from both Figure 7 and Figure 8 must be considered simultaneously. Figure 9 combines both GDP levels (for the federal and provincial governments) and the funding balance for both government tiers and plots them as a function of varying provincial and federal contributions.

In order to maximize economic growth while maintaining a fair balance of risk and rewards to infrastructure investment across government tiers, the Federal Government should be investing up to 1.9% of Ontario's GDP in infrastructure, with the Province and municipalities contributing an additional 3.1%. This point is indicated by the green dot in Figure 9. As can be seen, this shift would represent a small increase in provincial/municipal investments, but a significant increase in federal investments. Table 1 summarizes the current and optimal levels of infrastructure investment.

Over the next 10 years (in constant 2015 dollars), relative to the optimal level of investment, if public infrastructure investment policy were to follow current levels:

- The Province and municipalities will underinvest by $1.4 billion annually;
- The Federal Government will underinvest by $7.5 billion annually; and
- The absence of Federal funding accounts for 84% per cent of the total infrastructure investment shortfall.

[5] Specifically, if the change in revenue is R_f and R_p for the Federal Government, and the Province (with municipalities) respectively, with infrastructure investments of I_f and I_p, then the relative balance, B, is defined as $\log(B) = -\left(\frac{R_f}{I_f} - \frac{R_p}{I_p}\right)^2$

Figure 9 Federal and provincial/municipal investment balance for maximum GDP growth by 2065.

