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# Robots, Revenues & Responses

Ontario and the Future of Work

BY SUNIL JOHAL, JORDANN THIRGOOD  
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WITH KIRAN ALWANI & MATI DUBROVINSKY

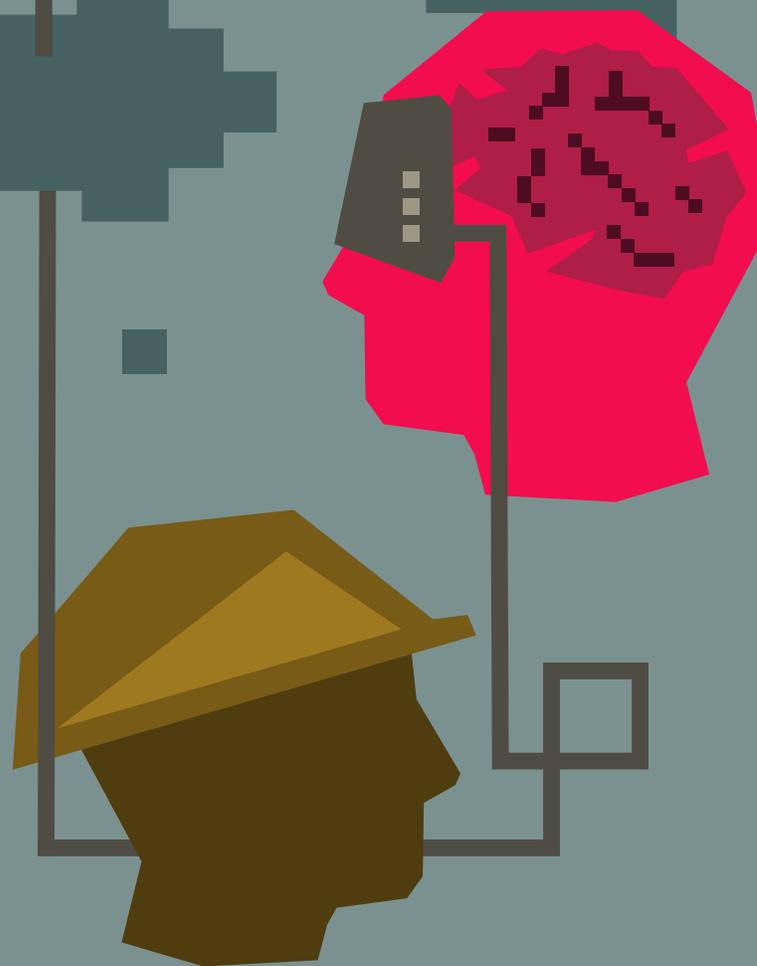
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Trends such as increased automation in the labour market, the rise of the gig and data economies, jurisdictional arbitrage and commercial consolidation are already threatening to erode the province's tax base.

# EXECUTIVE SUMMARY

Governments worldwide are grappling with disruptive technology and trying to understand how innovations like artificial intelligence and the sharing economy will reshape our lives and how we work. Much of the focus to date has been on how governments should respond to these technologies and the new business models they enable. Indeed, predictions of the types of jobs and skills that are becoming more and less relevant continue to multiply, and analyses of how to modernize social supports in the context of these disruptive changes have also started to appear.

Yet, so far, a critical underlying question – and one that will affect how well governments are able to respond to these changes – remains under-examined: How will the changing nature of work impact the tax base and governments' ability to generate revenue?

This report addresses this question by assessing the state of Ontario's labour market, exploring plausible future trajectories for it over the next 20 years and discussing how a variety of changes might impact provincial tax revenues in that time period. Most importantly, it initiates a conversation about how Ontario can respond to the likely impacts that the changing nature of work will have on its tax system. The report concludes by setting out a range of policy options aimed at ensuring that our tax system remains effective in the 21st century.

Like most other jurisdictions, Ontario's tax system is based on residency – for both individuals and corporations. But in an increasingly borderless world, this approach is showing signs of significant strain. Indeed, without taking action to confront the sources of this strain, Ontario could find itself facing plunging tax revenues at the very moment when an aging population consigns it to a slow growth trajectory and technological change results in unprecedented claims being made on its social safety net. Even outside such a concerning scenario, pre-existing issues such as underground economic activity, the rise of precarious work and income inequality will surely present challenges for Ontario's revenue integrity.

Ontario's revenue base relies heavily on taxation. Two-thirds of provincial revenues derive from various tax sources, with almost half of that amount coming from personal and corporate income taxes. But trends such as increased automation in the labour market, the rise of the gig economy and commercial consolidation are eroding the province's tax base. Already, the OECD estimates that between 4 and 10 per cent of global corporate tax revenues are lost as a result of profit-shifting to low-tax jurisdictions. For Ontario, this means up to \$1.5 billion in lost revenue in 2017 – a figure that could easily rise as a handful of global platforms, operating largely beyond the reach of Canadian tax authorities, continue to grow.

How can Ontario, and other similarly situated jurisdictions, adapt to these global trends? Uncertainty over the rate of technological adoption, and the rate at which institutional responses will emerge, will shape the future that policymakers will face, something explored by this report in sketches of four plausible futures for Ontario. Nevertheless, even in the face of such uncertainty, there are actions that Ontario can take in the near-term to build resilience, whichever scenario ends up unfolding. These include:

- » Investing in enhanced in-house data analytics capacity to identify underground economy activities
- » Negotiating tax collection and remittance agreements with digital platforms (e.g., for HST)
- » Collaborating with the federal government on potential revenue collection issues and solutions as they relate to digital service providers
- » Exploring preferential tax treatment for firms that develop and commercialize innovations, and then declare the associated revenues, in Ontario
- » Assessing opportunities to tax data collection and usage

Ensuring revenue integrity will be a critical part of Ontario's response to technological change and the changing nature of work. But government should also work to ensure that it is using the revenues it takes in as efficiently as possible. Moreover, as the nature of work continues to change, efforts to help workers build resilience and adaptability will not only help them live better lives and reduce their need to use Ontario's social supports, they will also strengthen a tax base heavily reliant on income taxes.

There are a range of partnerships that could help deliver services more effectively and efficiently in an environment of more constrained revenues. For example, exploring how government can work with business and labour to deliver skills development and training and how intermediaries can connect job seekers to opportunities are two priority areas which may help smooth transitions in the labour market. Similarly, greater dialogue with post-secondary institutions and collaborative efforts to create a culture of lifelong learning can help ensure workers are able to continually acquire the new skills needed to keep pace with changes in the labour market.

Finally, the government should also consider how it can use technology to improve its own systems. For example, new technologies can help to detect tax evasion as well as enable it. Similarly, digital service delivery offers significant savings when implemented properly, and other approaches such as outcomes-based funding can also serve to shake-up stagnant delivery models and achieve both better results and cost-savings.

Technological disruption will change the nature of work and present significant challenges for all governments as they adapt existing systems of revenue generation. But, by identifying trends that are already underway, examining a range of potential scenarios, and considering the full battery of tools available, Ontario can begin to protect its citizens and its economy, whichever future is on the way.

# 1 INTRODUCTION

The future of work is a top of mind issue for policymakers around the world. It is one of the G20's three priority areas for 2018, is the subject of frequent reports from international organizations, think tanks and consulting firms, and is covered almost daily by the popular press. Typically, this attention has focused on technological disruption, whether or to what extent technologies such as artificial intelligence (AI) and robotics will replace human workers and which skills may become obsolete in the not too distant future.

Less attention has been paid to what the knock on effects of this technological disruption of the labour market might be for government revenues. Governments in advanced economies are already faced with challenges related to aging populations, slowing productivity growth, income inequality and a rise in precarious work. The combined impact of these challenges, when added to the threats and opportunities of automation and other technological advancements, means the world of work is likely to look dramatically different in 20 years. Ontario and many other jurisdictions could face a fiscal squeeze as traditional approaches to taxation and revenue generation – based primarily on residency – lose relevance in a borderless world of digital transactions, virtual work and AI.

This report starts to unpack these issues through the lens of Ontario, Canada's largest province. The report:

- » Canvasses the current state of the labour market in Ontario as well as some of the important ongoing trends that will shape the future of jobs in the province.
- » Summarizes the existing literature on automation in the labour market and assesses

some of the key gaps and challenges in Canada's social architecture for workers.

- » Discusses the potential implications of technological disruptions on the tax base of the province, with a focus on corporate and personal income taxes, payroll taxes, sales taxes and the underground economy.
- » Explores four plausible alternative futures for Ontario's labour market in the years leading up to 2040.
- » Proposes policy options that could position Ontario for success as current and potential trends begin to play out, with a focus on alternative revenue streams, innovative partnerships with stakeholders and service delivery modernization.

This report is based on a literature review, environmental scan and a number of interviews and conversations with policymakers and experts. It also integrates insights from a policy lab held in March 2018 that brought together 40 participants representing a broad range of perspectives, including government, the not-for-profit sector, academia, technology firms and consulting.

Ontario and many other jurisdictions could face a fiscal squeeze as traditional approaches to taxation and revenue generation — based primarily on residency — lose relevance in a borderless world of digital transactions, virtual work and AI.

# 2 SETTING THE STAGE

This section highlights the key trends in, and features of, Ontario’s economy and labour market today, and describes how they are likely to evolve over the next 20 years. These trends and features include:

- » Demographic shifts
- » Gross Domestic Product (GDP) growth and size of the labour market
- » Wage growth and inequality
- » Changing nature of skills
- » Non-standard work and precarious work
- » Access to benefits
- » The underground economy

## Demographic shifts

Ontario’s population will continue to grow in coming years, but at a slower pace. An aging population and immigration are the main factors driving these shifts. These demographic shifts have implications for GDP growth and labour market size.

- » From 2016 to 2040, Ontario’s population growth is projected to continue, but at a reduced pace – slowing from 1.1 per cent annually in 2016 to 0.9 per cent in 2040. The population is projected to increase from 14.0 million in 2016 to 17.8 million in 2040, adding an additional 3.8 million people.
- » Only 13 per cent of this growth will come from natural increase, with immigration representing the key driver of the province’s sustained population growth.

**FIGURE 1**  
Highlights of Long-Term Demographic Projections

Measures	Historical 2011	Historical 2016	Projection 2040
Population (000s)	13,264	13,983	17,802
Average Annual Growth from Previous Year Listed (%)	–	1.1	0.9
Age Distribution (%) - 0–14	16.6	15.9	15.0
Age Distribution (%) - 15–64	69.1	67.8	59.8
Age Distribution (%) - 65+	14.2	16.4	25.2
Total Dependency Ratio <sup>x</sup>	45	48	67

<sup>x</sup> Measured as the number of children aged 0–14 and seniors (65+) per 100 people of core working age (15–64).

Source: Ministry of Finance. 2017. “Chapter I: Demographic Trends and Projections.” *Ontario’s Long-Term Report on the Economy*. Government of Ontario. <https://www.fin.gov.on.ca/en/economy/ltr/2017/ch1.html>.

» The number of seniors living in the province will nearly double between 2016 and 2040 – from 2.3 million to 4.5 million. Seniors will make up 25.2 per cent of the Ontario population in 2040, up from 16.4 per cent in 2016.<sup>1</sup>

» Real GDP per capita will increase by 29 per cent (to \$62,000) by 2040. This is slower than the 50 per cent growth in real GDP per capita that occurred between 1981 (\$32,000) and 2015 (\$48,000).

## GDP growth and labour market size

While GDP and the size of the labour market in Ontario are both projected to grow in coming years, this growth is slowing down. Declining overall labour force participation rates as well as slow growth of the core working age (15-64) population are the main factors responsible for this decreased growth.

» While the labour force grew by an average of 1.4 per cent annually between 1982 and 2015, it is projected to grow at a lower annual rate of 0.8 per cent between 2021 and 2040.

» The number of employed people in the province is projected to grow from about 6.8 million in 2010-2015 to about 8.5 million in 2036-2040. The average unemployment rate is expected to decline from 7.7 per cent in 2010-2015 to about 5.5 per cent in 2036-2040.<sup>2</sup>

» Ontario’s Ministry of Finance projects that Ontario’s annual real GDP will grow at an annual rate of 2.1 per cent between 2016 and 2040. This is lower than the 2.6 per cent growth rate that prevailed between 1982 and 2015, primarily due to slower labour force growth.

**FIGURE 2**  
Highlights of the Long-Term Projection: Base-Case Scenario – Average Annual Growth (Per Cent)

	Actual (Average) 1982–2015	Projection (Average) 2016–20	Projection (Average) 2021–25	Projection (Average) 2026–30	Projection (Average) 2031–35	Projection (Average) 2036–40	Projection (Average) 2016–40
Nominal GDP	5.3	3.9	4.0	4.0	4.0	4.0	4.0
Real GDP	2.6	2.2	2.0	2.0	2.0	2.0	2.1
Labour Force	1.4	1.0	0.8	0.8	0.8	0.8	0.8
Employment	1.4	1.2	0.8	0.8	0.8	0.8	0.9
Labour Productivity	1.2	1.0	1.2	1.2	1.2	1.2	1.2
Consumer Price Index	2.9	2.0	2.0	2.0	2.0	2.0	2.0

Source: Ministry of Finance. 2017. “Chapter II: Economic Trends and Projections.” *Ontario’s Long-Term Report on the Economy*. Government of Ontario. <https://www.fin.gov.on.ca/en/economy/ltr/2017/ch2.html>.

1 Ministry of Finance. 2017. “Chapter I: Demographic Trends and Projections.” *Ontario’s Long-Term Report on the Economy*. Government of Ontario. <https://www.fin.gov.on.ca/en/economy/ltr/2017/ch1.html>.

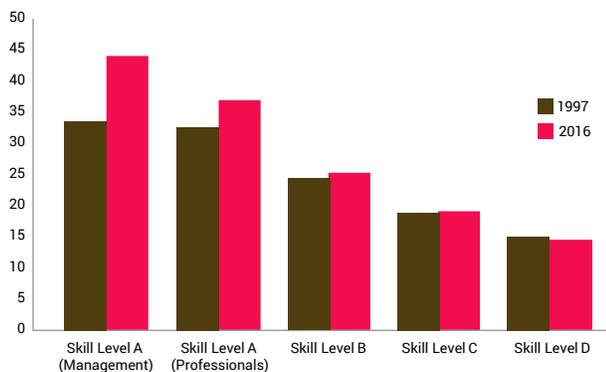
2 Ministry of Finance. 2017. “Chapter II: Economic Trends and Projections.” *Ontario’s Long-Term Report on the Economy*. Government of Ontario. <https://www.fin.gov.on.ca/en/economy/ltr/2017/ch2.html>.

# Wage growth and inequality

For most of the past 200 years, the economy and wages have tended to grow in tandem in advanced economies. More recently, economic growth and wage growth have begun to diverge. This trend is visible in Ontario - labour productivity and GDP have grown over the years, but have not translated into increased wages or a better standard of living for all. Inequality between the highest and lowest earners is increasing, impacting low-skilled workers in particular.

- » While provincial GDP per capita increased by 57 per cent between 1976 and 2015, real median adjusted after-tax income only increased by about half that rate.<sup>3</sup>
- » Labour productivity increased by 25 per cent between 1997 and 2014, but the average hourly wage increased by just 12 per cent.<sup>4</sup>

**FIGURE 3**  
Real hourly wage by skill level, 1997 and 2016



Source: Ministry of Finance. 2017. "Chapter III: Employment Trends". Ontario's Long-Term Report on the Economy. Government of Ontario. <https://www.fin.gov.on.ca/en/economy/ltr/2017/ch3.html>.

3 Ministry of Finance. 2017. "Chapter III: Employment Trends." Ontario's Long-Term Report on the Economy. Government of Ontario. <https://www.fin.gov.on.ca/en/economy/ltr/2017/ch3.html>.  
 4 Thirgood, J. McFatrige, S. Marcano, M. Van Ymeren, J. 11 October, 2017. *Decent Work in the Green Economy*. The Mowat Centre. [https://mowatcentre.ca/wp-content/uploads/publications/156\\_decent\\_work\\_in\\_the\\_green\\_economy.pdf](https://mowatcentre.ca/wp-content/uploads/publications/156_decent_work_in_the_green_economy.pdf).

- » GDP per capita increased by 38 per cent between 1994 and 2014, while the Canadian Index of Wellbeing measure only increased by 9.9 per cent.<sup>5</sup> This divergence is likely to continue with the rise in non-standard employment, technological changes and increasing cost of living.<sup>6</sup>
- » Between 1981 and 2010, 37 per cent of Canada's overall income growth was captured by the top 1 per cent of the earners.<sup>7</sup> Ontario saw its largest increase in income inequality during this period.<sup>8</sup>
- » The number of Ontarians with incomes below the low-income measure (LIM) has continued to increase over the years – from 5.9 per cent in 1996 to 9.0 per cent (or 644,000 people) in 2014.<sup>9</sup>
- » While real wages have grown quickly for higher-skilled professionals, lower-skilled workers saw their wages grow much more slowly – if at all. Between 1997 and 2016, real hourly wages for jobs in lower skill categorizations were essentially flat, while high skill categorizations, such as management and professionals, saw significant increases.<sup>10</sup>

5 The Canadian Index of Well-being (CIW) aims to measure how Canadians are faring in a way that traditional indicators, such as GDP, cannot capture. Since 2011, the University of Waterloo has conducted a comprehensive analysis of over 64 indicators across eight quality of life categories including community vitality, democratic engagement, education, environment, healthy populations, leisure and culture, living standards, and time use. Their analysis takes a systems approach, recognizing that quality of life is the result of a variety of interconnected domains. By tracking changes across these indicators over time, the CIW offers insights into new policy directions. See: Canadian Index of Wellbeing. 2016. *How are Canadians Really Doing? The 2016 CIW National Report*. University of Waterloo. <https://uwaterloo.ca/canadian-index-wellbeing/reports/2016-canadianindex-wellbeing-national-report>.  
 6 Ministry of Finance. 2017. "Chapter III: Employment Trends."  
 7 Organization for Economic Co-operation and Development (OECD). 30 April, 2014. *Top earners capturing growing share of total income in many countries, says OECD*. Social and Welfare Issues. <http://www.oecd.org/social/top-earners-capturing-growing-share-of-total-income-in-many-countries.htm>.  
 8 Thirgood, J. et al. 11 October, 2017. *Decent Work in the Green Economy*.  
 9 Ministry of Finance. 2017. "Chapter III: Employment Trends." For more information on LIM, see: <https://www.statcan.gc.ca/pub/75f0002m/2012002/lim-mfr-eng.htm>.  
 10 Ministry of Finance. 2017. "Chapter III: Employment Trends."

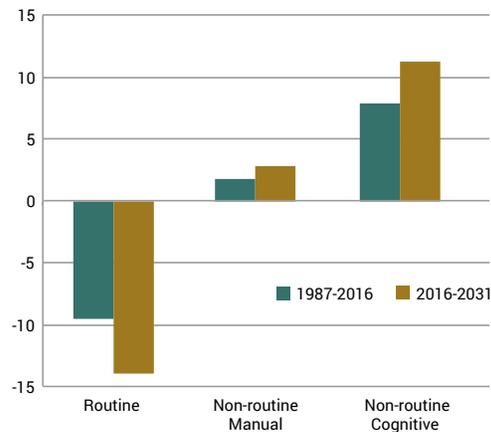
## Changing nature of skills

Ongoing automation and technological progress are shifting the demand for various types of skills. The proportion of stable, routine jobs in manufacturing and goods-producing industries has declined, while the proportion of non-routine jobs requiring higher cognitive skills has increased in recent decades.

- » Between 1987 and 2016, the proportion of non-routine cognitive jobs and non-routine manual jobs both increased as a share of total employment, while the proportion of routine jobs fell, as shown in Figures 4 and 5.
- » While employment in manufacturing and utilities declined by 20 per cent between 1987 and 2016, management and professional jobs, which typically require a university degree, increased by 145 per cent. Management and professional jobs accounted for 13 per cent of total jobs in 1987, but increased to 22 per cent by 2016.<sup>11</sup>

FIGURE 4

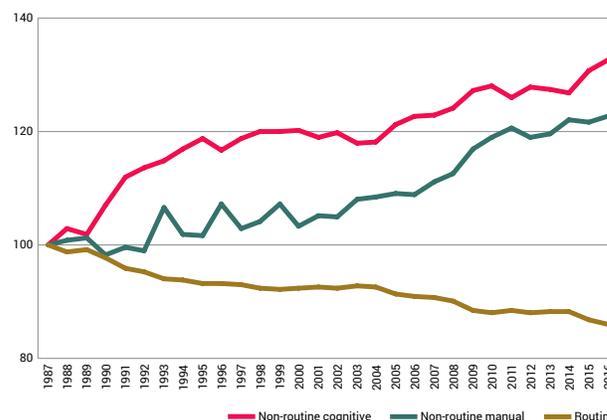
Percentage point change in the share of total employment, by task category, Canada



Sources: Department of Finance. 26 January, 2018. *Disruptive technologies and their prospects – Preliminary Draft of an Internal Government Presentation*. Government of Canada. This graph is based on concepts and the analysis of data from Oschinski, M. and Wyonch, R. March, 2017. *Future Shock? The Impact of Automation on Canada's Labour Market*. C.D. Howe Institute. [https://www.cdhowe.org/sites/default/files/attachments/research\\_papers/mixed/Update\\_Commentary%20472%20web.pdf](https://www.cdhowe.org/sites/default/files/attachments/research_papers/mixed/Update_Commentary%20472%20web.pdf); Statistics Canada. 6 January, 2017. Labour Force Survey, December 2016. *The Daily*. Government of Canada. <https://www150.statcan.gc.ca/n1/daily-quotidien/170106/dq170106a-eng.htm>; Lamb, C. June 2016. *The Talented Mr. Robot: The impact of automation on Canada's workforce*. Brookfield Institute for Innovation and Entrepreneurship (BII+E). <http://brookfieldinstitute.ca/research-analysis/automation/>.

FIGURE 5

Growth in the share of total employment, by task category, Canada, 1987-2016



Note: This analysis is based on an occupation classification methodology developed by Oschinski, M. and Wyonch, R. March, 2017. *Future Shock? The Impact of Automation on Canada's Labour Market*. C.D. Howe Institute. [https://www.cdhowe.org/sites/default/files/attachments/research\\_papers/mixed/Update\\_Commentary%20472%20web.pdf](https://www.cdhowe.org/sites/default/files/attachments/research_papers/mixed/Update_Commentary%20472%20web.pdf).

Sources: Department of Finance. 26 January, 2018. *Disruptive technologies and their prospects*. This graph is based on concepts and the analysis of data from Oschinski, M. and Wyonch, R. March, 2017. *Future Shock? The Impact of Automation on Canada's Labour Market*. and Statistics Canada. 6 January, 2017. Labour Force Survey, December 2016.

<sup>11</sup> Ministry of Finance. 2017. "Chapter III: Employment Trends."

# Non-standard and precarious work

Non-standard work includes temporary jobs, part-time jobs, sub-contracting and self-employment.

Precarious work includes jobs that pay lower wages, are not unionized and come without benefits. Often non-standard work is precarious, and this sort of work is increasingly common.

For employers, these types of contingent arrangements are less costly, come with fewer statutory and legislative burdens and make it easier to hire and fire staff. These types of arrangements are beginning to spread from low-wage workers to those with post-secondary education, and to a range of professions previously thought of as immune to precarity.<sup>12</sup>

David Weil has described the surge in alternative work arrangements as a “fissuring” of the workplace.<sup>13</sup>

» Between 1995 and 2013, 60 per cent of the jobs created in Organisation for Economic Co-operation and Development (OECD) countries could be classified as non-standard jobs, with these jobs making up about a third of the total employment in 2013.<sup>14</sup>

» Non-standard employment in Ontario increased from 23.1 per cent in 1997 to 26.7 per cent in 2017, mainly due to an increase in temporary employment.<sup>15</sup> In Ontario, between 1997 and

2015, non-standard employment increased by 2.3 per cent annually – about twice as quickly as standard employment (1.2 per cent).<sup>16</sup> About 27 per cent of Ontario workers were engaged in non-standard employment in 2015.<sup>17</sup> The proportions of employment represented by part-time jobs (13.5 per cent in 1976 and 19.0 per cent in 2016) and temporary employment (4.7 per cent in 1989 and 10.7 per cent in 2016) have increased considerably in recent decades.<sup>18</sup>

» Non-standard workers are about three to four times more likely to have incomes below the low-income measure (LIM) compared to standard workers, and this gap is projected to increase. In 2015, the median hourly wage for non-standard workers was \$15 compared to \$24 for standard workers.<sup>19</sup>

» The number of Ontarians with multiple jobs more than doubled between 1976 (2.2 per cent) and 2016 (5.4 per cent), suggesting that many workers need more than a single job to meet their needs.

» In Ontario, the rate of union membership declined from 35 per cent in 1981 to 25 per cent in 2016.<sup>20</sup>

» These trends are consistent with what is happening in other advanced economies. Temporary agency workers, freelancers and other contract staff accounted for nearly one in six workers in the United States in 2015.<sup>21</sup>

12 Weil, D. 24 March, 2017. “How to Make Employment Fair in an Age of Contracting and Temp Work.” *Harvard Business Review*. <https://hbr.org/2017/03/making-employment-a-fair-deal-in-the-age-of-contracting-subcontracting-and-temp-work>.

