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Sent: Friday, April 5, 2019 6:46 PM
To: Office of the Legislative Counsel
Cc: Trevor Floyd; Kirby McVicar; Bob Sloat; Smith, Dylan
Subject: Surety Bonds and Bill 119
Attachments: Surety Bonds and Prompt Payment in Nova Scotia.pdf; The economic value of surety in the Atlantic Provinces.pdf

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The Surety Association of Canada (SAC) commends the Nova Scotia Ministry of Justice on the recent introduction of Bill 119 and for the government's commitment to bringing a prompt payment and adjudication protocol to the Nova Scotia construction contracting process. In that regard, we very much appreciate the opportunity to provide feedback into this process and pledge to continue working with the ministry and CANS to bring this worthwhile objective to a successful conclusion.

Our association was a key stakeholder in the process that led to the recently adopted Construction Act in Ontario and as the industry that guarantees both the performance and payment obligations of construction contractors, we bring a unique perspective to the issue. We submit that there can be no promptness of payment without certainty of payment and our experience has shown that the most serious and pervading threat to payment certainty is financial stress or insolvency of the project contractor.

In a nutshell, our role is one of mitigating that risk and providing payment certainty and we're pleased to attach our written submission that elaborates on our role in the process and sets out our recommendation for changes. Also enclosed is the report of a study by the Canadian Centre for Economic Analysis (CANCEA) that demonstrates the positive economic impact of a universal surety bond requirement on public work.

The Surety Association of Canada recommends that Bill 119 be amended to include the surety bond requirements found in Section 85 of the new Construction Act of Ontario as set out in Appendix II of our attached submission. While we understand and appreciate that many of the details can be dealt with in the regulations, we respectfully suggest that the inclusion of a bonding requirement should be first be enshrined in the legislation itself. This will ensure that the new prompt payment regime will respond to the very real risk of project contractor insolvency, and better align the new measure with the ground-breaking legislation in Ontario.

Respectfully Submitted,

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SURETY ASSOCIATION OF CANADA
YOUR BONDING RESOURCE

SURETY ASSOCIATION OF CANADA
YOUR BONDING RESOURCE

Why Surety Bonds Need to be Integral in Nova Scotia's New Lien Legislation – Bill 119

Submission by the Surety Association of Canada

April 8, 2019

Who is the Surety Association of Canada (SAC)?

SAC is the voluntary industry association representing the surety industry in Canada, including 21 surety companies, surety brokers and related claims and legal professionals who support the industry. SAC member sureties write 97% of all bonds written in Canada each year. SAC celebrated its 25th anniversary last year; and takes great pride in an industry that has grown every year such that its member sureties now guarantee some $100 billion of contracts every year.

SAC has been and continues to be a vocal proponent of prompt payment initiatives across the country. Indeed, we were a key stakeholder in the process leading up to the passage and adoption of the Construction Act of Ontario; the first prompt payment measure adopted in Canada. We look forward to working with the ministry and other stakeholders to bring about a robust, workable and effective prompt payment regime in Nova Scotia.

Labour & Material Payment Bonds and Prompt Payment

It goes without saying that in order for payment to be remitted promptly, the money must be there in the first place, or put another way, there is no prompt payment without certainty of payment. Our experience has demonstrated that the most serious and pervading threat to payment certainty is financial stress or insolvency of the project contractor. Once a project becomes beset by a contractor financial issues, the business, operational and financial dynamic of that project will completely and irretrievably change. Whether the difficulties stem from estimating errors, unanticipated cost escalation, poor project management, or even factors completely extraneous to the project at hand, the resultant shortfall in project funds will create problems further down the payment chain.

As the project contractor spirals downward toward full insolvency, these problems can be compounded by the desperate measures that are often taken to keep the wolves from the door and allow the firm to live to fight another day. It's here that we encounter the "robbing-Peter-to-pay-Paul" manoeuvre of taking money from the project to pay a louder and/or more potentially damaging creditor somewhere else. As payment to project subcontractors and suppliers slows, or grinds to a halt, the relationship dynamic between contracting parties becomes more adversarial as project participants are now focused on simple survival and protecting their own interests; all of which further impedes the flow of funds down the payment chain.

Other remedies such as liens, holdbacks, trusts and even a robust prompt payment protocol simply cannot provide that certainty or replenish a depleted pool of contract funds. The labour and material payment bond is designed to address both the certainty and timeliness issues by providing security for payment on construction projects. When used in tandem with a performance bond, they bring stability to the construction process and address the risk of payment defaults and delays due to contractor failure.

The Four Pillars of Payment Certainty

A labour and material payment bond is a project-specific guarantee of payment for subcontractors, suppliers and other claimants on a project. Amounts due and payable to claimants are paid in full under the bond (up to the bond limit). Labour & material payment bond – are an integral part of any effective prompt payment regime. As noted, payment promptness without payment certainty does only part of the job – and bonds are the ***only*** remedy that adequately provide this certainty, providing:

1) ***Dedicated*** protection to unpaid subcontractors and suppliers on the bonded project in the event of a bankruptcy or simple refusal on the part of a general contractor to pay; dedicated in the sense that no other party or claimant can access the funds provided by the payment bond under any circumstances.

2) a pool of money that is ***sufficient*** to ensure that claimants will be paid the full amount due – in contrast to the traditional remedies (liens, holdbacks) that provide pennies on the dollar once the receivers and lawyers are done

3) actual money placed into the hands of unpaid subcontractors and suppliers ***in real time*** – without any requirement to pursue litigation through the courts or undertake in other costly and lengthy enforcement action

4) "***new money***" into the pool of construction funds where that pool has been depleted by the project contractor's financial distress or insolvency – ensuring the payment of unpaid subcontractors and suppliers, thus allowing money to flow down the construction payment chain

It is important to note that while General Contractor insolvency poses the biggest non-payment risk to subtrades and suppliers, labour & material payment bonds do not require the bonded General Contractor to be insolvent before payments can be made. In a current example, the surety industry is dealing with the problems created by a very large general contractor who has defaulted on a number of high-profile infrastructure projects in southwestern Ontario. Although the firm has not been placed into receivership or initiated bankruptcy proceedings, its inability to generate sufficient cash has left multitudes of trades and suppliers unpaid, forcing the surety to step in. While this situation is ongoing, current information suggest that the total payout by the surety could reach into nine figures.

Why should surety bonds be mandated for larger, publicly funded projects in Nova Scotia's Bill 119?

The answer is straightforward and it's for the same reason that prompt payment needs to be enshrined in law. Without making surety bonds part of a legislated prompt payment regime, they will not be consistently required and payees down the construction payment chain will be left exposed to the risk of non-payment. Dealing with promptness of payment without dealing with certainty of payment is only doing half the job.

This is the conclusion reached in other provinces which have and are looking at these issues (Ontario, where legislation is in place, as of July 2018; Manitoba, where the Manitoba Law Reform Commission reported in October to its Attorney General; and in the United States where mandatory bonding on public work has been the law of the land since the 1930s).

Even though most public bodies already have administrative policies in place that call for performance and payment bonds on construction work, we still see a "hit-and-miss" approach. Administrative policies, no matter how detailed and prescriptive, can be modified, applied selectively, or waived altogether. In Nova Scotia we see crown corporations, municipalities and other public agencies that call for bonds on a selective basis, if at all. We submit that It is particularly important for government to provide leadership in this area on where public money is being deployed.

CANCEA Study: The Economic Value of Surety Bonds in the Atlantic Provinces

In addition to the risk management benefits discussed here, a mandated surety bond regime will also bring benefits to the provinces economy by protecting GDP and jobs, ensuring recovery of revenues and enhancing the quality of public facilities. For more information, we invite you to review *The Economic Value of Surety Bonding in the Atlantic Provinces;* a study prepared by the Canadian Centre for Economic Analysis (copy attached).

Recommendation

The Surety Association of Canada recommends that Bill 119 be amended to include the surety bond requirements found in Section 85 of the new Construction Act of Ontario. Specifically, this would require contractors to provide 50% performance and labour and material payment bonds on all publicly funded work in the province that exceeds a prescribed threshold ($500,000 in Ontario). Note that this will not involve extensive changes to the legislation as currently drafted (the bonding provisions of the Ontario Act are set out in a few short paragraphs), nor will it entail any significant alteration to current business practices within the provinces non-residential construction industry.

Again, the Surety Association of Canada is a strong and vocal proponent of a legislated protocol for prompt payment and would be happy to work with the ministry and act a resource on issues related to surety bonds and the legislation itself.

Contact: **Steven D. Ness, President**
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APPENDIX I
SECTION 85 – CONSTRUCTION ACT OF ONTARIO

Bonds and public contracts

Definition

85.1 (1) In this section,

"public contract" means a contract between an owner and a contractor respecting an improvement, if the owner is the Crown, a municipality or a broader public sector organization. 2017, c. 24, s. 56.

Application

(2) Subject to the regulations, this section applies to a public contract if the contract price exceeds the amount prescribed for the applicable owner. 2017, c. 24, s. 56.

Exception

(3) This section does not apply in the case of a contractor who is an architect or an engineer. 2017, c. 24, s. 56.

Requirement for labour and material payment bond

(4) On entering into a public contract, a contractor shall furnish the owner with a labour and material payment bond, in the prescribed form, that,

(a) is of an insurer licensed under the *Insurance Act* to write surety and fidelity insurance;

(b) has a coverage limit of at least 50 per cent of the contract price, or such other percentage of the contract price as may be prescribed; and

(c) extends protection to subcontractors and persons supplying labour or materials to the improvement. 2017, c. 24, s. 56.

Requirement for performance bond

(5) On entering into a public contract, a contractor shall furnish the owner with a performance bond, in the prescribed form, that,

(a) is of an insurer licensed under the *Insurance Act* to write surety and fidelity insurance; and

(b) has a coverage limit of at least 50 per cent of the contract price, or such other percentage of the contract price as may be prescribed. 2017, c. 24, s. 56.

Claims process

(6) A bond form prescribed for the purposes of subsection (4) or (5) may set out the claims process applicable in respect of the bond. 2017, c. 24, s. 56.

No limitation on other bonds or security

(7) For greater certainty, this section does not limit the ability of the owner to require the contractor to provide other types of bonds or security. 2017, c. 24, s. 56.

Rights of action

Default, labour and material payment bond

85.2 (1) If a labour and material payment bond is in effect in respect of an improvement and the principal on the bond defaults in making a payment guaranteed by the bond, any person to whom the payment is guaranteed has a right of action to recover the amount of the person's claim, in accordance with the terms and conditions of the bond, against the surety and the principal. 2017, c. 24, s. 56.

Default, performance bond

(2) If a performance bond is in effect in respect of an improvement and the contractor defaults in performing the contract guaranteed by the bond, the owner has a right of action to enforce the bond, in accordance with its terms and conditions, against the surety and the contractor. 2017, c. 24, s. 56.

Saving

(3) Nothing in this section makes the surety liable for an amount in excess of the amount that the surety undertakes to pay under a bond, and the surety's liability under the bond shall be reduced by and to the extent of any payment made in good faith by the surety either before or after judgment is obtained against the surety. 2017, c. 24, s. 56.

Same

(4) Nothing in this section makes the surety liable as the principal under a bond, or makes the surety a party to any contract. 2017, c. 24, s. 56.

Subrogation

(5) On satisfaction of its obligation to any person under a bond to which this section applies, the surety shall be subrogated to all the rights of that person. 2017, c. 24, s. 56.

Section Amendments with date in force (d/m/y)

2017, c. 24, s. 56 - 01/07/2018

APPENDIX II

Surety Bonds: Common Myths and Misconceptions

Despite their familiarity as the most frequently used form of construction performance security, surety bonds are often greatly misunderstood by construction stakeholders across all sectors; even by those who rely on them for protection. A few of the more common myths and misconceptions:

1) **Bonds are only for large contractors and are a "barrier" to smaller firms.**

   Surety bonds are used on contracts large and small and by contractors of all sizes. Indeed there are several surety firms that specialize in providing surety facilities to small construction operations. Are bonds a barrier? Yes; but to ***unqualified*** contractors. Construction organizations that are looking to bid on projects that are too large, complex or out of their realm of expertise will likely be unable to secure bonding support. It only makes good business sense for a surety to support any qualified contractor when the opportunity presents itself.

2) **Bonds are too expensive**

   Bonds are anything but expensive and for the value they provide, they're a downright bargain. While the Surety Association of Canada doesn't involve itself in the pricing of the product, our members inform us that the "full retail" price of a bond will generally fall around one half a percent of contract value for each of a 50% performance bond and 50% payment bond. As the projects get larger, the rate will typically decrease, and we have encountered circumstances where the total cost of bonding is less that 0.3%. Compare that with the cost of an all-out construction failure which averages out at 43% of contract value.

3) **We don't need bonds because we only work with Contractors we know well, and have prequalified**

   Our association strongly encourages public owners to prequalify contractors where feasible. However, a surety will provide a different level of prequalification that looks beyond the four walls of the current project and evaluates a contractor's viability as an ongoing business entity. The surety industry's results speak for themselves and studies have shown that an unbonded contractor is ten times more likely to become insolvent than its bonded counterparts (Canadian Centre for Economic Analysis, 2017).

   As to a contractor being too well established, or too big to fail, recent experience demonstrates that this is a dangerous assumption indeed. Since January 2018, the surety industry has encountered three failures of major contracting organizations and has paid out more the $500 million in claims.

4) **A Bond Requirement is too Administratively Cumbersome**

   When a contractor first sets up a bonding facility with a surety company, there is an initial due diligence protocol that requires that contractor to provide background information on their finances and organization. This is quite similar to the process undertaken when setting up a banking arrangement. Once that facility has been established, it is simply a matter of keeping it up to date with annual statements, etc.; again, similar to the process required by a bank. The vast majority of professional contracting firms already have existing surety facilities and once that is in place, the process of getting a bond for individual jobs is a matter of a quick phone call or email.