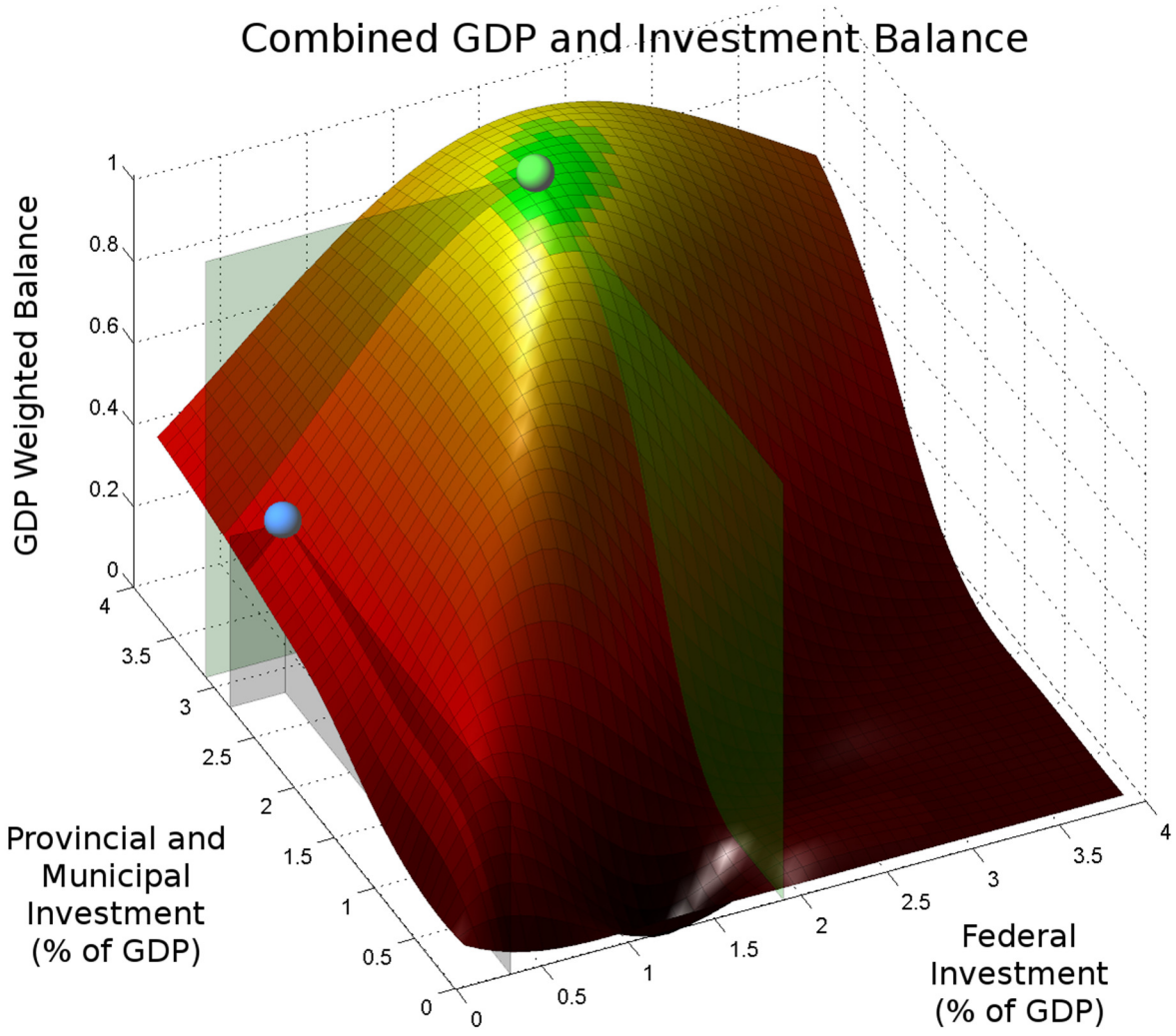


Table 1 Infrastructure Investment Contributions

Investment Contributor	Proportion of Ontario GDP	Relative Contribution
CURRENT LEVEL OF INVESTMENT (Over last 5 years)		
Provincial government	1.6%	51%
Municipal governments	1.2%	39%
Federal Government	0.3%	10%
OPTIMAL LEVEL OF INVESTMENT		
Provincial and municipal governments	3.1%	62%
Federal Government	1.9%	38%

3.2 Ontario Governments Cumulative Surplus/deficit

While public infrastructure investment is required to support economic growth and prosperity, the cost of this investment must eventually be paid. As the Province and municipalities increase their infrastructure investment, greater economic growth does occur (see Figure 7) but, as illustrated by the white arrow in Figure 10, the additional tax revenue received by the Province would be insufficient to cover the investment expenses, assuming no other change to governments' policies. The Federal Government, however, would see its surplus increase.

Conversely, if the Province and its municipalities were to reduce their infrastructure investment, (red arrow in Figure 10), it would impede economic growth, resulting in a faster increase in debt vis-à-vis income over time. Ontario governments are therefore in a difficult situation where increasing infrastructure spending without a significantly larger federal contribution does not yield sufficient revenue growth to cover the investment, but decreasing investment could result in even greater debt over time.

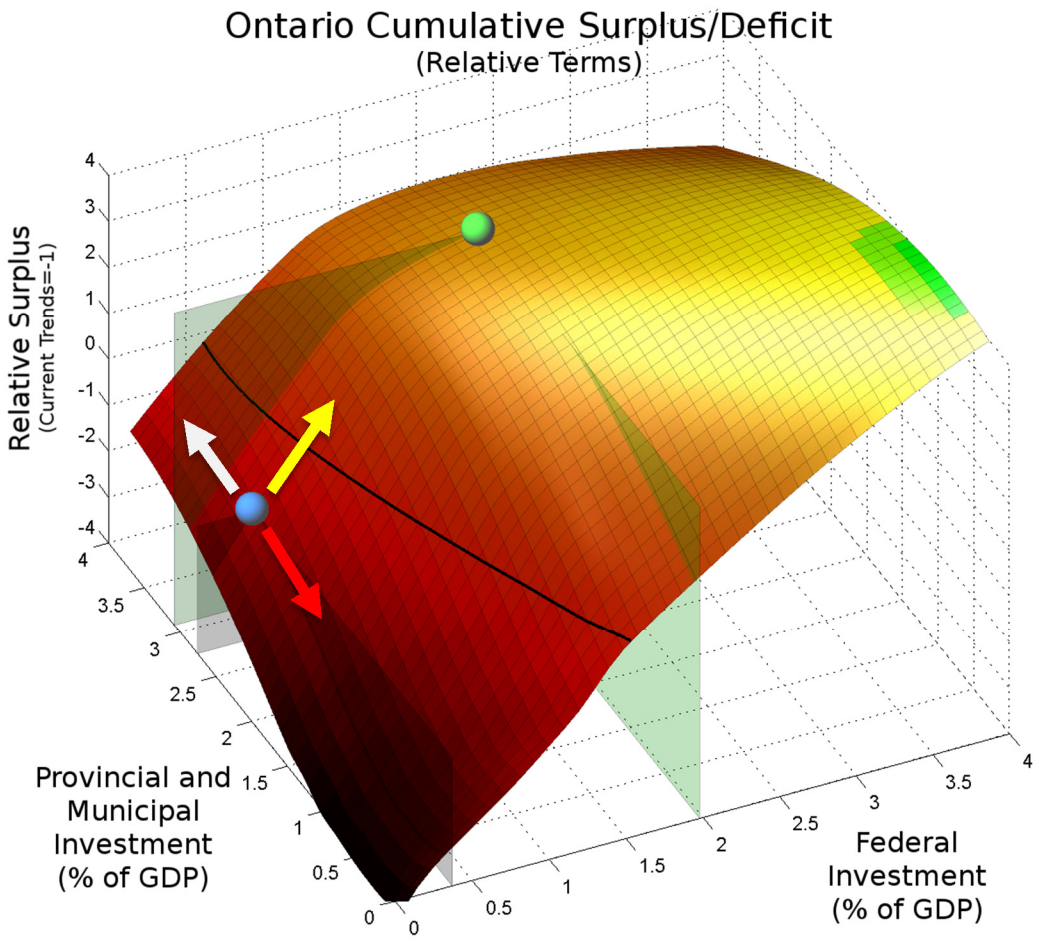
In contrast, if the Federal Government were to increase its investment in infrastructure in Ontario (yellow arrow in Figure 10), it would move closer to a scenario that balances the economic returns and investment while moving Ontario towards a long-term surplus position (i.e., above the black line). The Federal Government would still be well into a surplus position.

