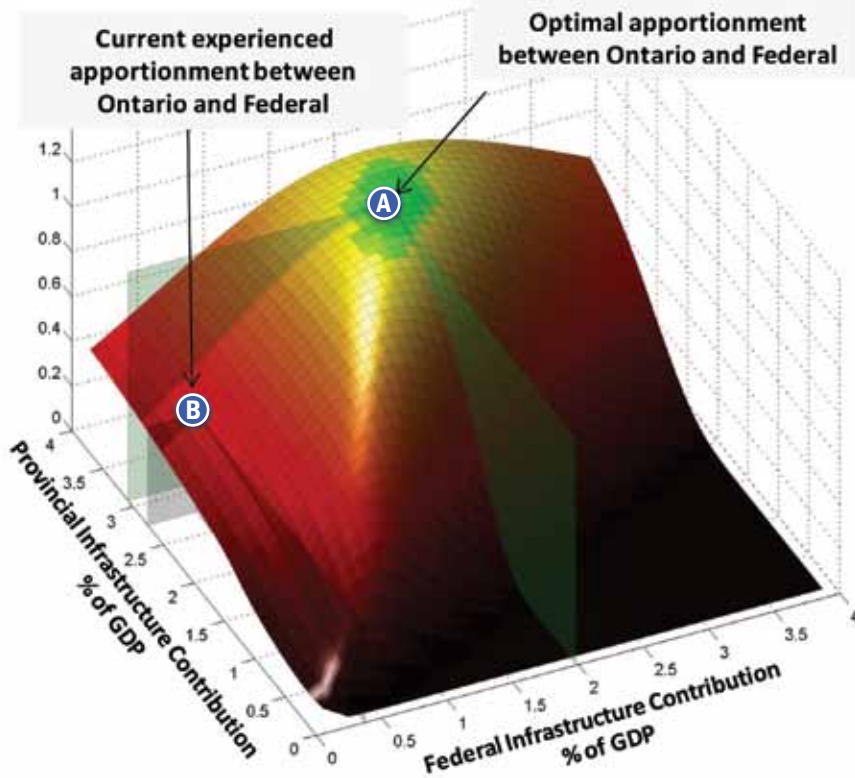




An Independent Study Commissioned by

## Investment and GDP Balance



# Ontario Infrastructure Investment:

## Federal and Provincial Risks & Rewards

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## **About this Report**

In keeping with the Canadian Centre for Economic Analysis' guidelines for funded research, the design and method of research, as well as the content of this study, were determined solely by the Centre. The research was conducted by Paul Smetanin, David Stiff, and Paul Kobak.

Statistics Canada data and relevant literature was used to inform the computer simulation models used to produce the results of this report. All quantitative methods used can be requested.

The interpretation and reporting of the results of the mathematical modelling contained within this report do not necessarily represent the policy position or the opinion of the grantor, the Residential and Civil Construction Alliance of Ontario.

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.

## **Citation**

Smetanin, P., Stiff, D., and Kobak, P., Ontario Infrastructure Investment: Federal and Provincial Risks & Rewards. The Canadian Centre for Economic Analysis, 2014.

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ISBN 978-0-9938466-0-1

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# Ontario Infrastructure Investment: Federal and Provincial Risks & Rewards

An Independent Study Commissioned by the  
RESIDENTIAL AND CIVIL CONSTRUCTION ALLIANCE OF ONTARIO

## **Technical Prosperity at Risk Details**

To obtain further information on the key technical details of  
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**July 2014**

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## EXECUTIVE SUMMARY

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### PREFACE

Sufficient investment into Ontario infrastructure ensures that Ontario's roads, waste management, transit systems as well as water and power delivery systems are properly maintained and are adequate to serve the growing needs of the population of the province. Beyond the basic societal needs, this investment also plays an important economic role in the way it supports the means of production and transportation of Ontario's goods and services. Previous work (1; 2) indicated that an investment of 5.1 per cent of Ontario's gross domestic product (GDP) would provide sufficient funding for maintenance of existing infrastructure and the building of new infrastructure and optimize Ontario's economic returns over the next 50 years. Yet the historical investment trends of 3.1 per cent of GDP are well below what macroeconomic analysis would suggest. An understanding of some of the reasons behind such an underinvestment may assist in the future development of a sustainable, long-term public infrastructure investment policy in Ontario.

If a sustainable public infrastructure investment strategy follows the premise of maximizing the economic returns and minimizing the economic risks for the investors (different levels government), then it would follow that an understanding of the extent to which governments benefit from such investment would assist in the way the financial risks might be shared. Municipal, provincial, and federal governments are gross fiscal beneficiaries of public investments in Ontario infrastructure (1; 3; 4). This study will extend previous work by investigating the sources for investment in the stock of Ontario public infrastructure. In particular, it will examine the way in which financial risks are shared and whether the status quo provides a sustainable balance or not.

The objective of the study is not to challenge the way in which fiscal revenues generated from Ontario economic activity are shared among municipal, provincial, and federal governments but is simply to examine the facts of different apportionment assumptions and the consequences for the economic prosperity of Ontarians. The study will do this by using agent-based economic modelling techniques that are used in conjunction with historical evidence to simulate the

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behaviour of computational economic agents under different sets of economic policies to understand the emergent results from their expected future interactions. For this purpose, we have assumed taxation rates do not respond to future surpluses or deficits in the future, and we have viewed Ontario as a single economy with one provincial government (investment data for the provincial government and all municipal governments are grouped) and one federal government. That is, when considering the consequences for the economic prosperity of Ontarians, this study is limited to viewing the provincial government and all municipal governments as one group of “Ontario-based governments” that are a source of Ontario public infrastructure investment, with the federal government being the other source. Future studies are encouraged to decompose the analysis into federal government sources, provincial government sources, and Ontario municipal government sources. The role of the private sector through P3 or alternative financing and procurement also would merit future research.

## **RESULTS AT A GLANCE**

Analysis demonstrates that if sharing of the Ontario public infrastructure funding risks were to follow from the fiscal benefits that accrue to different levels of government, then all Ontario-based governments would be expected to cover approximately 61 per cent of the investments, with the federal government covering the balance of 39 per cent. Yet currently, all the Ontario-based governments collectively cover 88 per cent of the infrastructure investment risk. The federal government currently covers the balance of 12 per cent, which is significantly below its share of the investment returns.

Examination of the sustainability of such an apportionment of risks demonstrates that, under the current trends, the federal government is a significant net beneficiary of Ontario public infrastructure investments while Ontario-based governments are not. The economic rate of return for Ontario-based governments does not cover their costs of funding such investments, while it does for the federal government. The long-term results are growing fiscal deficits and debt for Ontario-based governments and fiscal surpluses for the federal government.

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In investigating whether or not Ontario-based governments could avoid growing fiscal deficits and debt by investing more themselves, it was found that they could not. In fact, regardless of what Ontario-based governments do, whether they invested more or less, they could not avoid the exposure to growing future fiscal deficits. Objectively, such a situation cannot be described as sustainable.

