Mind the Gap:

Compensation Disparity Between Canadian and American Technology Workers

Vivian Li, Mahmehr Hamza, Anusha Arif | October 2023

Toronto Metropolitan University

the dais

Acknowledgements

The Dais is Canada's platform for bold policies and better leaders. We are a public policy and leadership institute at Toronto Metropolitan University, connecting people to the ideas and power we need to build a more inclusive, innovative, prosperous Canada.

For more information, visit **dais.ca**
20 Dundas St. W, Suite 921, Toronto, ON M5G 2C2

@daisTMU

/daisTMU

The Dais at Toronto Metropolitan University

Design and Illustration
Zaynab Choudhry

Copy-Editing
Suzanne Bowness

Translation
Ubiqus Translation Services

Contributors
Viet Vu, Manager of Economic Research, the Dais
André Côté, Director of Policy and Research, the Dais
Nina Rafeek, Communications and Marketing Specialist, the Dais

Acknowledgments:
Marium Hamid
Tony Bonen
Trisha Williams
Arif Khimani
Michael Burt
Benoit Tessier
Xavier St-Denis

Mind the Gap is part of the portfolio of work by the Future Skills Centre, which is funded by the Government of Canada's Future Skills Program.

The Future Skills Centre (FSC) is a forward-thinking centre for research and collaboration dedicated to driving innovation in skills development so that everyone in Canada can be prepared for the future of work. We are funded by the Government of Canada's Future Skills Program.

The Dais proudly engages a diverse group of funders to support and catalyze our work, consistent with **our values**, and subject to a thorough internal review. As a non-partisan, public-interest institute, we only accept funds from organizations that support our mission and enable us to undertake work independently, with full editorial control. The names of all of our financial supporters are publicly and transparently displayed on all online and printed material for each project or initiative.

How to Cite this Report
Li, V., Hamza, M., Arif, A. *Mind the Gap: Compensation Disparity Between Canadian and American Technology Workers*. The Dais. 2023.
https://dais.ca

ISBN: 978-1-77417-075-5

Graph data in this report can be found at:
https://github.com/thedaisTMU/mind-the-gap

Authors

Vivian Li
Senior Economist

Vivian Li curates research and produces insights on Canada's economic technology landscape and labour market at the Dais. Vivian is particularly interested in people-focused economic research, which pertains to the evolving landscape of skills and jobs, and the socioeconomic outcomes of economic policies and events. Vivian holds a Master of Arts in Economics from the University of Toronto and a Bachelor of Arts in Economics from the University of Waterloo.

vv.li@torontomu.ca

Mahmehr Hamza
Research Assistant

Mahmehr Hamza assists in researching and preparing labour market analysis alongside understanding the economic implications of a changing Canadian tech environment. She is particularly interested in the sustainable finance ecosystem. Mahmehr holds a Masters of Arts in Economics from Duke University and has a background in financial services

mahmehr.hamza@torontomu.ca

Anusha Arif
Research Assistant

Anusha Arif is a former Research Assistant at the Dais, now working at TD as an Economic Analyst. Anusha is interested in topics related to employment and wages. She has particularly researched topics related to immigrants and their growth prospects in the Canadian labour market. Anusha holds a Master of Arts in Economics and Bachelor of Science in Statistics and Economics with a focus in Data Analytics, from University of Toronto.

anusha.arif@mail.utoronto.ca

Table of Contents

1

Executive Summary

Canada risks being left behind when it comes to its investment in the technology economy. For over two decades, there has been little change in who makes up tech workers in Canada.[1] One key component in our quest to catch up is the ability to attract and retain top tech talent to work in Canada. Yet the prevailing narrative cites fierce competition from US-based companies, who can afford to out-bid Canadian tech companies in compensation offers.

In this study, we carefully examine this claim, combining reliable data sources on tech pay in both countries, and adjusting for a host of factors, including purchasing power, cost of living, and compositional components. We show that the tech pay gap is present, is large, but is not simple. In particular, we find that:

1. **Overall, tech workers in the US were paid 46 percent more than tech workers in Canada (equivalent to almost $40,000 more):** The pay gap between tech workers in Canada and the US is significant, even once purchasing power is taken into account.

2. **Ten percent of the tech pay gap between US and Canada can be explained by a higher share of part-time, part-year work north of the border:** One key contributing factor to the tech pay gap was the much larger share of tech workers in Canada who worked part-time, part-year. In fact, when we restricted the analysis to just full-time full-year workers, the gap decreased to $34,800, or a 10 percent reduction in the overall pay gap. This may represent a higher level of flexibility that exists for tech workers in Canada.

3. **Pay inequity across gender and educational markers is much starker in the US than in Canada:** Pay inequity in tech in the US based on one's gender identity and educational attainment were much starker compared to that in Canada. However, due to the underrepresentation of both women and those who don't hold a Bachelor's degree in both countries, closing the already-smaller pay inequity in Canada had little impact on the overall pay gap.

4. **Racial pay inequity looks vastly different between the two countries:** In the US, there are stark compensation differences associated with a worker's racial identity (where the highest paid tech workers—those who are South Asian—make almost 84 percent more than American Indian (Indigenous) workers, who are the lowest paid group.

5. **Tech workers in Canada were paid similarly regardless of whether or not they were in a tech hub (such as Toronto, or Kitchener-Waterloo), while tech workers in US tech hubs received a notable pay premium:** Tech workers in the US had much to gain by working within key tech hubs in the country. While this effect is somewhat dampened when factoring shelter costs at those hubs, the pay premium is still notable, given that there are no strong compensation benefits for tech workers in Canada similarly located in tech hubs in the country.

6. **Non-wage compensation for tech work in Canada, while hard to measure, was in some cases valued as half that in the US:** When we consider available data on non-salary remuneration (in particular equity value from stock compensation), an average US tech workers' equity holdings were valued at twice that of a tech worker in Canada.

Implications for Industry and Policymakers

With the recent downturn in the tech sector and news of major layoffs even within tech giants, a window has opened that may allow Canadian companies to hire talent that will fuel its tech economy, given the sheer number of tech giants across the border. In particular, many of these talents come from large companies after they have scaled from their startup phase, the kind of "growth talent" that has often been cited as a crucial factor in allowing tech companies to scale and improve productivity.

How does Canada achieve pay competitiveness? To revel in lower wages and celebrate a downturn that would facilitate them would be the wrong focus. At the same time, the factors around pay raises are complicated, as tech pay often consists of more than salary compensation, and includes forms of compensation that are difficult to value. We also must not, in the name of compensation competitiveness, exacerbate pay inequity, for which we have a competitive advantage. We therefore recommend focusing on two paths simultaneously to ensure the tech sector in Canada has the talent it needs to grow:

1. **Develop growth-oriented policies that, coupled with strong labour protections, allow tech companies to grow, and expand their ability to offer competitive pay:** At the end of the day, tech companies will only be able to raise tech compensation if they are able to. Given the vibrancy of tech, competitive pressure is already present, and the right policies that support firm growth will activate Canadian tech companies' ability to compensate tech workers fairly.

2. **Continue tackling pay inequity across different groups:** While Canada is currently in a better position relative to the United States regarding pay inequities for women tech workers, tech workers with specific visible minority identities (such as Black, and South Asian) and tech workers without formal educational credentials, a gap is still present, and more needs to be done in tackling pay inequity.

2 Introduction

Despite being among the top countries in the world for producing tech talent (with four universities ranked in the global top 100 universities for engineering and technology),[2] a recurrent narrative of lower wages for tech workers in Canada persists. A survey by Hired in 2018 reported that firms located in tech hubs in the US such as Silicon Valley and Seattle pay the average tech worker nearly twice as much as the average tech worker in Toronto.[3] Even with a cost-of-living adjustment, the gap in wages is still significant, with salaries in cities such as San Francisco and Seattle ranging from 13 percent to 44 percent higher than in Toronto.[4] Annual surveys published by the University of Waterloo's graduating classes in programs including Software Engineering, Computer Science, and Systems Design Engineering paint a similar picture; some graduating classes have as many as 85 percent of alumni who plan to work or accept a full-time offer in the US after graduation.[5] Not surprisingly, a majority of students cited compensation as a major driver in accepting an offer for a full-time position.

Despite being among the top countries in the world for producing tech talent (with four universities ranked in the global top 100 universities for engineering and technology), a recurrent narrative of lower wages for tech workers in Canada persists.

The brain drain among tech workers is a part of Canada's overall struggles within the sector. To understand the overall competitiveness of the technology landscape in Canada, we need to set the scene for the industry in Canada as a whole. While the Information and Communication Technology (ICT) sector makes up 5.6 percent of Canada's GDP,[6] as of 2021, Canada lags behind other Organisation for Economic Co-operation and Development (OECD) countries in terms of investment in research and development (R&D) as a whole and in the tech sector. Gross R&D spending overall in Canada is below the OECD average (1.7 percent compared to the OECD average of 2.7 percent),[7] and investment into tech has been stagnating. Investment into natural sciences and engineering R&D in Canada as a percentage of GDP has decreased from an annual average growth rate of 5.7 percent in the two decades prior to the burst of the dotcom bubble in 2000 to 1.5 percent in the two decades after (nearly a four-fold decrease).[8] [9] [10] Tech R&D in Canada also pales in comparison to the US; the average annual growth rate of the value invested in the decades following the dotcom bubble was three percent in Canada compared to 13.3 percent in the US.[11] [12] [13] Lastly, labour productivity for the tech industry has been stagnating. While labour productivity in the ICT sector steadily grew in the first decade of the twenty-first century at an average annual rate of almost five percent, growth in the following decade slowed down to an average annual rate of 1.4 percent.[14]

A key piece of the puzzle that should be analyzed in the context of the overall competitiveness of the tech industry is the attractiveness of this labour market for workers. While wage compensation is only one factor when selecting employment, it is a significant driver for many tech workers. For new graduates, this is especially important given the impact of this consideration on their career progression. Software engineering graduates from the University of Waterloo often cited compensation as a primary consideration for selecting their full-time job post-graduation.[15] [16] [17]

Furthermore, a wage inequity issue also exists within the Canadian tech sector. While the tech industry produced 5.8 percent[18] of Canada's total compensation in 2021, the prosperity of this industry was not equitably distributed. Previous research found that the inequities within the Canadian tech sector continued to persist between 2001 and 2016 for historically-marginalized groups, especially for women, visible minorities, and immigrants.[19] Female tech workers earned around $6,000 less compared to their male counterparts, which is roughly the same as the gap in 2001.[20] Tech workers who are racial minorities made close to $8,000 less per year. A $5.70 difference in hourly pay emerged for immigrants in tech in 2016, whereas a pay gap did not exist in 2001.