The slope of the results at current levels indicates that Ontario's economy and fiscal health are very sensitive to federal contributions. A small increase in federal contributions would lead to significant benefits for Ontario's economy and fiscal health. However, small decreases in federal contributions lead to significant risk for Ontario's economy and fiscal health. As such, the current level of federal infrastructure contribution appears to have placed Ontario's economy and its fiscal health on a risky slope.

It is important to note that to reach both the greatest economic growth and maintain a balance between infrastructure investment and economic returns, the provincial government and the Federal Government would need to increase their infrastructure investment.

There are several approaches that could be used to improve the balance of risks and rewards between the Province and the Federal Government. One straightforward approach would be for the Government of Canada to increase its investment in federally-owned assets in Ontario. However, given the limited scope of federal infrastructure responsibility, this approach would be unable to address the full mismatch of risk and rewards. A second option could be to increase transfers for infrastructure funding from the Federal Government to the Province or municipalities. This would increase the infrastructure expense incurred by the Federal government whilst keeping the rewards at the same level. This is the implicit assumption under which this analysis was conducted. A third option would be a shift in taxation policies such that the Province receives a greater share of the rewards. A combination of the three options would also be possible.

Figure 10 Ontario government's cumulative surplus/deficit

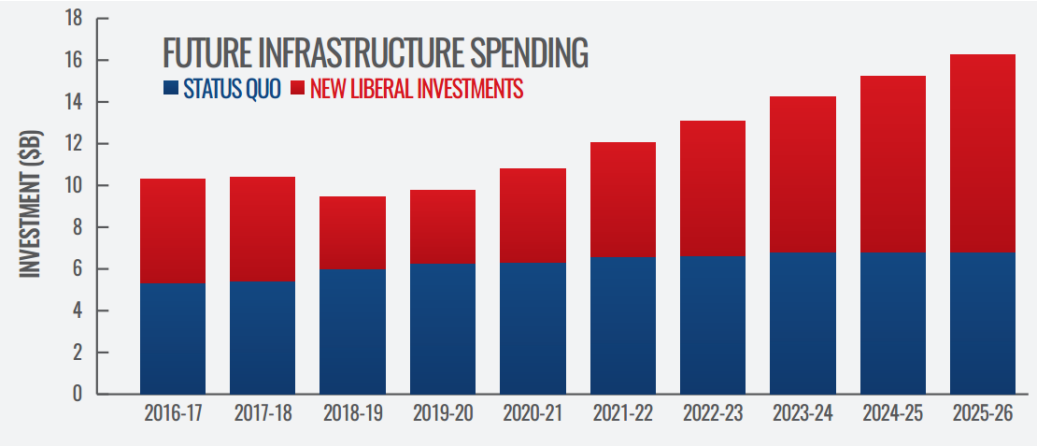


While this analysis assumes that governments would run surpluses or deficits during the process, the question of how best to fund and finance public infrastructure (whether through government debt funding, public-private partnership, user fee based or other forms) or any specific policy recommendations, is outside the scope of this report.

4.0 FEDERAL GOVERNMENT INFRASTRUCTURE INVESTMENT

A majority Liberal government was elected in Ottawa in October 2015 with a pledge to significantly increase infrastructure funding from the Federal Government. Figure 11 shows the promised infrastructure spending across Canada that would be divided into the three general categories of public transit, social infrastructure (such as affordable and senior housing, child care, and cultural and recreational), and green infrastructure (such as water, wastewater, climate resilience, and flood mitigation).

