# Bill 148: Fair Workplaces, Better Jobs Act, 2017

## Assessment of the Risks and Rewards to the Ontario Economy

September 2017

## Executive Summary and Report

CANADIAN CENTRE FOR ECONOMIC ANALYSIS

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ISBN 978-0-9959981-8-6

## 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.

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**Citation:**

Canadian Centre for Economic Analysis. Bill 148: Fair Workplaces, Better Jobs Act, 2017: Assessment of the Risks and Rewards to the Ontario Economy. September 2017.

# ACKNOWLEDGEMENTS

This report was prepared on behalf of the Ontario Chamber of Commerce and the Keep Ontario Working Coalition. While the scope of the research was predetermined by a contract with the Ontario Chamber of Commerce, the design and method of research, as well as the editorial content of this study, were determined solely by CANCEA.

The researchers involved in the performance of this study were Paul Smetanin (economics, risk management), David Stiff (analytics), Anastasios Papanastasiou (economics), Sener Salci (economics) and Aaron Zhu (data science). We thank Charles Burger (analyst) for assisting in the preparation of this report.

We thank Dr. Morley Gunderson for his independent review and helpful suggestions. Dr. Gunderson holds the CIBC Chair in Youth Employment at the University of Toronto where he is Professor at the Centre for Industrial Relations and Human Resources, the Department of Economics and the School of Public Policy and Governance. He is also a Research Associate of the Centre for International Studies, and the Institute for Human Development, Life Course and Ageing, and a Fellow of the Royal Society of Canada.

Without implicating Dr. Gunderson for any of the findings, we report that we have incorporated his suggestions. Further, as indicated in the review process, the detrimental effects of the Act to private capital investment and the wage compression changes assumed could be more significant. We respond that such adjustments in our model would increase the jobs at risk and costs to consumers as reported.

The results of this research are strictly attributed to the authors only.

The Canadian Centre for Economic Analysis Inc. is an employee owned business that receives no funding from third parties other than consulting and technology related revenues. There are no biases or conflicts to disclose.

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# EXECUTIVE SUMMARY

Themes of fairness, living wages, equal pay and the general sharing of economic prosperity are aligned to most peoples' wishes in our mixed market Canadian and Ontario economies. Significant economic and societal changes have occurred over the decades that have seen a significant amount of economic pressure placed on many Ontario households. On June 1, 2017 Ontario introduced legislation, Bill 148: Fair Workplaces, Better Jobs Act, 2017 (the Act) which could be viewed as an attempt to address such themes in our society.

The themes and changes contained in the Act are very sincere, serious and represent sensitive issues that deserve to be treated with a high level of respect. The purpose of this study is to identify and assess, before the fact, the key economic implications of the Act on various stakeholder groups including workers (through labour market performance), firms and product markets – and therefore the provincial economy as a whole. The changes behind the Act that we are most focused upon are:

- Impacts of minimum wages increase; and
- Other impacts of proposed employment and labour protection laws (e.g., temporary workers, contractors, equal pay for equal work provisions (part-time, full time, temp help versus permanent), scheduling, unionization etc.).

Economists have studied the types of changes in the Act for many decades, including the effects of minimum wage on the employment effects for young and low skilled workers. Findings within the literature vary considerably and are indicative of the highly contextual nature of employment and labour regulatory changes. In terms of the employment effects of minimum wage increases, the debates continue as a demonstration of the highly contextual nature of understanding the impacts across who, what, when and where. Recently, Joseph E. Stiglitz, a Nobel Prize winning economist reported that an accommodation of these factors are absolutely necessary when conducting policy evaluations (Stiglitz, Where modern marcroeconomics went wrong, 2017).

In this study we employ the modern technique of agent based modelling[1], which allows a richer understanding of the changes behind the Act and the way beneficiary households will spend their increased incomes from labour (stimulus) and what employers are able to achieve in the mitigation of higher expected costs of labour and its administration (not stimulus). A risk assessment approach is then adopted which involves an analysis of all the conceivable firm and household behaviours that the Act could induce. This allows policy makers to understand the size, shape and inherent risk and reward insights that result from considering all the possible outcomes. The objective then is to appreciate how the policy outcomes sort themselves into outcomes that are unintended and negatively consequential (risks) and areas of outcomes that are desirable (rewards), intended or otherwise. Policy makers are then equipped with a means of determining how to mitigate the risks of unintended negative consequences, and to move policy determination and implementation towards the intended desirable outcomes. This is the process of risk management.

[1] An approach that is embraced by the likes of the journal Nature, the Institute of New Economic Thinking (with an advisory board that includes six Nobel Prize winners in Economics), progressive central banks and scores of universities around the world.

## FINDINGS AT A GLANCE

The increased wages and the costs behind the Act means that there will be potential winners ("at Reward") and potential losers ("at Risk"). The key results separate these groups as follows:

| | at Reward | at Risk |
|---|---|---|
| **Minimum wage, spill-over and wage compression effects** | 2.2 million employees could receive a pay increase (of which 93% are private sector employees, of which 59% work in small to medium sized businesses)<br>55% are women, 45% are men<br>74% are dual income couples or unattached individuals<br>11% are single-parent families with children under the age of 17yrs | 400,000 small business owners (< 100 employees) are exposed to 46% of the increased costs from the Act<br>In 60% of Ontario industries, small to medium size businesses (SMEs) will pay 60% of the wage increases in those industries<br>185,000 Ontarians who might have had a job otherwise (when combined with other changes in the Act) |
| **Vacation & PEL** | Many of the 50% of private sector employees with tenure greater than 5 years could receive an increased vacation benefit. Many at small companies will receive a personal emergency leave benefit | At least 80% of small business employers will be affected by these changes that will lead to higher costs |
| **Union** | Up to 100,000 employees that currently do not belong to a union could unionize for a 2% increase in unionization rate | In addition to the above, 40% of these employees will increase the labour costs for small to medium size businesses |
| **Equal pay for same work** | Over 120,000 part-time employees could be affected | In addition to the above, 55% of these employees will increase the labour costs for small to medium size businesses |
| **Together** | 6 million Ontarians are expected to be positively affected by a wage increase, and/or vacation days and/or PEL either directly or via a family member<br>The gross wage amounts to $6.6 billion in aggregate per annum which will generate spending that will benefit some Ontario businesses | A $23 billion cost challenge awaits Ontario businesses over 2 years. Of this, we expect that they will bear 15% after accounting for stimulative effects of wage increases<br>1.8 million Ontarians are expected to be negatively affected directly or via a family member SME business owner or by a job loss. These effects amount to -$3.0 billion in aggregate per annum<br>10.4 million Ontario adults will be affected by an additional increase in prices that amounts to -$3.4 billion in aggregate per annum |

The following aggregate outcomes are measured relative to what is expected to happen if policy prior to the Act were to continue, which includes expected employment and population growth over the next several years. The following table shows the results of: the expected case (second column); the results if businesses were to bear all of the costs through reduced profit margins (third column); if consumers were to bear all the costs in the form of higher prices (forth column); if employers reduced the costs associated with their employees (fifth column); or if costs were equally shared by employers, consumers and employees (sixth column).

**Table 1** Two year employment outcomes and average annual outcomes for all sectors (net)

| Metric | Expected Case[2] | Businesses bear all costs | Consumers bear all costs | Employees bear all costs | All share cost equally |
|---|---|---|---|---|---|
| | | | | | |
| Employment: *Over 2 years* | **-185,000 (-2.6%)** | +121,000 (+1.7%) | +24,000 (+0.3%) | -437,000 (-6.2%) | -96,000 (-1.4%) |
| Total Nominal Wages: Annual | **+$5.4B (+1.5%)** | +$15.3B (+4.3%) | +$12.3B (+3.4%) | -$2.7B (-0.8%) | +$8.3B (+2.3%) |
| Gross Operating Surplus: Annual | **-$1.7B (-0.7%)** | -$7.8B (-3.1%) | +$0.9B (+0.4%) | -$0.8B (-0.3%) | -$2.6B (-1.1%) |
| Federal Revenue: Annual | **+$0.51B (+0.6%)** | +$1.5B (+1.9%) | +$1.6B (+2.0%) | -$0.6B (-0.7%) | +$0.88B (+1.1%) |
| Provincial Revenue: Annual | **+$0.62B (+0.9%)** | +$1.8B (+2.6%) | +$1.6B (+2.4%) | -$0.51B (-0.7%) | +$0.99B (+1.4%) |
| Municipal Revenue: Annual | **$0 (0%)** | $0 (0%) | $0 (0%) | $0 (0%) | $0 (0%) |
| Consumer Costs per Household[3]: Annual | **+$640 (+0.7%)** | $0 (0%) | +$2,200 (+2.6%) | $0 (0%) | +$770 (+0.9%) |
| Nominal GDP: Annual | **+$3.6B (+0.6%)** | +$7.6B (1.2%) | +$13.2B (2.2%) | -$3.5B (-0.6%) | +$5.8B (+0.9%) |
| Real GDP: Annual | **-$1.1B (-0.2%)** | +$7.6B (+1.2%) | -$3.1B (-0.5%) | -$3.5B (-0.6%) | +$0.3B (+0.0%) |

The summary results show the competing risks and rewards for different stakeholders depending upon how Ontario businesses respond to the Act and what they are able to realize through labour and product market adjustments. Over two years, at the extremes, the employment outcomes range from 121,000 jobs created if Ontario businesses absorb all of the costs, through to 437,000 jobs lost if Ontario businesses are able to increase the productivity of its employees allowing them to cut jobs and reduce hiring rates. Also note that the increased costs for Ontario households ranges from $0 through to $2,200 per annum on average.

The expected outcomes, which are established by guidance from Ontario academic literature (refer below), are summarized in this first column of Table 1. We expected that the Act will, over two years, put 185,000 jobs at risk.

[2] Refer to Sections 4, 7.4 Appendix C

[3] Refer to Section 6.3.1.3 of the report for details on how consumer costs per household and the percentage is calculated.

## DETERMINATION OF THE EXPECTED OUTCOMES

There is lack of consensus in the literature, with those on either side of the argument tending to "cherry pick" their evidence. We appreciate the desire to reduce inequality, but risk assessment is about a faithful depiction of the evidence.

As is mentioned throughout the report, **the policies in the Act are significant, sudden and sizable**. Further, such wages must be put into the context of the structure of Ontario businesses, households and government policies. This includes an appreciation of income sources, expenses, investments, asset values and debt levels. To do otherwise would be misleading (Stiglitz, Where modern marcroeconomics went wrong, 2017). In this regard, **only Canadian and Ontario studies are relevant**.

Canadian and Ontario studies that explore the employment effects of minimum wage hikes in Canada estimate negative average disemployment effects with respect to the minimum wage level (Baker, Bejamin, & Stanger, 1999; McDonald & Myatt, 2004; Campolieti, Gunderson, & Riddell, 2006; Sen, Rybczynski, & Van De Waal, 2011). Godin and Veldhuis (2009) and Gunderson (2007) provide the evidence for Canada and Ontario: a 10% increase in the Ontario minimum wage will decrease employment numbers by 2% to 6% over time (Gunderson, 2007). Gunderson (2007) indicates that a 10% increase in the minimum wage may lead to a 3%-6% decrease in employment among teenagers and slightly less for young adults. **That is, for a 30% increase in minimum wage, the literature suggests a disemployment impact of anywhere between 9% and 18% for teenagers and slightly less for young adults.**

Given that we are dealing with many factors that will affect Ontario business costs as a result of the Act, from all of the results generated from the model, **we selected as the expected case those results that indicated a disemployment effect due to minimum wage increases only of -1.5% generally over two years**.

When combined with equal pay changes we get a total of 2% disemployment effect. When all effects are included we find total disemployment effects between 2.3% and 2.8%, with a midpoint of 2.6% on average. For people under the age of 25 years, they experience a disemployment effect of 3% on average, which is the lower bound of (Gunderson, 2007) for only a 10% increase in minimum wage on its own. For other age groups we see that people aged over 25 years of age will experience a disemployment effect of 2.6% on average, which varies across sectors which is also the lower bound of Godin and Veldhuis (2009) and Gunderson (2007) for a 10% change in minimum wage only.

Given we did not assume any private capital investment rate effects due to the uncertainty created for businesses related to the significance, suddenness and size of the Act (see Section 7.6.1), we feel that we have been **conservative in the determination that it is expected that the Act will, over two years, put 185,000 jobs at risk** of being lost relative to expected job growth without the Act.

The 185,000 jobs at risk are jobs which may currently exist or jobs that are yet to be created through economic growth. While jobs may be at risk, the expected case also indicates:

- For those who have a job, they are expected to see a gross $6.6 billion per annum increase in aggregate wages from the Act. This has a stimulative effect which, however, is more than offset by a -$1.3 billion per annum loss of wages from fewer jobs/hours, a -$1.7 billion per annum loss of business profits and investment and increased consumer prices for households of -$3.35 billion per annum. This is evident when nominal GDP shows a gain of $3.6 billion (0.6% increase), but when adjusted for inflation and the inflationary effects of the Act, real GDP shows a net loss of $1.1 billion (-0.2%). To be clear, stimulus only occurs to the extent that Ontario businesses absorb the costs associated with the Act. Given the absorption of $2.4 billion of the increased cost per annum by Ontario businesses, **the resulting stimulus generates a net increase in total wages of $5.4 billion per annum, or $11 billion over the two year time frame**;

- The stimulative aspects of the Act do not compensate Ontario businesses for the increased costs that they will bear. **Ontario businesses will bear a gross amount of $2.4 billion per annum.** With the effects of stimulus, the **net cost to businesses is in the amount of $1.7 billion on average per annum (29% lower),** the exposure of which will vary by industry and firm sizes;

- **Federal and the provincial governments will receive $1.1 billion in additional taxation revenue, but will also have to pay increased wage costs of $1.7 billion associated with the Act**, yielding a net loss for both levels of government. **Municipal governments will receive no additional taxation revenue, but will also have to pay increased wage costs associated with the Act, yielding a net loss of $500 million per annum**; and

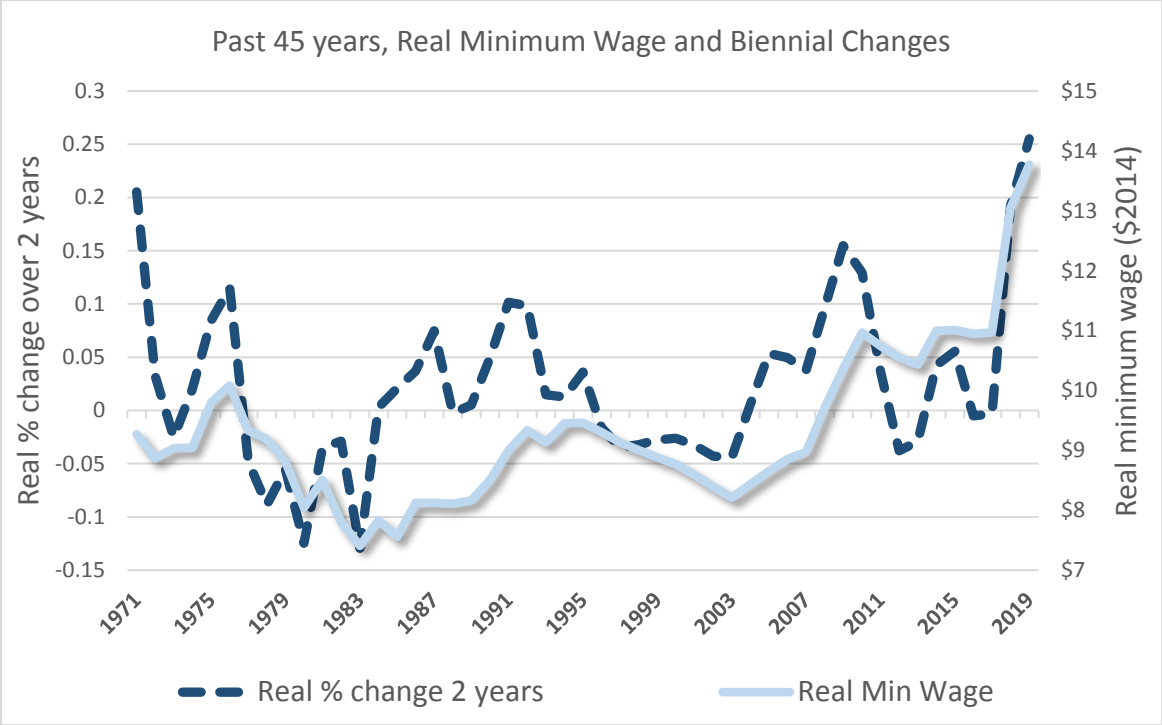
- The **increased cost for Ontario households within the expected case can range from $0 through to $1,300 on average per annum, with a midpoint of $640 on average per annum**.

## KEY CHANGES BEHIND THE ACT AND RELATED ASSUMPTIONS

The Act will have direct business cost consequences for Ontario businesses. For the purposes of our study, the direct business costs that we consider are limited to:

- **Minimum wage increases**: Will change what employers will have to pay employees. Minimum wage increases for different groups of employees will increase by 32% (if pre October rates used) and 29% (if post October rates used) by January 2019. The scheduled minimum wage increases in the Act are the largest increases seen in the past 45 years (refer to Figure 1). The scheduled change is 15 times the average two year real change in minimum wage of 1.49% that has occurred since 1971 (Section 4.1 of the report);

**Figure 1** Real minimum wage and biennial changes, past 45 years




Source: Govt. of Canada, Minimum Wage Database. CANCEA calculations

- **Wage spillover and compression effects**: An important aspect of minimum wage changes is the way wages change for employees currently earning wages at or above the new minimum wage levels (Section 4.1.3 of the report).

- **Temporary workers and equal pay**: Will change what employers will have to pay part-time, contract, temporary and casual workers. For our purposes, we have assumed an alignment of all average wage rates by using current public sector experience (an average increase of 3%, Section 4.2 of the report);

- **Vacation and Personal Emergency Leave**: Some employers that do not already have such rules will have to pay employees for days not worked (Section 4.4 of the report);

- **Scheduling and an increase in employee rights**: Labour overheads are expected to increase for employers for hours not worked and for the cost of extra negotiations with employees in response to the new rules (Section 4.4.1 of the report); and

- **Unionization**: It is expected that unions will take advantage of the new rules and attempt to increase unionization rates (Section 4.3 of the report).

## Risk assessment approach to the Act

The Act can be generally viewed as an attempted redistribution of income from Ontario employers to Ontario employees, mainly through the minimum wage mechanism. The difficulties with assessing the economic impacts of this potential redistribution lies in the fact that competitive market forces are in play across different sectors, different regions, different firm sizes, and different demographics. These forces, at times competing, will attempt to resolve who will bear the cost of the attempted redistribution.

It is clear that given the inherent uncertainty behind how employers will respond to the costs to them from the Act, any claim of knowing what will happen is unrealistic. **As an exercise in risk measurement and assessment, the study hopes to encourage a risk management response and allow politicians and community leaders to debate how much tolerance for risk they have and at what price.** To achieve this, we have the following three tools at our disposal:

1. A measure of the key components and size of the costs for firms that accrue from key features of the Act, to the extent that they can be determined (Section 6.1);
2. A model of the Ontario economy that has the objective of realistically representing the benefits of increased income generation and the distribution and resolution of the associated costs (Appendix E); and
3. Ontario focused economic literature that contains studies of how such changes could transpire in terms of employment effects (Sections 4 and Appendix C).

Analysis is conducted before the fact and projects the future outcomes of such changes from now across the different behavioural combinations of employers relative to what could occur without the Act in place. Risk assessment then occurs as a measurement of the potential impacts (the differences) under the combination of three plausible employer responses to higher costs as follows:

1. Passing costs onto current and future employees by way of workplace pressures and/or reductions in hiring rates (labour market implications);
2. Passing costs onto consumers in the form of prices (product market implications); and
3. Absorbing the costs at the expense of profits, savings and capital investments (gross operating surpluses)(firm level impacts).

Given the focus on employment, price levels in product markets, profits of the firms and general economic activity means that while evaluating and distributing the impacts of the Act, heterogeneity across firms (e.g., size and type of enterprise, type and location of employees) and households is taken into account[4]. From these outcomes we begin to understand what is *at risk* and what is *at reward*.

[4] The Nobel Prize winning economist, Joseph E. Stiglitz, has reported that these factors are all important in the consideration of the macroeconomic impacts of policy (Stiglitz, Where modern marcroeconomics went wrong, 2017).

Using relevant economic literature that takes into account the context of the changes and the structure of the Ontario economy, we focus on the group of outcomes that past ex-post analysis suggests we consider in order to anchor to an expected case of impacts. This should then allow policy makers to have a conversation about whether the expected outcomes are desirable and intended or whether policy changes or new policies are required to avoid unintended consequences.

## ONTARIO FIRMS AND THEIR EMPLOYEES

The differences between the sizes of firms in different sectors becomes an important consideration when attempting to understand how Ontario businesses may react to the costs behind the Act. Firm size will govern the ability of a business to weather cost shocks through the risk management of a portfolio of business exposures. Small to medium sized firms, between 1 and 500 employees, have less ability to risk manage their exposures (due to their smaller size) and to navigate the changes behind the Act.

Section 3 of the report covers Ontario firm size by employees in some detail. In summary:

- There are a total of 6.1 million employees in Ontario (not including self-employed) of which 1.3 million employees work for the public sector and 4.8 million work for the private sector;
- A majority of private sector Ontario employees (56%) work in small to medium size businesses (SMEs, less than 500 employees). There is slightly more than 1.4 million private employees[5] that earn less than $15/hr with an additional 100,000 working in the public sector.

In terms of the aggregates, retail trade, accommodation/food services, manufacturing and business/ building/other support services account for 59% of employees that earn less than $15/hr in the private sector (main job definition used).

As an exercise in risk assessment we need to understand what firm sizes in what sectors are currently dependent upon employees that earn less than $15/hr (ie. incidence of exposure). This is measured by the proportion of a firm's workforce composed of such employees. The following chart depicts this dependency.

[5] According to Statistics Canada LFS PUMF January to July 2017.

**Figure 2** Distribution full/part-time, by sectors, usual hourly wages, large & SME private sector employee share of employees less than $15/hr

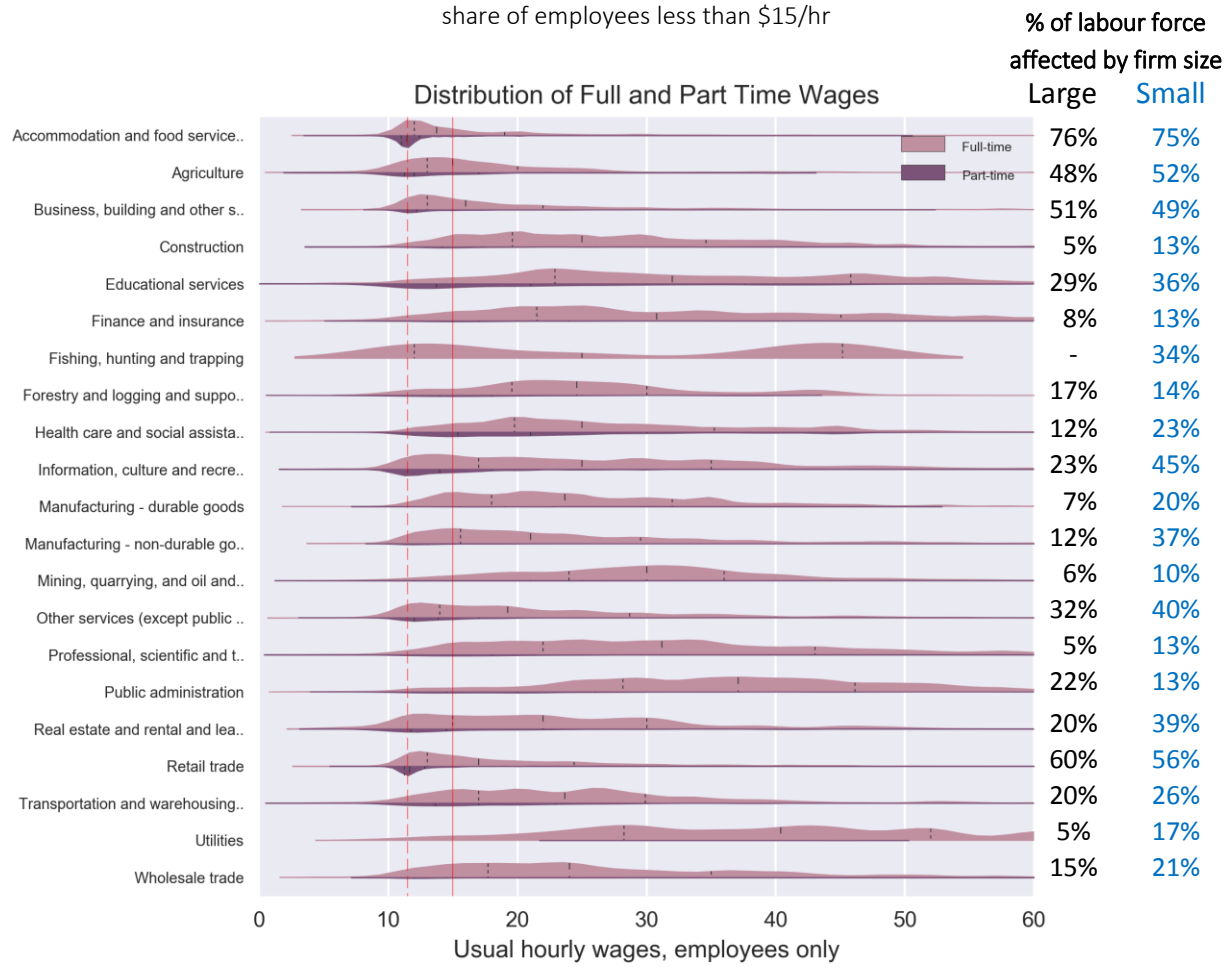



Figure 2 shows the considerable variation for different employees within a sector and the number of employees below $15/hr. A majority of private sector industries are at least 20% dependent upon such employees under $15/hr. When minimum wage increases begin, it is this measure that sectors will respond to when contemplating their business plans. For example, there are about 96,000 manufacturing employees that earn less than $15/hr that work for SMEs. They represent 6.8% of all private sector employees under $15/hr. However, these employees represent 25% of the SME labour force in manufacturing (18% in durable goods, 33% in non-durable goods). For the 18,000 SME manufacturing businesses in Ontario[6], this is a measure of their labour cost risk.

[6] Conservatively, Statistics Canada Table 529-0001 x 0.38 x 0.9

# RESULTS

## SIZE OF THE CHALLENGE

Relative to the baseline of minimum wage increasing at the rate of inflation, the analysis estimates a $23 billion cost challenge for Ontario businesses over two years. As shown in Table 2, the majority of the impact (81%) arises from the minimum wage and equal pay provisions in the Act.

**Table 2** Components of the challenge facing businesses

| $Billions | Minimum wage increase | Equal Pay Provisions | Vacation & PEL | Labour Overheads (e.g., scheduling) | Unionization | Combination of all |
|---|---|---|---|---|---|---|
| 2018 | $5.3B | $2.6B | $0.8B | $0.2B | $1.1B | $10.2B |
| | 53% | 26% | 8% | 2% | 11% | 100% |
| 2019 | $7.7B | $2.6B | $0.8B | $0.2B | $1.1B | $12.7B |
| | 62% | 21% | 6% | 2% | 9% | 100% |
| Total | **$13.0B** | **$5.2B** | **$1.6B** | **$0.4B** | **$2.2B** | **$22.9B** |
| | 58% | 23% | 7% | 2% | 10% | 100% |

Firms have three primary methods to respond to the $23 billion increase in costs associated with the Act:

1. Absorb these costs through reducing their gross operating surplus;
2. Pass some of these costs onto consumers; and/or
3. Restructure their labour force to reduce labour costs (eg. increase productivity or limit future labour cost growth, or both).

It is important to note that only the portion of the total redistribution absorbed by firms through reduced operating margins has a stimulative effect. If firms adjust to the policy changes only through restructuring their labour to maintain their current total payroll, there is no net increase in total household income to drive increased consumption and employment growth. Similarly, if firms adjust by only increasing prices, while *nominal* household wages would increase, the aggregate cost of goods would also increase reducing any *real* wage benefits (in aggregate). It is only if firms reduce their gross operating surplus and minimize price increases that there would be an increase in real wages that leads to a stimulation of the economy.

To put the $23 billion challenge into perspective, over a two year period, the amount represents:

- 21% of Ontario non-residential private capital investment plans; or
- 100% of all the corporate income tax revenues expected to be paid to the Ontario government by Ontario businesses.

Given the size of the challenge relative to the scale of industry in Ontario, it is unlikely that firms will be able to absorb the full cost of the wage increases. Therefore, it is expected that firms will have to pass on some of the costs to consumers through increased prices and to employees through, for example, reduced

job growth. *However, it is fundamentally unknown how firms will respond*. Therefore, in the face of this uncertainty, a risk assessment approach to evaluating how companies might respond is required.

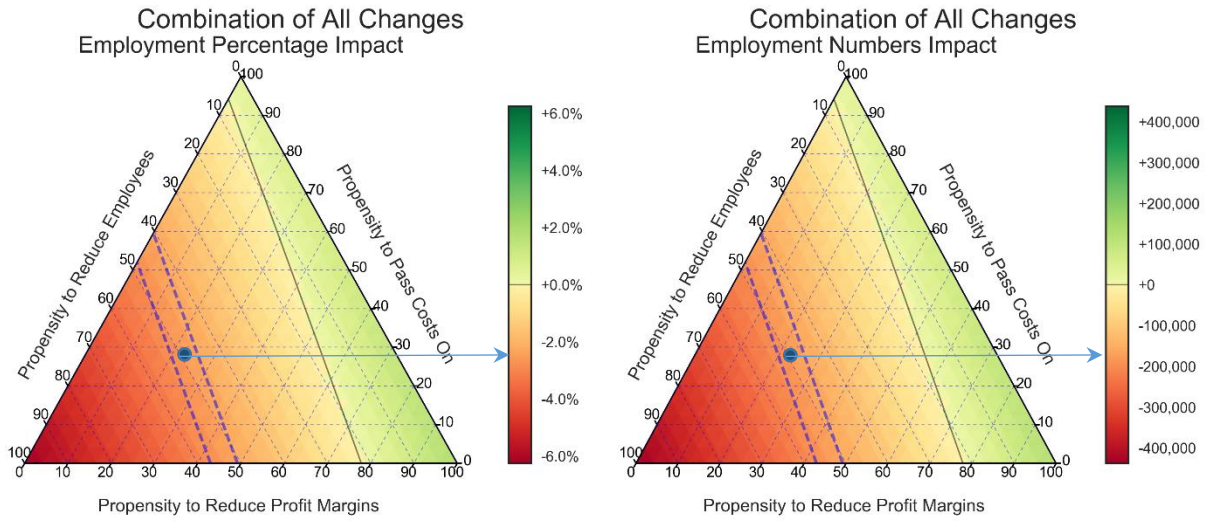
The analysis runs every combination of firm responses ranging from firms absorbing 100% of the $23 billion in extra costs through reduced operating surpluses, fully passing the costs on to consumers or changing job numbers. The estimated $23 billion in attempted redistribution is significant and sudden which will generate visceral behavioural responses.

Between January 2018 and December 2019 the analysis generates employment outcomes that range between 121,000 jobs **created** through to 440,000 jobs **lost**, with an equal sharing of the Act cost outcomes at 96,000 jobs at risk relative to otherwise expected growth. Using Ontario economic literature, the expected value of 185,000 jobs at risk over the two years is a reasonable expression of what is at risk.

## EMPLOYMENT IMPACTS

The wide range of responses available to firms could in part explain the variance of minimum wage impacts across different studies. As shown in Figure 3, depending upon the behaviour of firms, there could be a net increase in employment if firms are willing and able to reduce their operating surplus to absorb over 80% of increased labour costs and not pass on higher prices to consumers (refer for Section 5.3 of the report for details on how to read the ternary diagrams). However, this would correspondingly be equivalent to firms increasing their Ontario tax bill by about 80% and is unlikely to occur. The estimated net increase in employment falls as firms pass their increased costs onto consumers through higher prices or employees through restructuring their labour or slowing job growth.

**Figure 3** Results for all employer responses: Employment




The blue dashed contours on the right figure indicate the area expected by the Ontario literature, with disemployment effects of between a range of 2.3% and 2.8% (see Section 4.1 of the report for a discussion of literature estimates) across all age groups and sectors, with a midpoint (blue dot) where: **Employees** bear 50% of the initial cost ($11.4 billion of the $23 billion); **Consumers** bear 29% of the initial cost ($6.7 billion

of the $23 billion); and **Businesses** bear 21% of the initial cost ($4.8 billion of the $23 billion). At this point, approximately 185,000 jobs would be at risk over the next two years. Again, these are not necessarily all jobs lost, but include jobs not created that would have been otherwise. With an average of 81,000 jobs created per year in Ontario since 2010, the bulk of the jobs at risk could be jobs that would be created over the next two years and not layoffs of existing employees.

### GDP

In most scenarios, there is a net increase in nominal GDP, though a minimum of 20% of the costs must be passed on to consumers in order for there to be a nominal GDP output greater than one. Using the expected business behaviour of a 21% propensity to reduce profit margins and 29% to pass costs on to customers yields a nominal GDP ratio of 1.5. That is, the expected increase in nominal GDP is 50% greater than the stimulus amount supplied by firms' reduction in their gross operating surplus. However, unless firms absorb at least 30% of the total costs, there is no real GDP benefit. **The net real GDP benefits are always less than the stimulus provided (i.e., the amount of the total costs absorbed by firms). As a result, the policies contained in the Act do not appear to be an effective means to stimulate greater *real* economic activity regardless of the behaviour of firms.** Refer to Section 6.3.4 of the report for more information.

## IMPACTS IN KEY SECTORS

Different industry sectors can have very different income and expense profiles. Those that have lower gross operating margins, lower wages levels or greater total labour components of production are likely to be more affected by labour changes. There are two key factors driving the variation of costs between the industry sectors – the size of the industry in Ontario and the distribution of wages within the sector.

Figure 4 presents the net result of these factors that combine to yield the percentage and number of jobs at risk by industry sector. The sectors that dominate the number of jobs at risk tend to correspond to those with lower operating margins and higher labour costs. Also, as shown in Figure 4, the four sectors most at risk are all in the lower half of the average wage distributions:

- Accommodation and food services (17,300 jobs at risk);
- Manufacturing (16,800 jobs at risk);
- Wholesale trades (16,000 jobs at risk); and
- Retail trades (14,700 jobs at risk).

Other notable sectors include:

- Professional, Scientific and Technical Services (14,000);
- Finance, insurance (13,000); and
- Private Sector Health Care and Social Assistance (8,500).

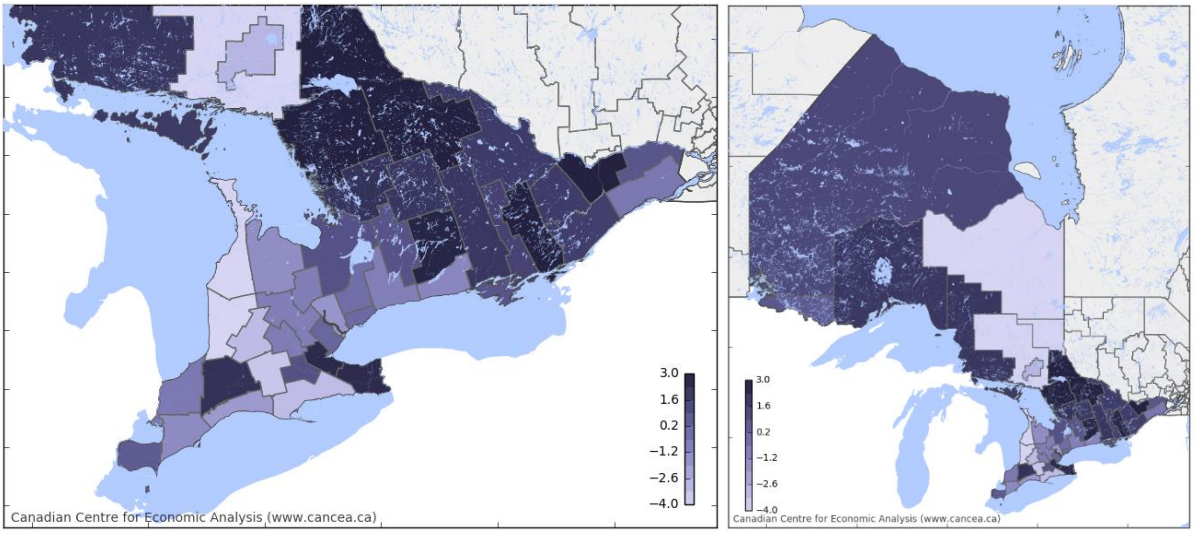
**Figure 4** Key sectors at risk by number of jobs in each sector


Source: Statistics Canada LFS. CANCEA calculations

## REGIONAL OUTCOMES

The distribution of firms across the province, both by size and type, mean that the impacts of the Act are not felt uniformly across the province. If all firms behave in the 'expected' manner, regions with a higher proportion of the sectors at risk (identified in Section 6.4 of the report) will have greater risks to employment. Figure 5 maps the regional variation of jobs at risk (relative to the size of their local labour force) relative to the provincial average.

**Figure 5** Regional jobs at risk relative to the provincial average




The relatively high proportion of jobs above minimum wage in the Greater Toronto Area (GTA) results in fewer jobs (as a percentage of all jobs in the region) at risk. **The jobs most risk are in regions outside the GTA.** For example, the large amount of employment in the Niagara Peninsula in the food and accommodation sector results in that region having one of the highest percentage of jobs at risk. Similarly, the same occurs for northeastern Ontario, which has a lower density of high-paid jobs (with considerable local retail).

## DEMOGRAPHIC OUTCOMES

For the expected behaviour, while about 17% of all jobs at risk are for those under 25 years old, the per-job rate (ie. incidence) is 15% higher than in other age groups. About 116,000 jobs are at risk for those 25 to 55 years old, and another 38,000 for those over 55 years old. In addition, of the 185,000 job at risk in the expected case relative to the potential growth that could occur, about 96,000 jobs (51%) are at-risk for women.

There about 1.8 million Ontarians that are expected to be negatively affected by way of a family member SME business owner or by a job loss and 10.4 million Ontario adults and their dependents will be affected by increased prices, or lower quantity of goods for the same price, for the goods and services they consume.

On the benefit side, there will be about 6 million Ontarians that we expect to be positively affected by a wage increase, and/or vacation or PEL for a family member. In terms of minimum wage increases, almost seventy five percent will go to households that are above the low income threshold, with over half of those households earning more that median income levels.

## SENSITIVITY OF JOBS AT RISK TO MINIMUM WAGE CHANGES

Using sensitivity analysis, we report in Section 6.8 that the impact of minimum wages only on jobs at risk occurs at around an 8% increase. With jobs at risk over two years at 22,000, the results are insignificant in

the context of usual job number variability. The jobs at risk results tend to accelerate past the 12% minimum wage increase which is evident at the 20.7% minimum wage increase level (eg. $14/hr) where jobs at risk over the two years at 81,000. At a 29.3% increase (which is the focus of this study), jobs at risk over the two years amount to 102,000 for just minimum wage increases.

## THREE MAIN CONCLUSIONS BEHIND THE STUDY

The study is about a significant and sudden shock to the economy of Ontario, the results of which question the balance between risk and reward for Ontarians. The three foundations that this conclusion is based upon are:

1. A measure of the potential $23 billion two year cost to firms from the Act to which they will react (Section 6.1);

2. A model of the Ontario economy. Attention should then be drawn to Appendix F of the report, which details the key processes at work in our agent-based simulations (Appendix E); and

3. What is to be expected. The expected case reflects our conservative position that that employers will try and avoid up to 80% of the cost (Sections 4 and Appendix C). While the analysis contains results for all potential employer behaviours, any suggestion that discounts the expected result will have to deal the basics of economic theory; that either consumers will bear the brunt of the costs (a faster effect that is not stimulative and one that will increase costs to consumers) or that private capital investment will be negatively affected (a longer term effect as the costs disrupt the equilibrium risk adjusted return on capital), being the very engine of the economy in the long-term.

We frame the results as jobs at risk[7] given the uncertainty around how or what Ontario businesses will be able to achieve as cost reductions, revenue increases or capital productivity gains. **The selection of the expected case is based upon Canadian and Ontario studies.** We argue that given the uniqueness of the Ontario economy, its demographics, its politics and private investment climate, Canadian and Ontario studies are the most relevant sources for the purpose of establishing an expectation.

To put the 185,000 jobs at risk in perspective, since 2010, an average of 81,000 jobs have been created annually in Ontario. Between 2002 and 2008, an average of 102,000 jobs had been created annually, however from 2008 to 2009, a net loss of 178,000 jobs occurred in the province. This is equivalent to a gross loss of 280,000 jobs in the province compared to what could have been present if there had been no global financial crisis. In other words, the net job impact of the 2009 financial crisis was 3 times greater than the annualized expected jobs at risk (about 92,000 annually) due to the Act. Therefore, it is apparent that industries in the province are able to, and have been seen to, respond quickly to external factors far greater than the scale of the Act.

[7] The term "jobs at risk" is not new, particularly when describing the impact of employer decisions to review their labour decisions in the face of cost constraints and the use technology to replace workers (Citi GPS, 2016).

In addition, the decrease in net jobs created between 2011 and 2012 was 76,000, and between 2013 and 2014 was 66,000. These slowdowns in jobs growth correspond to 83% and 72% of the two year annualized impact of the Act respectively. **Therefore, even within the past few years, historical fluctuations in the annual rate of job creation are similar to the scale of estimated jobs at risk in this analysis.**

## SMALL, MEDIUM SIZED FIRMS HAVE A GREATER SHARE OF THE COSTS BEHIND THE ACT

As raised in Section 3 of the report, the Ontario economy is built upon a dominance of private small and medium sized enterprises (SMEs) that employs 56% of the Ontario private labour force. Considering the distribution of employees earning less than $15/hr pay, we found that 56% of those employees belong to SME firm sizes. When we expand the analysis to those earning below $18/hr (as a proxy for spillover effects), we find that 59% of those employees work for SME firms. SMEs employees that earn below $15/hr make up 31% of the SME workforce. When we consider below $18/hr, those employees make up 45% of the SME workforce.

**Figure 6** Private employees under $18/hr, SME and large businesses, percent of employees


Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

In the above figure we can see that people earning under $18/hr (a proxy for spillover wage effects) in accommodation/food services are equally likely to work in a SME or a large business while large businesses tend to dominate retail trade by a factor of 1.7 times. **However, when considering other sectors, which account for 57% of people earning under $18/hr we find that those people are 2.4 times more likely to work in a SME than large businesses.**

## THE ECONOMIC CONTEXT WITHIN WHICH THE ACT WILL BE IMPLEMENTED

For many, the Act may be viewed as a remedy to the uneven distribution of economic prosperity in Ontario. Given that the Act will not be implemented in a vacuum, the undercurrents of the Ontario economy are important to be understood to the extent of what could exacerbate the effects of the Act. While income inequality, shrinking share of income accruing to labour, non-standard and precarious employment, growing discrepancies in wage rates across industries and the financial predicament of many Ontario households (refer to Section 2 of the report) are concerning, such issues require a fundamental review of fiscal reform and a deep introspection of where the modern economy and society is headed.

The Act is to be implemented in an economy that: (1) has a private investment problem, in that wealth generated domestically from production is falling dramatically; and (2) has become increasingly dependent upon household consumption while households have on average persistently spent more than they earn, largely funded by consumer credit, low interest rates and significant asset inflation (capital gains).

The economic context is such that the unintended consequences measured in this study that accrue to the Act may be compounded. The key mechanisms of the Act have not been shown by the literature to be an ineffective instrument for reducing poverty (Mascella, Teja, & Thompson, 2009), and the analysis shows that income and wealth inequity is expected to grow. Further, while the Ontario economy is dependent on small and medium sized businesses to employ 57% of its private workforce, the Act exposes small and medium firms to significant cost pressures that they may have difficulty managing given their relative lack of ability to risk manage through location and customer diversification, exposing them to their larger competitors (resident or foreign). Coupled with the fact that Ontario has historically low levels of private capital investment to support future labour growth, we would expect turbulence in Ontario labour markets over the coming years.

In this regard, the study aims to encourage a process of risk management in which policy makers see fit to contemplate mitigating strategies.

## Risk assessment and management requires an open, evidenced based dialogue

Section 7.2 discusses that if risk analysis is important to the development of sustainable policy that encourages risk management, the process necessarily relies upon a culture of open, evidence based communication. From the perspective of analysts hoping for evidence-based discussions of important issues, the dismissive reaction to our initial release was disappointing. Debates amongst economists are common and are usually evidence-based with insight from theory. However, the experience that we have observed, both directly and indirectly, leads us to the question of how Canadian's can discern information in an environment that is clearly not "an open environment to share risk information"?

The results of our analysis determines that there is a significant amount of economic risk associated with the Act and a rational debate needs to ensue. In Section 7.2 we pose two key questions that can be used to identify if participants in the debate around minimum wage are driven by ideology or evidence-based decision making (page 109) with the conclusion that a rational debate about minimum wage increases is a debate about models of the economy and its constituent parts.

While there appears to be many opinions in support of the minimum wage increases of the size scheduled in the Act[8], at the time of writing this report, there have been no conclusions based upon the results from relevant economic models. The implications are that the debates around minimum wage increases in Ontario currently appear not to be rational. This is reminiscent of the Nobel laureate Paul Krugman's observations in the United States "when faced with a conflict between their economic views and their

[8] Media Release: Canadian economists issue open letter in support of a $15 minimum wage in Ontario TORONTO, ONTARIO--(Marketwired - July 4, 2017)

political orientation, many economists will tone down or reject the implications of their own work." Krugman finishes his article with "All in all, this has not been the profession's finest hour" (Krugman, 2011).

## AVOIDING THE RISKS TO JOBS: POLICY ALTERNATIVES

In order to maintain current employment growth, in conjunction with the Act, the Ontario Government would have to:

- Induce firms to limit the reduction in employees and price increases; or
- Counteract the reduction in profit margins that firms would otherwise have to absorb. Sufficient margins must be maintained for long term capital investment.

**Yet, given the size of the potential cost implications for Ontario businesses, $23 billion over two years, it is difficult to construct policy alternatives within the framework of the Act.** Said differently, the size of the cost consequences behind the Act swamp any concessions that policy makers could make back to Ontario businesses. For example the consequence of $23 billion cost over two years requires:

- **Corporate tax rate concessions** of a 100% rebate back to Ontario businesses by the Ontario government; or
- **Ontario employer health tax concessions** of a 100% rebate back to Ontario businesses by the Ontario government, which would still leave a residual cost balance of about $8 billion for Ontario businesses over two years; and
- **Ontario electricity industry cost concessions** of a 100% rebate back to Ontario businesses by the Ontario government, which would still leave a residual cost balance of about $8 billion for Ontario businesses over two years.

None of which would be plausible in the current environment. If the stakeholders were to compromise on a shared balancing of the cost challenges behind the Act, we have included some suggestions in Section 7.12. There we find spreading the changes behind the Act over five years most compelling.

## CONCLUSION

The Act is a major piece of legislation that represents significant and sizeable changes for the Ontario economy that will need to be digested by Ontario businesses within a relatively short period of time.

The Act can be conceived as an attempted redistribution from Ontario businesses to Ontario employees in the amount of $23 billion over two years. The significance of the $23 billion is cast against it equaling all of the corporate income taxes that the Ontario government will receive over the next two years. Alternatively, it represents 21% of the non-residential private capital investment made by industry in the province.

Given the size, significance and suddenness of the changes behind the Act and the unknown reaction of Ontario businesses to avoid these increased costs, the consequences are unknown. The messages that accrue from the economic literature is that employers will attempt to avoid the costs and it is not a question of if jobs are at risk, but rather how many jobs will be at risk.

While the results of analysis show a range of employment outcomes, from 121,000 jobs created through to 437,000 jobs lost, Ontario economic literature indicates that firms will behave in a manner where 185,000 jobs are at risk in response to the Act. Consistent with this expectation of jobs at risk are a variety of outcomes for consumers (households) and Ontario employers. If costs are passed onto consumers, Ontario households might have to pay upward of $1,300 per annum on consumer products, while if Ontario businesses absorb more, firms could forfeit up to $3.5 billion of gross operating surplus annually. It ultimately depends upon bargaining powers between employees and employers, the propensity of consumers to pay more, and the willingness of businesses to continue operation at their current expected rates.

Our risk assessment of the Act is that there is *more risk than reward* for the Ontarians despite the stated goal of the Act attempting to assist low income households and the Ontario economy. To rationalize why policy makers would choose to self-inflict such uncertainty is outside the scope of this analysis, but would involve a behavioural economics exploration of why agency sometimes take greater risks than their principals might want to bear. Finally, given the risk of consolidating income and wealth inequality, putting about 185,000 people that need jobs out of work and the risks that SMEs will be exposed to their larger competitors, the unintended consequences are significant.

## FUTURE RESEARCH

The primary challenge of evaluating the impact of the Act is the uncertainty associated with employer responses. Our response was to adopt a risk assessment approach of the possibilities and consider Ontario economic literature to guide a determination of what could be expected and imply a range of employers' responses within that expectation.

**The implementation of the Act represents a rich opportunity for further research, given it is akin to one of Ontario's largest socio-economic experiments in over 45 years.** The economic literature is dominated by after-the-fact analysis that attempts to tease out the effects in the face of a multitude of confounding variables. Further research would be well served if data were to be collected through monitoring the response of Ontario businesses *in vivo* to provide researchers with data sets they can analyse for themselves. In this regard, an Ontario firm registry of business plans and changes would be an accommodating vehicle. Lastly, further research would benefit from other independent economic evaluation of the Act. At the time of our analysis, there had not been any other economic evaluation of the Act.

# 1. INTRODUCTION

In July 2017, the Ontario Chamber of Commerce along with the Keep Ontario Working Coalition awarded CANCEA the challenge of measuring the potential impacts of the key areas of change proposed in Bill 148: Fair Workplaces, Better Jobs Act, 2017 (the Act).

Themes of fairness, living wages, equal pay and the general sharing of economic prosperity are aligned to most peoples' wishes in our mixed market Canadian and Ontario economies. Significant economic and societal changes have occurred over the decades (e.g., population growth, economic inequality, non-standard and precarious employment, Great Recession) that have seen a significant amount of economic pressure placed on many Ontario households. The Act could be viewed as an attempt to address such themes in our society.

Economists have studied the types of changes in the Act for many decades, including the effects of minimum wage on the employment effects for young and low skilled workers. Findings within the literature vary considerably and are indicative of the highly contextual nature of employment and labour regulatory changes. In terms of the employment effects of minimum wage increases, the debates continue, with some studies finding no effects and others finding evidence of jobs either lost or not created. As a consequence, there is a significant amount of uncertainty associated with dealing with such changes, which largely hinges upon what employers are able to achieve in the mitigation of higher expected costs of labour and its administration.

The purpose of this study is to identify and assesses, before the fact, the key economic implications of the Act on various stakeholder groups including workers (through labour market performance), firms and product markets – and therefore the provincial economy as a whole. The changes behind the Act that we are most focused upon are:

- Impacts of minimum wages increase; and
- Other impacts of proposed employment and labour protection laws (e.g., temporary workers, contractors, equal pay for equal work provisions, scheduling, unionization etc.).

## 1.1 RISK ASSESSMENT APPROACH TO THE ACT

The Act can be generally viewed as an attempted redistribution of income from Ontario employers to Ontario employees, mainly through the minimum wage mechanism. The difficulties with assessing the economic impacts of this potential redistribution lies in the fact that competitive market forces are in play across different sectors, different regions, different firm sizes, and different demographics. These forces, at times competing, will attempt to resolve who will bear the cost of the attempted redistribution. Moreover, the embedding of the Ontario economy in a larger North American and global economy introduces significant uncertainties as to what will happen and when it will happen.

It is clear that given the inherent uncertainty behind how employers will respond to the Act, any claim of knowing what will happen is unrealistic. Furthermore, to date, we have no knowledge of any other macro-economic analysis of the Act. The approach adopted in our analysis is one of risk assessment.

The risk assessment approach to policy formulation requires an analysis of all conceivable behaviours that a policy could induce that allows policy makers to understand the size, shape and inherent risk and reward insights that result from considering all the possible outcomes[9]. Therefore, as a general rule, under a specific set of policy goals, we seek to understand how the policy outcomes sort themselves into areas of outcomes that are unintended and negatively consequential (risks) and areas of outcomes that are desirable (rewards), intended or otherwise. The aim is to equip policy makers with a means of determining how to mitigate the risks of unintended negative consequences, and to move policy determination and implementation towards the intended desirable outcomes. This is the process of risk management.

As an exercise in risk measurement and assessment, the study hopes to encourage a risk management response and allow politicians and community leaders to debate how much tolerance for risk they have and at what price. To achieve this, we have the following three tools at our disposal:

1. A measure of the key components and size of the costs for firms that accrue from key features of the Act, to the extent that they can be determined;

2. A model of the Ontario economy that has the objective of realistically representing the benefits of increased income generation and the distribution and resolution of the associated costs; and

3. The economic literature that contains studies of how such changes could transpire in terms of employment, prices and general economic activity.

The study is ex-ante and projects the future outcomes of such changes from now across the different behavioural combinations of employers relative to what could occur without the Act in place. The risk measurement and assessment approach then requires us to quantify the potential impacts (the differences) under the combination of three plausible employer responses to higher costs as follows:

- Passing costs onto current and future employees by way of increased productivity gains and/or reductions in hiring rates (labour market);

- Passing costs onto consumers in the form of prices (product market); and

- Absorbing the costs at the expense of gross operating surpluses (capital markets, future investment spending, etc.).

Given the focus on employment, price levels in product markets, profits of the firms and general economic activity means that while evaluating and distributing the impacts of the Act, heterogeneity across firms

[9] There is a correspondence of the approach to computable general equilibrium models where input-output tables and elasticities are used as derived from data, and non-market clearing, imperfect competition and price inelastic demands can be allowed for.

(e.g., size and type of enterprise, type and location of employees) is taken into account. From these outcomes we begin to understand what is *at risk* and what is *at reward*.

It is helpful to keep in mind that a risk management process is not an exact science where one dwells on the decimal places of results; rather it is management under vector analysis of directions and consequences that should be avoided and areas that should be promoted by the process of management. Using relevant economic literature that takes into account the context of the changes and the structure of the Ontario economy, we focus on the group of outcomes that past ex-post analysis suggests we consider in order to anchor to an expected case of impacts. In itself, the expected case is a measure of direction and size that allow us to have expectations of what are the more likely outcomes. This allows policy makers to have a conversation of whether the expected outcomes are desirable and intended or whether policy changes or new policies are required to avoid unintended consequences.

## 1.2 Proposed changes behind the Act

Historically, one of the most common changes in labour standards in Ontario are policies that affect the minimum wage and labour unionization laws. For example, between 2005 and 2015 the government of Ontario increased its minimum wage rate seven times with the highest change of 9.4% occurring in 2008. Table 3 summarizes the increases in minimum wages. The average real minimum wage was roughly $9 per hour throughout the 90s and had been steadily increasing during the 2000s before reaching a peak of about $11 during the last few years. Declines in the real minimum wage are generally the impact of inflation on constant nominal minimum wages, while increases are the result of policies that set higher nominal minimum wages.

**Table 3** Summary of minimum wage changes in Ontario

| Minimum Wage Increases | Sept 2017 | Jan 2018 | Jan 2019 | Over two years |
|---|---|---|---|---|
| General Minimum Wage | $11.60 | Up 20.7%<br>$14.00 | Up 7.1%<br>$15.00 | up 29.3%<br>from the<br>$11.60 level |
| Students Under 18 who work not more than 28 hours per week | $10.90 | Up 20.6%<br>$13.15 | Up 7.2%<br>$14.10 | up 29.35 % |
| Liquor Servers | $10.10 | up 20.8%<br>$12.20 | up 6.9%<br>$13.05 | up 29.2% |
| Hunting and Fishing Guides | $58 | up 20.6%<br>$70.00 | up 7.1%<br>$75.00 | up 29.3% |
| Homeworkers | $12.80 | up 20.31%<br>$15.40 | up 7.10 %<br>$16.50 | up 28.9% |

The scheduled minimum wage increases in the Act are the largest increases seen in the past 45 years in Ontario. The scheduled change is 15 times the average two year real change in minimum wage of 1.49% that has occurred since 1971.

The proposed changes to employment standards in Ontario will increase the minimum wage on the first day of 2018 by 20%-21% and again on the first day of the following year, amounting to a 30% total increase within a two-year period. Because such a sharp increase in the minimum wage has not been observed in Ontario in over 45 years, the literature on the economic effects (e.g., employment) of minimum wage

policies become less informative in measuring what is at risk for Ontario when the Act passes. For instance, Gunderson (2007) points out that while the Canadian evidence suggests that a 25% increase in the minimum wage is likely to reduce employment of teenagers by 7.5%-15%, the adverse employment effects (such as reduced planned hiring) could be twice as large if the increase is implemented over a short period of time rather than a series of small increases over a longer horizon (Campolieti, Fang, & Gunderson, 2005a). More recently, Neumark (2017) points out that the lack of studies on the economic impact of large changes in the US minimum wage within a short period of time implies more uncertainty about the size of those effects.

This uncertainty becomes even greater in the face of additional changes in employment standards, such as increased unionization. The share of workers belonging to a labour union has steadily declined in Ontario but this is likely to change under the proposed policy amendments, leading to further changes in employment and higher uncertainty about the aggregate economic effects and their distribution across the Ontario population of consumers, workers and business owners (Walsworth & Long, 2012). In combination with changes in scheduling, equal pay, vacation and paid leave, it is even more difficult to predict redistribution effects with any degree of certainty as different firms will react differently to the measures depending on the market in which they operate and the extent to which the policies will affect their projected operational costs.

For example, the Act seeks to ensure that casual, part-time, temporary and seasonal employees are paid the same hourly rate to full-time employees when performing the same job for the same employer. Possible exceptions must be based on seniority, merit, production output and not on sex or employment status. Employees may request a review of their wages if they believe that they are not receiving equal wages to full-time employees. An employer must respond to the request with an adjustment in pay or a written explanation. At the very least, the proposed changes would require the firm to face higher expected administration costs to respond to wage review requests.

Under current law, provincial labour legislation requires a minimum of two weeks of paid vacation per year, but this is due to increase to three weeks of paid vacation per year after 5 years at a given company. With the new proposed regulation, employers will pay for three hours of work if:

(i) They cancel a worker's shift with less than 48 hours' notice;

(ii) An employee is ‘on call’ but not called in for work; and

(iii) If an employee working regularly for more than three hours per day is given less than three hours of work upon reporting to work.

Hence, proposed changes in scheduling force employers to post employees' schedules in advance and compensate workers for last-minute schedule changes. To put it simply, the policy is a regulatory protection that will improve wages, job security, and employee control over wages, hours, and working conditions (Campbell & Price, 2016).

For many, the Act may be viewed as a remedy to the uneven distribution of economic prosperity in Ontario. Given that the Act will not be implemented in a vacuum, the undercurrents of which are important to be understood particularity in terms of income inequality, share of incomes, differences in income levels across industries, declining private capital investment, weakness in consumer spending patterns and the private business firm structure of the Ontario economy.

# 2. DISTRIBUTION OF ECONOMIC PROSPERITY

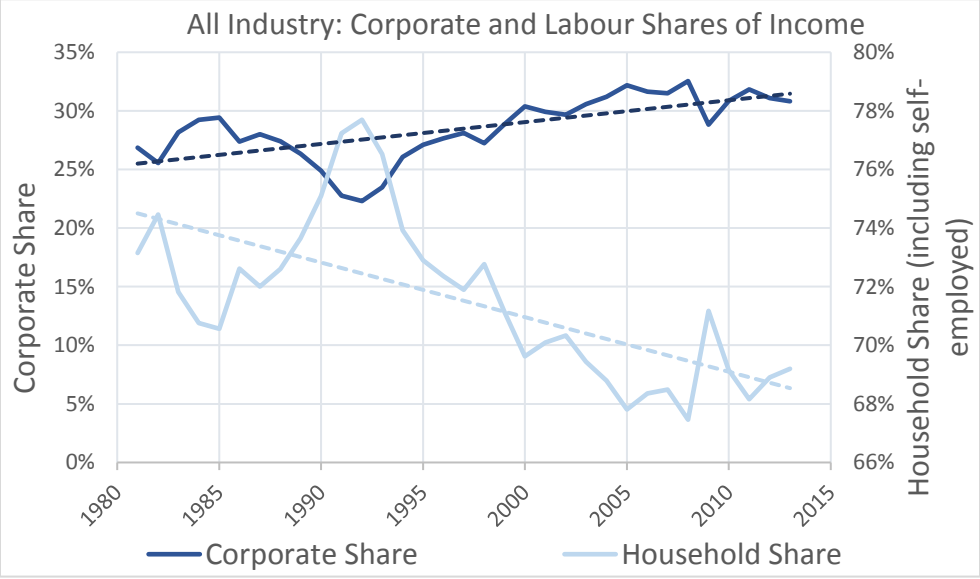
Wealth and income inequality are a widespread concern across many advanced countries and Canada, and Ontario is no exception. The International Monetary Fund (IMF) says that "widening income inequality is the defining challenge of our time." (Dabla-Norris, Kochhar, Suphaphiphat, Ricka, & Tsounta, 2015)

Inequality has consequences for economic growth and its sustainability, (Berg & Ostry, 2011; Ostry, Berg, & Tsangarides, 2014) with increasing disparities between income distributions leading to falling growth as wealth is accumulated on balance sheets and not utilized in the exchange of goods and services (Stiglitz, The Price of Inequality: How Today's Divided Society Endangers Our Future, 2012). Higher inequality lowers growth and living standards by depriving the ability of lower-income households to stay healthy and accumulate physical and human capital (Aghion, Caroli, & Garcia-Penalosa, 1999; Galor & Moav, 2004). In contrast, as the share of income of the population at the lower-end of income distribution increases, economic and social benefits are realized in the form of higher output growth and non-exclusion in economic prosperity.