In the absence of Ontario taxation rates being increased or other policy changes in Ontario, any solution needs to involve a change in the current federal government policy. If the federal government were to invest thirty five cents of every dollar of fiscal surplus it receives from Ontario public infrastructure investment, then Ontario-based governments could collectively enjoy fiscal surpluses of their own. Such a solution would allow Ontario, as well as the federal government, to be a net beneficiary in terms of investments in Ontario public infrastructure. Under such an approach, the simulation demonstrates that the optimal annual investment in public infrastructure of 5.1 per cent of Ontario GDP could be reached if:

- Ontario-based governments increase their public infrastructure investments by \$1.4 billion annually in the short term (and grow with real growth rates in the long term); and
- The federal government ramps up its Ontario public infrastructure funding from 0.37 percent to 2 per cent of provincial GDP which amounts to about \$7.2 billion annually in the short term (and continues to grow with real growth rates in the long term).

In the absence of additional federal funding, the results are clear: Queen's Park and local municipalities have little choice but to continue to invest in public infrastructure, at least at its current rate, while the federal government benefits, potentially at the expense of the health of the Ontario economy. This potential situation clearly demonstrates the case for Ottawa, Queen's Park, and municipalities to work more closely together to determine long-term, sustainable approaches to infrastructure investment.

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## CONCLUSIONS

While the Ontario government's announcement in 2011 of a 10-year infrastructure plan is promising, the fact is that sub-optimal investment has existed for a number of decades. Most of this investment was made by the Ontario government and municipalities despite the long-term economic benefits that accrue to the federal government. At current investment contribution levels, Ontario can be expected to run accumulating funding deficits over the next 50 years, which cannot be avoided by increasing Ontario's contribution toward infrastructure investment alone (assuming that other government revenue policies and expenses continue at current trends).

As Ontario's contribution to total public infrastructure investment is not expected to produce sufficient economic growth to overcome the accumulated cost of financing such investments, the Ontario government and municipalities are in the predicament of having to continue to invest at current sub-optimal levels if no other investment sources can be found. In contrast, however, the analysis reveals that the federal government would have to relinquish 35 per cent of the fiscal surplus it receives from Ontario in order to optimally restore the ability of all levels of government to enjoy a positive rate of return on their public infrastructure investments. In that sense, the future of Ontario's economic growth from public infrastructure investment is expected to be tied to the future of the federal government's Ontario infrastructure investment policy.



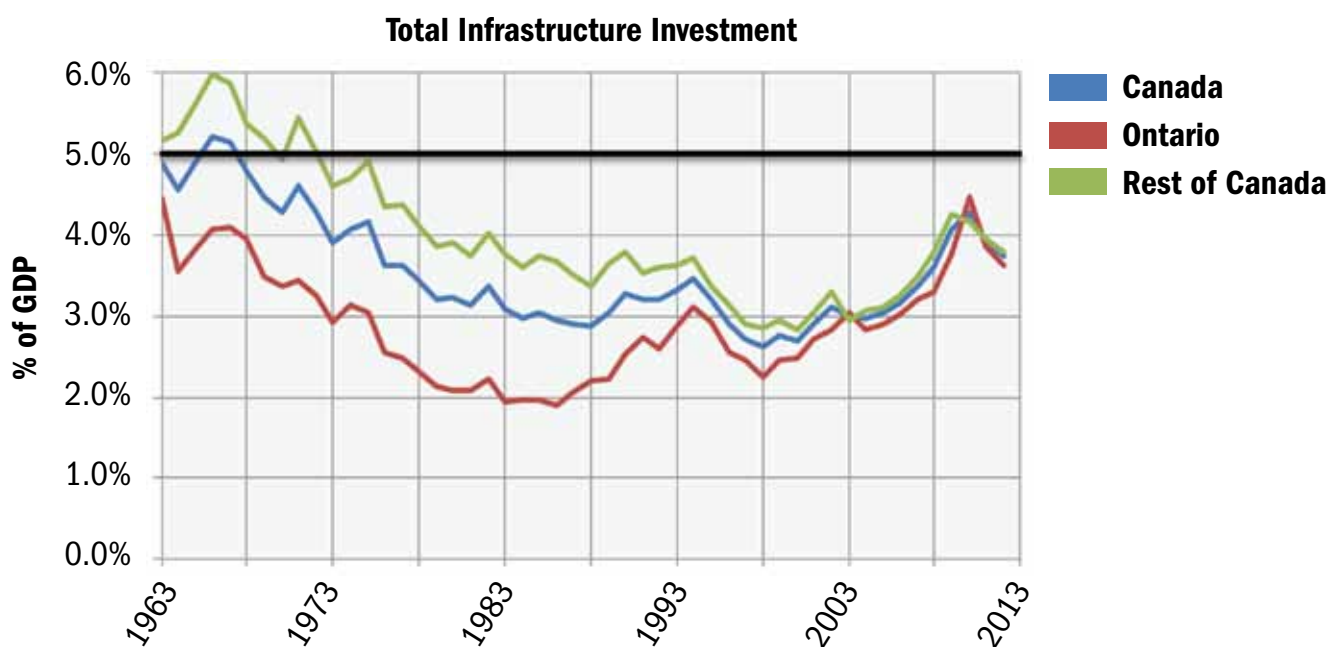
## 1.0 INTRODUCTION

### 1.1 Background: Public Infrastructure Investment in Ontario

While the recent and proposed increases in Ontario public infrastructure investment from the ReNew Ontario (5) and Building Together (6) plans are an important step in the right direction, when viewed against what macroeconomic analysis would suggest, there is a history of infrastructure underinvestment in Ontario (1; 2). Such an underinvestment (see Figure 1) is continuing to impact the ability of Ontario to invest in and appropriately maintain its roads, waste management, transit systems, and water and power delivery, which are required to serve the growing needs of the population of the province.

Beyond the basic societal needs, public infrastructure investment also plays an important economic role in the way it supports the means of production and transportation of Ontario's goods and services. Previous work (1; 2) concluded that an annual investment into Ontario public infrastructure of about 5.1 per cent of Ontario GDP is necessary in order to realize the optimal economic benefit over the next 50 years.

**Figure 1: Historical trends of infrastructure investment for Ontario and Canada as a percentage of their respective GDP**



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Currently there exists a gap between the optimal infrastructure investment levels in Ontario and the amounts the provincial, municipal, and federal governments are collectively investing. The recent historical average investment trends of 3.1 per cent of Ontario GDP are well below what macroeconomic analysis would suggest is optimal. This study was inspired by seeking a better understanding of some of the economic risk and return reasons behind such an underinvestment with the objective of better informing the dialogue around the future development of a sustainable, long-term public infrastructure investment policy in Ontario. In this regard, a press release dated February 13, 2014 by Ontario's Minister of Infrastructure turned the attention of the analysis to the differences between the provincial and federal contributions to Ontario public infrastructure investment. The theme of the message was that the federal government should be contributing more.<sup>1</sup>

The objective of this study is to better understand whether the current levels of provincial and federal contributions to Ontario public infrastructure investment are appropriate from a risk-based perspective and what would be more sustainable. It is not to delve into the complex issues of how fiscal revenues generated from Ontario economic activity are shared between municipal, provincial and the federal governments. In this regard, this is a study that examines the facts of different apportionment assumptions and the consequences for the economic prosperity of Ontarians. If a sustainable public infrastructure investment strategy follows the premise of maximizing the economic returns and minimizing the economic risks for the investors (different levels of government), then it would follow that an understanding of the extent to which governments benefit from such investment would assist in the way the financial risks might be shared. This recognizes the fact that the total amount of the infrastructure investment is not the only variable that is of interest in determining an optimal investment strategy.

Municipal, provincial, and federal governments are gross fiscal beneficiaries of public investments in Ontario infrastructure (1; 3; 4). Under current

<sup>1</sup> This theme was further emphasized by a letter dated March 19, 2014 from Ontario's Minister of Finance to the federal Minister of Finance.