While previous studies have analyzed the relative competitiveness of the tech sector in Canada, in our research we quantify this gap and the wage attribution to being a tech worker in the US over Canada. To understand the size of the wage gap attributed to a tech worker being located in the US, we conduct a regression analysis; this incorporates an examination of the gap attributed to various demographic characteristics such as education, age, gender, and visible minority status. The magnitude of these incremental impacts attributed to various demographic characteristics on wages can be compared across the US and Canada to understand the variation in equitable outcomes within the tech sector.

While the tech industry produced 5.8 percent of Canada's total compensation in 2021, the prosperity of this industry was not equitably distributed.

3 Methodology

Data sets

For Canadian data on annual wages, we examined the latest Statistics Canada Census for the year 2021.[21] Wages were measured as before-tax employment income[22] and pre-aggregated as a median and mean for all workers in each five-digit National Occupational Classification (NOC) occupation in the previous year.[23] Other demographic details specified for each occupational-wage pairing include gender, the highest education credential obtained, work activity throughout the year, geographic location (in terms of Census Metropolitan Area and Census Agglomerations), and visible minority status. In particular, Visible minority status is a term used by Statistics Canada to describe people with racialized identities; More information about how racialized identities are classified across Canada and the US is in Appendix E. This data set was used for all Canadian analyses in this report, using median annual wages for the descriptive part of the analysis, and mean annual wages for the regression analysis section. To examine American wages, we used a combination of three data sets:

1. The first data set is from the Current Population Survey,[24] coupled with the Annual Social and Economic Supplement (CPS-ASEC), which collects data from households on demographic traits such as race, educational attainment, age, and occupation. Annual wage data for the 2021 CPS-ASEC is derived from an individual's longest job held in the previous year (2020), including employment at farm and non-farm businesses, as well as self-employment. For the first part of the analysis, median wages are aggregated from unaggregated individual respondent data for the typical tech worker by education status

and gender. Pre-aggregated average wage data (calculated as the mean wage) is used in the first regression analysis to examine the incremental attribution of the wage differential due to working in the US, with other controls such as education, gender, and work type (full-time or part-time).

2. The second data set is the American Community Survey (ACS).[25] The annual survey for 2021 wages was released in 2022, and includes similar demographic detail as the CPS-ASEC. This data set was used to conduct the second set of regression analyses to understand the incremental wage differences between tech workers by racial identity.

3. The third data set is from the US Bureau of Labor Statistics' Occupational Employment and Wage Statistics (OEWS) data set. Similar to the Canadian census and the CPS-ASEC, the OEWS contains pre-aggregated wage data for each occupation for the year 2021. Geographic detail (by Metropolitan Statistical Area—MSA–and non-metropolitan areas)[26] is provided as well, but no demographic detail (such as gender, highest education credential, and race) is included. This data set was used to calculate the third set of regressions to examine the incremental attribution of the wage gap in the United States over Canada for a tech worker, accounting for geographic location as it pertains whether an area is a tech hub, and to account for variations in shelter costs.

Unless otherwise stated, all wages presented here are in 2021 Canadian dollars. Using a purchasing power parity (PPP) adjustment (as published by the OECD),[27] American wages are converted to Canadian wages within all relevant data sets. For two data sets (the Canadian Census and the CPS-ASEC), the values reflect annual wages earned in the previous year (2020). Though the COVID-19 pandemic had a substantial negative impact on the labour market in 2020, there is evidence that the technology sector was fairly resilient compared to the rest of the labour market.[28] Therefore, we assume the 2020 data is appropriate to use, and that the pandemic does not materially impact the results of this study.

After the conversion to Canadian dollars was conducted, the conversion to 2020 dollars for the appropriate data sets was made with respect to the change in average per-hour wages across all jobs from 2020 to 2021. In the US, this would be 3.5 percent (as per the OEWS),[29] and in Canada this would be two percent.[30]

Other supplementary data sets used in this study to estimate the drivers of a tech wage differential include measurements of other non-wage factors such as shelter costs, the categorization of a geographic area as a tech-hub, and non-wage compensation such as equities, refresh grants, and bonuses.

What is a tech worker?

This study adapts the definition of tech occupations derived by Vu, Zafar, and Lamb (2019).[31] We modified their original methodology to account for NOC 2021 classifications, examining five-digit occupations. A similar concordance was constructed for Standard Occupational Classification (SOC) occupations, with some manual adjustments to ensure comparability across Canadian and US tech occupations.[32]

Unlike the Canadian census, occupations in the CPS-ASEC and OEWS are specified as SOC codes. While there are more SOC codes than NOC,[33] the job codes roughly cover the same types of occupations, and while there are more SOC occupations identified as tech jobs, the coverage of jobs compared to NOC tech occupations are the same. Overall, this translates to roughly the same proportion of workers in both countries that are classified as tech workers (4.8 percent in Canada compared to 4.7 percent in the United States).[34] Other studies have estimated the proportion of STEM (science, technology, mathematics and engineering) workers in the US workforce, including a 19.4 percent estimate from LinkedIn,[35] and a 6.2 percent estimate from the US Bureau of Labor Statistics.[36] As this methodology only looks at tech workers, it only represents a subset of workers within STEM, which explains the relative differences in estimation when compared to others studies.[37]

Analytical method

A two-part analysis will be produced to understand the US-Canada wage gap. First, the wage for a typical tech worker (represented by the tech worker at the median of the wage distribution) is examined for both the US and Canada. This will be done using the 2021 Canadian census, and the CPS-ASEC data set for the US. For the Canadian census, pre-aggregated median wage data will be weighted by employment. For the CPS-ASEC data set, a median is calculated over individual respondent data. This will be replicated by gender, education status, and for full-time workers.

Second, to understand the size of the gap attributed to working in a tech occupation in the US, we conduct a series of regression analyses. Using the average employment wages in each occupation, the first regression analysis combines both pre-aggregated data from the CPS-ASEC and Canadian census to estimate the tech-wage difference between US and Canada. We also determine the incremental wage difference attributed to variables such as gender and education status. The second regression uses the ACS and Canadian census data sets to determine the incremental wage differences across racial identities.[38] Finally, we incorporate the impact of cost-of-living expenses across different locales in the US and Canada. This allows for an analysis to determine whether wages vary according to the average shelter costs of a jurisdiction. For example, do tech workers living in San Francisco receive pay that compensates them adequately for their higher housing costs, compared to those located in Phoenix? Through this analysis, we also are able to understand whether there are pay premiums associated with tech workers who work in major tech hubs in both countries.

4

Descriptive analysis of wage differentials

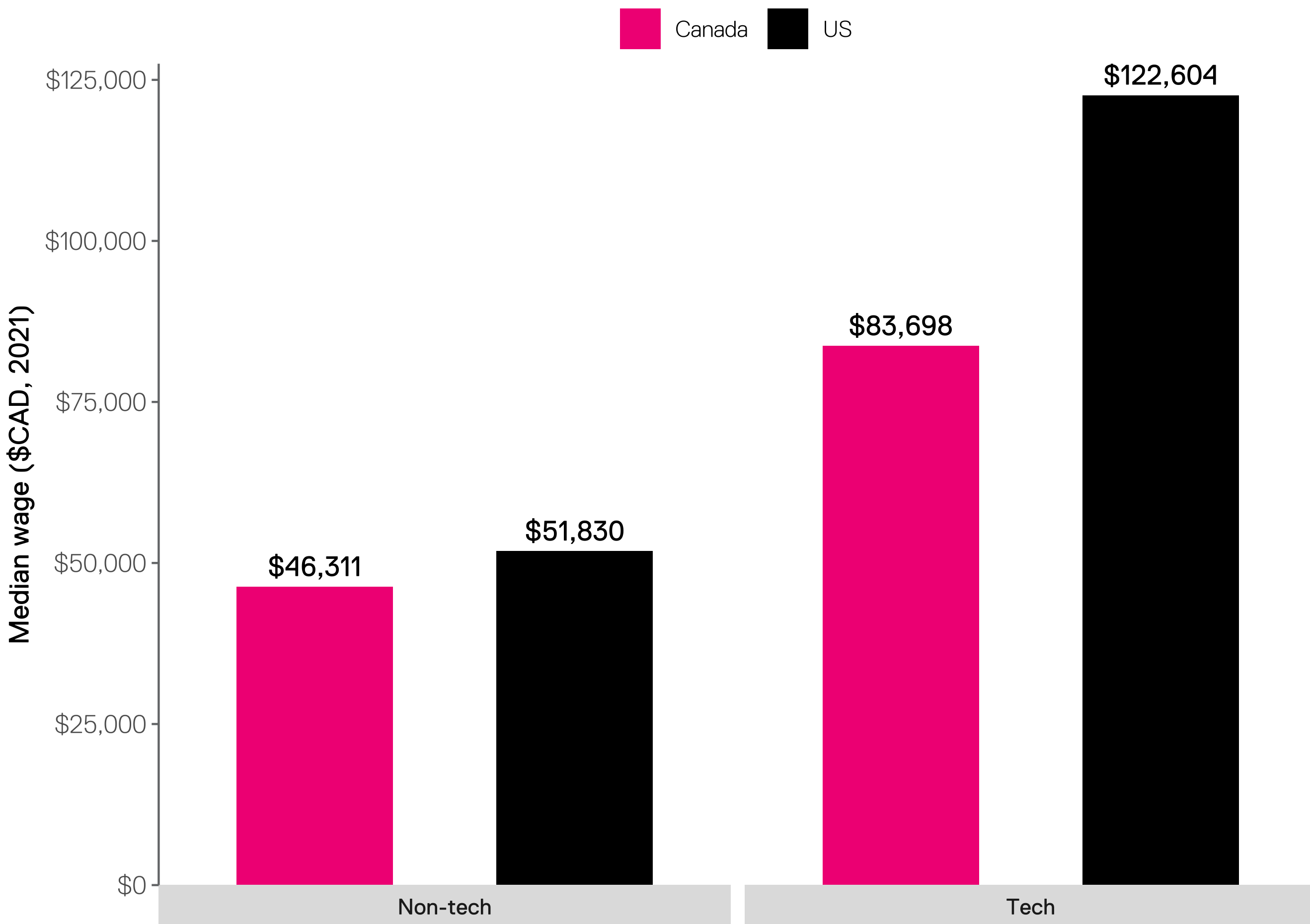
What is the raw wage differential between tech workers in Canada and the US?

Inclusive of all work types (full-time or part-time, full-year or part-year, or if a worker has a job but did not work during the year due to being on leave), we compare the wages of the typical tech worker (the tech worker at the median of the wage distribution) and typical non-tech worker (the median of the wage distribution for all other occupations not classified as a tech job) in both countries. A typical tech worker in Canada makes $83,700 in annual wages, almost twice as much as a typical non-tech worker (who makes $46,300). In comparison, the typical tech worker in the US makes $122,600 compared to $51,800 for the typical non-tech worker, which is over twice as much. This equates to a tech worker in the US making 46 percent more than a tech worker in Canada.