## 2.1 REDUCTION IN LABOUR'S SHARE OF INCOME: THE FACTORS OF PRODUCTION

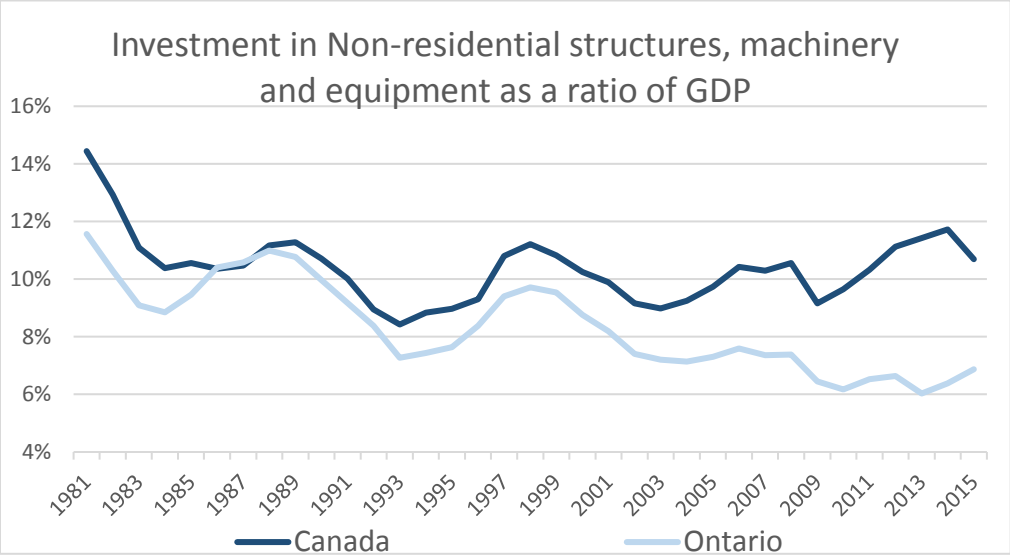
Inequality in income accruing to different factors of production is growing, with a smaller share of aggregate income accruing to labour since the 1980s (Sharpe, Arsenault, & Harrison, 2008). The fall in labour's share of income is a global and complex phenomenon. Broadly, it has been attributed to changes to the regulatory framework, such as increasing openness to trade, deregulation and privatization, declining unionization, declining real value of the minimum wage, the rise of non-standard employment, industrial restructuring from manufacturing to high-end and low-end services and macroeconomic effects, such as factor-biased technological progress and productivity (Neiman, 2013).

**Figure 7** Labour's share and corporate share of income *(Source: CANSIM Table 384-0037)*



Another potential cause of the reduction in labour's share of income in Canada has been corporate tax cuts, which increased the corporate profit share with the intent of spurring capital investment and economic growth[10]. However, businesses have been re-investing less despite corporate tax cuts; following corporate tax reforms in 1988, corporate cash flows increased while business capital investment fell, despite the reduction in the federal statutory tax rate from 36% to 28% (Stanford, 2011). Research suggests that the reduction in private capital investment is driving the decline experienced in the Canadian economy, and has rendered its post-recession recovery lacklustre and slow (Stanford, 2011). While Canada experienced a surge in capital investment in the energy and mining sectors between 2010 and 2013[11], Ontario did not.

**Figure 8** Investment in non-residential structures, machinery and equipment as a ratio of GDP

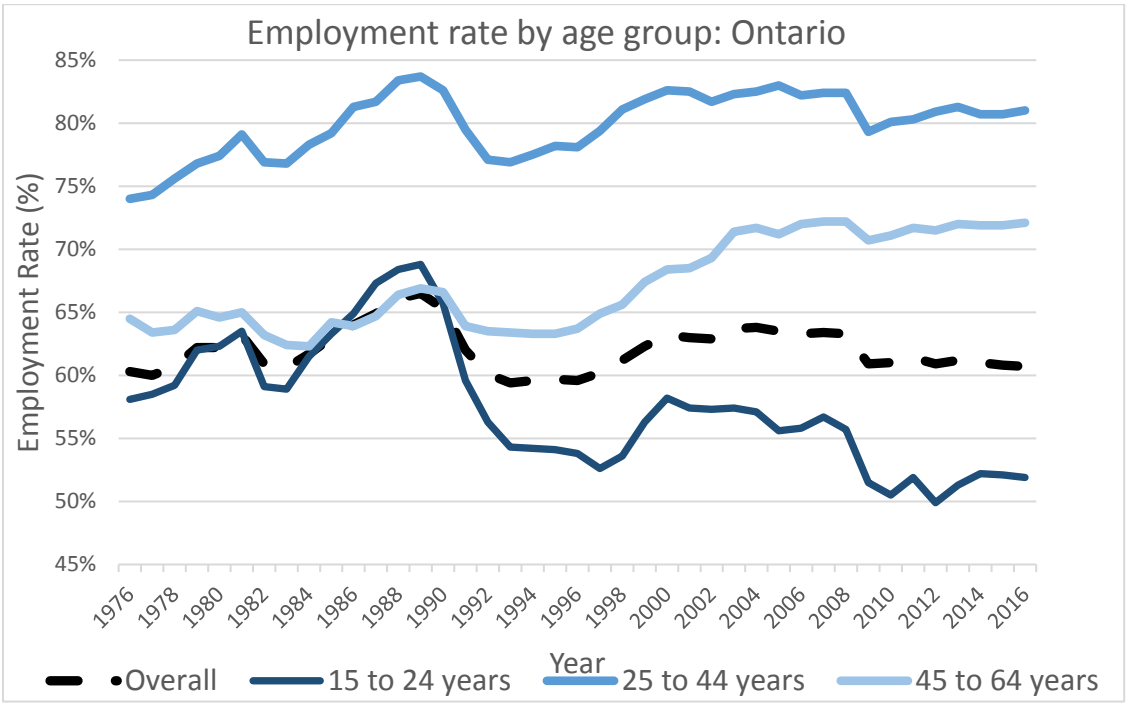



## 2.2 Poor employment outcomes for certain groups

An effect of the decline in business investment and labour's share of income, if not completely reflected in wages, is poor employment outcomes for certain groups. Although aggregate employment levels do not look particularly troubling, aggregate employment trends hide unequal trends that become visible when disaggregating by age groups. Those between the ages of 15 and 24 saw negligible increases in their labour force participation and employment rates (Statistics Canada, 2015). Since the mid-1990s, employment creation disproportionately accrued to workers between the ages of 45 and 64 (Statistics Canada, 2015).

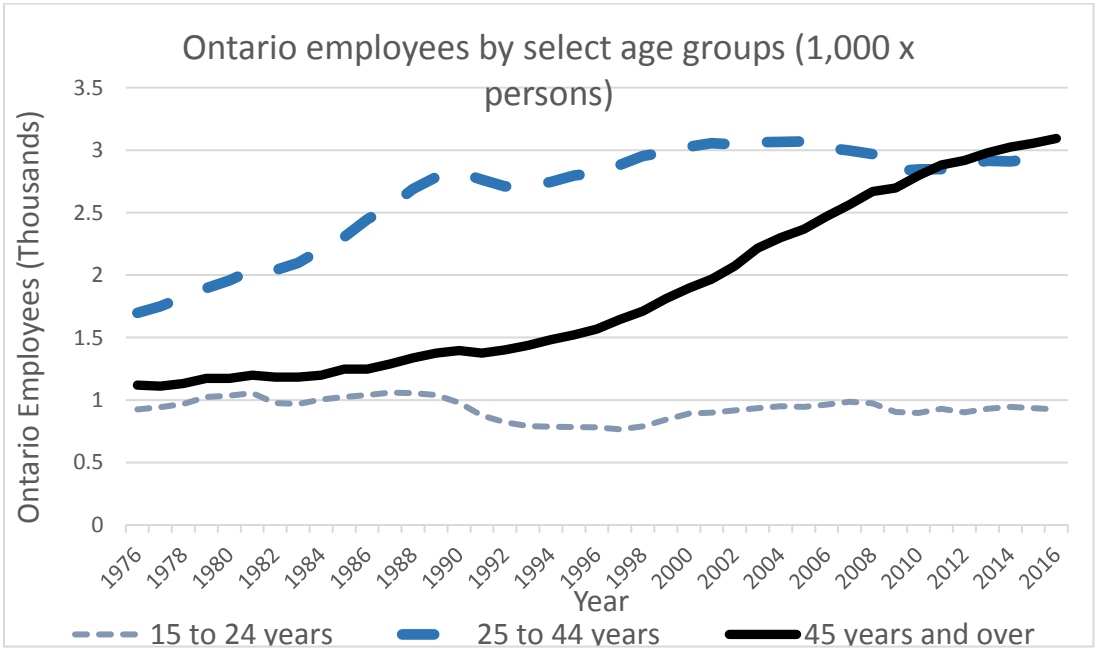
[10] Think the failure of *trickle-down* economics. Unfortunately the "cat is out of the bag" on this one with the risk that governments will pursue the easy to identify, young, small and medium size businesses that are growing companies with higher tax burdens and regulation rather than tracing and taxing the wealth that was generated prior to 2008.
[11] These effects have since reversed and have not been sufficient to derail long-term trends.

**Figure 9** Employment rate by age groups *(Source: CANSIM Table 282-0002)*




As can be seen on the graph, recessions and financial shocks tend to hit younger groups harder. Figure 10 shows that being an older worker is generally recession proof.

**Figure 10** Ontario employees by select age groups



Upward trends in nominal wages, as well as the participation and employment rates, hide significant disparities relating to *who* occupies *which* jobs, which jobs exhibited the highest wage increases, and whether the post-recession employment rate is a function of the participation rate alone.

**Figure 11** Part-time jobs as proportion of total employment: Canada and Ontario *(Source: CANSIM Table 282-0007)*

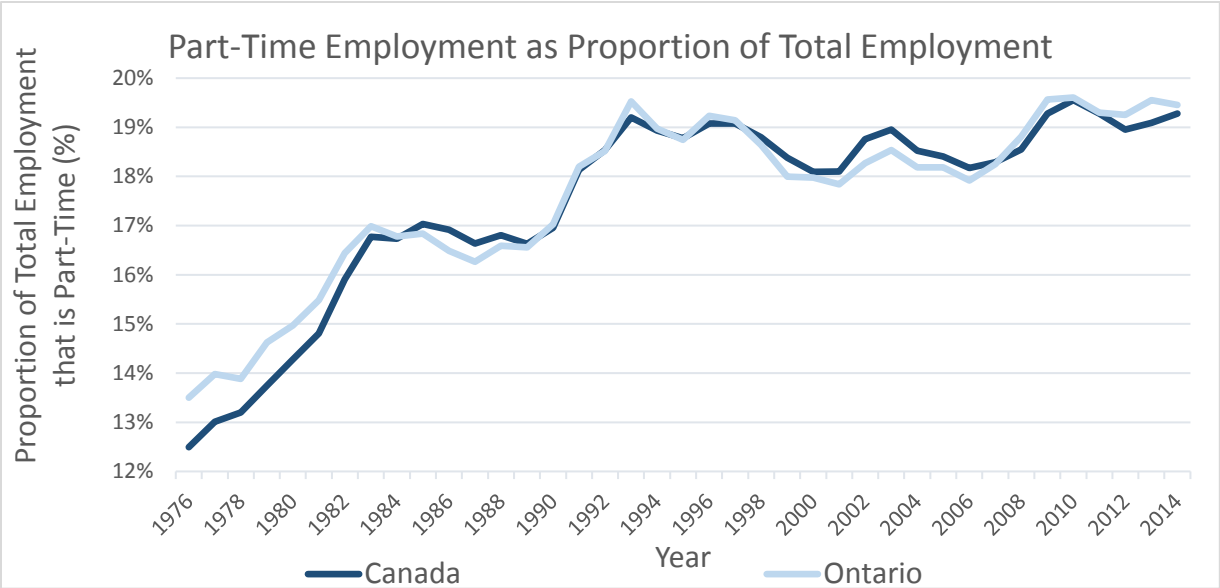
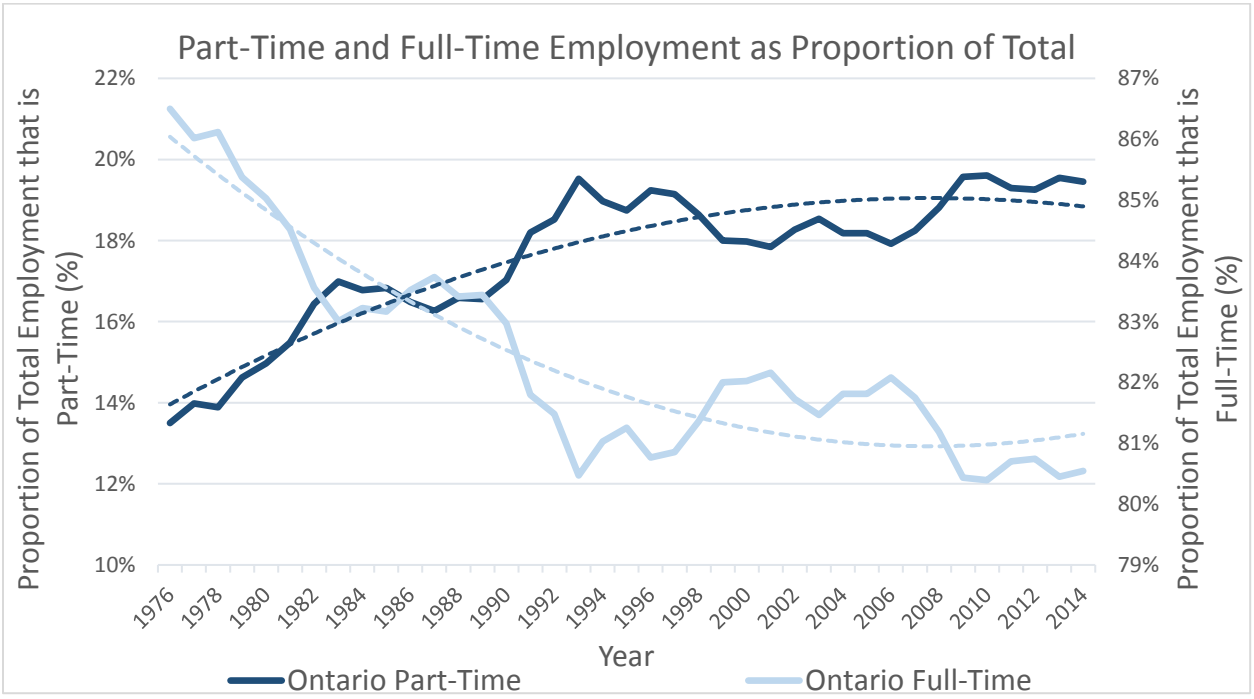
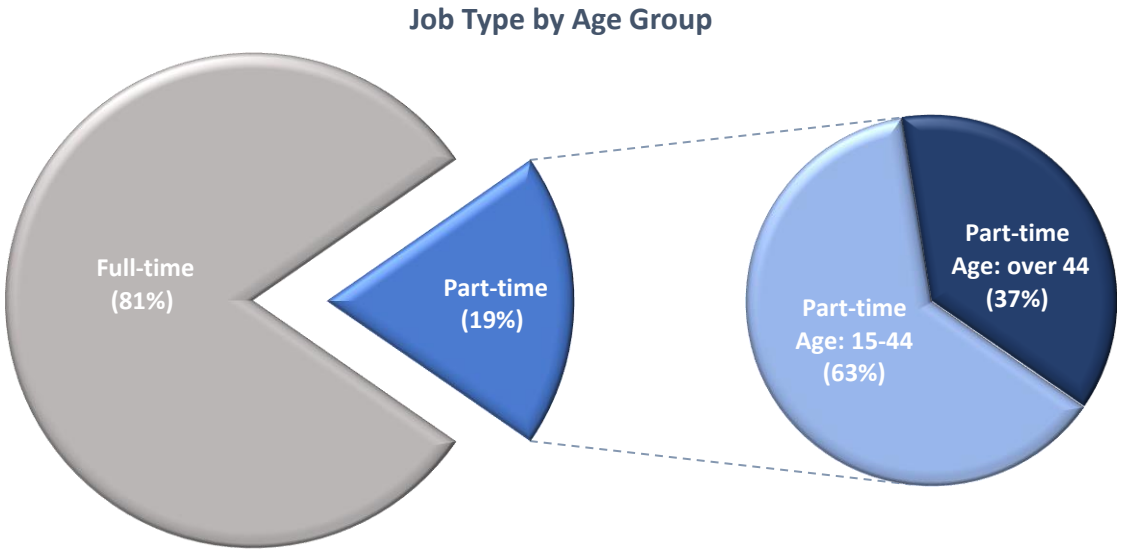



**Figure 12** Part-time and full-time employment proportions of total employment *(Source: CANSIM Table 282-0007)*



Jobs categorized as precarious labour[12] are disproportionately filled by younger workers. Approximately 57% of all employed Canadians are under the age of 45 (Statistics Canada, 2015d). However, almost two-thirds of all part-time jobs are occupied by Canadians under the age of 45, while only about half of all full-time jobs are occupied by members of this age group (Statistics Canada, 2015d).

**Figure 13** Job type by age group (Source: CANSIM Table 282-0002)




This has significant wage impacts for workers who hold part-time jobs: the average hourly wage rate of those in part-time jobs is about 34.5% lower than those who hold full-time jobs. This is biased downward by the significant proportion of individuals aged 15 to 24 who worked part-time, and who earned lower wages than other age groups did, both in full-time and part-time work. As this group is more likely to be enrolled in secondary and post-secondary education, their lower earnings profile in itself is not necessarily problematic. However, part-time workers aged 25 to 54 still earned an average of 25% less each hour than their peers in full-time work.

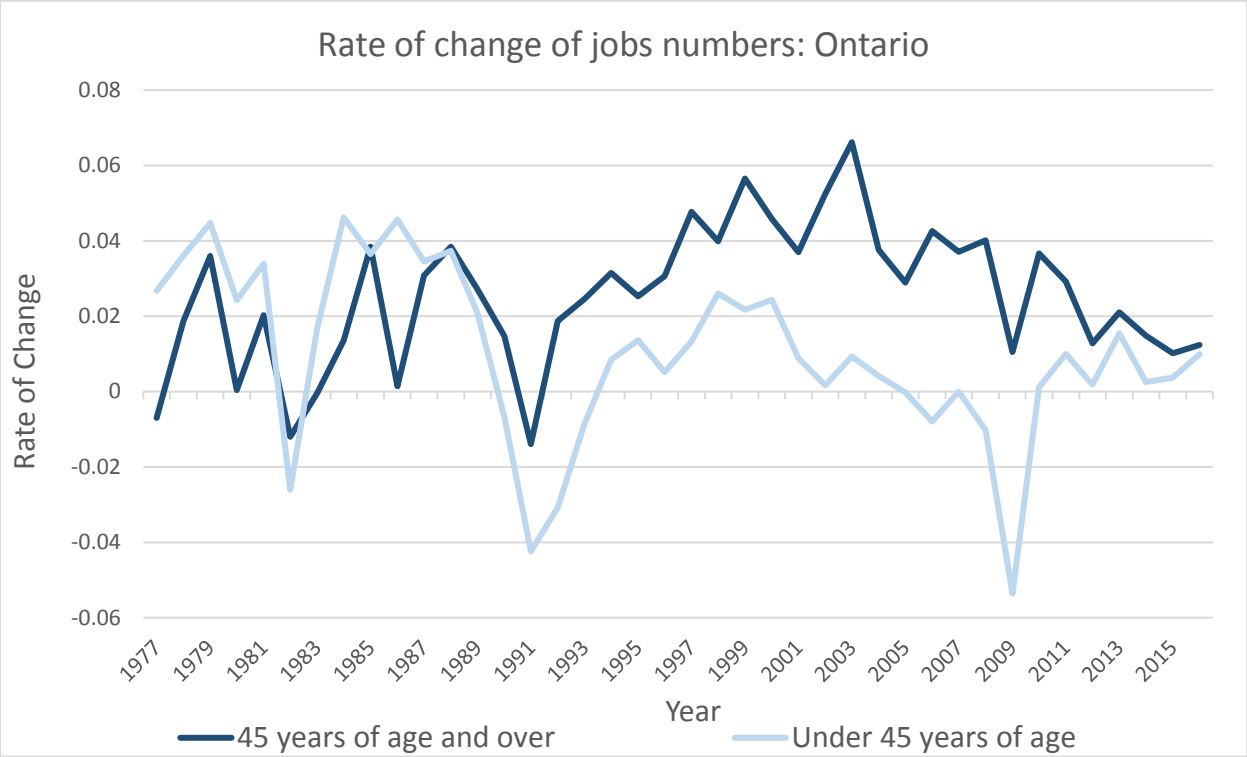
This was a trend that began in the early 1990s, and was accompanied by a period of declining wages among this cohort, which has been attributed to the following characteristics among this group:

- Decline in unionization;
- Decline in the number occupations held in science, technology, engineering, and mathematics (STEM) fields; and
- Reduced participation in high-paying sectors, such as public service (Galarneau, Morissette, & Usalcas, 2013).

[12] Precarious work is non-standard employment that is poorly paid, insecure, unprotected, and cannot support a household.

Note that since the 1990s, and especially following the financial crisis of 2008, the proportion of jobs held by those under the age of 45 has been deteriorating. (Statistics Canada, 2015d).

**Figure 14** Rate of job growth held by workers under the age of 45 vs over 45 *(Source: CANSIM Table 282-0002)*




Higher employment growth rates for older Canadians, especially since the 2008 financial crisis, could be limiting the ability of younger individuals to realize the benefits of aggregate job creation. It is important to note that other factors may be influencing this trend, such as the aging of the population, occupation-skill mismatches among younger cohorts, labour market imbalances including the excess demand for occupations in the STEM fields, and others.

Despite the range of potential sources of this effect, the current situation, if left unchecked, poses a significant risk to those individuals who are attempting to start their careers, raise capital to purchase a home, and then sustain a mortgage through consistent employment that pays a competitive wage.

## 2.3 Growing discrepancies in wage rates across industries

Growing wage and income inequality across industries could also serve to explain the growing inequality in employment income among Canadians, with possible implications for inequality across households of different socioeconomic, educational, and professional backgrounds.

Labour productivity by itself appears to be a relatively weak predictor of average industry wages (Statistics Canada, 2014; Statistics Canada, 2015e), implying that wage inequality across employment sectors may not necessarily be driven by differential productivity growth, and could be the result of other variables, including:

- Labour market institutions;
- Sectoral idiosyncrasies related to technological advancement and productivity growth;
- Commodity price influences; or
- Market forces, including changes in the prices facing consumers relative to the prices of goods and services they produce (Sharpe, 2006).

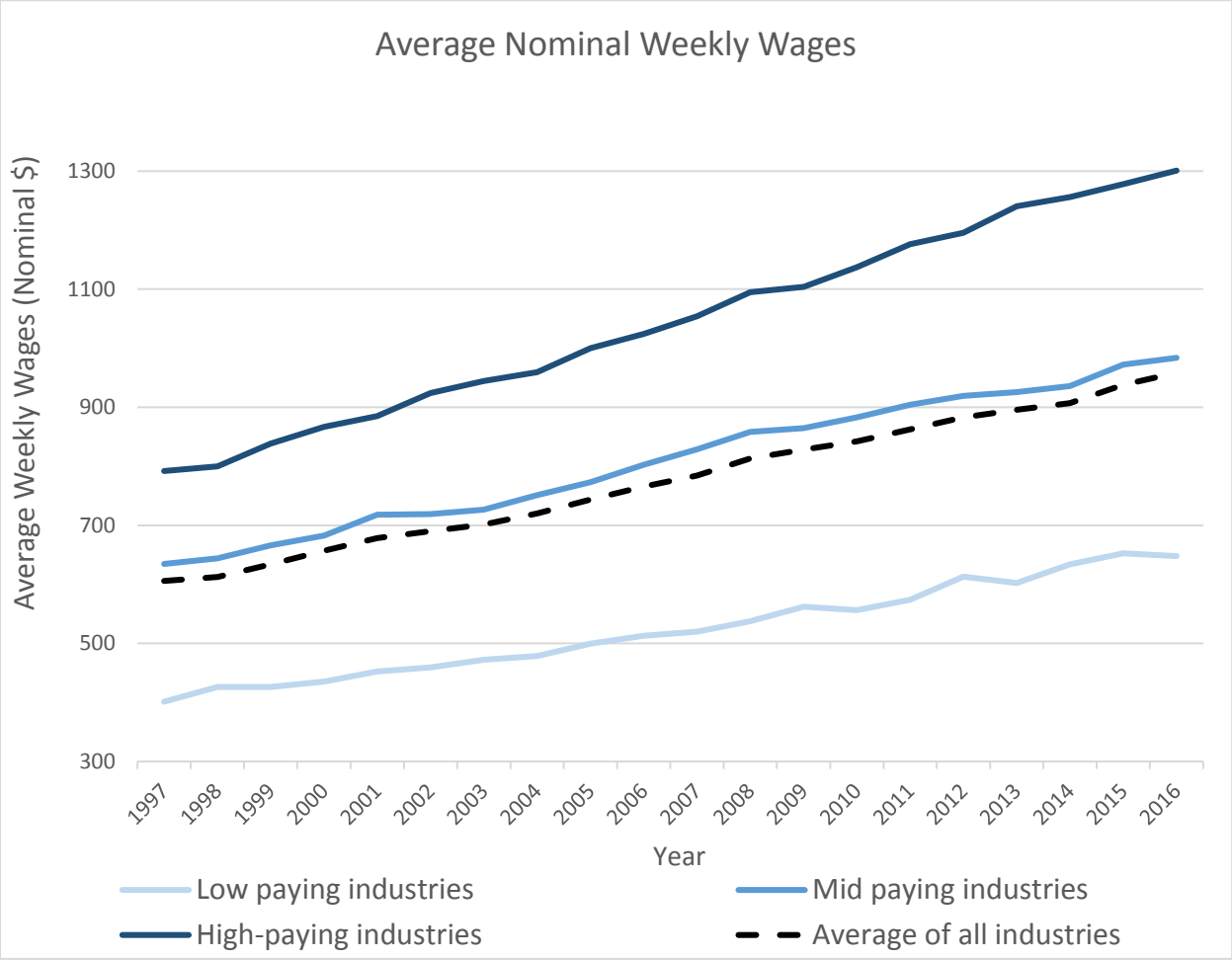
Table 4 and Figure 15 illustrate the industries that comprise those in the high-paying, mid-paying, and low-paying categories[13] (Statistics Canada, 2015e). In Ontario, 28% of the jobs in 2017 are in high-paying industries (2.15 million of the 7.69 million), of which 60% (1.3 million of the 2.15 million) are government sector jobs (including education) (LFS PUMF 2017).

**Table 4** Low-, mid-, and high-paying industries *(Source: CANSIM Table 282-0072)*

| Low-paying Industries (wages below 85% of average wages) | Mid-paying Industries (wages between 85% and 115% of average wages) | High-Paying Industries (wages greater than 115% of average wages) |
|---|---|---|
| Agriculture [111-112, 1100, 1151-1152]<br>Trade [41, 44-45]<br>Business, building and other support services [55-56]<br>Accommodation and food services [72]<br>Other services [81] | Manufacturing [31-33]<br>Transportation and warehousing [48-49]<br>Finance, insurance, real estate and leasing [52-53]<br>Health and social assistance [62]<br>Information, culture, and recreation [51, 71] | Forestry, fishing, quarrying, oil and gas [21, 113-114, 1153, 2100]<br>Utilities [22]<br>Construction [23]<br>Professional, scientific and technical services [54]<br>Educational services [61]<br>Public administration [91] |

[13] Based on data corresponding to the time period spanning 1997 to 2014. North American Industry Classification System (NAICS) 2007 codes are presented in square brackets.

**Figure 15** Wage inequality growth by sector *(Source: CANSIM Table 282-0072)*




## 2.4 Ontario Households and their Finances

In order to support more realistic economic decision making and policy analysis, and given the need to model household income, consumption and related finances, CANCEA has developed numerous indicators[14] to understand economic processes and questions of household affordability and sustainability. One of those indicators is the *Needs Consumption Affordability Ratio* (NCAR)[15] which incorporates the household consumption of necessary goods and services as a portion of disposable income (after paying taxes and debt obligations). The consumption of "necessary" goods and services – those things deemed to

[14] For example, the Shelter Consumption Affordability Ratio (Smetanin, Moca, Yusuf, & Kobak, 2015; CANCEA, 2017) is used by the Canadian Index for Wellbeing (Waterloo University) and Habitat for Humanity Greater Toronto Area in consideration of eligibility for its homeownership program.

[15] Originally proposed to provide a new way to measure federal-provincial policy impacts (CANCEA, 2017).

be required for living a "reasonable" lifestyle can include a portion of a specific good or service, insofar as households may overconsume such things relative to their needs. Specifically, NCAR is defined as:

$$NCAR = \frac{Shelter\ related\ needs + other\ needs}{(Discretionary\ income)}$$

Appendix B contains the components of NCAR.

It is important to note that, for NCAR, the higher the indicator gets, the more 'pressure' households feel in making ends meet in a given period, meaning trade-offs (e.g., labour for leisure, 'needs' for 'wants'). As a measure of needs, NCAR measures a household's ability to obtain both its 'basic needs' (i.e., their physical requirements for survival) plus their 'basic opportunity' (i.e., socially-defined minimums, such as education and health care in Canada)[16]. Sustainability is then about maintaining a household's 'Canadian' lifestyle, and thus carries a directional definition (e.g., "are things getting worse for me?"). If the distribution of NCARs across a province or territory sees too many households as unsustainable, then the province or territory as a whole can be said to be unsustainable. In such cases, the relevant government would likely start to experience significant pressures on its income statement and balance sheet (and resultant indicators) as households start trading off between wants and needs, or start depending on the provincial government for the likes of financial assistance and health care.

The following two charts showcase the distributions of Ontario households by after-tax market income and needs consumption (where darker areas represent more households).[17] Figure 16 presents how much is spent on needs in a given year versus after-tax market income. Households above/left of the red dashed line are by definition using transfers/borrowing/asset sales to consume their needs, giving them an NCAR of 1 in the period (the question of this being sustainable is a different question).

As household income rises, so does spending on needs (though not equally), largely demonstrating an increase in 'basic opportunity' – that is, for example, that 'middle-income' households consume 'middle-income' housing[18]. Figure 17 presents NCAR versus income, and shows that many low-income families are under extreme pressure to make ends meet. It also shows that many low-income households have the same NCAR as many higher-income households, again demonstrating the impact of households consuming 'basic opportunity' needs.

[16] This means that 'needs' includes certain types of consumption (e.g., food), without any judgement regarding the choices made within those types (with some exceptions, such as excluding alcohol from beverages).
[17] All contours collectively capture at least 95% of households.
[18] Note that in most cases, this is due to a distributed supply of big ticket 'needs', such as housing. While many household incomes may go down simultaneously due to a large economic change, there may not be a matched stock of cheaper housing available to those households.

**Figure 16** Distribution of needs consumption vs. after-tax market income

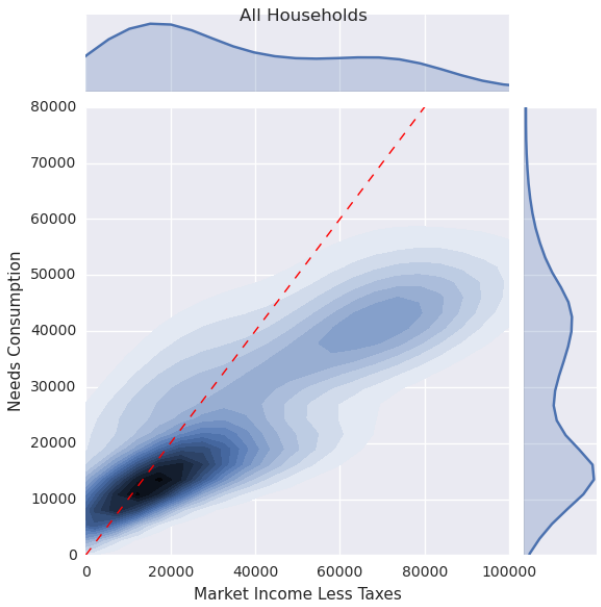



**Figure 17** Distribution of NCAR vs. after-tax market income

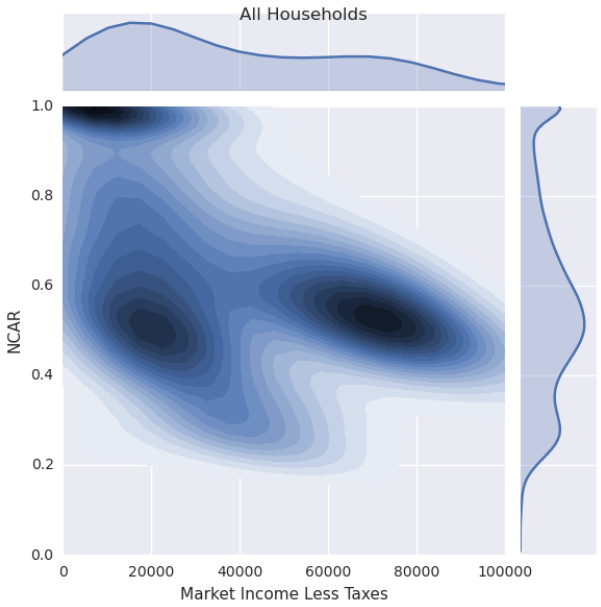


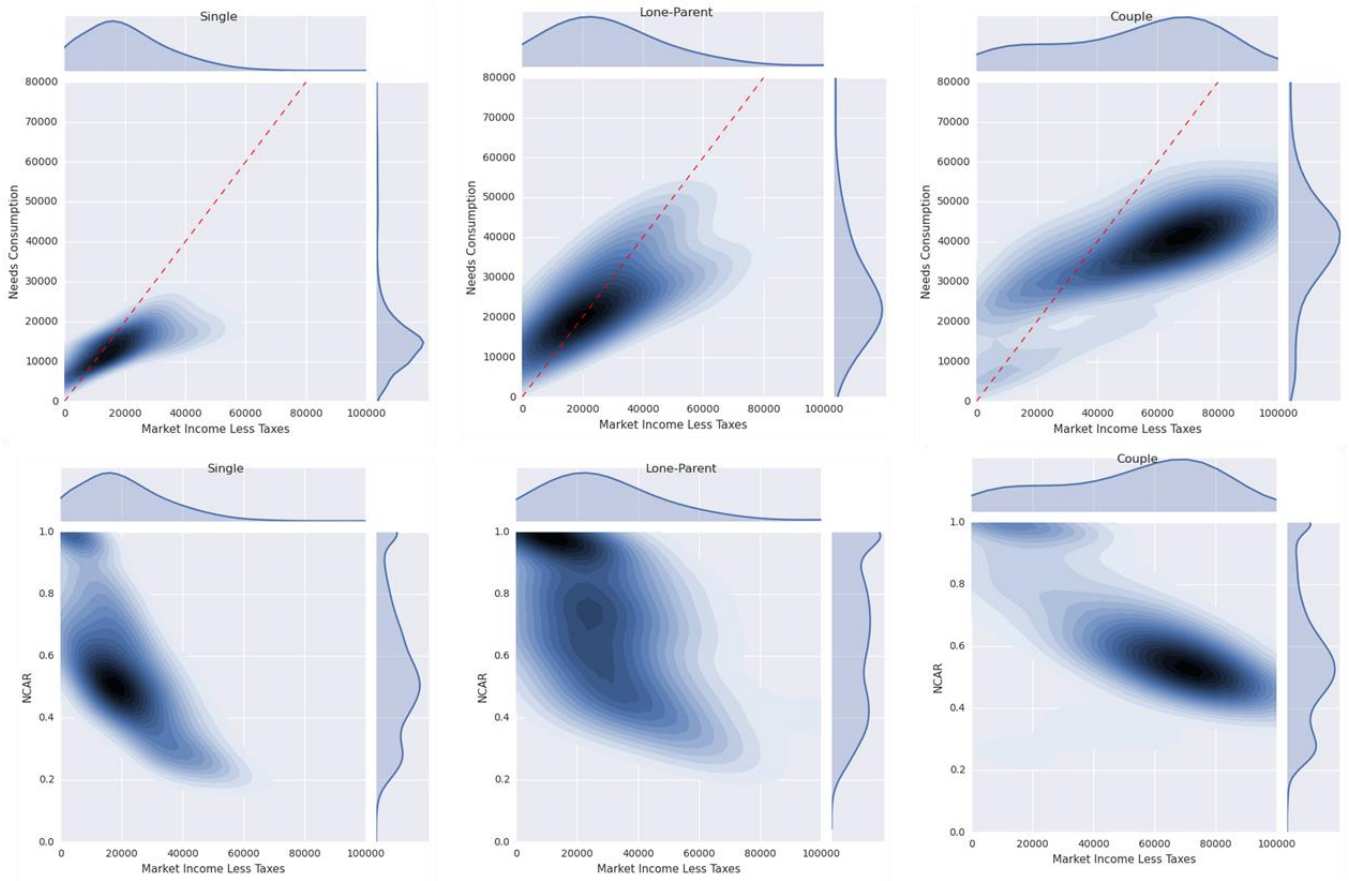

Illustration of how much is spent on needs in a given year versus after-tax market income. Households above/left of the red dashed line are by definition using transfers/borrowing/asset sales to consume their needs, giving them an NCAR of 1 in the period (the question of this being sustainable is a different question).

When these charts are broken down by household type, as illustrated in Figure 18, an even starker picture starts to emerge for lone-parents (and singles to an extent) trying to make ends meet.

While singles are typically lower-income relative to other household types, a smaller portion of them are under extreme pressure to make ends meet than the lone-parent households.

Most couple households have below average NCARs, meaning it is easier for them to make ends meet than the other household types.

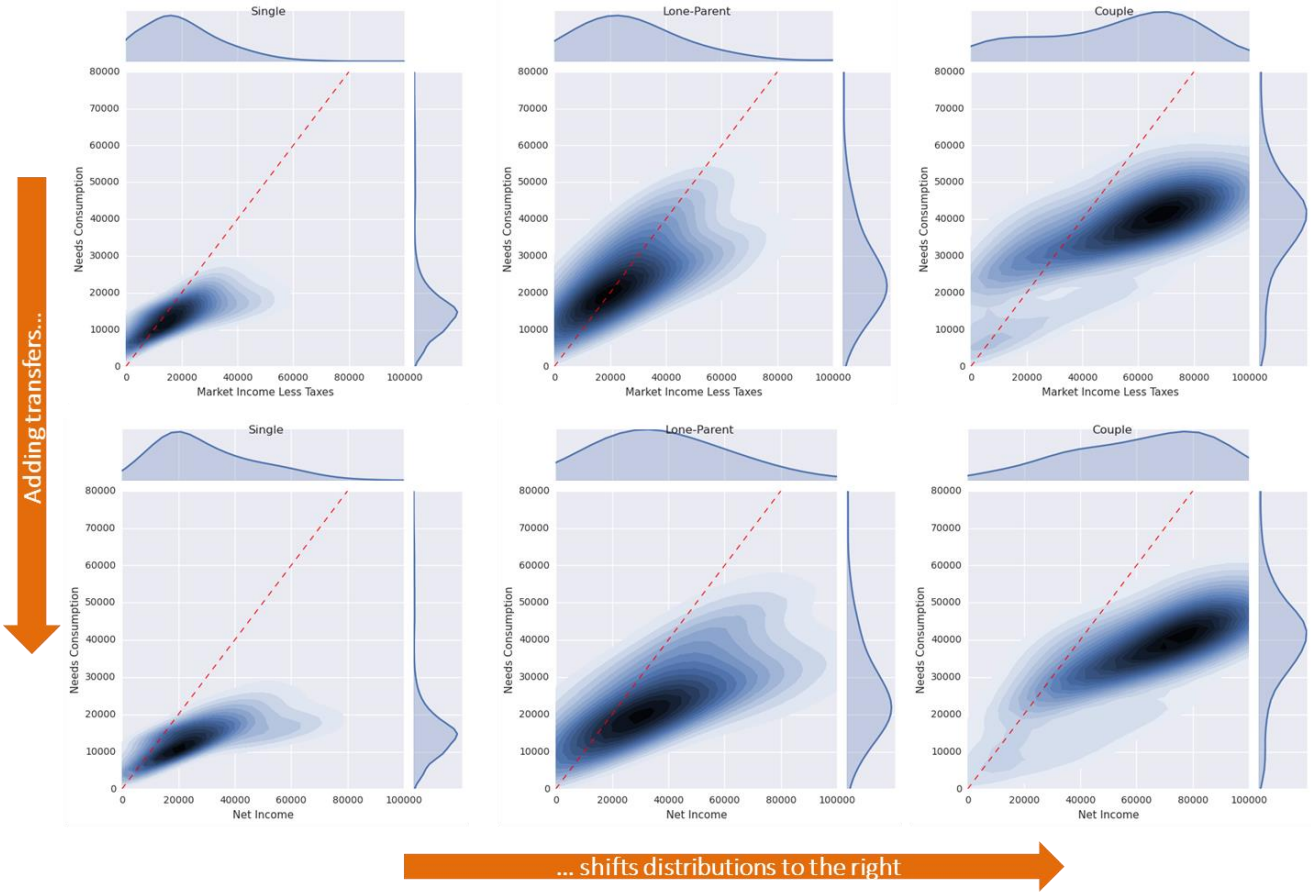
**Figure 18** Needs consumptions and NCAR by household type in Ontario




To demonstrate how different Ontario households are dependent upon government transfers to relieve their household financial challenges, please refer to Figure 19.

Areas above the red 45 degree line represent expenses in excess of market income.

**Figure 19** Impact on household finances by government transfers




Over 25% of Ontario households which have incomes below the median (so the lower half of all households) have NCAR above 85%. That is about 12% of all Ontario households.

## 2.5 Precariousness of the Ontario Economy

The structure of household income and expenses in Ontario coupled with the stagnant incomes of the poor and middle class have a causal effect on crises, and thus directly hurt short- and long-term growth. Kumhof and Ranciere (2010) and Kumhof, et al. (2012) show that, in theory, rising inequality enables investors to increase their holding of financial assets backed by loans to workers, resulting in rising debt-to-income ratios and thus financial fragility. The previous section amplifies these risks to the Ontario economy and the dependence of Ontario households on government transfers.

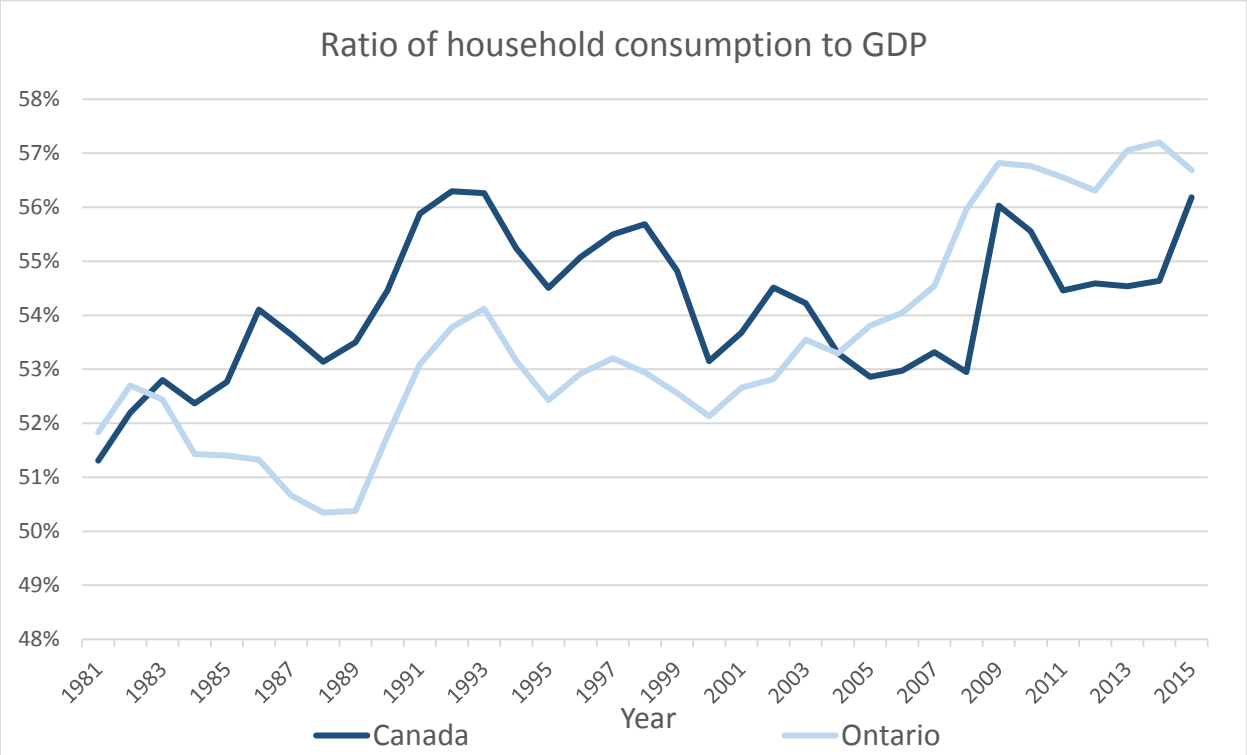
Previous sections have shown that:

- A bulk of wages paid to the population have stagnated which corresponds to the increase in inequality experienced across Canada and Ontario over the last several decades, which has accelerated since the financial crisis of 2008.

- As approximately 70% of Canadians aged 15 and older earn employment income, labour market outcomes are crucial to most households.
- The overall quality of jobs offered by the labour market has declined, and workers under the age of 45 are disproportionately represented in precarious labour, despite being relatively more reliant upon labour income than other age groups.

Coming out of the recession during the 1990s, such differences would influence the consumption and investment expectations of households. However, when coupled with increasingly accessible cheap finance in the 2000s, middle-class households were able to leverage the purchasing power of their disposable income, maintain their consumption levels, and sustain or even enhance their standards of living. This can be seen in Figure 20, particularly for Ontario, as the dependence of the economy upon household consumption which has gone from 50% in 1989 to a recent high of 57.2% in 2014.

**Figure 20** Ratio of household consumption to GDP (*Source: Statistics Canada. CANCEA calculations.*)




Yet, Figure 21 shows the contrast of how labour's share of economic output has decreased in Canada and Ontario from around 57.2% in 1982 for Ontario to around 52.5% in 2015.

**Figure 21** Ratio of employee compensation to GDP (*Source: Statistics Canada. CANCEA calculations.*)

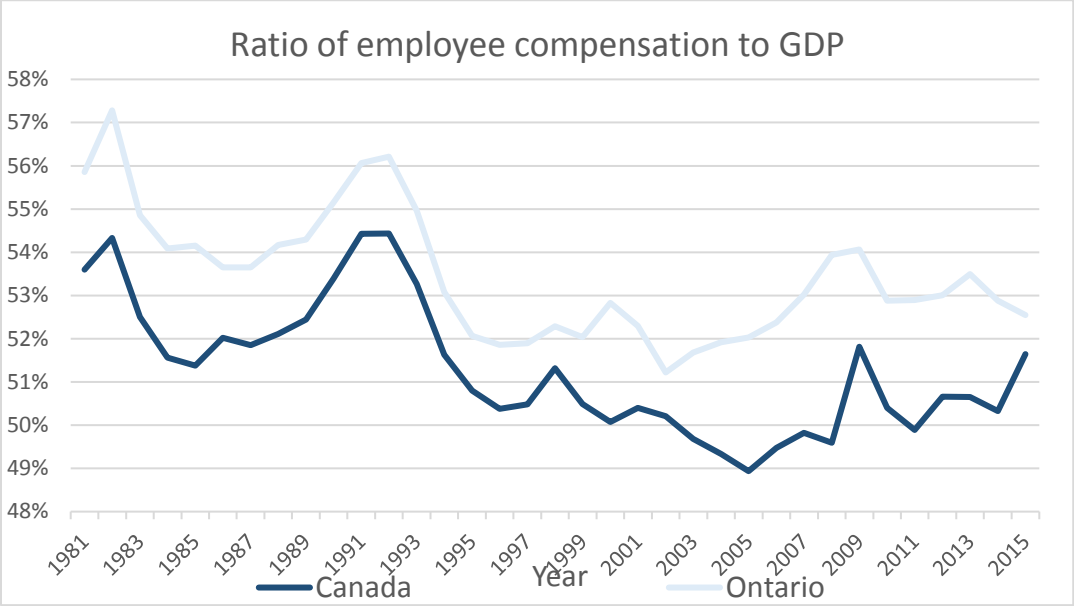
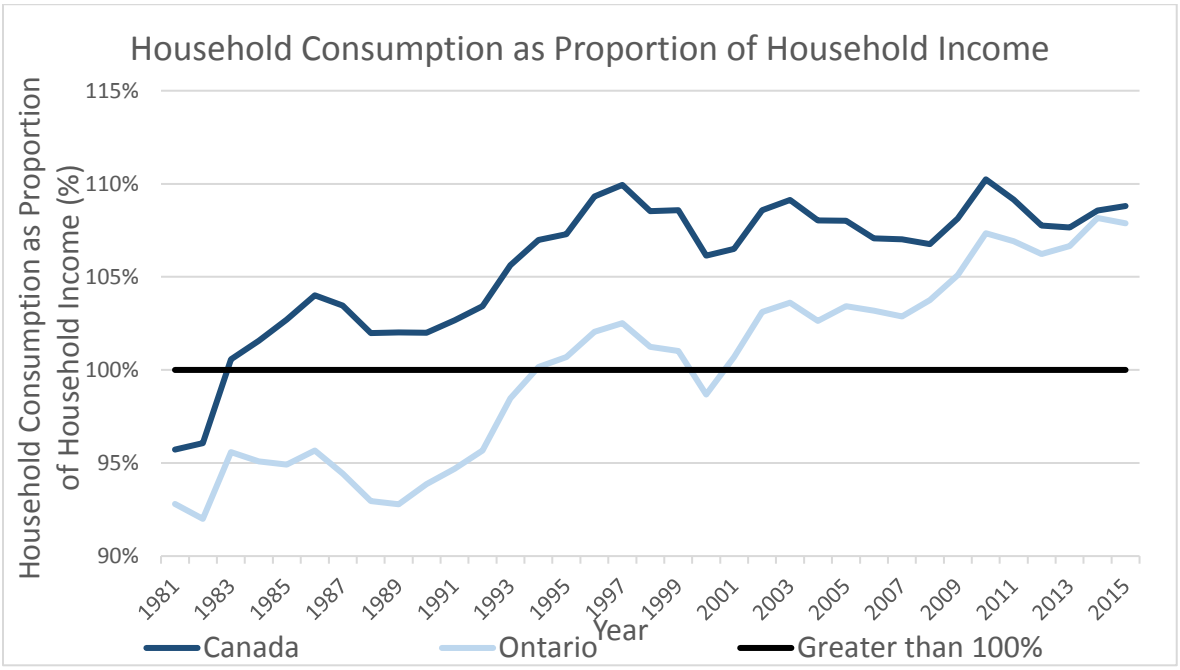



Figure 22 shows the net effect of how the economy has become increasingly dependent upon household spending while labour's share of economic output has decreased in Canada and Ontario. The excess over 100% is largely funded by consumer credit, low interest rates and significant asset inflation (capital gains).

**Figure 22** Household consumption as proportion of household income (*Source: Statistics Canada. CANCEA calculations.*)

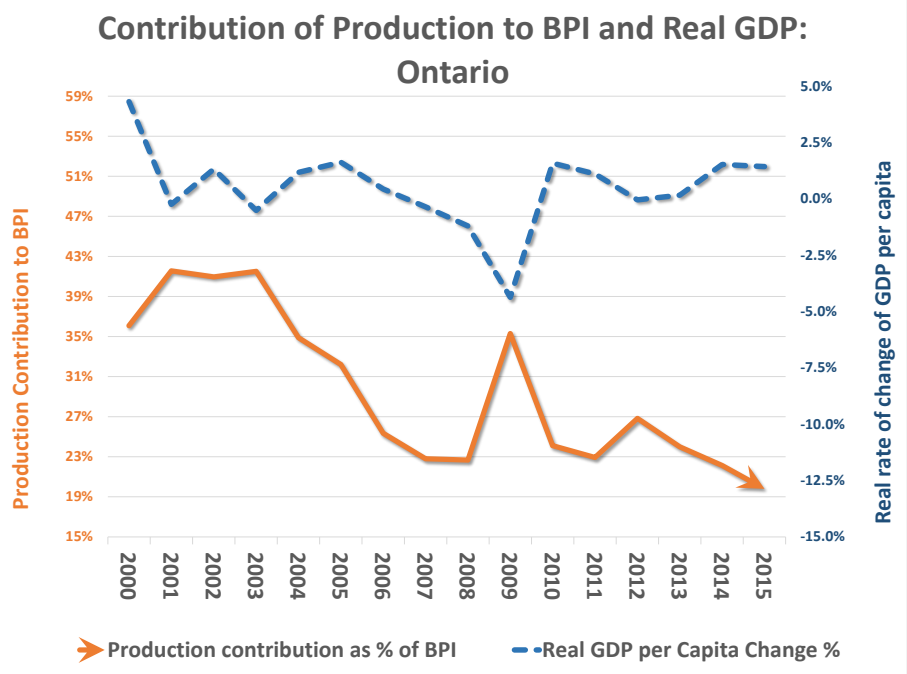


### 2.5.1 ONTARIO'S PRIVATE INVESTMENT PROBLEM

The falling labour share of economic output generally implies that wage growth has not kept pace with productivity growth. This means that the gains from productivity growth have been accruing to the owners of capital more than to workers. Yet, while the inclination is to expose businesses to higher costs of labour and its administration, one needs to appreciate the private capital investment problem in Ontario.

Coupled with household consumption, private capital investment has traditionally been viewed as the engine of an economy as it represents the risk taking by firms to produce goods and services and earn a profit. Recent analysis by CANCEA (OCC, 2017) demonstrates that the prosperity derived from the production of goods and services in Ontario has declined substantially over the past 15 years. While Ontario enjoyed an average 2.6% real GDP growth rate between the years 2000 and 2007, the source of wealth generated domestically from production activities actually declined by 12%. Since the recovery from the 2008/09 recession, average real GDP growth has been 2.2% while wealth generated domestically from production activities fell a further 12% over the period. Figure 23 contrasts this issue against the Ontario GDP per capita rate of change over the same period, which is a common measure of economic activity.

**Figure 23** Contribution of production to BPI and real GDP for Ontario




Source: Canadian Centre for Economic Analysis, Statistics Canada

Note the collapse of production contribution to the Business Prosperity Index in 2003-2005 which preceded the slower GDP growth rates. Troubling is the continuation of the collapse after the 2008 recession which, if persistent, will continue to underwrite the weaker economic growth that Ontario has been experiencing, particularly when considering what we have learnt about the state of Ontario household finances.

In conjunction with declining private capital investment has been the erosion of non-financial business operating margins (operating revenues less operating expenses, the surplus of which drives risk taking through increased capital investment). Operating margins have been consistently falling since 2005 in Ontario almost reaching their 2009 lows in 2015.

In short, Ontario has a business investment problem when it comes to producing goods and services. Ontario's non-financial businesses have been dogged by lower risk adjusted margins, declining manufacturing competitiveness, market uncertainties and fewer production opportunities. This has led to a preference for the maintenance of operations rather than growth, and the accumulation of financial flexibility.

# 3. FIRMS AND EMPLOYEES

The differences between the sizes of firms in different sectors becomes an important consideration when attempting to understand how employers may react to a policy like the Act[19]. Firm size will govern the ability of a business to weather cost shocks through the risk management of a portfolio of business exposures. Small to medium size firms (SMEs), between 0 and 500 employees, have less ability to risk manage their exposures (due to their smaller size in scale) and to navigate the changes behind the Act.

## 3.1 FIRM SIZE BY EMPLOYEES

According to the Labour Force Survey (LFS)[20], there are a total of 6.1 million employees in Ontario (not including self-employed) of which:

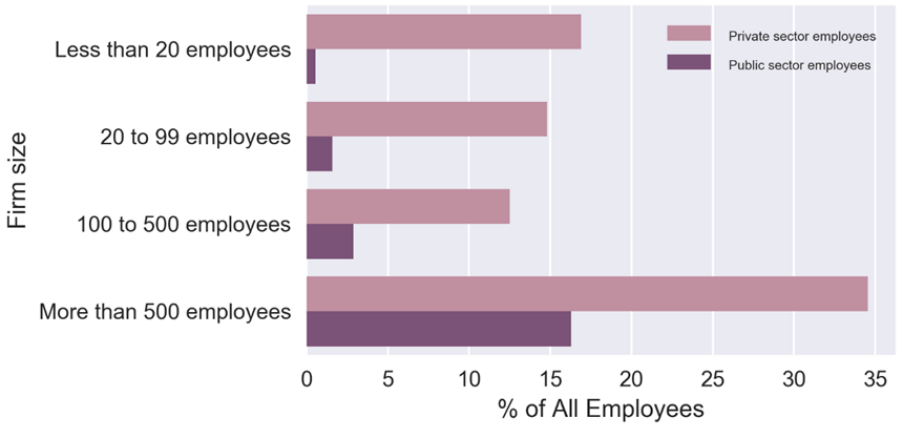
- 5.1 million employees are full time (83.9%);
- 980,000 are part-time (16.1%);
- 1.3 million employees work for the public sector (11.6% part-time); and
- 4.8 million work for the private sector (17.3% part-time).

Upon our first dissection of the LFS data, we have a measure of how many employees work in large (> 500 employees), medium (100 to 500 employees) and small (1 to 99 employees) private and public sector enterprises.

From Figure 24 below, of the total number of employees (including public sector employees) we see that 51% of employees work in large (> 500 employees) firms with 49% working in small and medium sized enterprises (SMEs, 1 to 500 employees).

[19] Breaking down the size of firms and number of firms in Ontario can be a tricky endeavour as the statistics used have different sources, definitions and purposes. For example, the Survey of Employment, Payrolls and Hours (SEPH) has the definition of an "enterprise" which is "one or more domestic establishments that were specified under common ownership or control". The Labour Force Survey (LFS) frequently reports data by establishment size but also includes a question that relates to enterprise size: LFI_Q262 — In total, about how many persons are employed at all locations? For the purposes of our analysis we have adopted the LFS PUMF data allocations of employees to firm size.
[20] Statistics Canada Public Use Microfile, January to July 2017 data using the definition of main job.

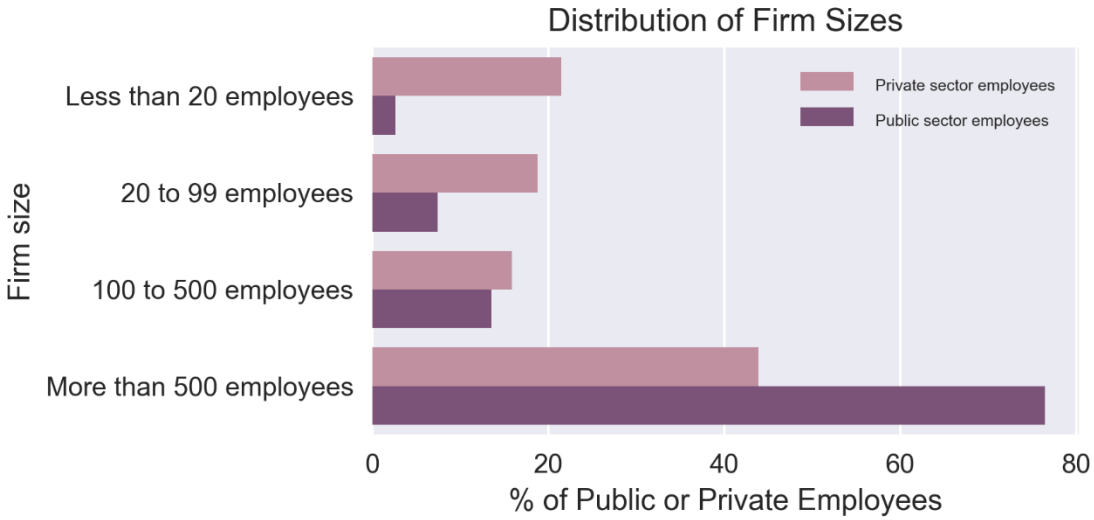
**Figure 24** Employees by firm size as percent of all employees




Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

Adjusting for public sector employees, which not surprisingly is dominated by large enterprises (i.e., the Government of Ontario), within the private sector only, we find about 44% of private sector employees are with large companies with the remaining 56% being in SMEs (shown in Figure 25)[21]. In terms of employees, a majority of private sector Ontario employees work in SMEs.