13 Weil, D. 2014. *The Fissured Workplace: Why Work Became So Bad for So Many and What Can Be Done to Improve It*. Cambridge MA: Harvard University Press.

14 Ministry of Labour. 2017. “Chapter 4: Vulnerable workers in precarious jobs.” *The Changing Workplaces Review – Final Report*. Government of Ontario. <https://www.ontario.ca/document/changing-workplaces-review-final-report/chapter-4-vulnerable-workers-precarious-jobs>.

15 Ministry of Finance. 2017. “Chapter III: Employment Trends.” Note that the share of non-standard employment in total employment has been fairly stable at around 27 per cent since 2010.

16 Ministry of Labour. 2017. “Chapter 4: Vulnerable workers in precarious jobs.”

17 Ministry of Labour. 2017. “Chapter 4: Vulnerable workers in precarious jobs.”

18 Ministry of Labour. 2017. “Chapter 4: Vulnerable workers in precarious jobs.”

19 Thirgood, J. et al. 11 October, 2017. *Decent Work in the Green Economy*.

20 Ministry of Finance. 2017. “Chapter III: Employment Trends.”

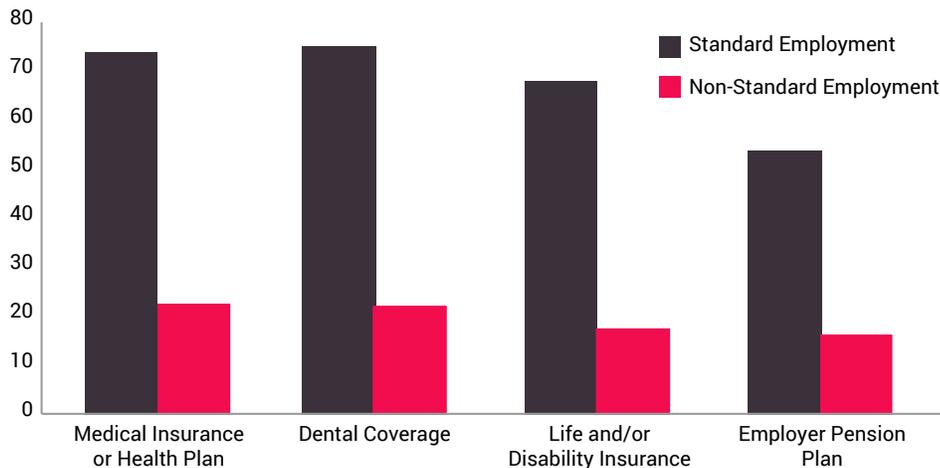
21 Katz, L. Krueger, A. September, 2016. “The Rise and Nature of Alternative Work Arrangements in the United States, 1995-2015.” *NBER Working Paper*, No. 22667. <http://www.nber.org/papers/w22667>.

# Access to benefits

There has been a marked decline in access to employer-provided health benefits and pension plans for many Ontarians, driven in part by the increase in non-standard and precarious employment.

- » Non-standard workers are less likely to receive benefits – only 23 per cent received medical insurance or health plans through their employers in 2011 compared to 74 per cent of standard workers.<sup>22</sup>
- » Overall, over 80 per cent of Ontarians engaged in precarious work have no access to vision, dental, drugs or life insurance.<sup>24</sup>
- » Workplace pension-plan coverage has declined from 42 per cent in the early 1990s to 34 per cent in 2017, mostly due to reduced coverage provided by private sector employers. Again, non-standard workers are less likely to have pension coverage – 16.6 per cent in 2011 compared to 53.8 per cent of standard workers.<sup>23</sup>

**FIGURE 6**  
Share of workers with employer-provided benefits and pension plans, standard and non-standard employment, Ontario, 2011



Source: Ministry of Finance. 2017. "Chapter III: Employment Trends" .

22 Ministry of Labour. 2017. "Chapter 4: Vulnerable workers in precarious jobs."  
23 Ministry of Finance. 2017. "Chapter III: Employment Trends"

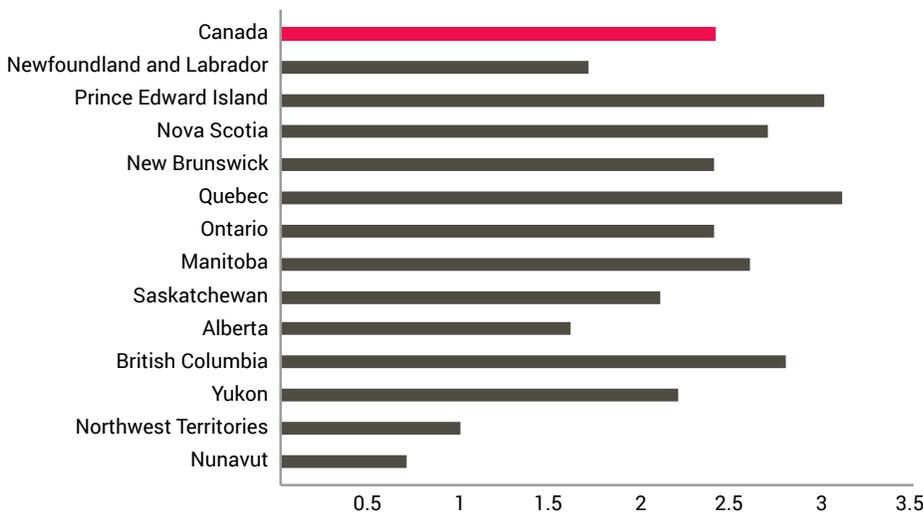
24 Johal, S. and Thirgood, J. 22 November, 2016. *Working Without a Net: Rethinking Canada's social policy in the new age of work*. The Mowat Centre. <https://mowatcentre.ca/working-without-a-net>.

# The underground economy

The underground economy refers to illegal economic activities undertaken by individuals or businesses to avoid paying taxes or complying with regulations. Paying workers under the table, not charging tax on cash sales, bartering and unreported apartment sublets are some examples. The underground economy is growing, with implications for both workers and tax revenues.

- » It is estimated that the underground economy in Canada grew by 3.8 per cent between 2012 and 2013 – at the same rate as GDP growth. Based on Statistics Canada’s calculations, transactions made in the underground economy were valued at about \$45.6 billion (or 2.4 per cent of GDP) in 2013.<sup>25</sup> More than 36 per cent of this amount – \$16.7 billion – is connected to underground economic activity in Ontario.<sup>26</sup>
- » The size of the underground economy in Canada may be even larger than Statistics Canada’s conservative estimates.<sup>27</sup>
- » The three sectors most prone to underground economy activities include residential construction (estimated at 27.8 per cent of the underground economy), retail trade (12.5 per cent), and accommodation and food services (11.7 per cent).<sup>28</sup>

**FIGURE 7**  
Underground Economy as a Proportion of GDP (by province and territory)



Source: Statistics Canada. 20 June, 2016. "Chart 2: Underground economy as a proportion of gross domestic product by province and territory, 2013." *The Daily*. <http://www.statcan.gc.ca/daily-quotidien/160620/cg-b002-eng.htm>.

25 Canada Revenue Agency. 20 June, 2016. *Statistics Canada Study on the Underground Economy in Canada, 1992-2013*. Government of Canada. <https://www.canada.ca/en/revenue-agency/news/newsroom/fact-sheets/fact-sheets-2016/statistics-canada-study-on-underground-economy-canada-1992-2013.html>.

26 Statistics Canada. 20 June, 2016. "The underground economy in Canada, 2013." *The Daily*. <http://www.statcan.gc.ca/daily-quotidien/160620/dq160620b-eng.htm>.

27 Tedds, L. 16 July, 2012. "Tipping point: Ottawa loses billions in undeclared income." *The Globe and Mail*. <http://www.theglobeandmail.com/report-on-business/economy/economy-lab/tipping-point-ottawa-loses-billions-in-undeclared-income/article4418504/>.

28 Statistics Canada. 20 June, 2016. "The underground economy in Canada, 2013."



If five per cent of existing jobs are at risk of automation over the next two decades, adjustments to our current labour market will be minimal. If that number is closer to half of existing jobs, then the disruption can only be termed seismic.

# 3 TECHNOLOGY AND THE LABOUR MARKET

## Context

A number of technologies that could unlock significant economic gains through increased productivity have emerged in recent years. These technologies include:<sup>29</sup>

- » Mobile devices and high-speed internet connections
- » The Internet of Things (IoT)
- » Rapid advances in big data analytics
- » Blockchain and Distributed Ledger Technology (DLT)
- » Robotics that automate physical tasks
- » 3D printing, and bioprinting
- » Virtual telepresence and virtual/augmented reality
- » AI applications in medical diagnosis, legal work and finance
- » Peer-to-peer platforms

Together, these technologies are changing:

- » How people work and what they do, through automation of certain types of tasks and by enabling virtual work to take place without regards to geographic location.
- » How businesses operate, through new business models such as the sharing economy (e.g., Airbnb, Uber, Lyft), e-commerce (e.g., Alibaba, Etsy, Amazon) and a number of fintech innovations (e.g., cryptocurrencies, new crowdfunding capabilities).
- » What people buy and sell, as new digital goods emerge in the economy such as mobile apps and as new digital services such as streaming services capture market share from traditional operators. Digitization has also reduced the cost of producing goods that previously required skilled labour to manufacture.

29 Policy Horizons Canada. 1 May, 2016. *Canada and the Changing Nature of Work*. Government of Canada. <http://www.horizons.gc.ca/en/content/canada-and-changing-nature-work>.

# AI, robotics and automation

The technologies that are receiving the most attention in terms of their potential impact on jobs and the labour market are AI and robotics, which can be broadly grouped together as forms of automation – whether of cognitive or physical tasks.

If present trends continue, automation in advanced economies will result in the continued stagnation or even decline in the number of routine cognitive and routine manual jobs in the future.<sup>30</sup> New forms of automation powered by AI are also likely to impact non-routine cognitive and non-routine manual jobs more than did past technological developments.<sup>31</sup> As more and more cognitive tasks are unbundled and automated through AI (e.g., medical diagnosis, legal analysis, financial advice), there may be significant job losses. It is uncertain whether enough new high-quality jobs will be created to offset these losses.

Historically, technological disruptions have resulted in a higher standard of living – at least, over the long term.<sup>32</sup> This time, however, analysts disagree on what the likely impact of automation on jobs will be. There are two main camps:

» A widely cited 2013 study by Carl Benedikt Frey and Michael Osborne suggests that “47 percent of total US employment is in occupations [that] are potentially automatable over some unspecified number of years, perhaps a decade or two.”<sup>33</sup> The Brookfield Institute replicated this study in Canada, finding that 42 per cent of Canadian jobs are at high-risk of automation.

» A 2016 study by Melanie Arntz and colleagues for the OECD estimates that the proportion of jobs likely to be automated is only 9 per cent.<sup>34</sup> The OECD found significant differences between national economies; the proportion of automatable jobs in Korea is 6 per cent while Austria’s is 12 per cent.<sup>35</sup> Arntz and colleagues qualified their findings in three important ways:

- 1] their findings refer to technological capabilities for automation, not certainties;
- 2] automation may drive greater economic growth that would in turn generate new jobs; and;
- 3] their findings do not take into account new occupations that may be created.<sup>36</sup>

There are a number of reasons for this disagreement, starting with methodology. Frey and Osborne take an occupation-based approach in their analysis. They assume that “whole occupations rather than single job-tasks are automated by technology.” This may overestimate

30 Dvorkin, M. 4 January, 2016. “Jobs Involving Routine Tasks Aren’t Growing.” *On the Economy Blog*. Federal Reserve Bank of St Louis. <https://www.stlouisfed.org/on-the-economy/2016/january/jobs-involving-routine-tasks-arent-growing>.

31 Yusuf, S. 2017. *Can the new world of work be rendered inclusive?* G20 Brainstorming Workshop, September 7-8. Buenos Aires, Argentina. Page 6.

32 Krugman, P. 13 June, 2013. “Sympathy for the Luddites.” *The New York Times*. <https://www.nytimes.com/2013/06/14/opinion/krugman-sympathy-for-the-luddites.html>.

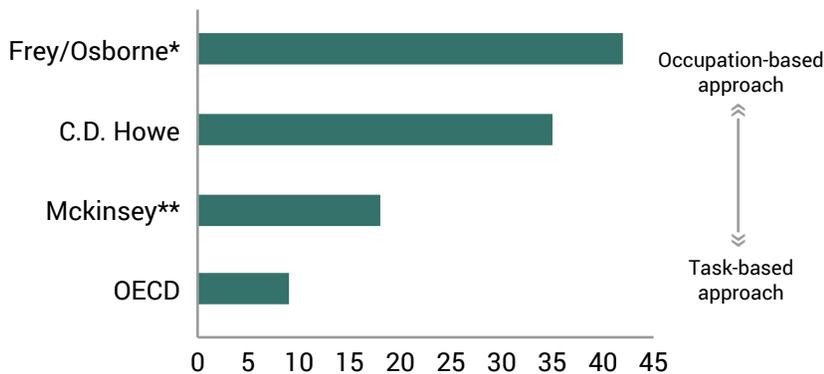
33 Frey, C. and Osborne, M. 17 September, 2013. *The Future of Employment: How Susceptible Are Jobs to Computerisation?* Oxford Martin School. <https://www.oxfordmartin.ox.ac.uk/publications/view/1314>. Page 38.

34 Arntz, M. Gregory, T. Zierahn, U. 2016. “The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis.” *OECD Social, Employment and Migration Working Papers*, No. 189. <http://dx.doi.org/10.1787/5jlz9h56dvq7-en>. Page 4.

35 Arntz, M. et al. 2016. “The Risk of Automation for Jobs in OECD Countries.” Page 4.

36 Arntz, M. et al. 2016. “The Risk of Automation for Jobs in OECD Countries.” Page 25.

**FIGURE 8**  
**Estimates of the share of Canadian workers at high risk of being affected by automation in the next 10 to 20 years**



\* This estimate, from Lamb, C. June 2016. *The Talented Mr. Robot*, is based on the methodology developed by Frey, C. and Osborne, M. 17 September, 2013. *The Future of Employment*.

\*\* This estimate, from Lamb, C. June 2016. *The Talented Mr. Robot*, is based on the methodology developed by Manyika, J. Chui, M. Miremadi, M. Bughin, J. George, K. Willmott, P. Dewhurst, M. January, 2017. *A Future That Works: Automation, Employment, and Productivity*. McKinsey Global Institute. <https://www.mckinsey.com/mgi/overview/2017-in-review/automation-and-the-future-of-work/a-future-that-works-automation-employment-and-productivity>.

Source: Department of Finance. 26 January, 2018. *Disruptive technologies and their prospects*. Government of Canada. This graph is based on concepts and the analysis of data from Oschinski, M. and Wyonch, R. March, 2017. *Future Shock? The Impact of Automation on Canada's Labour Market*; Lamb, C. June 2016. *The Talented Mr. Robot* and Arntz, M. Gregory, T. Zierahn, U. 2016. "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis." *OECD Social, Employment and Migration Working Papers*, No. 189. <http://dx.doi.org/10.1787/5jlz9h56dvq7-en>.

the impact of automation.<sup>37</sup> Arntz and colleagues focus on tasks within occupations, which they argue more accurately reflects how jobs will be impacted.<sup>38</sup> A more recent OECD study (2018) which refined this methodology estimated that 14 per cent of jobs in advanced economies have a probability of automation higher than 70 per cent, while 32 per cent of jobs have a probability of automation between 50 and 70 per cent.<sup>39</sup>

A study by the McKinsey Global Institute suggests that 49 per cent of paid work globally could be automated with existing technology. But like the OECD study, McKinsey finds that only 5

per cent of occupations are vulnerable to total automation.<sup>40</sup>

Conversely, in a study for the British think tank Nesta, Hasan Bakshi and colleagues argue that in all of these studies the methods used are insufficient to support the conclusions being drawn. Instead, Bakshi and colleagues conclude that 9.6 per cent of the US workforce are currently employed in occupations that will very likely increase their share of the workforce, 18.7 per cent are employed in occupations which will likely see their shares of the workforce decrease, and the fate of the remainder is uncertain.<sup>41</sup> The implication is that it is not currently possible to

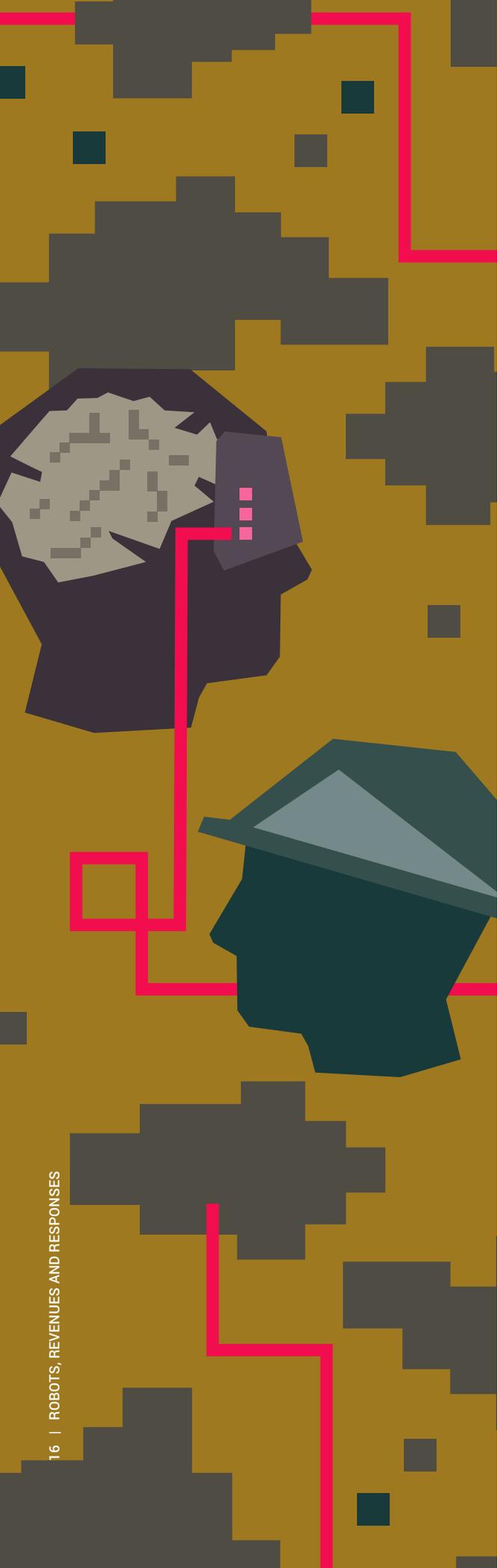
37 Arntz, M. et al. 2016. "The Risk of Automation for Jobs in OECD Countries." Page 4.

38 Arntz, M. et al. 2016. "The Risk of Automation for Jobs in OECD Countries." Page 4. Though, this approach also has been criticized: see Bakshi, H. Downing, J. Osborne, M. Schneider, P. 28 September, 2017. *The Future of Skills: Employment in 2030*. Pearson and Nesta. <http://www.nesta.org.uk/publications/future-skills-employment-2030> Page 22.

39 Nedelkoska, L. and Quintini, G. 2018. "Automation, skills use and training". *OECD Social, Employment and Migration Working Papers*, No. 202. <http://dx.doi.org/10.1787/2e2f4eea-en>.

40 Manyika, J. Chui, M. Miremadi, M. Bughin, J. George, K. Willmott, P. Dewhurst, M. January, 2017. *A Future That Works: Automation, Employment, and Productivity*. McKinsey Global Institute. <https://www.mckinsey.com/mgi/overview/2017-in-review/automation-and-the-future-of-work/a-future-that-works-automation-employment-and-productivity> Page 5.

41 The the analogous numbers for the UK are 8.0 per cent and 21.2 per cent. Bakshi, H. et al. 28 September, 2017. *The Future of Skills*. Page 89.



say, for more than 70 per cent of workers, whether their occupations will increase or decrease as a share of the workforce.<sup>42</sup>

There is also significant disagreement over whether automation will lead to fewer jobs in total. One group of studies argues that by raising productivity and lowering costs, automation drives economic growth, creating more jobs than it destroys.<sup>43</sup> While ultimately positive, this scenario would likely involve significant movement between jobs by workers, which means uncertainty for individuals.<sup>44</sup>

But Bakshi and colleagues also cite other studies showing that each additional industrial robot added to the workforce reduces employment by about seven workers, and note that there is limited evidence to suggest that these losses are offset by jobs gains in other sectors.<sup>45</sup> More optimistic studies suggest that workers who see part of their jobs automated tend to shift away from tasks within their occupation that are automatable towards new ones that are complementary with machines.<sup>46</sup>

42 Bakshi, H. et al. 28 September, 2017. *The Future of Skills*. Page 89.

43 Bakshi, H. et al. 28 September, 2017. *The Future of Skills*. Page 23.

44 Arntz, M. et al. 2016. "The Risk of Automation for Jobs in OECD Countries." Page 24.

45 Bakshi, H. et al. 28 September, 2017. *The Future of Skills*. Page 23.

46 Arntz, M. et al. 2016. "The Risk of Automation for Jobs in OECD Countries." Page 22.

# What factors will influence automation?

Taking these uncertainties into account, the path forward for policymakers and the public is unclear. If five per cent of existing jobs are at risk of automation over the next two decades, adjustments to our current labour market will be minimal. If that number is closer to half of existing jobs, then the disruption can only be termed seismic.

It is important to take into account the difference between “could be automated” and “are likely to be automated.” Many jobs could already be automated but have not been for a variety of reasons. McKinsey points to five factors that affect the rate of automation:

## » **Technical feasibility**

Many tools, such as better natural language processing, still need to be invented for many tasks to be automated.<sup>47</sup>

## » **Cost of developing and deploying solutions**

Some tasks could already be automated, but the cost of adopting the available technology can be quite large and is thus often prohibitive.<sup>48</sup>

## » **Labour market dynamics**

The supply, demand and costs of human labour influence decisions to automate. Automation is more likely to occur in developed economies where the cost of labour is relatively high.<sup>49</sup>

## » **Economic benefits**

The ability to enable greater throughput or higher quality products impacts the deployment of automation.<sup>50</sup>

## » **Regulatory and social acceptance**

Groups with significant social capital and political power, such as regulated professions, may be able to resist automation of their work much longer than unskilled labour, even after it becomes technically feasible.<sup>51</sup>

The McKinsey study also points out that due to demographics and the aging population – especially in advanced economies – there will still be a high need for labour to power the economic growth required to maintain living standards.<sup>52</sup>

We are also witnessing the deconsolidation of job “task bundles” so that what were once careers are progressively broken up into part-time jobs, projects, and tasks that can be automated.<sup>53</sup>

This is partially the result of automation – few occupations can be totally automated but as many as 60 per cent of occupations could see a third of their associated tasks automated.<sup>54</sup>

Increasingly, jobs that previously required employees are being converted into jobs that can be performed by independent contractors. The rise of the “gig economy” – that is, contingent, on-demand labour – could not have happened without a combination of technological change and labour market dynamics. The emergence of a marketplace of independent contractors available to perform these on-demand tasks was facilitated by digitization, advances in telecommunications, the Internet, online platforms like Mechanical Turk and TaskRabbit, and matchmaking algorithms.<sup>55</sup>

47 Manyika, J. et al. January, 2017. *A Future That Works*. Page 10. Cf. Arntz, M. et al. 2016. “The Risk of Automation for Jobs in OECD Countries.” Page 22.

48 Manyika, J. et al. January, 2017. *A Future That Works*. Page 10.

49 Manyika, J. et al. January, 2017. *A Future That Works*. Page 10. Cf. Arntz, M. et al. 2016. “The Risk of Automation for Jobs in OECD Countries.” Page 22.

50 Manyika, J. et al. January, 2017. *A Future That Works*. Pages 10-11.

51 Manyika, J. et al. January, 2017. *A Future That Works*. Page 12. Cf. Arntz, M. et al. 2016. “The Risk of Automation for Jobs in OECD Countries.” Page 22.

52 Manyika, J. et al. January, 2017. *A Future That Works*. Page 2. Cf. Bakshi, H. et al. 28 September, 2017. *The Future of Skills*. Page 24.