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trends, the Ontario government and municipalities provide the largest share of investment in Ontario public infrastructure, with a smaller contribution coming from the federal government. The economic implications of this type of investment strategy, in contrast to one in which the federal government plays a more active role, are not immediately apparent.

As an investigation of the relationships involved, and in order to provide insights as to how the distribution of the economic returns and risks can influence public infrastructure investment behaviour in Ontario, this study builds on previous research (1) by investigating the following three issues:

- Sensitivity of Ontario GDP to total infrastructure investment in Ontario from all levels of government;
- Fiscal revenues that accrue from Ontario public infrastructure investments at the federal level and by all government levels (provincial and municipal) in Ontario; and
- Current apportionment of public infrastructure financing as split between all “Ontario-based governments” and the federal government and its impact upon the economic prosperity of Ontario.

Using an agent-based socio-economic simulation called Prosperity at Risk, as explained in Section 1.2, the macroeconomic benefits of public infrastructure investment in Ontario are contrasted against the allocation of the financial risks of such investment in Section 2.1. Section 2.2 then examines what the economic simulation suggests as the optimal maximization of economic returns with the minimization of funding risks. These results are then contrasted against the current trend in apportionment between the federal government and the collective of all Ontario-based governments. Section 2.3 then investigates the net economic-return consequences of maintaining the status quo for the federal government and the collective of all Ontario-based governments. The section concludes with an investigation of the possible strategies that may be considered to resolve any identified undesired consequences for a sustainable, long-term Ontario public infrastructure investment strategy.

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## 1.2 Public Infrastructure Investment Simulation

To examine the consequences of different government contributions to Ontario public infrastructure investment on the economic prosperity of Ontarians, an agent-based socio-economic simulation platform called Prosperity at Risk was used in conjunction with historical evidence to simulate the behaviour of computational economic agents under different sets of economic policies to understand the emergent results from their expected future interactions. For this purpose, it was assumed 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 Prosperity at Risk can be obtained by contacting the authors (see inside cover of the report).

The Prosperity at Risk platform is built on a bottom-up, agent-based modelling approach where computational agents represent individuals, businesses (incorporated financial and non-financial and unincorporated), and the various levels of government (federal, provincial, and municipal). A demographic and labour-force model is used to estimate the state of individuals within the population from the present day and simulated out to 50 years into the future. The Prosperity at Risk platform considers three primary demographic processes: birth, death, and migration as well as labour-force processes, such as hiring, firing, and retiring. A single individual within a Canadian population is associated with a combination of demographic and labour states (sex, age, and employment state). The employment state determines whether an individual is employed by a specific industry, unemployed (seeking employment), or non-labour force.

A production model within Prosperity at Risk is used to simulate the output production of commodities in response to the requirements of consuming agents. The commodities represent non-durable and semi-durable goods and services that can be consumed immediately (or over short periods of time) as well as durable goods that contribute to private or public capital. In that sense, industries produce commodities for final consumption by households

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or governments as well as for intermediate consumption by other industries. Each industry is responsible for the production of multiple commodities and strives to reach target production levels that are set by consumer demand as well as the other industries (used as intermediate consumption in their production process). The ability to realize the target production is constrained by the skill level of employees and the productivity of the available capital (technology). Industries can hire and fire workers, and invest in capital and financial assets. A multifactor productivity accounts for changes in productivity due to other contributions, such as improvements in technology.

The platform also considers other agents, such as 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 revenue from all agents based on their income (from the productive process), dividends, and interests received as well as from consumption of produced goods and services (such as HST) and redistribute money to individuals and governments through transfer payments. Non-residents are included to allow the international flows of goods and money.

The entire economy (of Ontario and Canada) is composed of individual agents 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;
- Save and invest into financial and non-financial assets;
- Borrow funds;
- Receive dividends from the investments and pay interest on the liabilities; and
- Pay taxes.

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Within Prosperity at Risk, all macroeconomic quantities are constructed from these within a complete network of economic accounts that are constructed using the System of National Accounts from Statistics Canada (See Data Sources). This provides a complete portrait of the aggregate economic activity within Canada, the provinces, and even on the municipal level. The main accounts consist of productivity, income and expenditure, financial, 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 together provide a consistent picture of the overall economy. This provides a strong limitation on the degrees of freedom of the models by enforcing conservation of goods and money. For that reason a number of key economic variables are causally linked through the balancing of financial and capital accounts (a change of state of one agent induces a change to the state of a linked agent or agents somewhere else in the economy).

The combinatorial analysis modules of Prosperity at Risk are then used to investigate the economic impacts by varying the sources of public infrastructure investment funding from the federal government and Ontario-based governments. For this analysis, the model assumes tax rates are constant at recent trends and do not respond to changes in government surpluses or deficits. Increased funding levels therefore would be sourced from debt if required. For each level of public infrastructure investment, the government revenue benefits are identified and used to apportion risk to both Ontario-based governments and the federal government.

## 2.0 RESULTS

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### 2.1 Public Infrastructure Investment: Managing Risks and Returns

The aim of the current study is to develop a better understanding of the sustainability of the current levels of the federal government and Ontario-based governments' contributions to Ontario public infrastructure investment. In this regard, Prosperity at Risk is used to examine the effects of different apportionment assumptions and the consequences for the economic prosperity of Ontarians in terms of the following themes of sustainability:

- Maximization of economic returns (GDP), which includes investment levels and execution that maximize the economic productivity of the community; and
- Minimization of economic risks, which ensure government taxation revenues and financing risks are allocated to support continued sustainability of investment.

#### 2.1.1 Maximization of economic returns (GDP Growth)

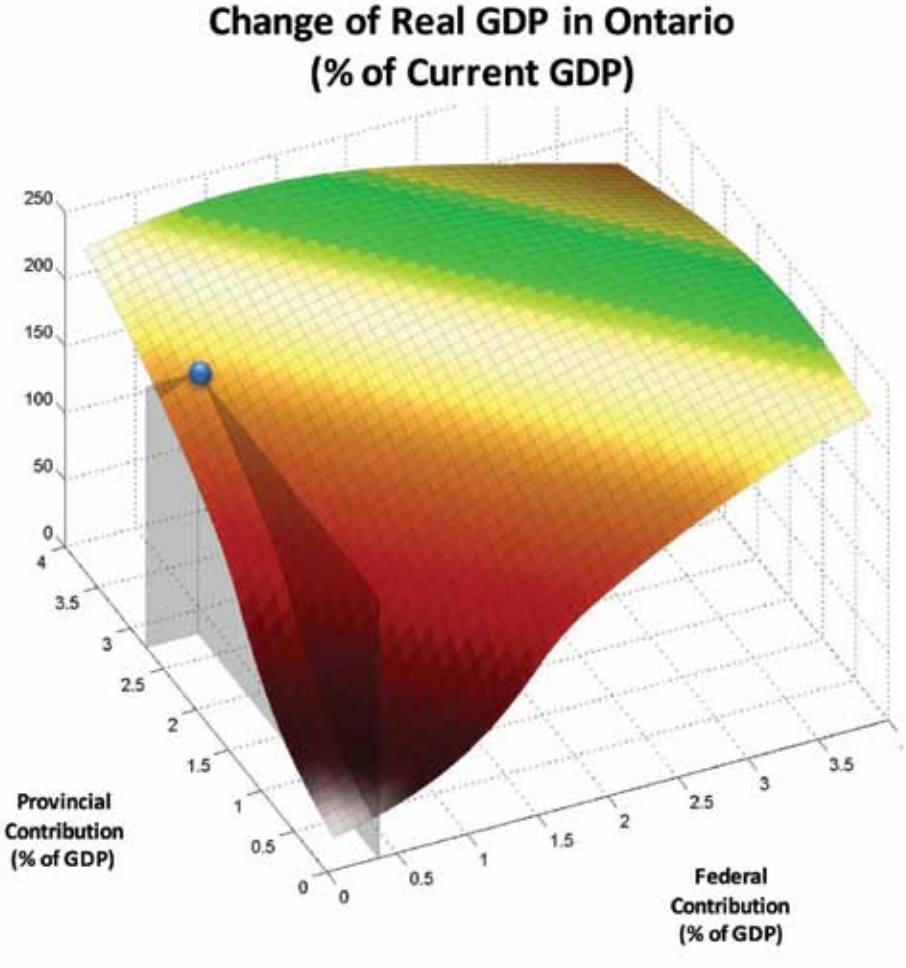
A combinatorial analysis<sup>2</sup> was used to determine the impacts of various infrastructure policies on the changes in the real GDP in Ontario. Each policy is characterized by a specific infrastructure investment contribution from all Ontario-based governments and the federal government in terms of the percentage of annual GDP. Each policy is represented by a single point on the surface plot in Figure 2, and the current policy is indicated by a blue point and represents:

- Ontario invests about 2.8 per cent of GDP; and
- The federal government contributes about 0.37 per cent of GDP.

2 All the surface diagrams used in this report are the result of running future 50 year simulations in Prosperity at Risk for every combination of variables on the bottom two axes.

The results in Figure 2 indicate not only that the present policy is sub-optimal (not near the green region) but also that any decreases in the Ontario's investment contribution can have significant impacts in reducing real GDP growth. This is characterized by the sudden drop on the surface in the direction of decreasing provincial contribution. The results suggest that, while ignoring the costs of public investment, the optimal investment (investments resulting in the maximum real GDP growth) is in the vicinity of 5.1 per cent of Ontario's GDP, regardless of which level of government funds it.

**Figure 2: Real GDP impacts of various infrastructure investment strategies by 2064**



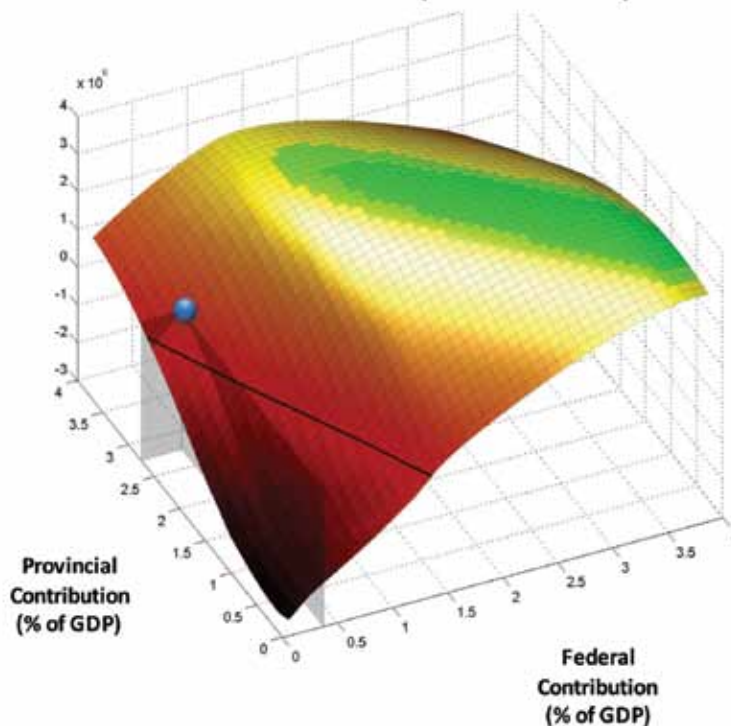


### 2.1.2 Minimization of economic risks

The combinatorial analysis was also used to determine the impacts of investment policies on the second theme of sustainability: the impact on economic risks. Under the assumption that taxation rates do not change in response to surpluses or deficits, the budget surplus or deficit of the various investment strategies are presented in Figure 3. Under current infrastructure investment policy, the aggregate of all governments (as a group) can expect to enjoy a small budgetary surplus over the next 50 years. Despite this, the results also indicated the surplus is expected to be far from the optimal outcome (green). It is important to note that the maximum surpluses cannot be reached by increasing the provincial (including municipal) contribution alone.

**Figure 3: The surplus/deficit positions of general governments together due to various infrastructure investment strategies by 2064**

#### Public financing of Investment – Surplus/Deficits All Governments (2014 Dollars)

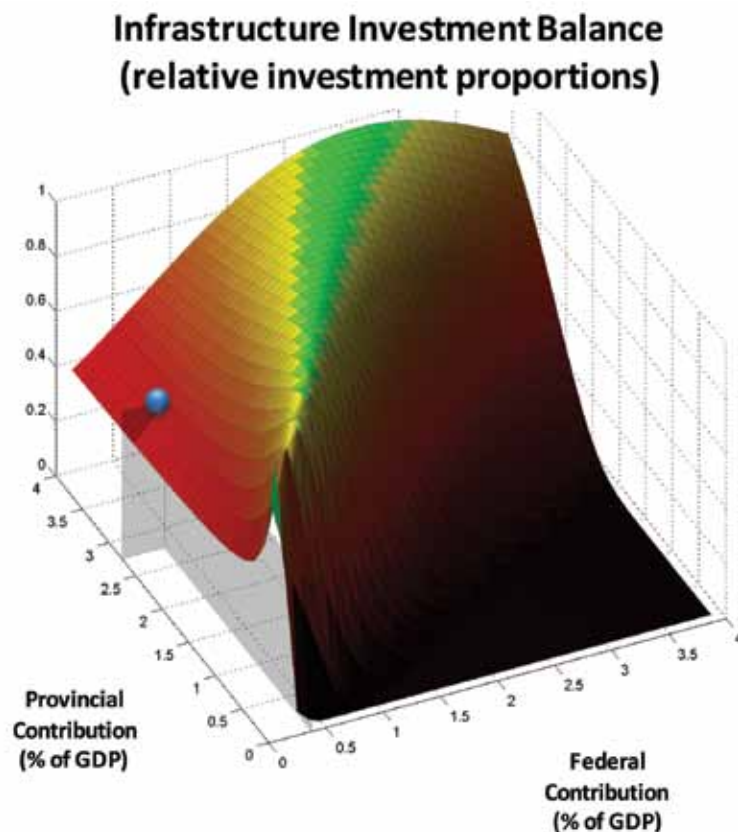


\* The black line shows the division between surpluses and deficits.

### 2.1.3 Balance of Risks and Rewards

Figure 4 presents the expected benefits standardized to the proportion of the investment contribution. That is, the points on the surface (associated with specific investment policies) that represent provincial (including municipal) and federal investment contributions with proportional benefits (to the respective governments) are represented by the highest values (green). Conversely, policies that represent provincial and federal investment contributions that are disproportionate to the benefits are given by low values (dark red). The current investment policy under which the federal government enjoys significant economic benefits despite providing only 12 per cent of the total investment is associated with mid-range value of around 0.4.