   As for public owners, the only administrative "burden" imposed is the need to include the surety requirement in its tender documents and ensure that the executed bonds are stored in a secure place.

5) **Surety Bond Claims Take Too Long to Resolve**

A contractor failure is, to say the least, a frustrating experience that can be fraught with tension and even acrimony. That frustration can be compounded and magnified during that time period between the collapse of the defaulting contractor and the re-commencement of the work. That said, when a messy default occurs on a very complex project, delays will be inevitable; irrespective of the contract security in place. A bond is not a magic lamp and it cannot make problems disappear, nor can it turn back the clock, but having that bond will bring in the expertise of the surety to minimize the delays and mitigate the impact of their effect.

In Ontario, the Surety Association of Canada worked with the Ministry of the Attorney General to create new standard bond forms that shorten delays further by imposing strict timelines for a surety's response to a claim notice. We would be glad to work with the ministry to tailor-make similar instruments for use on construction projects in Nova Scotia.

6) **Sureties Don't Pay Claims**

A myth that no doubt has its roots in the nature of the bond instrument itself. Each claim under a performance or payment bond must be investigated to ensure that it is meritorious and that monies are owing under the bond. Unlike the case with liquid security (e.g. a letter of credit), a surety will not, can not and should not pay out on a claim simply because someone tells them they should. An unfortunate truth of the construction/surety world (and pretty much everywhere else), is that not all claims advanced are valid.

In the case of a subcontractor bringing forward a claim under a payment bond, a surety will only advance payment if that subcontractor is actually due the money under the terms of its contact. Unfortunately, that is not always the case and where it isn't, the claim will be denied.

Again, we refer to the new state-of-the-art bond forms that are now in use for public projects in Ontario. These impose a strict time-line for the surety to acknowledge, investigate and pay out undisputed amounts. We would be happy to share and discuss these instruments with ministry staff.

The list of myths and misconceptions discussed here is not exhaustive and again, we find these misunderstandings pervasive among stakeholders across the country.

APPENDIX III

CANCEA Study – The Economic Value of Surety Bonds in the Atlantic Provinces

The compelling case for introducing mandatory bonding in support of a strong prompt payment protocol is reinforced by the economic benefits that accrue from across-the-board bonding on public projects. A thriving economy gives rise to a healthy construction industry in a symbiotic relationship where surety bonds play a key role in bolstering the fortunes of both.

In August 2017, the Canadian Centre for Economic Analysis (CANCEA) conducted a study that examined the impact that surety protection has on key performance indicators such as GDP, job creation and revenue generation/recovery in the Atlantic region. CANCEA reviewed more than 150,000 bonded projects completed over the last twenty years by more than 10,000 construction firms. They examined the economic ripple effect of more than 3,000 contractor defaults.

Their findings published in a report entitled *"The Economic Value of Surety Bonding in the Atlantic Provinces"* confirm the value proposition of public sector bonding to taxpayers by way of strengthening the broader economy and bringing stability and certainty to the public construction process. A summary of key findings:

- ***The Value of a Surety's Due-Diligence***: A non-bonded construction enterprise is ten times more likely to become insolvent than bonded companies. This serves to illustrate the effectiveness of the surety risk selection process in ensuring that only qualified firms are permitted to undertake public work and the consequent economic benefits that result from this certainty around the construction delivery process.
- ***Protection of GDP***: Even in the current stable construction environment with historically low interest rates and insolvencies at a 35-year low, surety bonds protect $800,000 of GDP for every $1 million of premium paid on public infrastructure. In more volatile times, this impact is magnified. In the early 1990's when the rate of construction insolvencies spiked to six times their current levels, surety bonds protected approximately $3 million for every $1 million in premium paid.
- ***Protection of Jobs/Wages***: Under current economic conditions surety bonds will protect approximately six full time jobs or $300,000 in wages for every $1 million in premium paid. In the tumultuous early 90's, $1 million in surety premium on public projects protected about 23 full time jobs or $1.6 million in wages.
- ***Fiscally Responsible: Revenue Recovery on Premiums Paid***: The CANCEA study has determined that some, if not all of the premiums paid by the government for bonds on public work can be recovered through the tax revenue generated from the timeliness and certainty of the completion of the bonded asset. The analysis demonstrates that even under status quo economic conditions, governments will recover $0.40 in tax revenue for every dollar paid out in premium. In a high-risk economic environment such as seen in the early 90's, governments show a net gain, recovering $2.60 in tax revenue for every premium dollar spent.

The study also demonstrates that the size and scope of the economic benefits generated are largely dependent upon the extent to which bonds are used to protect construction risk on public infrastructure. The optimum benefits are realized when 100% of public work is protected by both performance and payment bonds.

In addition to the Atlantic Canada study, CANCEA also examined the economic impact of surety bonds nationally and in other provincial jurisdictions.

The Economic Value of Surety Bonding in the Atlantic Provinces

A networked agent-based economic assessment

August 2017

CANADIAN CENTRE FOR ECONOMIC ANALYSIS

About the Canadian Centre for Economic Analysis

The Canadian Centre for Economic Analysis (CANCEA) is a socio-economic research and data firm. CANCEA provides objective, independent and strictly evidence-based analysis dedicated to a comprehensive, collaborative, and quantitative understanding of the short- and long-term risks and returns behind market changes, policy decisions and economic outcomes.

At the centre of CANCEA's analysis is its *Prosperity at Risk®* simulation platform which is a networked agent-based, socio-economic computer platform. Using a combination of "big data" technology advancements with data sets that are linked back to the objects that generated them, *Prosperity at Risk®* simulates the interactions of many millions of virtual agents (individuals, corporations, governments, and non-profit organizations) to provide a deep and realistic understanding of the consequences of market and policy developments for our clients.

About the Report

CANCEA does not accept any research funding or client engagements that require a pre-determined result or policy stance, or otherwise inhibits its independence.

In keeping with CANCEA's guidelines for funded research, the design and method of research, as well as the content of this study, were determined solely by CANCEA.

This information is not intended as specific investment, accounting, legal or tax advice.

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ACKNOWLEDGEMENTS

The report was prepared on behalf of the Surety Association of Canada. In keeping with CANCEA's guidelines for funded research, the design and method of research, as well as the content of this study, were determined solely by CANCEA. The CANCEA researchers involved in the performance of this study are Paul Smetanin and David Stiff.

This research has been prepared by the Canadian Centre for Economic Analysis (CANCEA) and would not have been possible without data received under non-disclosure agreements from Aviva Canada Inc., The Guarantee Company of North America, Intact Insurance, Travelers Insurance Company of Canada, Trisura Guarantee Insurance Company, and Zurich Insurance Company Ltd (Canadian Branch). Collectively, these companies underwrite the majority of surety bonds for the construction market in Canada.

CANCEA is grateful to those executives and experts who shared their expertise and insights via interviews that were conducted as part of the research process for this project. The profile of those organizations interviewed included several of the largest general contractors and subcontractors operating in Canada.

EXECUTIVE SUMMARY

Surety bonds protect against non-performance and non-payment risks associated with the operation and financial standing of construction enterprises and their relationships. In a highly integrated economy, understanding the economic value of surety bonds is no simple task and requires:

- The ability to model the contractual and commercial **connections** (network structure) that permeate through industries – particularly in the construction sector – to understand the "domino" impacts of financial and operational distress on the broader economy;
- A **significant amount of data** on the interaction of the surety industry with stakeholders in the construction sector and the broader economy, how stakeholders purchase surety products, construction projects on which surety bonds are used, and the performance of projects with and without surety bonds; and
- Analytical tools designed to quantify the economic impacts that extend beyond aggregate economic activity and include impact on jobs and taxes, and quantify where risks and rewards (intended or otherwise) arise for **different stakeholders**.

The Atlantic Provinces' construction industry plays a significant role in the region's economy, currently contributing approximately 7% of GDP and employment. Nationally, insolvency rates in the construction industry are at a 35 year low, averaging around 3.4 insolvencies per 1,000 firms over the last 10 years. This is almost 6 times lower than in the early 1990s when insolvency rates were averaging 17.7 per 1,000 firms.

The objective of this research project was to conduct a network-based quantitative analysis of the economic value of surety (e.g., performance bonds, payment bonds) for different construction activity (with varying capital types), and industries (i.e., public and private capital projects). The aim is to illuminate surety's value proposition for policy-makers, the general public, and other key stakeholders.

A **performance bond** is a special class of contract signed by a contractor (the 'principal') and a surety in which the contractor and surety guarantee to a third party (an 'obligee', often a project owner) that the contractor will perform a specific construction contract. If the contractor fails to perform, then the project owner may look to the surety under the bond for the costs of completing the contract and additional related costs.

Labour and material payment bonds (or simply, **payment bonds**), a related class of bonds, are signed by a contractor and its surety and guarantee that the contractor will pay its subcontractors, suppliers and labourers on a specific contract. If the contractor fails to honour its payment obligations then subcontractors, suppliers and labourers may look to the surety for payment under the bond.

Findings at a glance

A majority of public construction work in Canada is carried out under bonded contracts. Using surety industry datasets of over 150,000 surety records and Prosperity at Risk® network modeling of the Atlantic Provinces' economy, we found that:

Reduced risk of insolvency	**Non-bonded construction firms are ten-times more likely than bonded companies to suffer insolvency** at any given point in time. As a result, firms whose projects are bonded see a general reduction in project delays through a combination of reduced insolvencies and delays associated with insolvencies. The process of underwriting bonds on construction projects appears to contribute to capital and operational adequacy in bonded businesses.
Protection of economic activity (GDP)	In the current low interest rate economy, insolvencies in the construction industry are at a 35 year low. At these current insolvency rates, **surety bonds protect 0.7 times more economic activity in the Atlantic Provinces than their premium cost (over $0.7M of GDP protected per $1M premiums paid)**, which amounts to the equivalent of around 6 full time jobs (or about $0.3M in wages) protected per $1M of premiums paid.
Economic risk management benefits	In the 1990s, insolvencies had reached 6 times current levels. At these insolvency rates, **surety bonds could protect 3 times more economic activity in the Atlantic Provinces than their premium cost (about $3M of GDP per $1M in premiums paid)**, which amounts to the equivalent of 25 full-time jobs (or about $1.5M in wages) protected per $1M of premiums paid.
Fiscally responsible	In the current economic environment, **governments could recover** $0.4M per $1M of premiums paid on public infrastructure projects. In a higher insolvency environment, such as the early 1990s, this could increase to $3.0M per $1M of premiums paid indicating that governments (in total) become a net beneficiary of surety bonding.
Extent of industry coverage is important	The size and significance of the surety bond benefits vary depending upon the level of risk in the economy (e.g., increasing interest rates, debt levels, recession, and global shocks). The highest economic and fiscal benefits versus the premium costs required comes from a policy that requires a combination of **performance and payment bonds – with 100% of public infrastructure projects bonded.**

The Atlantic Provinces' construction industry and surety bonds

A majority of public sector construction work in Canada is carried out under bonded contracts. Based on the surety bond data, it is estimated that companies involved in non-bonded projects have an insolvency rate ten times greater than companies with bonded projects. While insolvency tends to occur more frequently in smaller companies, the insolvency of larger companies appears to be much more disruptive to the economy. Further, an examination of the surety bond data shows significant project delivery overruns associated with companies in financial stress (negative net worth, operating losses).

As highlighted in previous work by CANCEA (2016)[1], there are significant economic consequences to project delays, as infrastructure delivery is about "right size, right place, and *right time*". If something stands in the way of delivering or enabling a vital public service at that time, then the economy suffers. As a result, any delays could have a much greater impact than simply the direct financial cost of the delay, and there is potentially significant economic value to preventing construction delays.

Many additional impacts of surety bonding may not be directly observable in the public records of insolvencies or project delays. This includes changes to a firm's financial planning or intervention of the surety companies. In particular, these additional impacts could include:

- **Capital and operational adequacy:** The process of underwriting bonds on construction projects involves pre-qualification of bidders by surety companies, which is observed to accompany an improvement in the capitalization and financial management within the construction industry. This benefit reduces the potential and the severity of construction insolvencies;
- **Project completion and subcontractor payment:** Costs of restructuring, financing and completing failed projects can be significant and can be transferred to a surety under a bond. For example, during the five-year period ending in 2016, the surety industry paid out more than $200 million under bonds in Ontario to fund completion of projects and pay subcontractors, suppliers and labourers[2]; and
- **Prevention of financial distress:** While insolvencies are distinct legal and financial events, operational and financial distress (such as cash flow issues, inability to access needed credit or materials) often occurs prior to the recording of an insolvency. Given their role as guarantors to a process, surety providers will at times support firms through a project or program of work when needed, thereby reducing the incidence of solvency and enabling contractors to complete projects and pay subcontractors, suppliers and labourers.

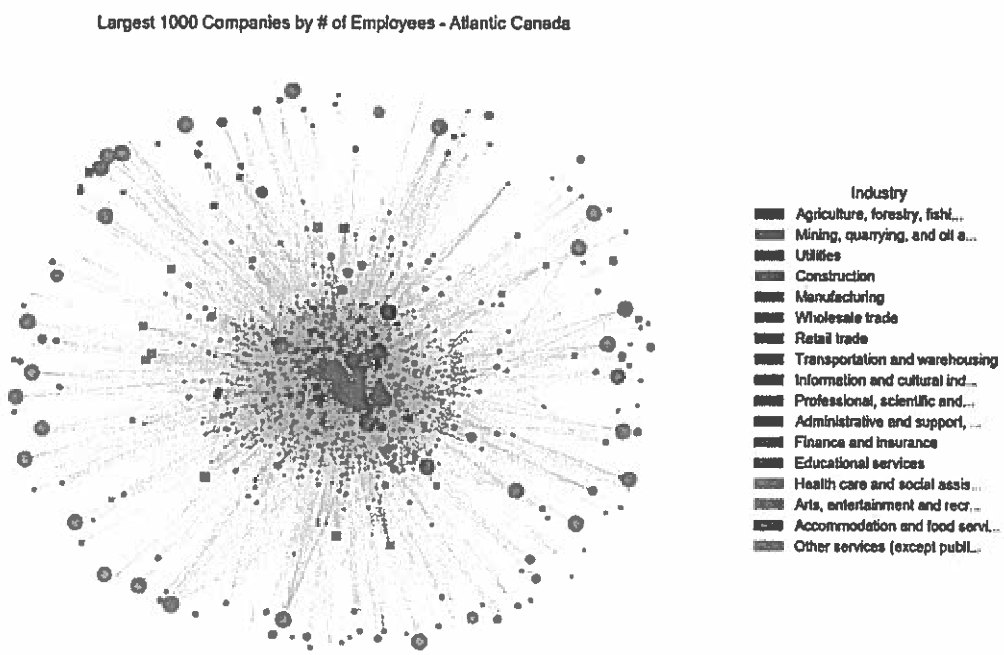
[1] An analysis of 200 P3 infrastructure projects in Canada found that delays in construction could have significant long-term economic impact particularly as the size of the portfolio of delayed projects increases

[2] Source: MSA Research Inc.