53 Policy Horizons Canada. 1 May, 2016. *Canada and the Changing Nature of Work*.

54 Manyika, J. et al. January, 2017. *A Future That Works*. Page 5.

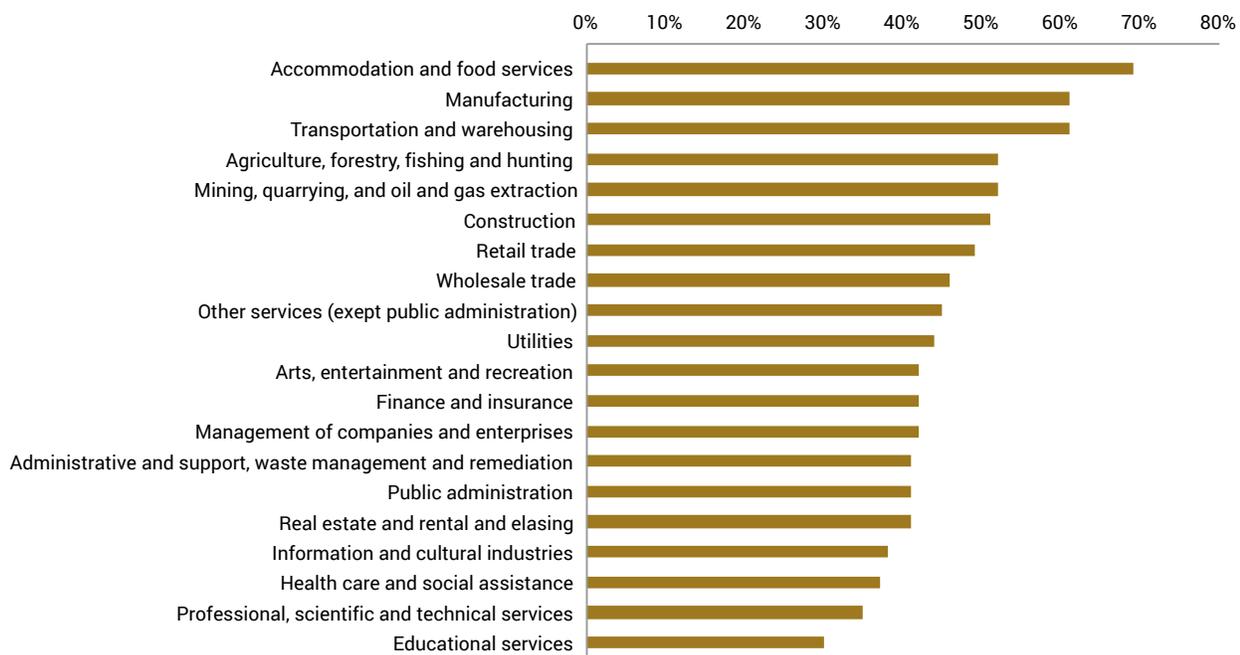
55 Yusuf, S. 2017. *Can the new world of work be rendered inclusive?* Pages 2-3.

# What types of jobs will be impacted?

Some types of jobs will be less amenable to automation than others. One analysis suggests that only 27 per cent of the tasks associated with education, for example, are likely to be automatable in the foreseeable future. Other professions that have relatively low levels of potential for automation include management, professional services, information, health care, and administration, in that order.<sup>56</sup>

Another analysis suggests that non-tradable services, such as food preparation and hospitality, will be relatively resistant to automation. While these occupations often require low skill levels, they are associated with differentiated products and services which are increasingly valued by customers.<sup>57</sup> There are concerns, however, that even if automation does not eliminate these jobs, it could depress wages further for these low-skilled workers.<sup>58</sup>

**FIGURE 9**  
Per cent of work activities with the potential for automation, by industry



Source: This graph is based on Manyika, J. Chui, M. Miremadi, M. Bughin, J. George, K. Willmott, P. Dewhurst, M. January, 2017. *A Future That Works: Automation, Employment, and Productivity*. McKinsey Global Institute. <https://www.mckinsey.com/mgi/overview/2017-in-review/automation-and-the-future-of-work/a-future-that-works-automation-employment-and-productivity> and analysis in Lamb, C. June 2016. *The Talented Mr. Robot*.

56 Yusuf, S. 2017. *Can the new world of work be rendered inclusive?* Pages 7.

57 Bakshi, H. et al. 28 September, 2017. *The Future of Skills*. Page 13.  
58 Manyika, J. et al. January, 2017. *A Future That Works*. Page 14.

**FIGURE 10**

**Distribution of employment by vulnerability to automation, by hourly wage group**



Source: Department of Finance. 26 January, 2018. *Disruptive technologies and their prospects*. This table is based on concepts and the analysis of data from Oschinski, M. and Wyonch, R. March, 2017. *Future Shock? The Impact of Automation on Canada's Labour Market*; Lamb, C. June 2016. *The Talented Mr. Robot*; and Statistics Canada. 6 January, 2017. Labour Force Survey, December 2016.

Notes: This analysis based on estimates of the share of job-tasks that can be automated using current technology, provided by Lamb, C. June 2016. *The Talented Mr. Robot*; and Statistics Canada. 6 January, 2017. Labour Force Survey, December 2016.

Occupations in the public sector are likely to be relatively less impacted by automation as they are characterized by high labour intensity and lower potential for growth in productivity.<sup>59</sup> Some professional services – though not all – will likely also be able to resist automation relatively well.<sup>60</sup> Ultimately, Bakshi and colleagues argue that interpersonal competencies, cognitive competencies, learning strategies and systems skills will be critical for the jobs of the future.<sup>61</sup>

While there is a relatively strong consensus that technological disruption will lead to the creation of new types of jobs, and despite attempts to predict what skills will be in demand in the future, there is little compelling evidence to suggest what these new jobs will be and what skills they will require. A number of observers are concerned that even if new types of jobs emerge, there will not be a strong enough supply of jobs in the future overall.

59 Bakshi, H. et al. 28 September, 2017. *The Future of Skills*. Page 13.

60 Bakshi, H. et al. 28 September, 2017. *The Future of Skills*. Page 14.

61 Bakshi, H. et al. 28 September, 2017. *The Future of Skills*. Page 89.

Indeed, it is an open question whether automation will further exacerbate the trend towards greater income inequality that has characterized growth in advanced economies over the past 40 years. The wage share of GDP has been falling in advanced economies since the 1970s and advances in automation could further accelerate this trend, creating significant social pressures.<sup>62</sup>

The declining share of GDP captured by labour income is perhaps the greatest difference between recent trends and those experienced during most of the 20th century. The last century was characterized by huge productivity growth that resulted in a reduction in the average hours worked per week from about 60 in 1900 to 38 in 1988.<sup>63</sup> Child labour, common in 1900,<sup>64</sup> was essentially abolished in the global north. In spite

62 Manyika, J. et al. January, 2017. *A Future That Works*. Page 18.

63 EH.net. No Date. *Hours of Work in U.S. History*. Economic History Association. <https://eh.net/encyclopedia/hours-of-work-in-u-s-history/>.

64 Sullivan, N. No Date. "Child Labor in the 1900s." *Western Civilization 1648 to the Present: Help and Review*. Study.com. <https://study.com/academy/lesson/child-labor-in-the-1900s.html>.

of a large shift in the economy from labour to capital intensity, real wages and standards of living increased.

The technological change that occurred in this period was such that the new equipment being used still needed substantial human participation.<sup>65</sup> Technological change that is much less dependent on complementary labour, and displaces large numbers of workers, can skew the gains towards the owners of capital. In this context, achieving a fairer distribution of the gains from technological advancement will likely require creative government policies to offset these market trends. For example, an increasing number of technologists are suggesting that transformational re-distributive policies such as a basic income will become necessary.<sup>66</sup>

Solving the income problem, challenging as that is, would not be sufficient. The problems that flow from the loss of the self-esteem that often comes from work also represent an enormous challenge. Having a large number of unemployed, even if provided with generous welfare benefits, could create significant societal problems. Ensuring broad provision of the types of education and training that will enable people to contribute to the economy as it evolves, and driving a cultural shift in attitudes to disconnect societal self-worth from an individual's labour market status will need to be priorities moving forward.<sup>67</sup>

65 In economic theory, this is referred to as non-neutral technological progress. Labour's share of national income would only stay constant if technological change is neutral as between capital and labour. With respect to workers, technological change may be non-neutral among different types of skills. Acemoglu, D. 2002. "Technical change, inequality, and the labor market". *Journal of Economic Literature*. 40(1) 7-72.

66 Schneider, N. 6 January, 2015. "Why the Tech Elite Is Getting Behind Universal Basic Income." *Vice*. <http://www.vice.com/read/something-for-everyone-0000546-v22n1>.

67 See the discussion of this idea on pages 31-32 in Urban, M. and Yip, C. May 2017. *Basic Impact: Examining the Potential Impact of a Basic Income on Social Entrepreneurs*. Mowat Centre. <https://mowat-centre.ca/basic-impact/>.

# Looking at the gig economy

Between November 2015 and October 2016, 2.7 million people – 9.5 per cent of the Canadian adult population – used peer-to-peer ride-sourcing or short-term accommodation services. The estimated spending on ride-sourcing services and short-term accommodation services by Canadians amounts to a total of \$1.31 billion.<sup>68</sup> However, while usage rates are relatively high given these platforms have only been in existence for a few years, the number of Canadians over the age of 18 who actually offer services as providers of ride-sourcing (0.3 per cent of the population) or short-term accommodation services (0.2 per cent) is very low.<sup>69</sup>

Nevertheless, there is a growing awareness that online platforms that offer services could dramatically impact the future of work. The rise of online platforms has facilitated the gig economy, where employers can outsource tasks to cut costs, and individuals can work virtually and remotely on short-term contracts with a series of employers around the world. In 2013, about 48 million workers were registered on such platforms globally, and this market is estimated to be growing by about 33 per cent each year.<sup>70</sup> This growth could create challenges for social policy and programs<sup>71</sup> as vulnerable groups – such as youth and low-skilled individuals – are particularly overrepresented in the gig economy, where work is more precarious.

**FIGURE 11**  
Number of sharing economy users (November 2015 to October 2016)

	Canada	Ontario
Number of users of peer-to-peer ride services aged 18 and older (thousands)	1,982.4	1,230.0
Proportion of the population aged 18 and older who used peer-to-peer ride services	7.0%	11.1%
Number of users of private accommodation services aged 18 and older (thousands)	1,196.0	476.6
Proportion of the population aged 18 and older who used private accommodation services	4.2%	4.3%

Source: Statistics Canada. 28 February, 2017. "The sharing economy in Canada." *The Daily*. <https://www.statcan.gc.ca/daily-quotidien/170228/dq170228b-eng.htm>.

68 Statistics Canada. 28 February, 2017. "The sharing economy in Canada." *The Daily*. <https://www.statcan.gc.ca/daily-quotidien/170228/dq170228b-eng.htm>.

69 Statistics Canada. 28 February, 2017. "The sharing economy in Canada."

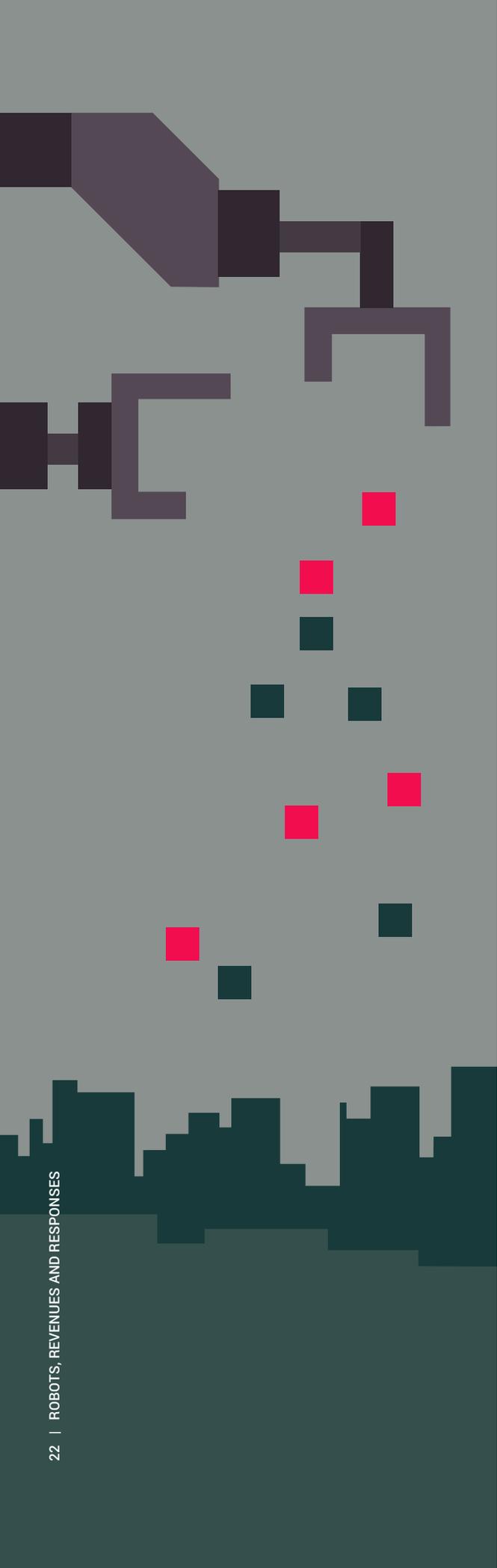
**FIGURE 12**  
Total spending on peer-to-peer ride services and private accommodation services from November 2015 to October 2016

	Peer-to-peer ride services	Private accommodation services
	millions of Canadian dollars	millions of Canadian dollars
Canada	240.8	366.7
Outside Canada	N/A	698.2

Source: Statistics Canada. 28 February, 2017. "The sharing economy in Canada." *The Daily*. <https://www.statcan.gc.ca/daily-quotidien/170228/dq170228b-eng.htm>.

70 Policy Horizons Canada. 1 May, 2016. *Canada and the Changing Nature of Work*.

71 Ministry of Labour. May 2017. *The Changing Workplaces Review: An Agenda For Workplace Rights – Final Report*. Government of Ontario. [https://files.ontario.ca/books/mol\\_changing\\_workplace\\_report\\_eng\\_2\\_0.pdf](https://files.ontario.ca/books/mol_changing_workplace_report_eng_2_0.pdf).



Whether the gig economy facilitates the ‘unbundling’ of work – leading to more part-time, temporary and contingent opportunities at the expense of full-time positions with benefits – remains to be seen. The extent to which it will result in an increase in non-standard employment will largely hinge on business practices, regulatory standards and a range of other factors. If non-standard employment becomes the norm beyond vulnerable groups like youth and low-skilled workers, significant changes to both social supports and taxation will be necessary.

# 4 IMPACTS ON WORKERS AND CANADA'S SOCIAL ARCHITECTURE

How well-prepared are Canada and Ontario to address the challenges workers will experience in the labour market of the future? Are existing federal and provincial social supports adequate given the changing nature of work? Many of the core planks of Canada's social architecture were designed in the period immediately after the Second World War, when standard employment (i.e., a full-time job with benefits) was the norm. As the nature of work has changed over the past 70 years, our social architecture has failed to keep pace.

Below is a brief assessment of three key policy and program areas that support workers in Ontario.<sup>72</sup>

## Employment insurance and training programs

Canada's Employment Insurance (EI) system is administered by the federal government and comprises a number of contributory programs that support Canadians who are out of work temporarily. Most program funding is directed towards income assistance known as "regular benefits" for those who have recently lost a job through no fault of their own.

EI is based on a dated understanding of the labour market. As the nature of work has shifted away from traditional employment, the proportion of Canadians who do not qualify for regular benefits has grown rapidly – in large part because non-standard workers typically do not qualify.

This seems to be hitting Ontario particularly hard: in 2017, only 29 per cent of unemployed Ontarians received regular EI benefits, compared to 44 per cent of unemployed workers in other provinces.<sup>73</sup>

Most publicly-funded employment and skills training programs are also tied to EI eligibility. Consequently, as fewer people qualify for benefits, many unemployed workers are not able to access vital retraining opportunities.<sup>74</sup> Furthermore, Canada's rate of investment in workplace development programs continues to fall as a proportion of GDP – and is already one of the lowest rates among advanced economies.<sup>75</sup>

<sup>72</sup> For more detailed discussion of social policy supports and the new world of work see Johal, S. and Thirgood, J. 22 November, 2016. *Working Without a Net*.

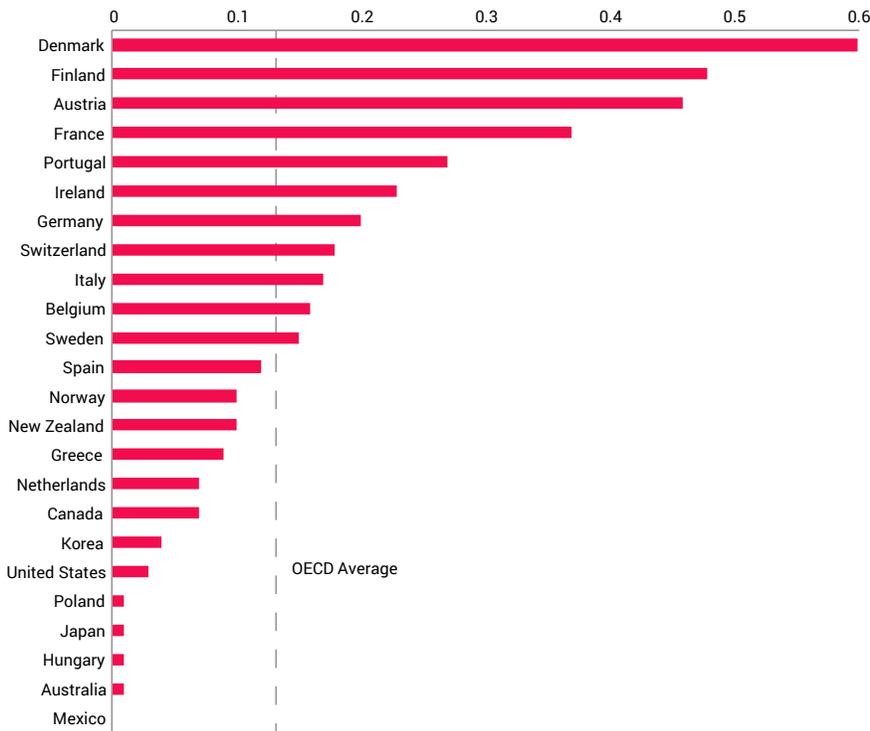
<sup>73</sup> Ministry of Finance. 2017. "Chapter III: Employment Trends."

<sup>74</sup> For a more in-depth exploration of this and related issues, see Morden, M. August 2016. *Back to Work: Modernizing Canada's labour market partnership*. The Mowat Centre. <https://mowatcentre.ca/back-to-work/>.

<sup>75</sup> Wood, D. 2015. "Hollowing out the middle: Recasting federal workforce development programs under the Harper government". in Healy, T. and Trew, S. (eds). *The Harper Record 2008 – 2015*. Canadian Centre for Policy Alternatives: 183-200. [https://www.policyalternatives.ca/Harper\\_Record\\_2008-2015/11-HarperRecord-Wood.pdf](https://www.policyalternatives.ca/Harper_Record_2008-2015/11-HarperRecord-Wood.pdf).

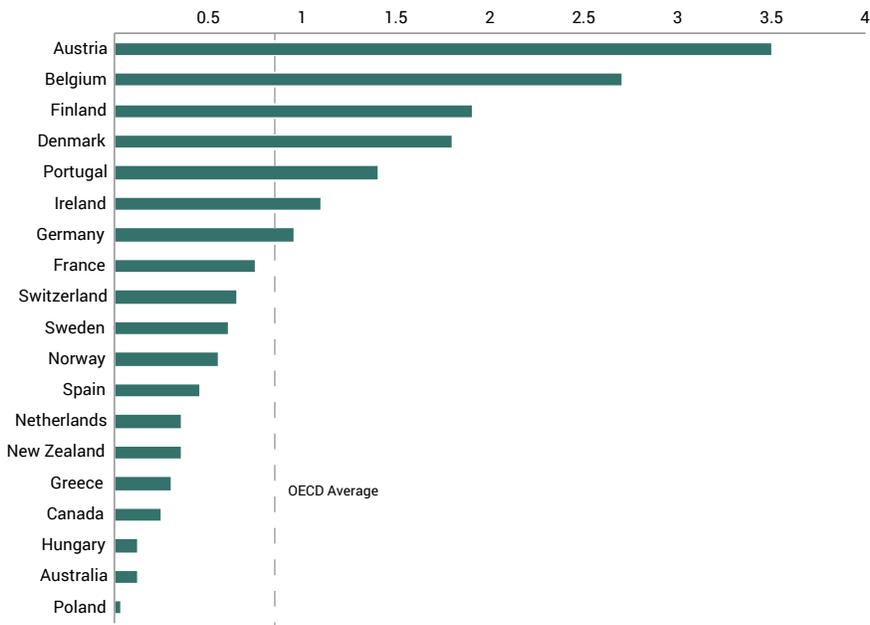
**FIGURE 13A**

Government spending on training programs as a share of GDP, selected OECD countries, 2015



**FIGURE 13B**

Share of labour force participating in publicly funded institutional training, selected OECD countries, 2015



Source: OECD. "Education at a Glance". *OECD.Stat*. <https://stats.oecd.org/>.

Notes: Expenditures are for 2015 or the latest year available.

# Public pensions and health benefits

Employers in the past tended to provide workplace pensions and various other benefits for employees and their families. Such benefits are becoming less common, and the benefits that do exist are mostly available to full-time, permanent employees rather than non-standard workers. In the absence of workplace-provided benefits, there is little in the way of government support.

- » The percentage of workers covered by a workplace pension in Ontario has declined from 42 per cent of workers in the early 1990s to 34 per cent in 2017.<sup>76</sup> Pensions are rare for non-standard employees: among Ontario workers with workplace pension plans, only about one-tenth held multiple jobs and another one-tenth were employed part-time.<sup>77</sup>
- » In the absence of workplace pensions, Canada's public pension system has three components that aim to support Canadians in their retirement: the Canadian Pension Plan and equivalent Quebec Pension Plan, Old Age Security, and the Guaranteed Income Supplement. However, nearly half of working-aged Canadians have not started or are currently not saving for retirement through other vehicles.
- » Over 80 per cent of workers in jobs classified as precarious in Ontario did not receive any benefits such as vision, dental, drug and life insurance in 2013.<sup>78</sup>

76 Ministry of Finance. 2017. "Chapter III: Employment Trends."

77 Ministry of Finance. 2017. "Chapter III: Employment Trends."

78 Lewchuk, W. Lafleche, M. Dyson, D. Goldring, L. Meisner, A. Procyk, S. Rosen, D. Shields, J. Viducis, P. Vrankulj, S. February 2013. *It's More than Poverty: Employment Precarity and Household Well-being*. Poverty and Employment Precarity in Southern Ontario (PEPSO). <http://www.unitedwaytyr.com/document.doc?id=91>.

» While our Medicare system covers medically necessary costs such as hospital visits and physician services, Canada remains the only country that provides universal health care without also providing universal drug coverage.<sup>79</sup> Provinces each provide limited coverage – in Ontario this is available for seniors, those on social assistance and as of 2018, those aged 24 and under who aren't covered by private insurance. Dental care and vision care are also largely not covered by government support.

## Other social supports

There are a range of social supports that can provide workers a sense of stability and security – such as childcare, affordable housing and many others.<sup>80</sup> Moreover, certain programs can also have other specific work related impacts such as, for example, child care which can drive higher labour market participation, particularly among women. While a number of such supports are provided by various levels of government, a few key pillars of our social architecture are described below:

- » Canada has been criticized in the past for its lack of comprehensive childcare policy and parents still struggle with a lack of available spaces and prohibitively high costs. While the federal government notionally provides funds to the provinces for this purpose, each province approaches this policy domain differently. In Ontario, subsidies for childcare services are provided based on the family's adjusted net income (subtracting any federal payments

79 Handren, L. 2 June, 2015. *Unfilled Prescriptions The Drug Coverage Gap in Canada's Health Care System*. The Mowat Centre. <https://mowatcentre.ca/unfilled-prescriptions-the-drug-coverage-gap-in-canadas-health-care-system/>.

80 For a detailed list of such supports provided by the Government of Ontario see: <https://www.ontario.ca/page/tax-credits-and-benefits-people>.

from the Canada Child Benefit). This may be of little help in cities like Toronto, however, where families can expect to pay fees approaching \$1,800 each month for infant care.<sup>81</sup>

- » Housing affordability is another key concern for workers simultaneously experiencing wage stagnation and skyrocketing market prices for both homebuyers and renters. Until very recently, Canada did not have an affordable housing strategy. While the new Affordable Housing Strategy is promising, the federal government is starting from a significant deficit, as it largely stepped away from affordable housing in the 1990s. The strategy has also been met with criticism for not going far enough in its proposals.<sup>82</sup>
- » The provincial government has also implemented the Ontario Long-Term Affordable Housing Strategy, updated in 2016 to help increase supply of affordable housing and modernize social housing through initiatives such as inclusionary zoning, supportive housing investments and the Survivors of Domestic Violence Pilot Project.<sup>83</sup> To fight a different but related battle, Ontario has also recently introduced sweeping measures to address housing affordability, though it is too early to assess the sustained impacts of these measures.<sup>84</sup>
- » Other elements of our social architecture,

such as provincial legislation, have important implications on the reality workers currently face in today's economy.<sup>85</sup> The Employment Standards Act (2000), for example, outlines roles and responsibilities for employees and employers in most of Ontario's workplaces, and the Labour Relations Act (1995) outlines other important functions such as collective bargaining, trade unions and workplace dispute resolution.<sup>86</sup> Both of these pieces of legislation underwent a significant independent review as a result of the changing nature of work.<sup>87</sup>

81 Johal, S. and Granofsky, T. June 2015. *Growing Pains: Childcare in Canada*. The Mowat Centre. [http://social-architecture.ca/wp-content/uploads/GrowingPains\\_ChildcareinCanada.pdf](http://social-architecture.ca/wp-content/uploads/GrowingPains_ChildcareinCanada.pdf).

82 Hulchanski, D. 4 December, 2017. "No, Ottawa has not put forth a national housing strategy". *The Globe and Mail*. <https://www.theglobeandmail.com/opinion/no-ottawa-has-not-put-forth-a-national-housing-strategy/article37173057/>.