**Figure 25** Employees by firm size, percent of private & public




Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

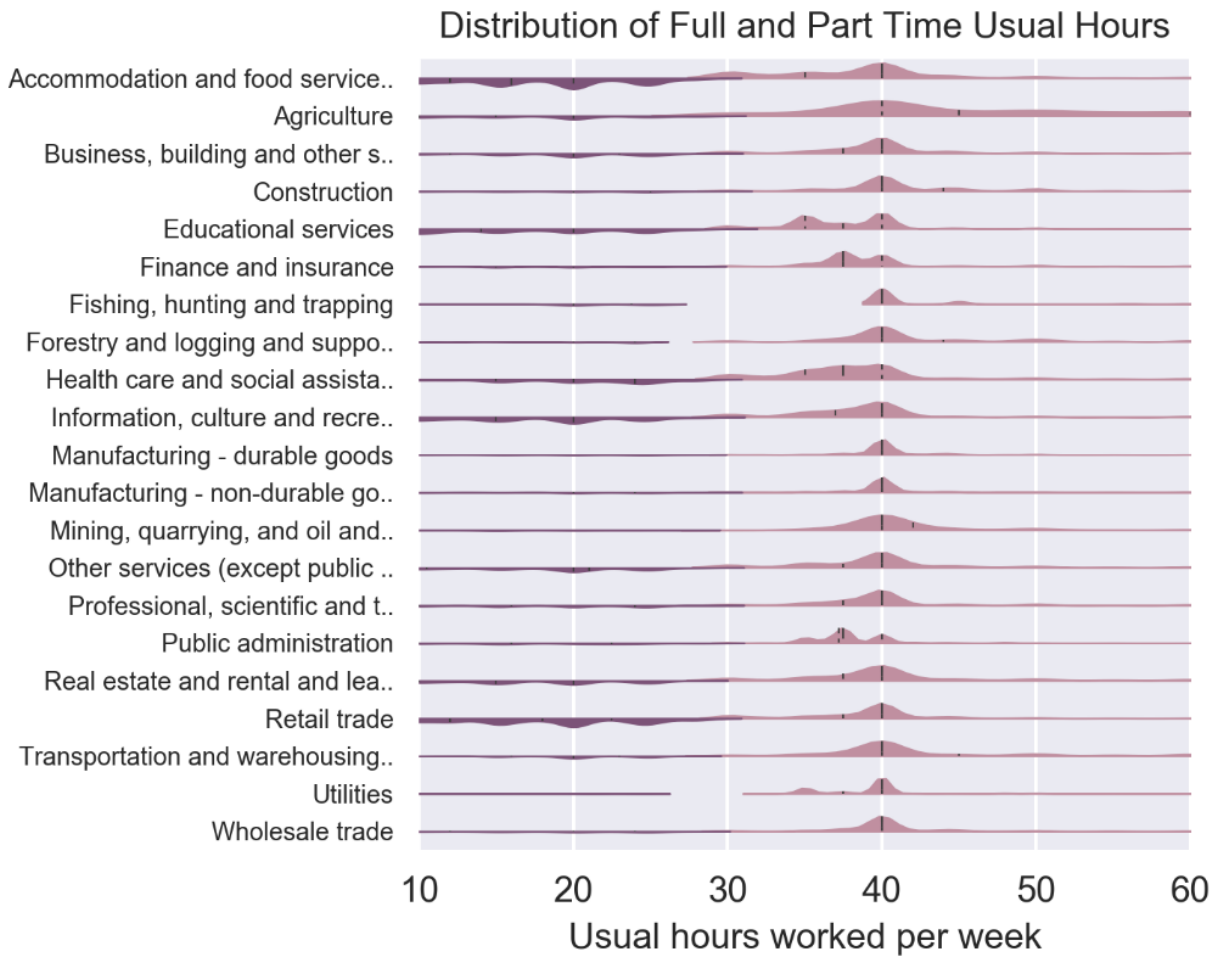
[21] Average percent of Statistics Canada Public Use Microfile, January to July 2017 data using the definition of main job.

## 3.2 Distribution of full-time and part-time employees

Next, we are interested in how full-time and part-time employees are distributed across industry sectors. Figure 26 shows the distribution of each sector which demonstrates:

- Higher dependency on part-time employees that work less than 30 hours per week in accommodation/food services (39%), retail trade (36%), educational services (33%), health care/social assistance (20%), information/cultural/recreational (20%), other services (21%), and real estate/rental/leasing (18%); and
- Higher dependency on full-time employees that work less more than 35 hours per week in agriculture, construction, forestry/logging, healthcare/social assistance, manufacturing, mining/quarrying/oil, professional/scientific/technical, transportation/warehousing.

**Figure 26** Distribution full/part-time by sector, usual hours worked




Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

### 3.2.1 DISTRIBUTION OF WAGE BY SECTOR

Following this, we are interested in how the distribution of wages vary across different industry sectors. As shown in Figure 27, the distribution of wages differs considerably when considering the public sector versus the private sector. A much larger portion of the employee base of private firms are under the $15/hr, which represents 30% of the private sector workforce compared to 7.8% in the public sector[22].

**Figure 27** Distribution full/part-time private & public sector, usual hourly wages


Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

Of the 1.4 million private employees earning less than $15/hr in the private sector, the sectors that carry the bulk of such employees (about 90%) are:

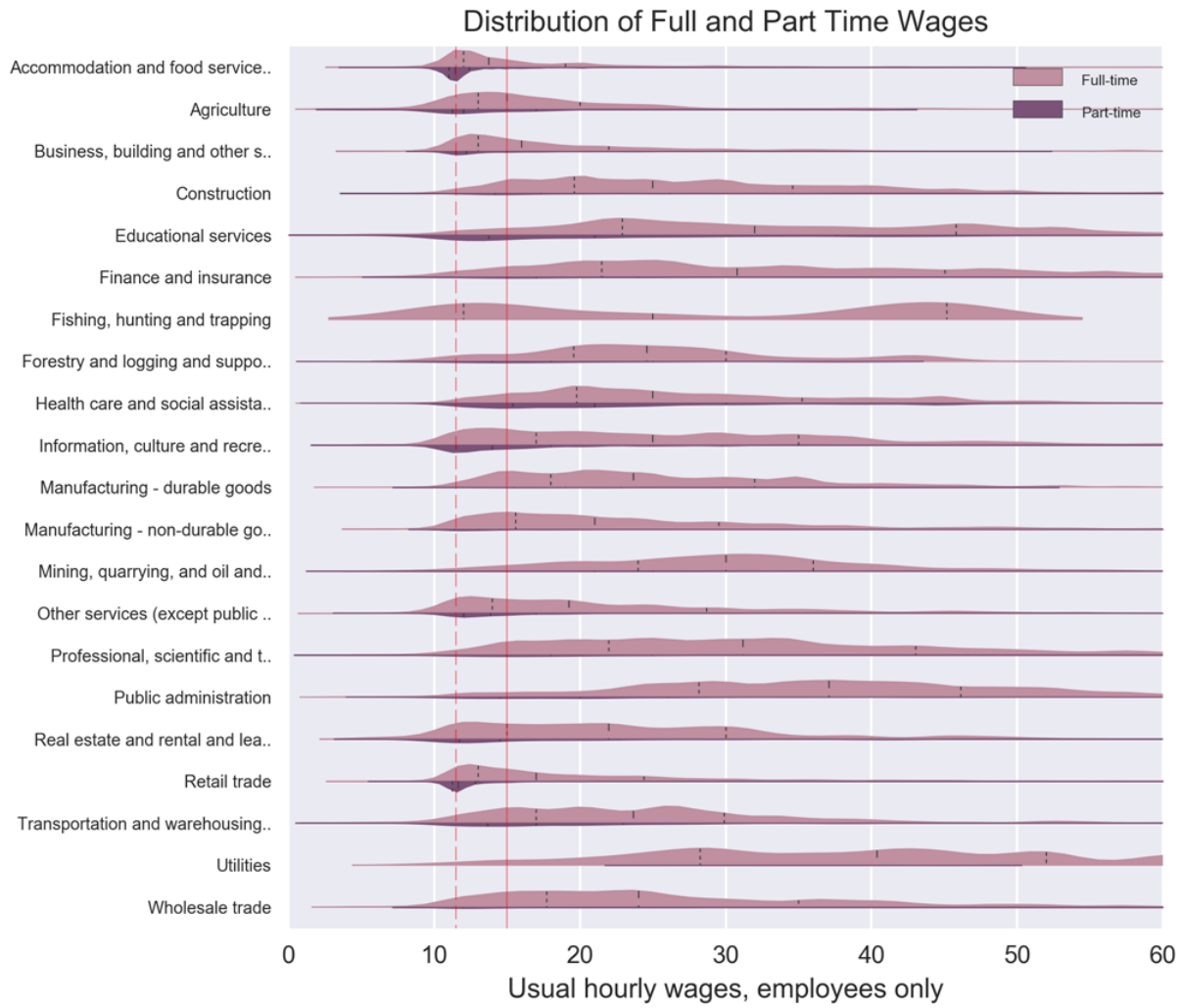
- Retail trade (29%)
- Accommodation and food services (21%)
- Manufacturing – durable and non-durable goods (9%)
- Business, building and other support services (9%)
- Health care and social assistance (5%)
- Information, culture and recreation (5%)
- Other services (except public administration) (5%)
- Transportation and warehousing (3%)
- Wholesale trade (3%)

In terms of the aggregates, retail trade, accommodation/food services, manufacturing and business/ building/other support services account for 59% of private sector employees[23] that earn less than $15/hr. However, a different picture emerges when we consider the distribution of wages within each industry

[22] Average percent of Statistics Canada Public Use Microfile, January to July 2017 data using the definition of main job.
[23] Average of January to July 2017 LFS PUMF

sector. Figure 28 shows how some industry sectors are concentrated in lower wage brackets and have a greater number of part-time workers relative to full-time.

**Figure 28** Distribution full/part-time, by sectors, usual hourly wages




Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

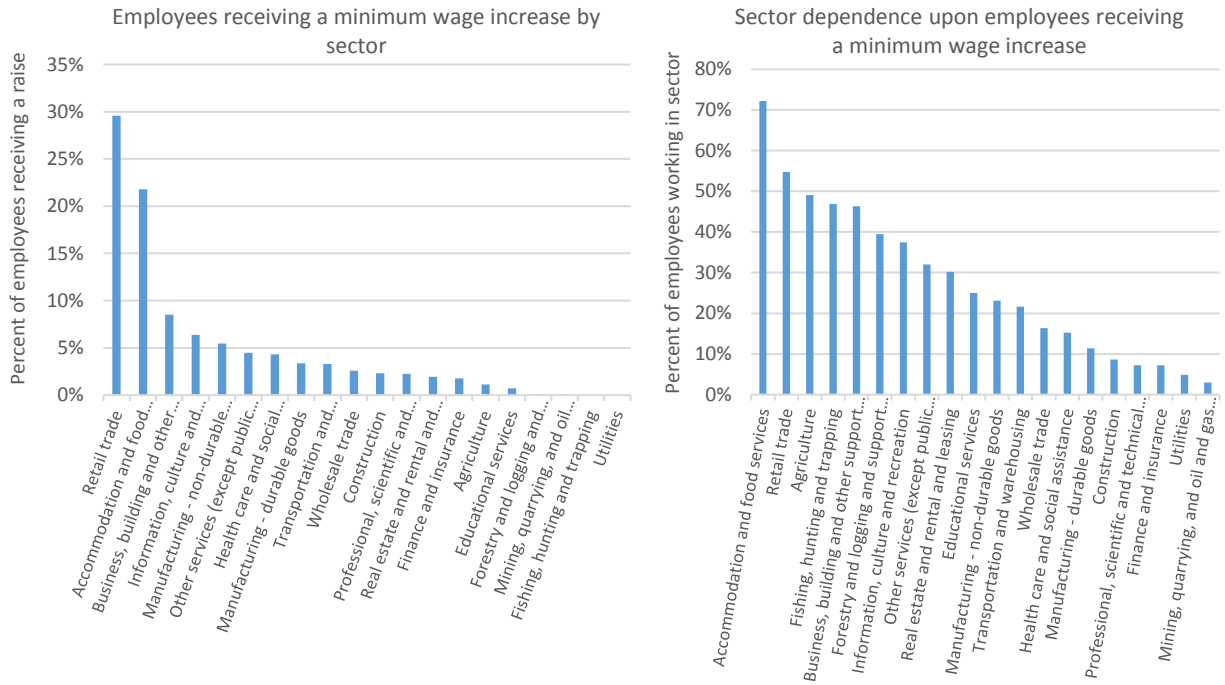
All employees to the left of the solid red line will receive an increase in wage directly from minimum wage changes (those to the left of the dashed red line are likely to receive less that the minimum wage increase). What we see in Figure 28 is a substantial number of employees less than $15/hr in different sectors. This indicates the dependence of different sectors on such workers. Of the 1.4 million employees earning less than $15/hr in the private sector[24], those sectors that are most dependent upon such employees (about 90%) as a proportion of their workforce are[25]:

[24] Note that we make the distinction for between $15/hr and under and not people at $15/hr and under which changes the reporting of the statistics.
[25] Average of January to July 2017 LFS PUMF

| | |
|---|---|
| • Accommodation and food services (74%)<br>• Retail trade (58%)<br>• Agriculture (51%)<br>• Business, building and other support services (49%)<br>• Other services (except public administration) (35%)<br>• Educational services (32%)<br>• Information, culture and recreation (32%) | • Real estate and rental and leasing (29%)<br>• Transportation and warehousing (22%)<br>• Forestry and logging and support activities for forestry (23%)<br>• Health care and social assistance (17%)<br>• Manufacturing – durable and non-durable goods (17%)<br>• Wholesale trade (17%) |

When considering the incidence of private sector employees below $15/hr employees, it appears that the exposure to minimum wage changes touches almost every sector. While the graph on the left of Figure 29 is interesting, the right graph of Figure 29 is a better measure of the dependence of different sector business models on low paid workers. As we will find in Section 7.7.2, this effect is amplified when minimum wage spillover and compression effects are taken into account[26].

**Figure 29** Employment under $15/hr by sector (LFS PUMF Jan to Jul 2017)




[26] Spillover effects refer to wage increases just above the minimum wage to somewhat restore old relativities. Compression effects refer to compressing the whole distribution as a result of wage increases at the bottom of the distribution that result from direct effects on those below the new minimum wage and indirect spillover effects on those just above the new minimum.

## 3.3 Distribution of wage by firm size

The previous section ended with a comment upon how the operation of different businesses are dependent upon lower paid workers. In Figure 30 we immediately see that a greater proportion of low wage workers in fact work in small and medium sized firms (SMEs) which amounts to 31% of their workforce.

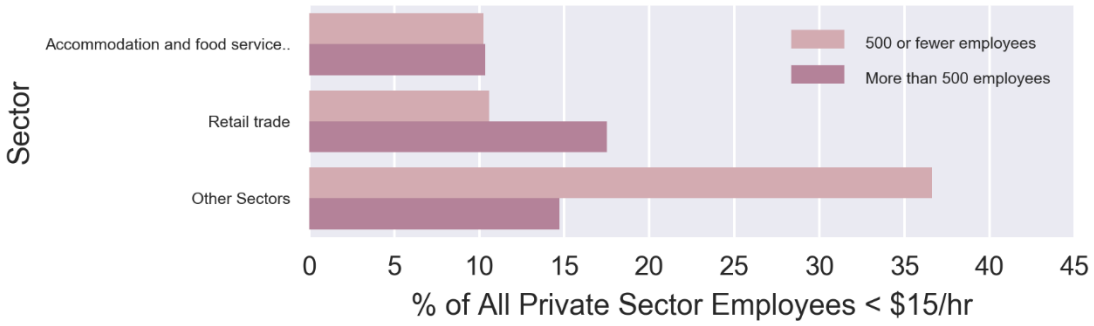
**Figure 30** Distribution full/part-time, private sector, by firm size, usual hourly wages


Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

In fact, of the 1.4 million private employees that are expected to receive a minimum wage increase, by dissecting firm size by small to medium size businesses, we find that SMEs account for 56% of these employees with small businesses (less than 99 employees) representing 78% of that number.

By dissecting firm size by small to medium size businesses (SMEs) and large businesses (more than 500 employees), we find that the sectors that are usually reported to be impacted by minimum wage increases include retail trade and accommodation and food services (Macdonald D. , 2017). However, we find that industries other than these sectors account for 50% of those private sector employees that will receive a direct minimum wage increase.

**Figure 31** Private employees receiving a minimum wage increase, by SMEs and large firms




Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

Table 5 provides a transparent relay of the exposure of firms of different sizes by sector. As Table 5 shows that there are very few instances where large businesses (percent of their employees below the wage rate of $15/hr) exceed that of SMEs. There is only one instance when small businesses are considered.

Noteworthy are the impacts of minimum wage increases in each sector with SMEs in most sectors shouldering more than 50% of the minimum wage change in that sector (indicated in red).

**Table 5** Table proportion of employees under $15/hr as a percent of sector and firm size

| | All Employees, Percent* | | | Proportion of Employees Less than $15/hr | | | Exposure of Firm Size as a Ratio of Large Firms** | | Share of SME change of wage changes under $15/hr in the sector |
|---|---|---|---|---|---|---|---|---|---|
| | Large | SME | Small | Large | SME | Small | SME | Small | |
| Accommodation and food services | 49% | 11% | 40% | 76% | 58% | 75% | 0.8 | 1.0 | 49% |
| Retail trade | 60% | 13% | 27% | 60% | 50% | 56% | 0.8 | 0.9 | 37% |
| Agriculture | 11% | 12% | 77% | 48% | 48% | 52% | 1.0 | 1.1 | 90% |
| Business, building and other support | 42% | 17% | 40% | 51% | 45% | 49% | 0.9 | 0.9 | 56% |
| Information, culture and recreation | 43% | 17% | 40% | 23% | 23% | 45% | 1.0 | 2.0 | 69% |
| Other services (except public | 16% | 12% | 72% | 32% | 13% | 40% | 0.4 | 1.3 | 86% |
| Real estate and rental and leasing | 34% | 24% | 42% | 20% | 25% | 39% | 1.3 | 1.9 | 76% |
| Manufacturing - non-durable goods | 44% | 21% | 35% | 12% | 28% | 37% | 2.3 | 3.0 | 78% |
| Educational services | 16% | 16% | 67% | 29% | 15% | 36% | 0.5 | 1.2 | 85% |
| Fishing, hunting and trapping | 0% | 0% | 100% | | | 34% | | | 100% |
| Transportation and warehousing | 50% | 19% | 31% | 20% | 22% | 26% | 1.1 | 1.3 | 56% |
| Health care and social assistance | 29% | 21% | 50% | 12% | 11% | 23% | 1.0 | 1.9 | 80% |
| Wholesale trade | 39% | 20% | 41% | 15% | 12% | 21% | 0.8 | 1.4 | 66% |
| Manufacturing - durable goods | 49% | 21% | 30% | 7% | 16% | 20% | 2.3 | 2.9 | 74% |
| Utilities | 74% | 8% | 18% | 5% | 0% | 17% | 0.0 | 3.5 | 47% |
| Forestry and logging and support activities | 22% | 11% | 67% | 17% | 88% | 14% | 5.2 | 0.8 | 83% |
| Finance and insurance | 74% | 11% | 16% | 8% | 10% | 13% | 1.3 | 1.8 | 36% |
| Professional, scientific and | 37% | 15% | 48% | 5% | 5% | 13% | 1.1 | 2.7 | 80% |
| Public administration | 84% | 0% | 16% | 22% | | 13% | 0.0 | 0.6 | 11% |
| Construction | 19% | 14% | 67% | 5% | 5% | 13% | 0.9 | 2.4 | 90% |
| Mining, quarrying, and oil and gas | 75% | 13% | 12% | 6% | 4% | 10% | 0.6 | 1.7 | 28% |

* Percent of sector. ** Firm size proportion of employees less than $15/hr divided by large firm proportion of employees less than $15/hr.
Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017 using averages from January to July 2017.

# 4. ECONOMIC IMPACTS: PERSPECTIVES FROM THE LITERATURE

## 4.1 MINIMUM WAGE CHANGES

Currently, over 700,000 workers (10.1%) in the Ontario workforce earn the minimum wage, of which 60.3%, or approximately 420,000 workers, were between 15 to 24 years of age, while 30.5% were between the ages of 25-54 (Murphy, Lammam, & MacIntyre, 2016). The majority of minimum wage workers were sons or daughters living with their family (59.8%), of which 40% were teenagers in school. Only 4.5% of minimum wage workers in the 25-54 age group were single, living alone or with non-relatives, and 2.4% had a child less than 18 years old and living with a spouse who was not employed. Gunderson (2007) argues that changes in the minimum wage were more likely to affect women (13.9%) than men (8.4%) and teenagers and young adults than middle-aged workers. Qualitatively, these numbers are consistent with the analysis of Campolieti (2015) who finds stronger wage compression effects for females and young workers.

According to the 2015 Labour Force Survey, Ontario has the highest share of minimum wage earners as a proportion of total employees (11.6%) across all provinces (Statistics Canada, 2017). In the context of the scheduled increase of the minimum wage to $15, roughly 28% of Ontario workers will have their wages directly affected by being under the new minimum wage levels (i.e., they earn less than $15)[27]. This translates to about 1,500,000 workers in Ontario (public, private)[28]. If the average number of work hours per week is 30 and there are 50 work weeks per year, the total impact is $4.5B annually, assuming a $2 increase in wages and no disemployment effects.

The impact of minimum wage policies on employment and income distribution has been a subject of policy debate for roughly a century. The bulk of the academic literature has focused on measuring the employment effects of policies that increase the minimum wage *after* these policies have been enacted by the relevant governments. Despite the evolution of scientific techniques and the availability of richer data sets, economists have not reached a consensus on the gains and the costs of minimum wage policies (Allegretto S. , Dube, Reich, & Zipperer, 2017; Neumark & Wascher, 2017). Even studies that focus on particular regions have reached contradicting conclusions about employment effects by adopting different methodologies (Neumark & Wascher, 1992; Card, Katz, & Krueger, 1994).

This lack of a general consensus among economists suggests that there is an inherent underlying uncertainty associated with minimum wage shocks: the employment and income distribution effects are not straightforward to separate, let alone their spillover and compression effects across firms and households. Especially in the context of the high minimum wage increases scheduled for Ontario and the US, past research is even more uninformative about policy debates about these effects, given that past studies have focused on smaller, more gradual changes (Neumark, 2017).

[27] Female workers are disproportionately represented in low wage jobs in Canada; one-third of female employees earn less than $15 per hour compared to 22% of male workers.

[28] We keep to the LFS PUMF January to July 2017 data using the definition of main job as a matter of consistency unless otherwise indicated. Further, we make the distinction between $15/hr and under and people at $15/hr and under.

At the very least, this inconsistency in the empirical literature suggests that the effects of such interventions in the labour market should not readily be assumed negligible, certainly not prior to analysis in the context of the forthcoming changes and the relevant theoretical and empirical literature.

Our main motivation for this research is to shed light on the possible implications for the Ontario economy regarding the proposed changes in the Act. Our approach adopts standard principles from input-output analysis in combination with modern computational techniques that have utilized and linked over 170 data tables, publicly available for Canada and Ontario. Refer to Appendix C for the complete methodology and Appendix F for data sources.

In contrast to the majority of studies around minimum wages, our research estimates the economic impact of *upcoming* minimum wage policies in Ontario. Instead of attempting to disentangle aggregate labour market effects of policy changes that took effect in the past, we simulate the economy under different behavioural responses by employers. Then we use the existing literature to narrow down the range of possible effects of the Act on the Ontario economy and the possible implications across various markets. Given the ex-ante nature of the analysis, this enables a greater level of detail that is absent in most public reports.

### 4.1.1 ECONOMIC LITERATURE THAT IS SUPPORTIVE OF MINIMUM WAGE INCREASES

Below, we provide a summary of the literature that is in favour of the minimum wage increase:

- Minimum wage increases reduce income inequality as the low-paid workers will receive more income per hour of employment. If low-paid workers live in households that are below the poverty level, the minimum wage increase may also help reduce poverty. Moreover, in the presence of labour market imperfections, such as monopsony power, an increase in the minimum wage may even increase employment rates and improve efficiency.[29]

- Minimum wage increases generate increased economic activity as a result of better-paid workers spending more income on goods and services. Aaronson et al. (2009) argues that minimum wage increases in the US have resulted in increased spending on durable goods that is greater than the increase in income among the affected households.

- Minimum wage increases force low productivity firms out of the market (Eckstein & Wolpin, 1990).

- Brochu and Green (2013) examine the impact of minimum wages on layoff, quit and hiring rates in Canada and find that, while an increase in the minimum wage is associated with a decline in hiring rates, the impact is offset by a reduction in layoff rates.

- Recent studies have reported positive employment effects in state-owned businesses, which are consistent with the assumption of a market situation in which there is only one buyer (monopsony assumption) (Ni, Wang, & Yao, 2011; Wang & Gunderson, Minimum wage effects on employment

[29] See, for example, Manning (1995) and Flinn (2006).

and wages: dif-in-dif estimates from eastern China, 2012). A stark example is the recent evidence from China. In the US and UK, among other countries, the employment effects are less clear cut, with some studies reporting large and positive effects and others large but negative.[30]

- Recent evidence from Seattle (Reich, Allegretto, & Godoey, 2017) provides evidence that employment was not affected when the minimum wage changes were based on business size, presence of tipped workers and health insurance provision and when "employers made use of the tip credit component of the law".

- Some economists claim that peer-reviewed journals have selectively published work that reports negative employment effects from minimum wage increases, and that the true effects are negligible or positive. For example, Giotis and Chletsos (2015) use meta-regression analysis to argue that this has been the case of late. However, several Canadian papers were dropped from their sample with less than 1.5% of their observations being estimates for the Canadian economy. This suggests that there are very little, if any, grounds to disregard the existing literature that reports Canadian estimates on the grounds of publication selection bias.

### 4.1.2 ECONOMIC LITERATURE THAT SUGGESTS NEGATIVE IMPACTS

The results in the majority of studies that use Canadian data point towards negative employment effects from minimum wage hikes, although these estimates vary across studies in terms of their strength[31] (Baker, Bejamin, & Stanger, 1999; McDonald & Myatt, 2004; Campolieti, Gunderson, & Riddell, 2006; Sen, Rybczynski, & Van De Waal, 2011; Campolieti, Fang, & Gunderson, 2005a; Campolieti, Gunderson, & Lee, 2014; Campolieti, Fang, & Gunderson, 2005b). Godin and Veldhuis (2009) and Gunderson (2007) summarize the literature for Canada and Ontario: The evidence suggests that a 10% increase in the Ontario minimum wage will decrease employment numbers by 2% to 6% over time. These employment effects mostly result from decreases in the growth rates of new jobs (Brochu & Green, 2013)[32] relative to the projected path of the economy without the minimum wage policy. However, some of the job losses are expected to result from firm downsizing and worker dismissals, especially when the economy is going through a recessionary period (Gunderson, 2007).

Other observations include:

- Ontario economists have argued that minimum wage policies are an ineffective instrument for reducing poverty (Mascella, Teja, & Thompson, 2009) as a majority of workers who will be affected by the policy are not members of poor households[33]. Another recent research paper by academic

[30] For example, Katz and Krueger (1992) vs. Coomer and Wessels (2013) (US); Dickens et al. (1994) vs. Balcombe and Prakash (2000)(UK).

[31] In Ontario for example Baker et al. (1999) suggest small disemployment effects compared to Campolieti (2005a) and Gunderson (2007). In the US, Dube et al. (2007), Orrenius and Zavodny (2008), Wolfson and Belman (2004)

[32] Labour force participation is negatively related to the minimum wage, which helps account for the relatively small unemployment effects in the empirical literature (Brown, 1999).

[33] In 2012, 83.4% of workers who lived in poverty (below the LICO threshold) earned more than the minimum wages (Murphy, Lammam, & MacIntyre, 2016).

economists in Ontario argues that minimum wage increases are associated with an *increase* of the percentage of families that live in poverty (Sen, Rybczynski, & Van De Waal, 2011).

- It is difficult for a blanket measure to have the intended beneficial effects: it is important to consider heterogeneity of firms and workers (Freier & Steiner, 2010). Furthermore, existing results can be misleading due to heterogeneity (Dube, Lester, & Reich, 2010).

- Minimum wage increases reduce the demand for untrained labour, which generates less opportunities for workers looking to find entry-level jobs that would allow them to acquire experience and training.[34] [35] This would adversely affect the more vulnerable group of untrained workers, which would have a negative impact on economic growth in the long run.

- Another concern associated with a higher minimum wage is that employers may attempt to mitigate the increased cost of labour by raising their output prices, leading to increased costs for some consumers.[36] Thus, even in the absence of disemployment effects, policies that increase the minimum wage are still likely to hurt rather than assist the poor, as well as households on fixed incomes (e.g., pension plans).

- Substitutes for the relatively more expensive "unskilled" labour become more attractive - firms may substitute with "intermediate-skill" workers (Meyer & Wise, 1983; Dickens, Machin, & Manning, 1994; DiNardo, Fortin, & Lemieux, 1996).

- Other cost offsetting measures: Just as mandated improvements in non-wage aspects of a job (e.g., health insurance, safety, layoff notification) may lead to lower wages, mandated improvements in the wage give employers an incentive to cut other aspects of the job package. A number of such margins have been suggested (e.g., health insurance, employer-provided training, and required levels of effort) (Wessels, 1980; Mincer, 1984; Hirsch, Kaufman, & Zelenska, 2015; Wang & Gunderson, Adjustments to Minimum Wages in China: Cost-Neutral Offsets, 2015).

Refer to Section 7.4 for our determination of the expected case selection from the modelling results.

### 4.1.3 WAGE SPILLOVER AND COMPRESSION EFFECTS

While the empirical literature on minimum wages focuses on disemployment effects, relatively little attention has been paid to examining the possible effects of minimum wage policies on the distribution of wages. Spillover effects refer to wage increases just above the minimum wage to somewhat restore old relativities. Compression effects refer to compressing the whole distribution as a result of wage increases

[34] For example, Gunderson (2007) showed that roughly 46% of minimum wage workers had been working in their positions for less than a year.

[35] Battle (2003) argues that only 1% of Canadians who held their positions for no less than five years were earning minimum wage.

[36] See Lemos (2004) for a comprehensive survey of the literature on minimum wage price effects.

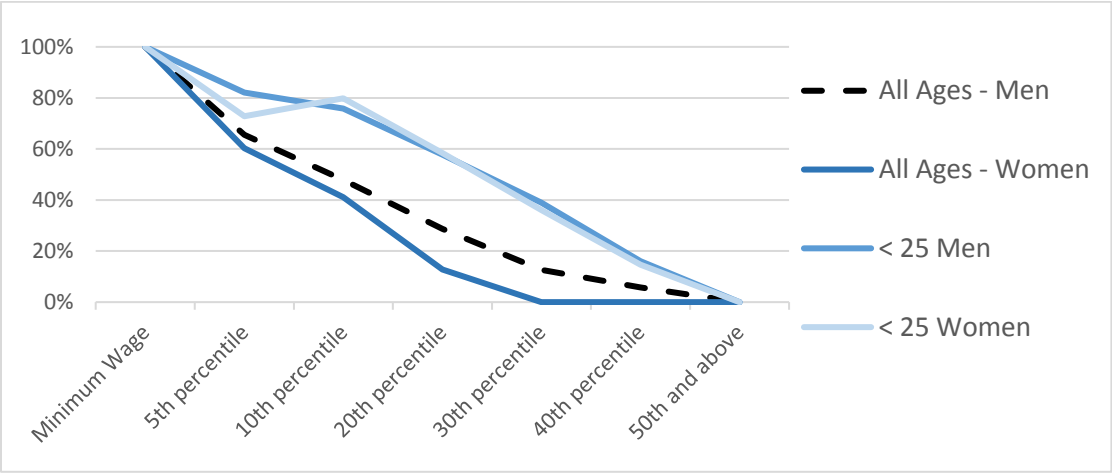
at the bottom of the distribution that result from direct effects on those below the new minimum wage and indirect spillover effects on those just above the new minimum.

One reason why wage rates above the minimum can be affected by minimum wage policies is often attributed to substitution effects across inputs of production. For example, we have argued that an increase in the minimum wage may lead firms to increase their demand for trained labour. If trained workers were receiving more than minimum wage before the policy change, increased demand, and consequently wages, for trained workers after minimum wage increases suggests that such policies may have indirect, or spillover, effects on the wage distribution.

Furthermore, as one of the stated purposes of minimum wage hikes is to reduce poverty, it is important to investigate if and to what extent lower bounds on minimum wages are related to wage inequality. The US literature answers this question in the affirmative, particularly for the lower parts of the wage distribution.[37] The recent literature that uses Canadian data reached similar conclusions (Campolieti, 2015). In particular, for persons aged 15 to 64, Campolieti (2015) finds that an increase of 10 log points in the minimum wage reduces inequality for men by bringing the 5$^{th}$ and 10$^{th}$ percentile closer to the median wage by 4.6 and 1.3 log points, respectively. The compression effects for women in the same age group are stronger, bringing the 5$^{th}$ and 10$^{th}$ percentiles closer to the median by 5.5 and 3.7 log points respectively. The estimated spillover effects are stronger for the 15 to 24 age group up to the 70$^{th}$ percentile, yielding stronger compression effects. Interestingly, the results for this age group point towards negative wage effects for men and women. One possible explanation is that employers compensate for the increased wages at the lower half of the distribution by cutting down wage payments from the better paid young workers.[38]

On the basis of the results above, we assume that the wage spillover and compression effects are as described in Figure 32:

**Figure 32** Wage spillover and compression effects adopted by the model




[37] For example, Card and Krueger (1995), Lee (1999) and more recently Autor et al. (2016).
[38] Although the author notes the possibility that the spillover effects for this age group partly reflect disemployment effects.

## 4.2 EQUAL PAY

It is acknowledged that the labour market rigidities often fostered by regulations are assumed to have a negative association with economic efficiency and have a negative impact on employment and, ultimately, on economic welfare (e.g., OECD, 2006; Brenke, 2004; Wey, 2004; Brodsky, 1994). On the other hand, improving security and opportunity for vulnerable workers in precarious work is equally important and acknowledged by the government of Ontario (Mitchell & Murray, 2017). Among many others, temporary workers, or part-time workers, are vulnerable and are employed in precarious work (e.g., a fulltime job but working in a minimum wage or low-aid job without a pension and other forms of non-wage benefits).

Based on recent calculations by Mitchell and Murray (2017):

- 2,097,000 or 31.9% of the 6,571,000 workers in Ontario have a before-tax employment income that is less than half of the median individual before-tax employment income, and have made no contribution to a private registered pension plan nor are self-employed with paid help.
- Of that 31.9% who are vulnerable, about half (51.2%) are in standard jobs, about equally divided between permanent full-time jobs (26.9%) and voluntary part-time jobs (24.2%). The other half (48.9%) of the 31.9% who are vulnerable are in non-standard jobs, with 18.2% in temporary jobs, 5.8% in involuntary part-time jobs, 23.9% in solo self-employment and slightly less than 1% in two or more jobs.
- Based on the minimum wage measure, 1,665,000 or 30.4% of the 5,481,000 workers in Ontario who are not self-employed or hold two or more jobs fall below 150% of the Ontario minimum wage and have made no contribution to a private pension plan. Of that, 30.4% who are vulnerable, about three quarters (75.8%) are in standard jobs mostly in permanent full-time jobs (48.7%) but also in voluntary part-time jobs (27.1%). The other one quarter (24.7%) of the 30.4% who are vulnerable are in non-standard jobs, with 18.9% in temporary jobs and 5.9% in involuntary part-time jobs.
- Of these workers, a majority of them are unskilled labour; workers with less than a high school diploma (61.4%); single parents with children under 25 (51.7%); recent immigrants (40.7%); women (39.1%); and visible minorities (34.4%).

The Act proposes a policy package to ensure part-time, part-year, contract, and temporary agency workers are paid the same rate as full-time workers. These changes will impose additional costs to firms in different ways, which are outlined below.

### 4.2.1 TEMPORARY AGENCY WORKERS

There are over 700,000 temporary (temp) agency workers in Ontario that are at risk of lower wages, working without security and benefits, and rarely have union representation (Fuller & Vosko, 2008; Vosko, 2010; Mitchell & Murray, 2017). Temporary employment is growing fast in Ontario (Arsdale & Mandarino, 2009; Longhurst, 2014), and in fact grew at an annual rate of 3.5% from 1997 to 2015 – faster than the other component of non-standard employment (Mitchell & Murray, 2017). Due to this growth of temporary

agency employment in Ontario, it is important to study implications of changes on both firms and employees. For example, Longhurst (2014) finds that agency workers were aware that a large portion of their wages were taken by the agency[39].

Temporary agencies help firms to accommodate fluctuating workloads and staff leave. Therefore, firms see the use of temporary agencies as a means of achieving labour flexibility (Segal & Sullivan, 1997; Smith, 2000; Houseman & Polivka, 2000; Houseman, 2001; Kallenberg, 2000; Kallenber, Reynold, & Marsden, 2003). The purpose of flexible scheduling, especially in service sectors, aims to respond to customers' demands quickly and, therefore, capacity is adjusted to meet the workload or customer demand (Jany-Catric & Lehndorff, 2005). At this point, temp agencies help firms to manage the risk of making permanent offers by screening potential employees to ensure suitable job matches (Autor D. , 2001). Therefore, the temp agencies help businesses gain a competitive edge through the utilization of '*just-in-time'* labour (Allan, 2002).

Temporary employment agencies are characterized by a 'tripartite relationship' or 'triangular employment relationship'. It involves the contracting out of individuals (workers) to third parties (client firms) by a service provider (the agency) (Houseman & Polivka, 2000; Cooke & Zeytinoglu, 2004; Vosko, 2010; Mitchell & Murray, 2017). Therefore, client firms pay fees to temporary agencies, and workers receive their wages from the agency. Agencies, however, charge a '*mark-up'* fee, which reflects the difference between the hourly wages of temporary workers and the billing rate charged by temporary agencies (Theodore & Peck, 2002).

Overall, to the extent that the Act applies to temporary workers, the equal pay provision regulation will not increase the cost of labour for client firms (not a labour market issues) but will change the cost structure of the service provider (a price issue for users of the service). The distribution of these costs depends largely on bargaining between third parties (client firm) and the service provider (the agency). The incremental labour costs from ensuring employment standards, including the guarantee of equal pay and benefits, and working conditions will tend to reduce mark-ups of temp agencies unless they pass these costs onto client firms, which is expected. Given that there are both explicit (wage) and implicit costs (e.g., non-wage costs in the form of hiring, firing, and searching etc.) of employment, these costs will be passed onto client firms to the extent that such services remain cost effective.

### 4.2.2 PART-TIME WORKERS

The demand for part-time workers within firms depends on the relative cost of providing labour that is determined by the following factors:

(1) The relative productivity of part-timers and full-timers;
(2) The relative wages of part-timers and full-timers; and
(3) The quasi-fixed labour costs[40] (Montgomery, 1988).

[39] Forde and Slater (2005) also state that "Only a minority of agency workers state a preference for agency work."
[40] Quasi-fixed costs include non-wage items such as costs of hiring new workers, costs of training new workers, social insurance programs (e.g., unemployment insurance, health and life insurance, vacation, etc.). These costs cause an employment with number/hour trade-offs, and the firm must determine its optimum mix of employment and hours per worker.

Managing the availability and cost of labour is a primary focus for labour-intensive sectors (e.g., food retailers). Given that they mostly operate on low profit margins within concentrated and competitive environments, they focus on cost minimisation approaches towards employment (Walsh, 1990; Broadbridge, 2002).

Under current regulations, employers do not have to provide workers with their schedule in advance, and there are no penalties for canceling a worker's shift. With the new proposed regulation, employers will pay for three hours of work if:

(i) They cancel a worker's shift with less than 48 hours' notice;

(ii) An employee is 'on call' but not called in for work; or

(iii) If an employee working regularly for more than three hours per day is given less than three hours of work upon reporting to work.

Hence, proposed changes in scheduling force employers to post employees' schedules in advance and compensate workers for last-minute schedule changes.

To put it simply, the policy is a regulatory protection that will improve wages, job security, and employee control over wages, hours, and working conditions (Campbell & Price, 2016). These changes will improve the income of workers and could increase their financial stability. However, some firms are more likely to bear the costs of such changes in scheduling in the short-run, and, in the medium- and long-runs. Firms might substitute shift-based part-time labour for regularly scheduled full-time labour or rearrange the use of labour more efficiently to minimize operating costs.

Relying on the assumption that wages reflect productivity, part-time workers would be expected to be less productive than full-time workers in the hours they work[41] (Ermisch & Wright, 1993; Baffoe-Bonnie, 2004; Aaronson & French, 2004; Hirsch B. , 2005). The structure of sectors with the dominance of part-time working relies on the incompatibility of fixed contracted working times and the need of firms to be flexible to meet fluctuating demand patterns over the day (Delsen, 2006).

Different from temp agency workers, wages of part-time workers employed by the firms are directly paid by the firms. In other words, there is no involvement of an intermediary (e.g., temp agency firm). This makes it a labour market issue.

[41] Some of their lower wages may also affect the fact that quasi-fixed costs are amortized over fewer hours so equating hourly cost would require lower wages.

### 4.2.3 THE EQUAL PAY IMPACTS

Current disparities between part-time/temporary workers and full-time/permanent workers can range up to 35% of wages (refer to Section 0). Temporary workers are unlikely to face the risk of losing their jobs. The reasons for this include:

(i) Wage compensation of temporary workers is settled between the temp work agency and the client firm; and

(ii) Firms mostly care about costs of permanent workers and the adjustment of permanent workers to minimize their costs. In other words, temporary workers suffer less adverse unemployment effects from a minimum wage increase and an overall wage increase than full-time permanent workers. However, we cannot predict the effects of the regulatory and employment standard change on temp agencies in the long run.

Campolieti, Gunderson and Lee (2014)[42] confirms that temporary workers that are not a part of temp agencies are not a labour cost concern for the firms, and their estimates show that minimum wage increases will not reduce their employment, unlike the situation with the permanent employment. However, impacts of minimum wage hikes decoupled with the 'equal pay for equal work' will alter the cost of the hiring temporary workers from temp agencies and, in this analysis, this wage increase is assumed to be transferred to client firms in the short-run. It further assumes that temp agencies will keep supplying labour to client firms while they remain cost effective to hire temp agency workers as temp agencies are perceived as gateways to solve their labour demand problem over the short-run, at least for the next 2 years.

Therefore, the minimum wage increase might induce employers to shift from part-time to full-time employees, or reduce the working hours of part-time workers, as stated in Shannon and Beach (1995).

#### EQUAL PAY ASSUMPTIONS

A direct comparison of average wages for full-time and part-time employees from the LFS would likely overstate the impact of equal pay policies due to difficulty accounting for legitimate differences, such as seniority or employee performance. However, it is reasonable to assume that in highly unionized environments with specific job descriptions, any discrepancy between part-time and full-time wages would be due to legitimate differences in jobs. Therefore, the ratio of part-time to full-time wages in the public sector is adopted as the legitimate difference between full and part-time employees, after adjusting for age of employees.

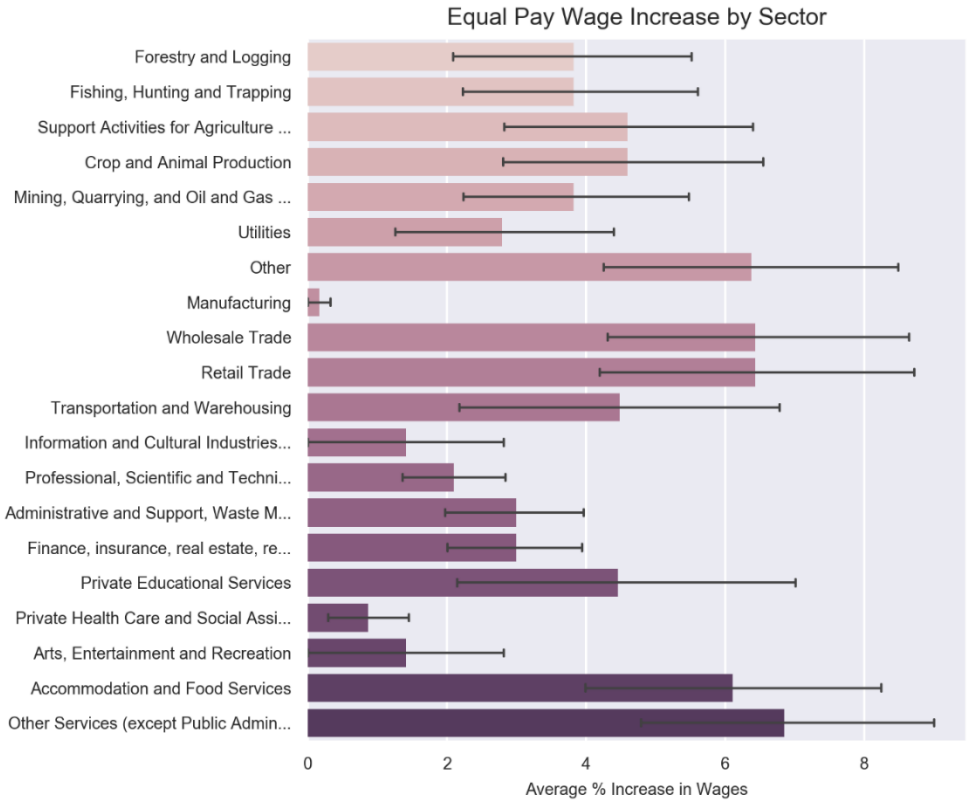
[42] Recent labour regulations might alter these results. It is important for the analysis, because over the past decade, from 2004 to 2014, there has been a 33% increase in the number of temporary workers in Toronto (equivalent to a total increase from 256,000 to 340,000), and they are mainly employed in industries such as food manufacturing, transportation and health care.

**Figure 33** Comparison of the distribution of full- and part-time wages in the public and private sector


Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

The result, shown in Figure 34, is anywhere from almost no increase (in the manufacturing sector), to up to 10% in other sector. The average across all sectors is 4.3%. The bars show the range in each sector due to differences in wages by age.

**Figure 34** Range of increases in wage due to equal pay provisions by sector




Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

## 4.3 UNIONIZATION

The effects of union bargaining power and density on economic growth are typically addressed through the impact of unions on investments, productivity, and employment growth (Hirsch B. , 1997). The size of union wage premiums and unions' ability to increase wages depends on the bargaining power of firms (i.e., it is higher in firms with a greater bargaining power) and the level of competition in the product market (i.e., increased competition in the product market reduces the ability of unions to raise wages), respectively (Nickell & Layard, 1999; Stephan & Gerlach, 2005).

The Act is expected to ease union membership rules for non-union members and expand the membership within the sectors. Therefore, this will increase the rate of unionization in sectors by making it difficult to avoid unionization and intensifying the union membership. We refer specifically to[43]:

> "The proposed changes will allow employees to unionize by just signing membership cards instead of holding a secret-ballot vote (i.e., no voting in favour or against unionisation).
>
> > i) Extension of mechanism to those who work through temporary agencies, home care, building sector"
>
> "With the changes, unions can also promise the employees the likelihood of significant wage and benefit increases in a way that they cannot now."

The Act will also increase the power of unions, and therefore the cost of production (depending on the share of labour used in the production) by limiting firms' operating flexibility. We refer specifically to the 20% rule, Sectoral Standards Agreements and remedial certification.

### 4.3.1 PROS (BENEFITS)

Virtually all empirical studies associate unionization with higher and more rigid wages rather than being competitive for its members (Freeman & Medoff, 1984; Card, 1992; Bruno, Manzo, & Parks, 2015; Breda, 2015).

The empirical studies investigating the long-running trends in unionization and income inequality show that:

- Unions are also an integral part of equalizing the wage distribution by instituting norms for fair pay (Neumark & Wachter, 1995; Farber H. , 2005; Autor D. , 2008; Western & Rosenfeld, 2011; Jaumotte & Osorio, 2015).
- Non-union wages are higher in highly unionized industries (and firms) and localities because unions send a signal to non-union workers on the "fair wage" they should receive, in turn, boosting the economy by benefitting non-unionised lower- and middle-wage workers, most of whom spend

[43] Section 15.3 of the Act.

their income on consumption. However, the effects on firms and their investment decisions could mitigate this effect.

- Unions can be an effective institution at increasing worker productivity, but this effect appears to be limited to American unions (Doucouliagos & Laroche, 2003).

- Unions tend to lower labour turnover, which is attributed mainly to higher wages and benefits (Renaud, 2002; Bryson, 2003; Addison & Belfield, 2004). Therefore, firms also gain from reduced labour turnover in the form of labour cost savings.

### 4.3.2 CONS (COSTS)

There might be longer-term detrimental effects to the economy as a whole depending on unions' impacts on the labour market and firms' decisions in response to unions or higher union wages.

The empirical studies investigating the negative impact of unions show:

- Firms' profits can be expected to be negative in the absence of an improvement in labour productivity, expressed as increase in marginal product of labour, to offset rising labour costs (Fuchs, Krueger, & Poterba, 1998; Hirsch B. , 2004; Doucouliagos & Laroche, 2003; Doucouliagos & Laroche, 2009). Productivity improvements from unionization do not typically offset compensation and, therefore, firms lose on their profits (Doucouliagos & Laroche, 2009).

- In the long-run, labour unions may also promote practices that reduce productivity growth through adverse impacts on capital formation and resource mobility (Clark, 1984; Hirsch B. , 1991a).

- Unions can affect a firm's ability to adjust labour and capital when input prices change (e.g., wages decoupled from bargaining power and restrictive practices on firms' decisions) hence affecting cash flow and the sensitivity of investments (Chen & Chen, 2013) as well as the cost of equity capital (Chen, Kacperczyk, & Ortiz-Molina, 2011). This potentially increases a firm's equity costs by decreasing a firm's operating flexibility (Rosett, 2001).[44]

- If a union has any effect, it generates a wage premium but it also has an adverse effect on employment by creating unemployment (Pantuosco, Parker, & Stone, 2001; Vedder & Gallaway, 2002). The empirical literature has depicted labour market rigidity in the form of strong labour and employment protection legislation, and union action leads to a low equilibrium rate of employment (Arpaia & Mourre, 2005) and hours worked per year (Alesina & La Ferrara, 2005).

However, there are empirical studies that find the role of employment protection legislation and union density in employment to be insignificant (Elmeskov, Martin, & Scarpetta, 1998; Pantuosco, Parker, & Stone, 2001; Mourre, 2004), or the effects die away when union density subsequently stabilizes at a new, higher rate (Nickell, Nunziata, & Ochel, 2005). Some studies have found a profound union effect on total

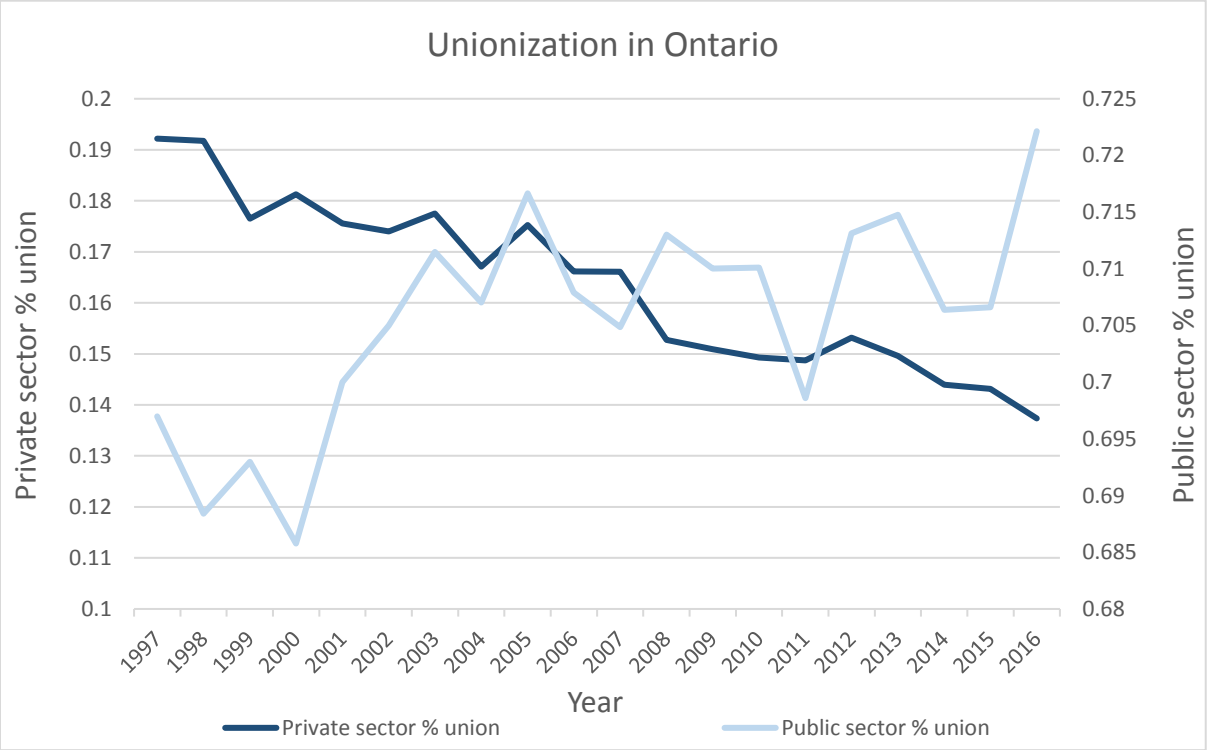
[44] For example, a one-standard-deviation increase in the unionization rate is associated with an increase in the implied cost of equity of about 1.23 percentage points per year (Chen, Kacperczyk, & Ortiz-Molina, 2011).

employment and economic growth. For example, a 1% increase in unionization leads to 0.07% (therefore, 0.7% at 10% increase) higher unemployment, and an 1% incremental increase in the union labour force lowers the real income growth per capita by over 1.24 percentage points (Vedder & Gallaway, 2002).

### 4.3.3 UNION EXPERIENCE IN CANADA

Based on Labour Force Surveys in Canada, unionization in the private sector has decreased by 4.7% from 18.4% in 1999 to 13.7% in 2016. Interestingly, union density has generally declined sharply among goods-producing industries (except for the construction sector) and service-producing industries, including transportation and education services. In contrast, unionization has increased very little among services-producing industries, except for those just listed. Overall, excluding public administration, Ontario is experiencing a sharp de-unionization trend in almost all sectors. Due to a shift in employment from industries and occupations with high unionization rates to low unionization rates, there have also been structural changes within industries and occupations.

**Figure 35** Unionization in Ontario, 1997-2016 *(Source: Statistics Canada. CANCEA calculations)*




Despite declining union power in the private sector, unions continue to exercise power over firms and generate a wage premium in Canada (Bartkiw, 2015). Union wage premiums have been falling in Canada from around 15% to around 8%, largely because of pressure from global competition. Labour unions in Canada also support a minimum wage increase and "strict" labour market regulations on the grounds of egalitarian beliefs and self-centered union interests, such as:

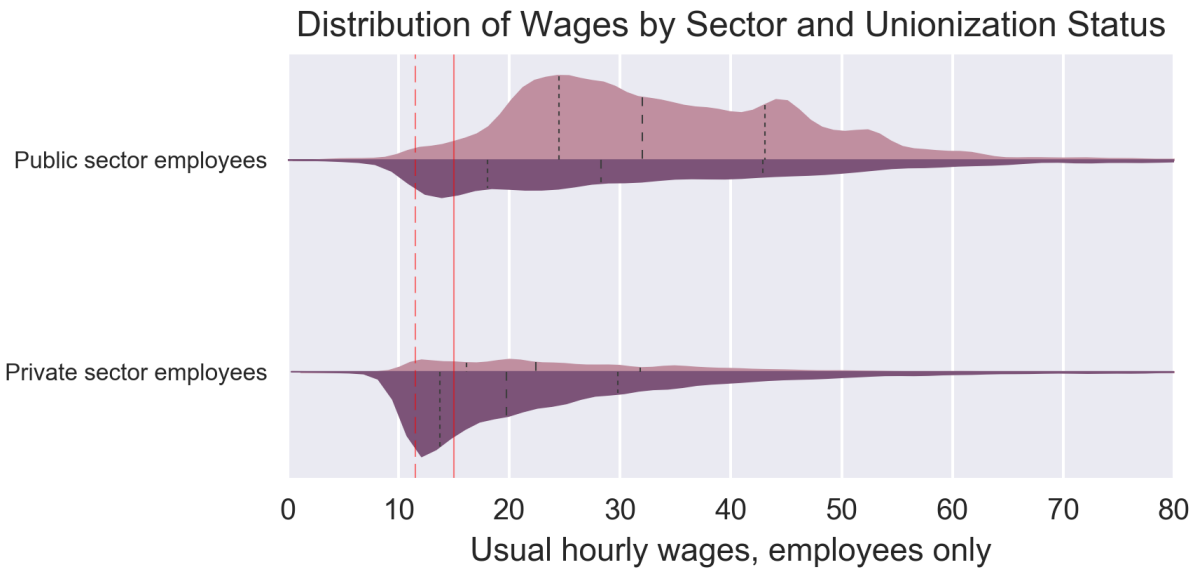
(i) A minimum wage increase helps low-paid workers; and

(ii) A minimum wage increase reduces competition against unionized workers who are significantly paid above a minimum wage.

### UNIONIZATION MODEL ASSUMPTIONS

The unionization scenario considered a one-time 2% increase in the number of employees in unionized environments in Ontario. As shown in Figure 36, the current distribution of unionized versus non-unionized employees is heavily biased towards the public sector.

**Figure 36** Distribution of wages for unionized (blue) and non-unionized (green) employees in Ontario




Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

Effectively, in the analysis, 2% of the non-unionized employee are shifted from non-unionized wage distribution (green) to the unionized wage distribution (blue), while matching age and employment status.

## 4.4 SCHEDULING, VACATION AND PERSONAL EMERGENCY LEAVE

### 4.4.1 SCHEDULING

Erratic scheduling is most common in volatile sectors such as retail, where jobs tend to be low-wage and non-unionized. In Canada, *"we don't know the extent of what's happening with on-call because there are no official numbers on it specifically"* (Lu, 2015). Currently, Ontario employers don't have to provide workers with their schedule in advance, and there are no penalties for cancelling a worker's shift. In addition there is no obligation to guarantee part-time workers a certain number of hours (this remains unchanged if the Act passes).

The Act proposes changes in scheduling where employees must be paid for three hours of work under certain conditions. The potential benefits of the changes include:

- Ontario workers will face less uncertainty in their lives and will be able to better plan their schedule around family obligations (O'Kane, 2017); and
- Workers employed in firms with uncertain demand will not be impacted as much by fluctuations in demand as they receive some insurance against unfavorable outcomes (i.e., when demand is unpredictably low).

However, issues do emerge for Ontario businesses that depend on flexible labour supply, such as:

- The proposed changes imply an increase in the operational risk that some firms are facing. Small firms that face highly uncertain demand (e.g., pest control and wildlife removal agencies, restaurants) will be more negatively impacted compared to large firms.
- The proposed changes will apply to non-minimum wage workers as well as the minimum wage sector. Some industries (e.g., Services sector (Campolieti, Gunderson, & Lee, 2012)) are more likely to see their costs rise as a result of *both* minimum wage and scheduling changes.
- Another outcome from the proposed scheduling change, specifically #3, revolves around how a firm allocates hours as opposed to bodies (i.e., workers). Firms may have an incentive to assign less than three hours daily over a larger pool of workers. In addition to keeping wages low, hiring a large pool of part-time employees who work limited hours minimizes employers' obligation to pay benefits such as medical and dental.
- The "three hour rule" forces bosses to give their employees three hours of pay if they arrive at work only to have their shifts abruptly shortened or cancelled. The rule does not apply to workers who are regularly scheduled to work less than three hours, which labour activists say is increasingly common (Mojtehedzadeh, 2015).
- Proposed change #2: On the other hand, if the firm may put less workers on-call and assign them more hours when they are called in, to avoid having to pay the fixed cost of not calling in workers.
- Proposed change #1: In order to avoid paying the cost of cancelled shifts, firms may substitute away from shift-based part-time labour for regularly scheduled full-time labour.
- These possible reactions from the firm would have an impact on the *composition* of demand. In turn, some workers will benefit more and some will be hurt by the changes (e.g., if there is a cut down on part-time positions, but the worker can only work part-time due to family obligations).
- The same is true for the firms: small firms who are more likely to be risk averse would be hurt more than large firms who can mitigate most of the cost away. Large businesses (e.g., Costco, Gap) may diversify these costs away more easily or faster than small businesses (e.g., Small retail).

- "It's a pure efficiency argument from the retailers' viewpoint," explains Joseph Milner, a professor at Rotman School of Management. "The more flexible you can get your resources — your human resources, in this case — the more you would expect to get efficiencies."

The purpose of flexible scheduling, especially in service sectors, aims to respond to customers' demands quickly and, therefore, capacity is adjusted to meet the workload or customer demand (Jany-Catric & Lehndorff, 2005). Under current regulations, employers do not have to provide workers with their schedule in advance, and there are no penalties for canceling a worker's shift. With the new proposed regulation, employers will pay for three hours of work if (i) they cancel a worker's shift with less than 48 hours' notice, (ii) an employee is 'on call' but not called in for work, and (iii) if an employee working regularly for more than three hours per day is given less than three hours of work upon reporting to work.

Hence, proposed changes in scheduling force employers to post employees' schedules in advance and compensate workers for last-minute schedule changes. To put it simply, the policy is a regulatory protection that will improve wages, job security, and employee control over wages, hours, and working conditions (Campbell & Price, 2016). These changes will improve the income of workers and increase the time they spend with their families. However, some firms are more likely to bear the costs of such changes in scheduling in the short-run, and, in the medium- and long-runs, firms might substitute shift-based part-time labour for regularly scheduled full-time labour or rearrange the use of labour more efficiently to minimize operating costs.

It is important not only to consider the distribution of the policy effects across a largely heterogeneous population of consumers and producers, but also the effects of changes in scheduling *in combination* with the other proposed policies (e.g., more unionization, Equal Pay and Vacation Provisions etc.). As with changes in minimum wage, the firms will find a way to mitigate the increase in expected costs, which could adversely hurt some employees (e.g., tip-based sector, service sector where workers are paid a per hour plus a sales commission).