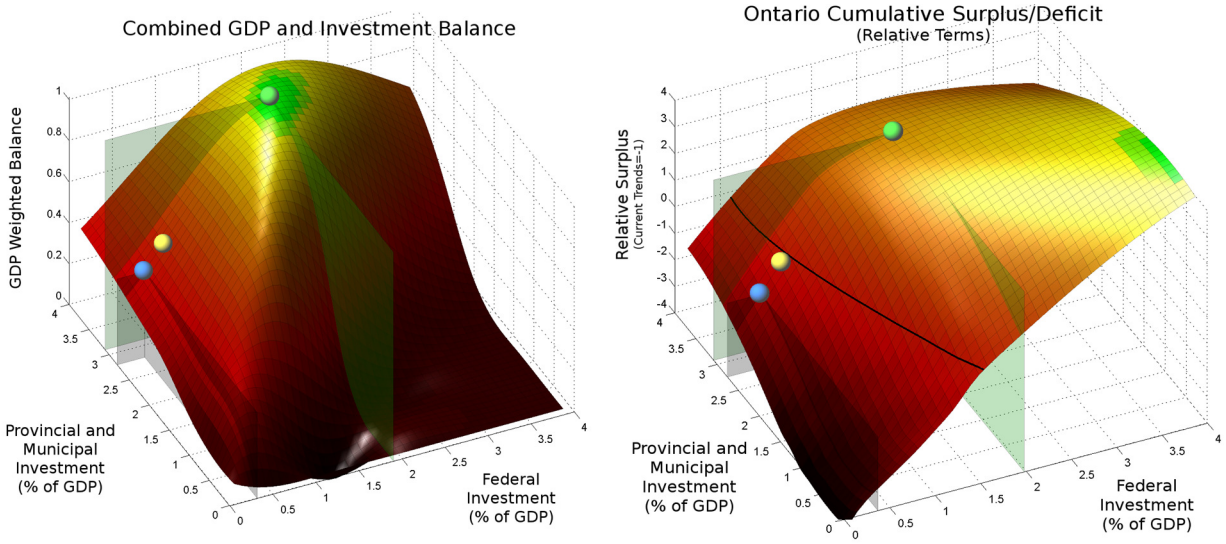
Figure 11 Federal Liberal Infrastructure Spending



(Source: 'A Historical Investment Plan', https://www.liberal.ca/files/2015/08/An-historic-investment-plan.pdf, Retrieved 2015-11-01)

While the detailed allocation of the planned infrastructure investment has not been announced, if the Province and the municipalities were to continue to invest at current rates and the Federal Government commits, based on a per capita provincial split, 38% of the investment to Ontario, public infrastructure investment would slightly increase towards the optimal 5% of GDP threshold, and this funding would be more balanced across government tiers. The yellow dot on Figure 12 indicates how the *status quo* might change under such a scenario. In addition, the increased federal funding moves Ontario and its municipalities much closer to a net surplus. It is still some way from the optimal sharing of investment risks and rewards, but it does shift the status quo in a more optimal and fair direction.

Figure 12 Estimated impact of increased federal infrastructure investment (yellow dot)



5.0 CONCLUSIONS

5.1 OVERVIEW

Despite recent economic developments, with the significantly lower Canadian dollar (relative to the US dollar) and much lower oil prices in 2015, the long timeframe over which the results of public infrastructure investment accrue does not significantly change the conclusions of our earlier report. In both cases, the current level of federal investment in public infrastructure in Ontario appears to be out of balance with the rewards that it receives, with economic growth being optimized when about 5% of GDP is invested by all governments to increase Ontario's stock of public infrastructure to the levels required to support maximum economic activity. Governments in Ontario appear to be in a difficult predicament whereby the benefits realized from their own infrastructure investment are insufficient to cover the associated expenses, while the Federal Government continues to increase its surplus.

Ontario's fiscal health and economy are very sensitive to changes in federal contributions, which places the Ontario economy and the fiscal health of Ontario governments on a risky slope.

In summary,

- Starting at Ontario's current levels of public infrastructure, a long-term trend of collectively investing about 5% of provincial GDP yields the greatest economic growth and net fiscal revenue benefits
- The risk/reward balance between the Province and the Federal Government is currently heavily skewed towards the Province, with the Province bearing most of the risk from infrastructure investment and the Federal Government disproportionately reaping the rewards
- To move towards greater economic growth while sharing the investment and revenue proportionally over the next 10 years,
    - the Federal Government could increase its real investment in Ontario by $7.5B annually to reach 1.9% of Ontario GDP (the Federal Government accounts for 84% of the current funding shortfall)
    - The Province and municipalities could increase their real investment by $1.4B annually to reach 3.1% of Ontario GDP (the Province and municipalities account for 16% of the current funding shortfall)

5.2 LIMITATIONS

The analysis of the long-term infrastructure impacts implicitly includes several assumptions including:

- No significant change in technology, which would significantly alter the return on investment or productivity requirements for specific asset types;
- Immigration and emigration trends continue as they have in the past;
- No significant climate change events alter the infrastructure requirements in Ontario;
- International markets continue long-term trends; and
- An appropriate mix of infrastructure investment across all asset categories is made and that the projects are properly executed.