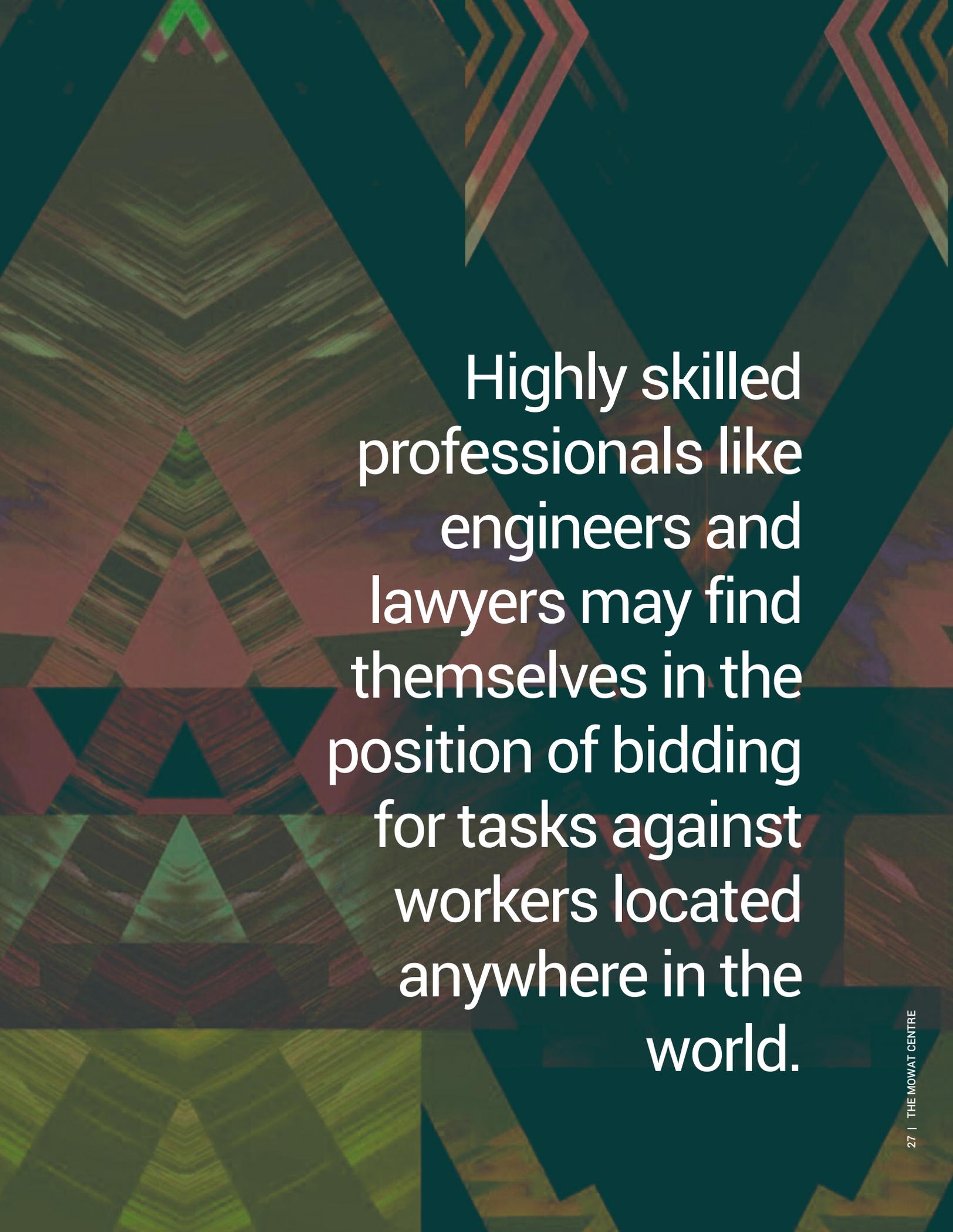
83 Ontario Ministry of Municipal Affairs and Housing. March 2016. *Ontario's Long-Term Affordable Housing Strategy: Update*. Government of Ontario. <http://www.mah.gov.on.ca/AssetFactory.aspx?did=13683>.

84 Cardoso, T. and Annett, E. 12 November, 2017. "Ontario's rent and housing reform: 16 big changes, explained in charts". *The Globe and Mail*. <https://www.theglobeandmail.com/real-estate/toronto/ontario-housing-16-big-changes-explained-in-charts/article34757648/>.

85 For more in-depth discussion around these other elements, and how each is holding up given recent economic shifts, see analysis in Johal, S. and Thirgood, J. 22 November, 2016. *Working Without a Net*. and Ministry of Labour. May 2017. *The Changing Workplaces Review*.

86 Government of Ontario. Employment Standards Act, 2000, S.O. 2000, c. 41, <https://www.ontario.ca/laws/statute/00e41> Government of Ontario. Labour Relations Act, 1995, S.O. 1995, c. 1, Sched. A. <https://www.ontario.ca/laws/statute/95l01?search=e+laws>.

87 See: Ministry of Labour. 2017. *The Changing Workplaces Review – Final Report*.



Highly skilled professionals like engineers and lawyers may find themselves in the position of bidding for tasks against workers located anywhere in the world.

# 5 POTENTIAL IMPACTS ON ONTARIO'S REVENUE BASE

Clearly, significant shifts in the nature of work are underway worldwide. These changes, partially driven by technological changes and partially driven by other factors such as globalization, are straining a set of social policies devised by Canada's various governments for a different context. These changes will have significant impacts on a variety of areas of governmental responsibility, including revenue generation.

In this section, we review some of the most significant threats to Ontario's current system for raising revenues. Specifically, we examine how the following trends and developments could undermine Ontario's ability to raise the revenues needed to operate government programs upon which Ontarians depend.

- » Increased automation
- » The rise of the "gig economy"
- » Digital outsourcing
- » Internet-enabled jurisdictional arbitrage
- » The shift to a service-for-data economy
- » Commercial consolidation
- » Platforms and the underground economy
- » The emergence of crypto-assets

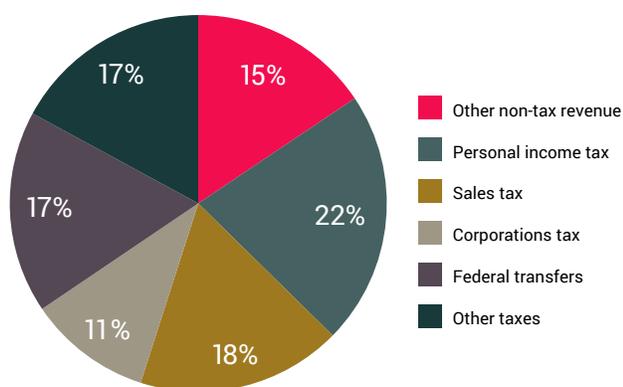
Before exploring the potential impact of these trends and developments on Ontario's revenues, however, we begin this section with a quick overview of how the Government of Ontario currently finances its operations and programs and the revenue sources on which it draws to do so.

# Ontario's revenue context

In the fiscal year 2016-2017 Ontario's total revenue was \$140.7 billion. Taxation revenue accounted for \$94.3 billion of this amount, with \$30.7 billion collected in personal income tax (PIT) revenues, \$24.7 billion in sales tax revenues, \$14.8 billion in corporations tax (CT) revenues, and \$5.9 billion in Employer Health Tax (payroll tax) revenues. The rest of the government's revenue came from other sources, such as:

- » Transfers from the Government of Canada (\$24.5 billion)
- » Other taxes, e.g. gasoline and alcohol
- » Income from government-owned corporations, e.g., the Liquor Control Board of Ontario (LCBO)
- » Other income such as vehicle and driver registration fees, royalties, etc.

**FIGURE 14**  
2016-17 revenue by source (\$140.7 billion)



Source: Treasury Board Secretariat. *Public Accounts of Ontario: Annual Report and Consolidated Financial Statements 2016-2017*. Government of Ontario. [https://files.ontario.ca/en\\_publicaccounts\\_annualreport\\_cfs\\_2017-9.pdf](https://files.ontario.ca/en_publicaccounts_annualreport_cfs_2017-9.pdf) Chart 1, page 14. Note: Percentages may not add to 100 per cent due to rounding.

In this section we focus our attention on the PIT, CT, sales tax and payroll tax, as they are particularly important to Ontario's finances, together constituting nearly 55 per cent of total annual provincial revenues. The importance of these revenue sources for our analysis is only increased by the fact that these revenues are significantly exposed to potential changes in the nature of work spurred by technological change.

How will changes in the labour market impact PIT, CT, sales tax and payroll tax revenues in the future? To answer this question, it is important to keep in mind the nature of the current tax regime. For PIT, CT and payroll tax, this regime is premised on residency – for both corporations and individuals – and traditional employment relationships:

- » PIT is payable for individuals deemed resident in Ontario, with a host of factors determining residency (e.g., nature of stay, centre of economic interests, location of bank accounts, etc).<sup>88</sup> Payroll taxes typically apply to those employees engaged in work in Ontario for an Ontario-based employer.
- » Corporations incorporated in Ontario are deemed resident in Ontario, while even corporations incorporated outside the country may be deemed resident if their central management and control is located domestically (e.g., their board of directors meets in Ontario).<sup>89</sup>

88 KPMG LLP. 1 January, 2018. *Canada - Income Tax: Taxation of international executives*. KPMG International Cooperative. <https://home.kpmg.com/xx/en/home/insights/2011/12/canada-income-tax.html>.

89 Goodmans LLP. October 2007. *Canadian Corporate Tax Guide*. <http://www.goodmans.ca/docs%5CCanadian%20Corporate%20Tax%20Guide.pdf>.

Ontario's CT is a flat rate of 11.5 per cent, but drops to 3.5 per cent for corporations with taxable capital employed in Canada under \$10 million in the previous tax year.<sup>90</sup> Ontario's PIT is a progressive system, where individuals with higher income levels are taxed at higher rates.<sup>91</sup> Consequently, corporations with higher profits pay more taxes than do corporations with lower profits, and individuals with higher incomes pay more taxes than do individuals with lower incomes – although the relative difference is greater for individuals due to progressivity.

The system for sales taxes collected in Ontario is slightly different. A Harmonized Sales Tax (HST) of 13 per cent is collected at point of sale from most goods and services in Ontario. The HST was created in 2010 when it was introduced as a means of combining the five per cent federal Goods and Services Tax (GST) and the eight per cent provincial Retail Sales Tax (RST). HST is applied to purchases made in Ontario when from an Ontario-based seller. In Ontario, HST is administered by the federal government on behalf of the Ontario government.

90 Canada Revenue Agency. *Ontario – Provincial corporation tax*. Government of Canada. <https://www.canada.ca/en/revenue-agency/services/tax/businesses/topics/corporations/provincial-territorial-corporation-tax/ontario-provincial-corporation-tax.html>.

91 Canada Revenue Agency. *Canadian income tax rates for individuals - current and previous years*. Government of Canada. <https://www.canada.ca/en/revenue-agency/services/tax/individuals/frequently-asked-questions-individuals/canadian-income-tax-rates-individuals-current-previous-years.html#provincial>.

## Threats to revenue

There are a number of ways that the changes to the nature of work being driven by technological disruption could impact Ontario's revenues. Many of these factors interact with each other, further adding to the complexity.

### INCREASED AUTOMATION

Some of the ways that technological innovation will disrupt the labour market and, in so doing, erode the revenue base for governments are fairly straightforward and easy to understand. Increased automation through the implementation of new technological developments in areas like robotics and artificial intelligence (AI) is one such area. For instance, if a worker is replaced by a robot, the government will no longer be able to collect income tax from the worker or workers who have been replaced, nor will they be able to collect payroll tax from the workers' employer or sales tax on the income that these workers would have spent. Moreover, even if the firms generate increased profits due to the use of the robot, the increased CT taxes collected on these profits may not fully compensate for the lost PIT and payroll taxes as CT rates tend to be lower than combined PIT and payroll tax rates.

To get a sense of the magnitude of the shift that could result from increased automation, and the magnitude of the potential change in taxes collected that it implies, it is worth examining how technology has previously led to changes in patterns of employment. As new technologies have been adopted, productivity has grown, with the result that firms require fewer employees to produce the same level of value as was previously the case.

This pattern is particularly evident when one compares firms on the cutting edges of technological advancement from different eras. For example, AT&T was one of the USA's most innovative firms in the 1960s as well as one of its most valuable. In 1964, AT&T was worth USD \$267 billion (in 2017 dollars) and employed over 750,000 workers. By comparison, Apple, worth USD \$750 billion in 2017, had roughly 80,000 workers in the USA. Similarly, Alphabet – Google's parent company – is valued at USD \$570 billion, and employs only 75,000 workers.<sup>92</sup>

While this pattern is most pronounced among technology companies, technological advances and automation are reproducing it in other firms as well. Exxon, the world's largest oil company employed 150,000 workers in the 1960s and now employs fewer than half that number – even after merging with Mobil, a larger rival.<sup>93</sup>

Advances in automation, whether it be in the form of robotics, AI or in technologies that enable automation like the Internet, are only going to expand their impact on the economy in the next few decades. Already, the impact that they have had has been profound.

For example, a decade ago, the possibility that digital platforms might outperform traditional bricks and mortar retail companies seemed a distant prospect. However, revenues of the top five e-commerce retailers in the world grew, on average, by 32 per cent per year between 2008

and 2016, while revenue growth in the entire European Union (EU) retail sector averaged only one per cent per year during the same period.<sup>94</sup> Similarly, in Europe, close to a third of growth in industrial output is a result of digital technology adoption.<sup>95</sup>

Indeed, the application of technological innovation is arguably becoming even more important for a firm's success than it was in the past. Large global technology firms are increasingly becoming the most valuable firms in the world. In 2006, only one technology company was among the top 20 firms in the world when measured by market capitalization, while by 2017 nine of the top 20 were technology firms.<sup>96</sup> This trend suggests that the pressure to achieve growth through the adoption of new productivity-enhancing technologies will only increase in the near future with the likely result that more and more workers will be impacted. While it is possible that workers who lose their jobs to automation – or workers who are never hired because of it – will find other jobs that could offset the losses in PIT and payroll and sales tax revenue, there is no guarantee that this will occur or that it will occur to the extent required to fully replace these revenues.

92 Gurdus, E. 4 May, 2017. "Apple's investing \$1 billion to expand US jobs—here's how many it's created so far." CNBC. <https://www.cnbc.com/2017/05/04/heres-how-many-jobs-apple-has-created-so-far.html>; Thomson, D. July/August 2015. "A World Without Work." *The Atlantic*. <https://www.theatlantic.com/magazine/archive/2015/07/world-without-work/395294/>; Molla, R. 24 July, 2017. "Alphabet has nearly doubled its headcount since 2013 to more than 75,000." *Recode*. <https://www.recode.net/2017/7/24/16022210/alphabet-google-employment-employees-doubled-headcount>.

93 Wooldridge, A. 17 September, 2016. "The rise of the superstars". *The Economist*. <https://www.economist.com/special-report/2016/09/17/the-rise-of-the-superstars>.

94 European Commission. 21 September, 2017. *Communication from the Commission to the European Parliament and the Council: A Fair and Efficient Tax System in the European Union for the Digital Single Market*. [https://ec.europa.eu/taxation\\_customs/sites/taxation/files/1\\_en\\_act\\_part1\\_v10\\_en.pdf](https://ec.europa.eu/taxation_customs/sites/taxation/files/1_en_act_part1_v10_en.pdf).

95 European Commission. 21 September, 2017. *Communication from the Commission to the European Parliament and the Council*.

96 IPO Centre. 31 March, 2017. *Global Top 100 Companies by market capitalisation*. PwC. <https://www.pwc.com/gx/en/audit-services/assets/pdf/global-top-100-companies-2017-final.pdf> and Financial Times. 9 June, 2006. *Global 500*. 2006. <https://www.ft.com/content/19e214d6-f7c7-11da-9481-0000779e2340>.

## THE RISE OF THE GIG ECONOMY

We have already discussed how one of the most important trends in the current labour market is the move towards non-standard forms of employment. In Ontario, the prevalence of non-standard work has steadily increased over the past two decades with 26.7 per cent of the workforce employed in these sorts of jobs in 2017. This compares with the 23.1 per cent that was employed in this way in 1997. One of the drivers of this shift going forward could be the growth of the “gig economy.” If the gig economy and other forms of independent, contingent work continue to grow, the proportion of Ontarians engaged in precarious work will likely continue to climb, perhaps dramatically.<sup>97</sup>

If a greater proportion of the workforce is employed in non-standard work, tax revenues from PIT, payroll and sales taxes will also decline. This is because workers in non-standard employment tend to earn less than those in standard employment, with the result that they will pay less income tax.<sup>98</sup> Earning less income will also reduce their ability to spend with the result that sales tax revenues generated from these individuals will also fall. Since many workers in the gig economy are independent contractors, and not employees, firms will not need to pay payroll tax either.

## DIGITAL OUTSOURCING

One potential rebuttal to much of the analysis presented so far is that while PIT and payroll and sales taxes might fall due to the developments being described, CT revenues could increase as firms become more productive and create more value. We have already discussed how CT may not be an adequate replacement due to the generally lower rate at which CT applies than does the combination of PIT and payroll and sales taxes.

In addition, this CT-replacement hypothesis also assumes that the firms replacing standard employees with robots, AI, or “gig” workers are located in Ontario and are therefore liable to pay Ontario CT. Increasingly, however, this may not be a safe assumption, as the Internet and advances in telepresence and virtual/augmented reality are enabling firms with their permanent establishment in another jurisdiction to operate as if they were located in Ontario.

The extent to which firms can leverage the power of new technologies to further commodify labour and break down careers in component parts – i.e., the “unbundling” of full and part-time jobs into gigs and micro-tasks – will play a critical role in determining the future of Ontario’s workforce.<sup>99</sup> This is partially because, once unbundled, it becomes much easier to move proportions of the work that formerly constituted these careers into the global marketplace through the use of online platforms such as Mechanical Turk, Upwork and Freelancer which already host tens of millions of users and facilitate millions of job transactions

97 Weil, D. 2014. *The Fissured Workplace*.

98 Johal and Thirgood, *Working Without a Net*.

99 Policy Horizons Canada. 1 May, 2016. *Canada and the Changing Nature of Work*. <http://www.horizons.gc.ca/en/content/canada-and-changing-nature-work?wbdisable=true>.

annually.<sup>100</sup> In this case, Ontario workers engaged in a range of knowledge industries could find their occupations threatened by well-educated, less expensive workers in the developing world who do not pay taxes in Ontario. Even if major job losses are avoided, the threat of such digital outsourcing could also easily suppress wages, which could also reduce revenues from PIT and sales taxes.

In effect, the experience of Ontario's manufacturing sector, which has lost roughly 300,000 jobs since 2000<sup>101</sup> could be replicated across a range of service industries, ranging from information technology to finance and law, through the use of global labour platforms. These sectors have seen a significant uptick in employment in the past decade in Ontario. Indeed, the service-producing sector as a whole has seen employment increase by nearly 700,000 jobs since 2007 while the goods-producing sector has shrunk by 100,000 jobs. The finance, insurance and real estate service sector has seen an increase of 92,000 jobs in the past decade, while professional, scientific and technical services employment (in areas such as accounting, computer systems design, etc.) has grown by roughly 160,000 over the same period.<sup>102</sup>

100 Beerepoot, N. and Lambregts, B. 2017. "Reining in the global freelance labor force: how global digital labor platforms change from facilitators into arbitrators" in Galperin, H. and Alarcon, A. (eds). *The Future of Work in the Global South*. International Development Research Centre. 12-14. <http://www.fowigs.net/wp-content/uploads/2017/12/FutureOfWorkintheGlobalSouth.pdf>.

101 Dragicevic, N. 29, July 2014. "How Ontario lost 300,000 manufacturing jobs (and why most aren't coming back)." *TLDR*. The Mowat Centre. <https://mowatcentre.ca/how-ontario-lost-300000-manufacturing-jobs/>.

102 Statistics Canada. *Employment by industry, monthly, seasonally adjusted and unadjusted, and trend-cycle, last 5 months (x 1,000)*, Table: 14-10-0355-01 (formerly CANSIM 282-0088). Government of Canada. <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410035501>.

The rise of the middle-class<sup>103</sup> and increases in educational standards in countries like India (which is projected to have 119 million higher education students between the ages of 18 and 22 by 2025)<sup>104</sup> and China (which saw 8 million students graduate from universities in 2017)<sup>105</sup> will only make the global labour market more competitive. The service sector, which has driven Ontario's job creation success in recent years, could be particularly challenged as firms look to outsource specialized services to low-cost, high-quality bidders from emerging markets. The outsourced workers of the future might not just be call-centre employees in India. Highly skilled professionals like engineers and lawyers may also find themselves in the position of bidding for tasks against workers located anywhere in the world.

## INTERNET-ENABLED JURISDICTIONAL ARBITRAGE

Around the world, technology firms are putting pressure on conventional modes of corporate tax collection, which are premised on the notion of value creation by a firm with a permanent establishment in a given jurisdiction.<sup>106</sup> Increasingly, the mobility of firms, the volatility of capital flows, the creation of more multi-sided business models, and the enabling power of big data analytics and network effects are all

103 88 per cent of the next billion entrants to the global middle class will come from Asia. Kharas, H. February, 2017. "The Unprecedented Expansion of the Global Middle Class: An Update." *Global Economy & Development Working Paper*. No. 100. The Brookings Institute. [https://www.brookings.edu/wp-content/uploads/2017/02/global\\_20170228\\_global-middle-class.pdf](https://www.brookings.edu/wp-content/uploads/2017/02/global_20170228_global-middle-class.pdf).

104 Bothwell, E. 10 December, 2015. "India will have the largest student population by 2025, study predicts." *Times Higher Education*. <https://www.timeshighereducation.com/news/india-will-have-the-largest-student-population-by-2025-study-predicts>.

105 Stapleton, K. 10 April, 2017. "Inside the world's largest higher education boom." *The Conversation*. <https://theconversation.com/inside-the-worlds-largest-higher-education-boom-74789>.

106 Jakurti, E. 13 December, 2017. "Taxing the digital economy—It's complicated." *The Brookings Institute*. <https://www.brookings.edu/blog/future-development/2017/12/13/taxing-the-digital-economy-its-complicated/>.

combining in ways that create new opportunities for global firms to reduce their tax liabilities by engaging in technologically-enabled jurisdictional arbitrage.<sup>107</sup>

A good initial example of how this can occur is to look at how global high-tech firms like Amazon are deriving considerable revenue from Ontario, but paying little or no corporate income tax in the province. Moreover, their sales of goods and services generate less sales tax revenue than would comparable sales by traditional retailers and service providers. Ontario is not alone in facing this challenge.

The OECD, in conjunction with the G20, has worked extensively on the issue of tax challenges arising from the use of new technologies, especially digital technologies, by firms to reduce their tax liabilities. This Base Erosion and Profit Shifting (BEPS) initiative explores opportunities to fill gaps in the international tax system that allow multinational firms to shift profits away from jurisdictions where value is created and underlying economic activity actually takes place to other jurisdictions where tax rates are lower. These activities are estimated to cost governments between \$100 and \$240 billion USD annually.<sup>108</sup>

Much of the profit-shifting portion of BEPS activity has little to do with technological advancements and is instead the result of clever accounting and legal strategies – something

discussed later in this section.<sup>109</sup> That said, there are a few characteristics of the digital economy that are exacerbating this longstanding problem. One of the most important of these is the heavier than normal reliance on intellectual property and other intangible assets that characterizes many digital firms. The intangible nature of intangible assets enables global firms to move revenues that derive from these assets around within their network of national subsidiaries – through a legal technique called “transfer pricing,” for instance<sup>110</sup> – or to keep the location of ownership of some assets unclear in order to gain more favourable overall tax treatment.<sup>111</sup>

On base erosion, however, governments’ revenue concerns are tied much more directly to technological innovation. Increasingly, firms have the ability to provide goods and services to customers over the internet in ways that are very difficult for the government to regulate. This is enabling firms headquartered in other jurisdictions to access the Canadian market without having to “permanently establish” themselves in Canada. In other words, many firms are now able to do business in Canada without being in business in Canada. This makes it easy for firms to sell goods and services to Canadians without paying CT on the revenues that they generate in Canada or collecting and remitting sales tax.

107 OECD. 2018. *Tax Challenges Arising from Digitalisation – Interim Report 2018: Inclusive Framework on BEPS*. OECD/G20 Base Erosion and Profit Shifting Project. [https://read.oecd-ilibrary.org/taxation/tax-challenges-arising-from-digitalisation-interim-report\\_9789264293083-en#page23](https://read.oecd-ilibrary.org/taxation/tax-challenges-arising-from-digitalisation-interim-report_9789264293083-en#page23).

108 OECD. 2015. *OECD/G20 Base Erosion and Profit Shifting Project: 2015 Final Reports: Information Brief*. OECD/G20 Base Erosion and Profit Shifting Project. <https://www.oecd.org/ctp/beps-reports-2015-information-brief.pdf> Page 3.

109 See Wooldridge, A. 15 September, 2016. “The Dark Arts”. *The Economist*. <https://www.economist.com/news/special-report/21707055-superstar-companies-are-good-everything-including-pushing-boundaries-dark-arts> for a discussion of these strategies. Nonetheless, there is arguably an indirect connection between these techniques and the corporate consolidation that has characterized sectors of the economy where technological adoption has been highest. This connection is discussed further in the next subsection.

110 Wooldridge, A. 15 September, 2016. “The Dark Arts”.

111 OECD. 2018. *Tax Challenges Arising from Digitalisation – Interim Report 2018: Inclusive Framework on BEPS*, OECD/G20 Base Erosion and Profit Shifting Project. Pages 170.