**Figure 4: Expected benefits standardized to individual government contribution**



## 2.2 Optimal Versus Current Infrastructure Funding

In the previous section, we presented the Prosperity at Risk simulation results regarding the impacts of various investment policies on the sustainability of the investment (in terms of changes to the future GDP) and government (all governments combined) surplus/deficit. The results indicated that increasing the infrastructure investment to the optimum point of 5.1 per cent (as suggested by the 2011 study) in itself may not be sufficient to ensure optimal sustainability occurs. In particular, the results revealed the contribution of the provincial and the federal governments to the total investment must be taken into account. Taking these results together (Figure 2, Figure 3, and Figure 4) provides us with a combined benefit of investing in Ontario infrastructure (Figure 5) as a function of varying provincial and federal contributions.

**Figure 5: Federal and Ontario investment balance for maximum GDP growth by 2064**

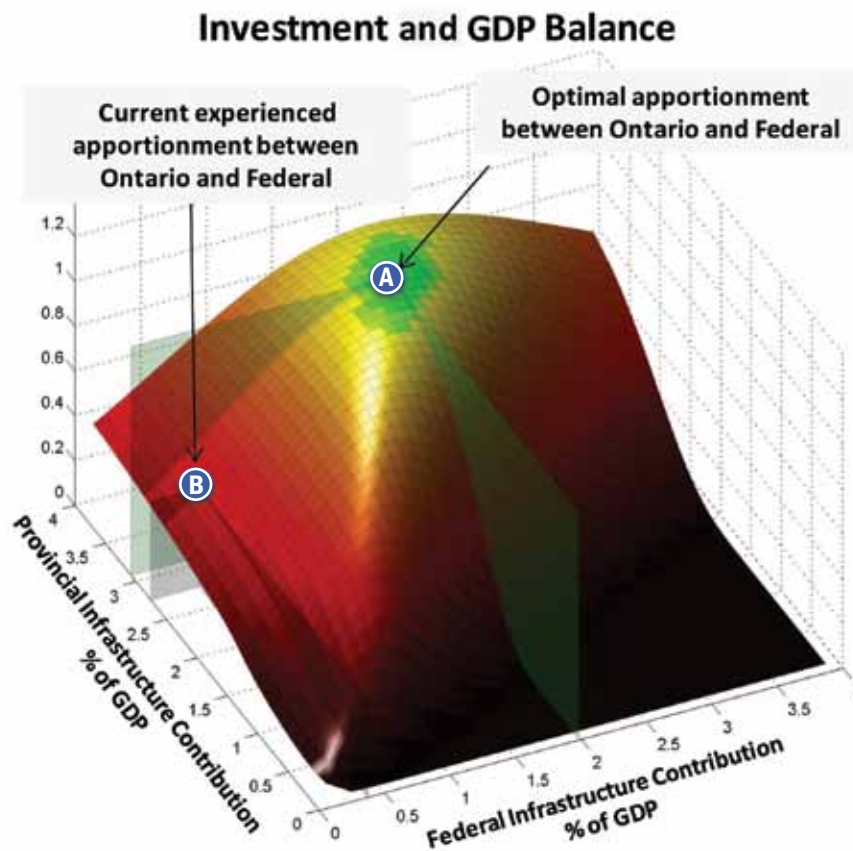


Figure 5 illustrates the overall benefits of an infrastructure investment when taking into account the benefits to real GDP (Figure 2), budget surplus/deficit (Figure 3), and the balance of the contributions (Figure 4). The vertical units used in Figure 5 are normalized to reflect the relative benefit with respect to the optimal investment (optimal investment is associated with a value of 1). The results indicate that the optimal benefit (to all governments) can be expected to occur when the federal and Ontario's contributions are 2.0 and 3.1 per cent of Ontario's GDP, respectively (see dot A). This corresponds to a 61 to 39-per-cent infrastructure investment contribution split between the Ontario governments and the federal government, a large change from the current levels of investment (Table 1). The results indicate that the optimal investment strategy requires a significant increase in the contribution from the federal government in parallel with a smaller increase in provincial investment.

**Table 1: Federal and Ontario Infrastructure Contributions**

Investment Contributor	Proportion of Ontario GDP	Relative Contribution
<b>CURRENT LEVEL OF INVESTMENT</b>		
Ontario government and its municipalities	2.8%	88%
Federal government	0.37%	12%
<b>OPTIMAL LEVEL OF INVESTMENT</b>		
Ontario government and its municipalities	3.1%	61%
Federal government	2.0%	39%

The results (Figure 5) indicate there is currently a significant investment shortfall, with the federal government being the major contributor to the underinvestment (see dot B). Over the next 10 years (in constant dollars) as governments move towards the optimal levels of investment:

- The Ontario government and its municipalities have a shortfall of \$1.4 billion annually;
- The federal government has a shortfall of \$7.2 billion annually; and

- 
- The absence of federal funding accounts for 84 per cent of the total infrastructure investment shortfall.

The long-term shortfall is equal to the short-term shortfall adjusted for real rates of economic growth.

The key conclusion, which can be made from the results in Figure 5, is that the Ontario government and its municipalities collectively cannot reach the optimal infrastructure investment point without an additional investment from the federal government (or some other source) regardless of their own additional contributions.

## **2.3 Predicament of the Ontario government and its municipalities**

### **2.3.1 Fiscal Benefits of moving to the optimal**

In the absence of additional federal contribution, the Ontario government and its municipalities are left with two possible actions other than maintaining the status quo:

- Increase their own investment funding to match the optimal level of 5.1 per cent of GDP; or
- Decrease the investment.

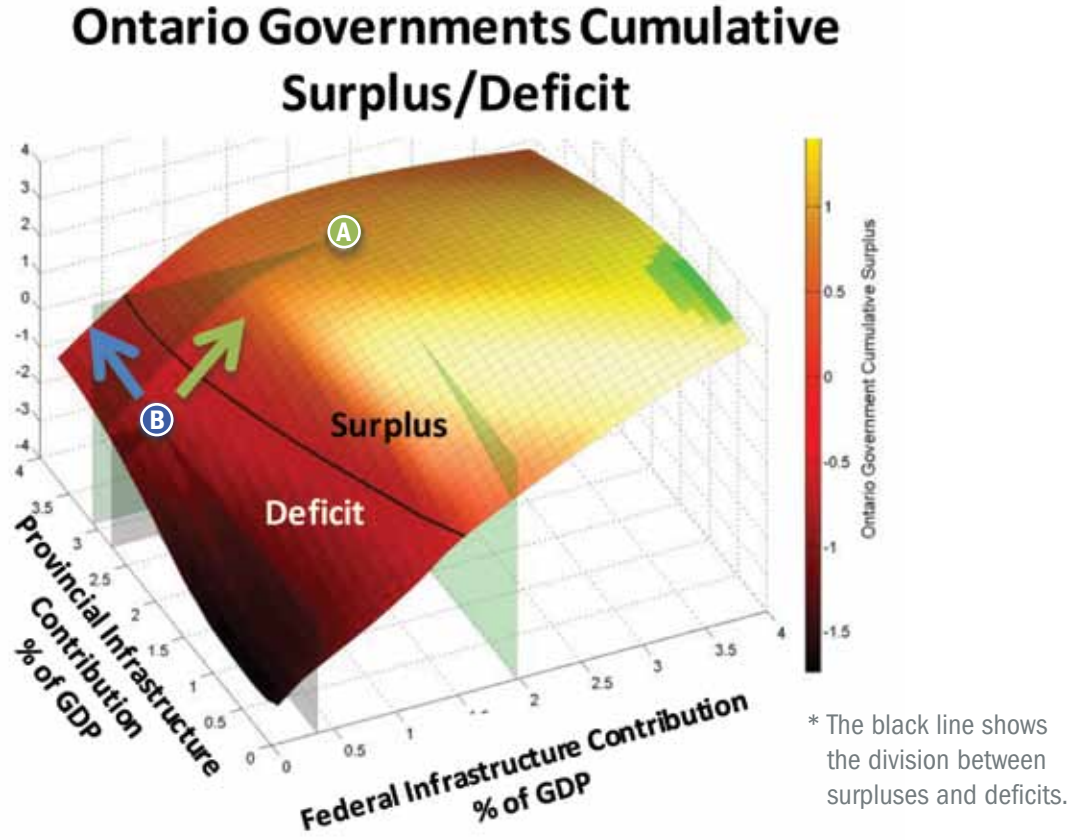
The impact of each of these strategies is investigated in the following three sections.