Industry network structure

The construction sector is part of a complex economic system, with a vast array of networked interactions between many diverse "agents". How things are connected within such a system impacts how actions reverberate through it. Without a good understanding of the key linkages between economic agents (e.g., firms), the measurement of the risks that could occur when an adverse event hits is significantly limited. Metaphorically, a car accident on the highway may only do severe damage to the few cars directly involved, but many more cars get affected due to traffic delays.

In order to capture the full effect of interruptions in the network, it must be modelled for over 3 million companies in 20 industry sectors across Canada and the Atlantic Provinces. The figure below shows the connections between the largest 1000 companies in the Atlantic Provinces. A typical construction company, could have a dozen linkages (e.g., suppliers, subcontractors or customers), each of which may have a dozen of its own, and so on. If such a company were to become insolvent, its suppliers would have an increased chance of insolvency depending upon how dependent it is on the insolvent company. In addition, if a supplier or subcontractor became insolvent, it could introduce delays in other projects of its customers. Surety bonds can help protect against such interruptions in the network.



The types of bonds considered in this analysis are performance bonds (which protect 'upstream' so the project is completed) and payment bonds (which protect 'downstream' so that suppliers and subcontractors are more likely to remain solvent). Section 2.2 presents more details on the industry network structure.

Given the complexity of modeling the range of networked interactions and impacts required for this research – a networked agent-based model was required. CANCEA's *Prosperity at Risk*® (PaR) computer simulation platform is used by several Ontario Ministries and municipalities to perform socio-economic impact analysis, and was used for this project. This had allowed for the detailed simulation of dependencies between:

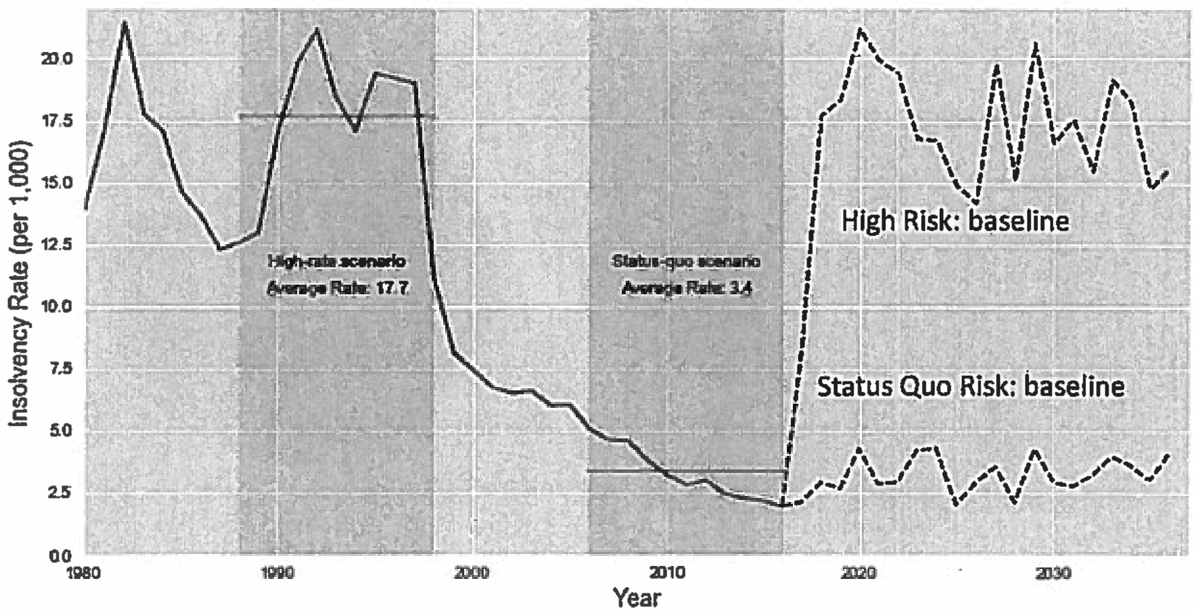
- 80,000 Atlantic province firms across 17 industries, 3 levels of government, 30 commodity types, 25 capital types;
- More than 150,000 surety records (see Appendix A for details);
- Other PaR (*Prosperity at Risk*®) datasets (e.g., many down to detailed geographic areas) on demographics, income statements and balance sheets, consumption patterns, labour force statistics, and commuting choices, among many others; and
- Public data on insolvency from the Office of the Superintendent of Bankruptcy Canada (OSBC) provide a good sense of the rates of insolvency by province and industry. These data allowed for a detailed comparison between the experience of bonded firms and those in the construction sector overall.

One benefit of using PaR is that multiple scenarios can be run and compared against a baseline. This shows, across thousands of randomized trials, the likely outcomes (plus the not-so-likely ones), and their broad impacts across the entire economy. It also allows for in-depth sensitivity analysis (employed here) to help decision-makers determine "optimal" policies. To investigate this topic in detail, we define eight broad scenarios (two risk scenarios times four bonding scenarios), and investigate over the next 20 years (2018-2037).

Results

Surety bonds can significantly reduce the insolvency rates within the construction sector. In the following figure the two risk scenarios are shown:

- The **blue line** shows the historical national number of **construction firm insolvencies** since 1980;
- The dashed **green line** shows a typical modelled rate of insolvency in the **status-quo risk baseline** <u>with no surety bonds</u>; and
- The dashed **red line** shows a typical modelled rate of insolvency in the **high-rate risk baseline** <u>with no surety bonds</u>.



Companies that exhibit financial distress (negative net worth and operating losses) or become insolvent can lead to project delays:

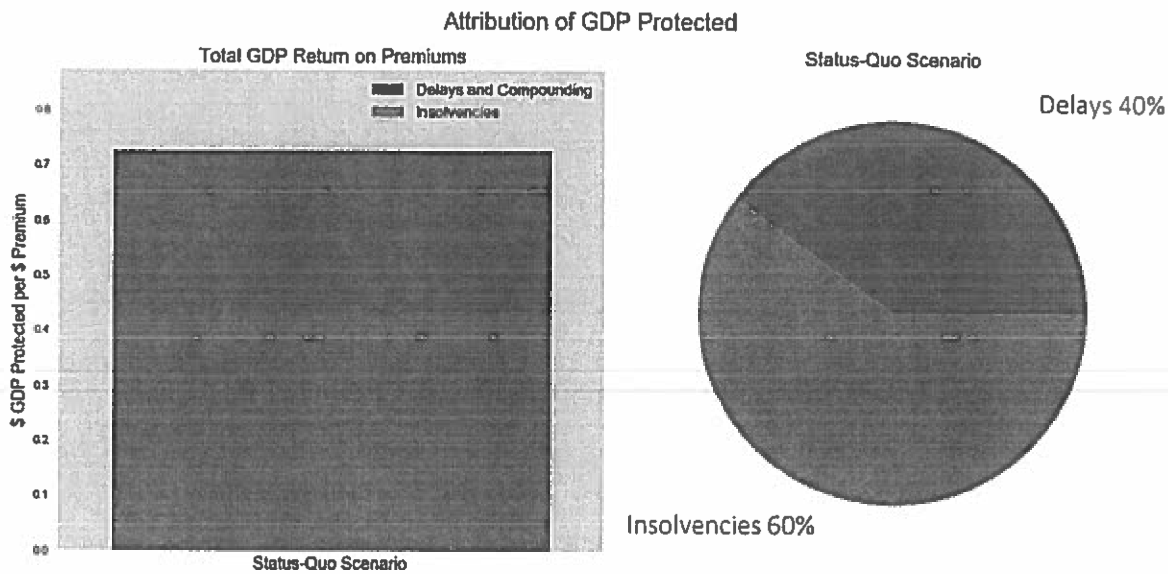
- Directly if company is the general contractor; or
- Indirectly if a supplier becomes insolvent (possibly through the previous insolvency of a different customer).

By introducing the performance and payment bonds, we see a significant reduction in delays for bonded projects through reduced insolvencies. As a result, many more projects are completed closer to the scheduled time with a large decrease in projects with significant overruns, particularly in the high risk case.

Status Quo Scenario

With performance and payment bonds, insolvency rates are reduced considerably resulting in significant economic benefits. The figure below shows that in the status quo scenario, if 100% of public infrastructure projects have performance and payment bonds, over $0.7 of GDP is protected per dollar of surety bond premium. Of this benefit, 60% is attributed to the reduction in insolvencies of companies, while the remaining 40% are systemic benefits which arise from having the infrastructure built on time.

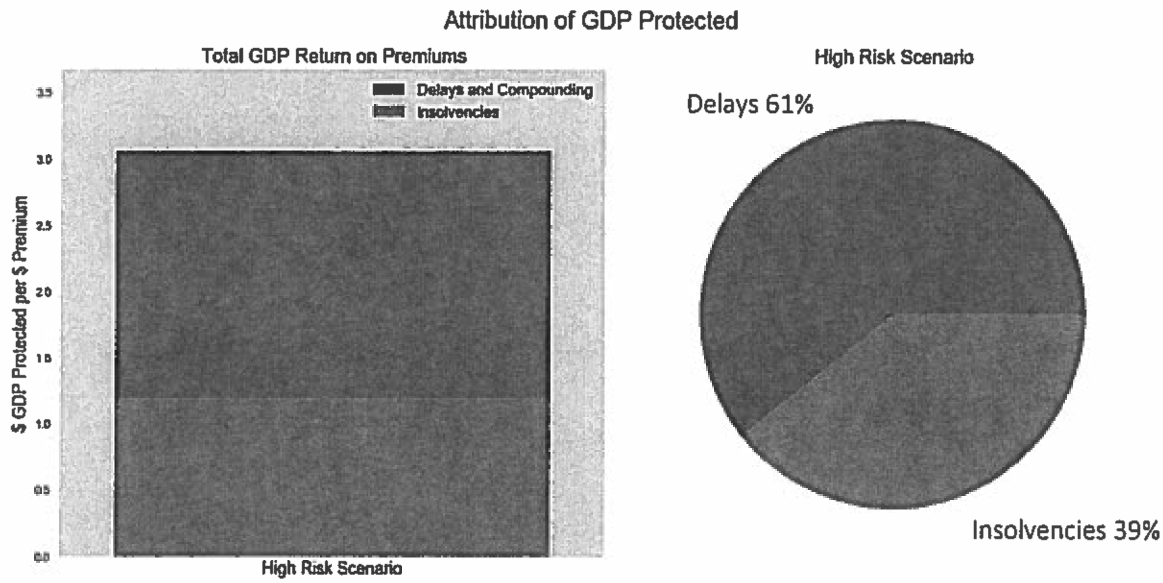
Attribution of GDP protected to insolvencies (green) and delays and compounding effects (blue) in the status-quo scenario



High Risk Scenario

In the high risk scenario, as illustrated in the figure below, if 100% of public infrastructure projects have performance and payment bonds, over $3 of GDP is protected per dollar of surety bond premium. Of this benefit, 39% is attributed to the reduction in insolvencies of companies, while 61% are systemic benefits which arise from having the infrastructure built on time, given a larger aggregate portfolio of projects delayed at higher insolvency rates. Similar differences exist for the other outcome metrics such as tax revenue and jobs.

Attribution of GDP protected to insolvencies (green) and delays and compounding effects (blue) in the high-risk scenario



The following table highlights some of the key economic metrics from the analysis. A greater proportion of the benefits in the status quo risk case are driven by direct insolvencies, while the high-risk case benefits result more from the network effects.