5.3 Future Research

The detailed Prosperity at Risk platform does not yet capture some secondary effects of infrastructure investment policies such as changes in demand and price in the housing market, or change in commodity prices due to demand arising from infrastructure investment. These items are currently on CANCEA's research agenda.

A. BIBLIOGRAPHY

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B. DATA SOURCES

The following data sources are the key tables used to calibrate the economic behaviour of the agents in Prosperity at Risk.

Quantity	Description	CANSIM Table
	DEMOGRAPHIC TABLES	
Population	The population of Canada by age and sex	051-0001
Births	The number of births in Canada by sex	051-0013
Deaths	Number of deaths in Canada by age and sex	051-0002
Immigration	Immigration into Canada by age and sex	051-0012
Emigration	Emigration from Canada by age and sex	051-0012
	ECONOMIC TABLES	
National Balance Sheet Accounts	National Balance Sheet Accounts quarterly	378-0121
Current and Capital Accounts	Current and capital accounts - Households (quarterly)	380-0072
	Current accounts - Households, provincial and territorial (annual)	384-0040
	Provincial and territorial consumption of fixed capital at replacement cost, by sector (annual)	384-0043
	Current and capital accounts - Non-profit institutions serving households (quarterly)	380-0075
	Current and capital accounts - Corporations (quarterly)	380-0076
	Current and capital accounts - General governments (quarterly)	380-0079
	Current and capital accounts - Non-residents (quarterly)	380-0082
Financial Flow Tables	Financial Flow Accounts (quarterly)	378-0119
	Financial Flow Accounts (quarterly)	378-0119
	Flows and stocks of fixed residential capital (annual)	030-0002
	Flows and stocks of fixed non-residential capital, by North American Industry Classification System (NAICS) and asset, Canada, provinces and territories (annual)	031-0002
	Flows and stocks of fixed residential capital (annual)	030-0002
Balance of International Payments	Balance of international payments, current account, investment income, by type and sector (quarterly) (dollars x 1,000,000)	376-0013
Income Tables	Income of individuals, by sex, age group and income source, 2011 constant dollars (annual)	202-0407
	Property income of households (quarterly)	380-0087
	Property income of households, provincial and territorial (annual)	384-0044
Input-Output Tables	Input-output tables, inputs and outputs, detailed level, basic prices	381-0022
	Provincial gross domestic product (GDP) at basic prices, by sector and industry (annual)	381-0030
	Provincial input-output tables, inputs and outputs, summary level, basic prices (annual)	381-0028

Quantity	Description	CANSIM Table
	Input-output tables, final demand, detailed level, basic prices (annual)	381-0023
	Provincial input-output tables, final demand, summary level, basic prices (annual)	381-0029
	Provincial input-output tables, international and interprovincial trade flows, summary level, basic prices (annual)	386-0003
	Inputs and outputs, by industry and commodity, S-level aggregation and North American Industry Classification System (NAICS) (annual)	381-0013
Labour Force Statistics	Labour force survey estimates (LFS), by sex and detailed age group (annual)	282-0002
	Labour force survey estimates (LFS), by North American Industry Classification System (NAICS), sex and age group (annual)	282-0008
	Labour force survey estimates (LFS), by provinces, territories and economic regions based on 2006 Census boundaries (annual)	282-0055
	Labour statistics consistent with the System of National Accounts (SNA), by province and territory, job category and North American Industry Classification System (NAICS) (annual)	383-0031
	Labour force survey estimates (LFS), retirement age by class of worker and sex (annual)	282-0051
	Labour force survey estimates (LFS), retirement age by class of worker and sex (annual)	282-0051
Other	Capital and repair expenditures, by sector and province (annual)	029-0005
	Consolidated federal, provincial, territorial and local government revenue and expenditures (annual)	385-0001

These sources are supplemented by census data.

C. TECHNICAL MODEL DETAILS AND VALIDATION

For technical model details and an overview of the validation details of the Prosperity at Risk simulation platform, please contact:

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