#### **2.3.1.1 Strategy 1: Increase Ontario's investment**

By increasing the investment to the optimal level of 5.1 per cent of GDP (without any additional federal contributions), the Ontario government and its municipalities can increase its taxation revenue by \$6.8 billion annually (on average over the next 10 years). Such action would also provide the federal government with an additional \$2.7 billion over that same period, despite it having made no additional investments. That is, of the total taxation revenue which is realized (by all levels of government) from such investment, 28 per cent would benefit the federal government (on average over the next 10 years). This benefit to the federal government could increase

to as much as 30 per cent (of the overall economic benefit) over the next 50 years. However, as illustrated by the blue arrow in Figure 6, the \$6.8 billion in additional revenue for the Ontario government and its municipalities is insufficient to balance its budget. The results indicate that despite reaching the optimal investment of 5.1 per cent of GDP, the Ontario government and its municipalities remain below the black line and thus cannot avoid a deficit and/or more debt. Increases in Ontario investment provide a movement in the direction of the blue arrow (Figure 6) and thus makes the movement up the slope towards the optimal point unreachable without additional investments from the federal government (green arrow).

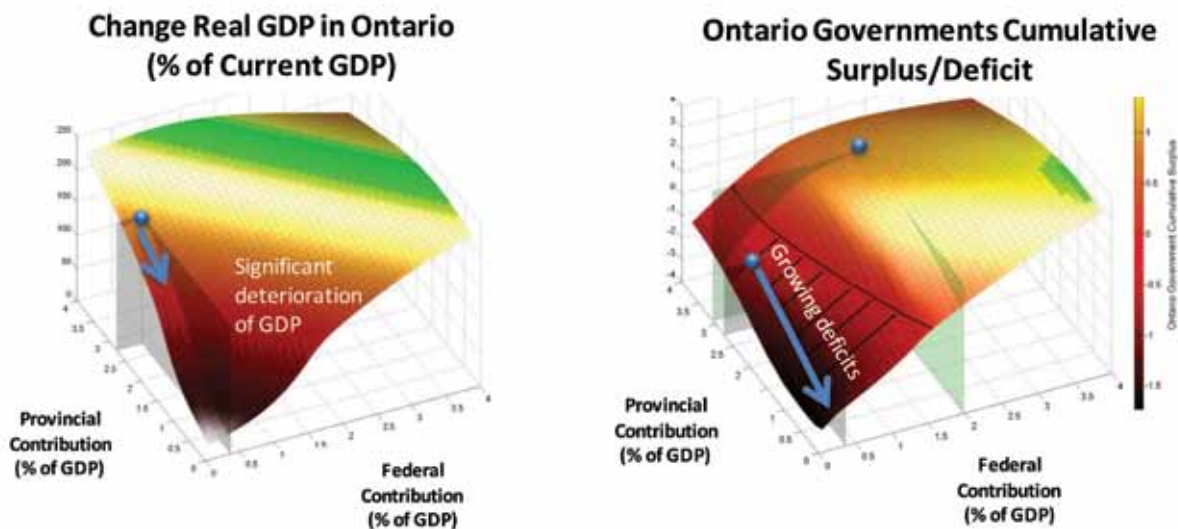
**Figure 6: Ontario governments cumulative surplus/deficit by 2064 as a function of Ontario and federal investment contributions**



### 2.3.1.2 Strategy 2: Decrease Ontario's investment

A decrease in Ontario's contribution to infrastructure investment will save funding in the short term but is expected to significantly reduce the taxation revenue in Ontario in the long term due to lower economic growth. As illustrated in the left panel of Figure 7, even a small decrease from the current investment levels by the Ontario government and municipalities can have a significant impact on the real GDP growth in Ontario over the next 50 years and pull Ontario budgets even further into deficit (Figure 7, right). In essence, there is no infrastructure strategy for the Ontario government and the municipalities, in the absence of raising taxes or other policy changes, that can restore Ontario to a net beneficiary position from public infrastructure investment. As a result, Ontario will be confronted with systemic funding deficits and/or debt from public infrastructure spending unless the federal government's contribution is increased.

**Figure 7: Change in the real GDP in Ontario (left) and Ontario government and its municipalities cumulative surplus/deficit by 2064 as a function of Ontario and federal investment contributions (right)**



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The predicament of the Ontario government and its municipalities is therefore one of limited choices with respect to its infrastructure investment strategies. That is, regardless of what Ontario-based governments do, whether they invest more or less, they cannot avoid the exposure to growing future fiscal deficits. Objectively, such a situation could not be described as sustainable.