A typical tech worker in Canada makes $83,700 in annual wages, almost twice as much as a typical non-tech worker (who makes $46,300). In comparison, the typical tech worker in the US makes $122,600 compared to $51,800 for the typical non-tech worker, which is over twice as much. This equates to a tech worker in the US making 46 percent more than a tech worker in Canada.

Figure 1

Median wages for Canada and the US, all work types

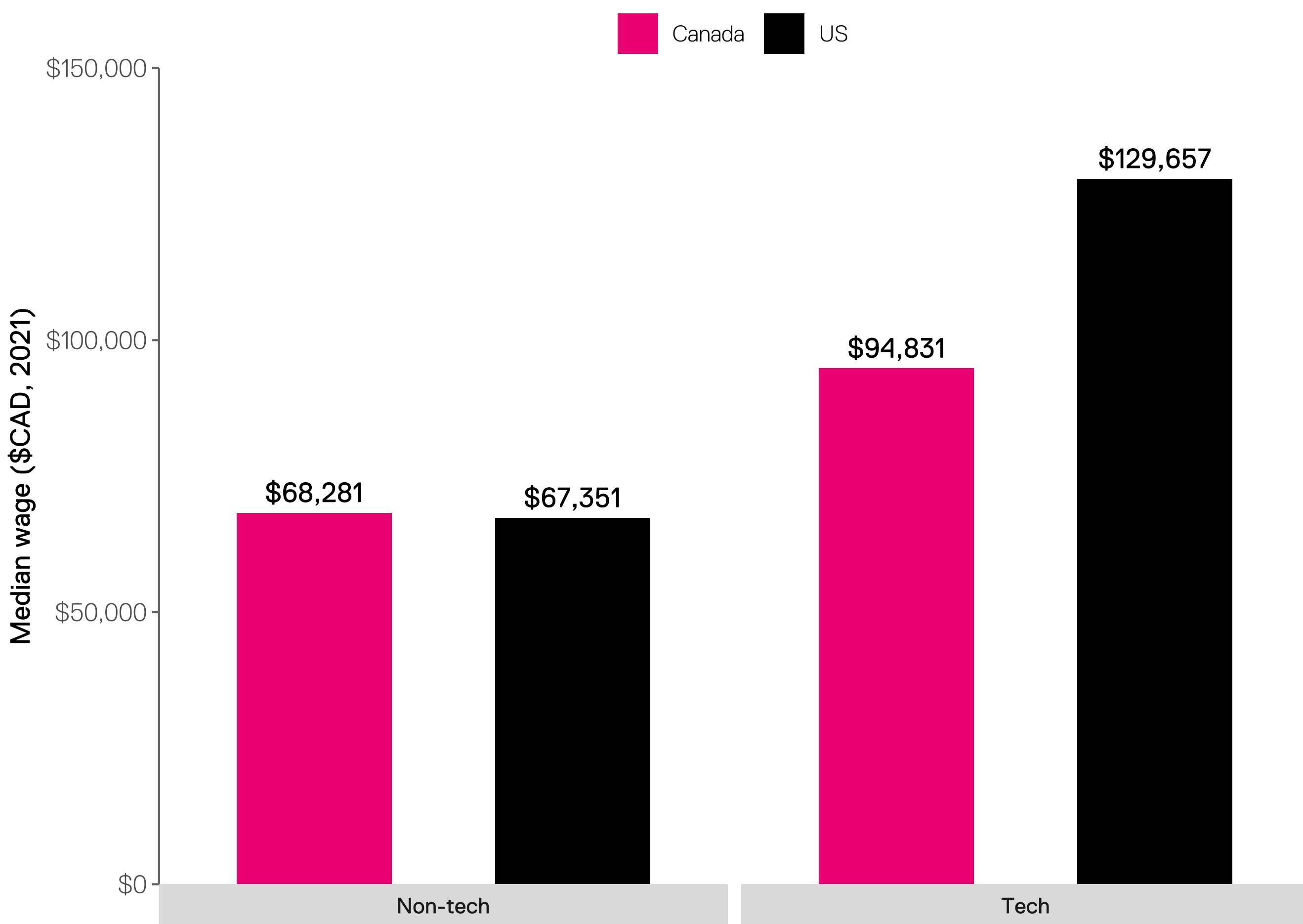


Differences in work status could contribute to some of the variation in annual wages for tech workers in Canada and the US. A higher proportion of tech workers in the US work full-time and full year (FT[39]/FY[40]) compared to tech workers in Canada (86 percent in the US compared to 74 percent in Canada).[41] However, it is useful to take into account this gap in FT/FY work when analyzing wage outcomes in aggregate, as it may signify a higher likelihood of flexible work arrangements in Canada. Furthermore, some demographic groups are observed to be more likely to work outside of a FT/FY capacity; this is also a consideration when understanding wage outcomes as societal and cultural norms may contribute to some of the observed discrepancies in labour market outcomes.

That being said, there continues to be a large annual wage gap between tech workers in the US and Canada when we only consider (FT/FY) workers. A typical tech worker in Canada who works FT/FY makes around $94,800 in annual wages, compared to tech workers in the US who makes $129,700. The tech wage gap between the countries equals $34,800 in annual wages between tech workers in the US and Canada. In other words, the typical FT/FY tech worker in Canada makes 37 percent less in annual wages than the typical FT/FY tech worker in the US. Interestingly, annual wages for non-tech FT/FY workers in Canada are slightly higher than for non-tech workers in the US (after the PPP adjustment), with the difference in annual wages being no more than $1,000."

Figure 2

Median wages for Canada and the US, full-time and full-year workers



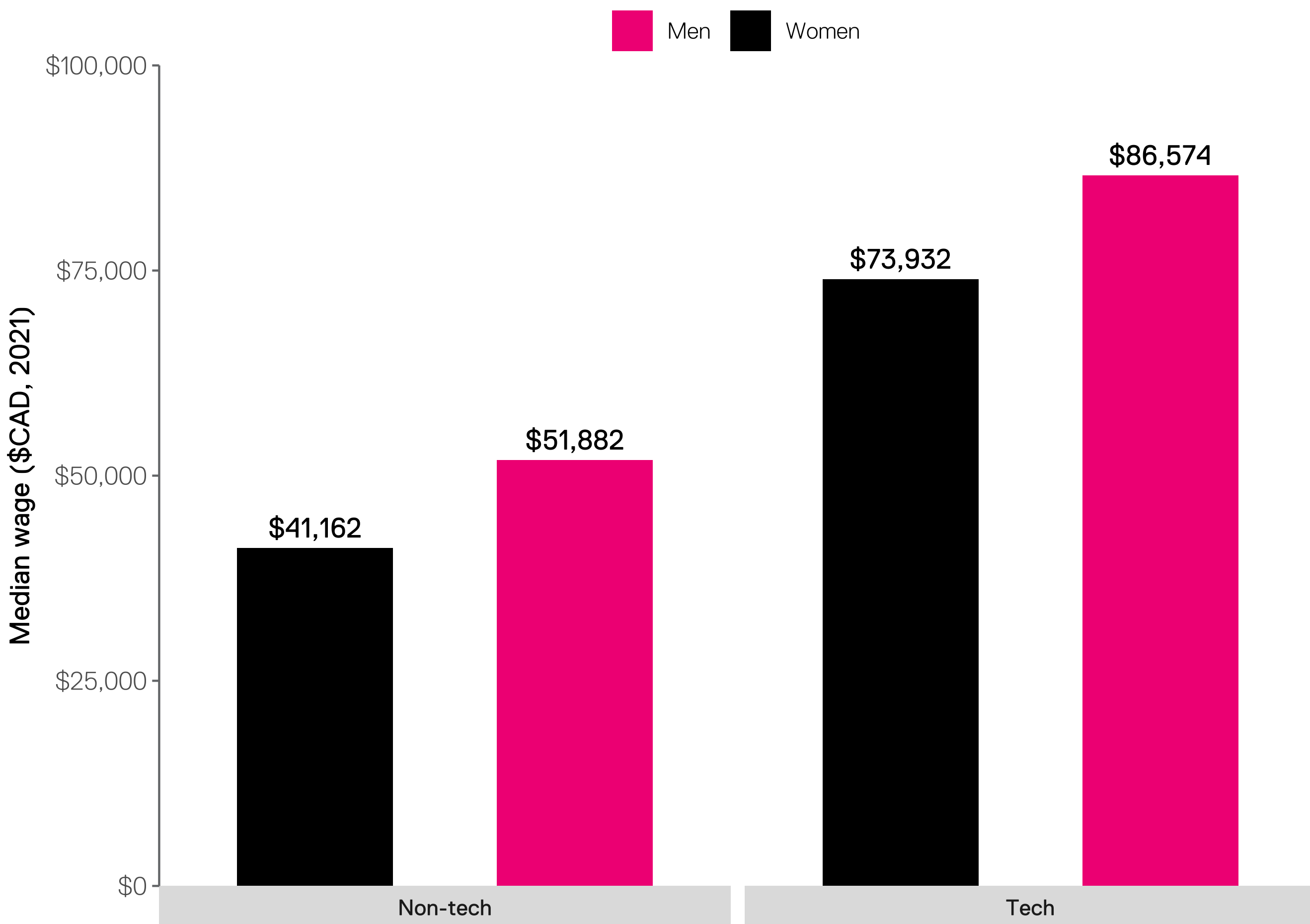
What is the gender gap in Canada and the US?

In the previous section, we began exploring the components of this wage gap by first understanding how the composition of full-time work contributes. We now further decompose this by looking at how the gender division in tech across two countries contributes to this gap. We find that a relatively larger gender gap exists in the US for tech workers compared to Canada, which may contribute to some of the variation in the tech wage gap. For all work types (full-time or part-time, full-year or part-year), the typical male tech worker in Canada makes $86,600 annually, which is around $12,600 more than the typical female tech worker, who earns around $74,000 annually. This equates to a female tech worker making 17 percent less than their male counterparts. Even subsetting for FT/FY workers only, the typical female tech worker makes close to $10,000 less than the typical male tech worker, a difference of 11 percent in annual wages.

For all work types (full-time or part-time, full-year or part-year), the typical male tech worker in Canada makes $86,600 annually, which is around $12,600 more than the typical female tech worker, who earns around $74,000 annually.