A good example of this problem can be seen in digital advertising. As of 2016, Google and Facebook captured 48 and 24 per cent, respectively, of all Canadian digital advertising spending. Combined, that represents 72 per cent, or nearly \$4 billion, of \$5.5 billion in spending.<sup>112</sup> Because Google and Facebook's advertising businesses are headquartered elsewhere, Google and Facebook do not pay either corporate or sales tax on these revenues.<sup>113</sup> Other firms providing digital goods and services are similarly generating significant revenues in Canada but not paying either CT or sales tax because they are headquartered in other jurisdictions. For example, Rosalie Wyonch from the C.D. Howe Institute estimates that Netflix and Spotify avoided \$52 million and \$9.4 million respectively in sales taxes in Canada in 2016, to say nothing of the CT they avoided paying.<sup>114</sup>

Given that the amounts just quoted would be divided between the federal, provincial and territorial governments, it is perhaps understandable that many governments (including Canada and Ontario) have not yet taken the – often legislative – action required to ensure that these missed tax revenues are collected.<sup>115</sup> In Ontario, the situation is further complicated by the fact that the federal government is

responsible for collecting sales tax on behalf of Ontario. Regardless, as these sorts of digital business models continue to grow and account for an increasing proportion of the economy, the lost revenues will very quickly begin to add up. While the small amount of lost revenue may not yet trouble governments, as these amounts grow the “current misalignment between where digital businesses are taxed and where they create value threatens to undermine the fairness, sustainability and public acceptability of the corporate tax system.”<sup>116</sup>

## THE SHIFT TO A SERVICE-FOR-DATA ECONOMY

Increasingly, digital firms are offering services for free. Google and Facebook are the classic examples of this sort of business model. But while Google and Facebook do not charge fees for using their services, they are still being remunerated for providing their services in the form of user-generated data. While this data is obtained from users at no charge, it plays a vital role in the creation of value by the company.<sup>117</sup> In the case of Google and Facebook, for instance, the most well-known use of this data is to provide targeted advertisements. However, it can also be used for a variety of other purposes where the value of that data can be much more difficult to quantify, such as training machine learning algorithms.

Facebook estimated that each one of its North American users were generating on average about USD \$39 in advertising revenues for the network in 2015. An independent estimate done on the value of each North American Facebook

112 News Media Canada. 18 April, 2018. *Google and Facebook continue to dominate the Canadian digital advertising market*. News Media Canada. <https://nmc-mic.ca/news/research/google-and-facebook-continue-to-dominate-the-canadian-digital-advertising-market>.

113 The Star Editorial Board. 18 January, 2018. “Ottawa should force Google and Facebook to pay their share.” *The Toronto Star*. <https://www.thestar.com/opinion/editorials/2018/01/18/ottawa-should-force-google-and-facebook-to-pay-their-share.html> and Public Policy Forum. January, 2017. *The Shattered Mirror*. Public Policy Forum. <https://shatteredmirror.ca/wp-content/uploads/theShatteredMirror.pdf> Page 79.

114 Wyonch, R. August, 2017. *Bits, Bytes, and Taxes: VAT and the Digital Economy in Canada*. C.D. Howe Institute. Page 9.

115 Note, Quebec does seem to be moving in this direction: Gouvernement du Québec. March, 2018. *The Québec Economic Plan: Additional Information 2018-2019*. [http://www.budget.finances.gouv.qc.ca/budget/2018-2019/en/documents/AdditionalInfo\\_18-19.pdf#page=137](http://www.budget.finances.gouv.qc.ca/budget/2018-2019/en/documents/AdditionalInfo_18-19.pdf#page=137).

116 UK Chancellor of the Exchequer, Philip Hammond, quoted in BBC. 13 March, 2018. “Spring Statement: Chancellor threatens new tech tax.” *Business*. <http://www.bbc.com/news/business-43383614>.

117 OECD. 2018. *Tax Challenges Arising from Digitalisation – Interim Report 2018: Inclusive Framework on BEPS*, OECD/G20 Base Erosion and Profit Shifting Project. Pages 170-171.

user in 2017 pegged their value at about USD \$82. Using this number, the firm that provided the estimate also modelled what Facebook would pay individuals for their data if this was a normal cash exchange and came up with a figure of USD \$20.<sup>118</sup>

This is not a lot of money per person, but given that Facebook is estimated to have had more than 18.6 million Canadians as users in 2017, this means that this data correlates with a cash value equivalent of USD \$372 million or about CAD \$475 million.<sup>119</sup> While it may not make sense for individuals to charge Facebook for the data they are providing – they are receiving a service for free in exchange after all – it does seem problematic that a commercial exchange of almost half a billion dollars in value is taking place without being taxed. Moreover, it is by no means the only one. As already noted, it is estimated that in 2016, Facebook captured about 24 per cent of all digital advertisement spending in Canada while Google captured twice that amount at 48 per cent.<sup>120</sup> If we apply a similar calculation to Google’s activity, that’s almost a billion dollars’ worth of data that Canadian users are providing to Google in a barter exchange for a service without any tax being applied to the transaction.<sup>121</sup>

118 Clinton D. 9 April, 2018. *Your Data Is Worth Less Than You Think*. Loup Ventures. <http://loupventures.com/your-data-is-worth-less-than-you-think/>.

119 Calculated on 10 May, 2018 at an exchange rate of 1 to USD to 1.28 CAD.

120 News Media Canada. 18 April, 2018. *Google and Facebook continue to dominate the Canadian digital advertising market*.

121 This is a conservative estimate. Many estimates suggest that users are worth more on average to Google than they are to Facebook. Bloor, R. 21 March, 2018. “How Much is Your \$\$\$Data Worth?” *Medium*. <https://medium.com/algebraix-data/how-much-is-your-data-worth-c28488a5812e>. Moreover, there are of course many other social networks and digital business models that rely on data. For example, when Microsoft bought LinkedIn in 2016 it paid USD \$26.2 billion, which works out to a onetime payment of about USD \$260 per active monthly user. See Short, J. Todd, S. 3 March, 2017. “What’s Your Data Worth?” *MIT Sloan Management Review*. <https://sloanreview.mit.edu/article/whats-your-data-worth/>.

## COMMERCIAL CONSOLIDATION

Another threat to government revenues emerging from technological change is the tendency that technologies such as the Internet have for promoting corporate consolidation. To a certain extent, this consolidation seems to be the result of some features inherent to digital commerce, such as the importance of network effects and low marginal costs for digital platform business models and the role of data in firms’ abilities to compete effectively in the current marketplace. But it also has its roots in North American competition and anti-trust regulators’ overwhelming focus on consumer harm in their market analyses and the fact that regulators have not yet developed sufficient understanding of the role of data to be able to properly integrate it into these analyses.<sup>122</sup> As a result we have witnessed the rise of a number of global “superstar” firms that command massive market shares and which pose important concerns for government revenues.

As was mentioned in an earlier sub-section, a significant portion of BEPS activity is not based on any new technological enabler, but rather is simply the result of firms using longstanding techniques to reduce their tax liabilities. Shifting the booking of profits from a jurisdiction where a profit is generated to another jurisdiction with a lower tax rate is an example of such a technique that has been in use for some time. The difference now, however, is that recent technological developments are resulting in larger firms that, with additional resources and capacity, are getting better at using these already existing tools.

122 The Economist. 20 January, 2018. “The techlash against Amazon, Facebook and Google—and what they can do”. *The Economist*. <https://www.economist.com/briefing/2018/01/20/the-techlashagainst-amazon-facebook-and-google-and-what-they-can-do>.

Consider, for instance the fact that even when digital firms are taxed by a particular jurisdiction, their average effective tax rates tend to be far lower than traditional enterprises. According to one study focused on the EU, digital domestic firms are taxed at a rate of about 8.5 per cent compared to the 20.9 per cent rate paid by traditional domestic firms. Similarly digital international (business to business and business to consumer) firms are taxed at rates of 8.9 and 10.1 per cent compared to 23.2 per cent for traditional international firms.<sup>123</sup>

This situation is at least partially the result of coordination and competition between jurisdictions striving to attract investment. Under the current system, taxes on a firm's profits are often only collected in one jurisdiction, even if profits are generated across many jurisdictions. This winner-takes-all situation creates fierce competition to be the one jurisdiction collecting taxes. Consequently, many governments feel like they are in a race to the bottom on corporate tax rates and incentives. For example, Apple and Ireland joined forces to appeal an EU ruling that the company pay \$14.5 billion in unpaid taxes for unfair state aid in the form of artificially low corporate tax rates (in 2014, the firm paid Ireland an effective tax rate of 0.0005 per cent).<sup>124</sup>

Simply put, larger, well-financed firms are better at finding ways to avoid taxes. They can hire the best managers, accountants and lawyers, meaning that they are much better equipped to engage in profit-shifting behaviour – as well as other similar behaviours. So prevalent have these sorts of manoeuvres become that it is now estimated that 30 per cent of all foreign direct

investment is actually corporate profits being shifted from the countries where they are actually generated to tax havens such as the British Virgin Islands, The Netherlands and Luxembourg.<sup>125</sup>

Indeed, the OECD and G20's work on BEPS has found that corporate tax revenues are between 4 and 10 per cent lower than they should be due to firms shifting profits to low-tax jurisdictions where they conduct little to no economic activity.<sup>126</sup> If we apply this figure to Ontario's \$14.8 billion CT revenue collected in 2017, this means that the Government of Ontario is missing out on up to \$1.5 billion of revenue.

The impact of profit shifting on traditional firms that are paying higher corporate tax rates is an important cause for concern. While one cannot predict what might happen to mega-firms like Amazon, Apple and Google by 2040, it is by no means impossible that they will continue to increase their shares of global corporate profits, thereby driving increased levels of corporate concentration. How will Canadian firms be impacted by the continued growth of these mega-firms? If Canadian firms are out-competed by profit-shifting mega-firms, what might be the consequences for CT revenue?

Finally, even if a number of these "superstar" firms decided to locate their headquarters in Ontario, the trend towards corporate consolidation has a more general long-term negative implication for government revenues. The present trend to corporate consolidation has coincided with, and likely contributed to, a decline in business dynamism – both in

123 Jakurti, E. 13 December, 2017. "Taxing the digital economy."

124 Yun Chee, F. Halpin, P. 29 August, 2016. "EU hits Apple with \$14.5 billion Irish tax demand." *Reuters*. <https://www.reuters.com/article/us-eu-apple-taxavoidance/eu-hits-apple-with-14-5-billion-irish-tax-demand-idUSKCN114211>.

125 Wooldridge, A. 15 September, 2016. "The Dark Arts".

126 OECD/G20 Base Erosion and Profit Shifting Project. 2015. "Information Brief." *OECD/G20 Base Erosion and Profit Shifting Project 2015 Final Reports*. Organisation for Economic Co-operation and Development. <https://www.oecd.org/ctp/beps-reports-2015-information-brief.pdf>.

Canada<sup>127</sup> and the wider western world.<sup>128</sup> A fall in business dynamism – that is, the rate at which new companies are created and old companies exit the marketplace – is closely tied to the competitiveness of an economy.<sup>129</sup> On balance, the more competitive an economy, the more innovative it will be. The converse is also true at a general level: the less competitive an economy the less innovative it will be.<sup>130</sup> This is important because innovation is the key to increases in productivity and without increases in productivity, there will be less economic growth – and critically, less tax revenues from this growth – that there otherwise would be.

## PLATFORMS AND THE UNDERGROUND ECONOMY

A significant concern for governments as they consider the disruptions of the labour market that emerging technologies, globalization and new business models may create centres on the extent to which these new developments will spur additional activity in the underground economy.

The underground economy is already a significant issue for Canadian governments from a revenue standpoint, though there is some significant disagreement as to its magnitude. For instance, Statistics Canada has suggested that the underground economy was 2.4 per cent of GDP for Canada as a whole in 2013 – the last year for which data are available. Statistics Canada also estimated the underground economy to be 2.4 per cent of Ontario's GDP in 2013.<sup>131</sup> These figures should be viewed with some skepticism, however, as Statistics Canada does not actively investigate the underground economy. Rather, they make assumptions about the proportion of each sector that is underground, and then apply an accounting framework to extrapolate from this to an overall estimate.

127 Tapp, S. 29 October, 2015. "The "start-up slow-down": Why is the Canadian economy losing its dynamism?" *Policy Options*. <http://policyoptions.irpp.org/2015/10/29/the-start-up-slow-down-why-is-the-canadian-economy-losing-its-dynamism/>.

128 Qureshi, Z. August, 2016. *The Productivity Outlook: Pessimists versus Optimists*. The Brookings Institute. <https://www.brookings.edu/wp-content/uploads/2016/08/productivity-outlook.pdf> Page 3.

129 Wessel, D. March-April, 2018. "Is Lack of Competition Strangling the U.S. Economy?" *Harvard Business Review*. <https://hbr.org/2018/03/is-lack-of-competition-strangling-the-u-s-economy>.

130 Qureshi, Z. August, 2016. *The Productivity Outlook*. Page 3.

131 See Statistics Canada. 20 June, 2016. "The underground economy in Canada, 2013."

Alternatively, some experts believe the underground economy to be much larger than these official figures suggest.<sup>132</sup> For example, in the case of unreported tips by wait staff, Statistics Canada estimated this amount to be \$750 million in 2008. Extrapolations based on the results of an actual Canada Revenue Agency (CRA) audit, however, suggest that the correct figure could actually be between \$2.7 billion and \$6 billion. This would mean roughly \$400-900 million in lost tax revenues at the federal level – just from tip income for wait staff.<sup>133</sup>

Some suggest that the emergence of new technologies – and the business models that go along with them, such as online platform marketplaces – will actually reduce the threat to government revenues presented by the underground economy. Indeed, in theory, platforms should enable much easier tracking of economic activity than was possible previously (e.g., an Uber or Lyft trip is recorded digitally and payment is made through a credit card, while traditional taxis still take cash payments). When transactions can be tracked, they can be taxed. Governments have already started to take advantage of this feature of platforms by entering into partnerships whereby platforms directly remit taxes on behalf of service users. For example, the Government of British Columbia (BC) recently entered into an agreement with Airbnb in which the platform will directly remit provincial sales tax and hotel taxes to the government. BC plans to use the \$16 million it expects to receive through this deal to fund affordable housing.<sup>134</sup>

132 Tedds, L. 30 January, 2014. "Canada's Underground Economy." *Dead For Tax Reasons*. <https://deadfortaxreasons.wordpress.com/2014/01/30/canadas-underground-economy/>.

133 Tedds, L. 16 July, 2012. "Tipping point: Ottawa loses billions in undeclared income." *The Globe and Mail*. <https://www.theglobeandmail.com/report-on-business/economy/economy-lab/tipping-point-ottawa-loses-billions-in-undeclared-income/article4418504/>.

134 Bailey, I. 7 February, 2018. "British Columbia reaches tax deal with Airbnb". *The Globe and Mail*. <https://www.theglobeandmail.com/news/british-columbia/british-columbia-reaches-tax-deal-with-airbnb/article37895386/>.

Simultaneously, the fact that platform marketplaces enable the tracking of online economic activity does not mean that they will automatically be taxed. In general, platform marketplaces do not proactively pursue agreements like the one just described with the BC Government and often only reach these agreements after significant pressure has been applied by the government in question. In fact, firms will often resist, as can be seen in the repeated bouts of conflict and brinksmanship – Uber has now threatened to leave Quebec on multiple occasions – between the Government of Quebec and Uber as the government sought to impose regulations on the ride-sourcing service including a requirement to collect and remit sales taxes on behalf of drivers.<sup>135</sup>

Critically, the likely result of a failure to require platform operators to themselves collect and remit sales taxes on behalf of the independent contractors offering their goods and services on the platform is significant tax revenue losses for the government. Compare the situation in Quebec where Quebec Sales Tax (QST) is collected and remitted to the Quebec government on every ride by Uber on behalf of their drivers with the situation in the rest of Canada where it is the responsibility of drivers to remit sales taxes. In 2017 the federal government amended the law and cancelled the exemption that had previously allowed ride-sourcing drivers earning less than \$30,000 to not remit federal sales tax.

135 See Lau, R. 26 September, 2017. "A look at Uber's controversial history in Quebec." *Global News*. <https://globalnews.ca/news/3769417/a-look-at-ubers-controversial-history-in-quebec/> and Dawes, T. 8 September, 2016. "What will Quebec's Uber deal mean for other jurisdictions?" *Cantech letter*. <https://www.cantech-letter.com/2016/09/will-quebecs-uber-deal-mean-jurisdictions/>. For a description of Quebec's partnership see <https://www.revenuquebec.ca/en/businesses/sector-specific-measures/uber-drivers/>.

The federal government did not, however, impose a requirement on platform operators (i.e. Uber and Lyft) to collect and remit the sales tax on drivers behalf – the responsibility remained with drivers. Uber, for instance, maintains a webpage where it explains to drivers their tax remittance responsibilities and provides advice on how to meet them.<sup>136</sup> Nevertheless, the Government of Canada itself estimates that it will only collect about 25 per cent of the taxes that it would collect if all drivers were adhering to the law because, one would assume, it believes that most will not do so.<sup>137</sup>

Similar problems are likely to recur on every online platform that does not have tax compliance measures built into them. Given that there is currently little incentive for the operators of these platforms to do so – it raises the price of the goods and services the sales of which they benefit from – it is unlikely that they will take these compliance-friendly steps. Moreover, these problems are likely to arise even more acutely when the platform is smaller, or based in a foreign jurisdiction, or focused on facilitating bartering, as enforcement will be more difficult, will return less value to the government and will likely force governments to overcome popular misconceptions about the tax exempt status of such transactions.<sup>138</sup>

136 See Uber Canada, "Sales Tax in Canada – Requirements for Drivers" <https://www.uber.com/en-CA/drive/resources/canada-sales-tax/>.

137 Wyonch, R. August, 2017. Bits, Bytes, and Taxes. Page 11, footnote 12.

138 Cestnick, T. 18, February, 2010. "Even barter transactions have a tax implication." *Globe and Mail*. <https://www.theglobeandmail.com/globe-investor/personal-finance/even-barter-transactions-have-a-tax-implication/article4311784/>.

## THE EMERGENCE OF CRYPTO-ASSETS

It is also worth considering the emerging role of crypto-assets and their potentially disruptive impact on government revenues through a variety of uses ranging from organized criminal activity, to the underground economy, to tax evasion. In popular conception, crypto-assets – and especially cryptocurrencies – have long been associated with criminal activity. Contrary to popular belief, however, the most popular cryptocurrencies, such as Bitcoin, are actually quite transparent – every transaction ever made in Bitcoin is recorded in a publicly accessible ledger. It is true that Bitcoin transactions are pseudonymous – meaning that users need an identity, even if it is just a string of numbers, to transact with Bitcoin.

This requirement of an identity differs from traditional cash where transactions can occur completely anonymously without any way of tracing who was involved.<sup>139</sup> Consequently, law enforcement authorities have been highly successful in tracking individual criminals' transactions through the Bitcoin blockchain.<sup>140</sup> Nonetheless, the head of Europol, the EU's police agency, recently stated that he believed that 3-4 per cent of Europe's annual criminal revenues, about £3-4 billion, were being laundered using crypto-assets.<sup>141</sup> Moreover, there are newer cryptocurrencies, like Zcash and monero, which

139 Emerging Technology from the arXiv. 23 August, 2017. "Bitcoin Transactions Aren't as Anonymous as Everyone Hoped." *MIT Technology Review*. <https://www.technologyreview.com/s/608716/bitcoin-transactions-arent-as-anonymous-as-everyone-hoped/>.

140 Yakowicz, W. 9 January, 2018. "Startups Helping the FBI Catch Bitcoin Criminals." *inc*. <https://www.inc.com/will-yakowicz/startups-law-enforcement-agencies-catch-criminals-who-use-cryptocurrency.html>.

141 The Economist. 26 April, 2018. "Crypto money-laundering". *The Economist*. <https://www.economist.com/news/finance-and-economics/21741190-will-crypto-help-money-launderers-future-crypto-money-laundering>.

are designed to provide greater anonymity for transactions.<sup>142</sup>

Since governments do not usually tax the proceeds of crime, the tax implications of criminal money-laundering using crypto-assets are not particularly germane to this report unless they lead to an expansion of such activity that would not have occurred otherwise. More concerning, however, is the potential for crypto-assets to take on a larger role in the underground economy more generally. Because pseudonymity can make it more difficult for authorities to link particular transactions to particular individuals, were crypto-assets to continue to grow in popularity, they could, much like cash, become attractive tools for individuals looking to avoid government scrutiny as they move value around. The use of cryptocurrencies in Argentina, for example, where they were used as a means of avoiding government-imposed official currency controls, offers an example of how this could occur.<sup>143</sup>

While by no means impossible to track, the widespread use of cryptocurrencies could erode government revenues simply by increasing the amount of enforcement resources needed to collect the same amount of revenue. In this way, crypto-assets could present a challenge similar to the one presented to governments by digital platforms discussed earlier, namely raising the costs of collecting tax revenues.

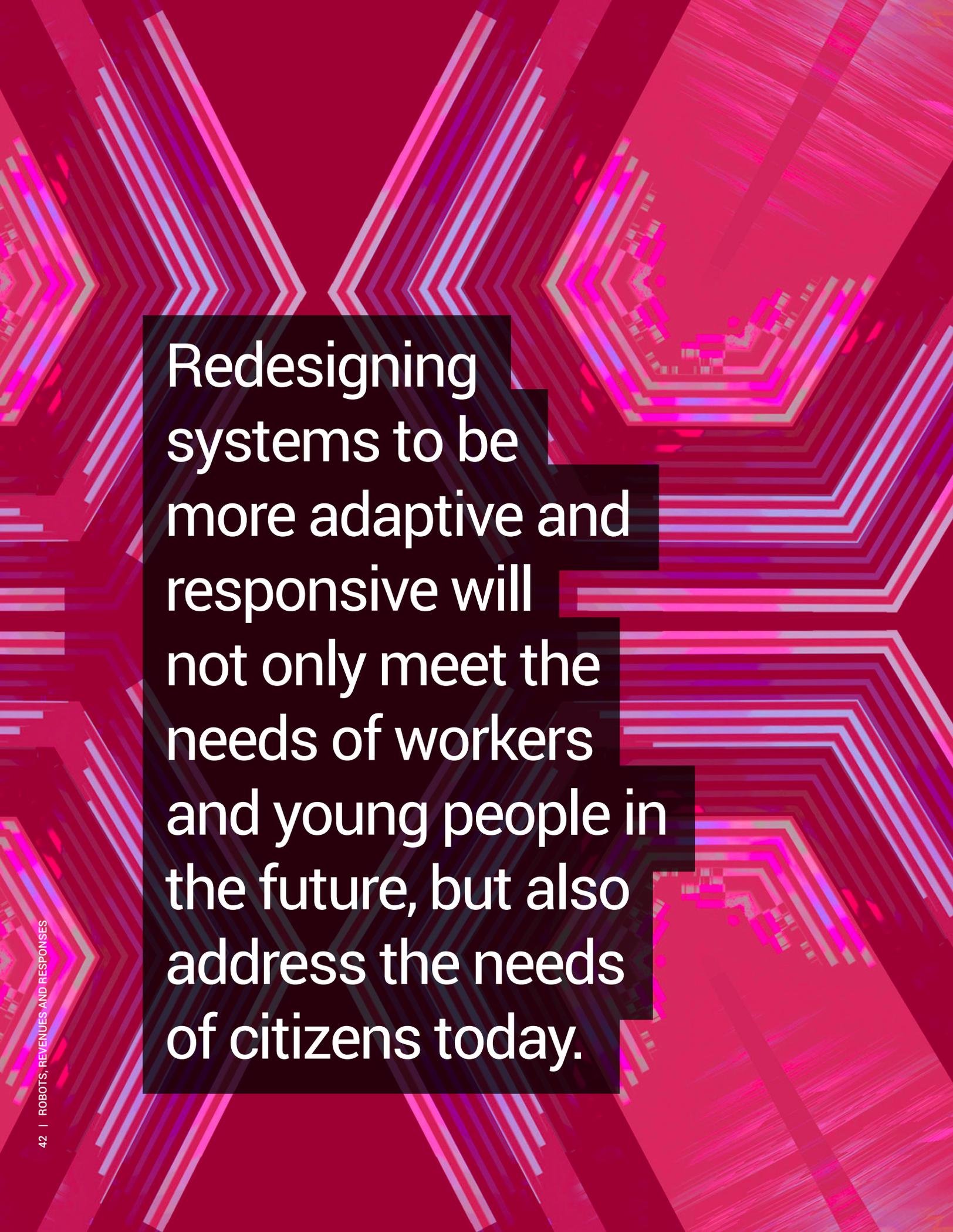
This concern has another potential manifestation beyond situations where crypto-assets become a high-tech form of cash. In many cases, crypto-assets are themselves the things being purchased. While some crypto-assets, like tokenized securities, would likely not normally attract sales taxes, other crypto-assets explicitly declare themselves not to be securities. The question then arises, should the sale of these assets be subject to sales tax?