Summary economic impacts of surety (public infrastructure)

Risk level	Economic activity, per $1 of premium	% of benefits arising directly from reduced insolvencies	Associated tax revenue, per $1 of premium
Status Quo	$0.7	60%	$0.4
High Risk	$3	39%	$3.0

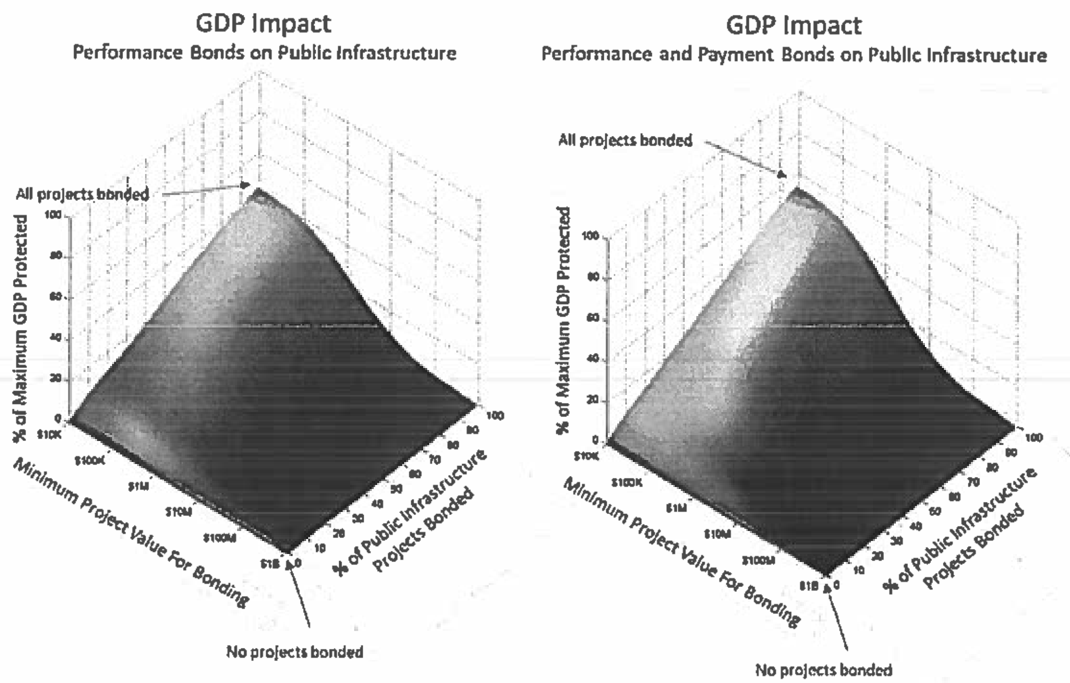
These results reflect status quo and high risk scenarios in which 100% of projects are bonded with both performance and payment bonds, and reflect the best economic outcomes. When only a portion of projects are bonded, or when performance bonds are used without payment bonds, the economic outcomes are less than optimal.

Surface plots of economic activity were generated for every combination of:

- Minimum project size for bonding (x-axis); and
- Percentage of public infrastructure projects bonded (y-axis).

The illustrations below show the expected GDP results of each combination (z-axis using percent of maximum GDP seen in the analysis). As can be seen, the most optimal outcome for the economy as a whole occurs when 100% of public infrastructure projects are bonded.

Bonding of Public Projects: Sensitivity of economic impacts, percentage of high risk scenario maximum



The "% of maximum GDP Impact" is the percent of the maximum GDP results we saw in any scenario. When payment bonds are used together with performance bonds the GDP outcomes increase slightly. In addition, the combination of performance bonds with payment bonds shows significant economic outcomes at the 100% project coverage level without negative marginal returns.

Conclusion

Credit and operational risk in the construction industry can vary significantly due to the movement of interest rates, recession, supply shocks, debt levels, credit squeezes, and so on. Currently, Canada enjoys historically low rates of construction insolvencies, which has been aided in part by the fact that many public infrastructure projects are surety bonded.

By understanding, quantifying and simulating the way in which the construction industry is connected between suppliers and subcontractors of materials and services and to the broader economy, the value of providing surety guarantees for projects to the socio-economic network of the Atlantic Provinces could be measured. We found that the impact of surety – and the additional due diligence its use ensures – is generally positive, regardless of scenario run (assuming some coverage). But a combination of performance and payment bonds – with a focus on infrastructure investments – yields the highest benefits (measured in terms of GDP growth) relative to the costs required.

Further, the process of underwriting bonds on construction projects appears to contribute to capital and operational adequacy in bonded businesses and reduces financial stress and insolvencies.

The benefits in the high insolvency rate scenario (e.g., 1990s levels) were particularly significant and about 4 times greater than in the status quo scenario despite the insolvency rates being only 5 times higher, which is a demonstration of how important network analysis is to such impact analysis. The analysis of the high risk scenario indicated that the benefits include:

- $3 of economic activity protected per $1 of premium paid;
- $3.0 of tax revenue (across all levels of government) protected per $1 of premium paid by all levels of government[3]; and
- 25 job-years protected per $1M of premiums.

Future research

Further, we have assumed zero administrative cost to construction companies in undertaking the due diligence required by the surety. (This is somewhat similar to capital adequacy requirements in the banking sector, where there are imposed costs to being a bank to ensure that the entire system isn't "infected" by poor performance.) Such research might suggest that there is a *minimum* project threshold that should be imposed, to avoid an undue burden on smaller construction companies.

[3] This analysis did not investigate any asymmetry in the government sector with respect to the level of governments which may pay the premium and those that receive the benefits. However, see CANCEA's report, "Ontario Infrastructure Investment: Federal and Provincial Risks and Rewards (Canadian Centre for Economic Analysis, 2016).

1. INTRODUCTION

Understanding the true economic value of surety is no simple task. It requires the ability to model the full network structure of industry – particularly in the construction sector – to understand the broad impacts of an adverse event. It also requires a significant amount of data on surety, such as who purchases it, what projects they work on, and what happens with those projects. Finally, it requires appreciating that economic impacts go beyond GDP; that they also include the likes of jobs and taxes, to understand where risks and rewards (intended or otherwise) may land. As such, as part of its industry advocacy work, the Surety Association of Canada (SAC) approached CANCEA to undertake network modeling, with major members confidentially providing significant amounts of data.

The objective of this independent report is therefore to provide the essential quantitative analysis of the economic value of surety (e.g., performance bonds, labour & material bonds) for different:

- Construction activity (with varying capital types); and
- Industries (i.e., public and private capital projects).

Using the framework established in previous and related work, CANCEA's unique modeling platform is utilized to demonstrate the value proposition for policy-makers, the general public, and other key stakeholders.

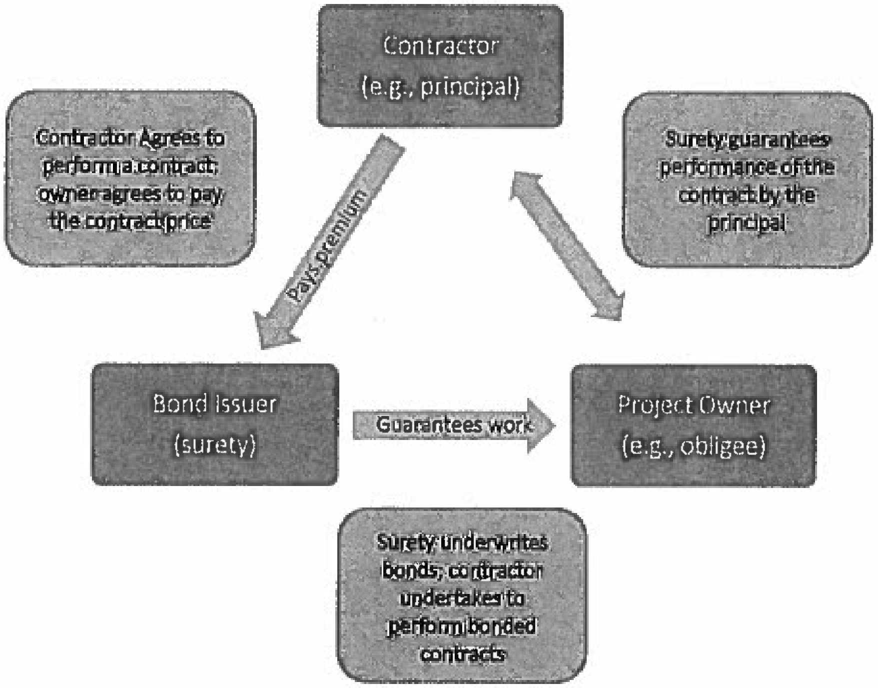
1.1 What is surety?

The enterprise of suretyship, where one person guarantees and answers for the performance of another person's obligations to a third party, is a form of performance security that has been effective and has persisted through time. Religious and civic laws have regulated the use of surety instruments in commerce and society since ancient times. By 1840, the first successful corporate Surety – Guaranty Society of London – was founded, and in 1935, the US federal *Miller Act* was established to require use of performance bonds for public works contracts in excess of $100,000 and payment bonds for contracts in excess of $25,000 (Surety Bonds Timeline, 2017). In 1992, The Surety Association of Canada (SAC) was formed by companies seeking advocacy independent of the insurance industry. SAC currently has close to 80 members.[4]

The diagram below illustrates the 3-party relationship that is at the heart of a surety bond. While the surety engages in a process of due diligence in evaluating the credit and performance capacity of a construction enterprise and often forms a business relationship with a contractor, the surety's primary obligation under a bond is to the obligee (often a project owner).

[4] See http://www.surety-canada.com/en/members/index.html/Surety/advanced-directory/search for details

Figure 1 Basic surety diagram



Among the various types of surety bonds underwritten by the surety industry in Canada, this study focuses on performance bonds and payment bonds used in the construction industry. In the Canadian market, performance bonds typically have a value of 50% of the value of the bonded contract, and are normally issued in tandem with a payment bond also having a value of 50% of the bonded contract.

The proceeds of a payment bond are restricted and can be used only to pay qualifying subcontractors, suppliers and labourers on the bonded contract. Payment of these subcontractors and suppliers can preserve warranty on products, equipment and work, and can ensure continuity of a project team to avoid delay in completion of a defaulted project. A payment bond can also ensure payment of subcontractors and others who would otherwise seek recovery of unpaid accounts by registering a lien on the project or taking other legal action that could disrupt the completion of a project.

The proceeds of a performance bond are available to offset additional costs of completing a bonded contract in the event of the default of the principal contractor and financial protection is provided to a project owner against the risk of contractor default.

1.1.1 ASSURANCE RATHER THAN INSURANCE

While surety has commonalities with insurance and banking, it should not be confused with either. An insurance company typically gathers premiums from a large group of customers at risk of some adverse event occurring (e.g., a car accident). This creates a substantial pool of money that can be used to pay out the costs of adverse events to the small subset of customers to whom they occur, spreading the costs of such risk across all customers. Details gathered on potential customers are generally only used to determine the premiums paid, without much regard for the individual characteristics that could determine actual "riskiness" (e.g., while people of a certain subgroup, like teenagers, may be more at risk in *general* of car accidents, *individuals* in that group may be excellent drivers).

But the fundamental idea of surety bonds is to *avoid* adverse events, because a surety company is putting up its own resources to ensure projects get completed. This makes surety bonds more like an extension of credit with the assumption that there will be no losses, such as co-signing a loan. This means that surety is more about *assurance* than *insurance*. A surety company assesses a contractor's experience and track record (e.g., in financial and project management), capacity (both financial and performance), character, and other factors before deciding whether or not to issue a bond. If a particular contractor is deemed too risky, the surety will simply decline to issue bond. Premiums are collected to cover the costs of underwriting expenses, not to pay losses. Taking on an overly risky contractor can be a costly decision.

2. THE ATLANTIC PROVINCES' CONSTRUCTION INDUSTRY

The Atlantic Provinces' construction industry[5] plays a significant role in the region's economy, contributing approximately 7% of GDP and employment – a share that has risen over the last 15 years. Over that period, the Canadian construction sector has built up a significant net worth, having grown their aggregate assets (net of liabilities) by nearly 500%.

Figure 2 Contribution of the construction industry to the Atlantic Provinces' economy (%)

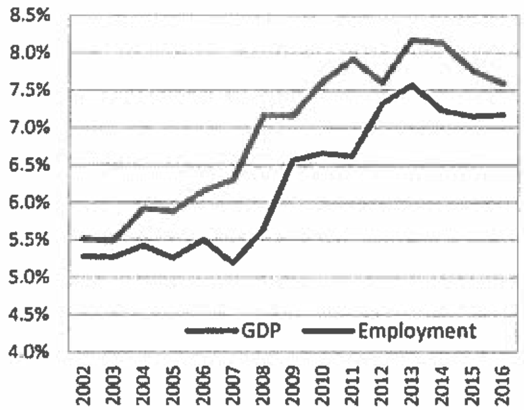
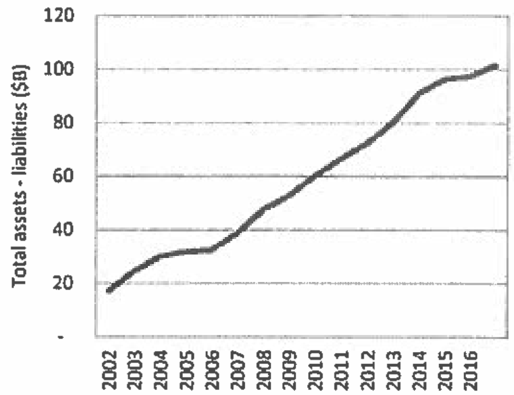


Figure 3 Net worth of the construction industry in Canada



Sources: Statistics Canada, tables 379-0028, 282-0008, and 187-0001

That said, this growth has come more from a return on capital investment than on operating profit margins.

Figure 4 Operating profit margin in Canada (%)

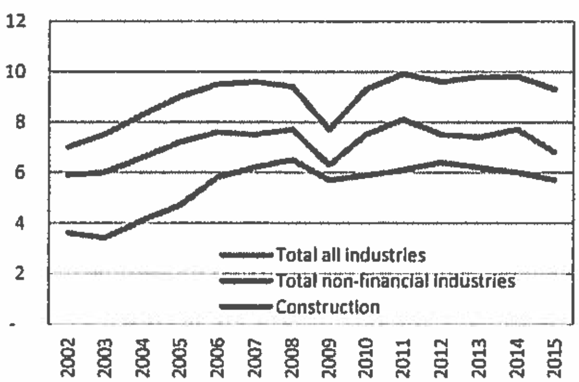
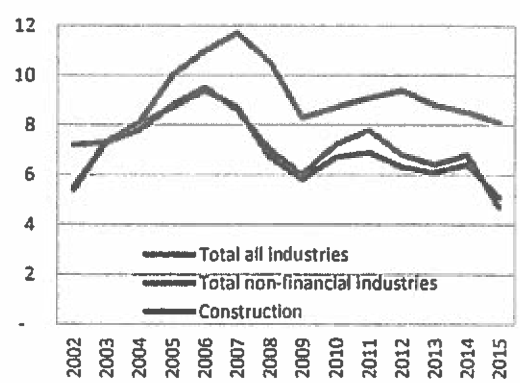


Figure 5 Return on capital employed in Canada (%)

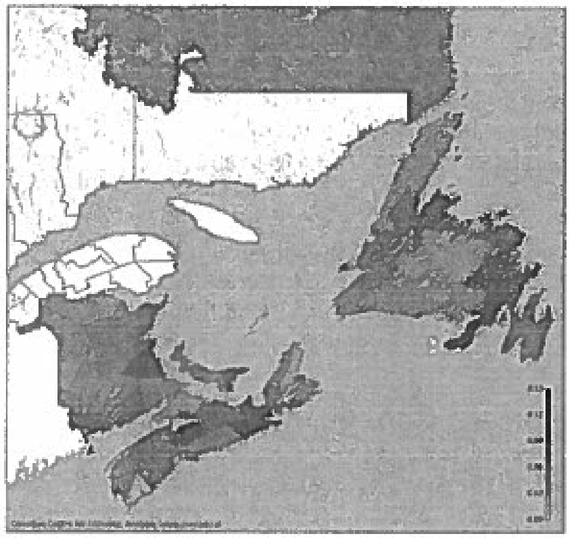


Sources: Statistics Canada, table 180-0003

[5] For the purposes of this analysis construction includes building construction (non-residential – industrial, commercial, and institutional, plus residential); and engineering construction (e.g., transportation, water & wastewater, communications, and other engineering construction). Each has a public and private component.