Figure 3

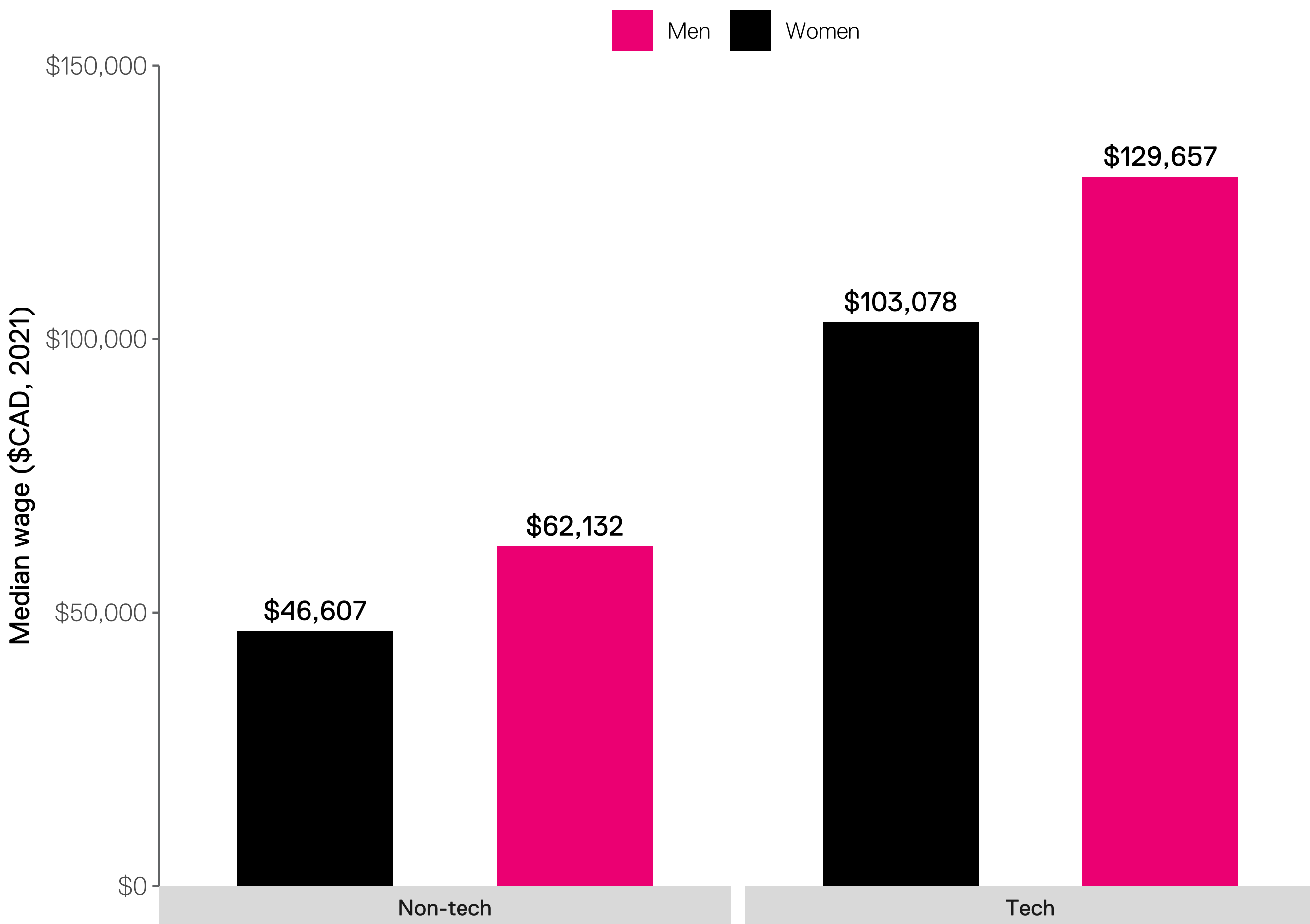
Median wages in Canada for women and men, all work types



In the US, the typical male tech worker makes an annual wage of $129,700, compared to $103,100 for the typical female tech worker. In other words, a female tech worker on average earns 26 percent less than a male tech worker, or close to $26,600 less annually. There continues to be a gender gap when looking at FT/FY workers only; the typical female tech worker makes $14,600 less than their male counterparts, or 13 percent less in annual wages.

Figure 4

Median wages in the US for women and men, all work types



Gender differences in FT/FY work across countries are stark; in Canada, 71 percent of women in tech worked FT/FY, compared to 83 percent in the US. Similarly, 77 percent of men in tech in Canada worked FT/FY compared to 88 percent in the United States.[42] While this is likely driven by a combination of country-specific factors, this difference in FT/FY status in both countries for both men and women could be partially driven by the availability of parental leave benefits for workers in Canada. While partially-paid parental leave up to 52 weeks is federally mandated in Canada,[43] this is not the case in the United States, where the Family and Medical Leave Act (FMLA) provides at most 12 weeks of unpaid leave.[44] Some of the largest tech companies such as Alphabet, Amazon and Microsoft provide between 20 and 24 weeks of paid leave.[45] Women have lower participation in the labour force than men,[46] [47] which can be assumed to be partially driven by their being primary caretakers for children. While the specific magnitude of this impact is unknown for female tech workers, it is important to recognize the role of these responsibilities on broader labour market outcomes.

What is the wage gap by education credential in Canada and the US?

Post-secondary education between countries is one of the largest drivers in the tech wage gap observed across the US and Canada. A substantial wage gap for the typical tech worker between both countries is observed for those with a Bachelor's degree or above. However, the overall distribution in wages according to education credential is much larger in the US, which signifies higher wage inequality, especially for those without a post-secondary education.

The most common type of education credential for a tech worker is a Bachelor's degree, with 46.6 percent of tech workers having obtained this credential. The typical tech worker in Canada with a Bachelor's degree makes $88,500 a year, compared to the $122,600 in annual wages that a typical tech worker with a Bachelor's degree in the US makes. This amounts to a difference of around $34,100 a year.

This wage difference between Canada and the US continues to increase with each level of education; the difference in annual wages for a typical tech worker with a Master's or Doctoral degree is around $50,000 or more. For tech workers in the US, having a Master's or Doctoral degree is attributed to higher wages compared to having a Bachelor's degree. While the same is true in Canada, having a Master's or Doctoral degree does not have as large of a wage difference compared to having a Bachelor's degree compared to tech workers in the US. The typical tech worker in the US with a Master's degree makes $141,500 a year, which is $18,900 more annually than the typical tech worker with a Bachelor's degree. In Canada, the difference in wages for a typical tech worker with a Bachelor's and Master's degree is only $4,500. The wage premium for a Master's degree in Canada for a tech worker is less than that of a typical non-tech worker; a non-tech worker with a Master's degree earns $11,000 more in annual wage compared to a non-tech worker with a Bachelor's degree.

The overall distribution in wages according to education credential is much larger in the US, which signifies higher wage inequality, especially for those without a post-secondary education.

Unlike tech workers in Canada, the difference between having no degree or high school diploma (having their highest education credential as less than a high school diploma) and having a high school diploma in the US is large. High school graduates in tech make over twice as much as tech workers with no degree or high school diploma. In Canada, the typical tech worker with no degree or high school diploma has higher wages than the typical tech worker with a high school diploma in Canada. This could be due to selection bias for tech workers who do not have any degree, as they likely have exceptional skills (either self-taught or through other non-institutional resources) which allow them to succeed in the tech industry. Furthermore, a small sample size may distort results, as less than half a percent of tech workers do not have any degree or high school diploma, compared to 10 percent who have high school diplomas as their highest education credential. The difference in annual wages for tech workers with a high school degree to what tech workers without any degree or high school diploma receive are no more than a $4,000 difference. This is not observed for non-tech workers, where the median high school graduate earns over $8,000 more.