### **2.3.2 Ontario Deficits, Federal Surpluses**

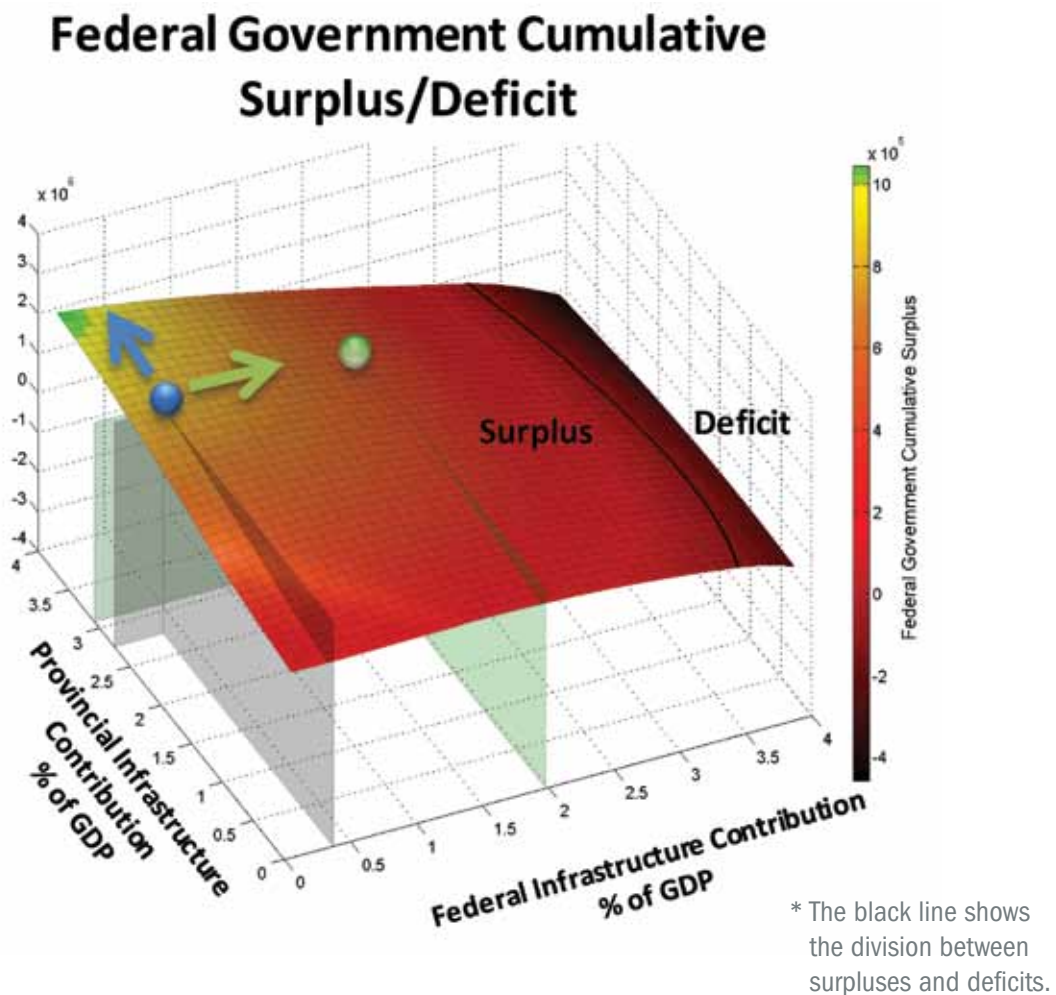
The results presented in the last section indicate that Ontario remains in a position in which its budgetary deficit position cannot be improved by either increasing or decreasing its own annual infrastructure investment. In that sense, the Ontario government's and municipal governments' shortfall is unavoidable unless additional sources of funding or revenue are identified. Given that the federal government remains a net beneficiary of the current investments in Ontario infrastructure, it is of interest to investigate the impacts of additional federal contributions on the economic benefits to both economies.

The situation for the federal government is significantly different from that of the Ontario government and its municipalities (Figure 8). In contrast to the Ontario deficit (Figure 7, right) the federal government enjoys a surplus for a wide range of Ontario and federal investment contributions (to the left of the black line in Figure 8). In particular, both the current levels of investment as well as the optimal levels of investment remain within the surplus position of the federal government. The results indicate that an increase in the federal contribution to the infrastructure investment in Ontario (green arrow in Figure 8) can create a large change in the improvement of Ontario's deficit while having a somewhat smaller impact on the surplus position of the federal government. If the federal government were to invest thirty five cents of every dollar of fiscal surplus that it receives from Ontario public infrastructure investment (2.0 per cent federal and 3.1 per cent provincial, green point in Figure 8), then Ontario-based governments could collectively enjoy fiscal surpluses of their own. Such a solution would allow them to be net beneficiaries of their own investments in Ontario public infrastructure.



This optimal contribution split is shown to be quite achievable by both levels of government without a significant sacrifice of the federal surplus from its current position (blue point in Figure 8).

**Figure 8: Federal government cumulative surplus/deficit by 2064 as a function of Ontario and federal investment contributions**



### 3.0 CONCLUSIONS

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Our analysis demonstrates that if sharing of the Ontario public infrastructure funding risks were to follow from the fiscal benefits that accrue to different levels of government, then all Ontario-based governments would be expected to cover approximately 61 per cent of the funding, with the federal government covering the balance of 39 per cent. Yet currently, all the Ontario-based governments collectively cover 88 per cent of the infrastructure investment risk, with the federal government covering the balance of 12 per cent, significantly below its share of the investment returns. While the level of public infrastructure investment in Ontario is considered below macroeconomic optimal levels, the analysis suggests that the absence of federal funding accounts for 84 per cent of the total infrastructure investment shortfall. To reach the greatest economic growth while balancing the risks and rewards of infrastructure investment, the Ontario-based governments could increase their infrastructure investment from about 2.8 per cent of GDP to 3.1 per cent while the federal government could increase its contribution from less than 0.4 per cent of GDP to 2 per cent.

A large contrast in benefits is expected to occur over the next 50 years for Ontario-based governments and the federal government if the current infrastructure investment trends continue. Despite expecting economic growth in Ontario, its provincial and municipal governments can also be expected to be exposed to growing cumulative deficits and/or debt over the next 50 years under the status quo. In the absence of additional fiscal revenue raising strategies or the redirection of current investments, a cumulative surplus (over the next 50 years) cannot be reached by Ontario-based governments regardless of the changes to the provincial contribution to Ontario infrastructure investment (even if the optimal 5.1 per cent level of investment is funded entirely by the province). That is, in the absence of other policy changes or additional federal investment, the deficit position may remain unavoidable for the Ontario-based governments.

Either increasing or decreasing the provincial/municipal share of infrastructure investment will place Ontario-based governments at risk of running even larger (than under the present investment policy) deficits and/

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or debt. As a result, in the absence of additional federal contribution to infrastructure investment, the Ontario government and municipalities are in a difficult predicament. In contrast, the results indicated that the federal government could be expected to enjoy a large cumulative surplus (over the next 50 years) at the current infrastructure investment levels as well as at the optimal investment levels (Figure 8). The results indicate that if the federal government were to invest thirty five cents of every dollar of fiscal surplus that it receives from Ontario public infrastructure investment, then Ontario-based governments could collectively enjoy fiscal surpluses of their own (Figure 6). Such a solution would allow Ontario to be a net beneficiary in terms of its own investments in Ontario public infrastructure.

In the absence of additional federal funding, the situation is clear: Queen's Park, and local municipalities have little choice but to continue to invest in public infrastructure, at least at its current rate, while the federal government benefits, potentially at the expense of the health of the Ontario economy. This potential situation clearly demonstrates the case for Ottawa, Queen's Park, and municipalities to work more closely together to determine long-term, sustainable approaches to infrastructure investment in Ontario.

### **3.1 Limitations**

The Prosperity at Risk simulation platform simulated the economic benefits to the federal and provincial governments over very long periods of time (50 years in the case of this study). Over that period of time, a series of assumptions were made about the behaviour of several key external variables. For instance, industry demand for infrastructure in the future was assumed to be similar as in the past.

The sensitivity of the public infrastructure investment to the various types of infrastructure was not considered in the current study. The relative proportions of the annual investments which were assigned to specific infrastructure types (roads, water and wastewater, electrical power, et cetera) were assumed to reflect historical trends found in Statistics Canada data.

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The impact of infrastructure on more intangible quantities such as quality of life is not addressed in this study. For example, improvements in transportation infrastructure may result in reduced commuting times, which may not affect companies directly but would have a bearing on the overall quality of life for the workforce. Similarly, community buildings like arenas or community centres may not have a significant long-term impact on production but could lead to a higher quality of life. Such benefits are not readily captured in a macroeconomic model.

### **3.2 Future Research**

The current study did not consider the roles of the individual municipalities of Ontario as individual governments but rather as a combined provincial and municipal entity. A natural extension of the current project would involve the consideration of economic benefits to the various municipalities within Ontario. This could provide a breakout of the economic benefits of individual municipalities within the province based on the allocations of investments from the municipalities and their provinces as well as the federal government.

The current study did not address the question of the manner in which the infrastructure investment is to be distributed among the various infrastructure types within Ontario. Sensitivity analyses of the relative funding of infrastructure could provide important information about another dimension of the optimized funding policy (the optimum investment policy is currently considered based only on the total amount of funding and the specific contributions from the individual governments).