Moreover, the purpose of a platform like Ethereum is to use crypto-assets as a means of purchasing services offered within the Ethereum network, like those provided by so-called “smart contracts” – computer programs designed to do certain tasks, such as pay out insurance contracts automatically when triggered by an outside event like a flight cancellation. The service of running these programs on the Ethereum network of computers is paid for by the network's own digital token, ether. How should the performance of services like these be treated from a taxation perspective? Should sales tax be applied to them? How should the income generated by these smart contracts be taxed? If so, in dollars or in ether?

While the value being transacted on blockchains like Ethereum or Bitcoin is not yet so large as to be a huge concern for jurisdictions like Ontario, these values are growing extremely quickly and the capabilities of the networks and the smart contracts they host are also growing rapidly. As more and more economic value is transferred into these digitally native value systems and out of the Ontario economy, the question of how to tax the increasingly large movements of value occurring in these systems will become much more important.

142 Kharif, O. 2 January, 2018. “The Criminal Underworld Is Dropping Bitcoin for Another Currency.” *Bloomberg Markets*. <https://www.bloomberg.com/news/articles/2018-01-02/criminal-underworld-is-dropping-bitcoin-for-another-currency>.

143 Popper N. 29 April, 2015. “Can Bitcoin Conquer Argentina?” *The New York Times Magazine*. <https://www.nytimes.com/2015/05/03/magazine/how-bitcoin-is-disrupting-argentinass-economy.html>.



Redesigning systems to be more adaptive and responsive will not only meet the needs of workers and young people in the future, but also address the needs of citizens today.

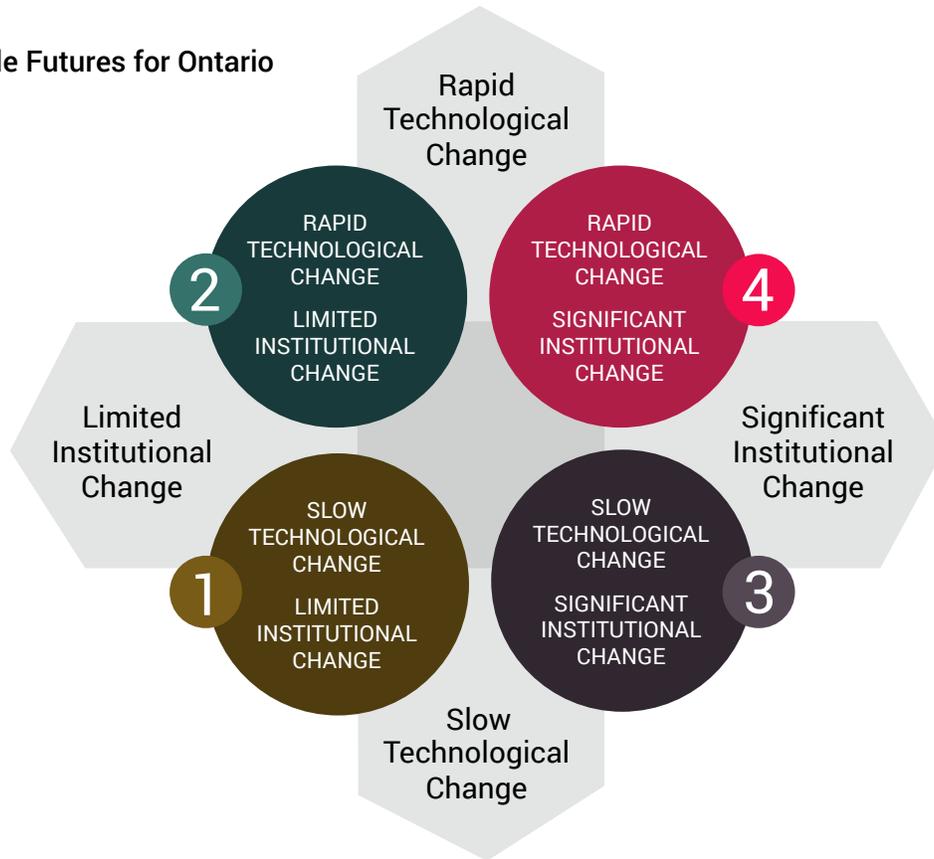
# 6 UNDERSTANDING PLAUSIBLE FUTURES TOWARDS 2040

## Plausible futures for Ontario's labour market

When faced with significant uncertainty, as is the case when considering the future of work in jurisdictions around the world, the analysis of plausible scenarios can be a useful exercise for policymakers as they work to craft possible solutions to potential future challenges. This approach generally entails envisioning various plausible futures, discussing the challenges and opportunities that may arise in each, and considering potential policies in response. These plausible futures are not designed to be factual forecasts or normative visions, but rather to serve as a mechanism through which policymakers can engage in a process of critical thinking and challenging of assumptions and conventional wisdom about the future.

In building these plausible scenarios, it is useful to map out what is known (e.g., current trends and drivers) and what is unknown (e.g., critical uncertainties). Critical uncertainties represent key inflection points that could result in drastically different outcomes. For example, we know that emerging technologies like AI already have the ability to replicate some human functions and eliminate the need for human labour in some occupations through automation. Nonetheless, we do not know the rate at which automation will occur in workplaces at a larger scale. It is plausible that this rate of replacement could be quite high, but it is also plausible that a variety of factors could result in it being fairly low. What the future of work actually looks like will depend to a great extent on which of these two plausible futures comes to pass. By developing scenarios for both of these eventualities, as well as the likely impacts of higher or lower rates of automation, the analysis of these two plausible futures can help policymakers identify the critical choices they will need to make and prepare themselves accordingly. Additionally, planning for plausible futures can also illuminate those areas where policy changes could themselves have opportunities to influence how the change plays out.

**FIGURE 15**  
**Four Plausible Futures for Ontario**



Other jurisdictions, such as Australia, have used exercises of this sort to help them rethink policy development in relation to employment.<sup>144</sup> The analysis that follows in this report builds on a similar scenario-building exercise undertaken by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia. As was done by CSIRO, we focus on two critical uncertainties in our analysis:

- » Speed of technological change and adoption over the next 10 to 20 years (vertical axis).
- » Degree of institutional change over the next 10 to 20 years (horizontal axis).

Each of these uncertainties is mapped onto a continuum represented by the vertical and horizontal axes above, creating four quadrants that each correspond to a plausible future scenario. In our analysis, we further structure each of the four scenarios by considering how the eight threats to revenue, outlined in the previous section, might play out in the years leading up to 2040 given the character of the quadrant in question. In other words, in the quadrant that represents a future in which rapid technological change and significant institutional change has occurred, we fill in the narrative of this quadrant by asking how the eight threats to revenue identified in the last section might play out in such an institutional and technological environment.

144 Hajkowicz, S. Reeson, A. Rudd, L. Bratanova, A. Hodggers, L. Mason, C. Boughen, N. January 2016. *Tomorrow's Digitally Enabled Workforce: Megatrends and scenarios for jobs and employment in Australia over the coming twenty years*. Commonwealth Scientific and Industrial Research Organisation (CSIRO). [https://www.acs.org.au/content/dam/acs/acs-documents/16-0026\\_DATA61\\_REPORT\\_TomorrowsDigitallyEnabledWorkforce\\_WEB\\_160128.pdf](https://www.acs.org.au/content/dam/acs/acs-documents/16-0026_DATA61_REPORT_TomorrowsDigitallyEnabledWorkforce_WEB_160128.pdf).

## 1

## SLOW TECHNOLOGICAL CHANGE; LIMITED INSTITUTIONAL CHANGE

In this scenario, the present situation has essentially stagnated. The rapid technological change witnessed in the years leading up to 2018 has slowed substantially. Moore's law – the observation that the number of transistors that can be fitted onto a chip has and will continue to double every two years – has ceased to hold. Correspondingly, the pace at which computers had been getting faster and shrinking in size has diminished markedly. Superstar technology firms built on technological innovation have not been able to continue churning out new products and services in the ways they once did as innovation has become more difficult and costly to generate. Many of the same firms still remain dominant, but the entire industry seems to have essentially hit pause.

In fact, significant **commercial consolidation** remains and the slowdown in innovation at the big firms has not been matched by any rebounding of overall business dynamism which remains near a 40 year low.<sup>145</sup> Simultaneously, however, governments are still largely uninterested or unable to take the steps needed to rein in the tech giants that remain. These firms continue to shift profits around the world and in order to lower their effective tax rates through **jurisdictional arbitrage**, regardless of where the profits were originally generated. Little has been done at the national or international levels to address the problem.

The story is the same in a variety of areas. **Digital outsourcing** continues to increase, but various factors ranging from unexpected technological obstacles to low levels of social acceptance have limited growth in this area. Barriers arising from a poor fit between existing regulatory frameworks and the new modes of working enabled by these

technologies have contributed to this slow down and the government has not been keen to modernize them. Similarly, while the late 2010s saw many declaring that data was the new oil,<sup>146</sup> this declaration seems to have been premature as the marginal return on increased **data collection** continues to fall. The ability to mine data for insights using big data analytics, and the advantages that most firms believed would accrue to them if they possessed large pools of data to mine, have not yet yielded the large spurt of innovation and revenue growth that were initially projected.

This slowdown in innovation has had important knock on effects. One has been that the costs of implementing the latest technologies has not fallen as had been expected, with the result that it has not yet made economic sense for many workplaces to adopt them. Indeed, while the details have changed, the overall structure of Ontario's economy does not look that different in 2040 than it did in 2018, with the bulk of employment still in service and knowledge-based jobs. Digital outsourcing and **automation** have resulted in some job loss, including in a few sectors that had previously been largely immune, such as retail, but this transition has taken place rather slowly. Similarly, the proportion of Ontarians working in the **gig economy** continues to grow but only slowly as most industries that could have been easily disrupted by a **platform-based business model** had already been disrupted by about 2020.

145 Tapp, S. 29 October, 2015. "The 'start-up slow-down'".

146 The Economist. 6 May, 2017. "The world's most valuable resource is no longer oil, but data." *The Economist*. <https://www.economist.com/leaders/2017/05/06/the-worlds-most-valuable-resource-is-no-longer-oil-but-data>.

Despite the slow pace of change, governments have still largely failed to address the changing nature of work in a meaningful way. While the job losses are not as widespread as was once expected, an increasing proportion of the workforce is experiencing repeated bouts of temporary unemployment and job churn. While some incremental progress has been made to adapt longstanding social programs, most government programs remain strikingly ill-fitted to the reality that more and more workers now face. For example, many Ontarians still do not qualify for EI when they are out of work, adequate retraining initiatives are scarce and often linked to EI eligibility, and the traditional education system remains largely unchanged – ill-suited and inaccessible for mature workers. While the growth of platform business-model adoption has slowed, numerous companies still make use of these business models to misclassify their workers to avoid their obligations as employers.

While it did disrupt the financial industry in a significant way, the disruption created by blockchain-based technologies like **crypto-assets** never fully moved beyond their original application, namely, cryptocurrencies. As a result, governments have neither adopted such technologies themselves, nor pursued any policy or regulatory interventions to improve their governance. Unfortunately, this means that a gradually growing, and increasingly significant proportion of wealth is being converted into crypto-assets as a way of evading taxation. An increasing proportion of underground economy transactions are also being carried out in untraceable crypto-assets.

## What does this mean for revenue?

Overall economic growth has slowed, as was expected given the aging of Ontario's population. More surprising has been the limited contribution that innovation has made to the growth of the provincial economy. Reduced financial inflows and smaller profits from businesses of all sizes have decreased revenue contributions from corporate taxes.

Similarly, wages have remained relatively stagnant and have lost value in real terms due to inflation. Growth in worker precarity and job losses to automation – while smaller than anticipated – has reduced revenue contributions from personal income and payroll taxes, though not as much as some had expected.

Finally, persistent underground economic activity continues to impinge on provincial government revenues. Some small steps have been taken to reduce revenue leakage due to a failure to report economic activity carried out on online platforms, but most sales taxes that ought to be collected and remitted from these activities never are.

## 2

RAPID TECHNOLOGICAL CHANGE;  
LIMITED INSTITUTIONAL CHANGE

In this scenario, the capabilities of new technology have advanced far enough, and its costs have fallen sufficiently, that it is now more affordable for firms to use AI than to recruit and train human labour for many tasks. This has enabled significant amounts of new **automation** in the workplace, which has had an important impact on the labour market. In Ontario, AI has disrupted many good-quality and highly-paid occupations in sectors such as banking, law, and insurance (i.e., “white-collar” jobs). Moreover, many of the service and knowledge-based occupations in which Ontario had seen substantial growth over the 15 years prior to 2018 have been lost to **digital outsourcing** through global platforms.<sup>147</sup>

These changes have only added to the growth in the proportion of workers who find themselves forced to participate in the **gig economy**. While technology has created some exciting new occupations, many of the new jobs that have been created by technological change are the result of an unbundling of traditional jobs into multiple tasks as a result of hybrid tasking. Indeed, while hybrid tasking and the further development of information and communication technologies – such as telepresence and virtual and augmented reality<sup>148</sup> – have contributed to the growth in digital outsourcing, they have also enabled firms to unbundle jobs and contract out those tasks that still need to be done in

Ontario through a growing number of platform marketplaces. Unfortunately, the commissions paid for this new form of piecework generally amount to much less than a living wage.<sup>149</sup>

This is only one example of how **platform business models** are playing an increasingly important role in peoples’ lives as technological change accelerates. Dwindling traditional employment opportunities mean that many workers must now work on multiple platforms just to earn a living, either as gig workers or by stitching together gigs with the minimal rewards that flow from producing data for platforms or service providers. This has had a polarizing effect on the labour market: while owners of capital and some highly skilled workers now enjoy much greater remuneration and freedom, more and more workers find themselves in increasingly vulnerable positions. Moreover, because government has failed to force these foreign-owned platforms to collect and remit sales taxes or provide third party reporting of income generated on these platforms, much of the economic activity taking place on these platforms is now essentially a part of the underground economy.

Despite these increasingly wrenching changes, institutional change in response has been limited with the result that there continues to be a growing gap between Ontario’s social programs and the reality of work in the province. Many workers have become incredibly vulnerable: a large swath of Ontarians have lost their jobs and are struggling to re-enter the labour market while an increasingly large cohort have never been engaged in a standard employment relationship.

147 Knight, W. 6 November, 2017. “Is Technology About to Decimate White-Collar Work?” *MIT Technology Review*. <https://www.technologyreview.com/s/609337/is-technology-about-to-decimate-white-collar-work/>.

148 Messenger, J. Llave, O. Gschwind, L. Boehmer, S. Vermeylen, G. Wilkens, M. 2017. *Working anytime, anywhere: The effects on the world of work*. Eurofound and the International Labour Office. <https://www.eurofound.europa.eu/publications/report/2017/working-anytime-anywhere-the-effects-on-the-world-of-work>.

149 Policy Horizons Canada. 1 May, 2016. *Canada and the Changing Nature of Work*.

Those retraining and skills development initiatives that do exist have not adjusted adequately to the new world of work where traditional standard employment relationships are increasingly rare. This poses a particular challenge to mature workers whose skills have suddenly become obsolete.<sup>150</sup> Returning to formal education is not an option for many due to challenging financial situations. Even if it was, traditional degree and diploma programs at Ontario's universities and colleges have grown outdated and do not provide the right skills for this high-tech labour market.

In addition to reducing their need for workers, new technologies have also strengthened the ability of a handful of "superstar" firms to find loopholes and take advantage of taxation and legal structures through the use of advanced big data analytics and AI. **Jurisdictional arbitrage** remains an important part of these tax and regulation minimization strategies as initially promising international cooperation on this issue has failed to produce significant global collaboration. This has further accelerated global **commercial consolidation** as a handful of tech giants have come to dominate most industries. Apple, Alphabet, Facebook and Amazon are still leading the pack, but have been joined by several large Chinese firms as well. All have taken a big step into other sectors – in Alphabet's case, such as retail and services – which were previously seen as outside their scope. Moreover, many smaller businesses now rely almost entirely on these platforms for the ability to sell their goods and services and run their operations, thus making them very vulnerable to the often arbitrary decisions of these firms.<sup>151</sup>

150 Gahan P. and Healy J. 6 March, 2017. "The Challenge and Opportunity of an Ageing Workforce," *Pursuit: University of Melbourne*. <https://pursuit.unimelb.edu.au/articles/the-challenge-and-opportunity-of-an-ageing-workforce>.

151 Taneja, H. 2 April, 2018. "Commentary: It's Time for Washington to Take on the Tech Monopolies," *Fortune*. <http://fortune.com/2018/04/02/tech-monopolies-small-businesses-competition/>.

The importance of **data** has greatly increased and more platform firms are creating closed economic systems within which data is exchanged for credit that can only be spent within that system. Facebook's launch of its own private cryptocurrency in 2020 turns out to have been only the first of a number of similar initiatives.<sup>152</sup> The wealth of data held by the tech giants has created something of a vicious cycle as this superior access to data has helped them develop better AI which has enabled them to build better services, attract more users and gather even more data from them.<sup>153</sup> This advantage has increased the gap between them and their aspiring competitors – many of whom eventually get bought by the dominant firms anyway. These giants have also become increasingly opaque, restricting access to their huge reserves of data, and successfully blocking – albeit tentative – attempts by governments to impose regulations and transparency on their use of algorithms.

Moreover, governments have also failed to find ways to leverage the same technological tools, such as AI, used by these giants to counter their use of increasingly sophisticated corporate structures and legal arrangements as means of avoiding taxes. This has become a significant problem as these firms represent an increasingly large portion of GDP.

Finally, technological innovation has resulted in the development of **crypto-assets** that are much more useful and attractive than was previously the case. This has resulted in the shifting of significant economic value out of traditional values systems, such as national currencies,

152 Gartenberg, C. 11 May, 2018. "Facebook reportedly plans to launch its own cryptocurrency," *The Verge*. <https://www.theverge.com/2018/5/11/17344318/facebook-cryptocurrency-token-blockchain-report-david-marcus>

153 Marr, B. 9 June, 2017. "Why AI Would Be Nothing Without Big Data," *Forbes*. <https://www.forbes.com/sites/bernardmarr/2017/06/09/why-ai-would-be-nothing-without-big-data/#48dbcf124f6d>.

and into new digitally native systems like Bitcoin or Ethereum. Governments have failed to devise effective regulations for the crypto-sector, however, and the widespread adoption of untraceable crypto-assets has significantly increased the amount of economic activity shifting into the underground economy. Indeed, many wealthy Ontarians are even using these assets as a means of moving their wealth into digitally native systems beyond the knowledge and reach of the CRA.

## What does this mean for revenue?

Governments in this scenario are left grappling with a shrinking revenue base at a time when funds to bolster the social safety net are desperately needed. Elimination of jobs due to technological advancement means that fewer people are working, and those who are working tend to experience greater precarity and employment churn leading to fewer total hours worked. The technology giants that are thriving and do offer high-quality jobs have exceptionally small staff given their economic weight. This has all translated into a significant drop in contributions from personal income and payroll taxes. Moreover, with a rapidly growing proportion of Ontarians engaged in the underground economy due to their work on poorly regulated platforms and their use of crypto-assets, an increasing number are successfully avoiding taxation almost entirely.<sup>154</sup>

Furthermore, CT contributions are declining as large tech corporations with highly mobile capital are expanding the proportion of GDP for which they are responsible while, simultaneously, these firms continue to shift profits between jurisdictions to lower their effective rate of corporate taxation. Moreover, advances in AI mean that even medium-sized corporations are now able to afford to exploit loopholes and build themselves sophisticated corporate and legal structures to ensure they need pay only minimal taxes. This has enabled corporate profits as a share of global income to grow, but very little of this prosperity benefits Ontario: despite generating considerable profits within the province, little to no corporate tax is paid to the provincial government by these extremely profitable mega-firms.

Finally, many activities that ought to be taxed are escaping the scrutiny of tax authorities because of how an increasing amount of economic activity, such as content creation on social media platforms, are taking place within closed systems where value is not denominated in national currencies. This leads to declines in both corporate and personal income tax as well as reductions in sales taxes. Similarly, adding fuel to the fire is the growing use of cryptocurrencies and untraceable digital transactions, which makes it exceptionally difficult for governments to capture potential revenue from the value created and exchanged in these contexts.<sup>155</sup>

154 National Online Journalist. 21 June, 2016. "Canada's underground economy is thriving. So are you contributing?" *Global News*. <https://globalnews.ca/news/2773718/canadas-underground-economy-is-thriving-so-are-you-contributing/>.

155 Cooper, C. 1 April 2018. "Bitcoin taxation: a global challenge for tax authorities." *CPA Australia*. <https://www.intheblack.com/articles/2018/04/01/taxation-bitcoin-global-challenge>.

## 3

## SLOW TECHNOLOGICAL CHANGE; SIGNIFICANT INSTITUTIONAL CHANGE

In this scenario, Ontario has seen gradual and consistent technological innovation along with a series of public policy responses to the resulting disruption. Canada has become a global leader in AI and other forms of technological innovation, and the economic growth and prosperity that results from this is shared widely among citizens. Investments in research and development and strategic efforts focused on acceleration and incubation have paid off – Ontario has a booming tech start-up scene. A number of globally relevant technology firms, as well as firms in sectors like banking and consulting services, call Toronto, Kitchener-Waterloo and Ottawa home.<sup>156</sup>

The relative slowing of technological change has stagnated the growth of **platform** business models, as fewer industries amenable to a platform model are left to be disrupted. As the level of economic opportunity occurring on platforms levels off, so too does the level of economic activity susceptible to migration into the underground economy, especially given the increasing government attention to and regulation of these markets. **Digital outsourcing** continues to increase, but unexpected obstacles prevent new technologies – such as telepresence, virtual and augmented reality – from having as significant an impact as was initially predicted for them. As a result, a number of middle-skill occupations that many were concerned would be outsourced, remain relatively untouched.

Technology has, of course, caused some disruption and displacement in the labour market. As was forecasted, **automation** and AI have replaced jobs that primarily consisted of routine tasks, and job losses have indeed spread to sectors that were previously immune to this phenomenon. Employment in sectors such as transportation, retail and some services inevitably shrunk as routine tasks were replaced by AI. However, regulatory challenges and slow growth in social acceptance has meant that the rollout of automation in these sectors has been slower than was the case for manufacturing in the years prior, allowing ample time for an effective government response. Moreover, government's proactive creation of stringent regulatory frameworks has helped to ensure that automation in sensitive areas, such as driving, has occurred gradually and with high public safety requirements.

Indeed, significant institutional changes have resulted in many successful government attempts to smooth the transition to a more automated future across the economy, though there have also been failures in this regard. For example, a robot tax was considered but vehemently protested against by industry for being costly, unworkable and economically distorting. Ultimately, the limited tax that was implemented proved unworkable and was quietly withdrawn after only a few years.

Other initiatives have proven much more useful. For example, those experiencing job loss from technological change and economic transformation have had easy access to opportunities for retraining and skills development to prepare them for a new career – and strong working relationships between

<sup>156</sup> Pender, T. 17 April, 2017. "Toronto-Waterloo tech corridor among top 20 worldwide." *Waterloo Region Record*. <https://www.therecord.com/news-story/8398212-toronto-waterloo-tech-corridor-among-top-20-worldwide>.

governments, employers and community organizations have enabled these initiatives to be accessible and affordable for all Ontarians.

Educational institutions at all levels – primary, secondary and post-secondary – have kept pace and evolved alongside the shifting labour market. From the earliest stages, students develop soft and transferrable skills that prepare them for a wide range of potential career trajectories and set expectations for multiple paths rather than a single lifetime profession.<sup>157</sup> Ongoing collaboration and cooperation between post-secondary education institutions and employers ensure that the knowledge and skills developed at graduate and undergraduate levels sufficiently match those that are in demand when they enter the labour market upon graduation.

While the number of **gig workers** continues to increase, the increase has occurred at a moderate and manageable pace. This has enabled government to gradually develop a series of policy initiatives that have largely succeeded in smoothing out income between jobs and providing stability and security for workers and their families. Many gig workers would still prefer to exit the gig economy, but gig work is now at least a sustainable carrier option for most workers in the sector. This evolution has been, to a large extent, the result of governments stepping up to provide greater support in areas where the lack of traditional standard employment relationships was most keenly felt, namely through the creation of universal pharmacare and dental care programs, the introduction of wage insurance and the strengthening of public pension systems. These new programs provide a floor for Ontario workers during the inevitable

times of transition that characterize gig work. At the other end of the income spectrum, decent work opportunities in Ontario's booming tech sector, liveable safe cities, a culture of tolerance and diversity and a welcoming business climate have enticed top talent and capital from all over the world to Ontario.

Other institutional reforms have also been crucial – such as labour law changes that require corporations to provide relatively equal supports to workers regardless of their employee classification (e.g. employees or independent contractors). Laws and negotiated agreements with major platforms to share income data and to collect and remit taxes for users located in Ontario have helped capture revenue from the underground economy. These laws have resulted in some platforms leaving the province and some services not being available legally to Ontarians, but in most cases local versions of these services have sprung up to fill these niches. Similarly, while “residency requirements” put in place for certain functions that are increasingly being outsourced in other jurisdictions (e.g. “uniquely sensitive” functions such as legal and medical work, and those of “strategic importance” such as banking) may mean Ontarians pay higher prices for these services than they need to, these measures have been useful in combatting digital outsourcing in these sectors.