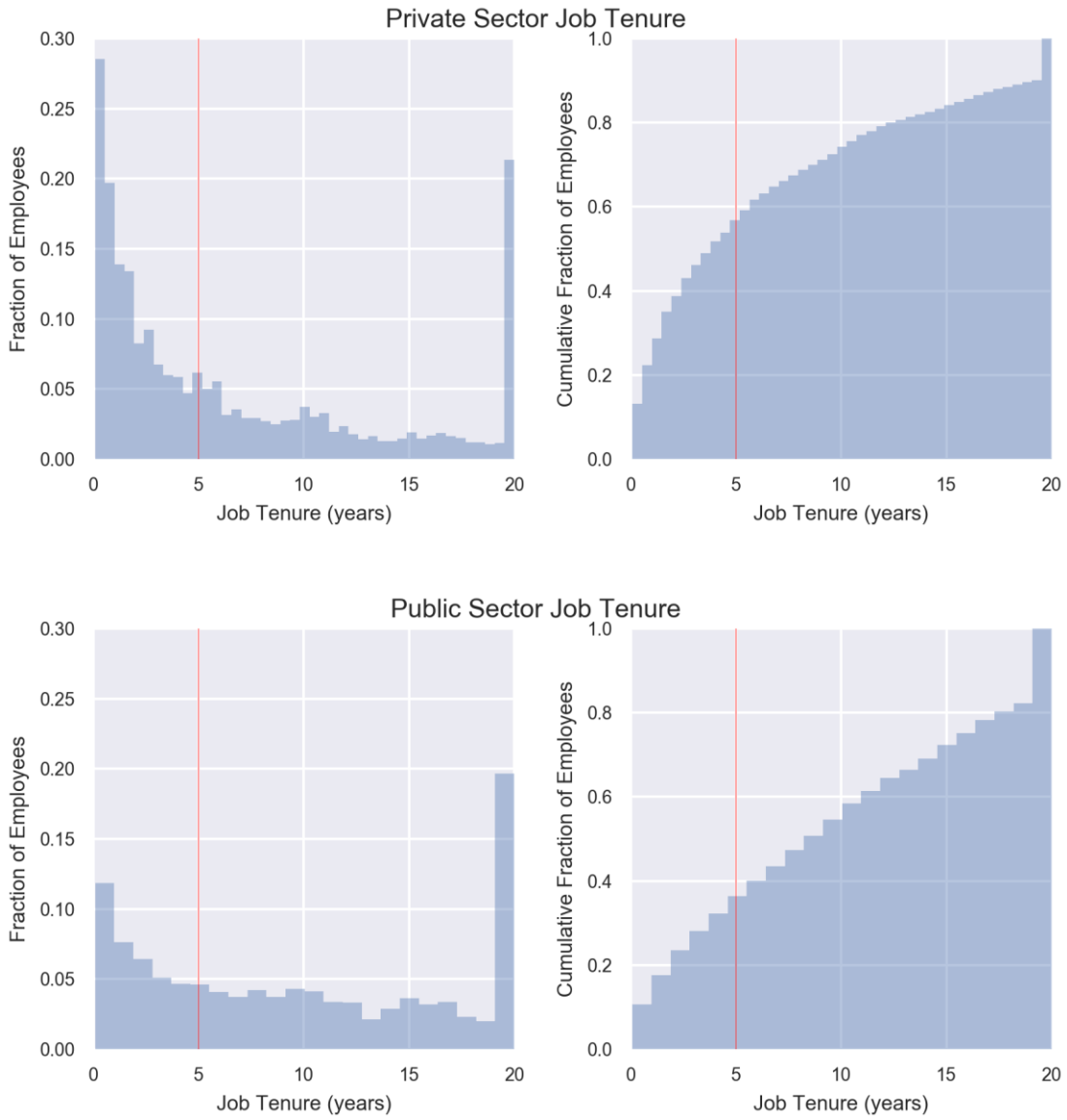
### 4.4.2 VACATION AND PERSONAL EMERGENCY LEAVE DAYS

Under current law, provincial labour legislation requires a minimum of 2 weeks of paid vacation per year, but this is due to increase to 3 weeks of paid vacation per year. Green (2007) found that longer paid vacation leave may be reflected in a reduction in the firm's production and competition levels through its impact on hours of work (Green, 1997). Existing studies have shown that vacation leave improved the well-being of employees and boosted employee productivity (Chikani, Reding, Gunderson, & McCarty, 2005; Huffman, 2006; De Bloom, Geurts, & Kompier, 2013). Conversely, in terms of measuring its impacts on firms, the relationship between working hours and paid vacation has been examined. For instance, Altonji and Oldham (2003) found an annual reduction of approximately 26.8 hours worked for each additional week of paid vacation in the US, and a reduction of only 29 hours worked for each additional week in Canada (Fakih, 2009). This is equivalent to almost one week of full-time work in Canada. Scaling the reduction in hours worked on all workers, the total loss in income is not negligible.

## VACATION AND PEL MODEL ASSUMPTIONS

As shown in Figure 37, about 40% of private sector employees have job tenures greater than five years and would be eligible for the three weeks of vacation. However, a significant number already have greater than the current minimum of 2 weeks. Therefore, it is conservatively assumed that 25% of those with more than 5 years at their current employer would receive an additional week of vacation. From the point of view of an employer, this effectively increase the wage of employees per productive hour, and reduces the number of productive hours worked. Due to the reduced number of productive hours worked, to maintain the same level of output, employees must recoup the lost production through additional employees (resulting in increased costs) or increasing employee productivity.

**Figure 37** Distribution of job tenure of private sector employees



# 5. GENERAL APPROACH: ECONOMIC RISK ANALYSIS OF THE ACT

Our economic risk analysis is evaluated in two steps:

1. Estimating the direct costs that must be addressed by Ontario businesses; and
2. Evaluating the economic outcomes of various business responses to such cost including how much of the direct cost might be recouped through processes of reengineering their factors of production, passing costs onto their customers, or both.

## 5.1 DIRECT BUSINESS COST CONSEQUENCES

The Act will have direct business cost consequences for Ontario businesses. For the purposes of this report, the direct business costs will come from:

- Minimum wage increases: Will change what employers will have to pay employees;
- Wage spillover and compression effects: An important aspect of minimum wage changes is the *spillover* and *compression effects* due to employees currently earning wages at or above the new minimum wage would expect an increase. Such an effect will change what employers will have to pay employees (Campolieti, 2015);
- Equal pay: Will change what employers will have to pay part-time, contract and casual workers;
- Vacation and Personal Emergency Leave: Some employers that do not already have such rules will have to pay employees for days not worked;
- Scheduling and an increase in employee rights: Labour overheads are expected to increase for employers for hours not worked and for the cost of extra negotiations with employees in response to the new rules; and
- Unionization: It is expected that unions will take advantage of the new rules and attempt to increase unionization rates.

## 5.2 ECONOMIC OUTCOMES OF THE DIRECT BUSINESS COST CONSEQUENCES

The Act, and a bulk of the direct business costs associated with it, can be viewed as an attempted redistribution of income from Ontario businesses to their employees. This essentially establishes a competition between Ontario businesses, Ontario employees and consumers of Ontario goods and services. The motivations of each are different:

- Ontario businesses (employers) are motivated to earn and maximize an after-tax profit over time for the risk they take;

- Ontario employees are motivated to earn and maximize an after-tax labour income given their skills, job preference, job security preference and standard of living expectations; and
- Consumers of Ontario goods and services are motivated to achieve the lowest price for a given quality and quantity of goods and services.

Broadly speaking, if firms experience increased costs, they could respond through market forces to the changes by:

- Reducing profit margins (the extreme being closing the business);
- Reducing labour force (by looking for productivity gains, capital and or labour substitution of labour);
- Passing the costs onto customers (increasing prices); or
- Any combination of the above.

These combinations of responses brings significant uncertainty as to how the impacts on businesses will resolve significant extra costs given the differences in market power of employers, employees and consumers in different sectors across different firm sizes across different rural and urban areas within the context of being embedded in a large North American market with global competition.

The outcomes are significantly circumstantial and there is no surprise that the economic literature has competing views as to the impact of increased business costs imposed by policies like minimum wage increases. Further, for any expert or economist to claim that they know what will happen would be irresponsible. Instead, we had chosen to examine the potential outcomes for the economy of Ontario by considering all combinations of responses. This is the approach of risk measurement and assessment and determining whether the rewards outweigh the risks. The approach is the topic of the next section.

## 5.3 Economic Risk Assessment

Given the significant uncertainty as to how the impacts on businesses will unfold, we adopt a risk measurement and assessment approach to understand what outcomes relate to what realized Ontario business responses. This is achieved by running our agent based model (prosperity at Risk®, refer to Appendix E for details) for every conceivable combination of responses and illustrating the results using ternary diagrams[45], as illustrated in Figure 38.

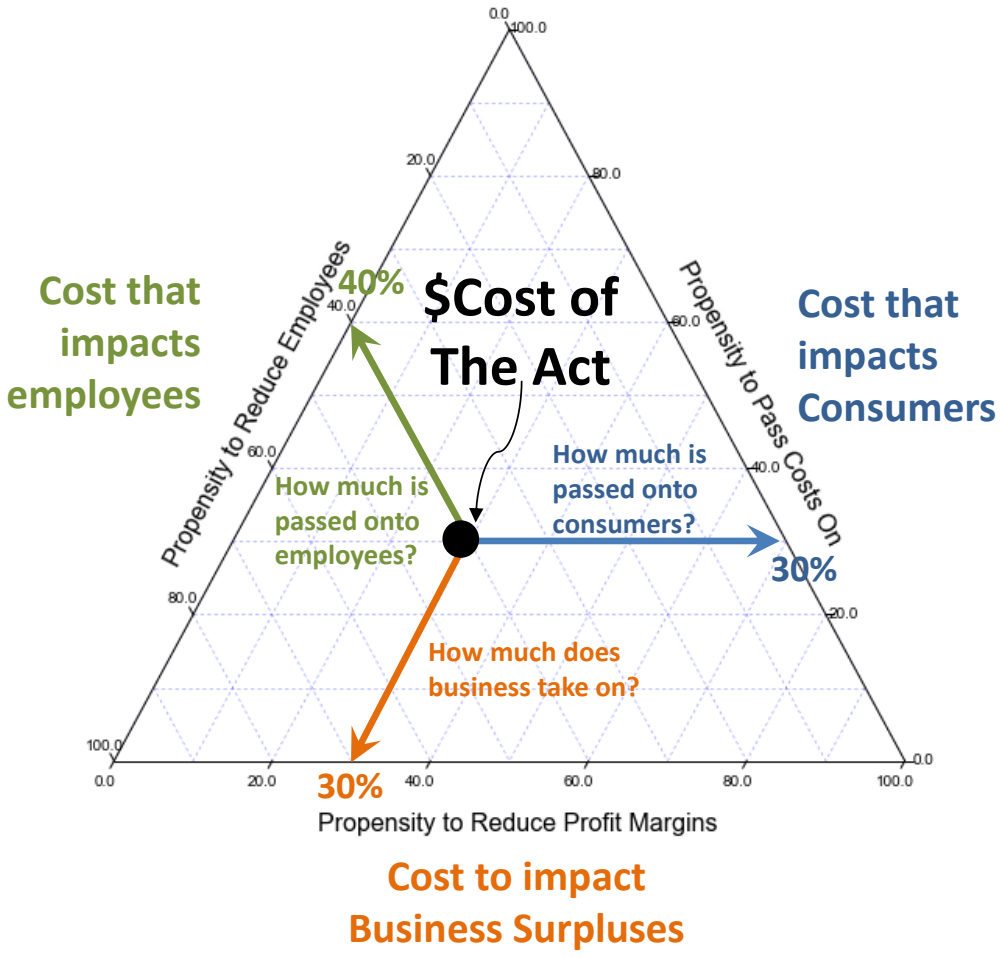
[45] Ternary diagrams are used in the physical sciences and economic evaluations of exploration to show the proportion of three variables that sum to a constant using barycentric coordinates (West, 2013). That is, for any point K inside ΔABC, there exist three masses wA, wB, and wC such that, if placed at the corresponding vertices of the triangle, their center of gravity (barycenter) coincides with the point K (Mobius, 1827).

The total additional costs seen by a firm can be accounted for by splitting the costs between three responses:

(1) Propensity to pass costs on to customers;
(2) Propensity to reduce employees; or
(3) Propensity to reduce profit margins.

These three response types establish the edges of a ternary diagram as follows:

**Figure 38** Ternary diagram




Each point in the above ternary diagram represents a definite cost allocation to either businesses, consumers and/or employees (through cost cutting or trading people for technology). The example shows that from the point, we read in the direction of the orange arrow the percent of cost absorbed by businesses; in the direction of the blue arrow the percent of cost passed on to consumers; in the direction of the green arrow the percent of cost passed onto employees. What we find in the next example is that when the ternary diagram is shaded with the results for, say, employment changes, we are able to associate the cost sharing of the Act with an economic outcome of the model.

In Figure 39, for each combination of cost sharing, the economic impacts can be estimated and plotted by colour on a ternary diagram, as shown. In the example, the ternary diagram is labeled with A, B, C, D and E points that correspond to:

A. Corresponds to a situation where 240,000 jobs are lost as: (1) businesses are successful in avoiding 60% of the costs in their expected costs of labour; (2) Businesses are successful in passing on 20% of the costs to its customers; and (3) 20% of the cost is forfeited in their operating surpluses (profit margin);

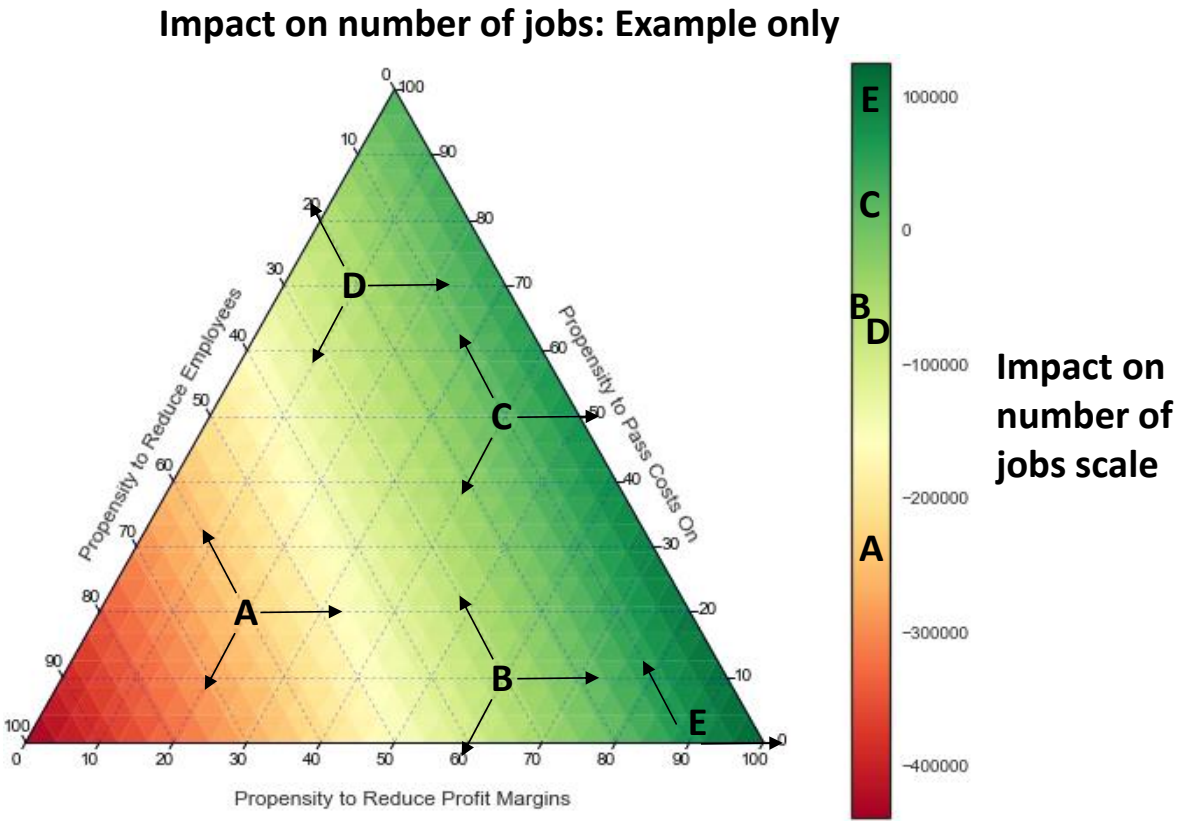
B. Corresponds to a situation where 60,000 jobs are lost as: (1) businesses are successful in avoiding 30% of the costs in their expected costs of labour; (2) Businesses are successful in passing on 10% of the costs to its customers; and (3) 60% of the cost is forfeited in their operating surpluses;

C. Corresponds to a situation where 20,000 jobs are created as: (1) businesses are only successful in avoiding 10% of the costs in their expected costs of labour; (2) Businesses are successful in passing on 50% of the costs to its customers; and (3) 40% of the cost is forfeited in their operating surpluses;

D. Corresponds to a situation where 85,000 jobs are lost as: (1) businesses are successful in avoiding 20% of the costs in their expected costs of labour; (2) Businesses are successful in passing on 70% of the costs to its customers; and (3) 10% of the cost is forfeited in their operating surpluses; and

E. Corresponds to a situation where 100,000 jobs are created as: (1) businesses are successful in avoiding 10% of the costs in their expected costs of labour; (2) Businesses are not successful in passing on any of the costs to its customers; and (3) 90% of the cost is forfeited in their operating surpluses.

**Figure 39** Ternary diagram, impact on jobs example




As can be seen from the example, the job outcomes vary significantly depending upon one's opinion of how successful businesses are able to avoid costs by either passing them onto consumers or by avoiding the costs of the unit of labour cost increase[46]. Given that no one really knows what will result from the different competitive forces at work, the results at each different point are referred to either as what is *at risk* or *at reward*.

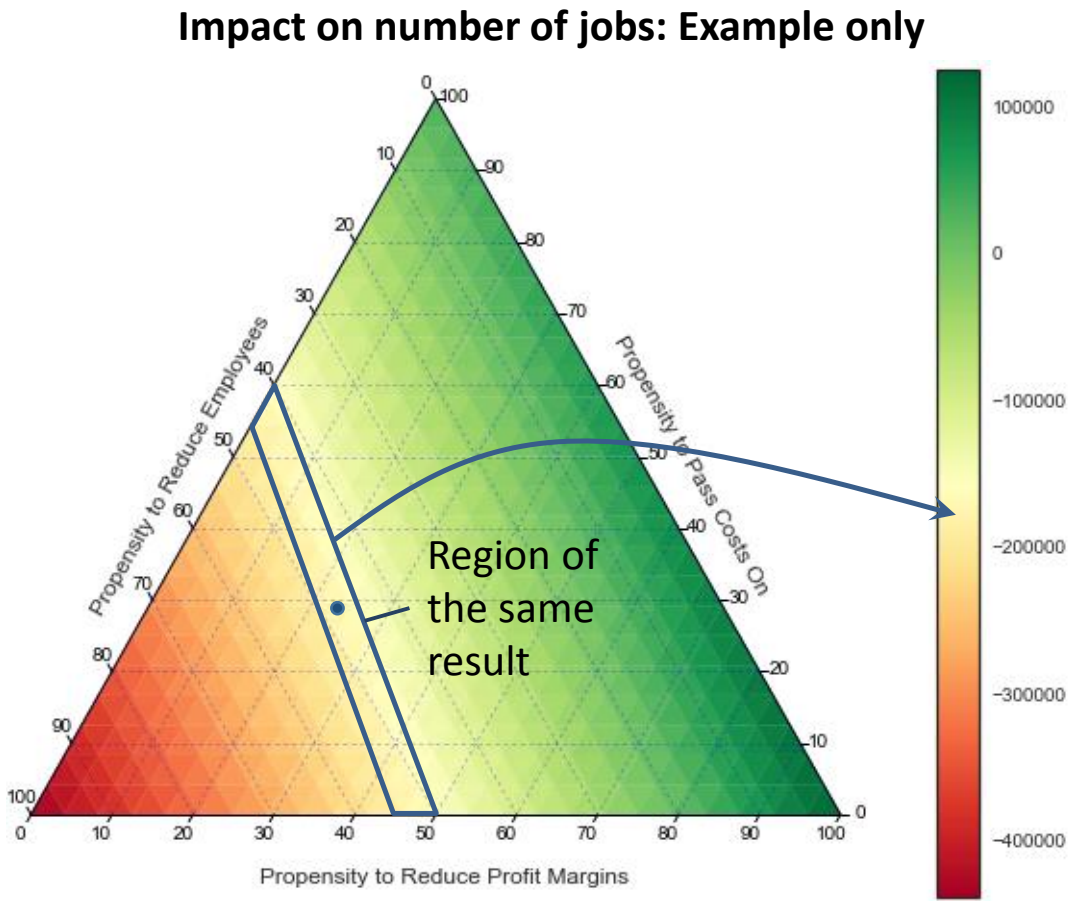
Notice also that different points on the ternary diagram can result in the same outcome. For example, the region in the Figure 40 represents the same outcome of about 190,000 jobs lost under various different combinations of successful business responses. In this example, 190,000 jobs are expected to be lost if:

- Businesses are successful in avoiding 50% of the costs in their expected costs of labour; Businesses are not successful in passing on any of the costs to its customers; and 50% of the cost is forfeited in their operating surpluses; or
- Businesses are successful in avoiding 50% of the costs in their expected costs of labour; Businesses are successful in passing on 30% of the costs to its customers; and 20% of the cost is forfeited in their operating surpluses; or

[46] By repackaging, reengineering, substituting or increasing the productivity of current and expected employees.

- Businesses are successful in avoiding 40% of the costs in their expected costs of labour; Businesses are successful in passing on 60% of the costs to its customers; and none of the cost is forfeited in their operating surpluses.

**Figure 40** Ternary diagram, impact on jobs example, same outcomes




The barycentre of the expected outcome region (blue dot) marks the point at the centre of that region being an average point, weighted according to the size of the outcomes. This provides a reference point from all other results can be understood.

## 5.4 THE MODEL: PROSPERITY AT RISK®

### 5.4.1 AGENT-BASED UNDERPINNINGS OF PROSPERITY AT RISK

A part of the business case for using agent-based models lies in their ability to handle heterogeneity, being are the differences that exist between households and their unique local situations. Modern times have brought an appreciation of the differences between households, firms and governments, and the way they are connected, particularly in the face of inequality and technological diversity.

Dynamic Stochastic General Equilibrium (DSGE) models have played such an important role in modern discussions of macroeconomics and are considered to be the conventional approach to modelling policy proposals. There is an emergence of literature that such an approach is inadequate when dealing with policy evaluations (Stiglitz, Where modern marcroeconomics went wrong, 2017):

> "macro-econometrics becomes little more than an exercise in curve fitting, with an arbitrarily chosen set of moments generated by the model contrasted with reality. Standard statistical standards are shunted aside." (page 3)

Korinek (2017) expands on the critique of which Stiglitz, a Nobel Prize winner in economics, describes as a "devastating critique".

Instead, we use an agent based model developed over a decade. Such approached has been in use for decades with a growth focus on such approached in economics since 2005 and is arguably as profound as what the Lucas critique did for microeconomics in the 1970's. Specifically, such an approach has been used in labour market economics as evidenced by Appendix D that has thirty three citations.

The agent based risk assessment approach in this study is in the spirit of Shackle combined with risk is

Appendix E contains the following details:

- Appendix E.1: Overview and justification for using an agent-based model (page 149);
- Appendix E.2 and E.3: Types of agents used in the model and agent behaviour: Industry behaviour (page 150); Household behaviour (page 153); Federal and provincial tax revenue (page 155);
- Appendix E.4: Summary of model variables (page 155); and
- Appendix E.5: Prosperity at Risk model validation (page 157).

Appendix F contains the data set characteristics used in this report (page 161).

# 6. RESULTS

All outcomes are measured relative to what is expected to happen if the current policy were to continue, which includes expected employment and population growth over the next several years. Therefore, quantities such as jobs at risk[47] include those jobs which have yet to be created and does not necessarily correspond to a decrease in existing jobs. For example, since 2010 Ontario has averaged a net creation of about 81,000 jobs per year, if a scenario were to indicate that no new jobs were to be created over the next two years, then 162,000 jobs would be at risk despite no direct loss of employment. In other words, the analysis may indicate that there are a significant number of jobs at risk while still having a net increase in employment.

## 6.1 SIZE OF THE CHALLENGE

Relative to the baseline of minimum wage increasing at the rate of inflation, the analysis estimates a $23B challenge for Ontario businesses over two years. As shown in Table 6, the majority of the impact arises from the minimum wage and equal pay provisions in the Act.

Table 6 Components of the challenge facing businesses

| $Billions | Minimum wage increase | Equal Pay Provisions | Vacation & PEL | Labour overhead | Unionization | Combination of all |
|---|---|---|---|---|---|---|
| 2018 | $5.3 | $2.6 | $0.8 | $0.2 | $1.1 | $10.2 |
| | 53% | 26% | 8% | 2% | 11% | 100% |
| 2019 | $7.7 | $2.6 | $0.8 | $0.2 | $1.1 | $12.7 |
| | 62% | 21% | 6% | 2% | 9% | 100% |
| Total | **$13.0** | **$5.2** | **$1.6** | **$0.4** | **$2.2** | **$22.9** |
| | 58% | 23% | 7% | 2% | 10% | 100% |

The scale of the impact of the minimum wage increase is in line with other literature regarding who would be affected. For example, Macdonald (2017) estimates that 23% of employed Ontarians, or about 1.6 million people, would receive an increase. If, on average, a person receiving an increase worked 1500 hours per year[48], and receives an average hourly increase of $2, this amounts to a $4.8B annual increase in wages that must be paid by 2019. The values from the analysis are slightly higher as they use the full distribution and characteristics of employees and include estimates of wage spillover and compression effects described in Section 4.1.3. For example, a person with several years of experience and earning $15/hr would likely require an increase to maintain a difference from a new employee with no experience who would start at $15/hr, though the percentage increase would likely be less than the minimum wage increase.

[47] The term "jobs at risk" is not new, particularly when describing the impact of employer decisions to review their labour decisions in the face of cost constraints and the use technology to replace workers (Citi GPS, 2016).
[48] Equivalent to 30 hours per week for 50 weeks since those receiving wage increases tend to be part-time employees.

Comparators for the other aspects of the Act were not available, which is surprising given the significance of the scope of changes in the Act. Therefore, as described in the methodology, conservative assumptions were adopted to facilitate simulations about the overall impact of the Act.

Firms have three primary methods to respond to the $23B increase in costs associated with the Act:

1. Absorb the cost through reducing their gross operating surplus;
2. Pass the costs onto consumers; or
3. Restructure their labour force to reduce labour costs (increase productivity or limit future labour cost growth, or both).

It is important to note that only the portion of the total redistribution absorbed by firms through reduced operating margins has a stimulative effect. If firms adjust to the policy changes only through restructuring their labour to maintain their current total payroll, there is no net increase in total household income to drive increased consumption and employment growth. Similarly, if firms adjust by only increasing prices, while *nominal* household wages would increase, the aggregate cost of goods would also increase reducing any *real* wage benefits. It is only if firms reduce their gross operating surplus and minimize price increases that there would be an increase in real wages that leads to a stimulation of the economy.

To put the $23B challenge into perspective, the amount represents over a 2 year period:

- 21% of Ontario non-residential private capital investment plans; or
- 100% of all the corporate income tax revenues expected to be paid to the Ontario government by Ontario businesses.

Given the size of the challenge relative to the scale of the industry in Ontario, it is unlikely that firms will be able to absorb the full cost of the wage increases. Therefore, it is expected that firms will have to pass on some of costs to consumers through increased prices and to employees through reduced job growth. *However, it is fundamentally unknown how firms will respond*. Therefore, in the face of uncertainty, a risk assessment approach to evaluating how companies might respond is required.

## 6.2 Risk management approach to analysis

The behavioural response of people and firms is uncertain and every situation is unique with different economic and social environments. From this point of view, it is no surprise that the economic literature has competing views as to the impact of increased business costs imposed by policies like minimum wage increases. Further, for any expert or economist to claim that they know what will happen would be irresponsible. Instead, economists ought to examine the potential outcomes for the economy of Ontario by considering all possible combinations of responses. This is the approach of risk measurement and assessment which is not geared towards predicting the outcome but determining whether the potential rewards outweigh the risks.

These combinations of responses bring significant uncertainty as to how the impacts on businesses will resolve the $23B in extra costs given the differences in market power of employers, employees and

consumers in different sectors across different firm sizes across different rural and urban areas within the context of being embedded in a large North American market and global competition.

The analysis runs every combination of firm response ranging from firms absorbing 100% of the increase labour costs through reduced operating surpluses, to fully passing the costs on to consumers. This allows one to identify the response of firms that pose the greatest risk to the economy and the behaviours that should be encouraged. It also allows one to understand how different participants in the economy (firms, governments and households) may be rewarded or may be at risk under different behaviours.

## 6.3 AGGREGATE SECTOR IMPACTS

To understand the potential high-level risks and rewards of the Act, it is useful to examine the aggregate impact of the policy changes across all sectors. Since it is impossible to consider the impact in one area of the economy without considering the impacts in other areas, the analysis includes an extensive model of the Ontario economy. The following sections highlight how, depending upon the responses of firms, the Act might affect the:

- Employees;
- Firms in various sectors;
- Governments; and
- Overall economy.

A summary of the key numbers presented in the following sections can be found in Section 6.3.5.

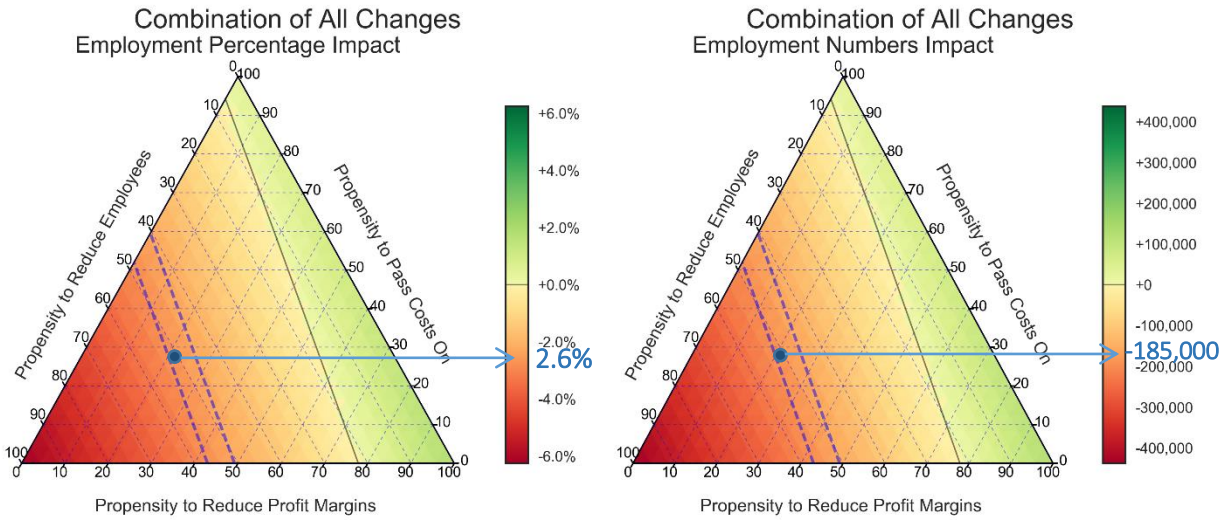
### 6.3.1 IMPACT ON EMPLOYEES

The stated aim of the policies in the Act is to improve the employment conditions in Ontario, particularly those earning lower incomes. Therefore, a natural starting point is to look at the impact of the Act on current and future Ontario employees.

#### 6.3.1.1 EMPLOYMENT

The wide range of responses available to firms could in part explain the variance of minimum wage impacts across different studies. As shown in Figure 41, depending upon the behaviour of firms, there could be a net increase in employment if firms are willing and able to reduce their operating surplus to absorb over 80% of increased labour costs and not pass on higher prices to consumers (refer for Section 5.3 for details on how to read the ternary diagrams). However, this would correspondingly be equivalent to firms increasing their Ontario tax bill by about 80% and is unlikely to occur. The estimated net increase in employment falls as firms pass their increased costs onto consumers through higher prices or employees by restructuring their labour or slowing job growth.

**Figure 41** Average annual employment impacts




The blue dashed contours on the right figure indicate the area expected by the Ontario literature, between 2.3% and 2.8% of disemployment effects (see Section 4.1 for a discussion of literature estimates) across all age groups and sectors, with a midpoint where:

- Employees bear 50% of the initial cost ($11.4B of the $23B);
- Consumers bear 29% of the initial cost ($6.7B of the $23B); and
- Businesses bear 21% of the initial cost ($4.8B of the $23B).

At this point, approximately 185,000 jobs would be at risk over the next two years. Again, these are not necessarily all jobs lost, but include jobs not created that would have been otherwise. With an average of 81,000 jobs created per year in Ontario since 2010, the bulk of the jobs at risk could be jobs that would be created over the next two years and not layoffs of existing employees.

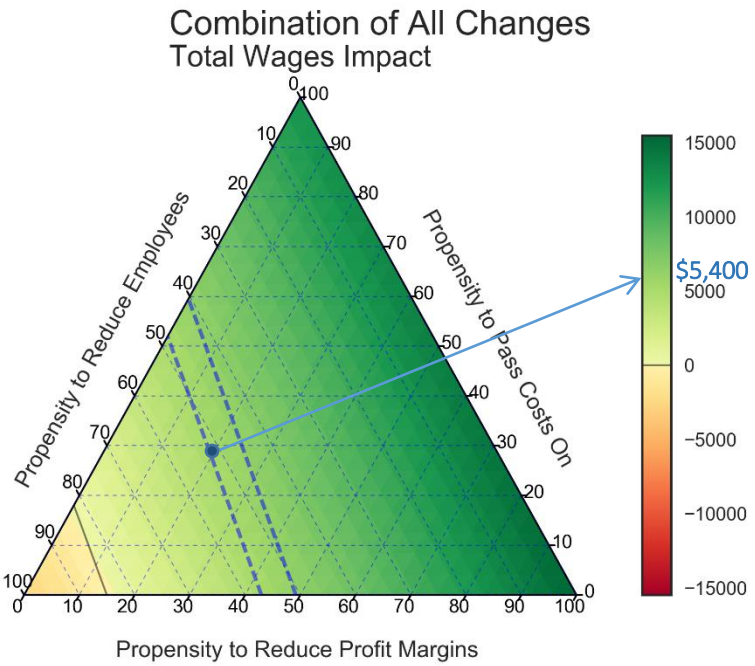
The fact that the lines are not parallel to any axis is a result of stimulus effects of the model. That is, as the probability that firms will absorb the costs through decreasing their operating margins increases, so does the likelihood of the policy leading to real stimulative economic effects, creating contours that are steeper against the "profit margins" axis relatively to the (slope of the) lines that are parallel to the "consumer pass-cost" axis. As the wage of an individual employee increases, the person is likely to spend that money on other items (particularly in lower income households). This results in a positive feedback as the additional demand propagates through the economy. However, if, relative to the baseline, a person is not hired, this acts to reduce demand.

#### 6.3.1.2 TOTAL EMPLOYEE WAGES

While there are a significant number of jobs at risk in the region that correspond to the Ontario literature estimates, as shown in Figure 42, total annual wages could increase by a net $5.4B (or 1.5% of total current wages) annually at the expected point relative to the baseline of maintaining current policies. That is, for

those who have a job, they are expected to see a gross $6.6 billion per annum increase in aggregate wages from the Act. This is partially offset by a -$1.3 billion per annum loss of wages from fewer jobs/hours.

**Figure 42** Average annual total wages increase

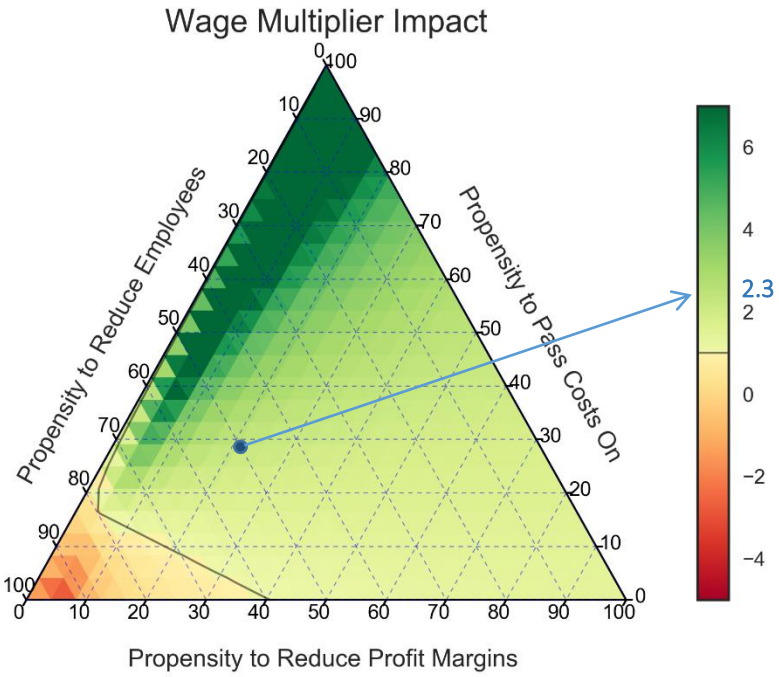



However, in the lower left, total wages actually decrease[49]. In this situation, employers are compensating for the increased costs almost entirely by restructuring their labour force to employ fewer people. The decrease in the number of people employed relative to the baseline expectation is sufficient to actually reduce household consumption resulting in additional decreases in output and employment. This results in both the net decrease in wages shown in Figure 42 and the high number of jobs at risk in Figure 41. In the lower right, the opposite is true, with increasing wages and employment coming at the cost of firms reducing their gross operating margins.

As the costs of the Act absorbed by firms (in reducing margins) are the only component that acts as stimulus, the appropriate denominator for any stimulus multiplier is not the total $11.5B annually, but only the portion that is absorbed by firms[50]. An estimate of the nominal wage multiplier (the net increase in nominal total wages divided by the stimulus portion of the $11.5B) is shown in Figure 43. The solid contour is the break-even line of a multiplier of one.

[49] To see this, note that the level set in black at the lower left corner corresponds to zero change in total wages paid.
[50] Any analysis using the total increase in wages as the basis for estimates of increased economic activity is implicitly assuming that firms are willing (and able) to absorb the whole cost with no changes in employment relative to the base growth and without passing any costs on to consumers.

**Figure 43** Nominal wage multiplier (Note that the contour is at a value of 1 in this figure)

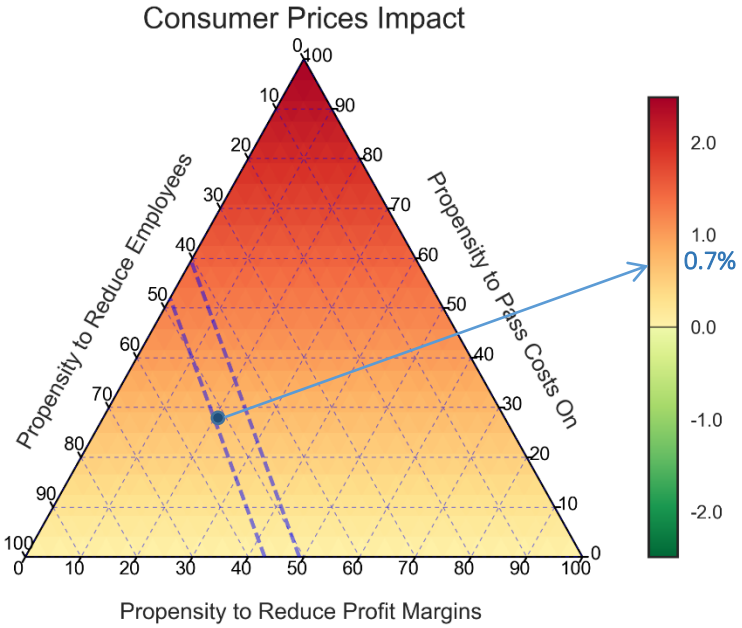



In almost all cases, there is a nominal wage multiplier greater than one. At the expected point, the output multiplier has a value of 2.3. In order words, the increase in total nominal wages paid is over twice the stimulus from firms reducing their gross operating surplus. The large nominal wage multipliers for a high business propensity to pass costs on (cost-push inflation) and low propensity to reduce profit margins leads to some demand-pull inflation leading to further increased wages across the board.

#### 6.3.1.3 CONSUMER PRICES

Figure 44 shows the impact on consumer prices when the disemployment effects are consistent with the existing evidence for Ontario, indicated by the area between the dashed lines in blue. Note that the change in prices is positive under every scenario that falls in this region. In other words, our model suggests that, given the existing evidence for Ontario, it is unrealistic to expect that the impact of the Act on nominal output prices is zero, especially in industries that are more likely to be affected by the minimum wage changes (which in turn are more likely to adversely affect the well-being of the poor, if they are the ones that buy most of their products from minimum wage markets – where prices are more likely to increase). There is no behaviour of firms that will result in a decrease of prices.

**Figure 44** Impact of consumer prices




The region consistent with literature estimates of employment impact (area between dashed blue lines) extends to firms passing on up to 58% of the additional costs to consumers. In this case, for the $23B additional costs (over two years), and for 5.2M households in Ontario, it is equivalent to about $1,300 per household annually[51].

At the midpoint of the expected range, 29% of the additional costs would be passed onto consumers and is equivalent to about $640 per household (in aggregate, this amounts to $3.35 billion). For an estimated final household consumption expenditure (from a GDP accounting perspective) of $447B[52], the $640 per household is equivalent to 0.7% of final household consumption expenditure.

In the limit of 100% of the costs being passed onto consumers, it would result in $11.5B being passed onto consumers which is equivalent to 2.6% of household final consumption expenditure. This is equivalent to about $2,200 per household.

It is important to note that the greater the costs passed onto consumers, the smaller the *real* benefits will be to employees. For example, if nominal wages for an employee were to increase by 2%, but total expenditures (for that person's fixed basket of goods) do as well, there is no real wage impact. This effect could be amplified if those who receive the wage increases differ from those whose expenses have increased.

[51] $23B / 2 x 58% / 5.2M = $1,300 per household
[52] Which is the most recent 2015 Statistics Canada value for Ontario grossed up for two years of growth

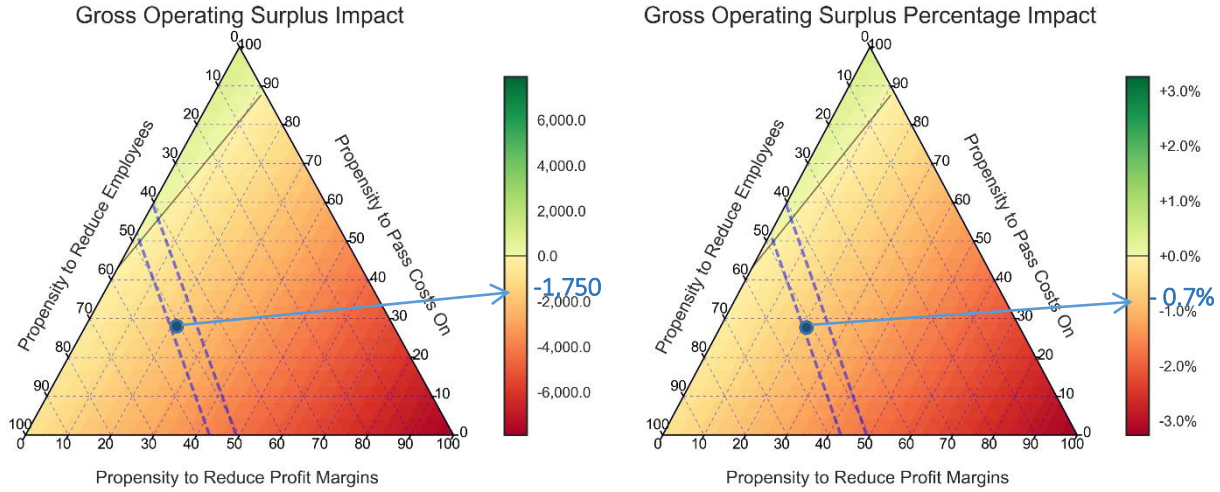
### 6.3.2 IMPACT ON FIRMS

Any discussion about the impact of minimum wage and labour policy changes is incomplete without considering the impact on employers as well as employees. A key metric to gauge the impact on a firm is through its gross operating surplus. The gross operating surplus of a firm is the remainder after goods are sold and wages and other inputs are paid. It is from the gross operating surplus that capital investment, corporate taxes, and profits are taken.

#### 6.3.2.1 GROSS OPERATING SURPLUS

As shown in Figure 45, under the expected 185,000 jobs at risk scenario, firms could achieve a net increase in gross operating surplus if the additional costs of the Act were about equally distributed between employees and consumers. For any region above the zero line (the solid line) in the figures, the additional growth from stimulative economic activity exceeds the components of the cost initially absorbed by employers. However, at the expected outcome, the aggregate gross operating surplus would be $1.7B per annum (or 0.7%) below the baseline expectations. Note that this is substantially less than 21% of the $23B over two years which would be $4.7B per annum which would be the result if there were no stimulative effects of the additional wages paid in the economy.

**Figure 45** Gross operating surplus




### 6.3.3 IMPACT ON GOVERNMENTS

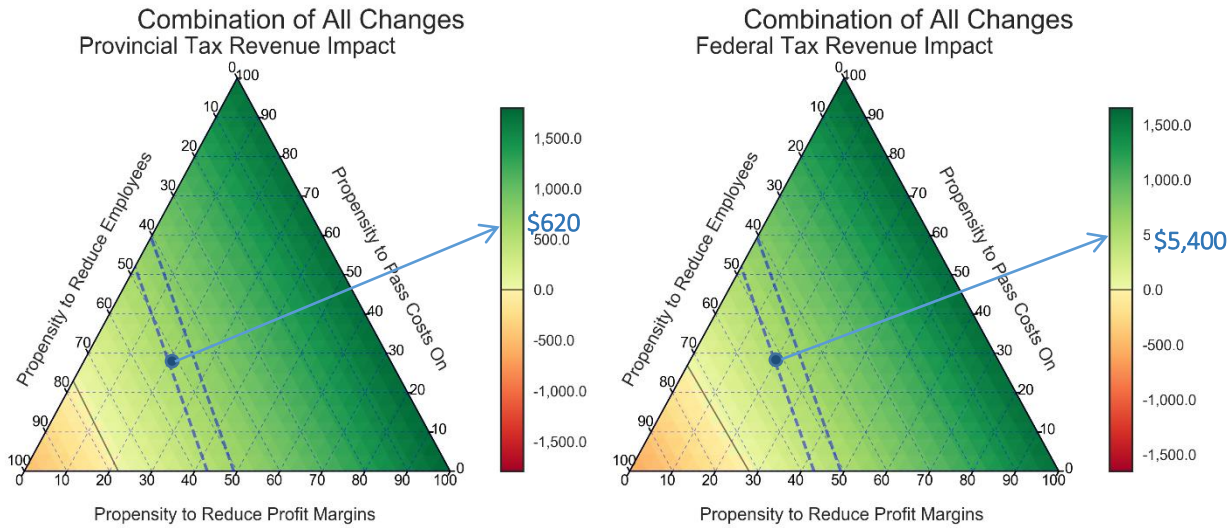
Governments are a key player in the economy and the provincial and federal governments may be affected by the Act through changes in their revenue and expenses. If any increase in expenses exceeds any revenue generated, governments will either have to increase borrowing, increase revenue through other means (i.e., taxes and user fees), or decrease other expenses.

#### 6.3.3.1 TAX REVENUE

As shown in Figure 46, the provincial and federal governments could each receive over $1.5B more additional tax revenue if firms do not pass any additional costs on to employees. This is driven largely by the increased wages paid to employees but also to consumption and corporate taxes. Around the expected midpoint:

- Federal tax revenue could increase by around $500M annually;
- Provincial tax revenue could increase by around $620M annually; and
- Municipal governments would not receive any direct tax revenue.

**Figure 46** Government taxation revenue from all sources




However, governments are also employers and will also be affected by the Act. If governments were to continue their current hiring plans, the Act could cost the:

- Federal government an additional $610M annually;
- Provincial government an additional $1.1B annually (due to the large number of provincial agencies); and
- Municipal governments an additional $500M annually.

The net result is that all governments would have a net loss in the expected case. In particular, the net loss would be

- $110M for the federal government;
- $440M for the provincial government; and
- $500M for municipal governments.

### 6.3.4 OVERALL ECONOMIC IMPACT

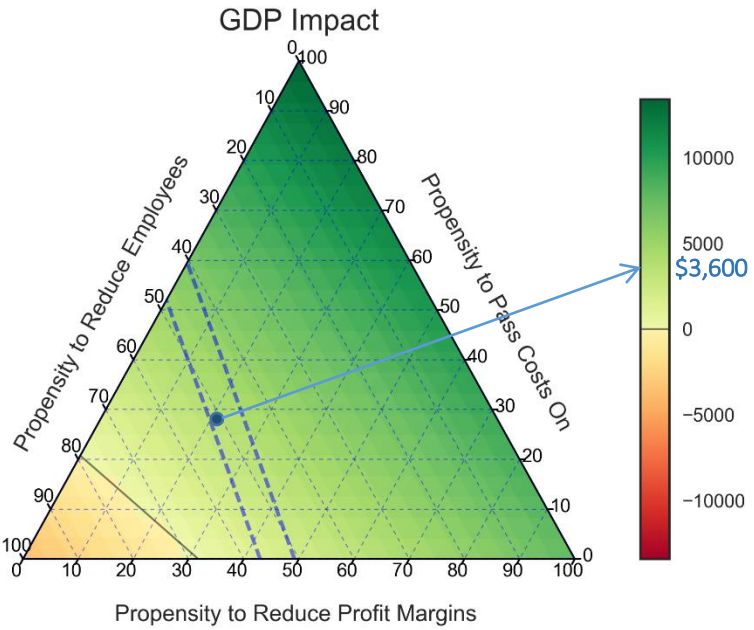
The overall economic impact can be quantified by examining the change in GDP. GDP can be expressed in both nominal and real terms. While the economy operates in nominal terms, to understand the relative benefits to different participants in the economy, real terms removes the effects of inflation. For example, if wages were to rise by 10% in nominal terms (the value on an employee's paychecks), but prices were to increase by 8% (the cost of goods paid in stores), the real benefit would be less than 2% more spending power.

The results are first presented in nominal terms, as that is what employees will see on their paycheck, followed by the results in real terms to understand the actual change in purchasing power.

#### 6.3.4.1 NOMINAL GDP IMPACTS

As shown in Figure 47, in most scenarios, there is a net increase in nominal GDP. It is only in the situation where employers place the burden almost entirely on employees that there is a net decrease in nominal GDP.

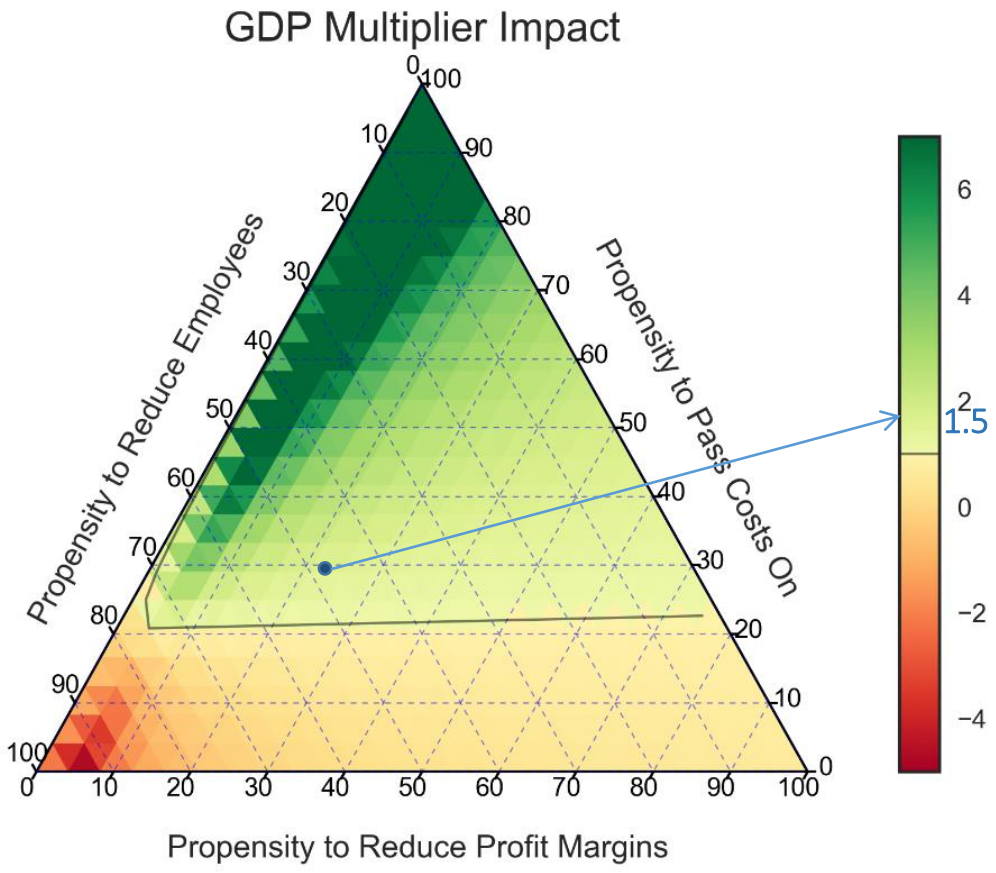
**Figure 47** Nominal GDP impact




From an income point of view, GDP consists primarily of wages earned and gross operating surplus. For a given propensity to pass costs on, as firms trade between wages paid to employees and their own operating surplus, there is no change in GDP. It is only if employees' additional income induces additional demand that an increase in economic activity occur. This is visible in Figure 47 as firms reduce their profit margins for a given propensity to pass costs on, the GDP impact increases due to the stimulus effect of additional consumer spending. However, to maximize the nominal GDP growth, firms would have to pass on the entirety of the direct costs of the Act to consumers.

As with the total wages for employees, the nominal GDP output ratio (called a multiplier for simplicity) for a given stimulus can be calculated. As shown in Figure 48, a minimum of 20% of the costs must be passed on to consumers in order for there to be a nominal GDP multiplier greater than one. This arises because the gross operating surplus of firms is a key component of GDP (from an income point of view). If firms do not pass on costs, it initially results in simply trading the components of GDP between gross operating surplus and wages. (However, the additional wages can induce an increase in nominal GDP as a majority of wages are spent increasing consumer demands). As a result, any stimulus multiplier from additional wages must generally exceed the reduction of gross operating surplus in order to have a net GDP benefit greater than the stimulus amount.

**Figure 48** Nominal GDP output ratio. Note that the contour is at a value of 1 in this figure

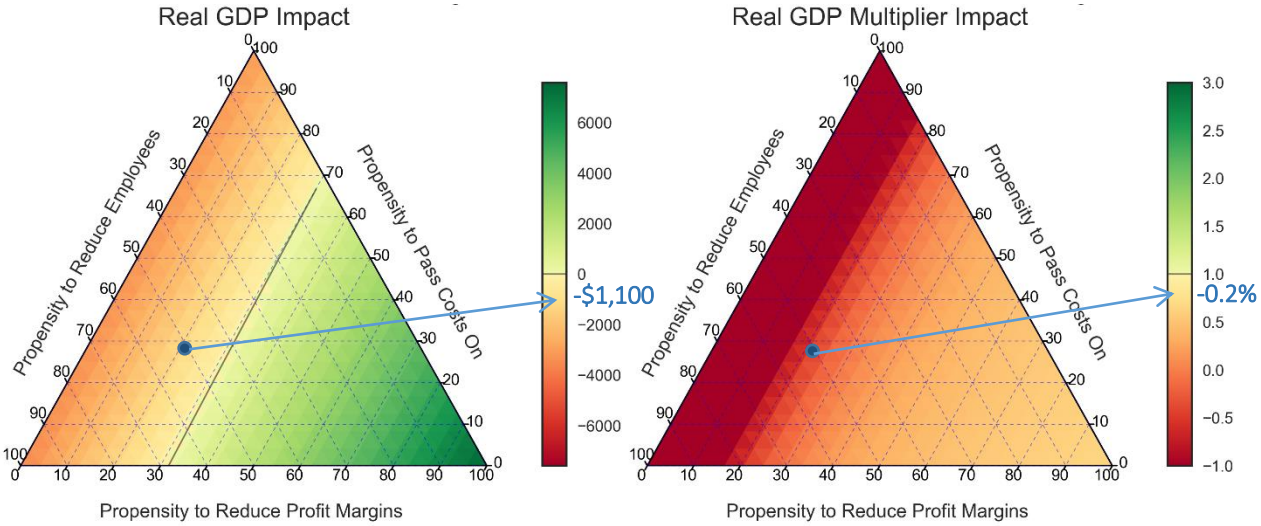



Note that the expected business behaviour of a 21% propensity to reduce profit margins and 29% to pass costs on to customers yields a multiplier of 1.5. That is, the expected increase in nominal GDP is 50% greater than the stimulus amount supplied by firms' reduction in their gross operating surplus.

### 6.3.4.2 REAL GDP IMPACTS

The real GDP impacts account for the increase in prices that may occur. As shown in Figure 49, unless firms absorb at least 30% of the total costs, there is no real GDP benefit due to the higher costs. This is in contrast to the nominal GDP results which almost always had net GDP benefits. If companies absorb less than 30% of the initial costs, the required price increases exceed the stimulus effect of the additional employee wages.

**Figure 49** Real GDP impact and multiplier




As shown in the right of Figure 49, the net real GDP benefits are always less than the stimulus provided (i.e., the amount of the total costs absorbed by firms). As a result, despite nominal multipliers appearing quite promising, the policies contained in the Act do not appear to be an effective means to stimulate greater *real* economic activity regardless of the behaviour of firms.

### 6.3.5 SUMMARY OF AGGREGATE OUTPUTS

Table 7 summarizes the key outcomes from the previous sections with the expected midpoint outcome (based on behaviour that is implied by literature estimates), the equal share behaviour, and each of the 'corner behaviours'.

**Table 7** Summary of average annual outcomes for all sectors

| Metric | Expected | Equal Share | Full Propensity to Reduce Margins | Full Propensity to Pass Costs On | Full Propensity to Reduce Employees |
|---|---|---|---|---|---|
| Employment | -185,000 (-2.6%) | -96,000 (-1.4%) | +121,000 (+1.7%) | +24,000 (+0.3%) | -437,000 (-6.2%) |
| Total Nominal Wages | +$5.4B (+1.5%) | +$8.3B (+2.3%) | +$15.3B (+4.3%) | +$12.3B (+3.4%) | -$2.7B (-0.8%) |
| Gross Operating Surplus | -$1.7B (-0.7%) | -$2.6B (-1.1%) | -$7.8B (-3.1%) | +$0.9B (+0.4%) | -$0.8B (-0.3%) |
| Federal Revenue | +$0.51B (+0.6%) | +$0.88B (+1.1%) | +$1.5B (+1.9%) | +$1.6B (+2.0%) | -$0.6B (-0.7%) |
| Provincial Revenue | +$0.62B (+0.9%) | +$0.99B (+1.4%) | +$1.8B (+2.6%) | +$1.6B (+2.4%) | -$0.51B (-0.7%) |
| Municipal Revenue | $0 (0%) | $0 (0%) | $0 (0%) | $0 (0%) | $0 (0%) |
| Consumer Costs per Household[53] | +$640 (+0.7%) | +$770 (+0.9%) | $0 (0%) | +$2,200 (+2.6%) | $0 (0%) |
| Nominal GDP | +$3.6B (+0.6%) | +$5.8B (+0.9%) | +$7.6B (1.2%) | +$13.2B (2.2%) | -$3.5B (-0.6%) |
| Real GDP | -$1.1B (-0.2%) | +$0.3B (+0.0%) | +$7.6B (+1.2%) | -$3.1B (-0.5%) | -$3.5B (-0.6%) |

Table 7 is a summary of results of behavioural trade-offs which demonstrates that stakeholders tend to benefit when other stakeholders lose. The estimated $23B in attempted redistribution is significant and sudden which will generate visceral behavioural responses. Given that, at the extremes, employment outcomes range between 120,000 jobs generated through to 440,000 jobs lost, with an equal sharing of the Act cost outcome at 96,000 jobs lost, the expected value of 185,000 jobs at risk is a reasonable expression of what is at risk.

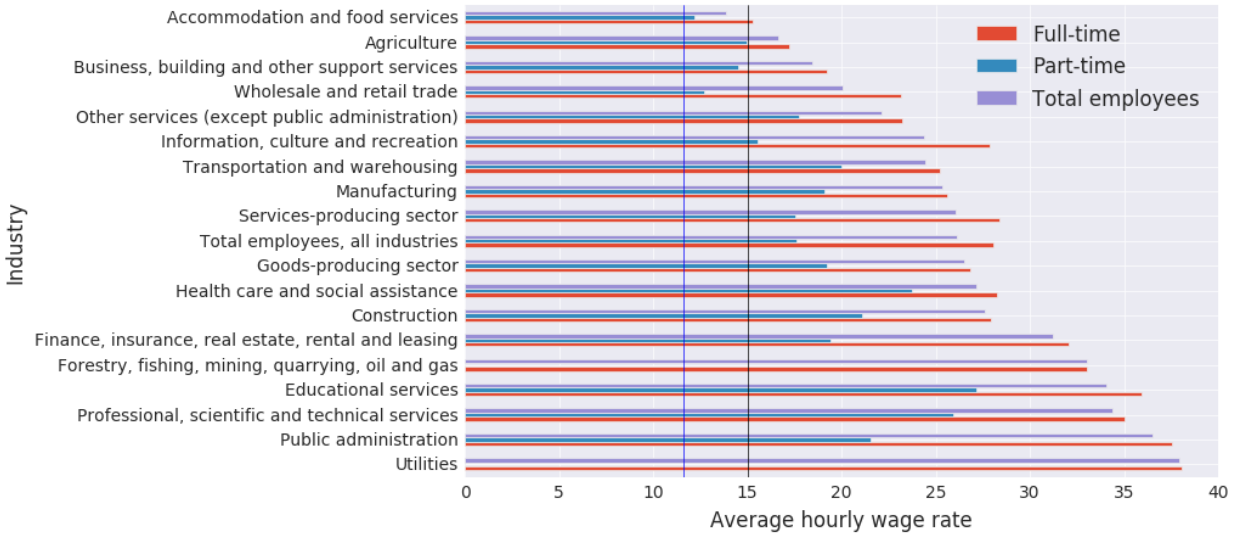
To consider a risk management response at the extremes would be over insuring against possible consequences. As previously mentioned, the expression of jobs at risk is to determine a reference point from which risk management planning can occur. The interpretation of 185,000 jobs at risk begins with the determination that this would be an unintended consequence of the Act. If so, the expectation serves as a reference point that allows policy decision makers to reconsider the policy changes in the Act, or include other concessions, that reduce the likelihood of the unintended consequence. Otherwise, it would be a "let's hope for the best" approach which runs counter to best policy practices.