Finally, it is currently unknown whether the benefits of infrastructure investments in other provinces are as dependent to the same degree upon the federal contributions as they are in Ontario. The existing model does not have to be modified and can simply be extended to the other provinces (within Canada) for an analysis of their infrastructure investment opportunities.

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## DATA SOURCES

Quantity	Description	CANSIM Table
<b>DEMOGRAPHIC TABLES</b>		
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
<b>ECONOMIC TABLES</b>		
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



Quantity	Description	CANSIM Table
<b>ECONOMIC TABLES (continued)</b>		
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
	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



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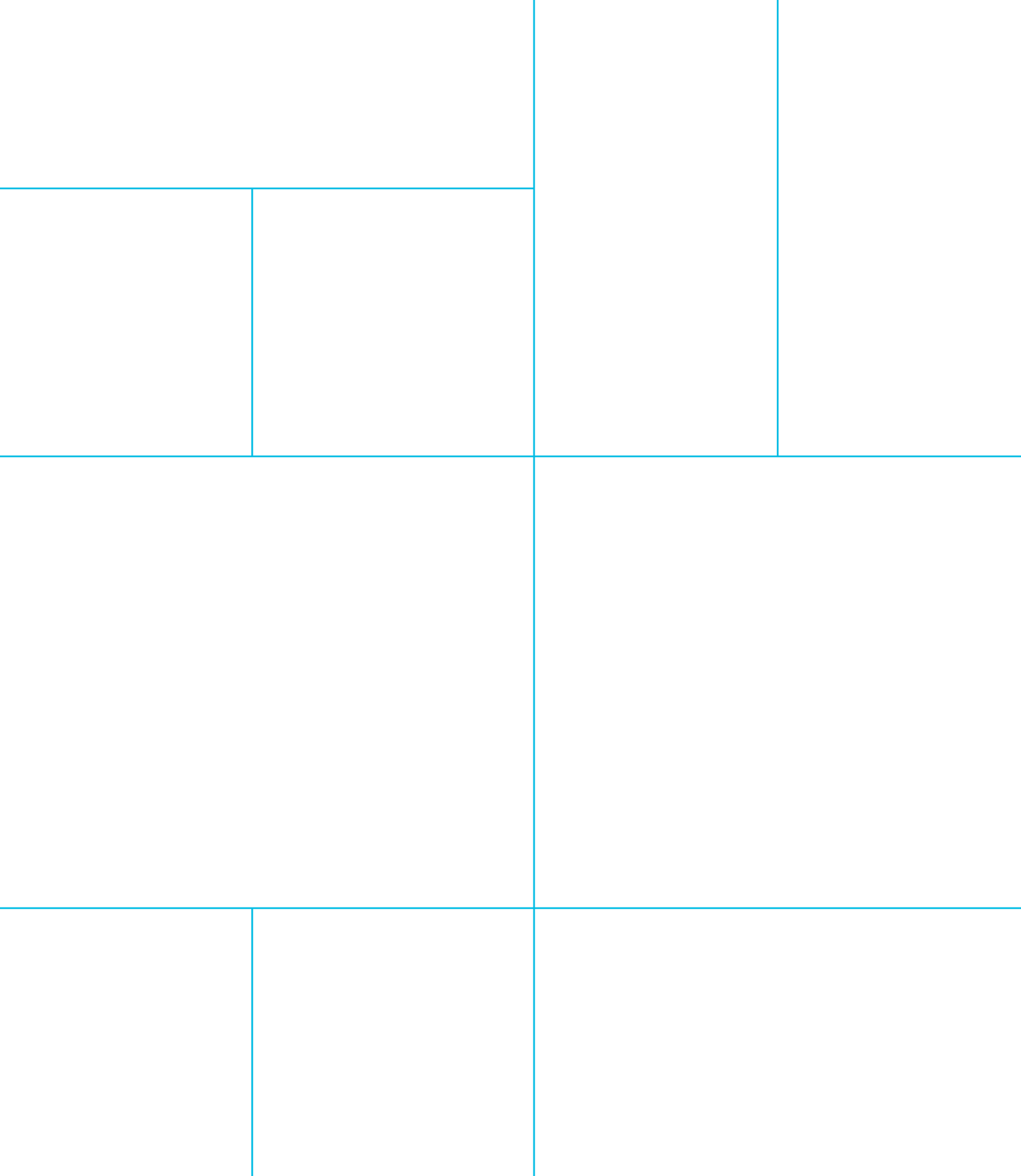
The Residential and Civil Construction Alliance of Ontario (RCCAO) is composed of management and labour groups that represents a wide spectrum of the Ontario construction industry. The RCCAO's goal is to work in cooperation with governments and related stakeholders to offer realistic solutions to a variety of challenges facing the construction industry and which also have wider societal benefits.

RCCAO has independently commissioned close to 30 reports on planning, procuring, financing, and building infrastructure, and we have submitted position papers to politicians and staff to help influence government decisions.

For more information on the RCCAO or to view copies of other studies and submissions, please visit the RCCAO website at [rccao.com](http://rccao.com)

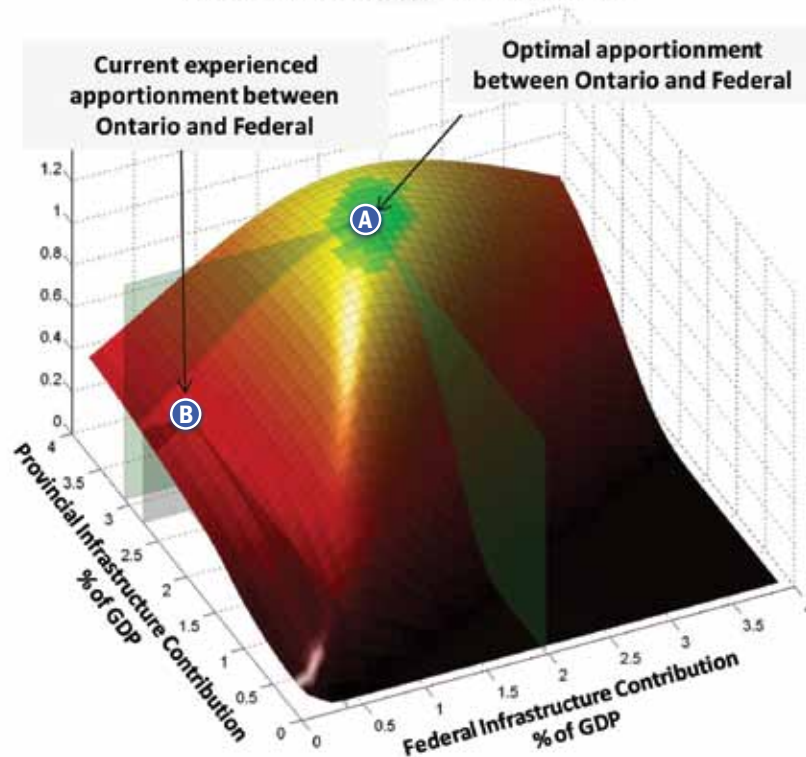
#### **RCCAO members include:**

- Carpenters' Union
- Greater Toronto Sewer and Watermain Contractors Association
- Heavy Construction Association of Toronto
- International Union of Operating Engineers, Local 793
- International Union of Painters and Allied Trades, District Council 46
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## Investment and GDP Balance



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