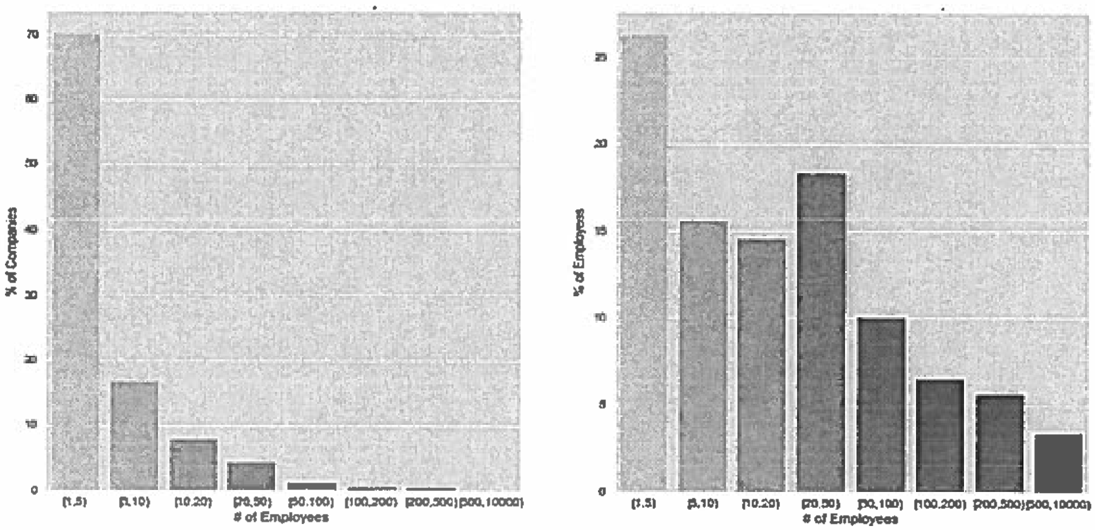
Further, construction employs a significant fraction of the population geographically distributed across the province.

Figure 6 **Distribution of construction employees across the Atlantic Provinces**



This distribution stems from the fact that the construction sector is dominated by a large number of small companies, both in terms of the number of companies (over 2/3) and number of employees (over 1/4) and the construction is location dependent.

Figure 7 **Canada's construction industry breakdown by size of firm**

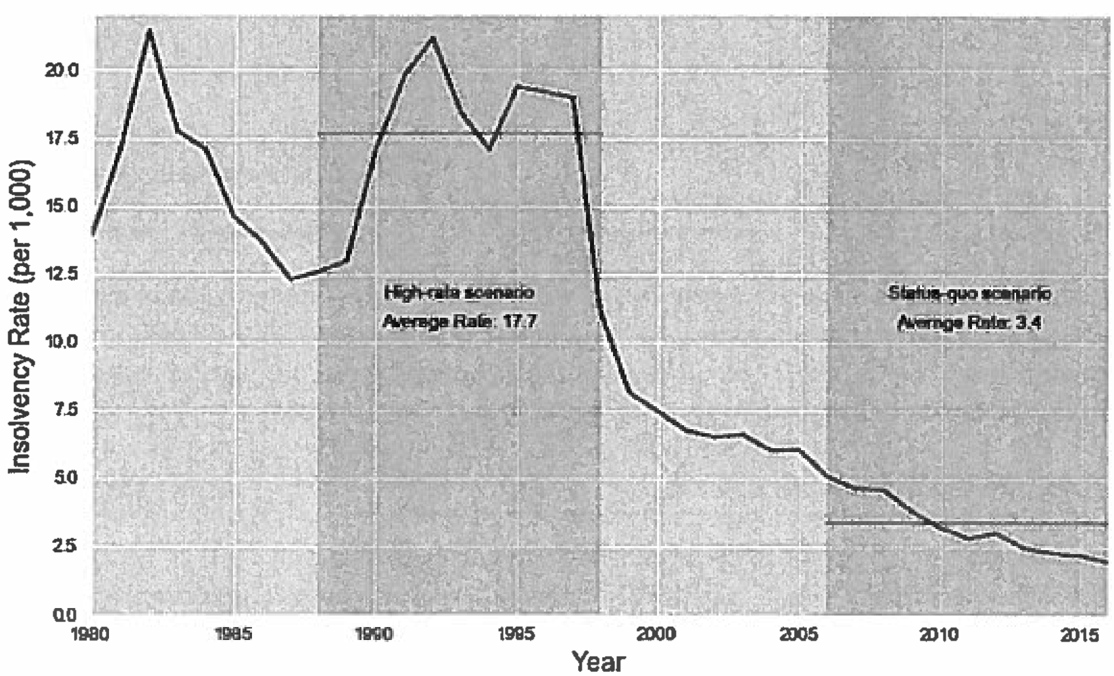


2.1 Risk in the construction industry

As discussed in previous CANCEA work, it has become fairly common to read a news headline about a major infrastructure project having blown through its budget or construction timelines. Research suggests that such cost overruns and construction delays "are a global epidemic. They affect projects conducted by national, provincial, and local government, and by private sector organizations; they are a feature of a wide diversity of infrastructure project types; and they have been stubbornly persistent throughout history" (Siemiatycki, 2015). Cost overruns and timing delays are often borne of multiple issues, including poor schedule management, trade strikes, unknown site conditions, harsh environmental conditions, design errors, delivery delays of core elements, scope changes, or inspections by other authorities having jurisdiction (Hanscomb, 2015).

Another driver is contractor insolvency. Currently, as shown in Figure 8 , the insolvency rate in the construction industry is at a 35 year low, having fallen consistently over the last twenty years.

Figure 8 Insolvency rates in the Canadian construction sector

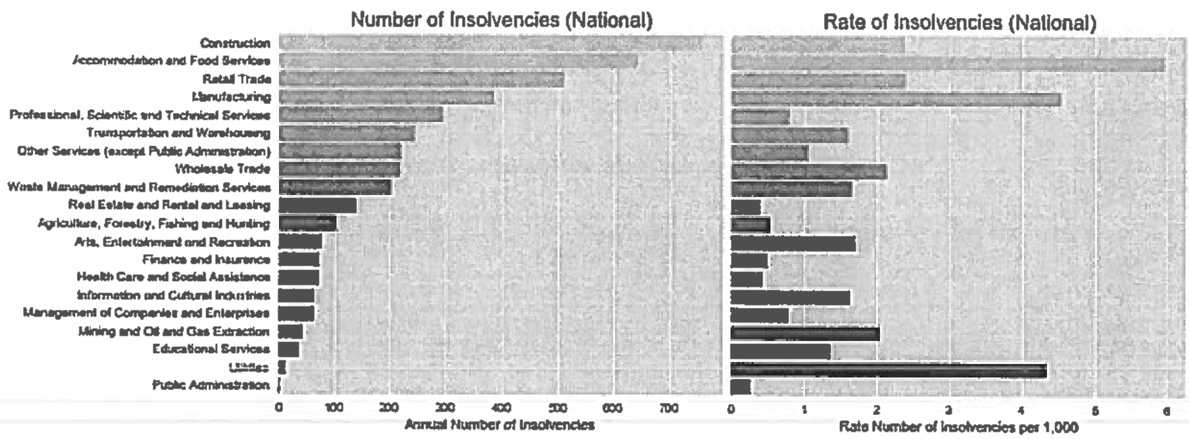


Part of that is likely due to the significantly low interest rate environment and the significantly increased amount of liquidity held by Canadian construction companies, who have seen the share of their (aggregate) assets held in cash nearly double from 7% in 2002 to 13% in 2016. However, underlying these trends are risks, for instance, in Ontario, the average collection period in construction has increased by nearly a quarter from 2002 to 2013, from 57.3 to 71.1 days (Reynolds & Vogel, 2016), and thus a larger "pot" of receivables has developed on corporate balance sheets (accounts receivable have grown as a share of total assets over that period by 36% to 19%. There are no readily available data to know whether these financial trends are simply dominated by the larger players[6] in the industry, though a review of the financial statements for a few of the bigger companies would suggest this to be the case.

Nonetheless, as shown in Figure 9 , over the last 5 years the construction sector in Canada has had:

- The highest absolute number of industry insolvencies;
- The 5th largest industry rate per 1,000 companies; and
- An insolvency rate significantly higher for smaller companies.

Figure 9 **Number and rate of insolvencies by industry**



The construction industry has been making efforts to reduce their exposure to risk. Part of this has come from the introduction of modern risk management practices that understand the role of the external environment (Baloi & Price, 2003; Fan, Lin, & Sheu, 2008), and that appreciate that different stages of a project face different risks and so should be managed differently (Nielsen, 2006).

2.2 Industry network structure

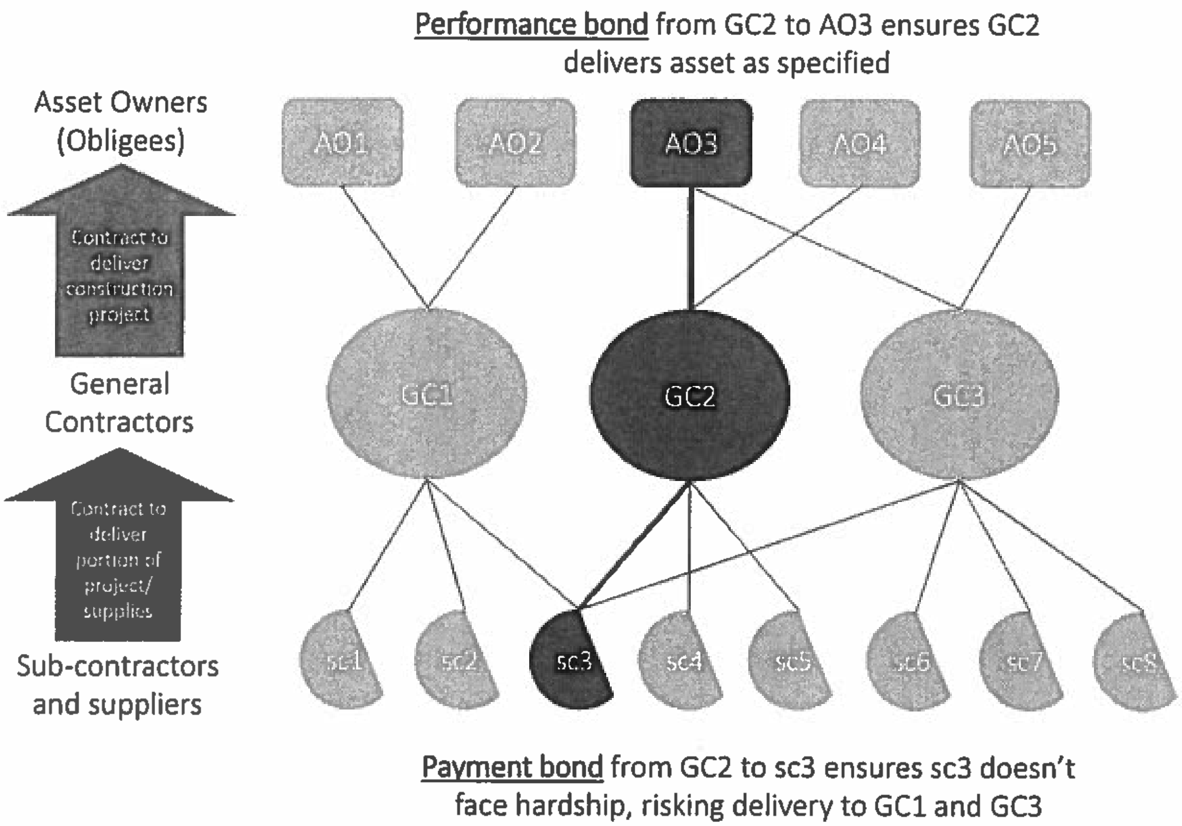
The construction sector is part of an incredibly complex economic system with a vast array of networked interactions between many diverse "agents". If analysis only relies on averages to estimate causes and effects, then it only looks at the economy from the top down. But we are not averages. We behave differently. We offer different things to different people. And we all face different constraints.

In other words, how things are connected within a system impacts how actions reverberate through it. Without properly understanding the linkages between economic agents (e.g., firms), a full understanding of what happens when an adverse event hits is impossible. Metaphorically, a car accident on the highway may only do severe damage to the few cars directly involved, but many more cars get affected.

[6] In the Canadian construction industry, the top 3 companies represent roughly 5% of the revenue generation and the next 10 companies another 5% *(Sources: On-site Magazine and Statistics Canada table 187-0001)*

As an example, Figure 10 illustrates the ease with which networked companies can indirectly impact other organizations within a network. Trying to model such a network top down would entirely lose these linkages, and hide knock-on effects from an interruption (e.g., from a financial hardship).