Innovative “superstar” firms have continued to grow, but they have found it difficult as they age to maintain the consistently high levels of innovation that they once achieved. While they are able to maintain commanding positions in the marketplace, their growth has slowed, as has the marginal return on increased **data collection**. While **commercial consolidation** remains a problem, more active anti-trust agencies, the spread of regulations similar to the EU's General

157 Sander. L. 7 March, 2017. “In the workplace of the future, these are the skills employers want.” *World Economic Forum*. <https://www.weforum.org/agenda/2017/03/in-the-workplace-of-the-future-these-are-the-skills-employers-want>.

Data Protection Regulation (GDPR) across the world, and the increasingly significant decentralization of the Internet enabled by the emergence of digitally native value systems, have all combined to halt the trend towards greater consolidation that characterized the 40 years leading up to 2025.

To the extent that **jurisdictional arbitrage** had been enabled by the arrival of new technologies, this trend has largely run its course. In fact, an opposite trend is now starting to assert itself. Ontario has begun to use big data analytics and AI to identify firms and individuals that are using jurisdictional arbitrage to evade instead of simply avoid taxes.<sup>158</sup> The province has also successfully pressed the federal government to take a larger international leadership role in reducing opportunities for firms to engage in this behaviour. Canada's adoption of the OECD's Base Erosion and Profit Shifting (BEPS) working group recommendation to amend the Excise Tax Act has helped as well, with the result that foreign firms selling intangible goods to Canadians via the internet are now considered to be "carrying on business" in Canada, and are required to collect and remit sales tax accordingly. Getting them to pay corporate taxes commensurate with the profits they derive in Ontario is still a work in progress, however.

Finally, despite significant excitement and promise, the development of new applications of blockchain beyond crypto-assets remains a gradual process. As such, disruption of the financial industry continues but anticipated disruption of other industries – such as energy – have not yet occurred. This has allowed governments to catch up to the earlier

innovations in this sector and Ontario has begun accepting payment of taxes denominated in some of the more established cryptocurrencies, thus making it easier for investors to comply with the law.<sup>159</sup> New regulations have also provided a level of certainty to the crypto-asset industry, which has led to a small crypto-boom in Ontario. Retail investors in the province are now able to participate in an accredited crypto-market through well-regulated crypto-exchanges based in Ontario, which are required to assist their customers in meeting their tax and other legal obligations and provide third party reporting to regulators. The effective regulation of these assets has sparked a clustering of crypto-focused businesses and services – such as crypto-legal expertise – that has enabled Toronto to emerge as a global crypto-hub.

## What does this mean for revenue?

Greater revenue derived from PIT, payroll tax and CT contributions has provided sufficient funds to empower government to provide a more robust social safety net to its citizens. This in turn has resulted in a surprisingly robust labour market and increasing entrepreneurship in Ontario, which has in turn helped to ensure stable levels of government revenue.

Proactive government policies to support workers – combined with Ontario's reputation for diversity, tolerance and a welcoming business environment – has increased the inflow of global talent and capital. Anticipated declines in PIT and payroll tax as a result of job loss and underground economic activity have largely been offset by the strength of and growth in the reformed labour market. Indeed, by ensuring that all workers, regardless of their

158 Browning, L. 2015. "Computer Scientists Wield Artificial Intelligence to Battle Tax Evasion." *The New York Times*. <https://www.nytimes.com/2015/10/10/business/computer-scientists-wield-artificial-intelligence-to-battle-tax-evasion.html>.

159 The Economist. 24 February, 2018. "A banking centre seeks to reinvent itself." *The Economist*. <https://www.economist.com/finance-and-economics/2018/02/24/a-banking-centre-seeks-to-reinvent-itself>.

designation, were being treated relatively similarly by the tax regime, the government was able to lighten the load on traditional employers somewhat. This relief was complemented by reductions in the benefits packages that traditional employers had previously provided to employees given the creation of universal pharmacare and dental care programs.

Similarly, CT contributions are stronger than might have been expected only a few years ago. The steps taken by Ontario to ensure its tax regime was able to capture the increasing proportion of economic activity that was occurring online have proven quite farsighted. While this more aggressive and comprehensive approach to corporate taxation has resulted in some high profile departures from the province – and even some popular over-the-internet services not being legally available in Ontario – the gains in CT revenue from new sources have largely compensated for these losses and have managed to ensure relative stability in these revenues.

Furthermore, greater coordinated efforts both domestically and internationally have successfully targeted tax avoidance and evasion. Enforceable requirements and progress on international tax treaties have enabled governments to better capture revenue through corporate taxes in a way that they were unable to for years prior, when global tech companies took full advantage of available loopholes.<sup>160</sup> Moreover, the successful, if initially difficult, engagement with platforms and the government's willingness to begin collecting taxes denominated in forms other than Canadian dollars has enabled it to ensure that it is capable of capturing an appropriate share of the economic value being created in these environments.

160 OECD. 15 December, 2017. "Further progress made in implementation of BEPS measures against tax treaty abuse". *OECD*. <http://www.oecd.org/tax/treaties/further-progress-made-in-implementation-of-beps-measures-against-tax-treaty-abuse.htm>.



## 4

## RAPID TECHNOLOGICAL CHANGE; SIGNIFICANT INSTITUTIONAL CHANGE

In this scenario, advancement and adoption of new technologies has drastically increased while institutional changes have largely kept pace. Canada has become a global leader in AI and other forms of technological innovation, which has led to widespread automation in the workplace. This has created significant job losses – both in sectors where this seemed inevitable, such as service and retail, and in some unexpected sectors that had previously seemed immune. Furthermore, **digital outsourcing** has accelerated the disruption of many previously untouched occupations such as law, finance and health care. On the other hand, technological change has also created numerous jobs that were previously unheard of in areas of computer science and engineering as well as in the growing occupation of computer-human interface facilitation – a label that initially emerged to cover a variety of occupations ranging from social media marketer to search engine optimization.

Critically, many of these new occupations – jobs that involve working closely with technology and use hybrid tasking so that workers share their daily functions with AI – are quite precarious as rapid technological change creates and destroys them in spaces of only a few years. This rapid turnover and the need for workers to adapt has led to an overall decline in average hours worked by individuals and a drop in the share that labour contributes to GDP. This job churn has both contributed to and enabled the continuation of the trend towards **gig employment**. The increased availability of gig workers has, in turn, helped to sustain the growth of online **platform** firms, a trend that has also been boosted by the introduction of new technological tools such as telepresence and virtual and augmented

reality which firms have used to shift even more economic activity onto their platforms. Many of these platform firms continue to use alternative worker classifications to keep work arrangements more informal.

Faced with these trends, the provincial government has responded actively. For instance, the government now requires platforms to collect and remit taxes on behalf of those workers located in Ontario. Moreover, even if worker misclassification remains a problem, labour law reforms have forced companies to take on some additional responsibilities for those working under alternative classifications which has gone some ways to leveling the playing field among all workers. Moreover, to offset some of the potentially harmful consequences of digital outsourcing, Ontario has also imposed residency requirements for occupations viewed as “strategically important” or “uniquely sensitive” such as medicine and some areas of the law and banking. To varying degrees of success, the provincial and federal governments have also enforced a number of institutional changes, such as robot taxes, to address automation in the labour market. More successful, however, have been efforts to reform the support system for workers which have included the introduction of wage insurance, government sponsored portable benefits schemes and a re-vamp of the government’s approach to education so that it focuses much more on “21st century skills”<sup>161</sup> and on building support for lifelong learning.<sup>162</sup>

161 Scott, C. L. 14 November, 2015. *The Futures of Learning 2: What Kind of Learning for the 21st Century?* United Nations Educational, Scientific and Cultural Organization (UNESCO) Education Research and Foresight Working Papers. <http://unesdoc.unesco.org/images/0024/002429/242996E.pdf>.

162 The Economist. 14 January, 2017. “Learning and Earning: Special Report on Lifelong Education.” *The Economist*. [https://www.economist.com/sites/default/files/learning\\_and\\_learning.pdf](https://www.economist.com/sites/default/files/learning_and_learning.pdf).

Since about 2020, the ability of large dominant tech firms to identify and exploit loopholes in the tax system and to engage in **jurisdictional arbitrage** has been strengthened by their unique ability to invest significant amounts of capital into using advanced big data analytics and AI. This accelerated **commercial consolidation** as it created another significant competitive advantage for these firms *vis-à-vis* smaller ones.

The importance of **data** has only grown for most firms' business models. In fact, data is becoming so important that more and more firms are seeking to entice consumers to provide them with their data in exchange for special "credits." Of course, these credits can only be used within those same firms' closed online platform systems, a condition which enables these firms to collect even more data from these consumers.

Ontario has attempted to counter some of these developments by using the same tools – namely big data analytics and AI to identify and close loopholes and to catch tax evaders and monitor tax avoiders. Ontario has also led the provinces in pressing the federal government to take a leadership role in combatting opportunities for jurisdictional arbitrage on the international stage – an initiative which has borne some important fruit in the form of a number of important multilateral tax treaties. As well, Canada has adopted the OECD's recommendation to amend its definition of what constitutes "carrying on business" in Canada and has reproduced many of the requirements around data portability required of firms in the EU under the GDPR. Similarly, Ontario has pressured the federal government to alter competition laws to make it more difficult for global tech firms to eliminate future competitors based in Canada through early "shoot-out" acquisitions.<sup>163</sup>

163 The Economist. 2 June, 2018. "American tech giants are making life tough for startups." *The Economist*. <http://media.economist.com/news/business/21743287-big-rich-and-paranoid-they-have-reams-data-help-them-spot-and-buy-young-firms-might>.

Ontario has also been successful in leading the way in trialing a variety of new and creative responses to the data-driven economy, such as passing the first legislation in North America to enable data-provider unions which negotiate with platforms on behalf of users to set terms and conditions for use of service.<sup>164</sup> As well, the Government of Ontario has begun to negotiate annual lump sum payments from platform firms in lieu of having the data collection they do in Ontario taxed directly.

Nevertheless, while these government initiatives have been fairly effective, they have arrived just as new challenges have emerged. Several former tax havens have reinvented themselves using blockchain technology to offer competitive new forms of "digital citizenship."<sup>165</sup> Married to new technologies like enhanced telepresence, virtual and augmented reality and blockchain, these offers of digital citizenship are designed to compete with territorially-based forms of citizenship by offering "governance services" such as currencies, access to banking and financial and business services, the provision of official documents like passports, and corporate registration and residency through the Internet. While still quite new and expensive to join, many are already concerned that these initiatives – which also offer low tax rates for "citizens" – may erase much of the progress on challenges like jurisdictional arbitrage that governments had finally started to make.

164 Posner, E. and Weyl, E. *Radical Markets: Uprooting capitalism and democracy for a just society*. Princeton; Oxford: Princeton University Press.

165 These initiatives were largely inspired by Estonia's e-residency program, though they have taken the program's logic much further. See <https://e-resident.gov.ee/>.

Finally, technological developments have resulted in new forms of **crypto-assets** and applications of blockchain technology that are significantly more useful than was the case in years prior. These innovations have caused increasing amounts of economic value to be moved from traditional systems (e.g., Canadian dollars) to digitally native value systems (e.g., Bitcoin and Ethereum). The Government of Ontario has responded by beginning to collect taxes denominated in some of the most widely traded cryptocurrencies, making it easier for investors in crypto-assets to comply with existing laws. Government action to regulate crypto-assets has also provided a degree of certainty to the industry: retail investors within the province are now able to participate in an accredited market in crypto-assets through regulated crypto-exchanges that assist customers in meeting tax and legal obligations. This has resulted in a crypto-industry boom in Ontario.

## What does this mean for revenue?

Significant institutional change has meant greater government expenditure on various programs to provide support for workers and offset the potentially negative consequences of the changing nature of work and the economy, requiring significant revenue inflows to sustain this. Precarious work arrangements and job losses to automation have led to small declines in PIT and payroll tax. However, policy changes which have helped limit the duration of unemployment and underemployment for workers has largely constrained the potential reductions in PIT and payroll tax, as well as sales taxes overall. The fact that the government has found ways to tax more of the previously untaxed activity occurring on online platforms, as well as the activity denominated in crypto-assets, has played a large role in maintain the relative revenue

integrity that has been achieved. Moreover, the adoption of data payments in lieu of data taxes has created, at least for now, a new revenue stream for the government. Nevertheless, despite all this progress, challenges to government revenue integrity, such as “digital citizenship,” are arising with much greater speed and frequency now and require the government to be in a state of constant innovation just to maintain its position.

The underground economy continues to be a problem as it is becoming increasingly difficult to measure much of the economic activity that is actually occurring within platform firms’ closed economic systems. It is difficult for governments to value the transactions occurring on these firms, especially the ones where firms have introduced their own cryptocurrencies which are not tradable outside of the firm’s platform and which the government does not accept for tax payment purposes. While governments have successfully negotiated annual lump sum payment agreements with some of these firms to cover this sort of activity, it is difficult to know if the payments are actually an appropriate size. Moreover, while significant amounts of cryptocurrency activity is now being regulated through Ontario-based exchanges, a large proportion of underground business is still being transacted using crypto-assets designed to be anonymous and untraceable. Moreover, many Ontarians still choose to participate in the crypto-economy through exchanges based in other jurisdictions that have more lax regulatory frameworks. Because of this, even the size of the underground economy remains open for debate.

Greater coordinated efforts both domestically and internationally have begun to successfully target tax avoidance and evasion, although it is a work in progress. Federal and provincial action has enabled government to better capture revenue through corporate taxes in a way that they were unable to for years prior, when global tech companies took full advantage of available loopholes.<sup>166</sup> CT revenue remains relatively stable at the moment, although jurisdictional arbitrage continues to be a problem, and it is unclear if institutional change will be able to continue keeping pace with technological change and shifting corporate structures over the longer term. Indeed, “digital citizenship” initiatives have not yet resulted in significant tax losses, but they do loom as a potential threat on the horizon.

166 OECD. December 15 2017. “Further progress made in implementation of BEPS measures against tax treaty abuse”.

Governments that can deploy modern service delivery frameworks effectively will be well-positioned to maximize their resources, free up staff for higher-value tasks and deliver services that achieve their intended outcomes.

# 7 POLICY OPTIONS

What types of options should policymakers consider in light of the changing nature of work, and the inherent uncertainty around so many of the key elements of its trajectory? Taking account of the plausible futures that we have outlined, we set out below **our top line recommendations** for how the Government of Ontario should respond in the short term, so as to position the province well for the arrival of any of these potential futures:

- » Invest in enhanced data analytics capacity within the Ministry of Finance and other key ministries, with the goal of identifying underground economy activities based on assessments of high-risk activities or red flags. These assessments should be based on data from all relevant ministries, as well as municipalities (modelled on pilot work done through the 2013 Open Ontario Compliance Initiative).<sup>167</sup>
- » Invest in additional enforcement staff focused on underground economy activities, given the scope and size of the underground economy is likely much more significant than formal estimates. Additional inspectors focused in high-risk sectors should yield more than sufficient revenue to offset staffing costs.
- » Work closely with digital platforms and cryptocurrency exchanges to ensure tax and regulatory obligations for platforms and service providers/consumers are clearly articulated and understood (modelled on Ontario's pilot project with Airbnb to support tax compliance).<sup>168</sup>
- » Work directly with platforms in areas such as ride-sourcing to explore opportunities for agreements that would see platforms cover HST costs directly, rather than relying on service providers to remit tax owing (modelled on Quebec's recent agreement with Uber).
- » Engage with the federal government on tax collection issues related to digital service provision in Canada; and whether amendments to federal legislation would support enhanced revenue collection.
- » Create a working group of key ministries at the Assistant Deputy Minister level (Finance, Cabinet Office, Economic Development, Labour) with a mandate to engage on revenue threats and opportunities for Ontario over the medium to longer term. This working group should be supported by a small team of dedicated staff. Given the rapid changes in the technological and labour landscape, which may occur in the coming years, it will be vital for the province to have a dedicated, cross-ministry body that considers and proposes new policy/tax options for the province in order to maintain relevant, updated advice and analysis.

<sup>167</sup> See also, Browning, L. 9 October, 2015. "Computer scientists wield artificial intelligence to battle tax evasion".

<sup>168</sup> Government of Ontario. 19 February, 2016. "Ontario partners with Airbnb on new pilot project". *Newsroom*. <https://news.ontario.ca/mof/en/2016/02/ontario-partners-with-airbnb-on-new-pilot-project.html>.

- » Augment the working group with a range of external advisors with expertise in tax policy, economics and service delivery modernization. These advisors should be asked to provide the government with an annual list of five actionable issues to address in the province's annual budget, which the government would then either need to adopt or develop a public rationale as to why the item could not be adopted.
- » Advocate for provincial representation at the federal level with respect to international tax treaty discussions. Many of the issues related to profit shifting that are dealt with by national authorities have significant implications for provincial tax revenues.
- » Engage with municipalities in a dialogue around potential municipal tax revenue impacts of the changing nature of work (e.g., reduced development charge revenue or non-residential property tax revenue). As these issues begin to impact municipalities, it will be important for the province to be able to assess longer-term risks and potential opportunities to partner with municipalities or the federal government to mitigate those risks and ensure revenues and expenditures are fairly aligned between levels of government.
- » Develop a skills-and-training agenda for the 21st century that engages a broad range of partners from the private sector, universities/colleges and elsewhere, to position Ontario as a magnet for highly skilled workers from around the world, as well as a stable, innovative home for world-leading firms with a strong pipeline of talent across a range of disciplines.

- » Advocate for federal modernization of the EI program, in terms of benefit duration, eligibility and training enhancements. Canada's under-investments in labour market supports when compared to peer jurisdictions will only become a more pressing pain point in a world where jurisdictions are competing for talent.

At a more detailed level, three key areas of focus emerge as important for further policy debate and discussion on the future of work.

- » Alternative revenue streams for the province
- » Innovative partnerships with stakeholders
- » Service delivery modernization and policy resilience

Each of the policy options proposed below addresses issues that are either already posing challenges to workers, government revenues or the delivery of public services, or are likely to do so in the coming years.

# Alternative revenue streams

Apart from focusing on the generation of decent work and opportunities in the labour market, there is little scope for innovation around PIT and payroll tax revenue generation in a future of work scenario that could involve more precariously employed, contingent workers whose wages don't increase in an appreciable manner, year over year. Moreover, at a macro-level, labour's share of national income has been trending downwards in Canada and other advanced economies since the 1980s. It declined in 26 of 30 advanced economies between 1990 and 2009, and this drop for G20 nations averaged 0.3 percentage points per year between 1980 and the late 2000s.<sup>169</sup> In Canada, corporate compensation as a share of GDP stood at 23.2 per cent in 2017, up from a trough of 16.3 per cent in 1992.<sup>170</sup>

One of the main constraints on governments' abilities to increase revenue generation from PIT and payroll taxes is the fact of increasing economic mobility. Attempting to raise PIT rates on high-income earners could lead to jurisdiction-shopping and other means of PIT minimization through sophisticated accounting advice.<sup>171</sup> In practice, recent modest increases in PIT rates by Ontario, Quebec and New Brunswick appear to have led to an increase in the taxes paid by high-

earners.<sup>172</sup> There may be a limit on how much PIT can be increased before high-earners will shift jurisdictions.

An alternative to raising tax rates is to focus on ensuring the collection of all PIT and payroll tax revenue that is owed to them but not paid, whether as a result of underground economy activity or inadvertent non-compliance. Tax revenue from digital transactions that ought to be subject to sales taxes but is not remitted is a key area of focus. Enforcement efforts, education and awareness campaigns, and partnerships with digital platforms are all potential measures to explore.

There is potentially greater scope for increasing PIT revenues through base broadening than by raising rates. Tax credits are a much more significant feature of Canada's income tax landscape than is the case in most other countries, and curtailing these could lead to increased revenue.<sup>173</sup> Investment income, for example, is taxed at lower rates than regular income in Canada, largely benefiting high-income earners.<sup>174</sup> Likewise, reducing the universality of some government programs could help address fiscal problems from the expenditure side. For example, many programs offered to senior citizens are currently provided to the rich as well as poor seniors at the same cost. Ottawa has removed universality from the Old Age Security

169 International Labour Organization (ILO) and OECD. 2015. *The Labour Share in G20 Economies*. Report prepared for the meeting of the G20 Employment Working Group, Antalya, Turkey, 26-27 February. <https://www.oecd.org/g20/topics/employment-and-social-policy/The-Labour-Share-in-G20-Economies.pdf>.

170 Johal, S. and Thirgood, J. 22 November, 2016. *Working Without a Net*.

171 Milligan, K. and Smart, M. 2016. "Provincial Taxation of High Incomes: The Effects on Progressivity and Tax Revenue" in Green, D. Riddell, W. St-Hilaire, F. (eds) *Income Inequality: The Canadian Story*. Institute for Research on Public Policy (IRPP): 479-507. <http://irpp.org/wp-content/uploads/2016/01/aots5-milligan-smart.pdf>.

172 Statistics Canada. "Table 204-0001: High income trends of tax filers in Canada, provinces, territories and census metropolitan areas (CMA), national thresholds annual (percent unless otherwise noted)". *CANSIM*. <http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=2040001> (Accessed on 24 April, 2018).

173 Spiro, P. 8 February, 2017. *Tax Exemptions for Investment Income: Boon or Bane?* The Mowat Centre. <https://mowatcentre.ca/tax-exemptions-for-investment-income/>.

174 MacDonald, D. 25 May, 2017. *The History and Cost of Tax Exemptions, Credits, and Loopholes in Canada*. Canadian Centre for Policy Alternatives. <https://www.policyalternatives.ca/publications/reports/preferential-treatment>.

pension, and starts clawing it back for those with incomes above \$76,000. The Ontario government could also consider reviewing its programs to determine which might be suitable for means-testing.

There is usually a great deal of vociferous opposition from the affected groups when changes of this type are suggested. This makes them politically challenging to implement. However, even capping these expenditure programs so that they stop growing could create considerable fiscal breathing space in the long term. The compromise recently implemented by the federal government with respect to passive income taxation for small business corporations is an example of how this might be done.

Additionally, there are a number of more specific options for how the federal and provincial governments could reform corporate taxes so that tax revenues as a percentage of GDP do not continue to drop as the nature of work changes and businesses are increasingly globalized. These include:

» **Eliminating the dividend tax credit and preferential treatment of capital gains**, which are currently taxed at 50 per cent. While this proposal may improve income distribution and the efficiency of taxation, its most straightforward impact would be raising the CT base and revenue. Of course, such a reform would also likely meet significant opposition from its current beneficiaries, who are predominantly high-earners.<sup>175</sup>

175 Boadway, R. and Tremblay, J. April 2014. *Corporate Tax Reform: Issues and Prospects for Canada*. The Mowat Centre. [https://mowat-centre.ca/wp-content/uploads/publications/88\\_corporate\\_tax\\_reform.pdf](https://mowat-centre.ca/wp-content/uploads/publications/88_corporate_tax_reform.pdf) and Boadway, R. and Tremblay, J. 31 May, 2016. *Modernizing Business Taxation*. C.D. Howe Institute. [https://www.cdhowe.org/sites/default/files/attachments/research\\_papers/mixed/Commentary\\_452.pdf](https://www.cdhowe.org/sites/default/files/attachments/research_papers/mixed/Commentary_452.pdf)

» **Introduce country-by-country reporting**, where firms based in Ontario would have to disclose profits in every country where they have financial flows. Since many modern-day corporations engage in cross-border activity these corporations may avoid being taxed even once on the income they generate. This proposal will reduce the likelihood of not paying CT in Ontario. Businesses may object that this would unduly increase costs of tax compliance across the board.<sup>176</sup>

» **Vigorously pursue international and inter-provincial tax cooperation** to reduce profit shifting to other jurisdictions, which is consistent with the aforementioned OECD-G20 BEPS initiative.<sup>177</sup>

» **Preferential tax treatment for rent from innovations which are retained and commercialized in Ontario**. While in the short-run this proposal has the potential of reducing CT revenues, it would encourage firms to locate their most mobile resource – intellectual property – in the province, and induce innovation and economic activity here. This induced economic activity would then add to tax revenues through both the CT and the PIT in the future.<sup>178</sup>

» **Require each firm that undergoes an Initial Public Offering (IPO) in Ontario to provide the Ontario government with a certain number of its non-voting shares**. Proponents of this approach typically argue for a complete elimination of the CT and collecting revenue

176 Boadway, R. and Tremblay, J. April 2014. *Corporate Tax Reform*. and Boadway, R. and Tremblay, J. 31 May, 2016. *Modernizing Business Taxation*.

177 Boadway, R. and Tremblay, J. April 2014. *Corporate Tax Reform*. and Boadway, R. and Tremblay, J. 31 May, 2016. *Modernizing Business Taxation*.

178 Boadway, R. and Tremblay, J. April 2014. *Corporate Tax Reform*. and Boadway, R. and Tremblay, J. 31 May, 2016. *Modernizing Business Taxation*.

purely through the dividends the firms pay to the government as a shareholder.<sup>179</sup> A drawback of this approach is that digital economy firms do not tend to pay dividends,<sup>180</sup> thus the actual ongoing revenue Ontario would be able to secure in the new economy might be minimal, apart from divestiture of shares. Additionally, absent similar action in peer jurisdictions, this approach would likely act as a significant disincentive to firms conducting IPOs in the province.

- » **Introduce a global wealth tax**, which would see individuals pay a progressive tax on the value of their total net assets.<sup>181</sup> This approach would likely only yield significant results if it were a truly global approach. Otherwise wealth-shifting to other jurisdictions would be very likely. Other jurisdictions with wealth taxes have experienced significant under-reporting – which increased enforcement costs and distortion of investments because of the exemption of certain assets from the tax.<sup>182</sup>

There are also revenue generation options specifically designed for economies faced with the prospect of automation and digitization.