## 6.4 Impacts in key sectors

Different industry sectors can have very different income and expense profiles. Figure 50 to Figure 52 show some of the key differences between industry sectors, all of which are included in the analysis. Sectors that have lower gross operating margins, lower wages or greater total labour components of production are likely to be more affected by labour changes.

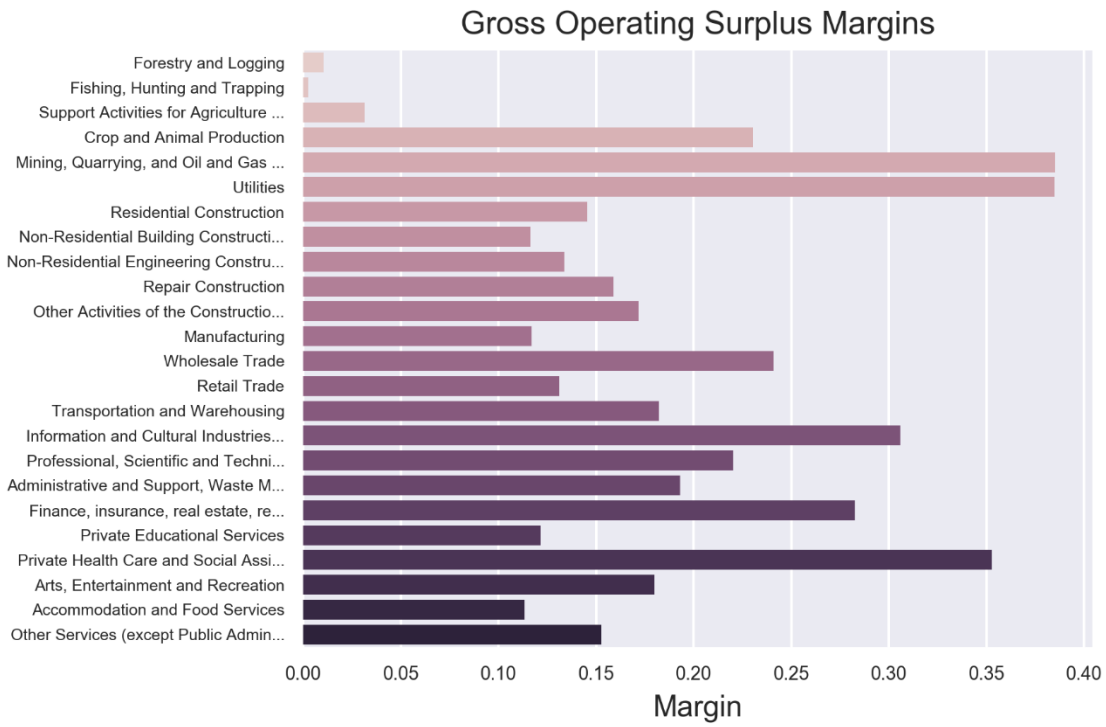
[53] Refer to Section 6.3.1.3 for details on how consumer costs per household and the percentage is calculated.

**Figure 50** Average wage by sector




While, as shown in Figure 50, the average hourly wage of most full-time employees is at or above the $15/hr policy change, it is important to note that there can be a considerable variation for different employees within a sector.

**Figure 51** Gross operating margin by sector

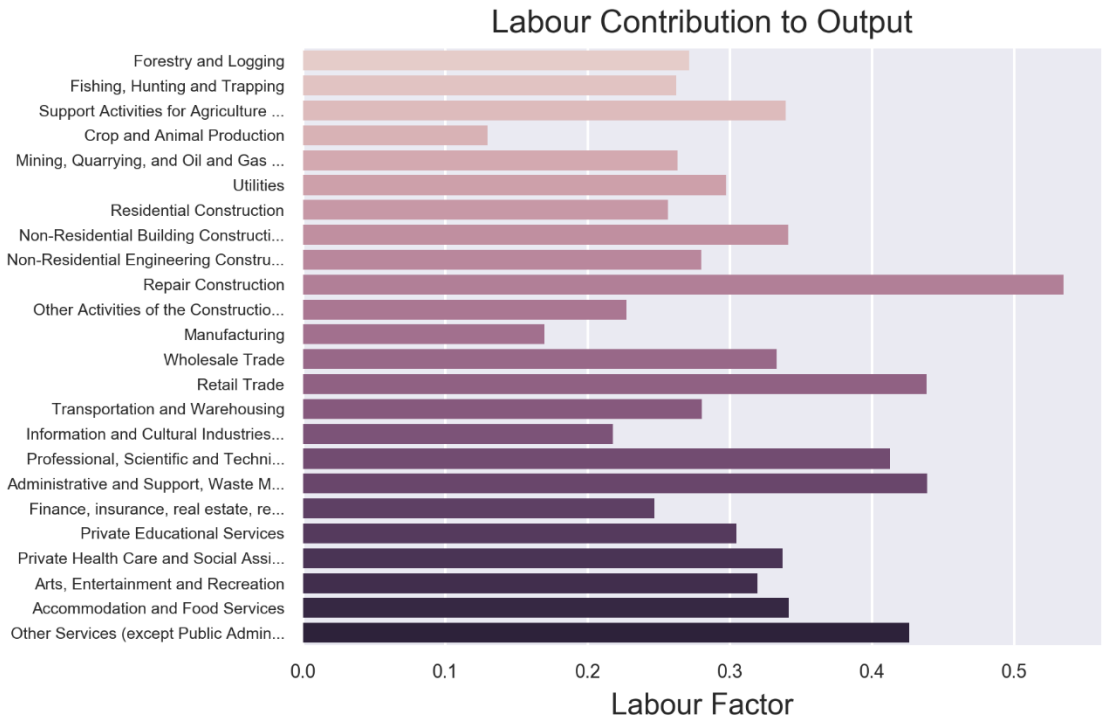



The gross operating margins for each sector, illustrated in Figure 51, show the average gross operating surplus as a fraction of the value of total output. This is the fraction of total sales revenue that is used for

capital investment, taken as profits or otherwise invested. It is important to remember that this is more than just the profits of firms. It also includes the amount available to re-invest in the company, such as equipment upgrades.

Depending upon the industry, different amounts of labour input are required. For example, the retail trade involves a relatively large fraction of employees and wages relative to the value of the output produced. In contrast, manufacturing industries now involve a relatively small component of labour input due to increased automation.

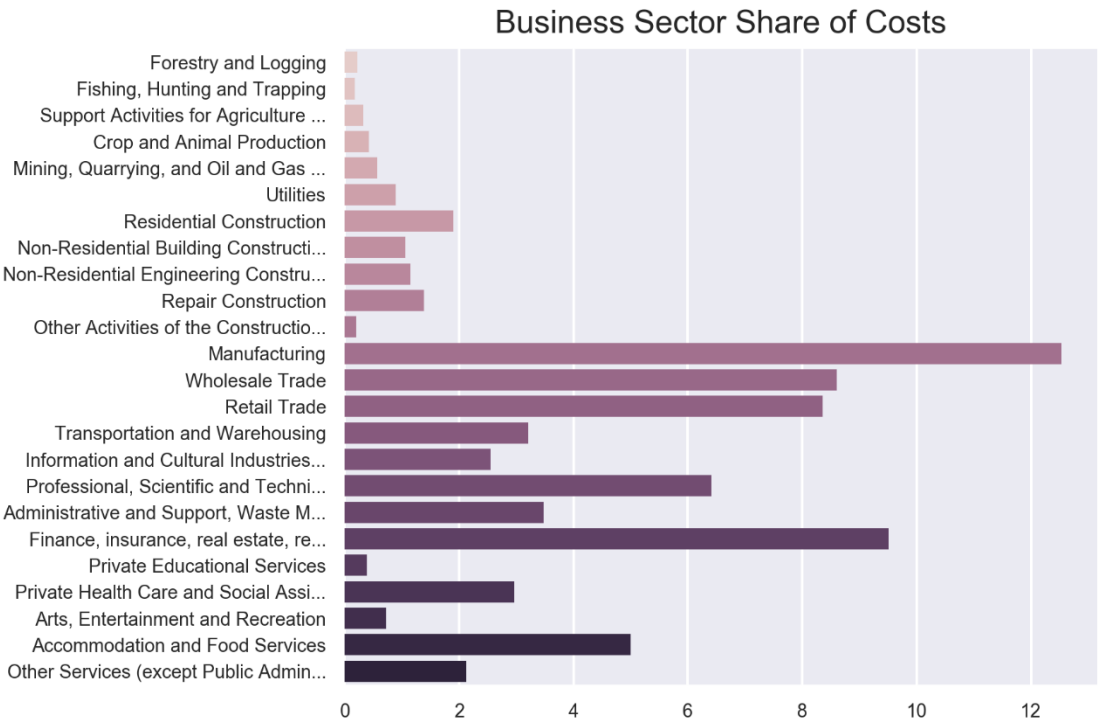
**Figure 52** Labour component of output




### 6.4.1 SECTOR OVERVIEW

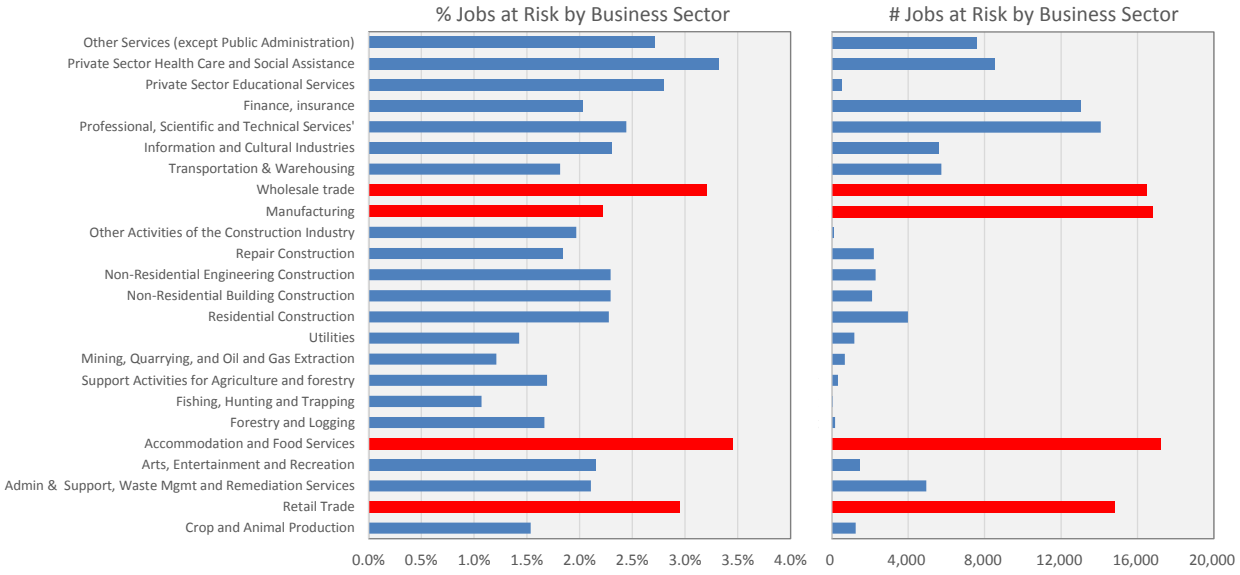
The different structure of various industry sectors results in a non-uniform distribution of the $22.9B over the next two years with manufacturing bearing the greatest fraction.

**Figure 53** Business sector share of costs




There are two key factors driving the variation of costs between the industry sectors – the size of the industry in Ontario, and the distribution of wages within the sector. Figure 54 present the net result of these factors and combine to yield the percentage and number of jobs at risk by industry sector in Ontario. The four sectors with the greatest number of jobs at risk are highlighted in red.

**Figure 54** Key sectors at risk by number of jobs



In particular, these sectors are:

- Accommodation and food services (17,300 jobs at risk);
- Manufacturing (16,800 jobs at risk);
- Wholesale trades (16,000 jobs at risk); and
- Retail trades (14,700 jobs at risk).

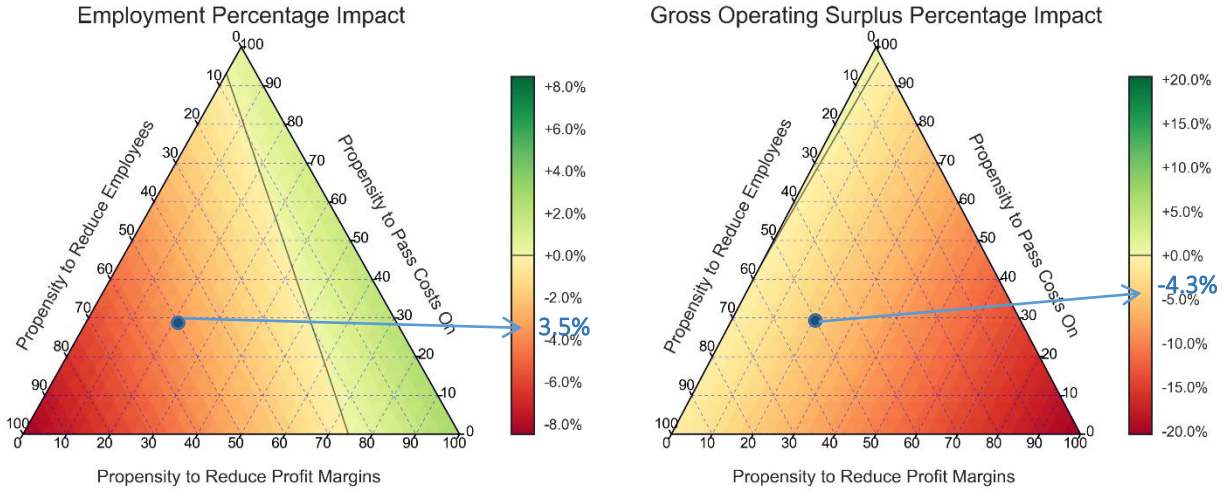
Note how these sectors correspond to those with lower operating margins and higher labour costs. Also, as shown in Figure 50, the four sectors most at risk are all in the lower half of the average wage distributions.

The following sections take a closer look at these sectors.[54] Refer to Appendix G for more sectors.

### 6.4.2 ACCOMMODATION AND FOOD SERVICES

The accommodation and food services sector includes all firms in IOIC[55] category BS720. As shown in Figure 50 and Figure 51, the gross operating margins and average wages paid in the accommodation and food services sectors are the smallest of all sectors excluding agriculture. As a result, it has both the greatest percentage of jobs at risk, and the greatest reduction in gross operating surplus. Figure 55 highlights how up to 8% of jobs and 20% of the gross operating surplus could be at risk under various responses. Though in the expected case, around 17,000 jobs could be at risk. As the gross operating surplus is also the source of private capital investment for firms, a significant decrease in operating surplus could put long-term capital plans at risk.

**Figure 55** Employment and gross operating surplus impacts for the accommodation and food services sector



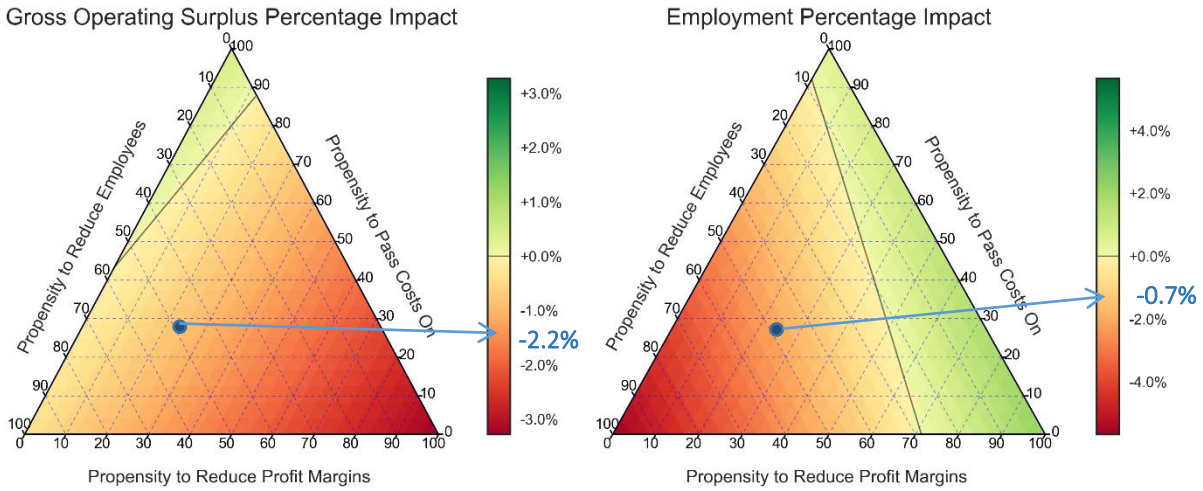

[54] For details on any other sectors, please contact CANCEA at connect@cancea.ca.

[55] Input Output Industry Codes (IOIC) are Statistics Canada industry divisions which are similar to North American Industry Classification System (NAICS) but separates private and public activity.

### 6.4.3 MANUFACTURING

The manufacturing sector includes all firms in IOIC category BS3A0. In the expected case, about 16,800 jobs could be a risk in the manufacturing sector in Ontario relative to the expected growth in jobs. While the manufacturing sector bears the largest total costs of the Act, its relative smaller dependence on labour compared to the accommodation and food services sector results in fewer jobs at risk for a given behaviour.

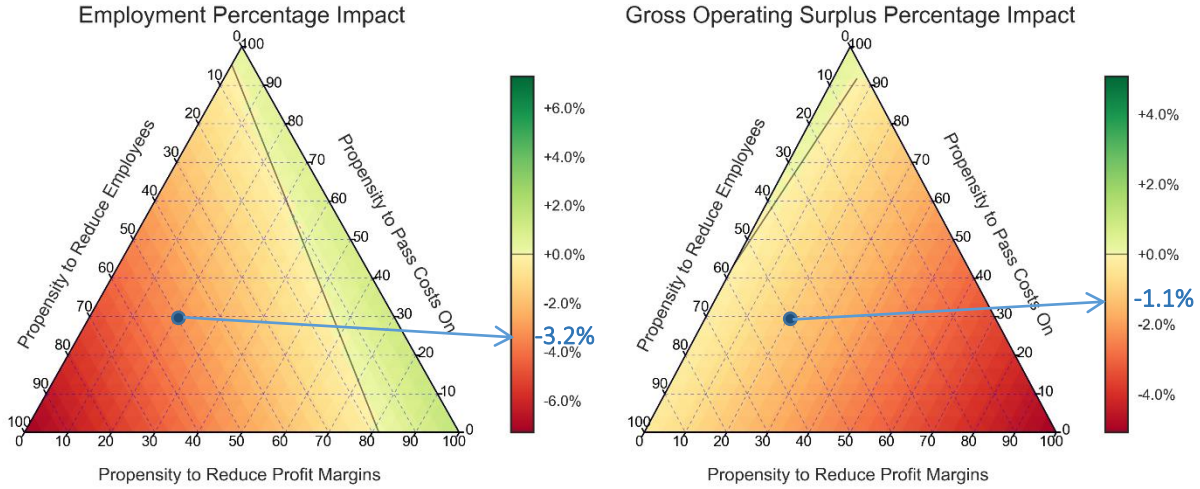
**Figure 56** Employment and gross operating surplus impacts for the manufacturing sector




### 6.4.4 WHOLESALE TRADE

The wholesale trade sector includes all firms in IOIC category BS410. The large contribution of labour to the sector's output and the relatively low wages result in the wholesale trade sector having the third highest share of additional labour costs. At the expected behaviour of firms absorbing 21% of the costs, and 29% being passed onto consumers, about 16,000 jobs would be at risk in the sector relative to baseline growth.

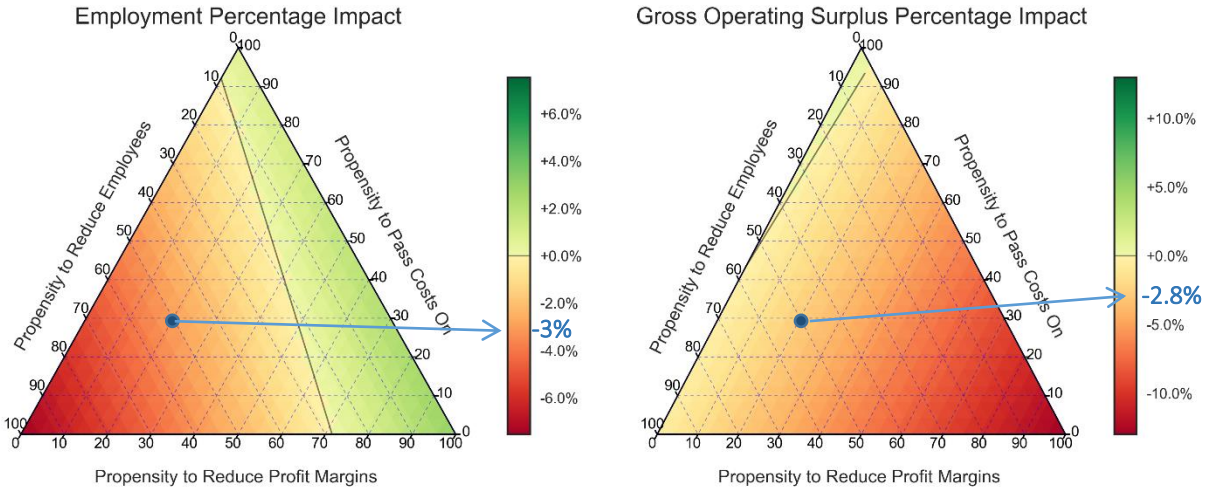
**Figure 57** Employment and gross operating surplus impacts for the wholesale trade sector



### 6.4.5 RETAIL SECTOR

The retail sector includes all firms in IOIC category BS4A0. The retail sector is heavily dependent on labour with wages contributing almost 45% of the value of the industry output. As a result, it is also significantly impacted by changes to the wage structure of employees.

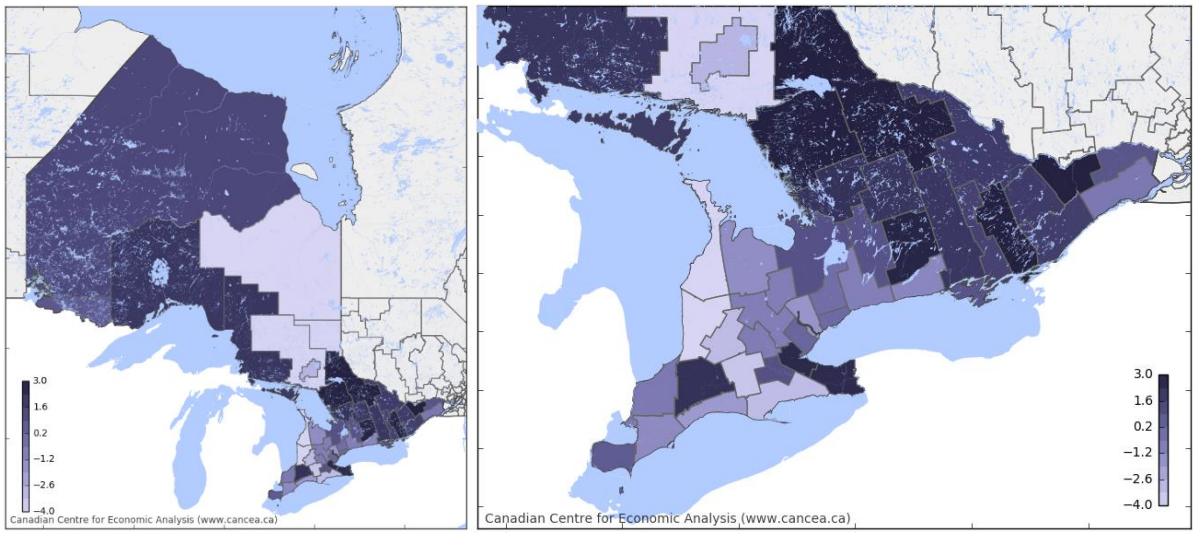
**Figure 58** Employment and gross operating surplus impacts for the retail sector



## 6.5 Regional outcomes

The distribution of firms across the province, both by size and type, mean that the impacts of the Act are not felt uniformly across the province. If all firms behave in the 'expected' behaviour, regions with a higher proportion of the sectors at risk (identified in Section 6.4) have greater risks to employment. Figure 59 maps the regional variation of jobs at risk (relative to the size of their local labour force) relative to the provincial average

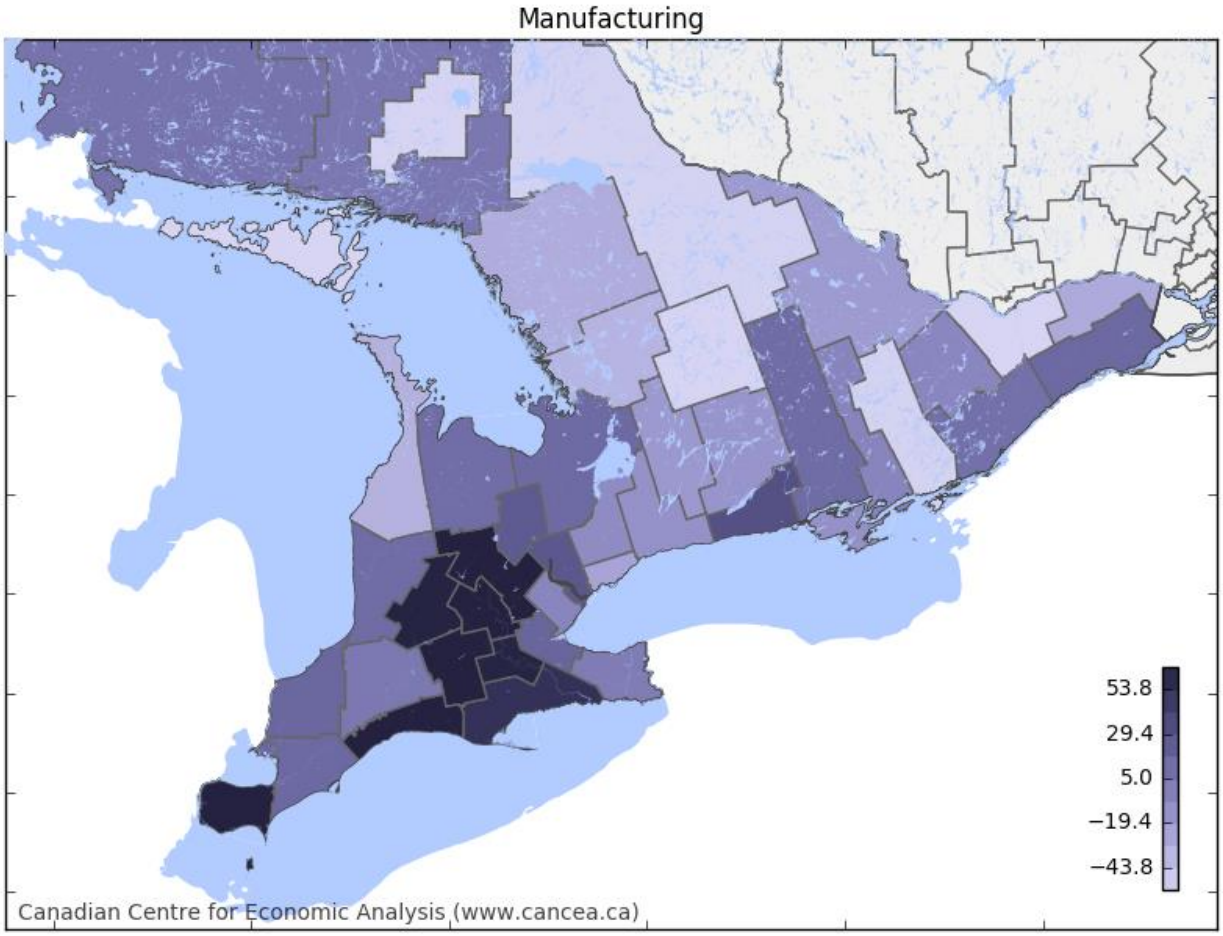
**Figure 59** Regional jobs at risk relative to the provincial average




The relatively high proportion of jobs above minimum wage in the GTA results in fewer jobs (as a percentage of all jobs in the region) at risk. However, the large amount of employment in the Niagara Peninsula in the food and accommodation sector results in that region having one of the highest percentage of jobs at risk. Similarly, northeastern Ontario's lower density of high-paid jobs (with considerable local retail and tourism) results in a greater fraction of jobs at risk.

As shown in Figure 53, the manufacturing sector bears some of the highest costs due to the relatively large amount of employment in the province (about 15%) and its distribution of wages. Unlike many other industries which are more broadly spread across the province, Figure 60 highlights the concentration of manufacturing jobs at risk in south-western Ontario.

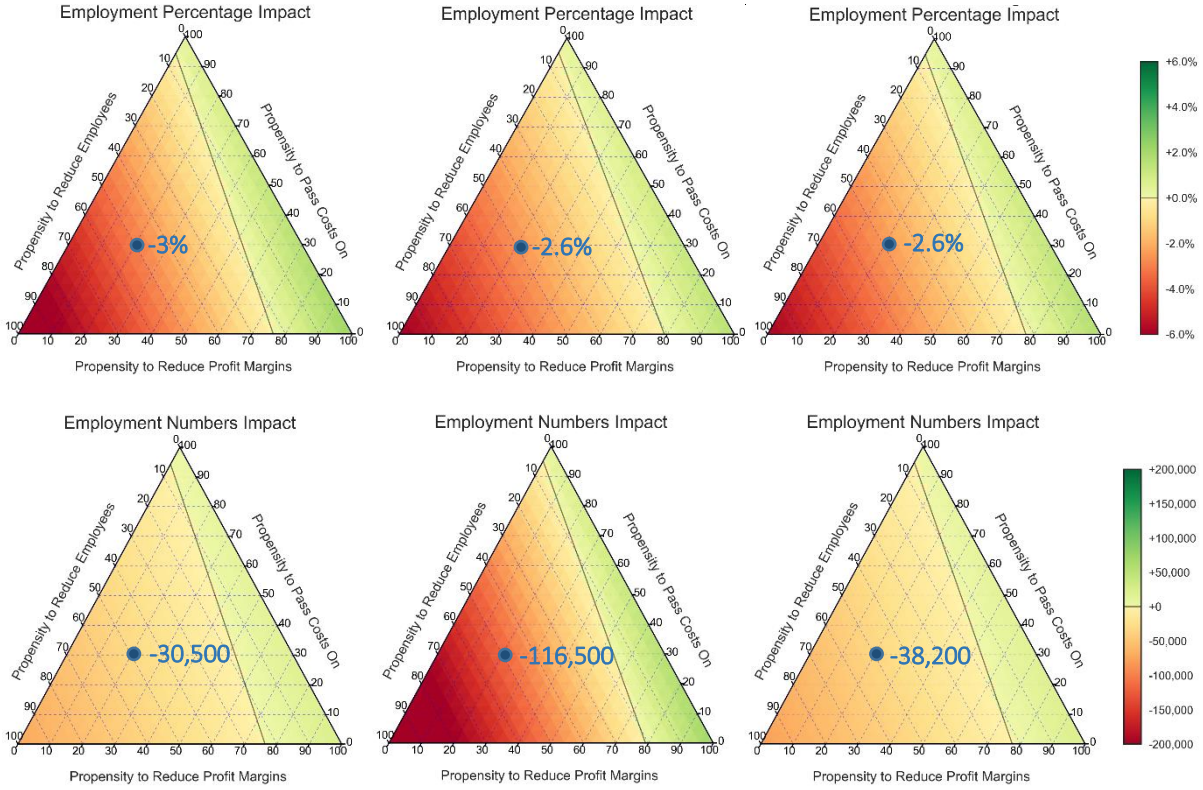
**Figure 60** Regions at risk in the manufacturing sector relative to the provincial average



## 6.6 Demographic outcomes

Ages and wages of employees vary considerably by sector. While it is true that a greater fraction of younger employees tend to make minimum wage, low wages exist across all age groups. When companies tend to defer hiring (or fire employees) it tends to affect lower wage brackets first (Refer to Appendix C.1). As a result, if firms have a large propensity to reduce employees to account for the increased labour costs, the total number of jobs at risk is greater for middle age groups (Figure 61) than those under 25 or above 55.

**Figure 61** Number and percentage of jobs at risk by age group under 25 (left column), 25 to 55 (center column), and 55+ (right column)




For the expected behaviour, while about 17% of all jobs at risk are for those under 25 years old, the per-job rate is 15% higher than in other age groups. About 116,000 jobs are at risk for those 25 to 55 years old, and another 38,000 for those over 55. In addition, of the 185,000 job at risk in the expected case relative to the potential growth that could occur, about 96,000 jobs are risk are for women.

## 6.7 Firm size outcomes

The impact of the Act would be felt in both large and small firms. As shown in Figure 62 and Figure 63, the number of jobs at risk is similar for both sizes of firms. However, given the much greater number of small firms, it would affect many more small businesses than large.

**Figure 62** Jobs at risk for large firms (100 or more employees)

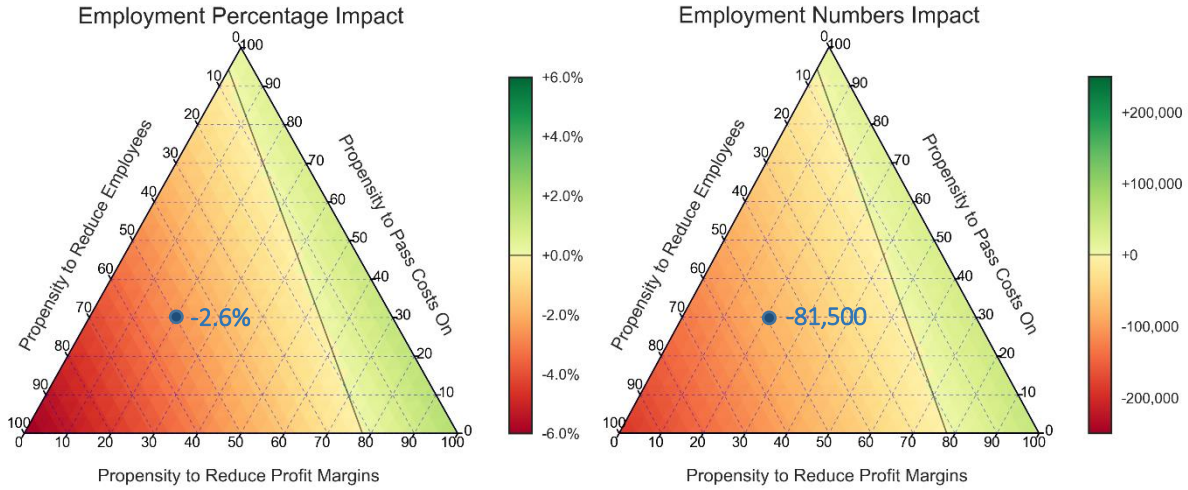
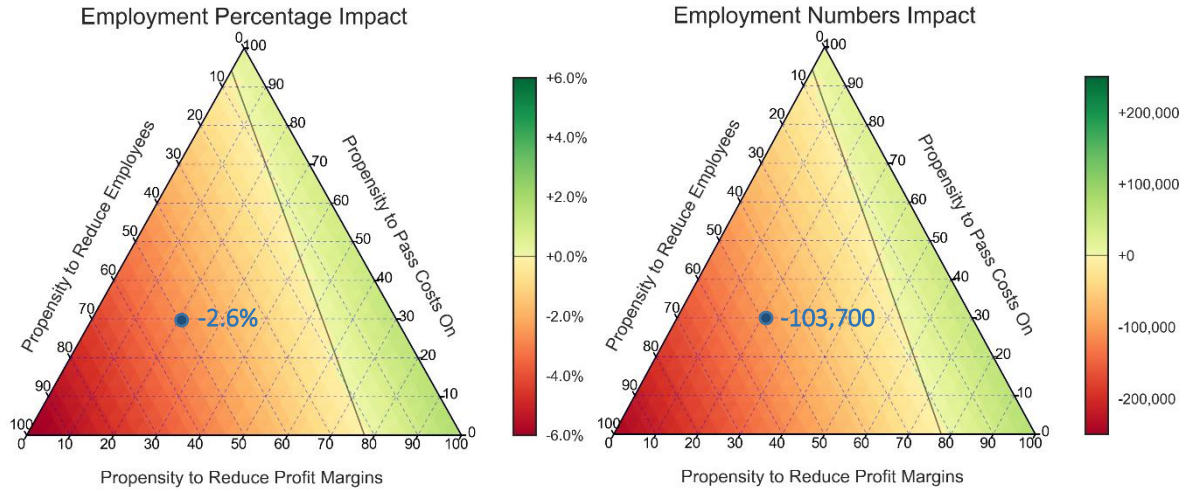



**Figure 63** Jobs at risk in small firms (less than 100 employees)

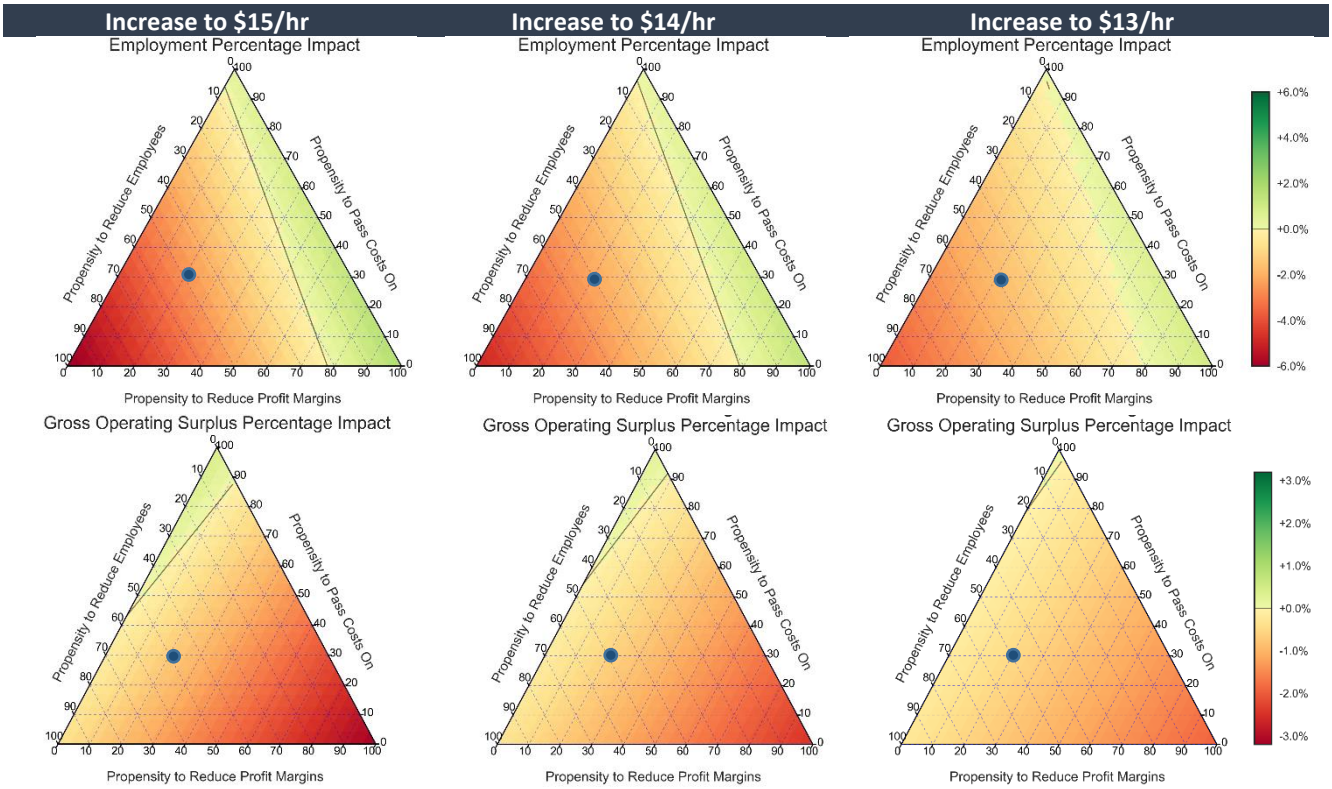



## 6.8 Sensitivity to size of minimum wage increase

The largest component contributions to the challenge facing businesses is largely driven by the increase in minimum wage. Therefore, it is useful to investigate the sensitivity of the results to changes in the minimum wage aspect of the Act. The analysis was repeated with final minimum wage increases to $13/hr and $14/hr

by 2019 instead of $15/hr with 70% of the minimum wage increase occurring for 2018. Again, the baseline for comparison is that minimum wages would increase as determined by existing policies.

**Figure 64** Sensitivity to wage increase




Sensitivity analysis shows that when considering the impact of minimum wages only we find that jobs at risk at the expected point begins around an 8% increase of minimum wages over two years. With jobs at risk over two years at 22,000, the results are insignificant in the context of usual job number variability. The jobs at risk results tend to accelerate past the 12% minimum wage increase which is evident at the 20.7% minimum wage increase level (eg. $14/hr) where jobs at risk over the two years at 81,000. At a 29.3% increase (which is the focus of this study), jobs at risk over the two years amount to 102,000 for just minimum wage increases.

# 7. DISCUSSION

## 7.1 SIZE AND SIGNIFICANCE OF THE ACT

Given the significance, suddenness and size of the Act, it is expected to increase the risks and uncertainties for many Ontarians and businesses sectors:

- Significance: Viewed as having six key changes, Ontario businesses will need to adjust to at least one of 64 different labour cost outcomes emanating from the Act.
- Suddenness: 15 month period with added ambiguity yet to be resolved or tested.
- Size: the minimum wage changes scheduled largest in 45 years, being 15 times the average and the $23 billion 2 year costs of the Act are equal to all of the corporate income tax that the provincial government is expected to receive of the same period.

The Act is a major piece of legislation that represents significant and sizeable changes for the Ontario economy that will need to be digested by Ontario businesses within a relatively short period of time. Given the size, significance and suddenness of the changes behind the Act and the unknown reaction of Ontario businesses to avoid these increased costs, the consequences are unknown. The messages that accrue from the economic literature is that employers will attempt to avoid the costs and it is not a question of if jobs are at risk, but rather how many jobs will be at risk.

While the results of analysis show a range of employment outcomes, from 121,000 jobs created through to 437,000 jobs lost, Ontario economic literature indicates that firms will behave in a manner where 185,000 jobs are at risk in response to the Act. Consistent with this expectation of jobs at risk are a variety of outcomes for employees with a job, consumers (households) and Ontario businesses.

While jobs may be at risk, the expected case also indicates:

- For those who have a job, they are expected to see a gross $6.7 billion per annum increase in aggregate wages from the Act. This has a stimulative effect which, however, is more than offset by a -$1.3 billion per annum loss of wages from fewer jobs/hours, a -$1.7 billion per annum loss of business profits and investment and increased consumer prices for households of -$3.34 billion per annum. This is evident when nominal GDP shows a gain of $3.6 billion (0.6% increase), but when adjusted for inflation and the inflationary effects of the Act, real GDP shows a net loss of $1.1 billion (-0.2%);
- The cost to businesses of $1.7 billion per annum would have been 42% higher or $2.4 billion without the gross stimulative effect noted above;
- Federal and the provincial governments will receive $1.12 billion in additional taxation revenue, but will also have to pay increased wage costs of $1.72 billion associated with the Act, yielding a net loss for both levels of government. Municipal governments will receive no additional taxation revenue, but will also have to pay increased wage costs associated with the Act, yielding a net loss of $500 million per annum; and
- The increased cost for Ontario households within the expected case can range from $0 through to $1,300 on average per annum, with a midpoint of $640 on average per annum.

## 7.2 Risk assessment and open dialogue

The results represent an incremental change to what is expected without the Act. Given the redistribution amount is fixed by policy, the impact of the Act hinge on employer responses and whether they are able to achieve their own cost mitigation plans. As a response, we have adopted a risk assessment approach to the evaluation of the Act. Risk assessment is the process of identifying and measuring risk. Risk management is the process of taking steps to reduce risk to an acceptable level.

The MITRE Corporation[56] has a sound summary of the approach to risk management and subsequent planning as it relates to governments. As part of its "Twenty-One Musts" of minimum conditions needed to initiate and continuously execute risk management successfully they open with the following statement:

> "Risk management must be a priority for leadership and throughout the program's management levels. Maintain leadership priority and open communication. Teams will not identify risks if they do not perceive an open environment to share risk information (messenger not shot) or management priority on wanting to know risk information (requested at program reviews and meetings), or if they do not feel the information will be used to support management decisions (lip service, information not informative, team members will not waste their time if the information is not used)." (MITRE, 2017)

Risk assessment and management is dependent upon a culture of open, evidence based communication. In a public policy forum, it is essential if sustainable policy solutions are to be developed and implemented. The results of our analysis performed determines that there is a significant amount of economic risk associated with the Act. The preliminary results of this analysis was released on August 14th 2017 (CANCEA, 2017) and was met with speculative criticism [57] (Jamasi & Rozworski, 2017) and assumptions about what was and was not taken into account (MacDonald, 2017) [58] despite such critics having been invited to walk through both the methodology and results.

Debates amongst economists are common and are usually evidence based with insight from theory. However, given the responses above to an independent research business working on such an important issue, we are concerned with the question of how Canadian's can discern information in an environment that is clearly not "an open environment to share risk information"? (MITRE, 2017).

Two key questions can be used to identify if participants in the debate around minimum wage are driven by ideology or evidence-based decision making. The first is that if minimum wages were to be increased to infinity, is there is a point that such increases will create risk for any economy? If the answer is no, then there can be no rational debate about the topic with this person. If the answer is yes, the second question

[56] The MITRE Corporation is a not-for-profit company that operates multiple US federally funded research and development centers (https://www.mitre.org/).

[57] Refer to Rob Gillizeau, Economics Professor at University of Victory: "If there's a minimum wage debate going on, it isn't this,"….."This report is junk." http://www.metronews.ca/news/ottawa/2017/08/15/cancea-s-minimum-wage-analysis-dismissed-by-labour-minister.html

[58] Refer to David MacDonald, Senior Economist, Candian Centre for Policy Alternatives, "the report seems to assume workers will "take those wage increases and burn them in a hole in the backyard."".

is: A what point does a minimum wage increase switch from having no risk to the economy to creating significant risk for the economy? Two answers can follow, the first is "I don't know", the second is "an X% increase". If the person doesn't know but maintains the position that there is no risk with the Act, then there are likely ideological motivations for the opinion. Alternatively, a quantitative answer of "an X% increase" implies they have a model that generates X%. The discussion can then continue in a quantitative evidence-based manner comparing and contrasting the various model assumptions, data choices, and implementations. The conclusion is that a rational debate about minimum wage increases is a debate about models of the economy and its constituent parts.

The model used in this study shows that when considering the impact of minimum wages only we find that jobs at risk at the expected point begins around an 8% increase. With jobs at risk over two years at 22,000, the results are insignificant in the context of usual job number variability. That is, in the context of the discussion above, we identify X% as an 8% increase in minimum wage over two years. The jobs at risk results tend to accelerate past the 12% minimum wage increase which is evident at the 20.7% minimum wage increase level (eg. $14/hr) where jobs at risk over the two years at 81,000. At a 29.3% increase (which is the focus of this study), jobs at risk over the two years amount to 102,000 for just minimum wage increases.

While there appears to be many opinions in support of the minimum wage increases of the size scheduled in the Act[59], at the time of writing this report, there have been no conclusions based upon the results from relevant economic models[60]. The implications are that the debates around minimum wage increases in Ontario currently appear not to be rational. This is reminiscent of the Nobel laureate Paul Krugman's observations in the context of the disagreement of American economists when it comes to the debate around what drives business cycles when he says "when faced with a conflict between their economic views and their political orientation, many economists will tone down or reject the implications of their own work." Krugman completes his article with "All in all, this has not been the profession's finest hour" (Krugman, 2011).

## 7.3 Three conclusions behind the analysis

A risk management process is not an exact science where one dwells on the decimal places of results; rather it is management under vector analysis of directions and consequences that should be avoided and areas that should be promoted by the process of management.

Using relevant economic literature that takes into account the context of the changes and the structure of the Ontario economy, we focus on the group of outcomes that relevant economic literature suggests we consider in order to anchor to an expected case of impacts. In of itself, the expected case is a measurement of direction and size, which allow us to support better-informed expectations of what is *at risk*. This allows

[59] Media Release: Canadian economists issue open letter in support of a $15 minimum wage in Ontario TORONTO, ONTARIO--(Marketwired - July 4, 2017)

[60] Committee Documents: Standing Committee on Finance and Economic Affairs - 2017-Jul-21 -.

policy makers to have a conversation of whether the expected outcomes are desirable and intended or whether policy changes or new policies are required to avoid unintended consequences.

The study is about a significant and sudden shock to the economy of Ontario, the results of which question the balance between risk and reward for Ontarians. The three foundations that this conclusion is based upon are:

1. A measure of the anticipated $23B two year cost to firms from the Act to which they will react;
2. A model of the Ontario economy. Attention should then be drawn to Appendix F, which details the key processes at work in our agent-based simulations; and
3. What is to be expected. The expected case reflects our position that that employers will try and avoid up to 80% of the cost (Sections 4 and Appendix C). While the analysis contains results for all potential employer behaviours, any suggestion that discounts the expected result will have to deal the basics of economic theory; that either consumers will bear the brunt of the costs (a faster effect that is not stimulative and one that will increase costs to consumers) or that private capital investment will be negatively affected (a longer term effect as the costs disrupt the equilibrium risk adjusted return on capital), being the very engine of the economy in the long-term.

We frame the results as jobs at risk as nobody knows how or what Ontario businesses will be able to achieve as cost reductions, revenue increases or capital productivity gains, particularly when we consider:

- The world of labour substitution for technology, which Canada has yet to be fully exposed to;
- The indications of uncertainty that the Act represents and the impacts upon private capital investment;
- The 500,000+ workers that enjoy non-union and non-public sector group health plans that cost about $1.2B per annum;
- The likelihood that firms will hire that extra employee;
- The possible age bias of owners of many small businesses towards retirement age. They may simply choose to retire form their increased costs after an extended period of asset price inflation.

## 7.4 The expected case

The selection of the expected case is based upon Canadian and Ontario studies. We argue that given the uniqueness of the Ontario economy, its demographics, its politics and private investment climate, Canadian and Ontario studies are the most relevant source for the purpose of establishing an expectation.

Canadian and Ontario studies that explore the employment effects of minimum wage hikes in Canada estimate negative average employment elasticities with respect to the minimum wage level (Baker, Bejamin, & Stanger, 1999; McDonald & Myatt, 2004; Campolieti, Gunderson, & Riddell, 2006; Sen, Rybczynski, & Van De Waal, 2011).

Godin and Veldhuis (2009) and Gunderson (2007) provide the evidence for Canada and Ontario: a 10% increase in the Ontario minimum wage will decrease employment numbers by 2% to 6% over time (Gunderson, 2007). Gunderson (2007) indicates that a 10% increase in the minimum wage may lead to a 3%-6% decrease in employment among teenagers and slightly less for young adults.

The modelled impacts of the Act upon employment ranges from 120,000 jobs created through to 440,000 jobs at risk of being lost by way of disemployment or the reduction in hiring rates. With the results of the modelling exercise of all business responses, and keeping in mind the scale of changes represented by the Act, and in light of the Ontario literature on the matter we concluded that a minimum wage disemployment effect of -1.5% generally over two years is a reasonable expectation on the basis of:

- The literature suggests up to 6% of disemployment effects for youth and others given a 10% change in minimum wage in Canada. Instead of adopting upward of 15% of disemployment for a near 30% change in minimum wage[61], we had chosen the model output of the range of between 1.5% to 2.3% for youth and adults; and

- The suddenness and significance of the changes. First, the scheduled changes in the minimum wage within the two-year period are much larger relative to past changes, and so are likely to have a greater impact on employment than gradual and periodic increases (Campolieti, Fang, & Gunderson, 2005a; Gunderson, 2007). The scheduled minimum wage increases are the largest increases seen in the past 45 years in Ontario. Since 1971, the average 2-year increase in real minimum wages is 1.49%, with the scheduled increases representing 15 times that average. Economic equilibriums don't like shocks and tend to amplify the negative effects (Gulen and Ion (2016); (Sabia, 2014); (Kang, Lee, & Ratti, 2014)).

When minimum wage increases are combined with other changes (such as equal pay), the disemployment effect increases. Considering minimum wage increases and equal pay only, the expected case of -2.0% change in employment emerges over two years and is decomposed as follows:

- Minimum wage effects: -1.5% (driven by our interpretation of the relevant Ontario literature)
- Equal pay effects: -0.6% (under assumption, refer to Section 4.2.3)
- Combined minimum wage and equal pay: -2.0% of which:
    - -2.3% is expected for workers under 25 year old
    - -2.0% is expected for 25 year old and over
    - -1.9% is expected for men and -2.2% for women

[61] There is some Canadian evidence on the differential effects of large shocks based on the 94-95 wage hikes in B.C. Campolieti (2005a) suggests that 1. Pre-announced and regularly scheduled minimum wage changes have a close to zero differential effect on employment 2. a large one-time minimum wage increase has an adverse employment effect approx. twice as large. More recently, Addison et al. (2012) found similar evidence in the US. Given the estimated elasticities of -0.3 to -0.6, a one-time increase of 30% in the Ontario minimum wage would lead to a 9%-18% reduction in teen employment if it is gradually implemented. If it is a shock, then the effect would be double, approximately a 18%-36% reduction in employment.

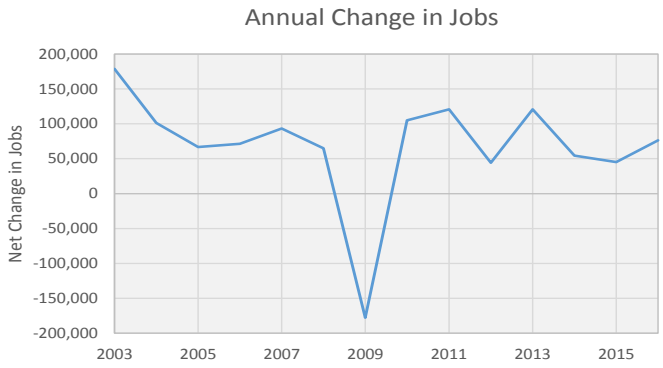
The decompositions, especially by age and sex accord with what the literature would expect. Further, at this choice of the expectation, we note that the model does not produce an expected change in any sector of more than -3.5%.

Given we did not assume any private capital investment rate effects of the uncertainty related to the significance, suddenness and size of the Act (see Section 7.6.1), we feel that we have been **conservative in the determination that it is expected that the Act will, over two years, put 185,000 jobs at risk** of being lost relative to expected job growth without the Act.

## 7.5 THE EXPECTED CASE IN PERSPECTIVE

To put the jobs at risk in perspective, since 2010, an average of 81,000 jobs have been created annually in Ontario. Between 2002 and 2008, an average of 102,000 jobs had been created annually, however from 2008 to 2009, a net loss of 178,000 jobs occurred in the province. This is equivalent to a gross loss of 280,000 jobs in the province compared to what could have been present if there had been no global financial crisis. In other words, the net job impact of the 2009 financial crisis was 3 times greater than the annualized expected jobs at risk (about 92,000 annually) due to Bill 141. Therefore, it is apparent that industries in the province are able to, and have been seen to, respond quickly to external factors far greater than the scale of the Act.

**Figure 65** Annual change in total number of jobs in Ontario (*Source: Statistics Canada, Labour Force Survey*)




In addition, the decrease in net jobs created between 2011 and 2012 was 76,000, and between 2013 and 2014 was 66,000. These slowdowns in jobs growth correspond to 83% and 72% of the two year annualized impact of the Act respectively. Therefore, even within the past few years, historical fluctuations in the annual rate of job creation are similar to the scale of estimated jobs at risk in this analysis.

## 7.6 UNCERTAINTY, OPERATIONAL LEVERAGE AND PRIVATE CAPITAL INVESTMENT

### 7.6.1 POLITICAL UNCERTAINTY AND INVESTMENT

There are aspects of the literature that have not been incorporated into the model yet deserve a mention.

Political changes in a country can have an impact on real economic variables over time. The Act and other significant proposals are being made in Ontario at a time when politicians are gearing up for an election in the latter half of 2018. Investment decisions by Ontario firms are one variable that is likely to be affected.

Intuitively, policy and political uncertainty and changes may be a signal of increased economic uncertainty about future regulations (e.g. fiscal, labour, macroeconomic policy). As a result, some firms may find it optimal to wait for this uncertainty to be resolved before undertaking investments which in turn leads to a delay in economic growth.

Recent evidence (Gulen & Ion, 2016) of this negative relationship between policy uncertainty and corporate investment in Canada, the US and the UK finds that the effect is stronger for firms with:

- Higher degree of investment irreversibility. That is, once an investment it is made it is difficult to reverse or cash-out;
- Firms that are more financially constrained (in the context of minimum wage increases, these firms are the ones that are more likely to be affected by the policy changes)
- Firms operating in less competitive industries (e.g., patented goods - pharmaceuticals, technology etc.)

As such, policy uncertainty and policy constraints favour high liquidity, low fixed capital and high margin firms. Alternatively, policy uncertainty and policy constraints disfavour firms with low financial resources, high fixed operating costs and low margins.

#### 7.6.1.1 SIGNALS OF POLITICAL UNCERTAINTY

Some studies have used elections as a proxy for political uncertainty. According to Gulen and Ion (2016), policy uncertainty tends to spike during events that are likely to cause increases in perceived uncertainty: while the economic conditions have not changed directly, planned policy that increases costs or constraints for business can imply higher uncertainty for some firms. In addition, ex-post broken promises can lead to more perceived uncertainty. For example, if the government defaults on one of its pre-election promises, this can be taken as a signal of higher uncertainty for markets that are not directly impacted by the policy, since the default may be a harbinger of future shocks in other markets. Further, the absence of evident economic analysis carried out by the government further exacerbates the fear and uncertainty as if economic analysis was carried out, the government would likely promote it if it was consequence free in favour of the government's policy.

#### 7.6.1.2 THE BAD NEWS PRINCIPLE

Of course, not all announcements are bad for all investors. According to the bad news principle, firms that are more likely to be negatively affected by the policy changes will respond by cutting down more on their investments, but if other firms take the policy change as "good news", they may even increase investment. Such a situation could occur in Ontario due to minimum wage, spillover and compression effects as:

- Small to medium business enterprises typically operate with less financial flexibility and are unable to risk manage their exposures due to their scale. The Act would count as bad news for such firms;
- Large business enterprises typically have greater financial flexibility and are able to manage their risks and exposures across a large portfolio of locations and customers. The Act might count as good news for such firms as they can weather the uncertainty and cost shocks and wait-out there smaller competitors until they reach a market share that allows them to increase their prices. This increases monopsony power in larger firms which is an unintended consequence of the Act (if one argues that the Act is required because of monopsony power).

### 7.6.2 THE ACT

It is acknowledged that the labor market rigidities are assumed to have a negative association with economic efficiency and have a negative impact on employment and economic welfare (e.g., OECD, 2006; Brenke, 2004; Wey, 2004; Brodsky, 1994). Given the recent financial crisis and increasing global competitiveness, the issue of labor market flexibility has become more important for economic growth. This report presents the impacts of the minimum wage increase and employment standards (e.g., unionisation) that distort the behaviour of the labour market in the form of unemployment levels, changes in product price for consumers, and changes in the profits of the affected firms.

The economy-wide impacts of the minimum wage hike and the tighter employment standards are uncertain. In the context of Ontario, the labor market policy package covering legal minimum wage and employment standards are not moderate. The Act is a policy package that would impose additional risk costs to firms and thereby reduce firms' competitiveness from an increase in the domestic cost of production. To that extent, in response to major cost risks and uncertainty on the ability of firms to absorb the cost of regulation, the proposed policy might squeeze firms' profitability (Draca, Machin, & Van Reenen, 2011). Alternatively, the labor market policy package of Ontario might harm workers in the form of reduced employment (Sabia, 2014) and cut back on wage increases for other higher paid (DiNardo, Fortin, & Lemieux, 1996; Dickens & Manning, 2004) and consumers in the form of higher product prices (Aaronson & French, 2007; Lemos, 2008).

Overall, it is highly controversial on how minimum wages and rigid employment will affect the economy as a whole through changes in the employment levels, profits and future investments of firms, and prices for consumers. In fact, the uncertainty is not only on the impacts but also on the size of impacts during different times. For example, larger negative employment effects (Sabia, 2014) and larger reduction in investments (Kang, Lee, & Ratti, 2014) are inevitable during economic recessions.