Figure 10 Simple representation of surety in a networked economy



Taking this to the fullest, in order to capture the effect of interruptions in the network, it must be modelled for over the 3 million companies in 20 industry sectors across Canada[7]. While difficult to represent graphically, Figure 11 presents a subsection of such a set of networked companies, by showing the linkages (inputs and outputs) between the largest 1,000 companies by industry (the size of marker here represents the number of employees). Figure 12 then shows an individual construction company (brown square), which has (say) a dozen linkages (e.g., suppliers or subcontractors), each of which has (say) a dozen of its own, and so on.

Therefore, if such a company were to become insolvent, suppliers would have an increased chance of insolvency, based on both their own underlying industry rates and a fraction of revenue from the insolvent customer. (Payment bonds remove the impact of fraction of revenue from insolvent customers but do not

[7] For the Atlantic Provinces, the full network includes 80,000 companies across: 17 industries and 3 levels of government, 30 commodity types, 25 capital types. Most companies have dozens of suppliers and customers

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affect underlying industry rates.) On the flip side, if a supplier or subcontractor became insolvent, it could introduce delays in other projects depending on the fraction of inputs it supplies.

As such, surety bonds can help protect against interruptions in the network. The types of bonds considered here are performance bonds (which protect 'upstream') and payment bonds (which protect 'downstream').

Figure 11 **Network of 1,000 largest employers by industry**

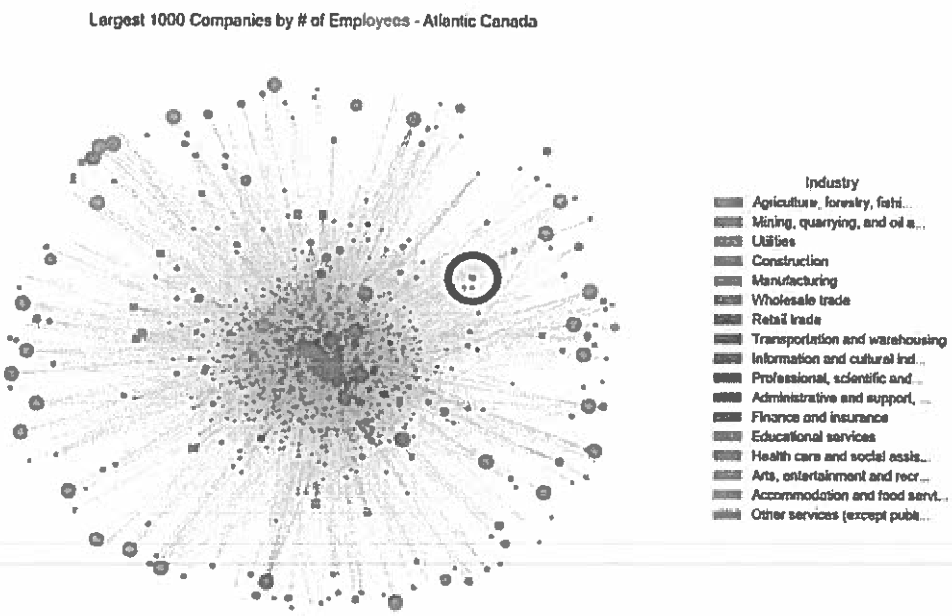
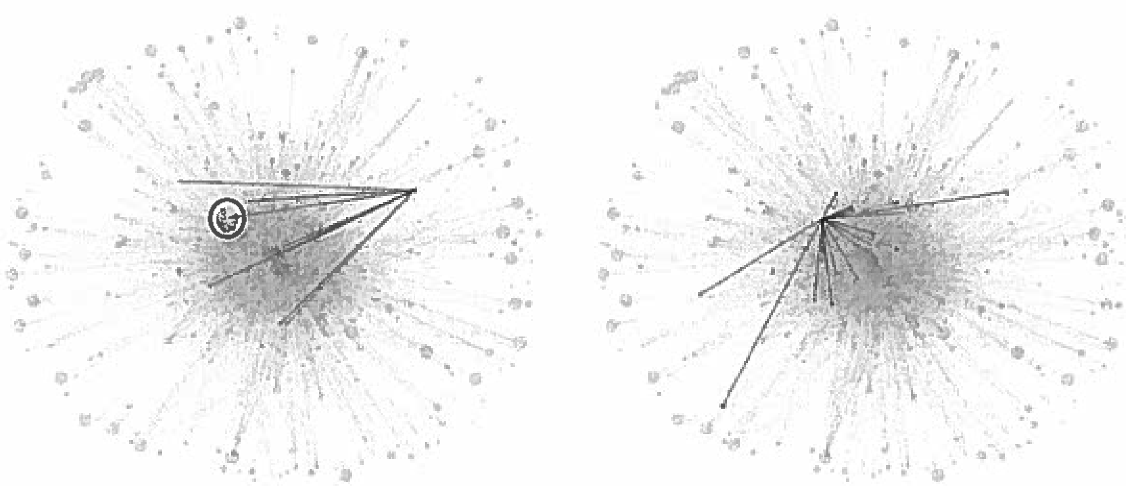


Figure 12 **Suppliers or subcontractors of one construction company (left) have their own connections (right)**



3. MODELING THE NETWORK

Given the complexity of modeling the range of networked interactions and impacts required for this project, a different approach is required. Improvements in computing power and data have given rise to a new method of socio-economic inquiry.

Agent-based modeling provides a framework for investigating dynamic, networked systems, such as an economy (with specific land-uses), by means of individual agents (e.g., households, businesses, governments), their mutual interaction with each other and their environment. *Prosperity at Risk*® (PaR) is CANCEA's "big data" computer simulation platform that incorporates social, health, economic, financial, and infrastructure factors in a networked system. This platform models agents as:

- **Individuals**, with individual budget constraints (e.g., income, expenses, assets, and liabilities) and production/consumption activities (dependent upon economic input/output tables), thereby recognizing the independence of their motivations and decisions; and as
- **Part of a spatial and economic network**, thereby recognizing the dependence of their economic decisions upon other agents (via, for example, policy, investment decisions, and land use).

As such, PaR simulates the interactions of more than 40 million agents (people, households, dwellings, companies, government) across Canada that are each encoded with financial, behavioural/motivational rules to guide their decisions, act based on those rules, and be influenced by the actions of others. This is enabled by an enormous "linked-path" database that links hundreds of disparate (and typically cross-sectional) data sources back to the very objects that created them (e.g., individual companies)[8]. This allows for the introduction of varied constraints and behaviours over time. The goal of such analysis is to identify the risks and rewards (intended or not) across various stakeholders.

Because PaR features the entirety of the Canadian economy and adopts a micro-simulation approach, all scenarios can be evaluated with precision regarding their impacts on various types of agents or sectors of the economy. This also allows for unforeseen spillover effects (or 'externalities') to be accounted for, tracked, and assigned to the correct cause, as agents dynamically adapt to their environments. Small changes in behaviour, spending, or infrastructure lead to local adaptations by agents, which then spread to others, such that all the relevant aspects of the economy reflect all the 'ripples in the pond'.

In this way, the breadth of effects can be tracked as they unfold geographically and temporally, and an intervention or scenario can be assessed holistically, such that all impacts are taken into consideration. The model is therefore realistically sensitive to the particular type of investment, intervention, or behavioural change with as few *a priori* assumptions as possible.

[8] For example, PaR imbues in agents hundreds of data sources (e.g., Statistics Canada tables, many down to detailed geographic areas) on demographics, income statements and balance sheets, consumption patterns, labour force statistics, and commuting choices, among many others.

3.1 Methodology

In addition to the hundreds of data sources that have already been triangulated into agents in PaR, the larger members of the Surety Association of Canada (SAC) provided detailed (proprietary) claims data (collectively called the SAC data for simplicity) that included:

- Surety industry datasets of over 10,000 construction firms
- Over 150,000 bonded construction projects
- Over 3,000 surety claims

Additional details on the SAC data are provided in Appendix A.

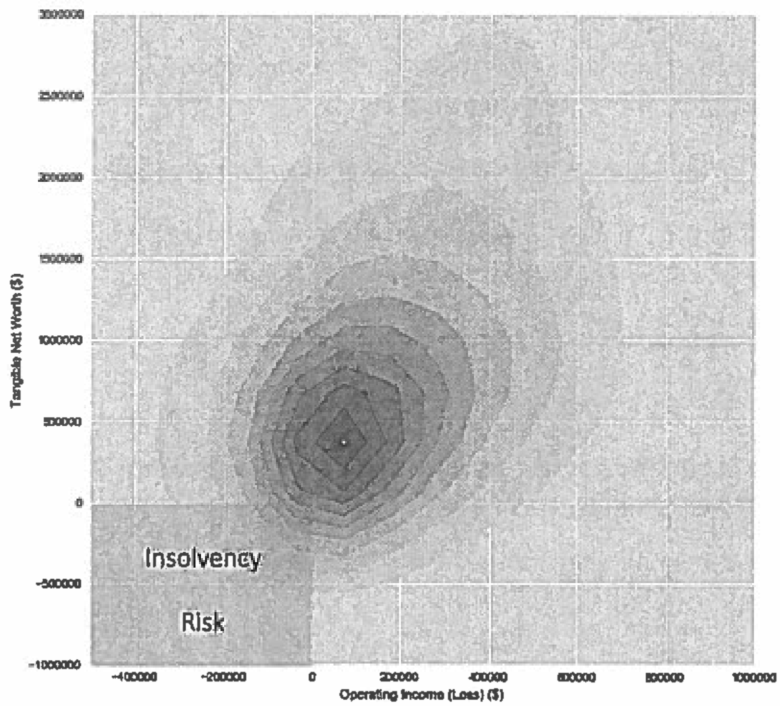
Further, public data on insolvency from the Office of the Superintendent of Bankruptcy Canada (OSBC) provide a good sense of the rates of insolvency by province and industry.

These data allowed for a detailed comparison between the experience of bonded firms and those in the general construction sector. Given that the number of companies involved with surety bonds is small relative to the number of construction-related companies overall, these average rates of insolvency provide a good estimate for the rate of insolvency for companies with non-bonded projects.

Given the number and distribution of firms in the construction industry, its dependence on other sectors, and the inherent (and often unforeseen) risks associated with construction, the industry writ large is affected by insolvency at a relatively high rate. Recall from Figure 9 that the industry has the highest absolute number of insolvencies across Canada on an annual basis, and has the 5^{th} highest rate (per 1,000 companies), behind the likes of accommodation and food services, and retail trade.

However, identified by companies with large losses or expenses (greater than 50% of project value), and operating losses, and negative tangible net worth, Figure 13 shows that insolvencies are quite rare within the SAC data.

Figure 13 **Distribution of companies by net worth and operating income (excluding extreme outliers)**



This suggests that the due diligence that surety enforces, along with the surety itself (in cases requiring it), help to reduce strain in the economic network, although this does not apply to all companies evenly.

Individually, smaller companies are not eligible for larger projects since they do not have the resources available. As the project values requiring surety bonds decreased, a greater number of smaller companies would require their projects to be bonded. It is assumed for this project that any policy which may require surety bonds for small projects will not impose an undue burden on either the smaller companies or the surety. (This assumes no attrition of small companies due to the surety requirement.) As a result, they experience a reduction in insolvency (though stay at a higher rate than larger companies).

3.1.1 SCENARIOS

One benefit of using PaR is that multiple scenarios can be run and compared against a baseline. This shows, across thousands of randomized trials, the likely outcomes (plus the not-so-likely ones), and their broad impacts across the entire economy. It also allows for in-depth sensitivity analysis (employed here) to help decision-makers determine "optimal" policies. For this project, there are some key steps:

- *Define a 'baseline' capital investment profile*: construction (public and private) under the status quo
- *Assign companies to build projects*: Under the status quo, companies are randomly assigned to build the projects (accounting for insolvencies)
- *Quantify impacts of Surety bonds*: Vary the number of bonded projects to study the impact through changes in insolvency and project delays

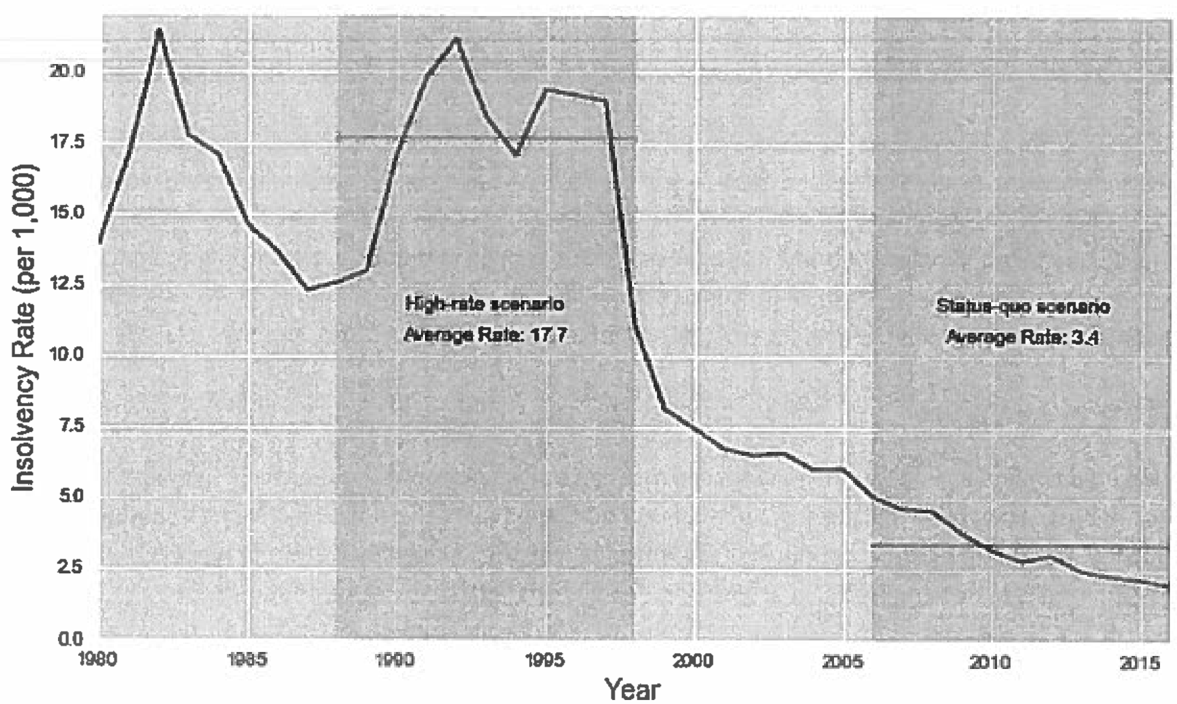
To investigate this topic in detail, we define four sets of projects and the related bonds issued. For varying project sizes, we consider – over the next 20 years (2018-2037) – the fraction of:

1. Public sector infrastructure (e.g., transportation and transit, health, education, water & wastewater) projects with only performance bonds;
2. Public sector infrastructure projects with only performance *and* payment bonds;
3. All construction (i.e., public plus residential/commercial/industrial construction and private engineering construction) projects with performance bonds; and
4. All construction projects with performance *and* payment bonds.