Figure 5

Median wages for Canada by highest education credential, all work types

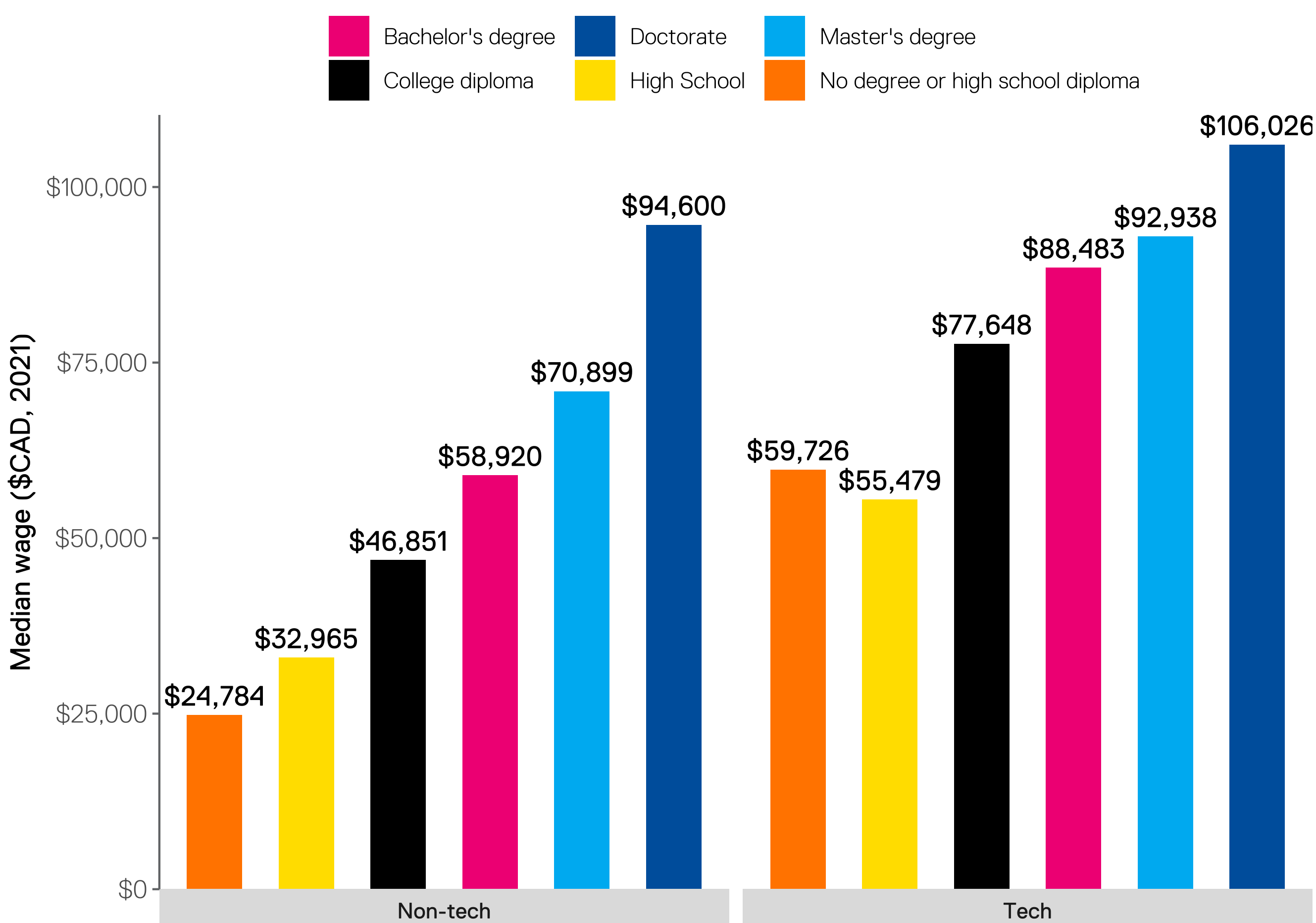
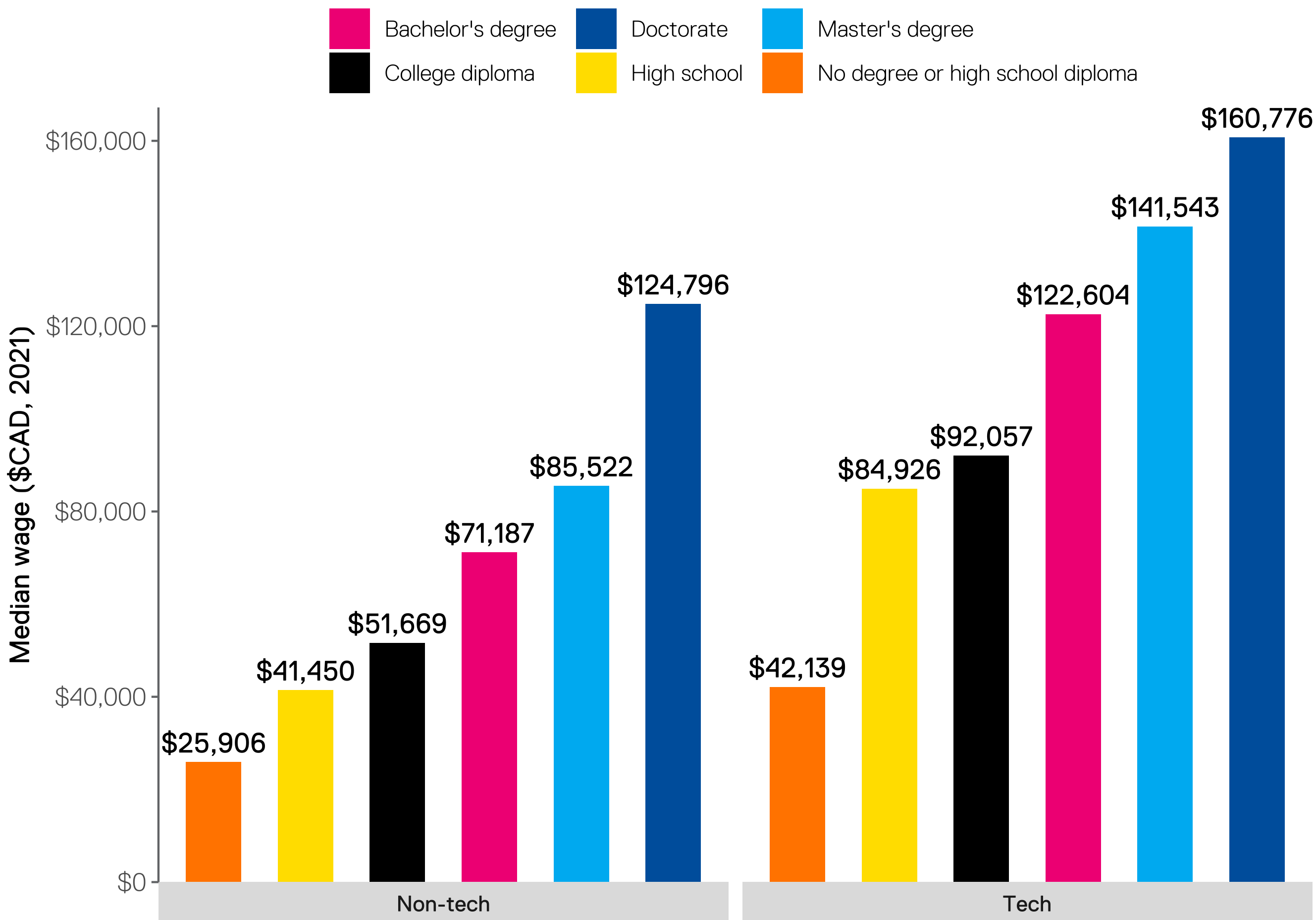


Figure 6

Median wages for the US by highest education credential, all work types



What is the racial wage gap in Canada and the US?

When we deconstruct tech wages by racial identity, similar patterns emerge across countries. Tech workers in both Canada and the US who are South Asian, Chinese, or Japanese consistently make more in annual wages than other racial groups. In the US, the typical tech worker who is South Asian, Chinese, or Japanese makes among the highest annual wages, making upwards of $160,000. In Canada, the typical tech workers in these groups earn upwards of $83,000 in annual wages, which is amongst the highest across all racial identities. In contrast, the typical tech worker in the US who is Black, American Indian and/or Alaskan Native, or Native Hawaiian or Pacific Islander makes the lowest annual wages, making less than $100,000. In Canada, the median wages are the lowest for tech workers who are Black, Arab or Filipino, making less than $77,000 annually.

The distribution of tech wages in the US by racial identity is much larger than Canada. The difference between the racial identity with the highest and lowest median annual wages is over $70,000 in the US (greater than the median annual wage for non-tech workers), while in Canada this range is around $20,000. This inequity in the wage distribution in the US is not unique to tech workers; for non-tech workers, the racial group with highest median annual wages earns over twice as much as the racial group with the lowest annual wages. Furthermore, there is evidence that wage inequality is increasing in the US. The gap between the median Black and White workers' wages in 2019 was 24.4 percent; this gap was between 32 and 42 percent in 2021.[48] Though US tech wages in general are higher than Canadian tech wages, this exemplifies how opportunities are not always equally distributed. While differences in FT/FY work could play a part in the unequal distribution of wages, an examination of other contributors to the observed disparity in economic outcomes could include access to education, seniority/experience, participation by industry, and discrimination, among others.

The distribution of tech wages in the US by racial identity is much larger than Canada. The difference between the racial identity with the highest and lowest median annual wages is over $70,000 in the US (greater than the median annual wage for non-tech workers), while in Canada this range is around $20,000.

Figure 7

Median wages for tech workers in Canada by racial identity, all work types

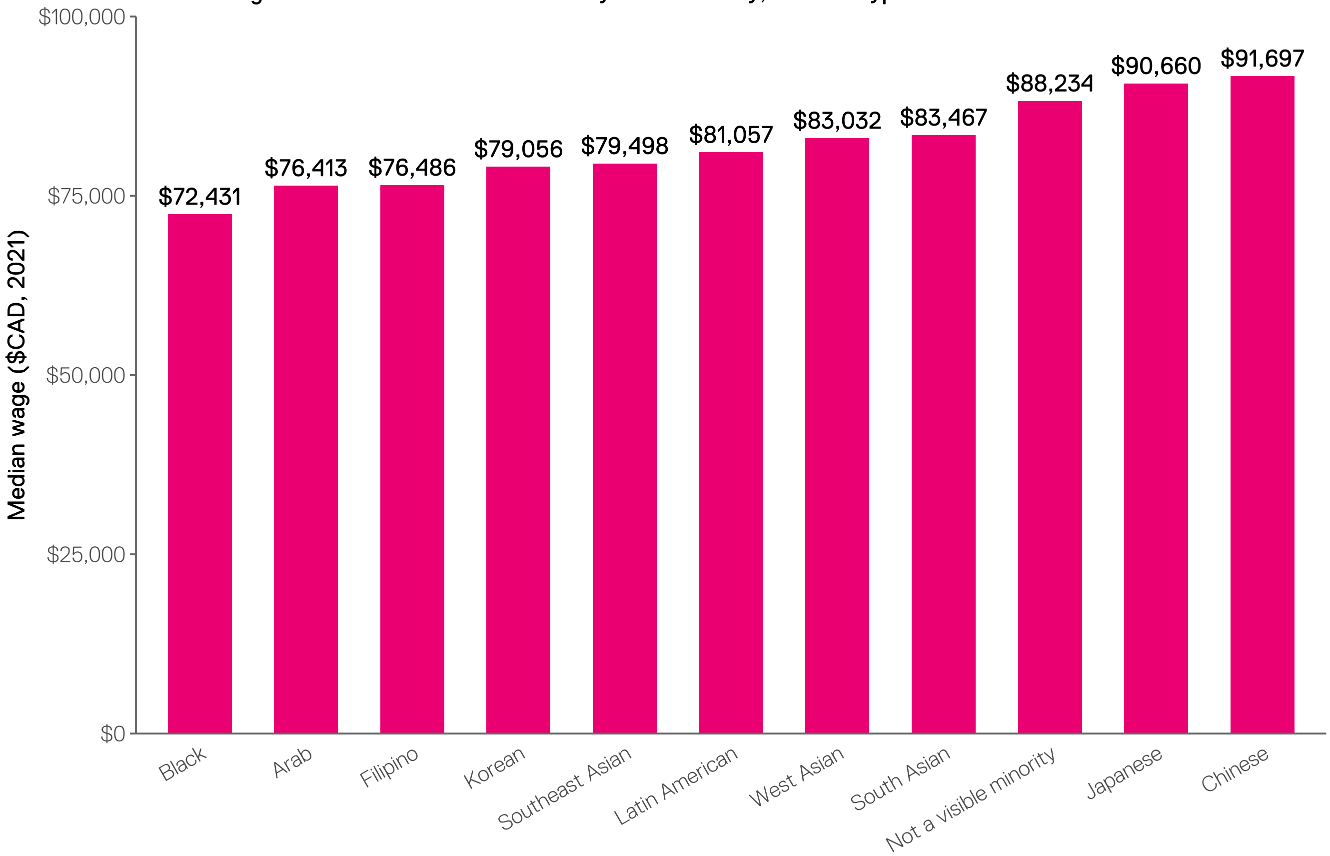
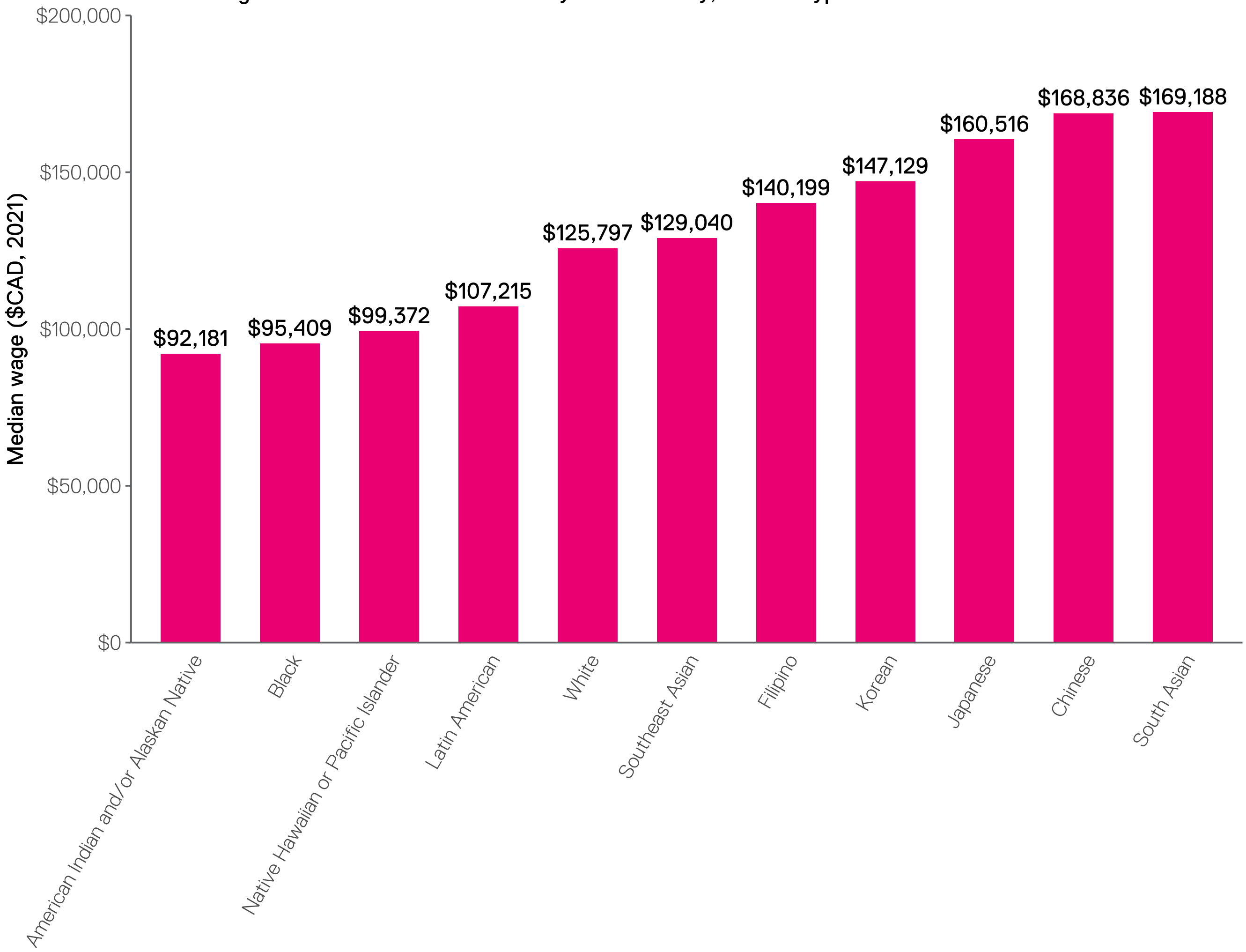