Based on the literature, it is reasonable to take the minimum wage policy as a "bad news" for some firms in different sectors and locations. The absence of measures that would protect such firms from the new policy implies greater uncertainty for such firms which are more likely to postpone planned investment. This in turn will negatively impact employment and economic growth in addition to the direct impact of minimum wage hike.

Gulen and Ion (2016) estimate that a one standard deviation increase in policy uncertainty leads to an average decrease in quarterly investment by 6.3% relatively to the average in the sample. The increase in policy uncertainty between 2007 and 2009 could account for up to two-thirds of the total decrease in capital investments during that period.

There is a good case to be made to insert the impact of uncertainty on private capital investment changes. Yet, as previously mentioned, that in the short term we are conservatively assuming no change in demand for capital investment, import or export demand, or income from non-wage sources. In the longer term, if prices increase, it could lead to reduced export demand and increase import demand. This would reduce the impact of any additional consumer spending due to increased wages. If gross operating margins are reduced, investment income from businesses (dividends, capital gains, or owner salaries) could be reduced also resulting in reduced consumer demand. Similarly, if gross operating surpluses are reduced firms may choose to reduce capital investment which could both reduce final demand for goods and services and impede productivity growth in the future.

## 7.7 Small, medium size Firms have a greater share of the costs behind the Act

As raised in Section 3, the Ontario economy is built upon a dominance of private small and medium sized enterprises (SMEs) that employees 56% of the Ontario private labour force which is not limited to just the sectors of accommodation/food, retail trade and business/building/other services.

In the context of minimum wage increases, it has been reported that the Act is primarily a large Ontario business problem[62] as the focus is upon the distribution of the increase with little regard for the incidence of the increase – the other 56% of private Ontario employees that belong to SMEs (of which small businesses make up 71% of all private employees in SMEs).

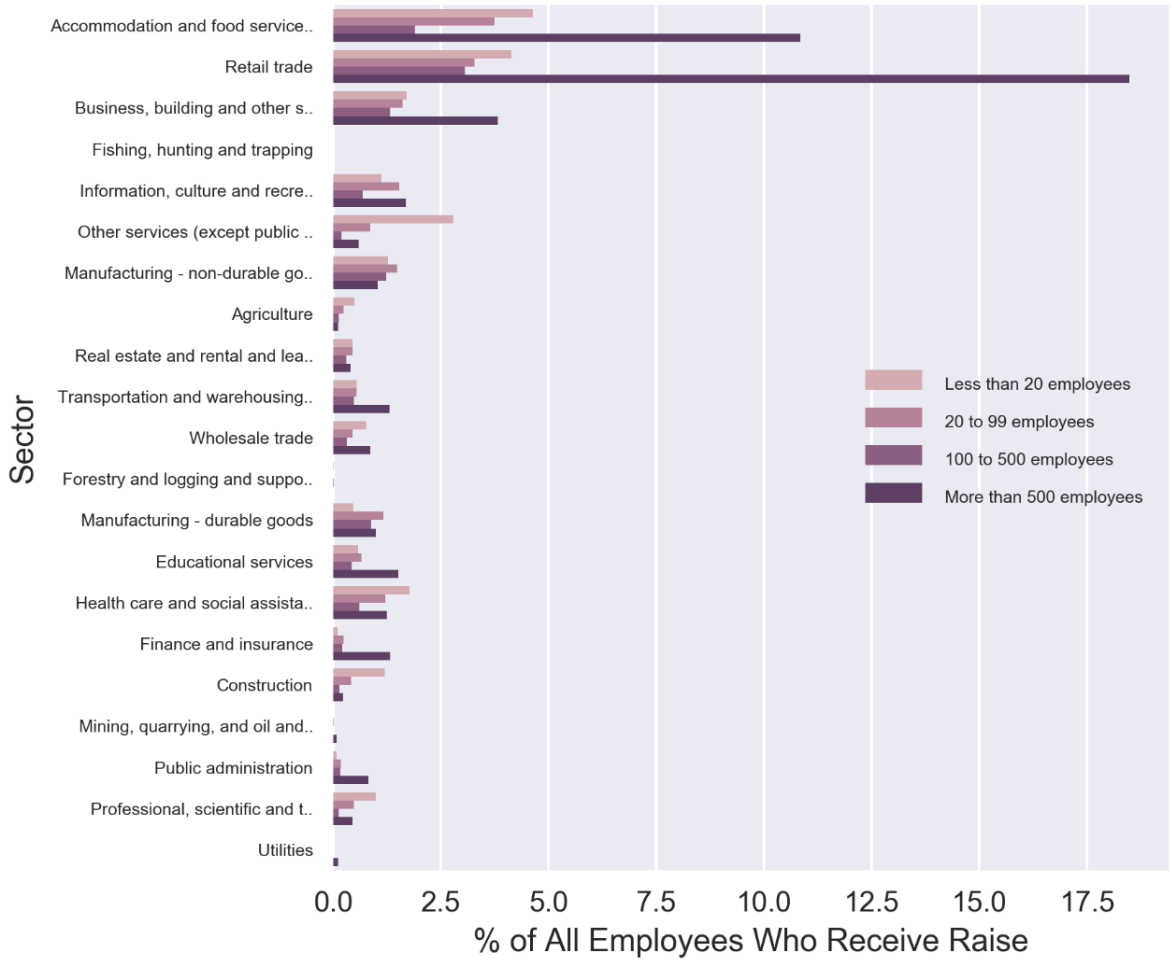
The following makes the case that when conducting economic analysis, it is in the details that exposures and risks to business operations within sectors arise (Stiglitz, Where modern marcroeconomics went wrong, 2017).

### 7.7.1 SME CONSIDERATION AT BELOW $15/HR

Figure 66 shows how one could be misled to think that minimum wage increases are a large business problem in just three industries. It shows the sector and firm size of those employees that will receive a direct minimum wage increase as a percentage of all employees that would receive an increase. This represents the distribution of increases.

[62] McDonald (2017) p. 15 "that's why a $15 minimum wage is a more of a big business issue than a small business one."

**Figure 66** All employees under $15/hr, sector & firm size, percent of employees receiving a direct increase

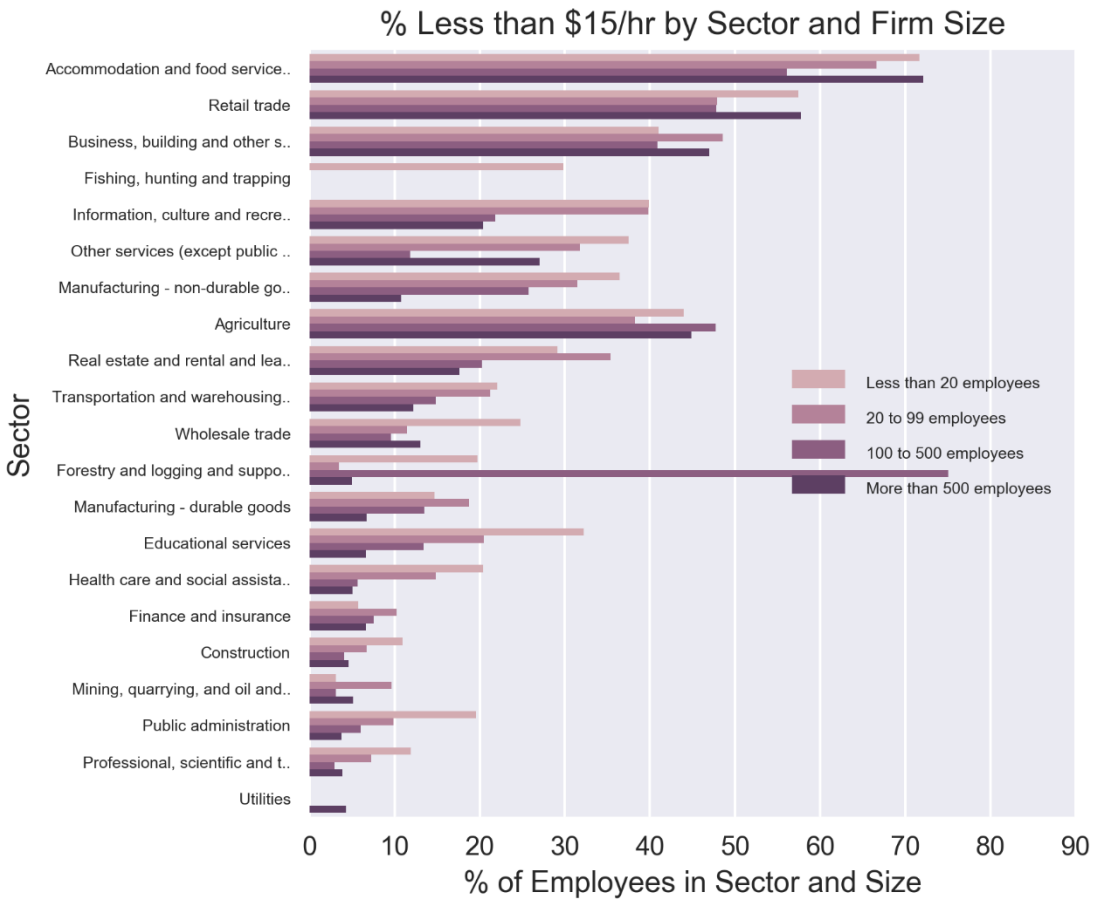



Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

With this representation of the data, large firms in accommodation/food, retail trade and business/building/other significantly dominate the graph.

Figure 67 uses the same data but this time with a denominator of those employees who work in the sector and in what firm size. This is a measure of the incidence of increase and a business's mode of operation and its dependency upon employees that earn $15/hr. Keep in mind that we have kept the data at each firm size description as in Figure 67 where large businesses are in one category while SME's are spread across three categories (less than 20 employees, 20 to 99 employees, 100 to 500 employees) which breaks there size down on the graph.

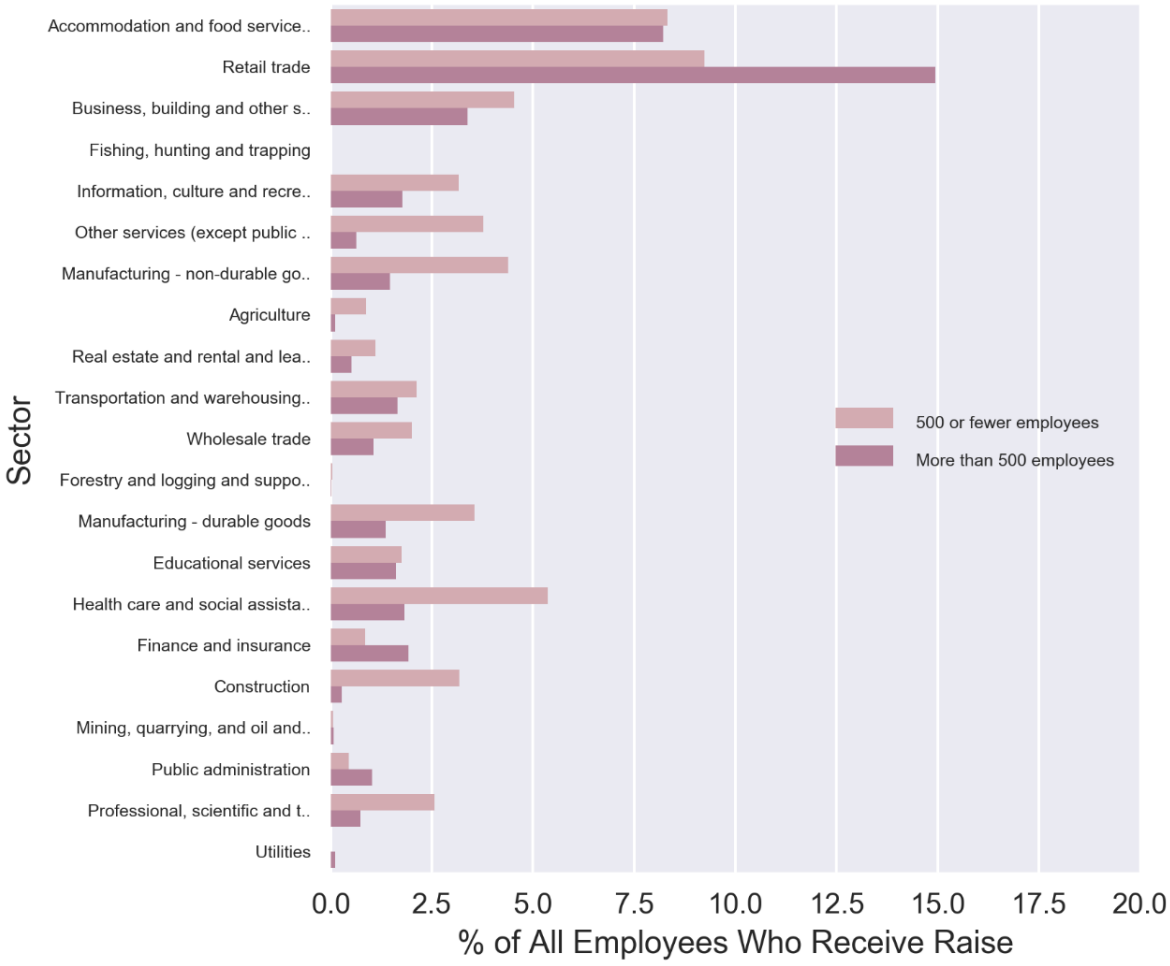
**Figure 67** All employees under $15/hr, by sector & firm size, percent of employees in sector firm size




Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

We can see in Figure 67 the emergence of small and medium business dependency upon those that are paid below $15/hr. By combining small and medium business together to compare SMEs with large Ontario businesses we find a much clearer illustration of the situation. Figure 68 shows that SMEs have greater exposure to employees earning less than $15/hr in every sector with the exception of retail trade. This is an indication of the exposure of SME firms to the direct consequences of the scheduled increase in minimum wages. SMEs, and small businesses in particular, have less of a portfolio effect of the diversification of their business risks when contemplating large changes to the cost of their labour force.

**Figure 68** All employees under $15/hr, sector, SME and large businesses, percent of employees




Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

Figure 68 brings home the point that while some analysts showcase the large firms in the accommodation/food and retail trade sectors as dominating the exposure to minimum wage increase, by combining SMEs into one category the exposure becomes much clearer. While large businesses dominate in the retail trade sector, we find that:

- All SMEs account for 57% of private employees earning less than $15/hr;
- SMEs and large businesses are equally exposed in accommodation/food;
- SME exposure in other private sectors dominates both SMEs in accommodation/food and retail combined by 1.75 times.

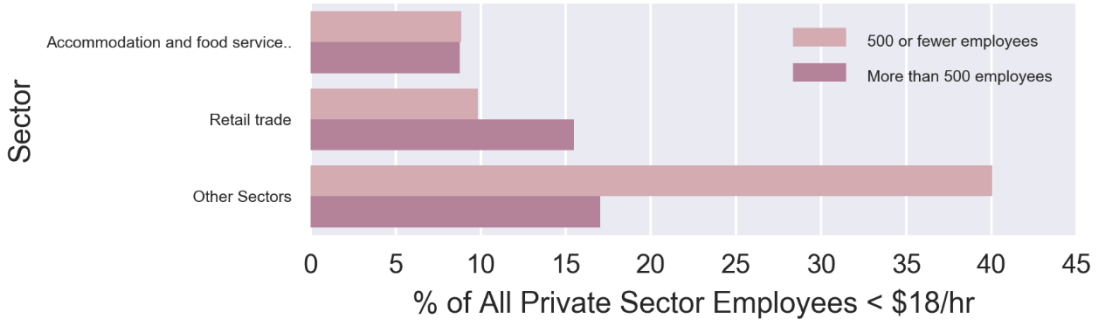
Attention was drawn to this issue in Section 3 which is an operational business risk expression of the exposure of SMEs to the 1.4 million private sector employees earning less than $15/hr with SMEs accounting for 800,000 employees (17% of Ontario's private employee base). While the case is made at the

level of those private employees that that earn less than $15/hr, we now turn our attention to those that earn below $18/hr as a demonstration of the scale of the effects caused through spillover for SMEs.

### 7.7.2 SME CONSIDERATION AT BELOW $18/HR

Considering the distribution of employees earning less than $15/hr pay we found that a significant proportion of those employees within a sector to belong to SME firm sizes. When we expand the analysis to those earning below $18/hr (Figure 69), we find that the SME dependency on those private employees expands from 31% to 45% of all their employees.

**Figure 69** Private employees under $18/hr, SME and large businesses, percent of employees




Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

While Figure 69 provides a summary of the exposure of SMEs to cost of labour, Figure 70 shows the labour cost exposure for firms to all those employees currently earning less than $18/hr.

**Figure 70** All employees under $18/hr, SME and large businesses, percent of employees


Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

Figure 70 delves into the firm size of each industry by minimum wage increases and spillover effects for those earning less than $18/hr. We find that the exposure for small and medium firms alike grows in all industries, with small businesses of less than 20 employees have a higher proportion of their employees expecting a pay rise in comparison to large firms (more than 500 employees).

Table 8 compares how much of a business's employment base is exposed to wage increases and which firms sizes tend to shoulder the greater proportion of the changes. The table shows there are no instances where large businesses (with percent of employees below the wage rate of $18/hr) exceed that of small businesses. Included in Table 8 are the indications (red text and numbers) of which sectors include high growth firms that dominate the top 50% of industry sectors[63] and have more than 25% of their employees under $18/hr. As can be seen, minimum wage increases and the related spillover effects dominate those sectors that will be most affected which suggests that some of the growth in those sectors will be put at risk.

[63] As per Innovation, Science and Economic Development Canada Key Small Business Statistics June 2016

Table 8 Proportion of employees under $18/hr as a percent of sector and firm size

| | All Employees, Percent | | | Proportion of Employees Less than $18/hr* | | | Exposure of Firm Size as a Ratio of Large Firms** | | Share of SME change of wage changes under $18/hr |
|---|---|---|---|---|---|---|---|---|---|
| | Large | SME | Small | Large | SME | Small | SME | Small | |
| Accommodation and food services | 49% | 11% | 40% | 85% | 73% | 86% | 0.9 | 1.0 | 50% |
| Retail trade | 60% | 13% | 27% | 71% | 64% | 71% | 0.9 | 1.0 | 39% |
| Agriculture | 11% | 12% | 77% | 62% | 67% | 70% | 1.1 | 1.1 | 90% |
| Business, building and other support services | 42% | 17% | 40% | 67% | 58% | 68% | 0.9 | 1.0 | 57% |
| Information, culture and recreation | 43% | 17% | 40% | 31% | 29% | 60% | 1.0 | 2.0 | 68% |
| Manufacturing - non-durable goods | 44% | 21% | 35% | 24% | 40% | 58% | 1.7 | 2.4 | 73% |
| Other services (except public administration) | 16% | 12% | 72% | 46% | 21% | 55% | 0.5 | 1.2 | 85% |
| Educational services | 16% | 16% | 67% | 45% | 30% | 52% | 0.7 | 1.2 | 84% |
| Real estate and rental and leasing | 34% | 24% | 42% | 39% | 31% | 49% | 0.8 | 1.3 | 67% |
| Transportation and warehousing | 50% | 19% | 31% | 31% | 39% | 46% | 1.3 | 1.5 | 59% |
| Health care and social assistance | 29% | 21% | 50% | 26% | 27% | 41% | 1.0 | 1.6 | 78% |
| Fishing, hunting and trapping | 0% | 0% | 100% | | | 41% | | | 100% |
| Manufacturing - durable goods | 49% | 21% | 30% | 14% | 36% | 36% | 2.6 | 2.6 | 73% |
| Mining, quarrying, and oil and gas extraction | 75% | 13% | 12% | 9% | 5% | 35% | 0.6 | 3.9 | 42% |
| Wholesale trade | 39% | 20% | 41% | 25% | 25% | 35% | 1.0 | 1.4 | 67% |
| Construction | 19% | 14% | 67% | 9% | 12% | 27% | 1.3 | 2.9 | 92% |
| Professional, scientific and technical services | 37% | 15% | 48% | 10% | 9% | 25% | 0.9 | 2.5 | 78% |
| Finance and insurance | 74% | 11% | 16% | 15% | 19% | 23% | 1.3 | 1.5 | 34% |
| Forestry and logging and support activities for | 22% | 11% | 67% | 17% | 88% | 20% | 5.2 | 1.2 | 86% |
| Utilities | 74% | 8% | 18% | 7% | 0% | 17% | 0.0 | 2.5 | 39% |
| Public administration | 84% | 0% | 16% | 39% | | 13% | 0.0 | 0.3 | 6% |

* Percent of sector. ** Firm size proportion of employees less than $18/hr divided by large firm proportion of employees less than $18/hr.
Source: Labour Force Survey PUMF January to July 2017, CANCEA 2017

## 7.8 Labour substitution, automation and jobs at risk

The term "jobs at risk" is not new, particularly when describing the impact of employer decisions to review their labour decisions in the face of cost constraints and the use technology to replace workers (Citi GPS, 2016). There is opportunity for firms to restructure their labour force by way of automation to reach higher productivity levels in response to increased costs of labour.

The use of robotics in the re-engineering of firms production choices have been occurring for at least four decades, with the trend showing signs of acceleration since 2009. For example, average robot sales have increased by 17% per year[64] in the period from 2010 to 2014 representing an almost six fold increase on 2004 to 2008 growth rates. For 2014, the growth rate of robot sales reached almost 29%.

It is helpful to keep in mind that such growth in robot sales had occurred during lacklustre industrial production growth since 2009. Researchers in the field (Citi GPS, 2016) attribute the growth rates to the aging of the population and cost of labour in large manufacturing-producing countries, surprisingly "especially China".

China, Germany, Japan, Korea, and the US make up about 75% of industrial demand for robots globally with China representing the fastest growing market. It is difficult to think that Canada generally and Ontario specifically would be immune from these trends. Sirkin, H. et al. (2015) estimates that robots will eventually perform about 40% of production tasks versus less than the current levels of 10%.

Automation has been one of the dominant forces that has threatened low-skilled jobs in the United States in recent decades (Autor & Dorn, 2013; Autor, Dorn, & Hanson, 2015). Of the jobs at risk from automation, "jobs in transportation, logistics, as well as office and administrative support, are among the most susceptible" with "low-skilled jobs are the ones that are most susceptible to automation in the future". "The pace of displacement in service occupations is also expected to increase" (Citi GPS, 2016).

Consistent with the literature on technology and employment, Lordan and Neumark (Lordan & Neumark, 2017) find that analysis of the period from 1980 to 2015 demonstrated a relationship between increasing minimum wages decreases the share of automatable employment held by low-skilled workers significantly, and increases the likelihood that low-skilled workers in automatable jobs become unemployed.

> "Our work suggests that sharp minimum wage increases in the United States in coming years will shape the types of jobs held by low-skilled workers, and create employment challenges for some of them. Our findings identify some workers on whom the more general minimum wage literature is silent, but who are vulnerable to substitution of machines for people. Given data limitations, we cannot address the permanence of the effects. However, the decision to use labor-saving technology seems likely to be relatively permanent, especially if – as is becoming increasingly common – minimum wages are indexed so that a minimum wage increase results in permanently higher relative costs of low-skilled labor"

[64] Compound average growth rate.

Aaronson and Phelan (2017) minimum wage increases lead to job losses for cognitively-routine jobs. Is has been estimated that about 47% of US jobs are at risk from automation, with different regions and cities having different "job risk" (Frey & Osborne, 2013)[65].

Canada recently signalled its foray into automation by robotics with a 49% surge in 2015. Although, Canada lags behind Mexico by a factor of 1.6 to 1 (International Federation of Robotics, 2016).

## 7.9 Other effects of the Act

Remembering that at the time of writing this report, there have been no other economic analysis of the Act. Instead think tanks have contemplated the benefits of the Act with claims of:

- Less turnover: There is strong evidence of such an effect under normal circumstance (Brochu and Green (2013)), however given the size and significance of the Act, we doubt that the cost savings are sufficient to counteract the large looming costs for Ontario businesses. Notwithstanding, this effect was considered in setting our assumed labour overhead cost adjustment to a lower net 0.5% increase of part-time wages;

- Better health outcomes: We agree that there could be better health outcomes for those people with a job and group health insurance. However, there are two issues that require some thought:

    - Health outcomes for those people that could have had a job but don't are likely to be lower;

    - Many Ontario employees enjoy group health benefits that are not a part of a collective bargaining agreement. Such a discretionary benefit provided to employees by firms that seek to reduce their increased costs are likely to be at risk either partially or all together. This means that some employees that have benefited from prescription coverage may be left without coverage. Morgan et al. (2015) report that one in six hospitalizations in Canada could be prevented if prescription drugs were used more appropriately. This figure would grow if employees were to be denied group health benefits which is potentially at risk under the Act[66].

[65] The least at risk group range from Boston (38.4%) to New York (40.7%) to San Francisco (41.7%) (Frey & Osborne, 2013).

[66] Private conversations with several Ontario businesses suggest this to be an area in which cost recovery is contemplated.

## 7.10 Rationalizing the Act: Economic decision theory

If this analysis suggests that there is more risk than reward, then a natural question becomes "why do it?"

While the analysis of the Act does not include the association of probabilities to outcomes, both intuition and education strongly suggests that there is more risk than reward given:

- In the space of outcomes generated by the model, the risk outcomes in terms of jobs are over represented by 2.7 times more than the reward outcomes; and
- The Ontario economic literature signal more risks that rewards in the aggregate.

It is therefore useful and interesting to put the Act in the context of what economic decision theory would say about the situation. As a model explaining decision making under conditions of risk, prospect theory, cumulative prospect theory and other rank-dependent theories provide a description of the relationship between contingencies in the form of gains and losses and individual risk propensity. Such decision theories have been influential behavioral theories of choice in the wider social sciences, particularly in psychology and economics (Kahneman & Tversky, 1979; Kahneman, Slovic, & Tversky, 1982) in issues of political science (Druckman, 2001; Lau & Redlawsk, 2001; McDermott D. , 2004; Mercer, 2005; Quattrone & Tversky, 1988); and in international relations (Berejikian, 1997; 2002; Faber, 1990; Jervis, 1994; 2004) (Levy, 1994; 1997; McDermott R. , 1998), international political economy (Elms, 2004), comparative politics (Weyland, 1996; 1998), American politics (Patty, 2006), and public policy (McDaniel & Sistrunk, 1991).

A central tenant of these theories is that when people are a faced with gains (rewards), they have the tendency to trade reward for risk (risk aversion). When faced with losses they are more likely to choose to gamble and become risk seeking even though the expected payoffs are lower than a safer option.

Aktipis and Kurzban (2004) highlight the importance of foraging theory for economic models of choice and decision making and McDermott, Fowler and Smirnov (2008) do the same for models of politics. Essentially, these studies show that that the best-surviving strategy changes depending on the environment. When resources are plenty and you are getting what you want, the safe choice yields a probability of survival that is higher than the risky choice. When resources are scarce, or you are not getting what you want, risky choice improves the probability of survival. As per McDermott, Fowler and Smirnov (2008), "When individuals have nothing to lose, it makes sense for them to engage in risky behavior with the hope that it will keep them alive through the next period."

To rationalize the Act in the context of economic theory is to conclude that the risk taking behaviour of the policy makers suggest that they have more to gain than lose, or that they have nothing to lose.

## 7.11 The Act and inequality

The IMF finds that the key drivers of inequality are the skill premiums associated with technology, which has been good for growth and productivity, combined with the decline of some labour market institutions. Better education, health care and "targeted social policies" can assist in mitigating inequality. But the IMF warns that:

> "There is no one-size-fits-all approach to tackling inequality. The nature of appropriate policies depends on the underlying drivers and country-specific policy and institutional settings. In advanced economies, policies should focus on reforms to increase human capital and skills, coupled with making tax systems more progressive."
>
> (Dabla-Norris, Kochhar, Suphaphiphat, Ricka, & Tsounta, 2015)

Beyond the improvement in employee rights and fair pay, we not only believe that the policy combinations of the Act in isolation will not relieve inequality in Ontario, we believe that it will exacerbate inequality as it favours those that can withstand the significance, suddenness and size of the changes such as large, technologically savvy organizations and those people that have a job. Our primary criticisms include:

- One-size-fits-all approach: The devil is in the detail of the differences between different economic agents. In the face of significant increases in inequality, for both households and firms, a one size fits all approach will have undesirable consequences. For many advanced countries there has been an exacerbation of net income inequality, which are hallmarks of problems associated with the way the government taxes and transfers funds between different economic agents (Hungerford, 2013). Tax regimes can affect the way people choose to receive income and gains. Differential capital gains tax and income tax treatment is an example;
- Redistribution inefficiency: The number of households that are dependent upon SMEs is significant in Ontario and the Act represents a significant amount of risk for SMEs which could lead to an exacerbation of wealth and income inequality.

Also recall that in Figure 19 most of the dual income couples and single households have lower NCARs (before and after government transfers), yet these cohorts will receive 74% of the minimum wage benefits.

While stronger labor market institutions could reduce the wage differential between high-skill and low-skill workers with a complementary effect on labours share of income, they are also know to increase unemployment rates and have an ambiguous effect on inequality through the wage sharing mechanism (Dabla-Norris, Kochhar, Suphaphiphat, Ricka, & Tsounta, 2015).

Further, it is clear that minimum wage policies are an ineffective instrument for reducing poverty (Mascella, Teja, & Thompson, 2009) as a majority of workers who will be affected by the policy are not members of poor households. In 2012, 83.4% of workers who lived in poverty (below the LICO threshold) earned more than the minimum wages (Murphy, Lammam, & MacIntyre, 2016).

## 7.12 Avoiding the Risks to Jobs: Policy Alternatives

In order to maintain current employment growth, in conjunction with the Act, the Ontario Government would have to:

- Induce firms to limit the reduction in employees and price increases;
- Counteract the reduction in profit margins that firms would otherwise have to absorb. Sufficient margins must be maintained for long term capital investment

Yet, given the size of the implications for Ontario businesses, $23B over two years, it is difficult to construct policy alternatives within the framework of the Act. Said differently, the size of the cost consequences behind the Act swamp any concessions that policy makers could make back to Ontario businesses. For example the $23B cost over two years consequence would require:

- Corporate tax rate concessions of a 100% rebate back to Ontario businesses by the Ontario government; or
- Ontario employer health tax concessions of a 100% rebate back to Ontario businesses by the Ontario government which would still leave a residual cost balance of about $8B for Ontario businesses over two years; and
- Ontario electricity industry cost concessions of a 100% rebate back to Ontario businesses by the Ontario government which would still leave a residual cost balance of about $8B for Ontario businesses over two years.

None of which would be plausible in the current environment. If partial concessions were to be contemplated, the following table of heuristic results may help:

| | | Annual Gross Operating Surplus Equivalent | Effective Propensity to Reduce Profit Margins | Jobs at Risk over 2 years | Additional Cost to Governments | Comments |
|---|---|---|---|---|---|---|
| Expected Case | | | 21% | 185,000 | n/a | |
| Corporate Tax Rate Reduction | 1 point | $0.9B | 33% | 152,000 | $0.9B | Base Ontario rate of 11.5% |
| | 2 point | $1.9B | 36% | 120,000 | $1.9B | |
| | 3 point | $2.9B | 57% | 89,000 | $2.9B | |
| Small Business Tax Rate Reduction (Based on $1,775M Ontario | 1 point | $0.4B | 26% | 171,000 | $0.4B | Base Ontario rate of 4.5% |
| | 2 point | $0.8B | 32% | 157,000 | $0.8B | |
| | 3 point | $1.2B | 38% | 143,000 | $1.2B | |
| Training Grants (Annual) | $1B | $1B | 34% | 151,000 | $1B | |
| | $2B | $2B | 47% | 116,000 | $2B | |
| Longer Implementation | 3 years | $0.4B | 21% | 103,000 | $0 | Impact over the next two years; assuming |
| | 5 years | $0.7B | 21% | 49,000 | $0 | |
| Reduction in Business Education Tax (Based on $1.8B from 2015 | 10% | $0.2B | 23% | 179,000 | $0.2B | Impact likely less than stated since due to credits or excemptions |
| | 20% | $0.4B | 26% | 173,000 | $0.4B | |
| | 50% | $0.9B | 33% | 154,000 | $0.9B | |
| Reduction in Health Tax (Based on expected $6,117M in 2017) | 10% | $0.6B | 29% | 164,000 | $0.6B | Impact likely less than stated since small businesses may not be |
| | 20% | $1.2B | 37% | 143,000 | $1.2B | |
| | 50% | $3.0B | 60% | 80,000 | $3.0B | |

https://www.fin.gov.on.ca/en/budget/fallstatement/2016/transparency.html
https://www.fin.gov.on.ca/en/budget/finances/2017/ofin17_1.html
**If there is an increase in the propensity to reduce profit margins, it is assumed that the other propensities will be reduced in proportion to current values**
**It is assumed that 100% of offsets would go towards mitigating impact of Bill 148**

The effect of a longer term implementation of the Act over 5 years is noteworthy.

# 8. CONCLUSION

The Act is a major piece of legislation that represents significant and sizeable changes for the Ontario economy that will need to be digested by Ontario businesses within a relatively short period of time.

The Act is an attempted redistribution from Ontario businesses to Ontario employees in the amount of $23B over the period to the end of 2019. The significance of the $23B is cast against it equaling all of the corporate income taxes that the Ontario government will receive over the next two years. Alternatively, it represents 21% of the non-residential private capital investment made by industry in the province.

Given the size, significance and suddenness of the changes behind the Act and the unknown reaction of Ontario businesses to avoid these increased costs, the consequences are unknown. The messages that accrue from the economic literature is that employers will attempt to avoid the costs and it is not a question of if jobs are at risk, but rather how many jobs will be at risk.

While the results of analysis show a range of employment outcomes, from 121,000 jobs created through to 437,000 jobs lost, Ontario economic literature indicates that firms will behave in manner where 185,000 jobs are at risk in response to the Act. Consistent with this expectation of jobs at risk are a variety of outcomes for consumers (households) and Ontario employers. If costs are passed onto consumers, Ontario households might have to pay upward of $1,300 per annum on consumer products while if Ontario businesses absorb more, firms could forfeit up to $3.5 billion of gross operating surplus annually. It ultimately depends upon bargaining powers between employees and employers, the propensity of consumers to pay more, and the willing of businesses to continue to operation at their current expected rates.

The key mechanisms of the Act have been shown by the literature not to remedy poverty in any material way, this analysis shows that wealth inequity is expected to grow. Further, while the Ontario economy is dependent on small and medium sized businesses to employ 57% of its private workforce, the Act exposes small and medium firms to significant cost pressures that they may have difficulty managing given their relative lack of ability to risk manage through location and customer diversification., Larger businesses may "wait them out" in anticipation of greater future market shares. Coupled with the fact that Ontario has a historically low levels of private capital investment to support future labour growth, we would expect turbulence in Ontario labour markets over the coming years.

Our risk assessment of the Act is that there is *more risk than reward* for the Ontarians despite the stated goal that the Act attempting to assist low income households and the Ontario economy. To rationalize why policy makers would choose to self-inflict such uncertainty is outside the scope of this analysis, but would involve a behavioural economics exploration of why agency sometimes take greater risks than their principals might want to bear. Finally, given the risk of consolidating income and wealth inequality and the risks that SMEs will be exposed to their larger competitors, these consequences of the Act are likely to be viewed as unintended.

## 8.1 Future research

The primary challenge of evaluating the impact of the Act is the uncertainty associated with employer responses. Our response was to adopt a risk assessment approach of the possibilities and refrain from associating probabilities with the outcomes. Rather, we considered Ontario economic literature sufficient to guide a determination of what could be expected and imply a range of employers' responses within that expectation.

The implementation of the Act represents a rich opportunity for further research, given it is akin to one of Ontario's largest socio-economic experiments in over 45 years. The economic literature is dominated by after-the-fact analysis that attempts to tease out the effects in the face of a multitude of confounding variables. Further research would be well served if data were to be collected through monitoring the response of Ontario business *in vivo* to provide researchers with data sets they can analyse for themselves. In this regard, an Ontario firm registry of business plans and changes would be an accommodating vehicle.

Lastly, further research would benefit from other independent economic evaluation of the Act. At the time of our analysis, there had not been any other econometric analysis of the Act.

# A. GENERAL CHANGES BEHIND THE ACT AND MODEL INPUTS

## A.1. GENERAL CHANGES ASSOCIATED WITH THE ACT

**Table 9** Minimum wage increases

| Minimum Wage Increases | Sept 2017 | Jan 2018 | Jan 2019 | 2022 | 2025 | Long term | Model Input |
|---|---|---|---|---|---|---|---|
| General Minimum Wage | $11.60 | Up 20.7% | Up 7.1% | CPI | CPI | CPI | Hourly rate |
| Students under 18 who work not more than 28 hours per week | $10.90 | Up 20.6% | Up 7.2% | CPI | CPI | CPI | Hourly rate |
| Liquor Servers | $10.10 | Up 20.8% | Up 7.0% | CPI | CPI | CPI | Hourly rate |
| Hunting and Fishing Guides | $58 or $116 | Up 20.6% | Up 7.1% | CPI | CPI | CPI | Hourly rate |
| Homeworkers | $12.80 | Up 20.7% | Up 7.1% | CPI | CPI | CPI | Hourly rate |

**Table 10** Proposed changes to employment standards

| Proposed Changes to Employment Standards | Jan to April 2018 | Temporal adjustment | Model Input |
|---|---|---|---|
| Equal Pay for Equal Work Provisions | Age and sex alignment of part-time hourly rates (distribution) with full –time hourly rates (distribution) | Occurs by the end of 2018 | Hourly rate |
| Equal Pay for Equal Work Provisions: Temporary Help Agency Employees | Sector specific hourly rates (distribution) aligned with full –time hourly rates for all sectors (distribution) | Occurs by the end of 2018 | Hourly rate |

| Proposed Changes to Employment Standards | Jan to April 2018 | Temporal adjustment | Model Input |
|---|---|---|---|
| Equal Pay for Equal Work Provisions | Age and sex alignment of part-time hourly rates (distribution) with full –time hourly rates (distribution) | Occurs by the end of 2018 | Hourly rate |
| Equal Pay for Equal Work Provisions: Temporary Help Agency Employees | Sector specific hourly rates (distribution) aligned with full –time hourly rates for all sectors (distribution) | Occurs by the end of 2018 | Hourly rate |
| Termination of Assignment; Scheduling; Overtime Pay; Employee Misclassification; Paid Vacation; Paid Emergency Leave; Leave for the Death of a Child and for Crime-Related Disappearance; Family Medical Leave; Physician Notes for Absences; Penalties for Non-Compliance of the ESA; Interest on Unpaid Wages; Collections | General cost of labour sensitivity analysis | Full impact of sensitivity scenario occurs by the end of 2018 | Labour and regulatory administration costs |
| Union Certification<br><br>Fines | General increase of unionization sensitivity analysis<br><br>Age and sex alignment of non-union hourly rates (distribution) with union hourly rates (distribution) | Full impact of sensitivity scenario occurs by the end of 2020 | Hourly rate<br><br>Labour and regulatory administration costs |

# B. DEFINITION OF NEEDS CONSUMPTION AFFORDABILITY RATIO

CANCEA has developed numerous indicators related to the consumption of "necessary" goods and services – those things deemed to be required for living a "reasonable" lifestyle. (Note that "needs" here can include a portion of a specific good or service, insofar as households may overconsume such things relative to their needs.) Specifically, the *Needs Consumption Affordability Ratio* (NCAR) incorporates the household consumption of necessary goods and services as a portion of disposable income (after paying taxes and debt obligations).

$$NCAR = \frac{Shelter\ related\ needs + other\ needs}{(Discretionary\ income)}$$

## B.1. COMMODITIES LIST

The following lists provide household consumption commodity groups utilized (partially or wholly) for the construction of NCAR. In cases where the group is not entirely used, assumptions are provided. Further, margins (i.e., transportation, wholesale, and retail) are proportionally reduced (i.e., assumes all margins for the group are uniformly distributed per dollar consumed).

Necessary shelter-related commodity groups (including transportation) include (partially or wholly):

| |
|---|
| Paid and rental fees for housing |
| materials and services for the maintenance and repair of the dwelling |
| electricity, gas, and other fuels |
| water supply and sanitation services |
| new passenger cars, trucks, vans and sport utility vehicles |
| used motor vehicles |
| other vehicles |
| spare parts and accessories for vehicles |
| fuels and lubricants |
| maintenance and repair of vehicles |
| parking |
| railway transport, urban transit, and interurban transit |
| other transport services |
| insurance related to transport |
| property insurance |

*Items where the category is only partially included:*

- **Other services related to the dwelling and property**: Excludes: Investigation and security services; Private household services (except babysitting).
- **New passenger vehicles**: assumed to be 17.15%, which is average of spending on new cars by bottom two quintiles in United States (see here) – there are reasons why a new car could be more desirable than a used car, largely pertaining to availability of specific features, fear/risk of sellers, warranties, financing terms, and capital/expense allocation.
- **Spare parts and accessories for vehicles**: assumed to be 50% to reduce overconsumption.
- **Fuels and lubricants:** assumed to be 60% (other than Diesel) to reduce social, recreational, and other car trips. See Table 5 in National Household Travel Survey from the US, annual person-miles traveled.
- **Rail transport**: assumed to be 10% to remove train travel for vacation purposes. Uses passenger revenues on GO Trains ($437.9m*(54.2/68.7 passengers on GO trains) = $345m) as % of total urban transport.
- **Interurban bus:** Excludes: Scenic and sightseeing tour services. Remaining assumed to be 10% to only include bus travel for commuting purposes ($437.9m GO Transit revenue * (14.5/68.7 passengers on GO trains) = $92m + a little more for other municipalities).

Other necessary commodity groups include (partially or wholly):

| |
|---|
| food and non-alcoholic beverages |
| garments and footwear |
| cleaning of clothing |
| clothing materials, other articles of clothing and clothing accessories |
| furniture and furnishings |
| carpets and other floor coverings |
| household textiles |
| major household appliances and small electric household appliances |
| other non-durable household goods |
| repair of personal and household goods except vehicles |
| pharmaceutical products and other medical products |
| hospital and out-patient services |
| telecommunication equipment and services |
| health insurance |
| personal grooming services |
| other appliances, articles and products for personal care |
| child care services |

*Items where the category is only partially included:*

- Food: Excludes: live animals; raw fur skins; chocolate and confectionary goods; ice cream and frozen desserts; Cookies, crackers and baked sweet goods; Snack food products and Flavouring syrups, seasonings and dressings.
- Non-alcoholic beverages: Excludes: Bottled water, soft drinks and ice.
- Clothing/footwear: assumed to be 50% to reduce overconsumption.
- Cleaning of clothes: assumed to be 50% to limit expenses on dry cleaning.
- Furniture and furnishings: Excludes: Office furniture; Custom work, other manufacturing production services; remaining items assumed to be 50% to reduce over consumption.
- Carpets and other floor coverings: assumed to be 50% to reduce over consumption.
- Household textiles: Excludes: Blinds and shades – which are also included in furniture and furnishings (assumption is that these are more utilitarian than textiles).
- Major household appliances: assumed to be 50% to reduce over consumption.
- Small electric household appliances: assumed to be 50% to reduce over consumption.
- Other non-durable household goods: Excludes: sand, gravel and clay; paper; paperboard containers and other converted paper products; lubricants; Other basic organic chemicals; Pesticide and other agricultural chemicals; Chemical products not elsewhere classified; numerous plastic goods; Rubber products, not elsewhere classified; Aluminum and aluminum-alloy semi-finished products; Springs and wire products; Threaded metal fasteners and other turned metal products; Industrial and commercial fans and blowers, and air purification equipment; Other miscellaneous general-purpose machinery.
- Soaps and cleaning compounds assumed to be 50% to reduce overconsumption.
- Telecommunication equipment/services: assumed to be 65% to reduce over consumption, based on proportion of landline + 1/2 of cell phone expenditure (CANSIM Table 203-0021).
- Personal grooming services: assumed to be 50% to reduce over consumption.
- Other appliances, articles and products for personal care: Excludes: Other miscellaneous goods.
- Soaps and cleaning compounds and Hand tools and cutlery assumed to be 50% to reduce overconsumption.

# C. ECONOMICS

## C.1. ECONOMICS OF MINIMUM WAGE INCREASES, SPILLOVER AND COMPRESSION

In contrast to the majority of studies around minimum wages, our research estimates the economic impact of *upcoming* minimum wage policies in Ontario. Instead of attempting to disentangle aggregate labor market effects of policy changes that took effect in the past, our approach is an ex-ante analysis of simulating the potential effects to key macroeconomic variables (e.g. employment growth), focusing on understanding the range possible outcomes that different behavioral assumptions about firm response may produce. Our simulations begin with the case in which the firm absorbs all of the costs and extend to cases involving different degrees of pass-through in the form of higher prices to consumers and various changes in the levels of employment of labour. We use the existing literature, with particular attention to studies based on Canadian and Ontario data, to guide us in terms of selecting ranges of possible values of the response coefficients to use in our ex-ante analysis and to judge the likelihood of different possible combinations of responses in the context of the present-day Ontario economy. Our agent-based model analyzes the possible implications on many macroeconomic variables of interest for each possible combination of firm responses, allowing us to deliver a level of detail that is absent in most public reports.

The starting point for the analysis is the simple fact that while workers whose wages are increased will benefit, these benefits must of necessity involve costs somewhere else in the system. The effects of an increase in the minimum wage cannot be analyzed as if the increase were a simple transfer to minimum wage workers: because the employer is paying the higher wages out of the firm's revenue stream, the analysis must begin with a consideration of the employer's possible responses. These responses can, broadly speaking, be grouped under three headings:

1) Reducing profit margins or exiting the business.

2) A reduction in employment of minimum wage labour, through reductions in output and through substitution away from minimum wage workers in the firm's hiring decisions, either in the short or the long run.

3) A pass-forward of the cost increase to consumers in the form of higher prices.

Unless all firms in Ontario choose the first option, workers and consumers in Ontario will bear some of the costs of the policy changes. Yet, even if it were true that the costs of the upcoming measures were to be paid in their entirety by a reduction in firms' profit margins or market exit, it need not necessarily be true that the beneficiaries of the redistribution effects that would follow are the poor and the underpaid workers in Ontario. For example, some firms may respond by delegating research that aims to resolve the uncertainty about the implications of the Act on their operational costs (for example, hiring lawyers and optimization analysts to become better informed about their flexibility on distributing their costs over the above response categories).

## EVIDENCE IN FAVOUR

The main argument in favor of minimum wage hikes is that they reduce income inequality as the low-paid workers will receive more income per hour of employment. If low-paid workers live in households that are below the poverty level, the minimum wage increase may also help reduce poverty. The workers that will benefit from the wage increase will also spend most of that extra income on goods and services in local markets which will stimulate the economy. Moreover, in the presence of labor market imperfections, such as monopsony power, an increase in the minimum wage may even increase employment rates and improve efficiency.[67]

Studies have found evidence of a positive impact on employment from minimum wage hikes in certain countries. A stark example is the evidence from China: The majority of recent studies report positive employment effects in state-owned businesses, in consistence with the monopsony assumption (Ni, Wang, & Yao, 2011; Wang & Gunderson, Minimum wage effects on employment and wages: dif-in-dif estimates from eastern China, 2012). In the US and UK, among other countries, the employment effects are less clear cut, with some studies reporting large and positive effects and others large but negative.[68]

Some authors have claimed that peer-reviewed journals have selectively published studies that report negative employment effects from minimum wage increases, and that the true effects are negligible or positive. Giotis and Chletsos (2015) use meta-regression analysis to argue that this has been the case recently. However, less than 1.5% of their observations are estimates for the Canadian economy, suggesting that there are very little, if any, grounds reasons to disregard the existing literature that reports Canadian estimates on the grounds of publication selection bias.

Research papers that use non-Canadian data provide little guidance when the task at hand involves forming reasonable expectations about the possible employment effects from minimum wage policies in Ontario, not only because of the wide range of estimates that have been reported in the literature, but mainly because of institutional differences in Canadian labor markets and the current state of the Ontario economy compared to other countries and regions. Virtually all of the research papers that explore the employment effects of minimum wage hikes in Canada estimate negative average employment elasticities with respect to the minimum wage level (Baker, Bejamin, & Stanger, 1999; McDonald & Myatt, 2004; Campolieti, Gunderson, & Riddell, 2006; Sen, Rybczynski, & Van De Waal, 2011). Godin and Veldhuis (2009) and Gunderson (2007) summarize the literature for Canada and Ontario: The evidence suggests that a 10% increase in the Ontario minimum wage will decrease youth employment numbers by 2% to 6% over time. These employment effects mostly result from decreases in the growth rates of new jobs, relatively to the projected path of the economy without the minimum wage policy, however, some of the job losses are expected to result from firm downsizing and worker dismissals, especially when the economy is going through a recessionary period (Gunderson, 2007).

[67] See, for example, Manning (1995) and, Flinn (2006).

[68] For example, Katz and Krueger (1992) vs. Coomer and Wessels (2013) (US); Dickens et al. (1994) vs Balcombe and Prakash (2000) (UK).

Brochu and Green (2013) examine the impact of minimum wages on layoff, quit and hiring rates in Canada for the period 1979-2007. They find that an increase in the minimum wage is associated with a decline in hiring rates, in consistence with the result of Meer and West (2016) and Gunderson (2007) , among other studies, who argue that some of the unemployment effects are likely to occur in the form of reduction in the growth rates of new jobs[69]. The main finding of the paper is that increases in minimum wages have a negative impact on job separation, that is, during periods that follow minimum wage hikes it is less likely that newly hired low-skilled workers will be fired or quit their jobs. The authors estimate that a 10% increase in the minimum wage decreases the teenage employment rate by 2.5% and overall employment rates by 0.5%, but the latter effect is not found statistically significant. The authors suggest that the small negative effects on overall employment rates are the result of offsetting effects of minimum wages increases on hiring and layoff rates. One possible explanation for not finding significant results on overall employment rates may lie in the small variability in real minimum wages during the period 1979-2007[70] (refer to section on minimum wage variability). At any rate, the result suggests that the gains of lower job separation rates for the workers that remain employed will come at the cost of other unskilled workers being unable to find a job due to declines in hiring rates. Again, a distributional question arises, which workers will tend to reap the benefits and which will bear the costs?

Ontario economists have also argued that, even in the absence of any negative employment effects, minimum wage policies are an ineffective instrument for reducing poverty (Mascella, Teja, & Thompson, 2009). This is mainly because the large majority of the workers who will be affected by the policy are not members of poor households, and the majority of poor households do not have a member that works for minimum wage. Campolieti et al. (2012) estimate that only 30% of the increased earnings resulting from minimum wage hikes goes to poor households, and that the disemployment effects are disproportionately concentrated on the poor, concluding that "[…]political rhetoric not-withstanding, minimum wages are poorly targeted as an anti-poverty device and are at best an exceedingly blunt instrument for dealing with poverty". Another recent research paper that uses Ontario data finds that minimum wage increases are associated with an *increase* of the percentage of families that live in poverty (Sen, Rybczynski, & Van De Waal, 2011).

Despite these drawbacks minimum wage hikes may positively impact some industries (Aaronson, Agarwal, & French, 2009) through increased economic activity as a result of better-paid workers spending more income on goods and services. Aaronson et al. (2009) argue that minimum wage increases in the US have resulted in increases in spending in durable goods that are greater that the increase in income among the affected households. In any case, there's no objection to the argument that a lot of minimum wage workers have high marginal propensities to consume (and if the small group who were buying a car were doing it in order to increase their employability – they could drive to a job instead of only being able to look for work in the area served by public transit – this would actually increase their productivity). However, such large spending responses are connected to increases in borrowing and consumer debt. Also, the propensity of households to spend their extra income on goods and services will depend on the state of the economy,

[69] However, unlike most of the research papers, including ours, that look at total or net job growth, Brochu and Green focus exclusively on hiring rates.
[70] Refer to diagram.

their expectation about its future state and their attitude towards risk at that given point in time. It may well be the case that such intrinsic household preferences changed significantly after the 2008 financial crisis and that the extra income today is spent on debt servicing rather than goods and services, which would not be immediately stimulative. The important issue is whether there is likely to be a boost to aggregate demand sufficient, with multiplier effects, to create an overall net increase in equilibrium income and employment.

### EVIDENCE AGAINST

Economists' criticism of minimum wage hikes has largely focused on disemployment effects which concentrate disproportionately on the poor and untrained workers, increasing inequality and poverty. Systemically higher costs of labor are likely to induce employers to promote changes in employment numbers as well as the structure of jobs within firms. In addition to the possibility of hiring less workers, employers may respond by reducing the number of hours worked by individual employees leading to greater declines in employment rate (Couch & Wittenburg, 2001). For example, some full-time workers may remain employed but in part-time positions. Since the minimum wage workers are more likely to bear the cost of disemployment, minimum wage policies may adversely affect the group of workers that is intended to benefit by the policy the most.

Heterogeneity in the minimum wage labor force may also lead to low skilled workers facing a greater risk of suffering disemployment effects compared to their trained co-workers that perform similar tasks at work. Minimum wage increases will give an incentive to firms to substitute low-skilled (less productive) with trained (more productive) workers, thus increasing employment among the skilled group while decreasing their demand for the more vulnerable groups of untrained labor. Small changes in total employment numbers may reflect the balance of such losses and gains in the aggregate. Small changes in aggregate variables are misleading towards concluding that the true effects on inequality are negligible. But as firms reduce their demand for untrained labor, there are less opportunities for such workers to find entry-level jobs that would allow them to acquire experience and training, suppressing human capital growth for the group of workers that needs it the most, shutting-down opportunities to better-paid jobs or even employment at the minimum wage.[71] [72] This would adversely affect the more vulnerable group of untrained workers, having a negative impact on economic growth in the long run.

Another concern associated with a higher minimum wage is that employers may attempt to mitigate the increased cost of labor by raising their output prices, leading to increased inflation.[73] Thus, even in the absence of disemployment effects, policies that raise the minimum wage are still likely to hurt rather than assist the poor as well as households on fixed incomes (e.g., pension plans).

[71] For example, Gunderson (2007) showed that roughly 46% of minimum wage workers had been working in their positions for less than a year.
[72] Battle (2003) argues that only 1% of Canadians who held their positions for no less than five years were earning minimum wage.
[73] See Lemos (2004).

## COMPETITIVE VS. NON-COMPETITIVE MARKETS

Standard theory suggests that output prices are exogenously given to competitive firms. But if a large number of firms in a competitive industry are affected by increased prices in the labor market without being matched by an increase in labor productivity, the shock in the price of labor will lead to a higher equilibrium price in the output market. Firm heterogeneity will again play an important role in determining aggregate level outcomes which, under conventional analysis, are assumed to follow a well-structured behavioral equation that neatly summarizes the underlying behavior of economic agents according to the chosen aggregate measure; firms that employ minimum wage workers and directly compete with firms that also employ minimum wage workers (e.g., local restaurant industries), are more likely to respond to higher labor costs by raising prices.

This also raises the possibility of firms engaging in dynamic pricing games that may undermine market competitiveness. Consider a small local firm competing with a large multi-national firm. If the large firm has the ability to run a deficit for an extended period of time (e.g., by borrowing from its other branches), it may attempt to drive the small firm out of the market by keeping prices low, and raise them to the monopoly level when the small firm shuts down. Such pricing strategies may be of particular appeal to large firms who operate in markets where there are high fixed costs of entry (e.g., restaurant industry) and the expected monopoly period would be relatively long.

If the firm is a price taker and can't pass cost increases on to customers, more of any cost increase will pass through to reductions in output and presumably therefore employment. If a single imperfectly competitive firm faces cost increases and tries to pass them forward in the form of price increases, its competitors in all probability won't follow its price increase, rather they will keep their prices down and attract the first firm's customers away, so the demand curve faced by the only firm which happens to face a cost increase will tend to be highly elastic. When all of the firms in a sector face a cost increase (this happened quite clearly in the case of the Tobacco Master Settlement in the US, which raised costs to the same degree for all the major cigarette companies) they can all raise their prices to the same extent and because there will be no change in relative prices across firms, the elasticity of demand which matter will be the elasticity of demand for the product, at the industry level, not the elasticity of demand for the product of a single firm in the industry when it is the only firm raising its price.

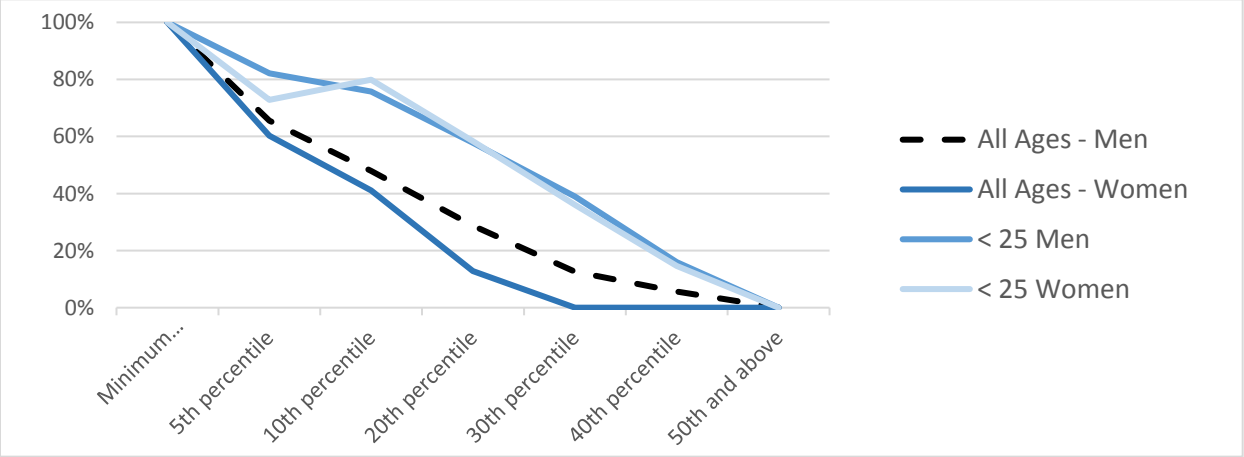
Invoking the argument of fixed output prices in competitive markets in an attempt to exclude the possibility of firms passing on costs to consumers in the form higher prices is a poor argument for proponents of minimum wage increases because if there are no market imperfections there is no need for government intervention in labor markets from a theoretical perspective. The theoretical grounds on which minimum wage hikes can be supported *require* the presence of some form of monopsony power in the labor market. If some firms are in a position to set wages in the labor market, it is also likely that they have some price-setting power in the output market. This will translate to a higher likelihood of passing on costs to consumers resulting in increased inflation which will have a stronger negative impact on the poor.

## WAGE SPILLOVER AND COMPRESSION EFFECTS

While the empirical literature on minimum wages focuses on disemployment effects, relatively little attention has been paid to examining the possible effects of minimum wage policies on the distribution of wages. One reason why wage rates above the minimum can be affected by minimum wage policies is often attributed to substitution effects across inputs of production. For example, we have argued that an increase in the minimum wage may lead firms to increase their demand for trained labor. If trained workers were receiving more than minimum wage before the policy change, increased demand, and consequently wages, for trained workers following minimum wage increases will result in spillover effects on the wage distribution.

As one of the purposes of minimum wage hikes is to reduce poverty it is important to investigate if and to what extent lower bounds on minimum wages are related to wage inequality. The US literature answers this question in the affirmative, particularly for the lower parts of the wage distribution.[74] The recent literature that uses Canadian data reached similar conclusions (Campolieti, Minimum Wages and Wage Spillovers in Canada, 2015). In particular, for persons aged 15 to 64, Campolieti (2015) finds that an increase of 10 log points in the minimum wage reduces inequality for men by bringing the 5$^{th}$ and 10$^{th}$ percentile closer to the median wage by 4.6 and 1.3 log points respectively. The spillover effects for women in the same age group are stronger, bringing the 5$^{th}$ and 10$^{th}$ percentiles closer to the median by 5.5 and 3.7 log points respectively. The estimated spillover effects are stronger for the 15-24 age group up to the 70$^{th}$ percentile, yielding stronger compression effects. Interestingly, the results for this age group point towards negative wage effects for men and women. One possible explanation is that employers compensate for the increased wages at the lower half of the distribution by cutting down wage payments from the better paid young workers.[75] On the basis of the results above, we assume that the wage spillover and compression effects are as described in Figure 71:

**Figure 71** Wage spillover and compression effects




[74] For example, Card and Krueger (1995), Lee (1999) and, more recently, Autor et al. (2016).
[75] Although the author notes the possibility that the spillover effects for this age group partly reflect disemployment effects.

## C.2. ECONOMICS OF UNIONIZATION

### OVERVIEW

This section summarise the impacts of unions on the labor market and firms. It is divided into two sections, benefits and costs, to show address full 'quantifiable' impacts of unionisation for our simulations. The effects of unions' bargaining power and density on the economic growth are typically are addressed through the impact of unions on investments, productivity, and employment growth (Hirsch B. , 1997). The size of union wage premium and unions' ability to increase wages depends on bargaining power of firms (i.e., it is higher in firms with a greater bargaining power) and the level of competition in the product market (i.e., increased competition in the product market reduces the ability of unions to raise wages), respectively (Nickell & Layard, 1999; Stephan & Gerlach, 2005).

### PROS (BENEFITS)

Virtually all empirical studies associate unionization with higher and more rigid wages than competitive for its members (Freeman & Medoff, 1984; Card, 1992; Bruno, Manzo, & Parks, 2015; Breda, 2015).

The empirical studies investigated the long-run trends in unionisation and income inequality show that unions are also an integral part of equalizing the wage distribution by instituting norms for fair pay (Jaumotte & Osorio, 2015; Western & Rosenfeld, 2011; Autor D. , 2008; Farber H. , 2005; Neumark & Wachter, 1995). More concretely, non-union wages are higher in highly unionized industries (and firms) and localities because unions send wage signals to non-union workers on "fair wage" that they should receive. This in turn boosts the economy by benefitting non-unionised lower- and middle-wage workers, most of whom spent their income on consumption.