These include:

- » **Taxing robots.** This was most famously suggested by Bill Gates, who envisions a

world in which robots perform more and more tasks that are currently performed by human workers, such that workers ultimately lose their employment options along with their ability to pay PIT.<sup>183</sup> There are several practical challenges to this idea. If Ontario were to tax robot manufacturers or firms which deploy robots, those firms could opt to locate in non-robot tax jurisdictions. This would compromise sources of future CT revenue and dampen general prosperity as innovative economic activities were conducted elsewhere.<sup>184</sup> Additionally, definitional issues around what actually constitutes a robot would make such a tax difficult to implement.<sup>185</sup>

- » **Taxing data collection and usage.** Data represents one of the key resources that digital firms use to generate income and they typically obtain this data at no cost from their users. Data collection and usage is also the only taxable aspect of the digital economy that is neutral with respect to business models, technologies and business location strategies. This type of approach eliminates concerns of cross-jurisdictional mobility and distortions in investment and research and development (R&D) activity.<sup>186</sup> In practice, a data tax would

179 For a summary, see Baker, D. 12 January, 2016. "A Progressive Way to End Corporate Taxes." *The New York Times*. <https://www.nytimes.com/2016/01/13/opinion/a-progressive-way-to-replace-corporate-taxes.html?mcubz=1>.

180 See the discussion in Collin, P. and Colin, N. January, 2013. *Task Force on Taxation of the Digital Economy*. Report to the Minister for the Economy and Finance, the Minister for Industrial Recovery, the Minister Delegate for the Budget and the Minister Delegate for Small and Medium-Sized Enterprises, Innovation and the Digital Economy. The French Republic. [https://www.hdataprotection.com/files/2013/06/Taxation\\_Digital\\_Economy.pdf](https://www.hdataprotection.com/files/2013/06/Taxation_Digital_Economy.pdf)

181 See Piketty, T. 2014. *Capital in the Twenty-First century*. Cambridge, MA. Belknap Press.

182 For a review of the European experience, see the following excerpt from Heckly, C. 2004. "Wealth Tax in Europe: Why the Downturn?" in Taly, M. and Mestrallet, G. (eds) *Estate Taxation: Ideas for Reform*. Institut de l'entreprise. 39-50. <http://www.hluthafar.is/assets/files/ExecSummaryHeckly.pdf>.

183 Bill Gates is the founder of Microsoft. He articulates the proposal in the following video: <https://qz.com/911968/bill-gates-the-robot-that-takes-your-job-should-pay-taxes/>.

184 While media stories have extensively reported that South Korea is the first country to introduce a "Robot Tax," (See, for example: McGoogan, C. 9 August, 2017. "South Korea introduces world's first 'robot tax'." *The Telegraph*. <https://www.telegraph.co.uk/technology/2017/08/09/south-korea-introduces-worlds-first-robot-tax/>) what the legislators actually proposed was only a reduction to subsidies for R&D. While this proposal might have a slowing impact on innovation in South Korea, the country already is a world leader in electronics manufacturing. Jurisdictions that are not leaders in the field would likely find it challenging to reduce incentives and subsidies for advanced manufacturing and the information and communication technology (ICT) sector.

185 These arguments are based on Rosenblatt, G. 5 June, 2017. "The Robot Tax Fallacy: Anthropomorphizing Automation." *The Vital Edge*. <http://www.the-vital-edge.com/robot-tax/>

186 Collin, P. and Colin, N. January 2013. *Task Force on Taxation of the Digital Economy*.

be challenging to implement because it would be difficult to accurately value different types of data, and value could vary widely based on usage by firms.

- » **Redefining permanent establishment** to take account of how many residents contribute data to a firm. Under existing international tax laws, a corporation can only be taxed in jurisdictions where it has its headquarters or a permanent establishment. This definition only takes account of a physical presence (e.g., premises and personnel), which means digital firms that collect and use data from Ontarians are exempt from CT. Amending the permanent establishment conventions for the digital era would require significant international cooperation, and would require a complex formula to assign tax revenue based on different jurisdictions' role in value creation. It would also likely face significant opposition from the United States, which is home to many of the world's largest technology firms.<sup>187</sup>
- » **Imposing a tax on personal data provided by residents of Ontario.** Applying a data-collection tax (e.g., data collected on 100,000 or more Ontarians might be taxed at a level of \$1 per person) on Ontario-based firms could create immediate revenue sources for the province. Firms located outside of Ontario would be much more challenging to work with in the absence of concerted action by a broad range of other jurisdictions. Yet, as data is increasingly recognized as a key asset in the digital economy, the momentum for this type of approach could accelerate in the coming years.<sup>188</sup>

187 Collin, P. and Colin, N. January 2013. *Task Force on Taxation of the Digital Economy*.

188 Madsbjerg, S. November 14, 2017. "It's Time to Tax Companies for Using Our Personal Data". *The New York Times*. <https://www.nytimes.com/2017/11/14/business/dealbook/taxing-companies-for-using-our-personal-data.html>.

- » **Explore sales tax levies on digital services**, modelled on Quebec's recently announced plans. This would aid Ontario's revenue generation in light of the growth of digital services across a range of sectors.<sup>189</sup>

- » Advocate for amendments to the federal **Excise Tax Act** that would place the onus on digital firms to remit HST, rather than the current system which relies on consumers to do so, though in practice they rarely do.<sup>190</sup>

## Innovative partnerships with stakeholders

The trends and drivers that have transformed the way we work pose many complex challenges that cannot be addressed by government alone. In addition to implementing creative regimes to increase revenue streams and exploring opportunities to generate higher levels of growth, governments should also look to work collaboratively with other key actors to deliver programs and services that better reflect the new age of work.

Novel partnerships and consortium models among government, private sector employers, post-secondary education institutions, labour and the not-for-profit sector should be explored to provide more effective approaches. Such collaboration could be particularly impactful in the areas of skills development and retraining, education, financial and wrap-around supports, as well as social dialogue and labour representation.

189 Gouvernement du Québec. March, 2018. *The Québec Economic Plan: Additional Information 2018-2019*. [http://www.budget.finances.gouv.qc.ca/budget/2018-2019/en/documents/AdditionallInfo\\_18-19.pdf#page=137](http://www.budget.finances.gouv.qc.ca/budget/2018-2019/en/documents/AdditionallInfo_18-19.pdf#page=137).

190 Wyonch, R. August 24, 2017. "Canada must stop giving foreign companies a digital advantage". *The Globe and Mail*. <https://www.theglobeandmail.com/report-on-business/rob-commentary/canada-must-stop-giving-foreign-companies-a-digital-advantage/article36081209/>.

## RETRAINING, SKILLS DEVELOPMENT AND SKILL-MATCHING

Ontario, along with the federal government, must work more effectively with employers to retrain employees. Employers are best positioned to understand the skills profile required for the new world of work as they see firsthand how technology impacts their daily operations. In theory, employers should also have a vested interest in their workforce and ability to retrain employees whose skills may become obsolete. Yet in practice we know that Canadian firms are investing less in retraining than they have in the past – a third less in 2015 than they spent in 1993.<sup>191</sup> Governments could provide direct support, particularly to small- and medium-sized employers, to carry out more robust retraining efforts and replicate what is already being done by some corporations.

AT&T has pursued an ambitious retraining initiative, investing in skills development for 100,000 employees by 2020.<sup>192</sup> Having recognized a gap between the skills that their current workers have and what is forecast to be required in the coming years, the company has begun to cover the costs for their employees to pursue higher education and provide online resources to obtain the necessary skills to find new work within the same company. The AT&T example demonstrates a valuable way to address the pending shift in skills required for the new age of work. Few other organizations have come forward with similar initiatives, however, largely because they are costly and high-risk.

Demand-driven labour market policies to address skills gaps have existed for quite some time – such as the Canada Job Grant and the United Kingdom’s Train to Gain program. Financial support for employers to support their existing workforce in times of economic transition may prove a useful strategy in the coming years – although it is important that these schemes are balanced with support for the unemployed and underemployed, who would not otherwise benefit from such a program.

Programs that aid in getting people back to work also exist in our current policy landscape. Ontario’s Second Career strategy, for example, provides support for those who experienced job loss – primarily as a result of the decline in manufacturing – to reskill for new fields. These existing programs are not without criticism, however, and policymakers should evaluate what has or has not worked in the delivery of these programs, and how they can be re-tooled for the new economy.

Government support for sector-based or consortium models for retraining to address the perceived risk of investing in one’s current workforce is another option that should be explored. Trade associations, for example, may be in a good position to tackle skills development and retraining collectively. Consortium models among employers with similar human capital needs enable the pooling of resources to encourage investment in training, while also lowering risks associated with this investment. This is a considerable concern for employers given increasingly high rates of turnover and potential for other employers to ‘poach’ talent. For small organizations with limited capacity for training, this model also provides economies

191 The Conference Board of Canada. 10 December, 2015. *Turning a Corner: Canadian Employers’ Investments in Employee Learning and Development on the Rise*. [http://www.conferenceboard.ca/press/newsrelease/15-12-10/Turning\\_a\\_Corner\\_Canadian\\_Employers\\_Investments\\_in\\_Employee\\_Learning\\_and\\_Development\\_on\\_the\\_Rise.aspx?AspxAutoDetectCookieSupport=1](http://www.conferenceboard.ca/press/newsrelease/15-12-10/Turning_a_Corner_Canadian_Employers_Investments_in_Employee_Learning_and_Development_on_the_Rise.aspx?AspxAutoDetectCookieSupport=1).

192 Pressman, A. 15 March, 2017. “Can AT&T Retrain 100,000 People?” *Fortune*. <http://fortune.com/att-hr-retrain-employees-jobs-best-companies/>.

of scale.<sup>193</sup> However, it remains challenging to convince actors to collaborate in employer- or sector-specific training initiatives meant to address longer-term economic shifts.

The Ontario Chamber of Commerce has profiled some emerging examples of these types of initiatives, such as the collaboration between the Canadian Manufacturers and Exporters (CME) and the Canadian Skills Training and Employment Coalition (CSTEC), who are currently piloting a consortium-based approach to training in Ontario modelled after the Hamilton Skilled Trades Apprenticeship Consortium.<sup>194</sup> Other thoughtful approaches to skills-matching may also be valuable in addressing growing skills gaps. It has long been the case that employers cannot find candidates with the skills they need and graduates continue to feel that they do not have the relevant skills to find a job. As such, intermediaries to better connect the two should be considered. While governments can provide such services, it may be more efficient to collaborate with other actors to do so.

JobActive – Australia’s flagship program to help jobseekers find work – has been running in various forms for decades. The government recently stopped providing this service directly and instead put it out to tender. While government is still largely in control of the policy design for the program, private sector and not-for-profit groups successfully make these connections on their behalf.<sup>195</sup>

193 Holmes, A. and Hjartarson, J. 2014. *Moving Forward Together: An Employer Perspective on the Design of Skills Training Programs in Ontario*. Ontario Chamber of Commerce and Essential Skills Ontario. [http://www.occ.ca/Publications/Moving\\_Forward\\_Together.pdf](http://www.occ.ca/Publications/Moving_Forward_Together.pdf).

194 Holmes, A. and Hjartarson, J. 2014. *Moving Forward Together*.

195 See <https://www.jobs.gov.au/jobactive>.

## EDUCATION

Over the longer term, a push towards lifelong learning will begin to blur the line between formal education and other forms of on-the-job training or re-skilling initiatives. Today, however, governments can work more strategically with post-secondary institutions, and do more to support new approaches to education such as micro-credentialing and stackable credits.<sup>196</sup> This more granular approach to credentialing could also help to make the skills-matching initiatives discussed earlier more effective.

At the same time, new innovative methods of learning have emerged to fill the gaps that our traditional approach to education have left such as short-term technology ‘bootcamps’ and ‘massive open online courses’ (MOOCs), although the impact of these on skills training is unclear. These more informal modes of education have been hailed as having the flexibility necessary to educate for the new world of work. However, the institutions that deliver this programming are typically not eligible for government-provided student grants and loans such as the Ontario Student Assistance Program (OSAP). This means that students must pay out of pocket or seek other lending options, which has important implications for access to education. To this end, governments should consider how to support these new forms of education in a way that is equitable and accessible.

196 Microcredentials are a type of certification that demonstrates a specific skill or competency. These are typically earned in a shorter time period than formal education courses (e.g. over a four-year degree program), and can be completed either online or in a classroom setting. Microcredentials have been gaining popularity in recent years due to their flexibility and potential value in a rapidly changing labour market. Stackable credits are another form of lifelong learning that enables individuals to compile both traditional and non-traditional credentials from various institutions. While this is a similarly flexible and innovative approach to traditional degree programs, formal education institutions are increasingly using stackable credit systems.

Some jurisdictions have addressed this problem indirectly through individualized accounts dedicated to education, training and skills development. For example, SkillsFuture in Singapore provides credits to every citizen – at any stage of life – that can be used on a variety of programming for skills development, which are topped up at regular intervals and never expire. The concept is meant to provide individuals the opportunity to make their own informed choices, develop an integrated and high-quality system of education in the country, and promote a culture of lifelong learning.<sup>197</sup> France has recently introduced a similar initiative through individualized Personal Activity Accounts.<sup>198</sup>

While these new nimble and flexible approaches to education are bound to be useful, this does not mean that traditional degree programs should be overlooked. Indeed, the uncertainty around the future of work has proved the importance of soft and transferrable skills such as emotional intelligence, communication, critical thinking and problem-solving. These skills are often developed among students pursuing traditional education in the humanities for example. Governments should work with colleges and universities to refine curricula and programming, especially in STEM (Science, Technology, Engineering and Math) fields, to better foster the development of these skills.

Governments and education institutions should collaborate with employers to develop strategies that enable skills-matching between graduates and the labour market. These partnerships should entail forecasting of future skills, although this type of approach is becoming more difficult

as technology changes more rapidly than ever before. However, there are some areas where we can reasonably expect to see increased demand in the coming years, such as care work. As our population ages and Canadians retire in large numbers, there will undoubtedly be jobs in health and personal care for this population. Care work can be difficult, precarious and low-paid in some instances, and thus there is room for government strategies to incentivize enrolment and training in such fields.

## FINANCIAL AND WRAP-AROUND SUPPORT

If current trends continue, the labour market of the future is likely to be characterized by multiple jobs, gigs, contracts with numerous different employers and further deterioration of the standard employment relationship. Creating a sufficient floor for workers and greater support – financial or otherwise – will be crucial in this uncertain context. One option for providing this floor that is under discussion in a variety of jurisdictions is the implementation of a universal basic income program.<sup>199</sup>

Portable benefits schemes have also recently emerged as a potential solution for those working multiple jobs or gigs or engaging in platform work and who therefore do not receive sufficient benefits from their employer(s). Similar to the individualized accounts in Singapore and France, this account model could be extended beyond education to fill other growing gaps in the social safety net.<sup>200</sup>

197 See <http://www.skillsfuture.sg/AboutSkillsFuture>.

198 European Commission. 17 February, 2017. The Personal Activity Account comes into force in France. *Newsroom*. <https://ec.europa.eu/epale/en/content/personal-activity-account-comes-force-france>.

199 For more information on basic income, see Forget, E. Marando, D. Surman, T. and Urban, M. September 2016. *Pilot lessons*. The Mowat Centre; Centre for Social Innovation. <https://mowatcentre.ca/pilot-lessons/> and Urban, M. and Yip, C. May 2017. *Basic Impact*.  
200 Foster, N. Nelson, G. Reder, L. 2016. *Portable Benefits Resources Guide*. The Aspen Institute Future of Work Initiative. [https://assets.aspeninstitute.org/content/uploads/2016/07/resource\\_guide\\_final8-1.pdf](https://assets.aspeninstitute.org/content/uploads/2016/07/resource_guide_final8-1.pdf).

There are multiple forms that portable benefits accounts could take. The general objective is to provide a suite of benefits traditionally provided by a single employer – such as prescription drug, vision and dental coverage or paid leave – that can instead be carried between multiple jobs. The cost of these benefits could be covered by pooling contributions from employers, workers and governments into an account attached to the individual workers rather than the employers. Contributions would be pro-rated to the number of hours worked by an individual – or for those working on a task basis, a percentage of gross wages – and could be drawn from at any time.<sup>201</sup>

There are other ways to provide support to workers aside from direct financial support. For example, there are many wrap-around support programs and services that can ease the pressures that workers will likely continue to face as our economy shifts, such as affordable housing, childcare and immigrant settlement services. Often these supports are provided most efficiently by local not-for-profit or community-based organizations who understand local problems better than government actors. Governments can provide direct funding, resources or capacity-building to support community-based initiatives, resulting in more efficient delivery of programs and services.

## SOCIAL DIALOGUE AND LABOUR REPRESENTATION

It is becoming increasingly clear that workers need more of a voice in the labour market of the future. While union membership in North America continues to decline steadily, approaches to social dialogue and new forms of labour representation that are emerging in other jurisdictions are worth examining.

While public sector unionization remains relatively strong in Canada, private sector union membership continues to decline. The benefits of labour representation have been well-documented – e.g., higher wages, greater equality and a sense of security and belonging – although it is widely acknowledged that the union model of the previous century is less well-suited to today's labour market.<sup>202</sup> In an era when most employment was with locally-rooted corporations, it was reasonable to organize around specific companies or factories. However, as both labour and capital become increasingly mobile, this model is no longer sufficient.

Some new forms of labour representation have emerged, such as the Workers' Action Centre (WAC) in Ontario. The membership-based advocacy organization is working to mobilize those in precarious employment – many of whom are unable to unionize because of the nature of their work – by educating workers on their rights and working to modernize Ontario's employment law.<sup>203</sup> Outside of Ontario, there is a larger alternative labour (or 'alt-labour') movement in the United States, led by initiatives such as Our

201 Thirgood, J. 27 June, 2017. "What if you could take it with you?" *TLDR*. The Mowat Centre. <https://mowatcentre.ca/what-if-you-could-take-it-with-you/>.

202 Black, E. Silver, J. 10 June, 2011. *Fast Facts: How Unions Protect Our Human Rights*. Canadian Centre for Policy Alternatives (CCPA). <https://www.policyalternatives.ca/publications/commentary/fast-facts-how-unions-protect-our-human-rights> ; Canadian Labour Congress. 2015. *Why Unions?* <http://canadianlabour.ca/why-unions>.

203 See <http://workersactioncentre.org/about/>.

Walmart, which are attempting to fill the gaps where unions have failed.<sup>204</sup> The US Freelancers Union represents 375,000 independent freelancers and self-employed professionals and offers networking events, discussion forums and group-insurance rates to its members.<sup>205</sup>

While no alternative union model has fully taken hold in North America, European jurisdictions offer some promising models. In Germany, labour has long enjoyed a level of official partnership that provides it with much more power than in North America. For example, sector-wide collective bargaining – rather than company-wide – can incentivize cooperation to improve industry competitiveness.<sup>206</sup>

Similarly, Germany’s legislated co-determination concept enables workers to form “works councils” and influence decision-making alongside shareholders without having to formally unionize.<sup>207</sup> Furthermore, Germany’s unions have significant influence in government decision-making around issues such as workforce development, which helps explain why German workers are better prepared when factories automate tasks.<sup>208</sup>

In jurisdictions that have a strong labour presence, unions can play a key role in retraining initiatives designed to prepare the workforce for technological shifts, match job seekers with employment opportunities within similar sectors, or even administer government-funded benefits. The Ghent System, used in countries such as

Denmark and Sweden, utilizes unions to actually deliver unemployment insurance benefits.

While the success of these efforts has largely been a result of path dependency and established structures that do not exist in Canada, government should consider how to support workers – either legislatively or otherwise – in their ability to organize, and look to unions or alternative labour representation groups as key partners to deliver programs and services. For example, Ontario’s Changing Workplaces Review made a number of recommendations aimed at making it easier for employees of franchises to unionize, as this type of work has seen a steady growth in recent years, particularly in the fast-food and retail sectors.

204 Hackman, R. 1 May, 2014. “Alt-labor: a new union movement or the same old song?” *The Guardian*. <https://www.theguardian.com/money/2014/may/01/low-wage-new-union-walmart-fast-food>.

205 See <https://www.freelancersunion.org/>.

206 Rauch, J. July/August 2017. “The Conservative Case for Unions.” *The Atlantic*. <https://www.theatlantic.com/magazine/archive/2017/07/the-conservative-case-for-unions/528708/>.

207 Vara, V. December, 2017. “Can Unions Stop the Far Right?” *The Atlantic*. [https://www.theatlantic.com/magazine/archive/2017/12/can-unions-stop-the-far-right/544152/?utm\\_source=twb](https://www.theatlantic.com/magazine/archive/2017/12/can-unions-stop-the-far-right/544152/?utm_source=twb).

208 Vara, V. December, 2017. “Can Unions Stop the Far Right?”

# Service delivery modernization and policy resilience

Governments should focus on ensuring their programs are resilient and adaptable to changing circumstances – rather than focusing on unknowable, specific trajectories. System resilience has the benefit of not relying on correctly predicting the adoption or evolution of particular technologies or societal and economic trends. Instead, a focus on resilience results in systems designed to support citizens in any circumstance.<sup>209</sup>

Redesigning systems to be more adaptive and responsive will not only meet the needs of workers and young people in the future, but also address the needs of citizens today who are ill-served by programs such as EI, or struggling to access affordable housing and childcare.

What would this type of approach look like in practice? Successful social and employment policies and service delivery frameworks will be:

- » Delivered digitally to increase efficiency and reduce transaction costs for citizens and governments
- » Clearly focused on outcomes
- » Evaluated for effectiveness and impact
- » Continually refreshed to adjust to emerging social and economic conditions
- » Customized and flexibly designed to accommodate the varied needs of citizens
- » Integrated with other services and programs offered by government and delivery partners<sup>210</sup>

These approaches, if implemented thoughtfully, will have the dual benefit of better outcomes for citizens while also saving costs in a slow growth macro-economic environment in which fiscal constraint will become increasingly important. California's efforts to introduce an outcomes-based approach in the corrections system focused on probation violations saved the state \$536 million over a 3-year period, while also reducing the probation failure rate by 33 per cent.<sup>211</sup>

Digital government services can also deliver services faster, at far less cost than traditional in-person or telephone channels – the UK's Government Digital Service saved the treasury 3.5 billion pounds in the 3-year period spanning 2012-2015.

Governments that can deploy modern service delivery frameworks effectively will be well-positioned to maximize their resources, free up staff for higher-value tasks and deliver services that achieve their intended outcomes. In an increasingly competitive global landscape, government effectiveness will be an important factor in engendering trust from investors and highly skilled individuals.

209 Johal, S. 16 January, 2018. "Getting ahead of the future of work: Focus on the systems, not the skills." *TLDR*. The Mowat Centre. <https://mowatcentre.ca/getting-ahead-of-the-future-of-work-focus-on-the-systems-not-the-skills/>.

210 Johal, S. 16 January, 2018. "Getting ahead of the future of work."

211 Gold, J. and Mendelsohn, M. August 2014. *Better Outcomes for Public Services: Achieving social impact through outcomes-based funding*. The Mowat Centre. [https://mowatcentre.ca/wp-content/uploads/publications/91\\_better\\_outcomes\\_for\\_public\\_services.pdf](https://mowatcentre.ca/wp-content/uploads/publications/91_better_outcomes_for_public_services.pdf).

Increasing the size of the economic pie should be the first order priority, but revenue integrity (i.e., ensuring all taxes that are owed are paid), creative options to restructure taxation models so that all economic activity is taxed equitably, and the renewal of service delivery frameworks are equally important.

# 7 CONCLUSION

Clearly the challenges facing governments in the years ahead are wide-ranging. The future of work is only one of a number of thorny policy problems that will require innovative approaches, an appreciation of the rapidly changing policy environment and the ability to work collaboratively with other governments and stakeholders.

How changing work patterns and disruptive technologies will impact government revenues should be a top of mind issue for policymakers going forward. Absent sufficient revenue, governments will be hard-pressed to provide essential services like healthcare and education, as well as the social supports and employment retraining programs that will be increasingly important in the years ahead. While partnerships with the private and not-for-profit sector may be able to relieve some of these cost-pressures, organizations from those areas may be equally squeezed by broader macro-economic and technological trends.

Undertaking more detailed, quantitative modelling of potential impacts of the trends outlined in this report should be a first step for governments interested in understanding the scope for action that they currently have and how that scope may be further constrained by 2040. While this type of analysis was outside the scope of this report, it is apparent that the risks to provincial income, payroll, sales and corporate tax are real, and will require a clear plan. Increasing the size of the economic pie should be the first order priority, but revenue integrity (i.e., ensuring all taxes that are owed are paid), creative options to restructure taxation models so that all economic activity is taxed equitably, and the renewal of service delivery frameworks are equally important.

The path forward on these issues is daunting, largely because of the wide range of plausible futures that could play out. Uncertainty could lead to paralysis, given the risk that specific policy actions might prove to be ineffective, or worse still, counter-productive. Yet, policymakers must take the initiative to prepare for a future in which jurisdictions with creative, nimble and effective models of public administration, and socially inclusive, prosperous economies will be leaders. Concrete steps in these directions are possible, and possible now, despite uncertainty about what may happen in the coming decades.