Figure 8

Median wages for tech workers in the US by racial identity, all work types



5

Incremental wage premiums of worker characteristics

While inequities exist within the tech industry across both countries, these effects are often layered. Breaking down the economic outcomes of various groups helps outline the nuances in the barriers that different groups face within the labour market. For example, a tech worker who is a woman, a visible minority, and has a college diploma has different barriers to the labour market than a tech worker who is a man with the same credentials and visible minority status. Additionally, economic outcomes could look different for the same group across the US and Canada. Even in tech, where wages often far exceed non-tech occupations, it is observed that these higher wages are not always homogeneously distributed, as exemplified with the earlier descriptive analysis comparing tech wages across gender, education, and racial identity. Conducting a regression analysis allows us to understand how various demographic characteristics interact within each country, and isolate the incremental wage impact or wage premium, which is the increased amount in wages attributed to a certain characteristic. We can then understand the true proportion of the tech wage gap attributable to working in the US over Canada.

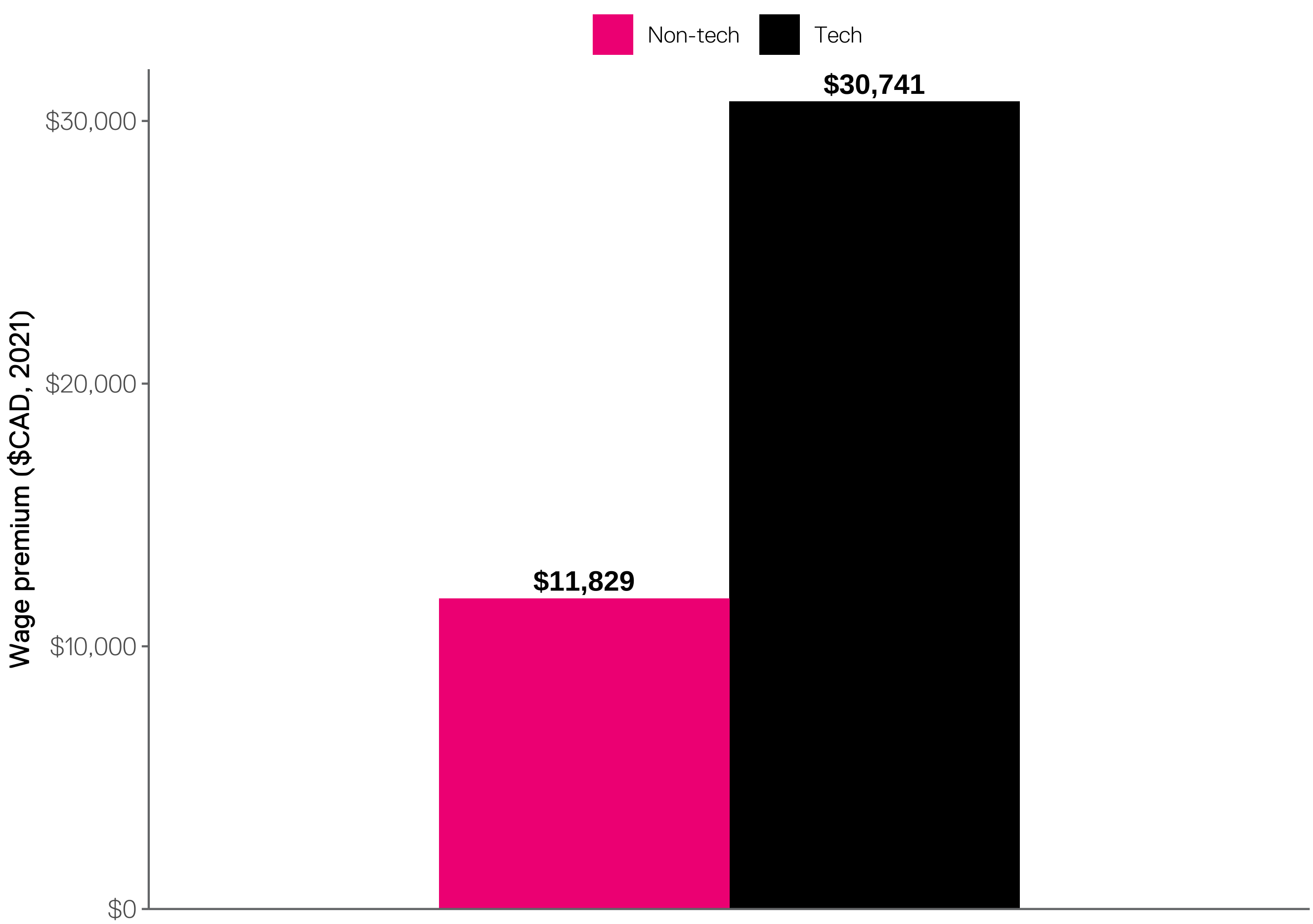
Breaking down the economic outcomes of various groups helps outline the nuances in the barriers that different groups face within the labour market. For example, a tech worker who is a woman, a visible minority, and has a college diploma has different barriers to the labour market than a tech worker who is a man with the same credentials and visible minority status.

Wage premiums to working in the US

First, we analyze the wage premium associated with working in a tech occupation in the US. After controlling for gender, education credential, and work type, the isolated premium of working in tech in the US has a $30,700 annual wage premium over working in tech in Canada. This is over two-and-a-half times as large as the premium from working in the US in a non-tech occupation ($11,900).

Figure 9

Wage premiums associated with working in the US over Canada



Bolded values indicate significance at a 5% level

Wage premiums by gender

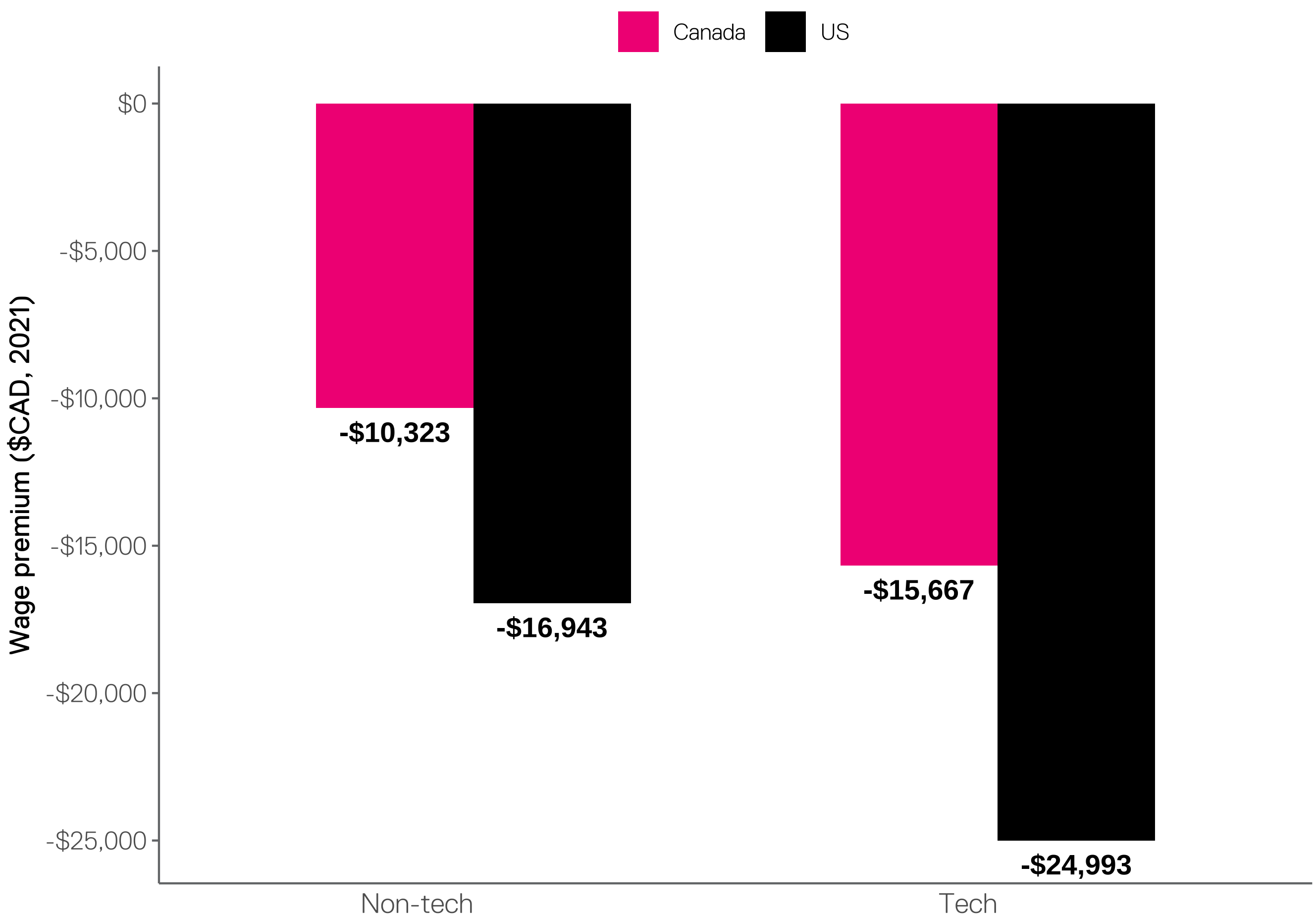
Women continue to be paid less than men in tech, even after controlling for work type and education. This gender gap exists for both tech and non-tech occupations, and is greater in the US compared to Canada. In the US, the attribution of being a woman in tech is associated with $25,000 less in annual wages compared to men in tech; in Canada, this gap is $15,700. In percentage terms, the incremental gender gap in annual wages between men and women in tech is -19.5 percent in Canada, and -24.4 percent in the US.