Doucouliagos and Laroche (2003) find in a meta-analysis of the literature that labor unions are an effective institution at increasing worker productivity, but only for American unions. He finds that American unions raise productivity by 1% to 8% with a higher expected productivity growth in manufacturing and the education sector (Doucouliagos & Laroche, 2004) and even higher in construction sector ranging between 17%-22% (Allen, 1983). [76]

Unions also tend to lower labour turnover and attributed mainly to higher wages and benefits (Addison & Belfield, 2004; Renaud, 2002; Bryson, 2003), therefore, firms also gain from reduced labour turnover in the form of labor cost savings. In the US, turnover costs are very high, therefore argued that the firms can potentially absorb minimum wage increase ranging between 15%-20% (Dube, Lester, & Reich, 2010; Dube, Kaplan, & Thompson, 2016; Pollin & Wicks-Lim, 2015; Fairris, Runstein, & Goodheart, 2005).

[76] Expressing labor production per hour in a linear and natural logarithm form [ln output per hour = constant + 0.01 *(unionisation rate)], one conclude that %1 increase in unionisation, on a range of minimum and maximum values, would boost labor production per hour by 1% to 8% in a unionised firm.

## CONS (COSTS)

Empirically, the studies on the effects of unions on profits are sparse and still continues to be inconclusive. There might be longer-term detrimental effects to the economy as a whole depending on unions' impacts on the labour market and firms' decisions in response to unions and/or higher union wages. Firstly, the effects of unions on firms' profits is expected to be negative in the absence of an improvement in labor productivity, expressed as increase in marginal product of labor, to offset the rising labor costs (Fuchs, Krueger, & Poterba, 1998; Hirsch B. , 2004; Doucouliagos & Laroche, 2003; 2009). However, productivity improvements from unionization does not typically offset compensation therefore firms lose on their profits (Doucouliagos & Laroche, Unions and Profits: A Meta-Regression Analysis, 2009). In fact, in long-run, labor unions may also promote practices that reduce productivity growth through its adverse impacts on capital formation and resource mobility (Clark, 1984; Hirsch B. , 1991a).

Unions largely affect firms' ability to adjust labour and capital when input prices change (e.g., wages decoupled with bargaining power, and restrictive practices on firms' decisions). Hence, unions affect cash flow and the sensitivity of investments (Chen & Chen, 2013) as well as the cost of equity capital (Chen, Kacperczyk, & Ortiz-Molina, 2011). Therefore, labour unions will potentially increase firms' equity costs by decreasing firms' operating flexibility (Rosett, 2001), for example, a 1-standard-deviation increase in the unionization rate is associated with an increase in the implied cost of equity of about 1.23 percentage points per year (Chen, Kacperczyk, & Ortiz-Molina, 2011).

If a union has any effect, it generates a wage premium but also has an adverse effect on employment by creating unemployment (Pantuosco, Parker, & Stone, 2001; Vedder & Gallaway, 2002). The empirical literature has already depicted labor market rigidity in the form of strong labour legislations, employment protection legislations and union action as leading to a low equilibrium rate of employment (Arpaia & Mourre, 2005), and also hours of work per year (Alesina & La Ferrara, 2005).

However, there are also empirical studies finding the role of employment protection legislation and union density on employment to be insignificant (Elmeskov, Martin, & Scarpetta, 1998; Pantuosco, Parker, & Stone, 2001; Mourre, 2004) or the effects dies away if union density subsequently stabilises at the new higher rate (Nickell, Nunziata, & Ochel, 2005). Some studies found profound union effect on total employment and economic growth, for example 1% increase in unionisation leads 0.07% (therefore 0.7% at 10% increase) higher unemployment, and an 1% incremental increase in labor force belonging to labor unions lowers the real income growth per capita by over 1.24 percentage points (Vedder & Gallaway, 2002).

## CONCLUSIONS

To conclude, unionisation has benefits and costs for the economy. Unions might lead firms to reduce employment as unions might essentially trade higher wages at the expense of lower employment prospects. Therefore, one can conclude that unions should have no or at least a little bargaining power in a highly competitive industry in the absence of a productivity growth, to offset wage increase (Hirsch B. , 1997).

In the situation where firms are able to pass some of the higher costs on consumers (Allegretto & Reich, 2015), or all costs on consumers (Aaronson, 2001; Aaronson, French, & MacDonald, 2008), firms' face risk of losing their ability to be competitive on the price of their product or service. Unionized firms then end up accepting a lower profit margin than non-union firms. Given such cost transactions, one can still conclude that firms and workers lose from unions failing to adopt efficient (or say socially desirable) contractual work, as stated in Hirsch (2008).

On the contrary, irreversibility of capital investments and under-investment by firms might occur in the presence of unions and the structure of wage bargaining (Hirsch B. , 1991a; Cavanaugh, 1998)[77]. A strict labour regulation and unionism could have an influence on the investment behavior of a company and prevent new investments. Overall, the effects of increased unionisation and union bargaining level on firms are multidimensional. The negative effects of unionism (e.g., reduction in investments) mostly outweigh the positive effects (e.g., productivity growth) – as stated by Freeman (1983), Karier (1985), Voos and Mishel (1986a), Menezes-Filho and Van Reenen (2003).

Therefore, lower taxes rather than higher would also improve relative competitiveness of small firms, and therefore would serve prudent protection policy to keep survival of these business - at least temporarily until they can cope with the sharp wage increase.

### UNION EXPERIENCE IN CANADA

Based on labor force surveys of Canada, the unionisation in private sector decrease by 2% since 1999; from % 18.4 to % 16.4 in 2012. Interestingly, union density generally declined sharply across goods-producing industries (except for construction sector) and service-producing industries including transportation and education services. In contrast, the unionization increased marginally across services-producing industries except for already mentioned. Overall, excluding public administration, Ontario is experiencing sharp de-unionisation almost in all sectors not only due to a shift in employment from industries and occupations with a high unionisation rates toward low unionisation rates, but also the structural changes within industries and occupations.

Despite declining union power in the private sector, under pressures of global competition, unions continue to exercise power on firms and generate a wage premium in Canada (Bartkiw, 2015). Labor unions in Canada also support minimum wage increase and "strict" labor market regulations on the grounds of egalitarian belief and self-centered union interest; (i) minimum wage increase helps low-paid workers; (ii) minimum wage increase reduces competition against unionized workers who are significantly paid above a minimum wage. O'Grady (2014) points out that de-unionization will put downward pressure on wages of both unionised workers and non-union workers, and this will lower wages and creates more inequality.

[77] Addison et al. (2007) on German establishments suggests that the presence of works councils has no effect on physical capital accumulation. Such contrasting evidence is also confirmed by Menezes-Filho and Van Reenen (2003).

## UNION PROVISIONS AND DATA FOR SIMULATIONS

The policy amendment behind the Act includes simplified union accreditation rules, union power, and access to unionisation.

- 'The proposed changes will allow employees to unionize by just signing membership cards instead of holding a secret-ballot vote (i.e. no voting in favour or against unionisation).'
- extension of mechanism to those who work through temporary agencies, home care, building sector
- 'With the changes, unions can also promise the employees the likelihood of significant wage and benefit increases in a way that they cannot now.'
- 'If 20 per cent of employees in a bargaining unit support a union, employers should give it the full list of names and contact information of employees in the bargaining unit, which can help in organization efforts. They cannot do so now under current secret-ballot vote model that requires at least 40% win vote'
- 'Under a Sectoral Standards Agreement, a labour union will certify one workplace and then extend that throughout a regional/occupational/industrial labour market. This could create a scenario where thousands of small employers are negotiating with one union bargaining council.
- 'Unions will be granted remedial certification (automatic unionization without a vote when an employer contravenes the Act) with more ease, as the changes decrease the threshold for determining what qualifies as employer misconduct." And the union can be certified without having to show that it has adequate support for collective bargaining.

Taking these proposals into consideration, it is expected that the changes will ease union membership rules for non-union members and expand the membership within the sectors, and therefore will increase the rate of unionization in sectors by making it difficult to avoid unionization (referring to #1) and intensifying the union membership (referring to #2). Further, the proposed legislation will increase the power of unions (referring to # 3-5), and such therefore the cost of production (depending on the share of labour used in the production) by limiting firms' operating flexibility.

**Hence, we have assumed one time increase of 2% of rate of unionization with wages to match by age and sex for 2018 returning to unionization rates of the early 1990s.**

Previous studies of Canada find unionization to be associated with slower employment growth. Despite higher wages (Table A1.1) and lower poverty among the employed, Unionization could thus lead to less employment (Table A1.2). This is valid point, if the union wage premium comes at the expense of normal profits, this can damage firms and directly reduce employment growth, as in Canada (Table 2). Based on numbers presented in Table A1.1, it is clear that the unions raise worker wages, but the wage-setting power of unions has declined over time (Fang & Verma, Union Wage Premium, 2002; Walsworth & Long, Is the Union Employment Suppression Effect Diminishing? Further evidence from Canada., 2012; Gomez & Lamb,

2015). The empirical studies for Canada show that union wage premium differs amongst size and sectors (Walsworth & Long, Is the Union Employment Suppression Effect Diminishing? Further evidence from Canada., 2012), gender, age, and employment status (Gomez & Lamb, 2015).[78] [79]

According to Hess Associates, turnover in general in Canadian corporations is 7%, but higher at 15% among full time staff in the retail sector and can reach up to 65% among temp workers in the retail sector. In addition, empirical studies for Canada concludes that unionized firms have 18 to 25 percent lower capital investment than non-union firms (Odgers & Betts, 1997), and investments in R&D drop by 28 to 40 percent when moving from a lightly unionized industry to a heavily unionized industry (Betts, Odgers, & Wilson, 2001)[80] . Therefore, under-investment will highly likely occur in Ontario based on the expectation that the unionisation will increase, union bargaining power will strengthen, and regulations become more favorable to labor. In fact, studies for Canada show that the unionization plays no role in the determination of closure among smaller establishments, but they increases the probability of firm closure (failure) among larger establishments (Fang & Heywood, 2006), and also reduces their growth over-time (Long, 1983).

Given the negligible impact of unions on productivity and small increase in unionisation by 2% increase, there will be minimal impact on the productivity growth and reduction in the labor turnover among unionised firms and investments of firm. The negative effects of increase in unionisation density will therefore outweigh the benefits of unionisation, and the benefits will not cover the costs from unionisation.

[78] Similar declining trend in union wage premium is observed in the US (Blanchflower & Bryson, 2004; Hirsch & Schumacher, 2004).

[79] Although it is not considered in this analysis, non-union employers might also raise their wages to avoid threat of unionization among employees (Rosen, 1969; Freeman & Medoff, 1981; Farber H. , 2003).

[80] Similar negative effects have been observed in the US (Hirsch B. , 1991a; Cavanaugh, 1998).

# D. AGENT BASED MODEL USE IN LABOUR MARKET ECONOMICS

What follows is an example list of literature in the field:

- Barbara Bergmann, "Micro-to-Macro Simulation: A Primer with a Labor Market Example" (pdf,427KB), Journal of Economic Perspectives 4(1), Winter 1990, 99-116. (Bergmann, 1990)
- Martin Ford, Rise of the Robots: Technology and the Threat of a Jobless Future, Basic Books, NY, 2015. (Ford, 2015)
- Richard B. Freeman, War of the Models: Which Labour Market Institutions for the 21st Century? (pdf,214KB), Labour Economics Vol. 5, No. 1, 31 March 1998, 1-24. (Freeman R. , War of the Models: Which Labour Market Institutions for the 21st Century?, 1998)
- Michael Neugart and Michael Richiardi, "Agent-Based Models of the Labor Market", in Handbook of Computational Economics and Finance, edited by Shu-Heng Chen and Mak Kaboudan, Oxford University Press, UK, 2014. (Neugart & Richiardi, Agent-Based Models of the Labor Market, 2014)
- Christopher A. Pissarides, Labour Market Adjustment: Microeconomic Foundations of Short-Run Neoclassical and Keynesian Dynamics (Book Description), Cambridge University Press, April 2009, 272pp. (Pissarides, 2009)
- Leigh Tesfatsion, "Labor Institutions and Market Performance: An Agent-Based Computational Economics Approach" (pdf,182KB) (Tesfatsion, Labor Institutions and Market Performance: An Agent-Based Computational Economics Approach, 2010)
- Truman Bewley, Why Don't Wages Fall During a Recession?, Harvard University Press, Cambridge, MA, 1999. (Bewley, 1999)
- James W. Boudreau, "Stratification and Growth in Agent-Based Matching Markets", Journal of Economic Behavior and Organization 75 (2010): 168-179. (Boudrea, 2010)
- William Darity, Jr., and Arthur H. Goldsmith, Social Psychology, Unemployment and Macroeconomics, Journal of Economic Perspectives 10:1 (Winter 1996), 121-140. (Darity Jr. & Goldsmith, 1996)
- Herbert Dawid, Simon Gemkow, Philipp Harting, and Michael Neugart, "Labor Market Integration Policies and the Convergence of Regions: The Role of Skills and Technology Diffusion", Journal of Evolutionary Economics, to appear. (Dawid, Gemkow, Harting, & Neugart, Labor Market Integration Policies and the Convergence of Regions: The Role of Skills and Technology Diffusion, Forthecoming)
- Herbert Dawid, Simon Gemkow, Simon, Philipp Harting, and Michael Neugart, "On the Effects of Skill Upgrading in the Presence of Spatial Labor Market Frictions: An Agent-Based Analysis of Spatial Policy Design", Journal of Artificial Societies and Social Simulation, 12 (2009): 5. (Dawid, Gemkow, Harting, & Neugart, 2009)
- Herbert Dawid, Simon Gemkow, Philipp Harting, Kordian Kabius, and Michael Neugart, "Skills, Innovation, and Growth: An Agent-Based Policy Analysis", Journal of Economics and Statistics 228 (2008), 251-275. (Dawid, Gemkow, Harting, Kabius, & Neugart, 2008)
- Giorgio Fagiolo, Giovanni Dosi, and Roberto Gabriele, Towards an Evolutionary Intepretation of Aggregate Labor Market Regularities (pdf,378KB), in U. Cantner, E. Dinopoulos, and R.F. Lanzillotti

(Eds.), Entrepreneurship, the New Economy and Public Policy: Schumpeterian Perspectives, Berlin-Heidelberg, Springer Verlag, 2004. (Fagiolo, Dosi, & Gabriele, Towards an Evolutionary Intepretation of Aggregate Labor Market Regularities, 2004)

- Simon Gemkow and Michael Neugart, "", Journal of Evolutionary Economics 21 (2011), 703-719. Referral Hiring, Endogenous Social Networks, and Inequality: An Agent-Based Analysis (Gemkow & Neugart, 2011)
- Olivier Goudet, Jean-Daniel Kant, and Gérard Ballot, "WorkSim: A Calibrated Agent-Based Model of the Labor Market Accounting for Workers' Stocks and Gross Flows" (pdf,2.5MB), Computational Economics, published online (6 July 2016), DOI 10.1007/s10614-016-9577-0. (Goudet, Kant, & Ballot, 2017)
- John Haltiwanger, Julia Lane, Jim Spletzer, Jules Theeuwes, and Ken Troske (eds.), The Creation and Analysis of Employer and Employee Matched Data, North Holland, 1999. (Haltwanger, Lane, Spletzer, Theeuwes, & Troske, 1999)
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# E. METHODOLOGY

## E.1. OVERVIEW

Agent based models (ABM) differs from the standard DSGE models in terms of the following:

- Rationality is bounded in ABMs---therefore, agents cannot have rational expectations using information that is ex-post and only available across the entire system, like DSGE models assume. Instead, they must attempt to realise their motivations (spending, investing, earning an income) with only local information available to them;
- Individual outcomes are derived from agent-level attributes and rules in ABM, but not system rules, as in DSGE models; therefore ,
- The summation is done only on individual (local) outcomes to arrive at economy-wide (system wide) impacts and are solely based on assumptions on the agent behavior when solving problem in ABMs.

More simply, ABM rules out the "top down" approach, as in DSGE models, strictly assuming/believing that the mechanism used to reach market clearing conditions does not necessarily represent the "true" behavior or activities of any agent[81].

With respect to labour market operations, agents are represented individually, and they are heterogeneous. The heterogeneity among agents involves differences in their behaviors as well as in their production processes over time. In fact, labour markets are path-dependent, and demand/supply of labour is even more complicated due to the wide range of heterogeneity in workers (part-time vs full-time, temporary vs permanent) and firms (small, medium or large), as well as power relationships (e.g. unionized vs non-unionized workers and sectors). Accordingly, each of them makes a calculation of costs and benefits, that is, the profit (for the firms) or utility (for the individuals) that they expect.

In the context of minimum wage increases and changes in employment standard mainly attributed to wage itself (i.e., labour market policy evaluation), the agents (firms) make decisions based on the information/regulation (e.g., minimum wage increase and changes in employment standards) imposed by the institution (e.g., government-imposed minimum wage increase and changes in the employment standards). ABM precisely allows us the flexibility to take into account their decisions and simulate them in a complex system on a computer (e.g., Stiglitz and Gellagati, 2011; Fagiolo and Roventini; 2017). Therefore, ABM is a powerful exploratory tool for labour market policy based on possible outcomes estimated in empirical predictions.

The next section introduces and presents the key structural labour market model contained in the Prosperity at Risk® platform that is used to analyze the effects of the Act. The responses detailing how

[81] For more information about ABMs and its up-to-date date applications in economics, visit http://www2.econ.iastate.edu/tesfatsi/ace.htm

workers/consumers and businesses implement the Act are unified in the model and therefore captures the simultaneous impacts of the labour market and product markets. This analysis studies impacts in the near future, but we acknowledge that short-run and long-run effects may differ. This is particularly the case when the impact of the Act on non-residential private capital investment is considered, which the current analysis largely ignores given the short-term 2 year nature of the evaluation and the speed at which the Act is expected to be implemented.

## E.2. AGENTS IN THE MODEL

The agents in the model are:

- People;
- Households;
- Firms; and
- Governments.

In the platform, agents can be connected to other agents. Links among people form households. Links between people and firms constitute employee/employer relations. For each link between employee and employer, there is an associated contract with hourly wage, and annual hours worked. People may hold multiple jobs with links to different employers (but total hours worked per person across all jobs is limited). In addition to earned income, people receive government transfers and investment income dependent on the characteristics of the household (age, assets, etc)

## E.3. AGENT BEHAVIOUR

While variables and indices are defined throughout the model presentation, a summary of the variable and index notation is presented at the end of this section for easy reference.

### Industry Behaviour

For any company *x,* the total monetary value of outputs ($V_o^x$) equals the total monetary value of inputs ($V_i^x$), net taxes on production and products ($T^x$), total wages ($W^x$), and gross operating surplus ($S^x$).

(1) $$V_o^x = V_i^x + T^x + W^x + S^x$$

The total output required to be produced by all companies is largely determined by consumer demand for goods and services and intermediate demand from other companies, with smaller portions driven by export demand. We will return to the question of how total output is calculated below, but first will investigate

From the gross operating surplus, companies must pay corporate taxes, invest in capital, and take profits. In contrast to net taxes on final consumption, net taxes on production and taxes on products for

intermediate consumption are relatively small (with a significant proportion actually being property taxes) and are ignored in our analysis.

(2) $V_o^x = \sum_c P_c Q_{o,c}^x$

(3) $V_i^x = \sum_k P_k Q_{i,k}^x$

The inputs and outputs ($Q_{o,c}^x$ and $Q_{i,k}^x$ respectively) are industry-specific goods and services measured in real terms. The pecuniary value of each commodity can be determined from its quantity ($Q_{i/o,c}^x$) and unit price ($P_c$). This yields,

(4) $\sum_c P_c Q_{o,c}^x = \sum_k P_k Q_{i,k}^x + W^x + S^x$

Next, in a standard input/output model, one assumes that for each unit of output, a distribution of input commodities are required, and that the relative distribution of output commodities is constant:

(5) $Q_o^x = \sum_k Q_{o,k}^x$

(6) $Q_{o,c}^x = \beta_c^x Q_o^x$

(7) $Q_{i,c}^x = \alpha_c^x Q_o^x$

This yields:

(8) $Q_o^x \sum_c P_c \beta_c^x = Q_o^x \sum_c P_c \alpha_c^x + W^x + S^x$

For the company, total wages is the sum of individual employee's wages. Every employee can be put into a group based on the employees characteristics, work role, number of hours worked and wage bracket. The number of employees in group *g* for company *x* is $E_g^x$. Employees in this group work an average of $h_g$ hours annually, and get paid an average of $w_g^x$ per hour. The total wages paid is then:

(9) $W^x = \sum_g E_g^x h_g w_g^x$

The group characteristics include aspects such as full/part time, unionization status, age and sex.

As the size of companies can vary considerably, it is more convenient to consider gross operating margins instead of the direct operating surplus. The gross operating margin is defined as:

(10) $S^x = \mu^x V_o^x$

Therefore,

(11) $(1 - \mu^x) Q_o^x \sum_c P_c \beta_c^x = Q_o^x \sum_c P_c \alpha_{i,c}^x + \sum_g E_g^x h_g w_g^x$

Finally, the total quantity of output produced is dependent upon the aggregate number of hours worked and their average productivity ($\gamma^x$) which may change in response to employer demands or investment:

(12) $Q_o^x = \gamma^x \sum_g E_g^x h_g$

Note that in order for output volume to increase, either the number of employees must increase, average hours worked must increase, or productivity must increase. Using the expression for total output, yields a final equality of:

(13) $$\gamma^x(\sum_c P_c(\beta_c^x(1-\mu^x)-\alpha_c^x))\sum_g E_g^x h_g - \sum_g E_g^x h_g w_g^x = 0$$

If one requires that the company's output remain constant, then

(14) $$\dot{Q}_o^x = 0 = \dot{\gamma}^x \sum_g E_g^x h_g + \gamma^x \sum_g \dot{E}_g^x h_g + \gamma^x \sum_g E_g^x \dot{h}_g$$

For convenience, rearranging the terms gives:

(15) $$\frac{\dot{\gamma}^x}{\gamma^x} = -\frac{\sum_g \dot{E}_g^x h_g + \sum_g E_g^x \dot{h}_g}{\sum_g E_g^x h_g}$$

Then differentiating equation (13) and using the expression for $\dot{\gamma}^x$ yields:

(16) $$\gamma^x\left(\sum_c \dot{P}_c\left(\beta_c^x - \alpha_{i,c}^x\right) - P_c\beta_c^x\dot{\mu}^x\right)\sum_g E_g^x h_g - \sum_g\left(\dot{E}_g^x h_g w_g^x + E_g^x \dot{h}_g w_g^x + E_g^x h_g \dot{w}_g^x\right) = 0$$

The terms in (16) can be grouped into four pieces. Terms with $\dot{E}_g^x$ and $\dot{h}_g$ are grouped together since they are the policy inputs that define size of the problem.

(17) $$\Omega^x = \sum_g\left(E_g^x \dot{h}_g w_g^x + E_g^x h_g \dot{w}_g^x\right)$$

As wages or hours of various groups are changed, $\Omega^x$ indicates the net size (in dollars per year) that must be accounted for through changes in employment. The total for all sectors is $\sum_x \Omega^x$.

The remaining three groups relate to the response of companies to the changes. The employment response term is:

(18) $$\Omega_E^x = -\sum_g \dot{E}_g^x h_g w_g^x$$

The price response term is:

(19) $$\Omega_P^x = \gamma^x\left(\sum_c \dot{P}_c\left(\beta_c^x - \alpha_{i,c}^x\right)\right)\sum_g E_g^x h_g$$

The gross operating margin response term is:

(20) $$\Omega_m^x = -\gamma^x \dot{\mu}^x \sum_c P_c\beta_c^x \sum_g E_g^x h_g$$

Adding-up of response terms will gives the total size of the problem:

(21) $$\Omega^x = \Omega_E^x + \Omega_P^x + \Omega_m^x$$

Note that the units of each term above is in dollars per year. Therefore, for a given policy change given by $\Omega^x$, it must be balanced by $\Omega_E^x$, $\Omega_P^x$ and $\Omega_m^x$. The fraction of the total cost to redistribute into each of the employment, price, and margins is defined as the relative propensity.

The propensity to restructure employment can be expressed as $\beta_{\mathrm{E}}^{\mathrm{x}} = \Omega_E^x/\Omega^x$, the propensity to pass costs on prices is $\beta_{\mathrm{p}}^{\mathrm{x}} = \Omega_p^x/\Omega^x$ and the propensity to reduce operating margins in $\beta_m^{\mathrm{x}} = \Omega_m^x/\Omega^x$. The simplifying assumption that all firms will responds in the same manner implies that $\beta_E^x = \beta_E$ , $\beta_p^x = \beta_p$ , and $\beta_m^x = \beta_m$.

For a given set of behavioural propensities, the costs to be transferred to employees, consumers and corporations can be calculated. For employees, assume that the probability of being hired or fired for an employee in group g is $\rho_g$ so that $\dot{E}_g^x = \theta\rho_g E_g^x$ where $\theta$ is a global scale factor. Then,

(22) $$\theta = -\frac{\beta_E \Omega^x}{\sum_g \rho_g E_g^x h_g w_g^x}$$

(23) $$\dot{E}_g^x = -\frac{\beta_E \Omega^x \rho_g}{\sum_g \rho_g E_g^x h_g w_g^x} E_g^x$$

For prices, note that a company can only increase price of goods it produces (i.e.$\beta_c^x \neq 0$). It is assumed that a firm will increase prices of all of its output by the same amount (which is reasonable since the output of most firms is dominated by a single type of good or service). That is, $\dot{P}_c = \omega P_c$. This yields

(24) $$\omega = \frac{\beta_P \Omega_P^x}{\gamma^x (\sum_c P_c \beta_c^x) \sum_g E_g^x h_g}$$

and

(25) $$\dot{P}_c = \frac{\beta_P \Omega_P^x}{\gamma^x (\sum_c P_c \beta_c^x) \sum_g E_g^x h_g} P_c$$

For the gross operating margin response,

(26) $$\dot{\mu}^x = -\frac{\beta_m \Omega^x}{\gamma^x \sum_c P_c \beta_c^x \sum_g E_g^x h_g}$$

## Household Behaviour

The total quantity of outputs required across all industries is determined using a standard input/output approach based on the conservation of commodities – every commodity created must be used or stored. The total output quantity of commodity *c* required, $Q_{o,c}$, is primarily driven by the number required for final domestic demand, $D_c$, plus any needed for intermediate use by companies, $Q_{i,c}$. In addition, export commodity demand, $X_c$, can increase the total demand while imports, $I_c$, can decrease local output requirements. Specifically,

(27) $$Q_{o,c} = Q_{i,c} + D_c + X_c - I_c$$

However, from above, the total real output and inputs of each commodity are the sum of individual companies.

(28) $$\sum_x \beta_c^x Q_o^x = \sum_x \alpha_c^x Q_o^x + D_c + X_c - I_c$$

This can be expressed in matrix form as

(29) $$\boldsymbol{\beta} Q_o = \boldsymbol{\alpha} Q_o + D_c + X_c - I_c$$

with rows corresponding to the commodities, and columns in $\boldsymbol{\alpha}$ and $\boldsymbol{\beta}$ corresponding to firms. Given the final domestic demand, exports and imports, the total output of each firm can be calculated using

(30) $$Q_o = (\boldsymbol{\beta} - \boldsymbol{\alpha})^{LI}(D_c + X_c - I_c)$$

where $A^{LI}$ is the generalized left inverse of matrix $A$. In the case that $A$ is a square matrix, the generalized left inverse is the same as the usual matrix inverse.

Final domestic demand, $D_c$, consists of three pieces:

- Final household consumption, $H_c$
- Capital investment, $V_c$
- Government and non-profit consumption, $G_c$

Therefore,

(31) $$D_c = H_c + V_c + G_c$$

The demand for household consumption is driven by disposable household incomes (from wages earned, government transfers received, and investment income less any income taxes paid and savings) and household characteristics such as age and number of children. If:

- $d_{c,h}$ is the nominal demand for commodity *c* by household *h* as a fraction of total household income,
- $R_h$ is the non-wage income for household h,
- $\tau_h$ is the effective income tax rate for household h,

then the total final real demand for household consumption for commodity *c* is

(32) $$H_c = \sum_h \frac{d_{c,h}}{P_c}\left(\sum E_g w_g h_g + R_h\right)(1 - \tau_h)$$

Note that the total nominal demand for consumption may be less than total income to account for savings. The total real output is then

(33) $$Q_o = (\boldsymbol{\beta} - \boldsymbol{\alpha})^{LI}\left(\sum_h \frac{d_{c,h}}{P_c}\left(\sum E_g w_g h_g + R_h\right)(1 - \tau_h) + V_c + G_c + X_c - I_c\right)$$

Differentiating, and assuming that $V, G, X, I, R$, and $\tau$ are constant yields:

$$\dot{Q}_o = (\boldsymbol{\beta} - \boldsymbol{\alpha})^{LI} \left( \sum_h \frac{d_{c,h}}{P_c} \sum \left( \dot{E}_g w_g h_g + E_g \dot{w}_g h_g + E_g w_g \dot{h}_g \right) (1 - \tau_h) \right) - (\boldsymbol{\beta} - \boldsymbol{\alpha})^{LI} \left( \sum_h \dot{P}_c \frac{d_{c,h}}{P_c^2} \left( \sum E_g w_g h_g + R_h \right) (1 - \tau_h) \right) \quad (34)$$

This change in domestic output feeds back into total output by relaxing the constraint in (14) that $\dot{Q}_o^x = 0$ and can results in positive feedback if real demand increases.

Note that in the short term we are conservatively assuming no change in demand for capital investment, import or export demand, or income from non-wage sources. In the longer term, if prices increase, it could lead to reduced export demand and increase import demand. This would reduce the impact of any additional consumer spending due to increased wages. If gross operating margins are reduced, investment income from businesses (dividends, capital gains, or owner salaries) could be reduced also resulting in reduced consumer demand. Similarly, if gross operating surpluses are reduced firms may choose to reduce capital investment which could both reduce final demand for goods and services and impede productivity growth in the future.

### Federal and Provincial Tax Revenue

Based on federal and provincial tax rates, the government fiscal impacts are captured in the model and simulations. In the analysis, all government tax rates are assumed to remain unchanged, though changing wages, employment and corporate margins result in increases or decrease in net government revenue. Note that when referencing tax revenue, it is strictly revenue from taxation being referred to. Any costs incurred by governments to receive the revenue are excluded from this total.

## E.4. Summary of Model Variables

**Agents**

$x$ firm (varied across employee size)

**Sets**

$o$ set of outputs commodities
$i$ set of inputs commodities by each firm
$k$ set of input commodities employed by all firm
$c$ set of commodities
$g$ sets of labour (i.e. age, gender, employment status such as part time vs full-time, temporary, vs permanent, unionization status)

**Fixed Parameters**

$\rho_g$ probability of firing/hiring of worker
$\theta$ scale parameter used in the calculations of employment changes

Policy Parameter

$w_g^x$ wage rate per productive hour for each type $g$ of employee in firm $x$
$h_g$ productive hours works for each type $g$ of employee

Variable Parameters - Employment (i.e. change in response to wage,$w_g^x$ and therefore firm)

$E_g^x$ number of employees in each group of labour $g$ employed in firm $x$

D consumer demand based on household incomes

Variable Parameters - Firm and Prices (i.e. function of wage,$w_g^x$ and therefore firm producing and supplying the product/service)

$P_c$ commodity unit price

$\mathrm{Q}_c^x$ quantity of output commodity produced by each firm, calculated through input/output model where:

$\mathrm{Q}_{o,c}^x$ quantity of output commodity , output produced by each firm, where relative distribution of output commodity $\beta_c^x$ is kept constant, and

$\mathrm{Q}_{i,c}^x$ quantity of input commodity, input produced by each firm to produce commodity, where distribution of input commodity $\alpha_c^x$ is kept constant

Calculated Variables

(from fixed and variable inputs parameters)

$V_o^x$ value of outputs of firm $x$
$V_i^x$ value of inputs employed by firm $x$
$T^x$ net taxes on paid production and products of firm $x$
$W^x$ total wages paid for employment by firm $x$
$S^x$ gross operating surplus of firm $x$
$\Omega_E^x$ employment response
$\Omega_P^x$ price response
$\Omega_m^x$ gross operating margin response

Response Variables

(i.e. responses, policy outcomes)

$\dot{E}_g^x$ changes in the employment level by employee type, estimated from $\Omega_E^x$
$\dot{P}_o$ changes in the output price levels, estimated from $\Omega_P^x$
$\dot{\mu}^x$ changes in the gross operating margin of each firm $x$, estimated from $\Omega_m^x$

## E.5. Prosperity at Risk: Model validation

Prosperity at Risk (PaR) is a spatial economic agent-based model that is consistent with the principles of 'new economic geography' (Tsekeris and Vogiatzoglou "Multi-Regional Agent-Based Economic Model of Household and Firm Location and Transport Decisions", 2010). Therefore, agents in PaR live, work, invest, and produce in (at least) one of the 56,000+ dissemination areas (DAs) in Canada. Each DA has estimates of industry presence, population/ employment, and capital stock. For example, public capital is provided locally as an input to industry directly (e.g., water) or indirectly (e.g., transportation services via trucking), or as a final consumption good (e.g., public transportation). As such, PaR provides 'first order' agglomeration modeling (i.e., people follow money and money follows people). Importantly, PaR provides internal consistency with respect to the location of person agents (i.e., they can't simultaneously live in multiple places).

PaR is a 'stock-flow consistent'[82] economic model. All information reported from PaR is generated from individual agents and is either stocks or flows. Stocks represent the value of non-financial and financial assets, liabilities, and the net worth of an agent at a point in time. Stock positions are articulated on an agent's balance sheet within the CSNA framework. Flows reflect the creation, transformation, exchange, transfer, or extinction of economic value. They record the economic activity that occurs between two points in time and with the accumulation of that activity affecting the stocks. The types of traits and transactions included in PaR are based on Canada's system of macroeconomic accounts[83], and ensures internal consistency by checking that all monetary flows are accounted for and changes to stock variables are consistent with these flows. The accounting system to record the properties of agents:

- Consists of a quad-entry accounting system which combines double-entry accounting for every agent interaction in which each flow comes from somewhere and goes to somewhere[84].
- Shows how the balance sheets of the different economic agents are interlinked and how the period-by-period balance sheets change dynamically over time
- Is consistent with a number of accounting identities that should always hold

This provides a solid and economically well-founded framework to test the consistency of the model.

Numerous types of model tests are run to ensure correctness of Prosperity at Risk including checking code correctness, internal conservation of value, and data consistency. In particular, the testing suite of PaR includes

- Over 500 code unit and integration tests of the implementation of PaR
- 57 general conservation rules (including stock-flow consistency) with

[82] See http://sfc-models.net/references/ for numerous references
[83] Refer to http://www.statcan.gc.ca/eng/nea/index
[84] Similar to the principles for general bookkeeping, PaR is based upon a double entry accounting system. Double entry accounting has at its foundation the rule that every transactions leads to at least two equal-value entries in the system—a debit and a credit entry. A debit entry is an increase in an asset, a decrease in a liability, or a decrease in net worth, whereas a credit entry is a decrease in an asset, an increase in a liability or an increase in net worth. Refer to http://www.statcan.gc.ca/pub/13-605-x/2014005/article/14088-eng.htm for more information.

- Over 30 cross model validation against government and private sector models (to the extent that they measure what PaR measures):

## Code Tests

All code in Prosperity at Risk is stored under version control repositories with automated testing upon any code changes.

- Agent core tests (i.e., the code that actually runs the simulations) which are independent from simulation context
    - Tests the core agent, event, and scheduling framework
    - 200+ tests (unit and integration)
- Process library: test individual decision processes used in PaR
    - Use mock data and agents to test decision processes (i.e., get expected outcomes)
    - 300+ tests (unit and integration)

## Conservation Rules

In order to verify that all agent events are recorded consistently, standard economic conservation rules are tested to ensure that nothing has been created or lost that should not have been. For example, balance sheet identities are tested included:

- Total amount of loans on the balance sheets of the banks equals total debts on the balance sheet of the firms
- Total money holdings on the balance sheets of households equals total household deposits on the balance sheets of the banks (summed across all banks)
- Total government bonds equals total bond holdings by all households, plus bond holdings of the Central Bank

Similarly, any changes in population changes are verified to be accounted for by demographic processes.

In total, the PaR test suites currently runs 57 separate value conservation tests, each of which may have many subcategories. For example, for changes in population, this applies to all 56,000+ DAs across Canada and for each of 100 age groups and 2 sexes. List of conservation tests in Prosperity at Risk

| | |
|---|---|
| Changes in population = birth - deaths + net migration + aging | Interest::Official International Reserves |
| Check total transfers paid = total transfers received | Other assets |
| check total recevied by household = total paid to household | consumption from iod = consumption from CA for household |
| check total received by nonres = total paid to nonres | consumption from iod = consumption from CA for industry |
| taxes paid = taxes received | p1000 / taxes on products from IOD = taxes in CA |
| Income::Taxes::Subsidies on Production | p2000 / subsidies of products from IOD = taxes in CA |
| Income::Taxes::Subsidies on Products and Imports | p3000 / subsidies on production from IOD = taxes in CA |
| Income::Taxes::Taxes on Production | p4000 / taxes on production from IOD = taxes in CA |
| Income::Taxes::Taxes on Products and Imports | p5000+p6000 / Check compensation from IOD = taxes in CA |
| property income paid = property income received | p7000/ Check gross mixed income from IOD = taxes in CA |
| Dividends::Equity::Foreign Investments | p8000 / Check gross operating surplus from IOD = taxes in CA |
| Dividends::Equity::Government Claims | Gross output from IOD = taxes in CA |
| Dividends::Equity::Listed Shares | gross intermediate from IOD = taxes in CA |
| Dividends::Equity::Mutual Funds | Outputs = Inputs for all BS |
| Dividends::Equity::Unlisted Shares | Outputs = Inputs for FC |
| Interest::Currency::Canadian currency and deposits | Outputs = Inputs for GS |
| Interest::Currency::Foreign currency and deposits | Outputs = Inputs for NP |
| Interest::Debt Securities::Canadian Bonds::Government of Canada | Wages received = Wages Paid |
| Interest::Debt Securities::Canadian Bonds::Local | IOD Capital Investment = Capital Investment Flows for Construction::Non-Residential::Buildings |
| Interest::Debt Securities::Canadian Bonds::Other | IOD Capital Investment = Capital Investment Flows for Construction::Residential |
| Interest::Debt Securities::Canadian Bonds::Provincial | IOD Capital Investment = Capital Investment Flows for IP |
| Interest::Debt Securities::Canadian Short Term::Government of Canada | IOD Capital Investment = Capital Investment Flows for M&E |
| Interest::Debt Securities::Canadian Short Term::Other | Consumption of Fixed Capital = Non-Financial Capital Depreciation for each asset type |
| Interest::Debt Securities::Foreign Bonds | Savings = Investment |
| Interest::Debt Securities::Foreign Short Term | Difference Between Income and Expense GDP is Zero |
| Interest::Life Insurance and Pensions | Difference Between Income and Value Add GDP is Zero |
| Interest::Loans::Mortgages | Average Household size = expected household size |
| Interest::Loans::Non-mortgage::Consumer credit | Total wages = wages x hours x employment for each industry and region |
| Interest::Loans::Non-mortgage::Corporate Claims | |
| Interest::Loans::Non-mortgage::General | |
| Interest::Loans::Non-mortgage::Government Claims | |

## Cross model validation

In addition to the internal model validation, the output from the Prosperity at Risk® platform is regularly calibrated and tested against the results other models. Cross model validation ensures Prosperity at Risk® is producing baselines that are in accordance with other models. Key models include:

- Public sector forecasts including Ontario MOF (e.g., population and GDP)
- Private sector forecasts including major banks and Conference Board

While CANCEA performs cross model tests internally, such tests are also performed for clients where they have a model to test.

# F. DATA SET CHARACTERISTICS

The following table outlines the characteristics of the datasets used to generate the agents and parameterize the processes in Prosperity at Risk. CANSIM tables are regularly updated as new releases become available.

**Table 11** Statistics Canada Public Use Microfiles

| Source |
|---|
| Census (individual and hierarchical), 2001, 2006, 2011 |
| Labour Force Survey (up to July 2017) |

**Table 12** Census Catalogue Datasets (2001, 2006, 2011, 2016)

| Catalogue Number | Catalogue Number |
|---|---|
| 98-312-XCB2011007 | 97-554-XCB2006029 |
| 98-313-XCB2011021 | 97-554-XCB2006041 |
| 98-313-XCB2011022 | 97-554-XCB2006042 |
| 99-014-X2011026 | 97-554-XCB2006008 |
| 99-012-X2011060 | 97-554-XCB2006053 |
| 99-014-X2011030 | 98-400-X2016003 |
| 99-014-X2011040 | 98-400-X2016015 |
| 99-014-X2011019 | 98-400-X2016017 |
| 99-012-X2011052 | 95F0300XCB2001001 |
| 99-014-X2011028 | 93F0050XCB2001010 |
| 94-581-XCB2006002 | 95F0321XCB2001001 |
| 97-551-XCB2006006 | 95F0322XCB2001001 |
| 97-554-XCB2006025 | 95F0326XCB2001001 |
| 97-554-XCB2006010 | 95F0327XCB2001001 |
| 97-554-XCB2006009 | 95F0323XCB2001001 |
| 97-554-XCB2006012 | 95F0437XCB2001001 |
| 97-554-XCB2006037 | 95F0324XCB2001001 |

Table 13 CANSIM tables used to calibrate Prosperity at Risk

| CANSIM | Description |
|---|---|
| 0029-0005 | Capital and repair expenditures, by sector and province |
| 0029-0035 | Capital and repair expenditures on construction and machinery and equipment, public and private investment, actual data |
| 0029-0039 | Capital expenditures on construction, by type of asset and North American Industry Classification System (NAICS) sector |
| 0029-0040 | Capital expenditures on construction, by type of asset and province |
| 0031-0002 | Flows and stocks of fixed non-residential capital, by North American Industry Classification System (NAICS) and asset, Canada, provinces and territories |
| 0031-0003 | Flows and stocks of fixed non-residential capital, by sector of North American Industry Classification System (NAICS) and asset, Canada, annual (Dollars) |
| 0031-0004 | Flows and stocks of fixed non-residential capital, All industries and asset, provinces, annual (Dollars) |
| 0030-0002 | Flows and stocks of fixed residential capital, annual (dollars x 1,000,000) |
| 0051-0001 | Estimates of population, by age group and sex for July 1, Canada, provinces and territories |
| 0051-0002 | Estimates of deatshs, by age group and sex for July 1, Canada, provinces and territories |
| 0051-0011 | International migrants, by age group and sex for July 1, Canada, provinces and territories |
| 0051-0012 | Interprovincial migrants, by age group and sex for July 1, Canada, provinces and territories |
| 0051-0013 | Estimates of births, by age group and sex for July 1, Canada, provinces and territories |
| 0051-0019 | Interprovincial migrants, by age group and sex for July 1, Canada, provinces and territories |
| 0051-0020 | Non-permanent resident |
| 0051-0056 | Non-permanent resident |
| 0051-0057 | Components of pop growth - including Non-permanent resident by CMA |
| 0051-0062 | Estimates of population by census division, sex and age group for July 1, based on the Standard Geographical Classification (SGC) |
| 0051-0063 | Components of population growth by census division, sex and age group for July 1, based on the Standard Geographical Classification (SGC) |
| 0051-0064 | Births by census division, sex and age group for July 1, based on the Standard Geographical Classification (SGC) |
| 0051-0065 | Interprovincial and intraprovincial migrants, by census metropolitan area of origin and destination for the period from July 1 to June 30; annual (persons) |
| 0052-0005 | Projected population, by projection scenario, age and sex, as of July 1, Canada, provinces and territories, annual (Persons), |
| 0052-0006 | Components of projected population growth, by projection scenario, Canada, provinces and territories, annual (Persons), |
| 0102-4503 | Live births, by age and province of mother, Canada |
| 0111-0001 | Charitable donors, |
| 0111-0002 | Charitable donors, by age and sex |
| 0111-0005 | Taxfilers and dependents, by age and sex |
| 0111-0008 | Income bracket of persons, by age and sex |
| 0111-0009 | Family characteristics, summary, annual (Number), |
| 0111-0010 | Family characteristics, by family type and age group, annual (Number), |
| 0111-0011 | Family characteristics, by family type, family composition and characteristics of parents, annual (Number), |
| 0111-0012 | Income bracket of families, by age and sex |

| | |
|---|---|
| 0111-0013 | Family characteristics, by family type, family composition and family income, annual (Number), |
| 0111-0014 | Family characteristics, by family type and sources of income, |
| 0111-0022 | Family characteristics, families with children, by age of children, annual (Number), |
| 0111-0026 | Neighbourhood income and demographics, taxfilers and dependents by sex, income tax, deductions and benefits |
| 0111-0030 | In-, out- and net-migration estimates, by geographic regions of origin and destination, *Terminated* |
| 0111-0032 | Seniors' characteristics, by family type and age of oldest individual, annual (Number), |
| 0111-0033 | Seniors' characteristics, by family type, sex and age group, annual (Number), |
| 0111-0034 | Seniors' characteristics, by family type, age of oldest individual and source of income, annual (Dollars), 2000 to 2013 |
| 0111-0036 | Canadian savers, by savers characteristics, annual (Percent), (only interest income -- no dividend income) |
| 0111-0037 | Canadian investors, by investors' characteristics, annual (Percent), (both interest and dividend income |
| 0111-0038 | Canadian investment income, by characteristics of taxfilers with investment income, annual (Percent), |
| 0111-0039 | Registered Retirement Savings Plan (RRSP) contributions, by contributor characteristics, annual (Percent), |
| 0111-0042 | Canadian capital gains, by characteristics of taxfilers with capital gains |
| 0187-0001 | Quarterly balance sheet and income statement INCORPORATED BUSINESSES ONLY, by North American Industry Classification System (NAICS) |
| 0187-0002 | Quarterly balance sheet and income statement INCORPORATED BUSINESSES ONLY, by North American Industry Classification System (NAICS), selected financial ratios and selected seasonally adjusted components |
| 0202-0407 | Income of individuals, by sex, age group and income source, 2011 constant dollars, annual |
| 0203-0001 | Survey of household spending (SHS), household spending, summary-level categories, by province, territory and selected metropolitan areas, *Terminated* |
| 0203-0021 | Survey of household spending (SHS), household spending, Canada, region and provinces |
| 0203-0022 | Survey of household spending (SHS), household spending, Canada region provinces, income quintile |
| 0203-0023 | Survey of household spending (SHS), household spending, by household type |
| 0203-0024 | Survey of household spending (SHS), household spending, by household tenure |
| 0203-0025 | Survey of household spending (SHS), household spending, by size of residence |
| 0203-0026 | Survey of household spending (SHS), household spending, by age of reference person |
| 0203-0027 | Survey of household spending (SHS), dwelling characteristics |
| 0203-0028 | Survey of household spending (SHS), household spending, detailed food |
| 0203-0030 | Survey of household spending (SHS), household spending, territories |
| 0203-0031 | Survey of household spending (SHS), dwelling characteristics, territories |
| 0205-0002 | Survey of Financial Security (SFS), composition of assets (including Employer Pension Plans valued on a termination basis) and debts held by all family units, by age group, Canada - 2012 dollars |
| 0205-0003 | Survey of Financial Security (SFS), composition of assets (including Employer Pension Plans valued on a termination basis) and debts held by all family units, and net worth quintiles by region - 2012 dollars |
| 0206-0031 | Upper income limit, income share and average of market, total and after-tax income by economic family type and income decile, Canada and provinces |
| 0281-0041 | Survey of Employment, Payrolls and Hours (SEPH), employment for all employees, by enterprise size and North American Industry Classification System (NAICS), unadjusted for seasonality |
| 0281-0042 | Survey of Employment, Payrolls and Hours (SEPH), employment for all employees, by enterprise size and North American Industry Classification System (NAICS), annual |

| | |
|---|---|
| 0281-0044 | Survey of Employment, Payrolls and Hours (SEPH), average weekly earnings (including overtime) for all employees, by enterprise size and North American Industry Classification System (NAICS) |
| 0282-0002 | Labour force survey estimates (LFS), by sex and detailed age group |
| 0282-0008 | Labour force survey estimates (LFS), by North American Industry Classification System (NAICS), sex and age group, annual (persons x 1,000) |
| 0282-0012 | public/private |
| 0282-0072 | Labour force survey estimates (LFS), wages of employees by type of work, North American Industry Classification System (NAICS), sex and age group |
| 0282-0076 | Labour force survey estimates (LFS), employees by establishment size, North American Industry Classification System (NAICS), sex and age group (persons x 1,000) |
| 0282-0078 | LFS unionization data |
| 0282-0142 | Labour force survey estimates (LFS), by National Occupational Classification (NOC) and sex |
| 0282-0152 | wages of employees by type of work, National Occupational Classification (NOC), sex, and age group |
| 0282-0163 | Labour force survey estimates (LFS), hourly wage distribution of employees by type of work, National Occupational Classification (NOC) and sex |
| 0378-0119 | Financial Flow Accounts, quarterly (x 1,000,000) |
| 0378-0121 | National balance sheet accounts, quarterly (x 1,000,000) |
| 0378-0126 | Other Changes in Assets Account, quarterly (x 1,000,000) |
| 0379-0023 | Gross domestic product (GDP) at basic price in current dollars, System of National Accounts (SNA) benchmark values, by North American Industry Classification System (NAICS), *Terminated*, annual (dollars x 1,000,000) |
| 0379-0028 | Gross domestic product (GDP) at basic prices, by North American Industry Classification System (NAICS), provinces and territories, annual (Percentage share), 2002 to 2015 |
| 0380-0063 | Gross domestic product, income-based, quarterly (dollars x 1,000,000) |
| 0380-0067 | Household final consumption expenditure, quarterly (Dollars x 1,000,000) |
| 0380-0068 | Gross fixed capital formation, quarterly (dollars x 1,000,000) |
| 0380-0071 | Current and capital accounts - National; all sectors (dollars x 1,000,000) |
| 0380-0072 | Current and capital accounts - Households (dollars x 1,000,000) |
| 0380-0073 | Selected indicators - Households quarterly (dollars unless otherwise noted) |
| 0380-0075 | Current and capital accounts - Non-profits serving households (dollars x 1,000,000) |
| 0380-0076 | Current and capital accounts - Corporations (dollars x 1,000,000) |
| 0380-0079 | Current and capital accounts - General governments (dollars x 1,000,000) |
| 0380-0080 | Revenue, expenditure and budgetary balance - General governments |
| 0380-0081 | Revenue, expenditure and budgetary balance - Provincial administration, education and health |
| 0380-0082 | Current and capital accounts - Non-residents (dollars x 1,000,000) |
| 0380-0085 | Detailed household final consumption expenditure quarterly (dollars x 1,000,000) |
| 0380-0087 | Property income of households quarterly (dollars x 1,000,000) |
| 0381-0009 | Inputs and outputs, by industry and commodity, L-level aggregation and North American Industry Classification System (NAICS), annual (Dollars x 1,000,000) |
| 0381-0010 | Final demand categories, by commodity, L-level aggregation, *Terminated*, annual (dollars x 1,000,000) |
| 0381-0011 | Final demand categories, by commodity, M-level aggregation, *Terminated*, annual (dollars x 1,000,000) |
| 0381-0012 | Final demand categories, by commodity, S-level aggregation, *Terminated*, annual (dollars x 1,000,000) |
| 0381-0013 | Inputs and outputs, by industry and commodity, S-level aggregation and North American Industry Classification System (NAICS), *Terminated*, annual (dollars x 1,000,000) |

| | |
|---|---|
| 0381-0014 | Inputs and outputs, by industry and commodity, M-level aggregation and North American Industry Classification System (NAICS), annual (Dollars) *Terminated* |
| 0381-0015 | Provincial gross domestic product (GDP) at basic prices in current dollars, System of National Accounts (SNA) benchmark values, by sector and North American Industry Classification System (NAICS), *Terminated*, annual (dollars x 1,000,000) |
| 0381-0016 | Provincial gross output at basic prices in current dollars, System of National Accounts (SNA) benchmark values, by sector and North American Industry Classification System (NAICS), annual (Dollars) *Terminated* |
| 0381-0022 | Input-output tables, inputs and outputs, detailed level, basic prices, annual (dollars x 1,000,000) |
| 0381-0023 | Input-output tables, final demand, detailed level, basic prices, annual (dollars x 1,000,000) |
| 0381-0028 | Provincial input-output tables, inputs and outputs, summary level, basic prices, annual (dollars x 1,000,000) |
| 0381-0029 | Provincial input-output tables, final demand, summary level, basic prices, annual (dollars x 1,000,000) |
| 0381-0030 | Provincial gross domestic product (GDP) at basic prices, by sector and industry, annual (dollars x 1,000,000) |
| 0381-0031 | Provincial gross output, by sector and industry, annual (dollars x 1,000,000) |
| 0381-0033 | Supply and use tables, detailed level, purchasers' and basic prices, annual (Dollars) |
| 0381-0035 | Supply and use tables, by province and territory, summary level, purchasers' and basic prices, annual (Dollars), |
| 0383-0030 | Labour statistics by business sector industry and by non-commercial activity consistent with the industry accounts, provinces and territories (annual) |
| 0383-0031 | Labour statistics consistent with the System of National Accounts (SNA), by province and territory, job category and North American Industry Classification System (annual) |
| 0383-0033 | Labour statistics consistent with the System of National Accounts (SNA), by province and territory, job category and North American Industry Classification System (annual) |
| 0384-0011 | Intergovernmental transfers, provincial economic accounts, *Terminated* |
| 0384-0037 | Gross domestic product, income-based, provincial and territorial, annual |
| 0384-0038 | Gross domestic product, income-based, provincial and territorial, annual |
| 0384-0040 | Current accounts - Households, provincial and territorial |
| 0384-0041 | Detailed household final consumption expenditure, provincial and territorial annual (dollars x 1,000,000) |
| 0384-0043 | Provincial and territorial consumption of fixed capital at replacement cost, by sector |
| 0384-0044 | Property income of households, provincial and territorial, annual |
| 0384-0047 | Revenue, expenditure and budgetary balance - General governments, provincial and territorial economic accounts, annual |
| 0385-0014 | Balance sheet of federal, provincial and territorial general and local governments, *Terminated* |
| 0385-0032 | Government finance statistics, statement of government operations and balance sheet, quarterly (dollars x 1,000,000) |
| 0386-0003 | Provincial input-output tables, international and interprovincial trade flows, summary level, basic prices, annual (dollars x 1,000,000) |
| 0527-0001 | Business dynamics measures, by North American Industry Classification System (NAICS) annual (number unless otherwise noted) |
| 0329-0075 | Industrial product price index, by North American Product Classification System (NAPCS) monthly (index, 2010=100) (ie. wholesale) |
| 0329-0077 | Industrial product price indexes, by North American Industry Classification System (NAICS), monthly (Index, 2010=100) (ie. wholesale) |
| 0326-0021 | Consumer Price Index, annual (2002=100) |
| 0102-0552 | Deaths and mortality rate, by selected grouped causes and sex, Canada, provinces and territories |

| | |
|---|---|
| 0102-* | Deaths by cause |
| 0027-0006 | Canada Mortgage and Housing Corporation, housing starts, under construction and completions in large urban areas, annual (Units), |
| 0027-0009 | Canada Mortgage and Housing Corporation, housing starts, under construction and completions, provincial, annual (Units), |
| 0027-0015 | Canada Mortgage and Housing Corporation, conventional mortgage lending rate, 5-year term, monthly (Percent |
| 0027-0040 | Canada Mortgage and Housing Corporation, average rents for areas with a population of 10,000 and over, annual (Dollars), |
| 0031-0005 | Flows and stocks of fixed non-residential capital, by industry and asset, Canada, provinces and territories, annual (Dollars |
| 0031-0006 | Flows and stocks of fixed non-residential capital, by industry and asset, Canada, annual (Dollars), |
| 0031-0007 | Flows and stocks of fixed non-residential capital, total all industries, by asset, Canada, provinces and territories, annual (Dollars |
| 0031-0008 | Flows and stocks of fixed residential capital, Canada, provinces and territories, annual (Dollars |
| 0031-0009 | Flows and stocks of fixed residential capital, by sector (Dollars), |
| 0551-* | Canadian business patterns |
| 0529-* | Enterprises data |

# G. TERNARY RESULTS FOR SECTORS

## G.1. RESIDENTIAL CONSTRUCTION

**Figure 72** Residential Construction: Employment percentage impact

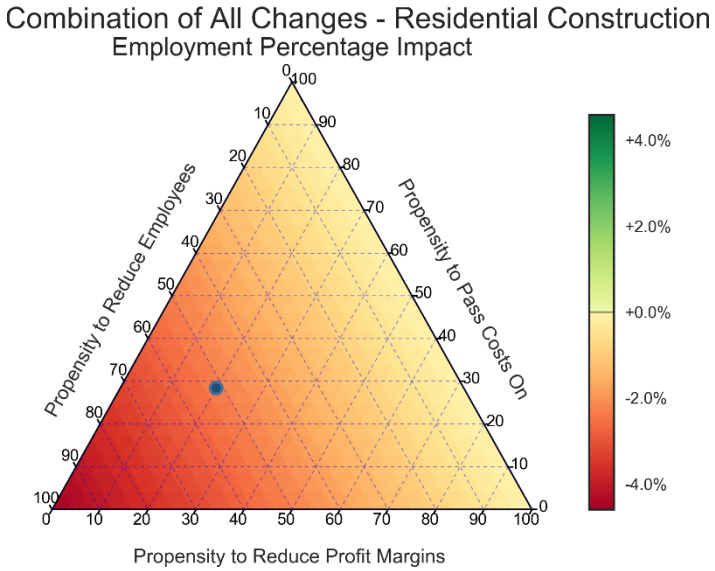
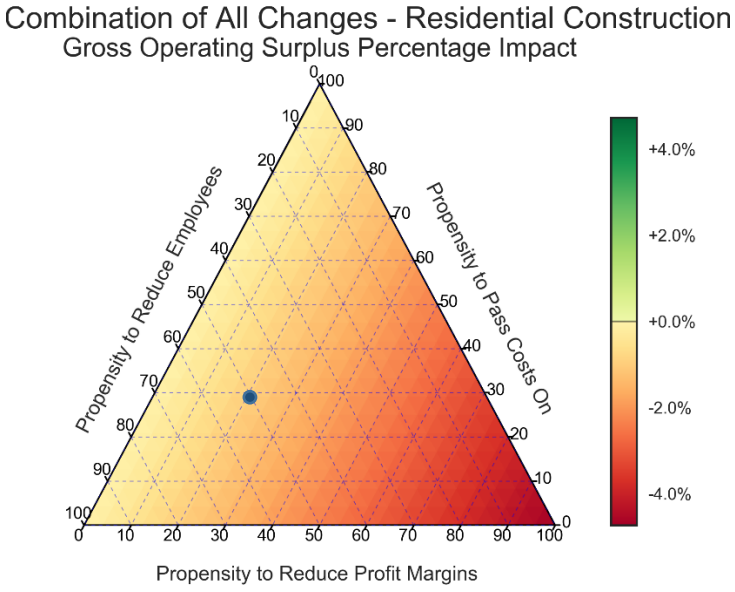



**Figure 73** Residential Construction: Gross operating surplus percentage impact



## G.2. MANUFACTURING

**Figure 74** Manufacturing: Employment percentage impact

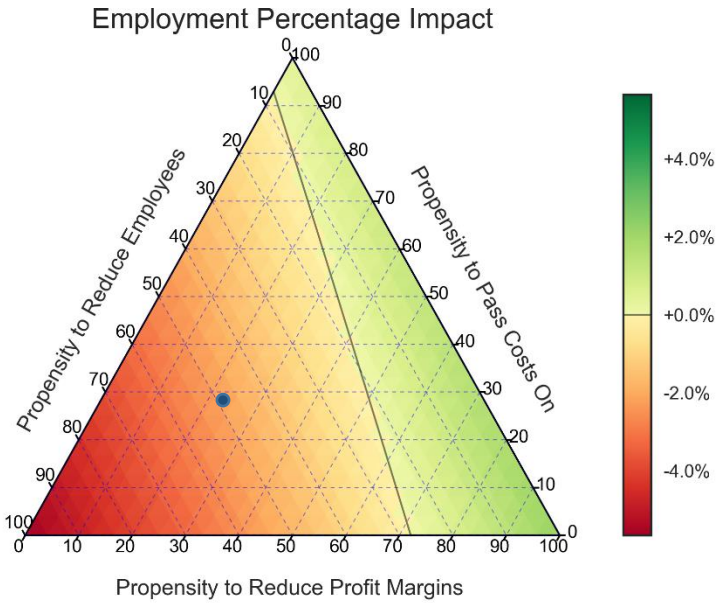
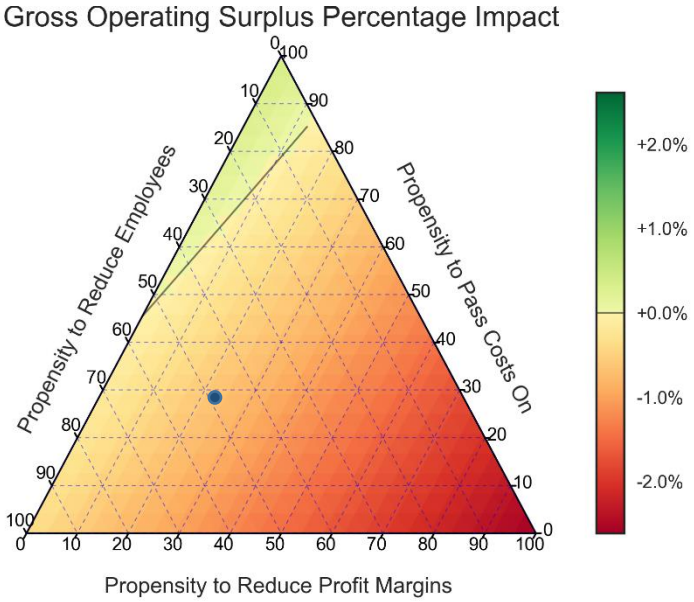