For each set, the analysis is performed:

1. Maintaining the current status quo insolvency rates – that is, maintain the average insolvency rate over the last 10 years (see Figure 14); and
2. Using 'high-risk' insolvency rates from the late-1980s to mid-1990s.

Figure 14 Insolvency rates in the Canadian construction sector



This leads to a total of eight broad scenarios, and a few key hypotheses:

- Insolvency rates for companies with non-bonded projects differ from those with bonded projects (could be tied to different capital levels as a correlating factor for insolvencies); and
- Projects that experience profit losses or have claims tend to have greater time overruns than those that don't after accounting for project size (difficult to attribute cause of overruns).

3.1.2 IMPACTS OF BONDS

To summarize some of the data used to help undertake the network modeling done in PaR, there is a noticeable variety in what happens to companies with bonded vs. non-bonded projects across Canada[9].

First, as shown in Figure 15 , the estimated difference in insolvency rates between bonded and non-bonded companies is almost a factor of ten. That is, non-bonded companies are ten-times more likely to go insolvent at any given point in time. Further, insolvency tends to hit smaller companies far more frequently than their larger counterparts (by orders of magnitude).

Figure 15 Comparison of insolvency rates in Canada's construction sector

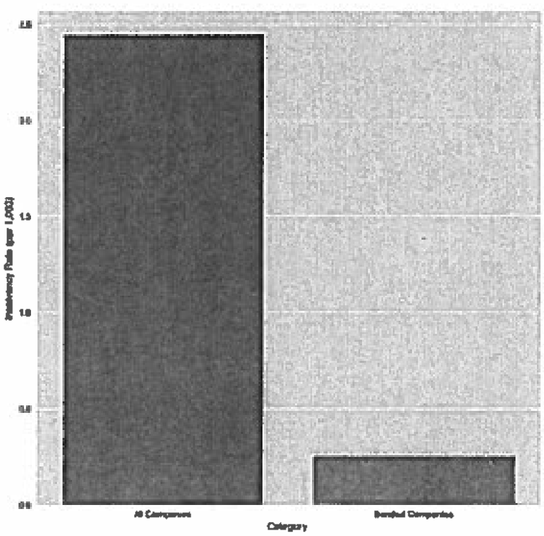
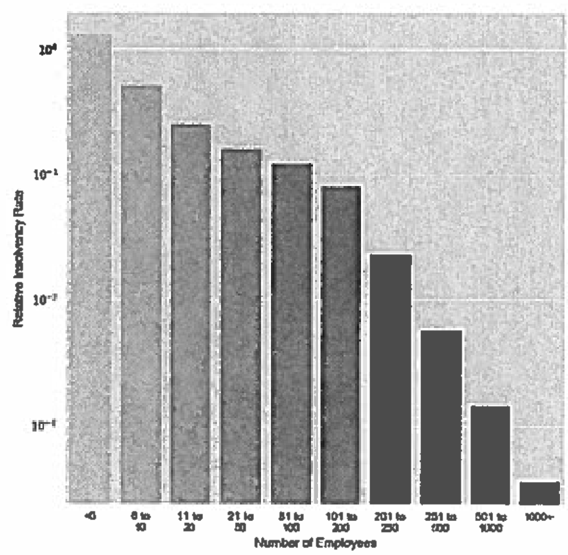


Figure 16 Relative insolvencies by firm size (by number of employees)



Further, as highlighted in previous work by CANCEA (2016)[10], there are significant economic consequences to project delays, as infrastructure delivery is about "right size, right place, and *right time*". If something

[9] Limited data due to the relative infrequency of surety claims require that the impact of surety bond be evaluated on a national scale but the results can be applied regionally.

[10] An analysis of 200 P3 infrastructure projects in Canada found that delays in construction could have significant long-term economic impact particularly as the size of the portfolio of delayed projects increases

stands in the way of delivering or enabling a vital public service at that time, then the economy suffers. Specifically:

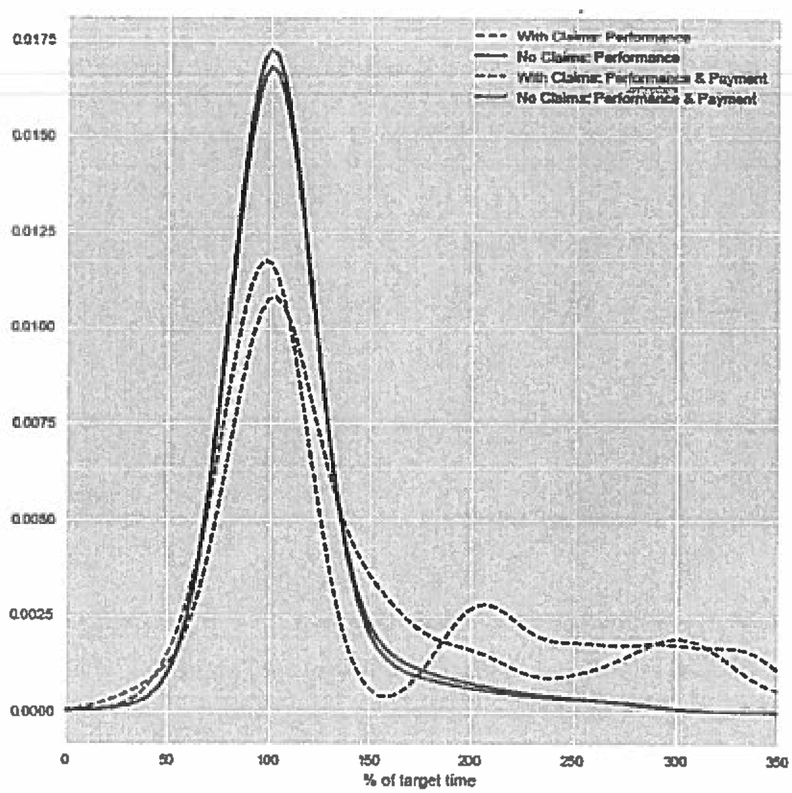
> *Since infrastructure plays a critical role in the efficient operation of the economy, the effect of delays today compound over decades. As a result, the effective present-day value of an infrastructure project is reduced significantly for larger projects and greater delay in implementation.... That is, for smaller projects, the impact of delays even up to a few years has a relatively small effect, but as the projects grow in size, the cost of delays to the Canadian economy quickly become more significant.*

The Economic Impact of Canadian P3 Projects (Canadian Centre for Economic Analysis, 2016)

Examining the data, as shown in Figure 17 , we see there is a distribution of delays given financial stress (where claims were used as a proxy for financial stress) with different bond types. Non-bonded companies experiencing financial stress would conservatively have projects facing the largest delay distribution. Similarly, the percentage of projects with claims have more delays than those without. This provides:

- A lower estimate of the delays that might be experienced without bonds; and
- The delays that might be avoided for projects that become bonded.

Figure 17 Impact of financial stress on project overruns



What this shows is that:

- Most projects are completed around the expected timeframe, though less so for those being undertaken by companies with under financial stress (i.e., with claims); and
- While roughly 90% of projects not under financial stress (i.e., without claims) are completed within a 40% delay, a similar proportion of those under financial stress (i.e., with claims) are only completed within a 200% delay.

Note that we are not assigning any specific reason for the change in total time from expectation. Projects may extend beyond their initial target date for a variety of reasons – such as scope changes or unforeseen issues – in additional to financial issues, hence overruns for projects without claims as well.

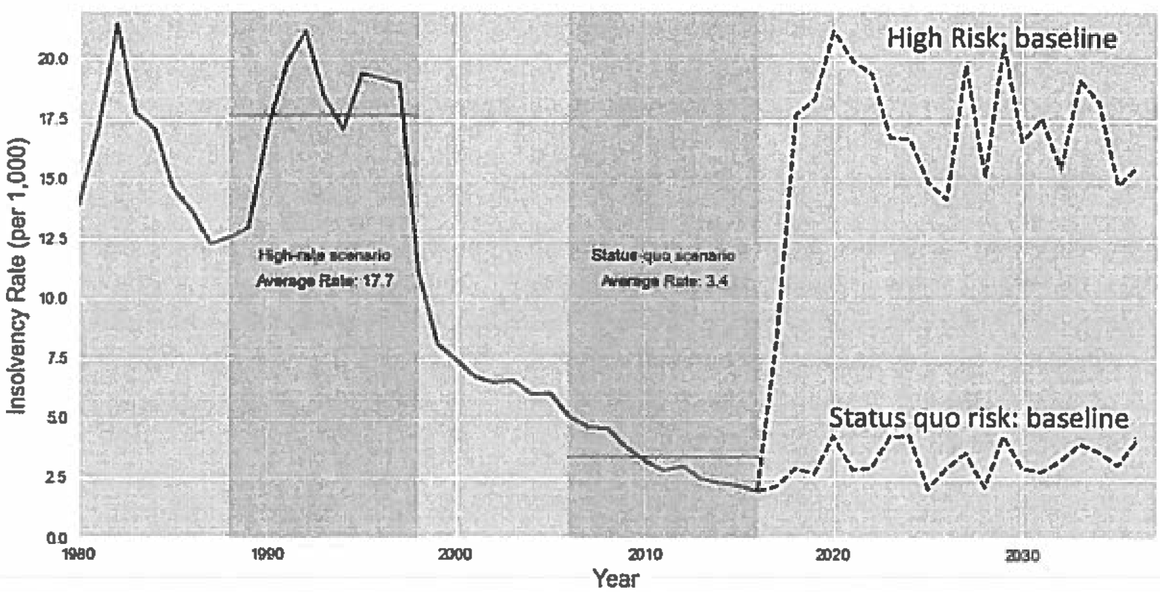
3.1.3 DISTRIBUTION OF PROJECTS AND BOND PROPERTIES

Project values range from tens of thousands to multi-million dollars with the majority in the $100,000 to $1,000,000 range. Note that project values are "annualized" by dividing total value by expected duration of construction (in years), as this is more reflective of the rate that money enters the economy. The model picks bond properties based on the distributions from the SAC dataset, and premiums may vary depending on bond type (performance vs performance and payment). This gives us a way of randomly selecting realistic bond characteristics in the simulations.

4. RESULTS

Beginning with the baseline, or reference scenario, against which the impacts of surety bonds will be measured.

Figure 18 Baseline insolvency rates in the construction sector



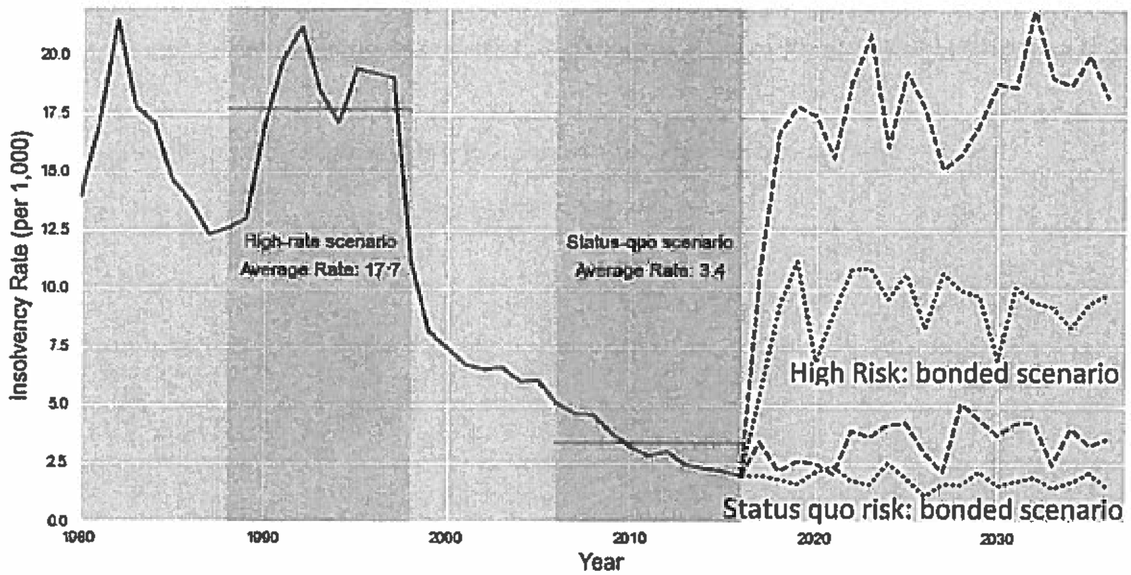
In Figure 18 :

- The dashed green line shows a typical modelled rate of insolvency in the status-quo scenario with no surety bonds; and
- The dashed red line shows a typical modelled rate of insolvency in the high-rate scenario with no surety bonds.