While the gender gap exists in both tech and non-tech occupations, the gap in tech is larger. The incremental gender gap in Canada is $5,300 greater in tech than in non-tech occupations (or a difference of two percentage points), while this gap is around $8,000 greater in tech compared to non-tech in the US (or 4.7 percent). Though tech workers as a whole earn more than non-tech workers, inequities that exist in the broader labour market persist. Participation for women in tech as a whole is considerably lower as well. As of 2022, women make up 28 percent of the tech industry workforce in the US,[49] which contributes to the inequity in the distribution of the prosperity of the sector as a whole. Additional data around attributes such as work experience could help understand where these inequities stem from, and provide insights on whether opportunities for career advancement could be inequitably distributed in tech.

In percentage terms, the incremental gender gap in annual wages between men and women in tech is -19.5 percent in Canada, and -24.4 percent in the US.

Figure 10

Incremental gender wage gap in Canada and the US



Bolded values indicate significance at a 5% level

Wage premiums by education credential

Across both countries, workers in tech occupations have an increasing and positive wage premium to post-secondary education (Bachelor's degree or above). However, in both countries, a high school education and a college education does not have a statistically significant wage premium compared to not having any degree or high school diploma in tech. This is in contrast to non-tech occupations, where there is a statistically significant incremental wage premium over having no degree or high school diploma for every level of education.

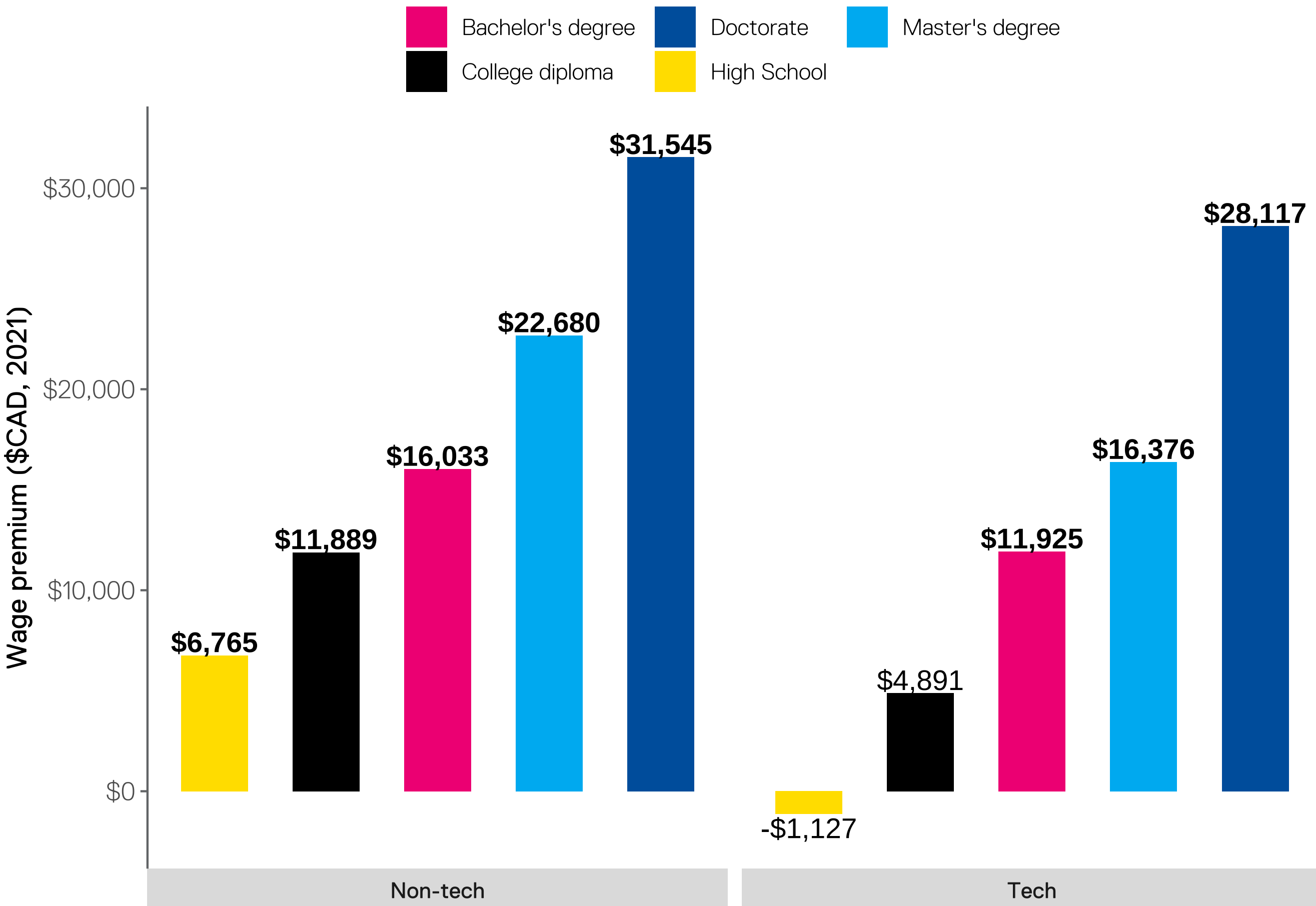
Higher education in the US yields a significantly greater wage premium in the US over Canada.

For tech worker occupations in Canada, the incremental wage premium to a Bachelor's degree or above is lower than for non-tech workers in Canada. But for the US, the opposite is true; higher education nets significantly larger returns at every level for workers in the tech sector compared to non-tech sectors. At a Bachelor's degree level, the incremental return for workers in tech in the US is $51,600, which is around $23,000 more than for non-tech workers. In Canada, the incremental return in tech for a Bachelor's degree is around $11,900, which is around $4,100 less than for workers not in tech. Furthermore, the gap between US and Canada for incremental returns to a Bachelor's degree for workers in tech is significant; workers in tech in the US have a $39,700 higher incremental return for their Bachelor's degree than tech workers in Canada. This gap only increases for Master's and Doctoral level education ($60,100 and $88,700, respectively).

The implications of the gap in the incremental wage premium by education contribute to the struggles in relative competitiveness of the Canadian tech labour market. For workers with higher credentials, the opportunity cost of working in tech in Canada over the US, spurred by higher pay inequity associated with having higher levels of formal credentials, means it becomes particularly challenging to retain such workers in the country. Furthermore, higher wages have a compounding effect, given the impact on career wage progressions. There is also evidence that US tech firms hire more STEM graduates with higher education: 78 percent of tech workers in the US have a Bachelor's degree or above, compared to 68 percent in Canada. A greater demand for tech workers with higher education and the attraction of higher salaries create alluring incentives for tech workers in Canada to work in the US.