**Figure 75** Manufacturing: Gross operating surplus percentage impact



## G.3. RETAIL TRADE

**Figure 76** Retail trade: Employment percentage impact

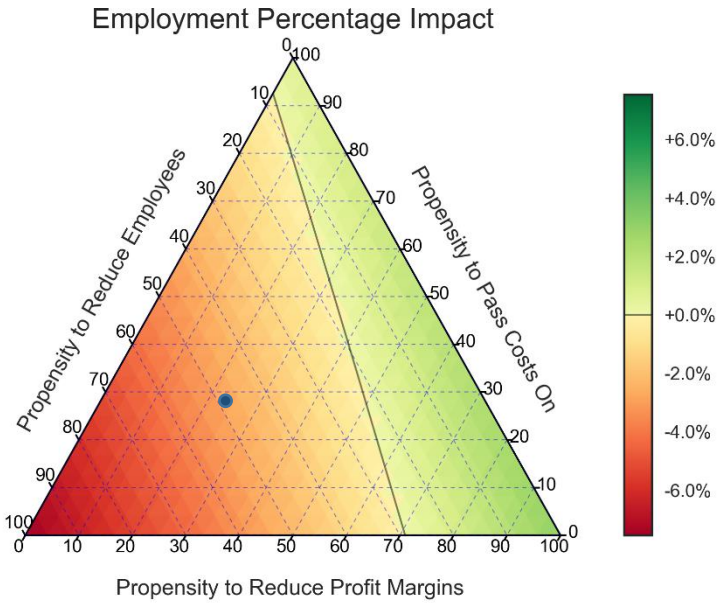
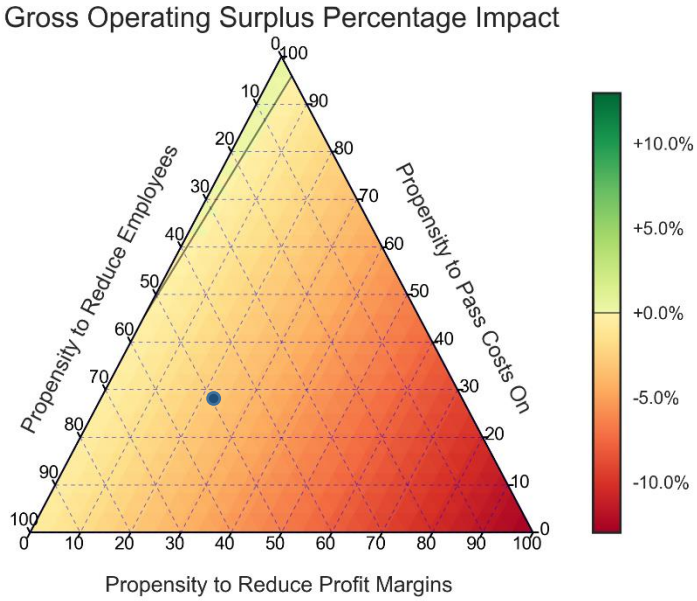



**Figure 77** Retail trade: Gross operating surplus percentage impact



## G.4. TRANSPORTATION AND WAREHOUSING

**Figure 78** Transportation and warehousing: Employment percentage impact

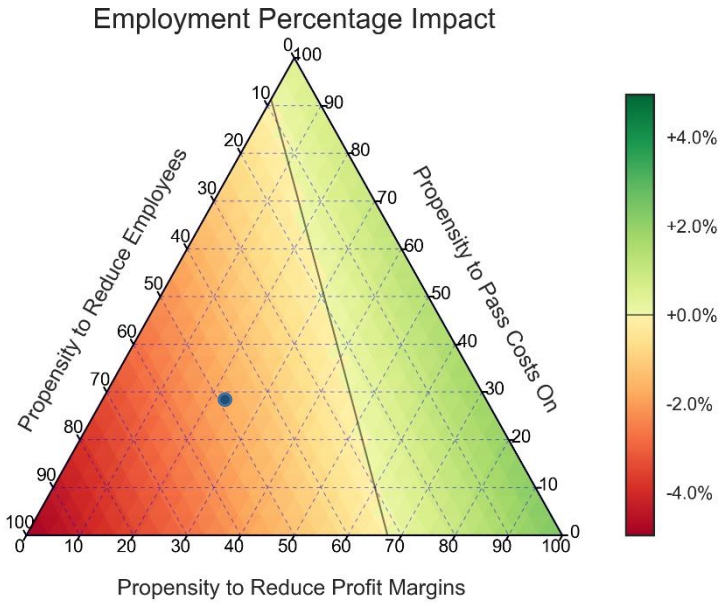
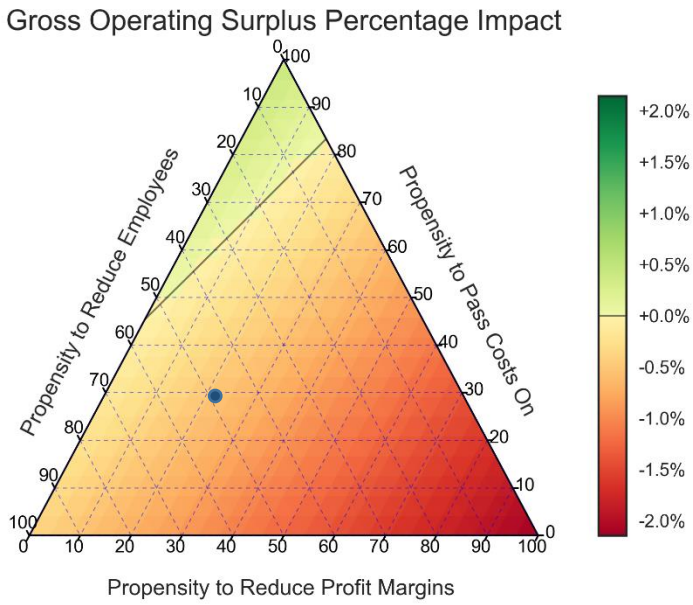



**Figure 79** Transportation and warehousing: Gross operating surplus percentage impact



## G.5. Finance, insurance, real estate, rental and leasing

**Figure 80** Finance, insurance, real estate, rental and leasing: Employment percentage impact

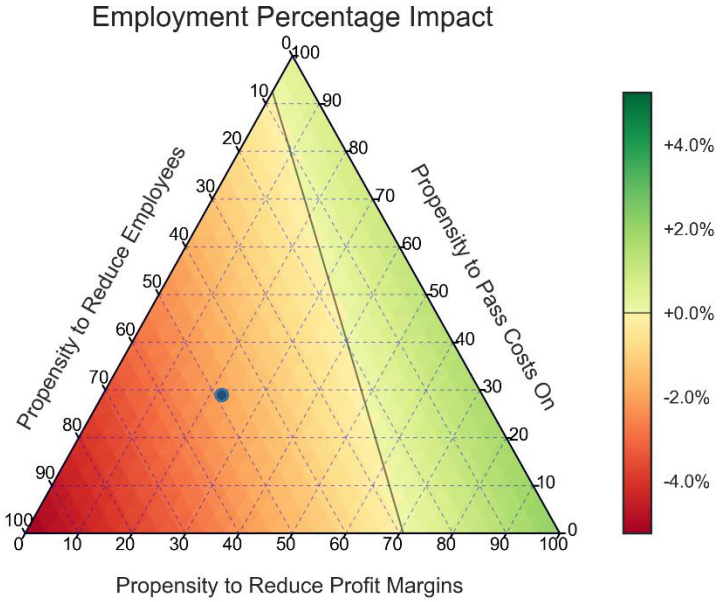
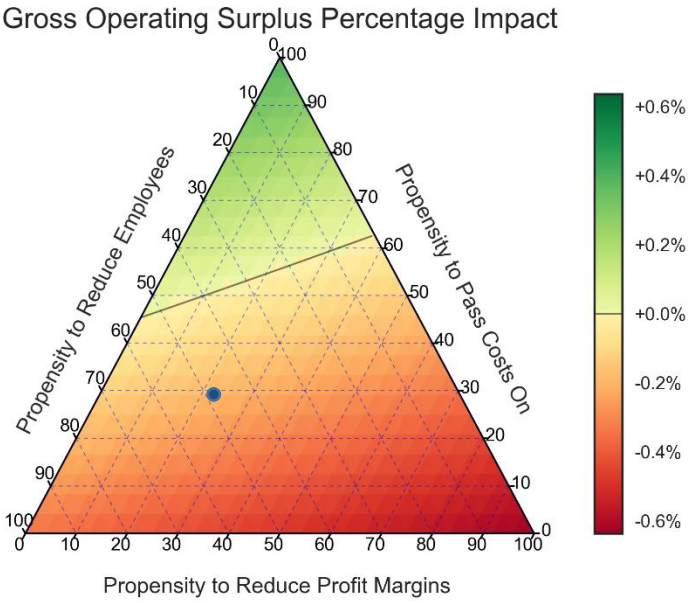



**Figure 81** Finance, insurance, real estate, rental and leasing: Gross operating surplus impact



## G.6. Crop and animal production

**Figure 82** Crop and animal production: Employment percentage impact

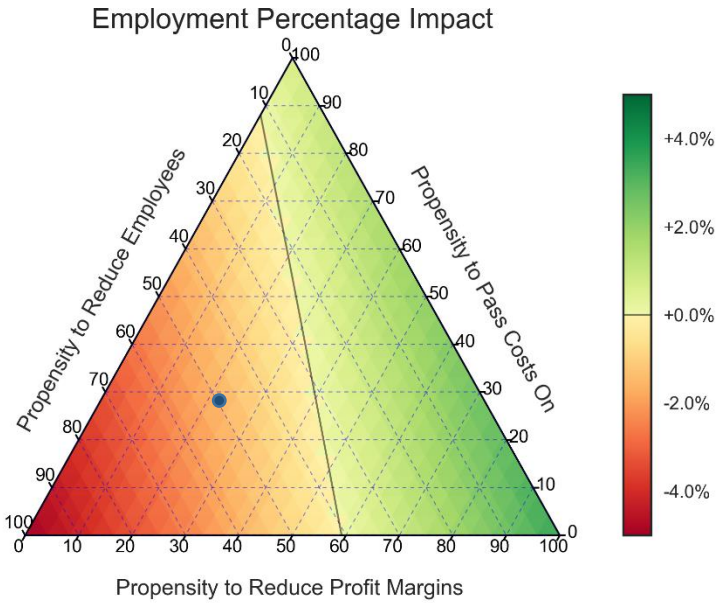
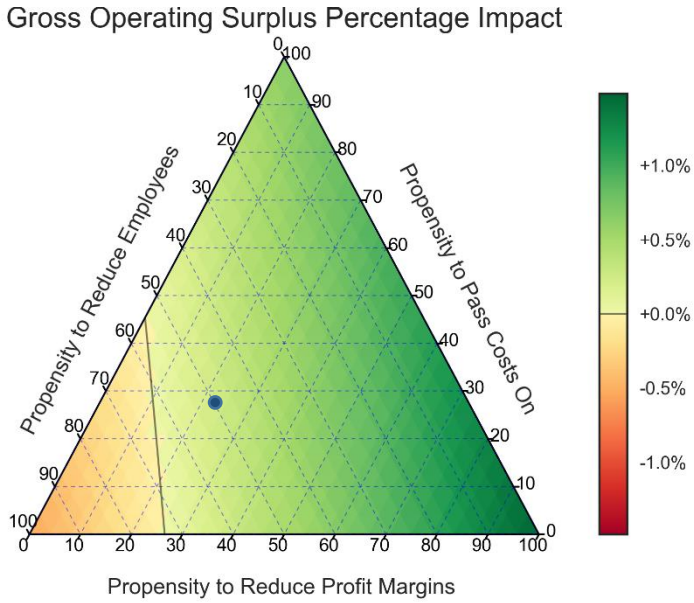



**Figure 83** Crop and animal production: Gross operating surplus percentage impact



## G.7. OWNER OCCUPIED DWELLING

**Figure 84** Owner occupied dwelling: Employment percentage impact

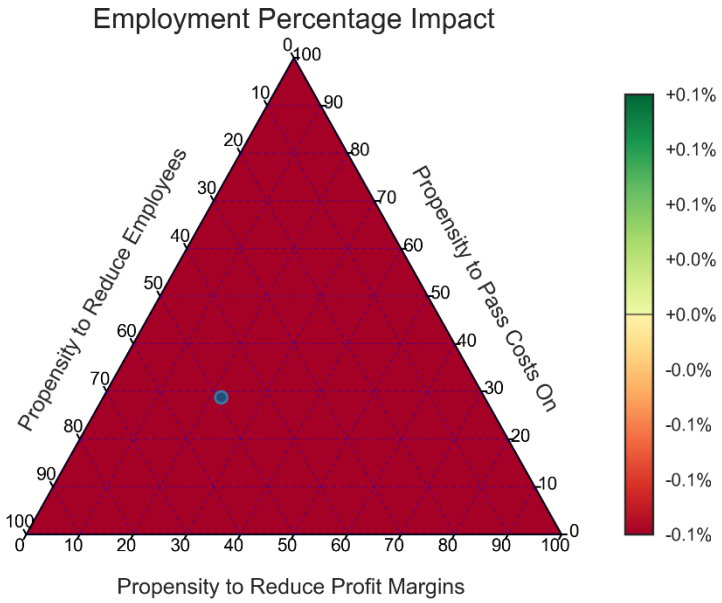
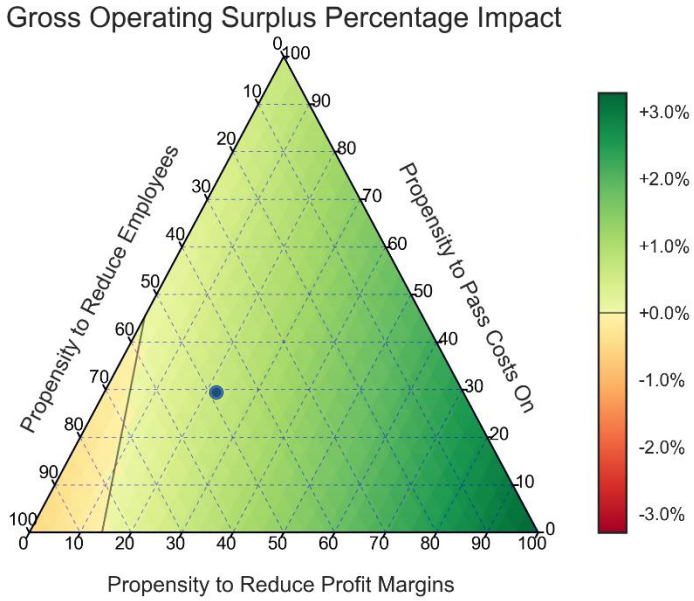



**Figure 85** Owner occupied dwelling: Gross operating surplus percentage impact



## G.8. Forestry and logging and support activities for forestry

**Figure 86** Forestry and logging and support activities for forestry: Employment percentage impact

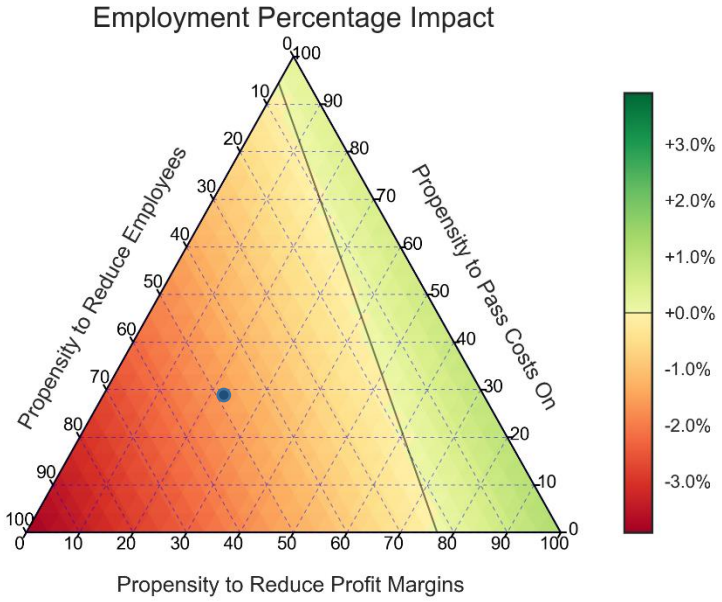
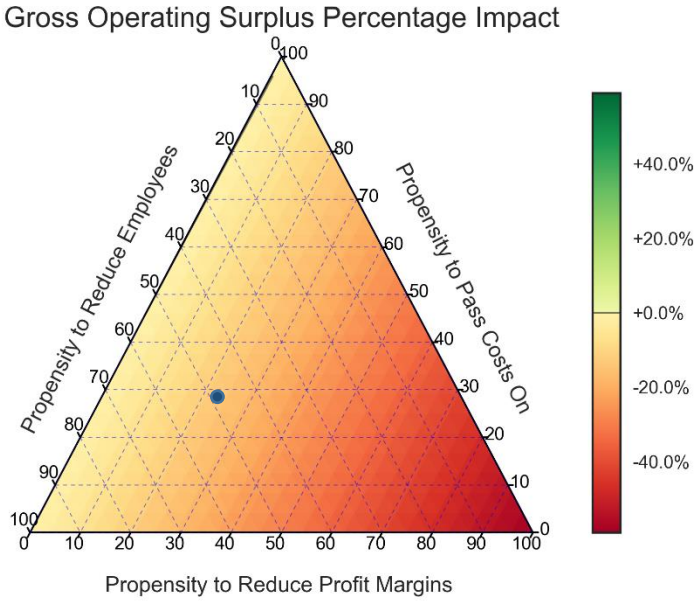



**Figure 87** Forestry and logging and support activities for forestry: Gross operating surplus percentage impact



## G.9. Fishing, hunting and Trapping

**Figure 88** Fishing, hunting and trapping: Employment percentage impact

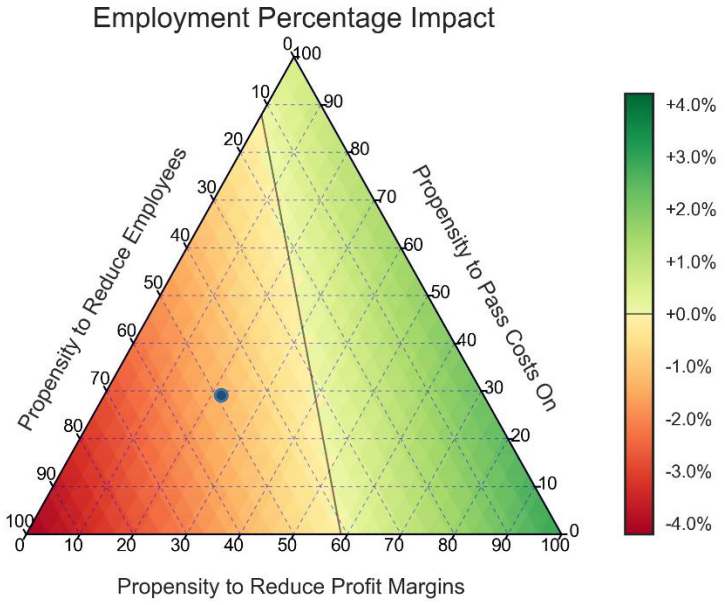
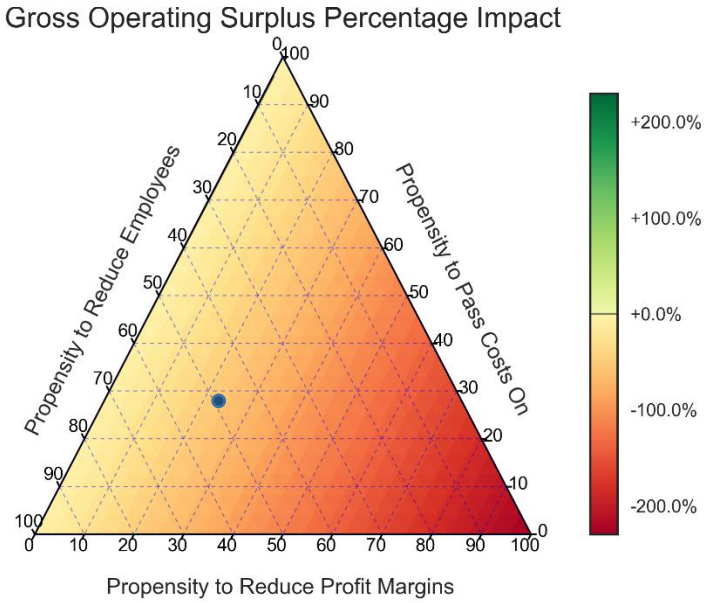



**Figure 89** Fishing, hunting and trapping: Gross operating surplus percentage impact



## G.10. Mining, quarrying, and oil and gas extraction

**Figure 90** Mining, quarrying, and oil and gas extraction: Employment percentage impact

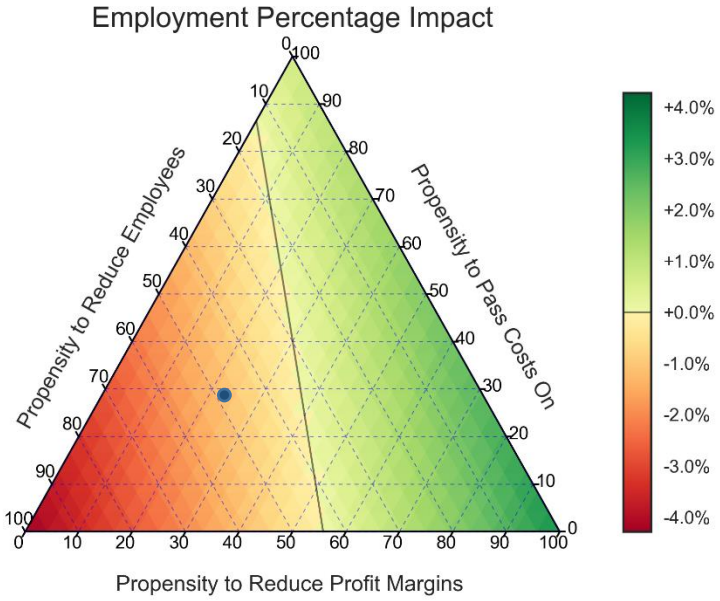
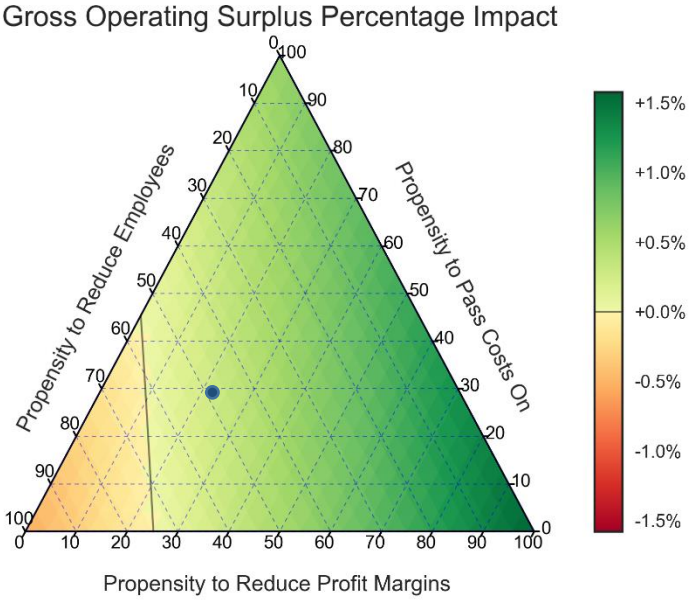



**Figure 91** Mining, quarrying, and oil and gas extraction: Gross operating surplus percentage impact



## G.11. RESIDENTIAL CONSTRUCTION

**Figure 92** Residential Construction: Employment percentage impact

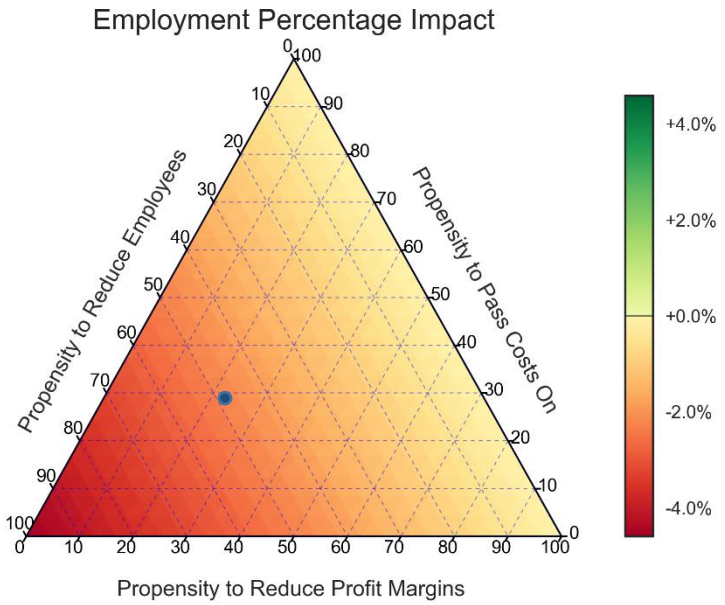
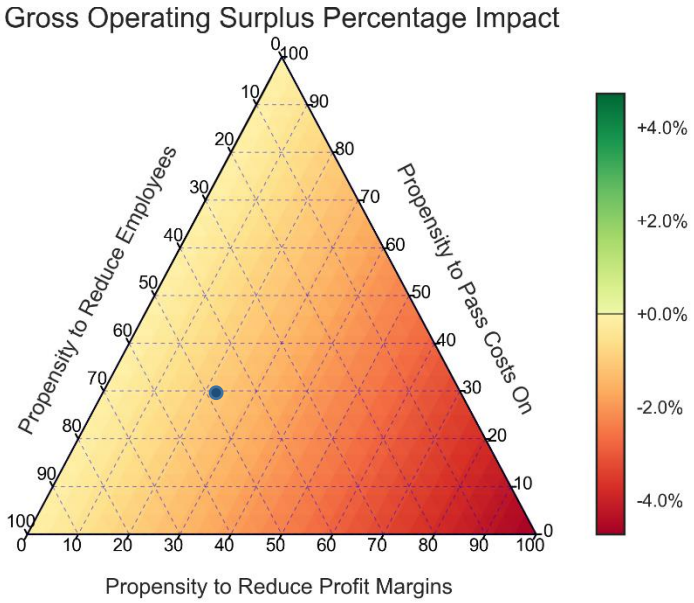



**Figure 93** Residential Construction: Gross operating surplus percentage impact



## G.12. NON-RESIDENTIAL CONSTRUCTION

**Figure 94** Non-residential construction: Employment percentage impact

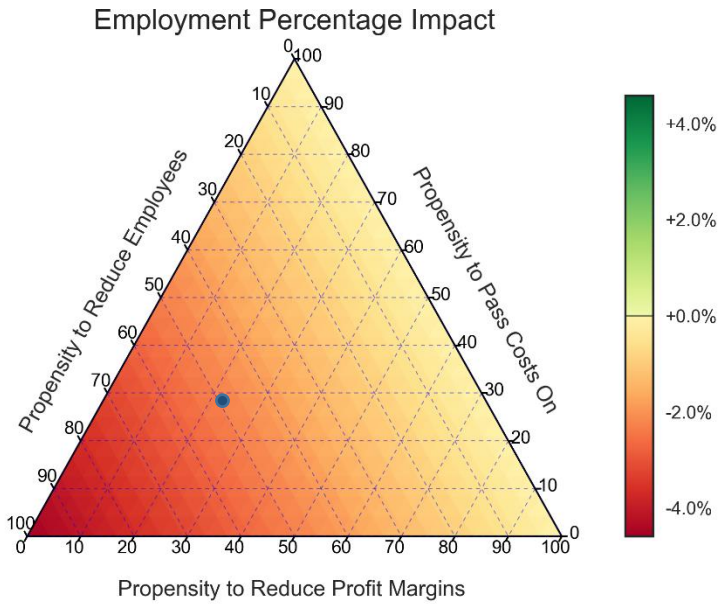
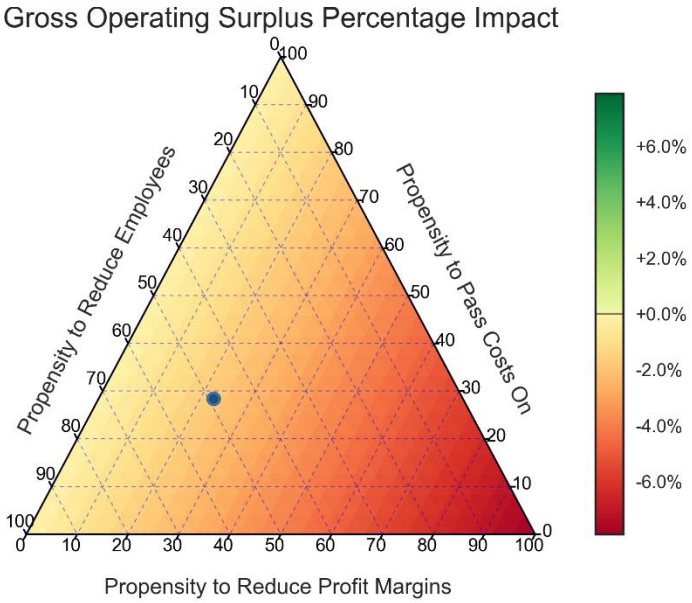



**Figure 95** Non-residential construction: Gross operating surplus percentage impact



## G.13. NON-RESIDENTIAL ENGINEERING CONSTRUCTION

**Figure 96** Non-residential engineering construction: Employment percentage impact

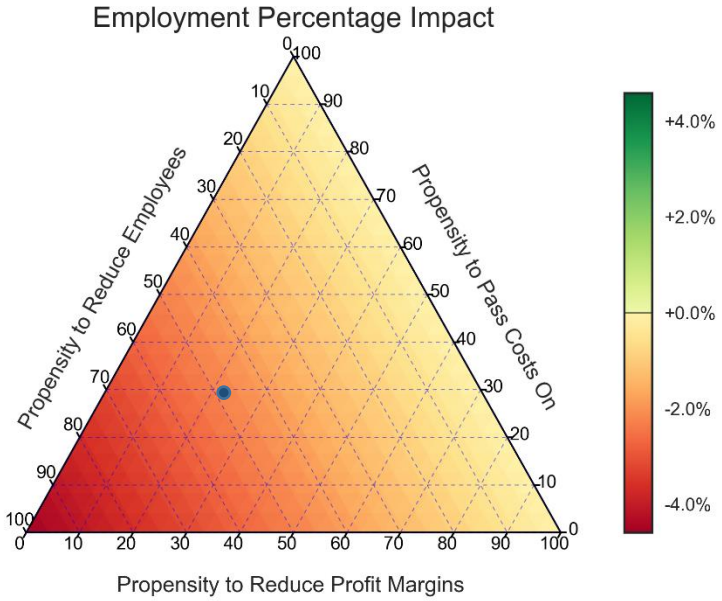
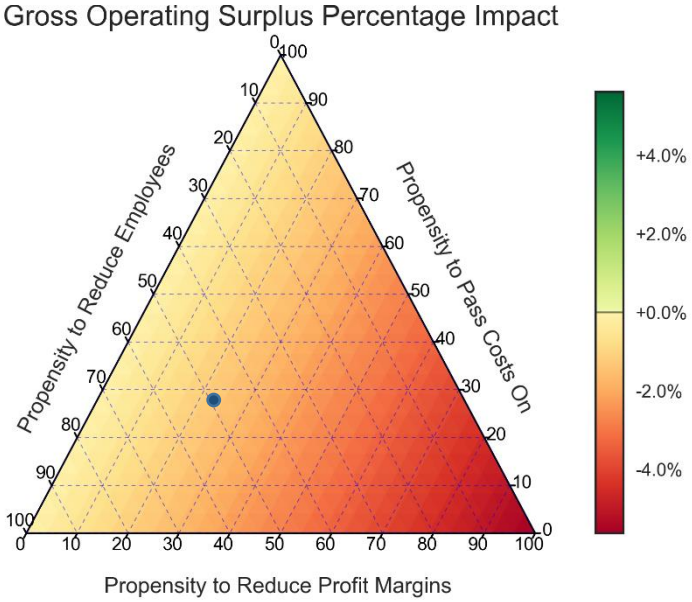



**Figure 97** Non-residential engineering construction: Gross operating surplus percentage impact



## G.14. REPAIR CONSTRUCTION

**Figure 98** Repair construction: Employment percentage impact

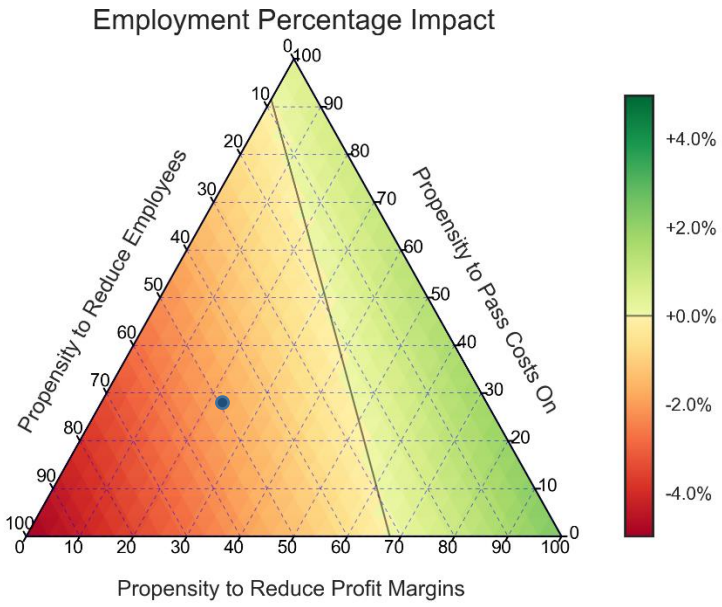
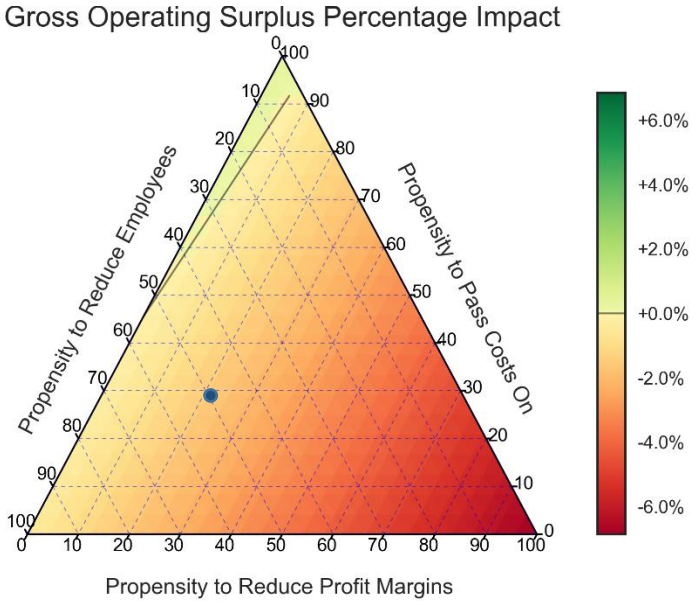



**Figure 99** Repair construction: Gross operating surplus percentage impact



## G.15. OTHER ACTIVITIES OF CONSTRUCTION

**Figure 100** Other activities of construction: Employment percentage impact

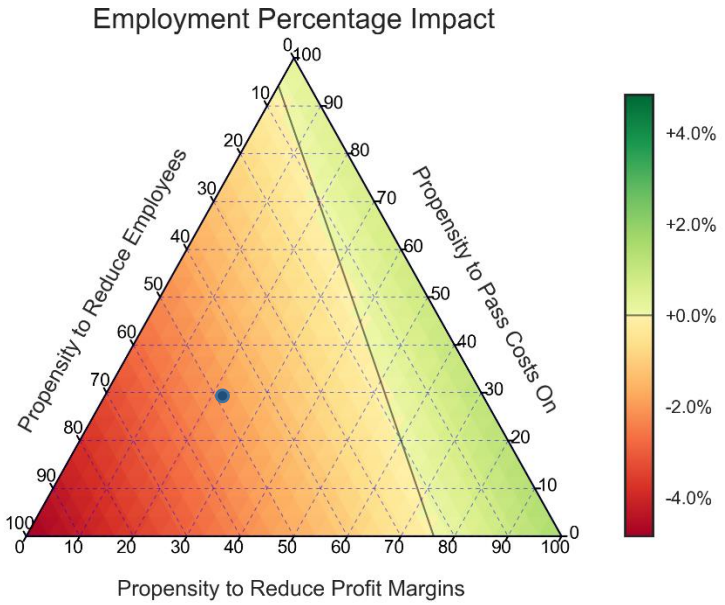
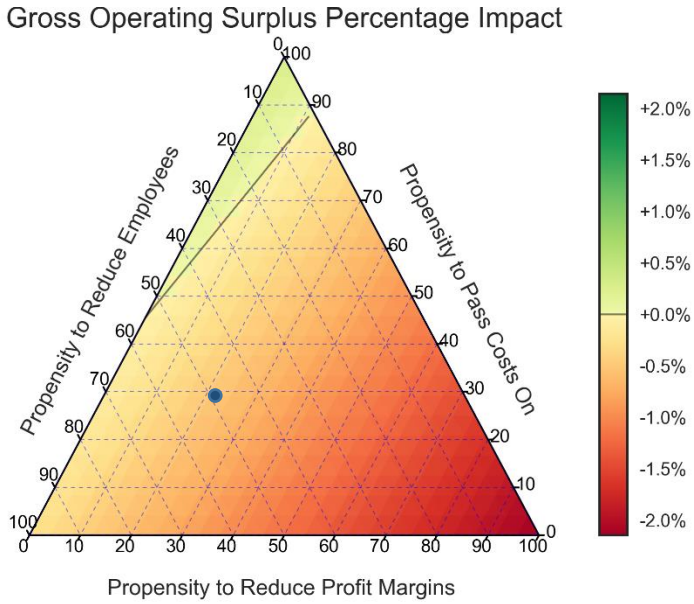



**Figure 101** Other activities of construction: Gross operating surplus percentage impact



## G.16. WHOLESALE TRADE

**Figure 102** Wholesale trade: Employment percentage impact

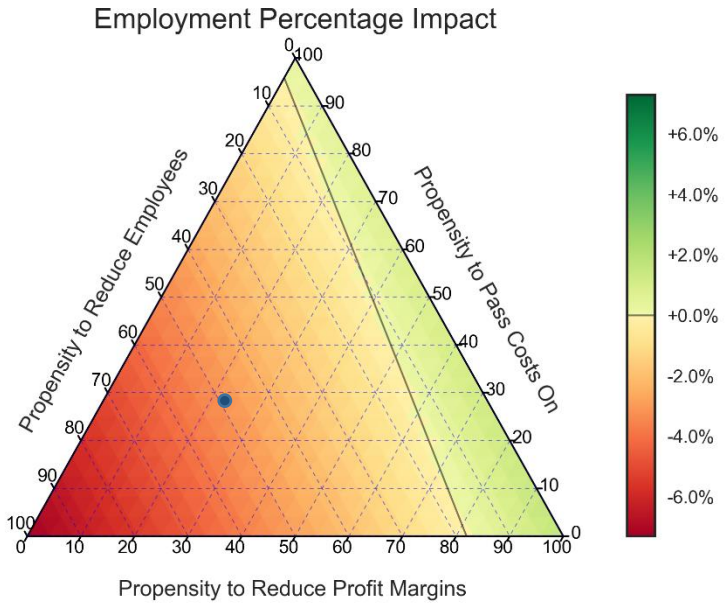
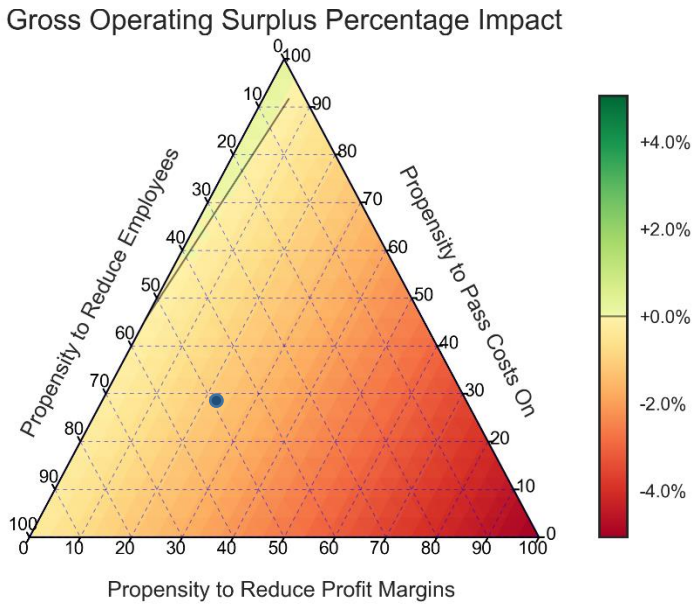



**Figure 103** Wholesale trade: Gross operating surplus percentage impact



## G.17. Information and cultural industry

**Figure 104** Information and cultural industry: Employment percentage impact

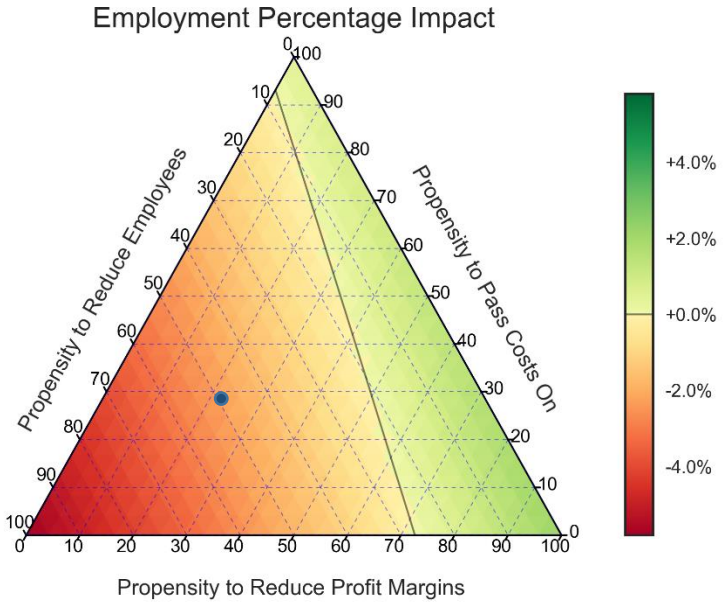
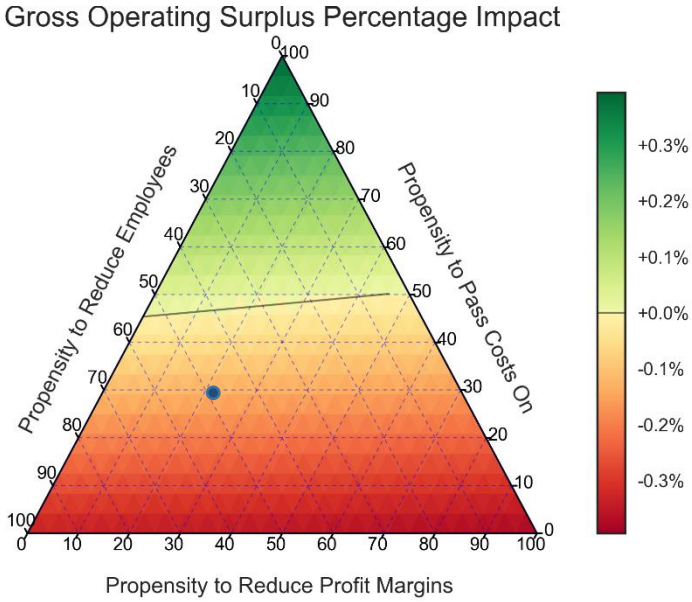



**Figure 105** Information and cultural industry: Gross operating surplus percentage impact



## G.18. Professional, scientific and Technical services

**Figure 106** Professional, scientific and technical services: Employment percentage impact

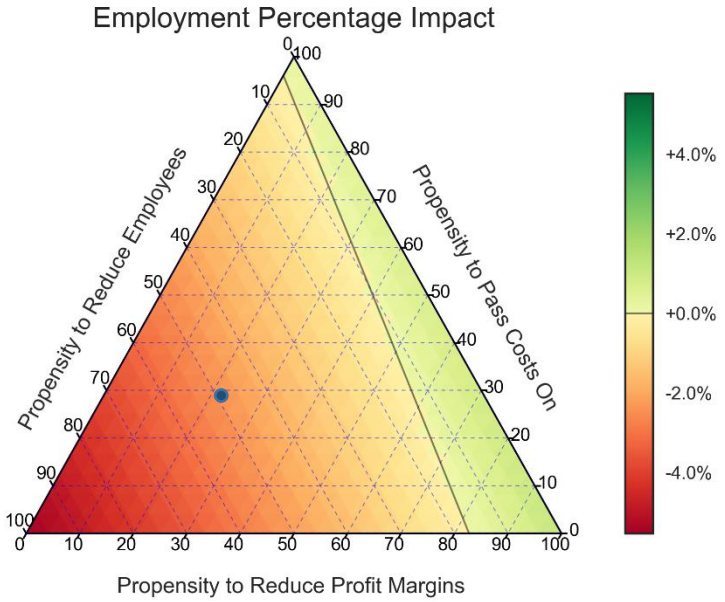
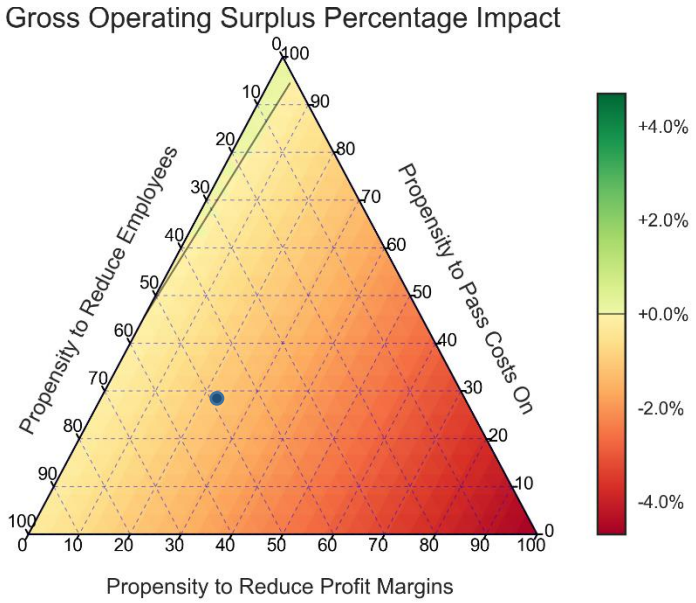



**Figure 107** Professional, scientific and technical services: Gross operating surplus percentage impact



## G.19. ADMINISTRATIVE AND SUPPORT, WASTE MANAGEMENT AND

**Figure 108** Administrative and support, waste management and: Employment percentage impact

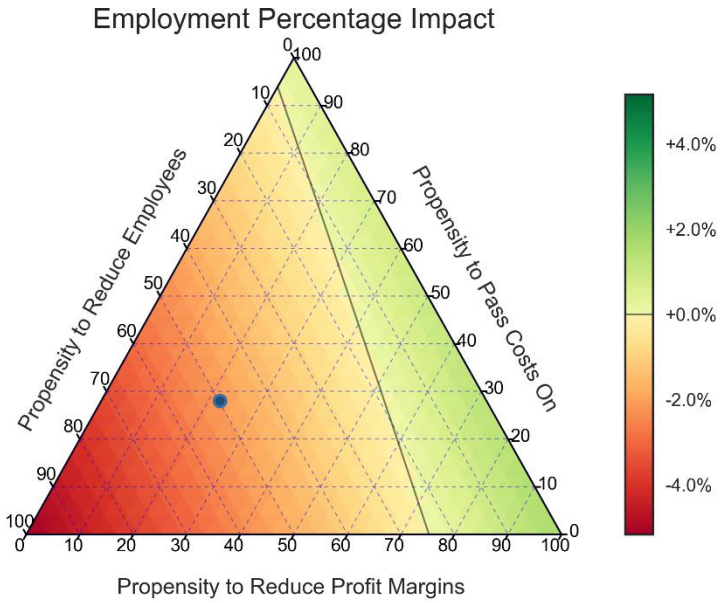
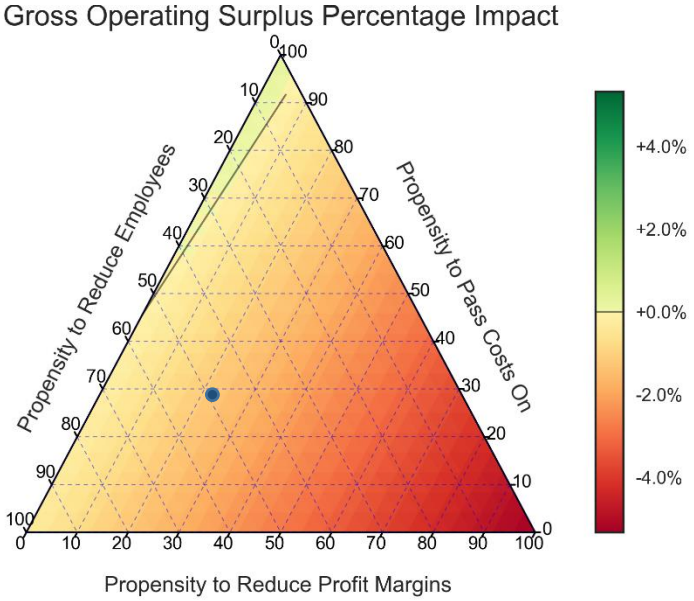



**Figure 109** Administrative and support, waste management and : Gross operating surplus percentage impact



## G.20. PRIVATE EDUCATIONAL SERVICES

**Figure 110** Private education services: Employment percentage impact

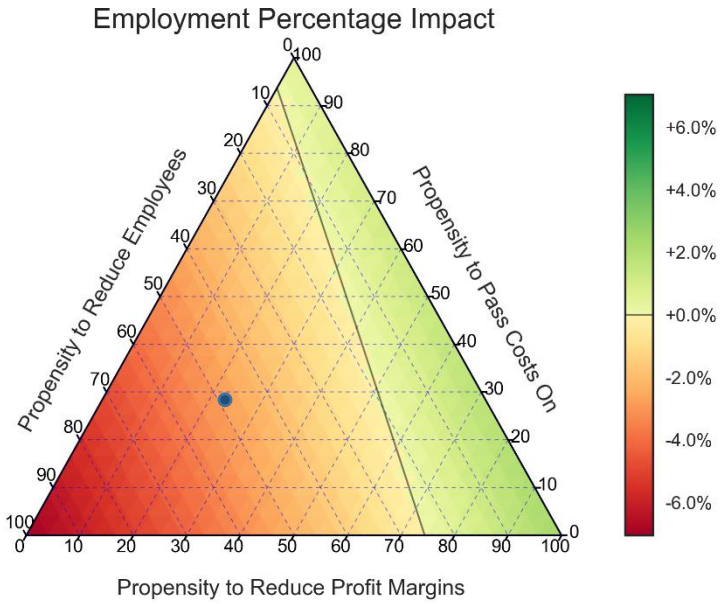
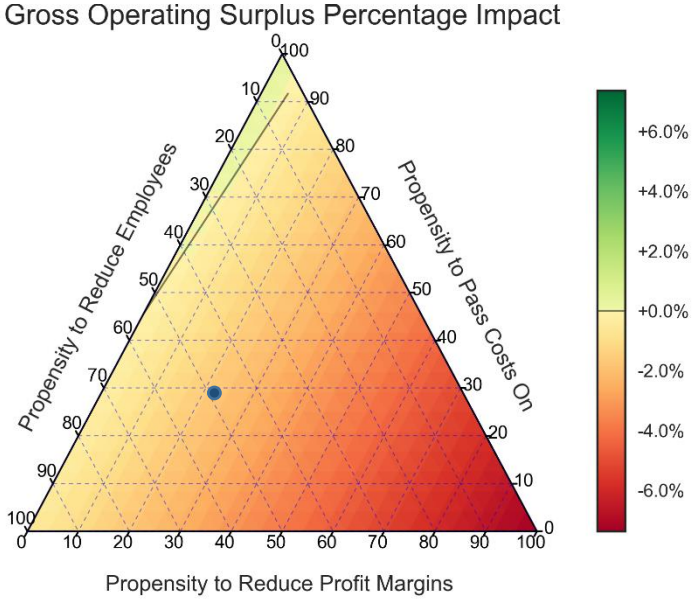



**Figure 111** Private education services: Gross operating surplus percentage impact



## G.21. PRIVATE HEALTH CARE AND SOCIAL ASSISTANCE

**Figure 112** Private health care and social assistance: Employment percentage impact

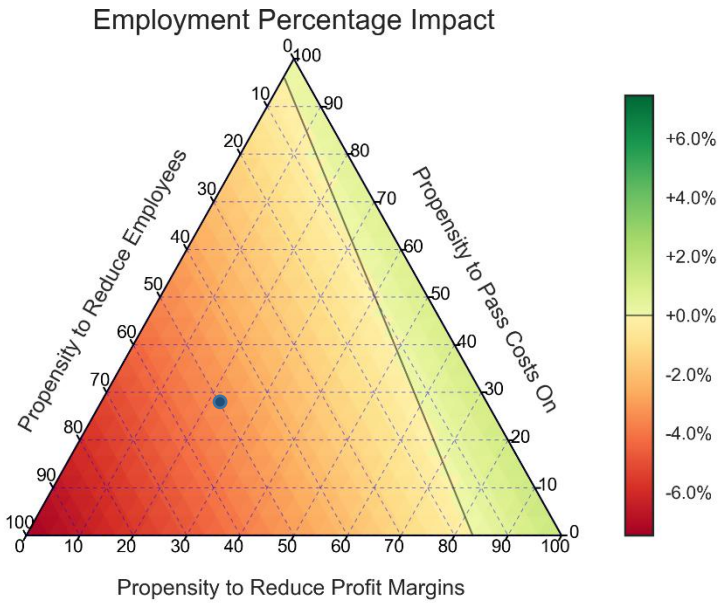
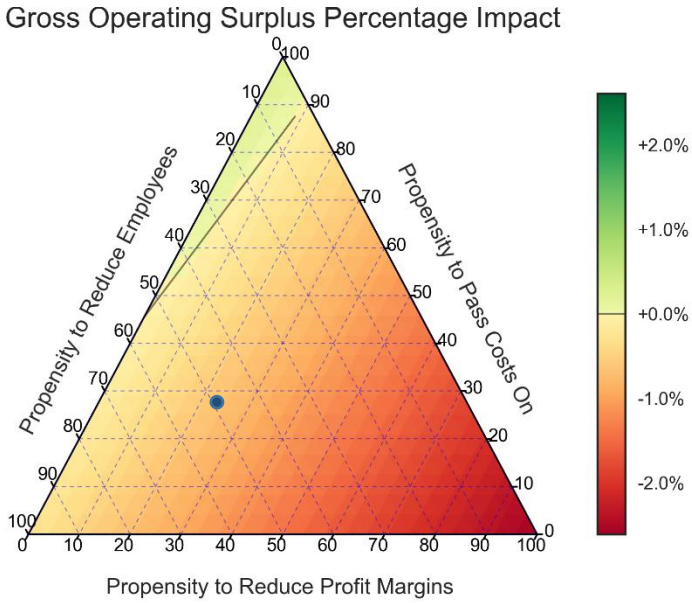



**Figure 113** Private health care and social assistance: Gross operating surplus percentage impact



## G.22. Arts, entertainment and Recreation

**Figure 114** Arts, entertainment and recreation: Employment percentage impact

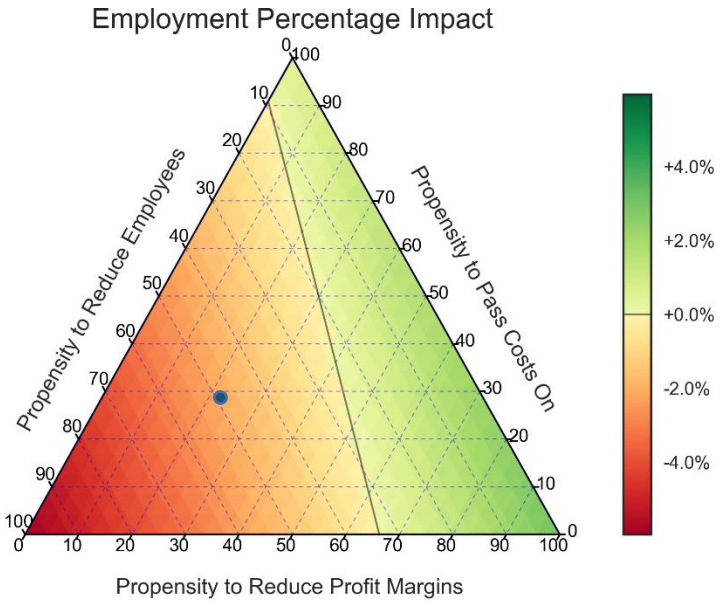
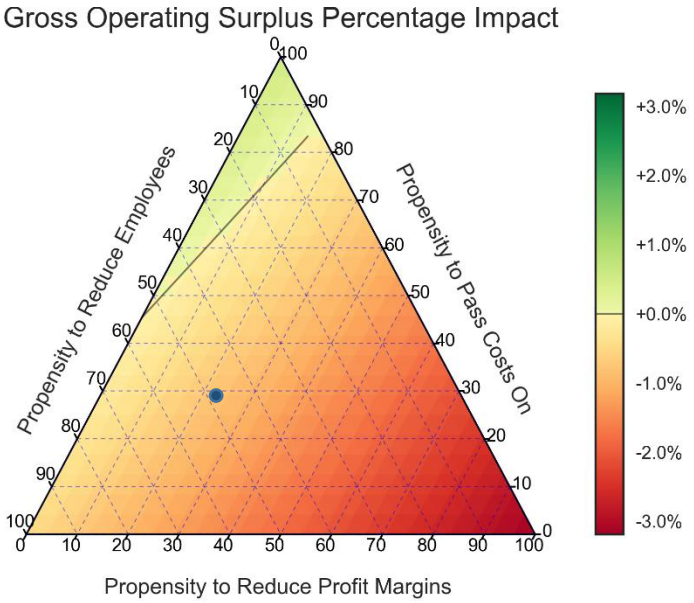



**Figure 115** Arts, entertainment and recreation: Gross operating surplus percentage impact



## G.23. OTHER SERVICES (EXCEPT PUBLIC ADMINISTRATION)

**Figure 116** Other services (except public administration): Employment percentage impact

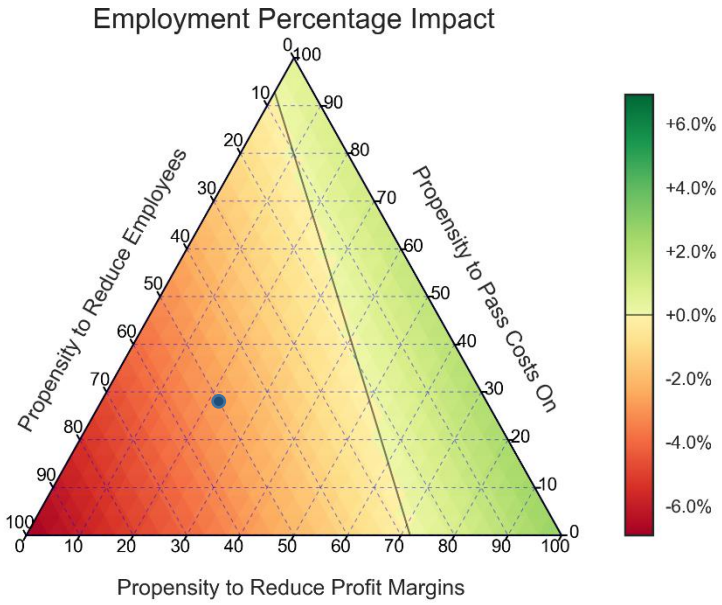
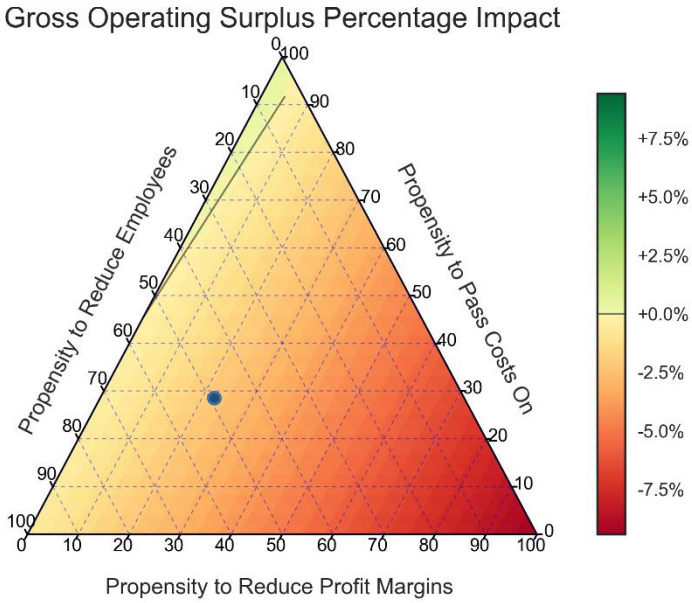



**Figure 117** Other services (except public administration): Gross operating surplus percentage impact



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