Now, consider a specific *example* in which all public infrastructure capital projects are eligible for bonds and are bonded, no minimum project threshold is applied, and all bonds can have characteristics randomly drawn from the characteristics seen in the SAC data. For example:

- The percentage of project value covered is randomly drawn from the "Bond Coverage" distribution (usually 50% or 100%); and
- The premium paid relative to the original bond is randomly drawn from the "Premiums" distribution.

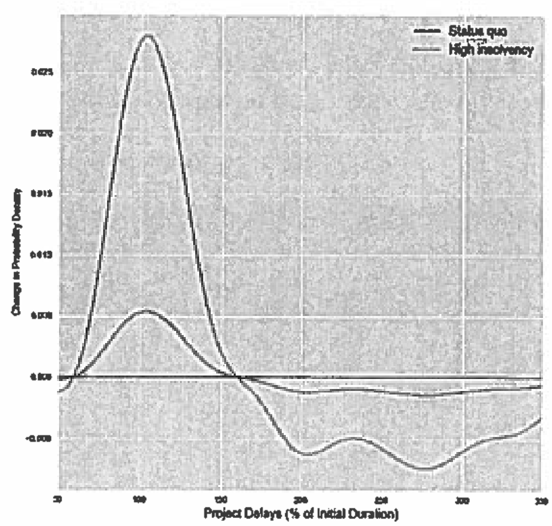
Figure 19 Scenario insolvency rates in the construction sector



As shown in Figure 19 , with performance and payment bonds, insolvency rates are reduced considerably (shown is the case when 100% of infrastructure projects have bonds). In the high-insolvency scenario, there is significantly more room for improvement, and as such, we see a significant decline in insolvencies. This results in much larger economic benefits overall.

Further, companies that become insolvent lead to project delays – directly if the company is the general contractor or indirectly if a supplier becomes insolvent, such as through the insolvency of a different customer. (These are modeled based on the distribution of project delays with claims.) By introducing the performance and payment bonds, however, we see a significant reduction in delays – as shown in Figure 20 . As a result, many more projects are completed closer to the scheduled time with a large decrease in the number of projects with large overruns, particularly in the high risk case.

Figure 20 Change in delay distribution



The economic contribution due to project delays and compounding effects are significantly greater in the high-insolvency scenario. This is largely driven by the bigger aggregate portfolio of projects delayed at higher insolvency rates. Similar differences exist for the other outcome metrics such as tax revenue and jobs.

Figure 21 GDP impact of all public infrastructure having performance and payment bonds

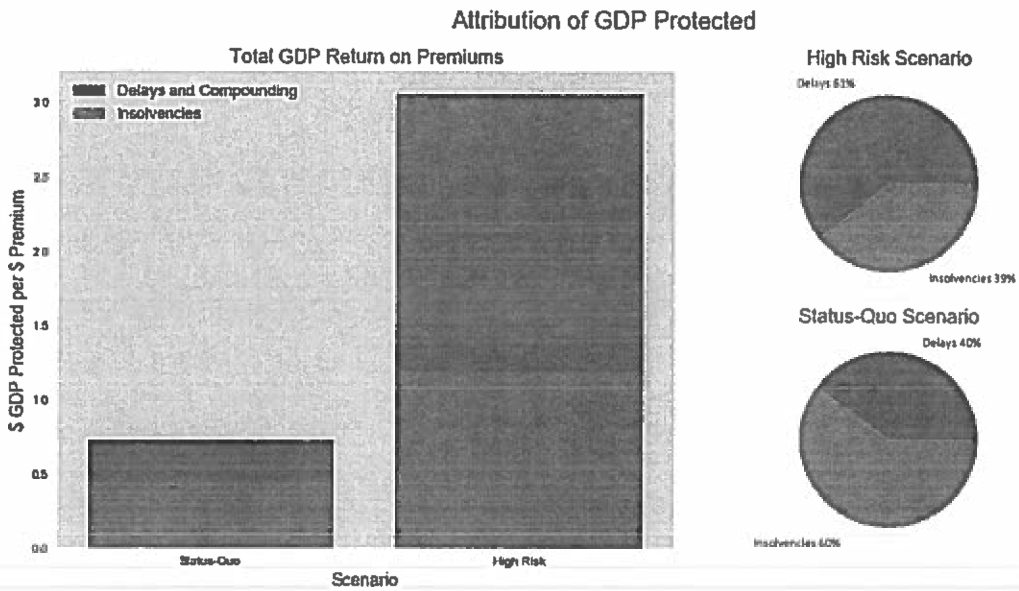


Table 1 highlights that the high insolvency risk case is disproportionately large. That is, the status quo risk case is driven more by direct insolvencies while the high-risk case more by the network effects.

Table 1 Summary economic impacts of surety (public infrastructure)

Risk level	Economic activity, per $1 of premium	% of benefits arising directly from reduced insolvencies	Associated tax revenue, per $1 of premium
Status Quo	$0.7	60%	$0.4
High risk	$3	39%	$3.0

As a demonstration of the importance of both bond types, Figure 22 and Figure 23 highlight the economic impacts as a percentage of the scenario maximum for public infrastructure only (Figure 22) and for all capital projects (Figure 23) in the high-risk scenario. That is, inclusion of both bond types (performance and payment) for projects leads to better economic outcomes than performance bonds only.

Figure 22 GDP impacts as % of high risk-scenario, public infrastructure only

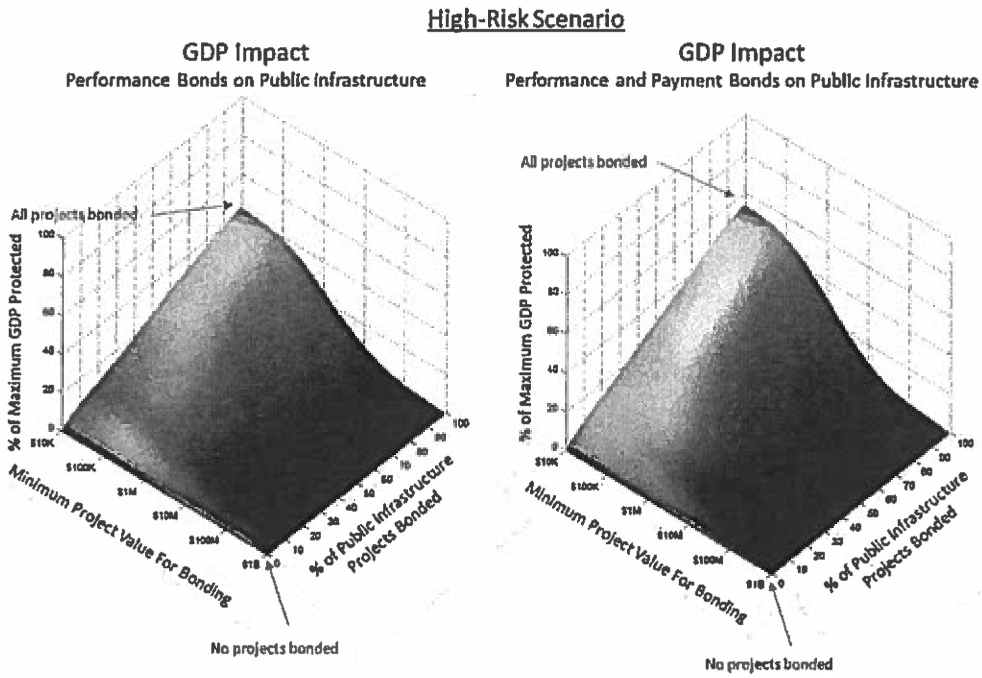
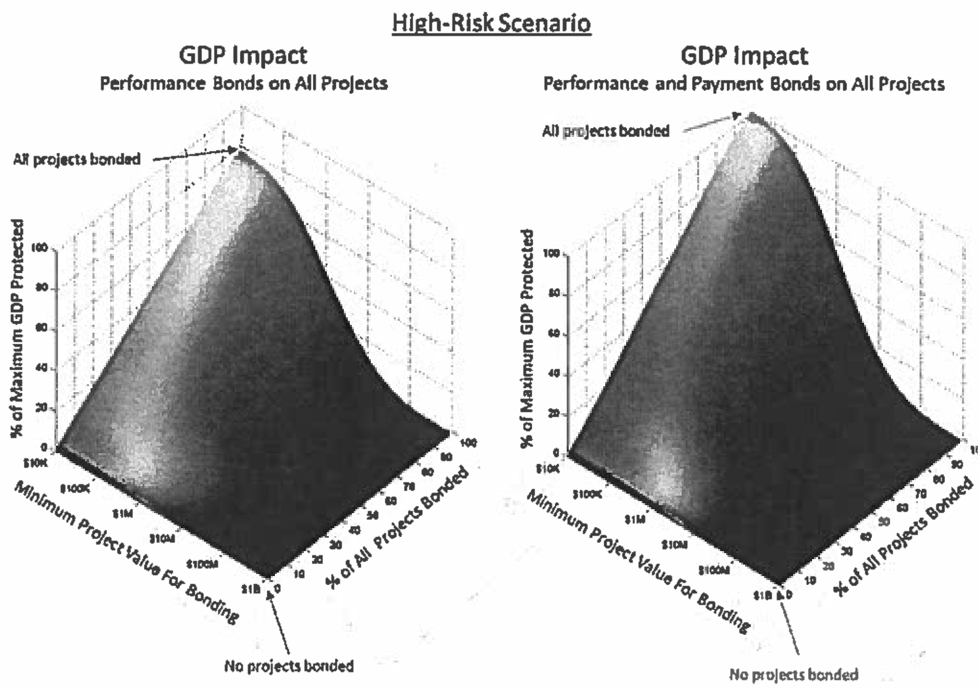


Figure 23 GDP impacts as % of high risk-scenario, all infrastructure



5. CONCLUSION

Credit and operational risk in the construction industry can vary significantly due to the movement of interest rates, recession, supply shocks, debt levels, credit squeezes and so on. Currently, Canada enjoys historically low rates of construction insolvencies, which has been aided in part by the fact that a majority of public infrastructure projects are surety bonded.

By understanding, quantifying and simulating the way in which the construction industry is connected between suppliers and subcontractors of materials and services and to the broader economy, the value of providing surety guarantees for projects to the socio-economic network of the Atlantic Provinces could be measured. We found that the impact of surety – and the additional due diligence its use ensures – is generally positive, regardless of scenario run (assuming some coverage). But a combination of performance and payment bonds – with a focus on infrastructure investments – yields the highest benefits (measured in terms of GDP growth) relative to the costs required.

The benefits in the high insolvency rate scenario (eg. 1990's levels) were particularly significant and about 4 times greater than in the status-quo scenario despite the insolvency rates being only 5 times higher. The analysis indicated that the benefits in the high risk scenario include

- $3 of economic activity recovered per $1 of premium paid;
- $3.0 of tax revenue (for all levels of governments) recovered per $1 of premium paid (by all levels of governments); and
- 25 job-years recovered per $1M of premiums.

A. DATA SET CHARACTERISTICS

The following table outlines the characteristics of the surety dataset used in the analysis.

Table 2 Characteristics of the surety data set

Characteristics	Value
Number of Surety Firms	6
Year of Earliest Record	1997 (not all firms provided data back to this date)
Total Number of Project	150,000+
Total Number of Construction Firm Records	10,000+
Total Number of Surety Claims	3,000+

Various firms provided different levels of details for construction firms, projects, and claims.

B. DEFINTIONS

Agent: An autonomous individual, firm or organization that responds to cues from other agents and their environment using a set of evidence-based behavioural rules in response to those cues.

Agent-based modeling: A framework for modeling a dynamic system, such as an economy, by means of individual agents, their mutual interaction with each other, and their mutual interaction with their environment(s)

Beneficiary: A person who is entitled, by law or bond language, to claim against a bond even though they may not be specifically named as an obligee.

Bid bond: An instrument which guarantees that a bidder, if awarded the project, will execute a contract for the amount bid and will provide the appropriate performance and payment bonds.

Collateral: Assets (e.g., cash) which is placed with the surety company and reduces the risk that the surety assumes when issuing a bond for high risk principals or unusual obligations.

Commercial surety bonds: Bonds that guarantee the performance of all obligations that do not arise from contracts.

Contract surety bonds: A classification of bond that guarantees the principal's obligations under a construction contract.

Obligee: The party to whom a service will be provided, and to whom a surety bond guarantees the service provider will perform as expected.

Payment bonds: Also known as "labour and materials bonds", a classification of bond that guarantees payment by a contractor to subcontractors, labourers, and suppliers involved in contracted project.

Performance bonds: A classification of bond that guarantees performance of the contract. The obligee will be protected from financial loss resulting from the principal's failure to perform the work according to the contract, plan, and specifications at the agreed price. Most of these contracts are for construction, and the contractor must meet pre-qualification standards before being approved for the bond.

Principal: The bonded party (e.g., contractor) who bears primary responsibility on a surety bond and who has the duty to perform for the obligee's benefit.

Prosperity at Risk®: An event-driven, agent-based, microsimulation platform that tracks over 50 million agents for all of Canada. It simulates the economy's processes, including consumption, production, labour force dynamics, as well as evolving financial statements of agents. It conserves the flows of people, money and goods.

Surety (company): The party to a surety bond who answers to the obligee for the principal's failure to perform as required by the underlying contract, permit, or law.

Surety bond: A written contract in which one party guarantees another party's performance to a third party. Protects the obligee against losses, up to the limit of the bond, that result from the principal's failure to perform its obligations or undertaking. Unlike insurance, a loss paid under a surety bond is fully recoverable from the principal.

System effects: Impacts that transcend direct, indirect and induced effects, which are not traditionally measured by economics. These impacts arise from the relationship between every economic agent and the environment in which they operate, as they influence one another's states and behaviours.

Systemic risk: In the context of this report, "systemic risk" refers to risks that are inherent to an entire market segment as well as the wider macroeconomic framework.

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