Figure 11

Incremental wage premium by education credential in Canada

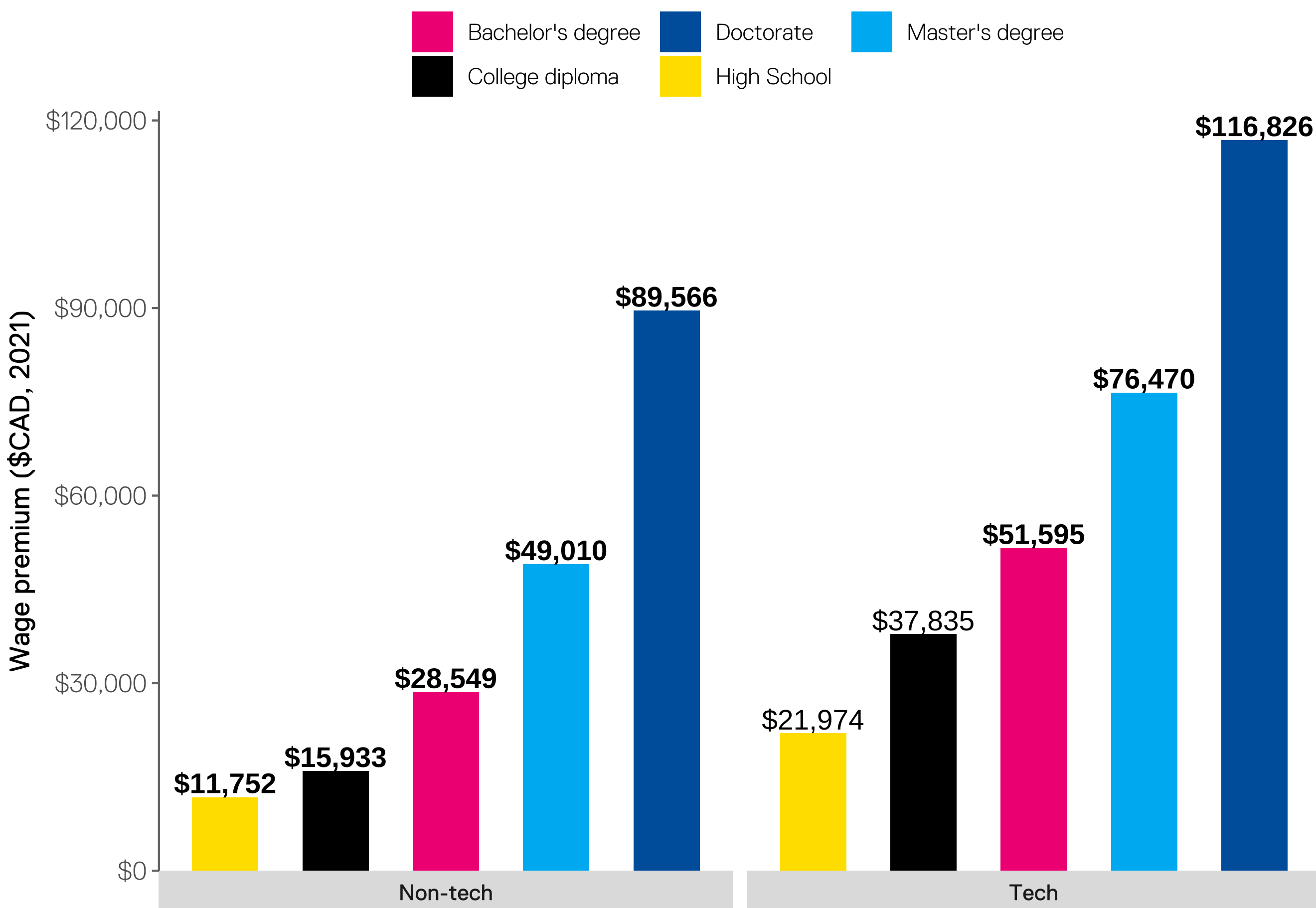


Bolded values indicate significance at a 5% level

However, in both countries, a high school education and a college education does not have a statistically significant wage premium compared to not having any degree or high school diploma in tech. This is in contrast to non-tech occupations, where there is a statistically significant incremental wage premium over having no degree or high school diploma for every level of education.

Figure 12

Incremental wage premium by education credential in the US



Bolded values indicate significance at a 5% level

Wage premiums attributed to racial identities

Examining the incremental racial gap reveals large inequities across both countries. While the majority of racial minority groups in Canada[50] who are not working in tech have a significant incremental racial wage gap compared to their White counterparts, the wage dynamics for tech workers is distinct. Only Arab, Black, and South Asian workers in tech in Canada make incrementally less than White workers in tech (ranging from -$8,000 to -$10,000 in annual wages), while Japanese workers in tech and non-tech make anywhere from $10,000 to $18,000 more incrementally in annual wages compared to their White counterparts in Canada. The wage gap for Arab and South Asian tech workers is notable, given those identity groups are overrepresented in the tech workforce, relative to the share of the general (non-tech worker) population. In Canada, South Asians represent 15.8 percent of the tech workforce, whereas there is only a 7.1 percent share of South Asians in the general (non-tech worker) Canadian workforce. Further, Arabs represent 2.5 percent of the tech workforce, and only 1.5 percent of the general (non-tech worker) workforce.

In the US, Black and Indigenous[51] tech workers make incrementally less than White[52] workers in tech, at a magnitude between -$18,000 to -$20,000 in annual wages. However, among the lowest-paid groups in the US are Latin American (or Latino) tech workers, who are paid close to $32,000 incrementally less than the average White tech worker in the US. This corresponds with wage outcomes for the group as a whole, as Latino non-tech workers in the US are paid close to $22,000 incrementally less than White non-tech workers in the US.

Black workers consistently have incrementally lower wage outcomes compared with their White peers, whether in tech or non-tech occupations, and across countries. In addition to lower incremental wage outcomes, Black tech workers are also underrepresented in tech. According to the Black Professionals In Tech Network (BPTN), an estimation of 8,725 Black tech workers were under-utilized in the tech workforce in Canada in 2016, which could grow to 33,000 by 2024.[53] This has been observed in the US as well; although 12 percent of the workforce is Black, only eight percent of tech jobs are filled by Black workers, with growth in Black workers in tech forecasted to fall behind overall tech job growth in the next decade.[54] Furthermore, research has found that wage growth in the US since 1979 was slower for Black workers as well compared with White workers (5.3 percent versus 20 percent). Educated Black workers were not insulated from wage inequality, with real average wage growth between 2015 and 2019 declining for Black workers with a Bachelor's degree.[55]

The jobless rate as well as formal post-secondary educational attainment for Latino and Hispanic and Black workers are higher in the US.[56] [57] Examining barriers to educational attainment for these groups could support pathways to tech careers, as this correlates with an underrepresentation within the tech labour force and hiring. Racially, 8.1 percent of tech workers identify as Latino (despite representing 18.9 percent of the total population) and 6.4 percent identify as Black (despite representing 13.6 percent of the total population).[58] [59] The lack of Black or Latino representation in leadership in tech and venture capital firms could also potentially contribute to lower economic outcomes for these groups in tech, when analyzing a top-down approach to advocating and supporting greater economic outcomes for these groups.[60] The consistently lower economic outcomes to Latino or Hispanic and Black workers speak to the overarching disparity in not just labour market outcomes in both countries, but the lack of diversity within the tech ecosystem overall, which is both a microcosm of and exacerbated by existing labour market issues.

Similar to labour market outcomes for Black workers, the lower incremental wage outcomes of Indigenous workers in tech may be part of a wider issue in labour market outcomes for this group. Indigenous people in the US have lower rates of attainment for higher education credentials, lower rates of labour market participation, and higher rates of disability compared with White workers.[61] And while incremental returns to Indigenous workers in Canada was not analyzed due to the lack of data, research has shown that wage outcomes and participation in tech and the overall labour market are lower compared to non-Indigenous workers.[62] Labour market discrimination and barriers to participation should be analyzed firstly as a systemic issue within the entire context of the labour market, before addressing the specificities of the inequalities within the tech sector.

The wage attribution to being South Asian as a tech worker in the US is significantly larger than White workers in tech, which contrasts the findings in the Canadian data set for this group. An estimated 38 percent of technical roles in Silicon Valley's top 20 firms are filled by Asian workers, with South Asian workers being the second-largest group in tech companies across the US (second to White workers).[63] Furthermore, South Asian entrepreneurs have built many successful technology companies from the ground-up in the US; India is the leading country of origin for entrepreneurs of billion-dollar start-up companies founded in the US in 2022, at 66 companies.[64] The disparity in wage outcomes for South Asian tech workers across countries underlines how the success of this group is not generalizable across countries, as circumstances and experiences vary. It also speaks to the need to analyze racial disparities in labour market outcomes separately, as experiences and barriers for one group are distinct.

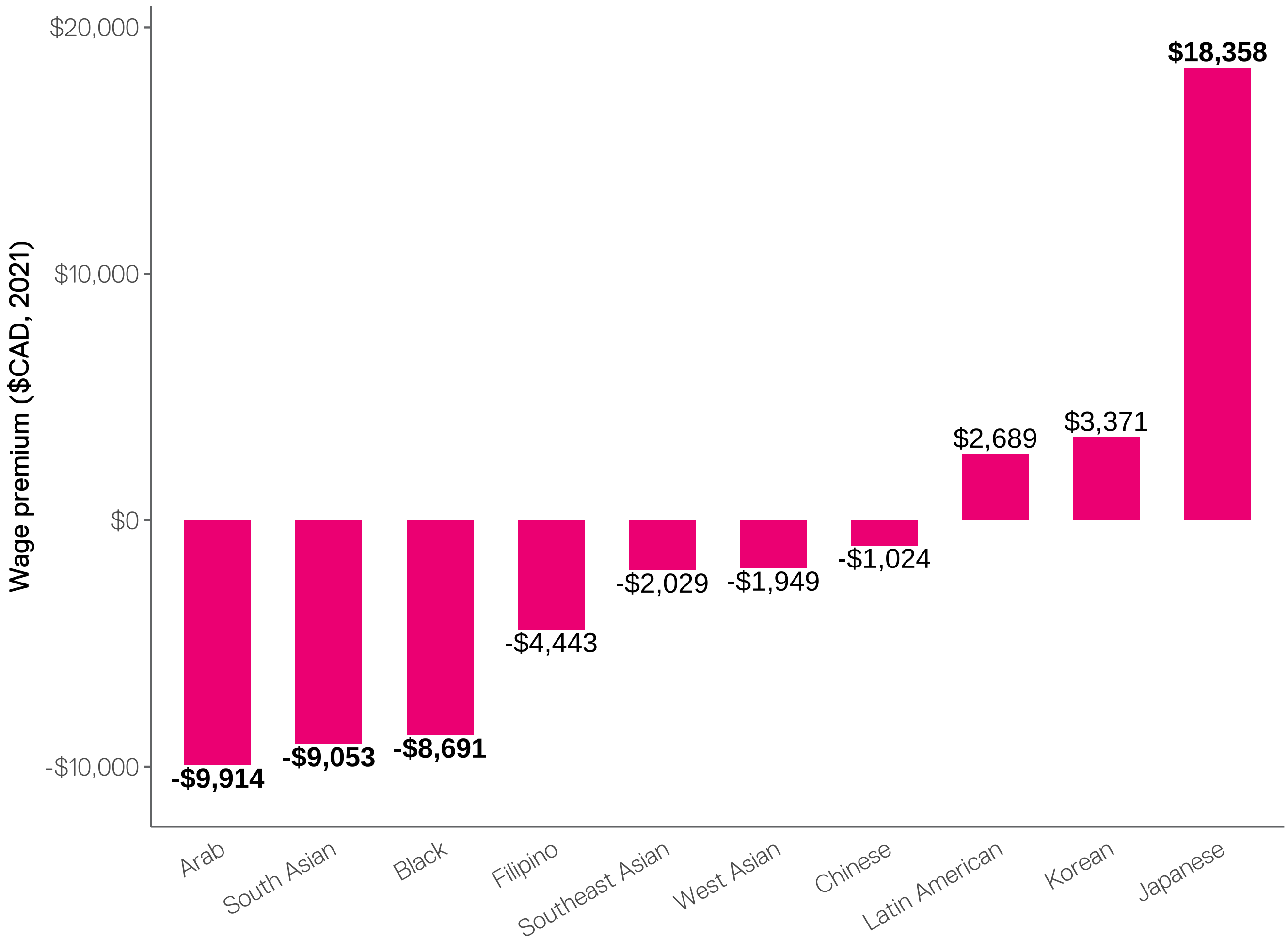
The incremental racial wage gap across both countries signifies that providing equitable opportunities is two-fold; having a greater number of visible minorities and underrepresented groups in tech is not equitable within itself if these workers are not provided the same opportunities to achieve and earn as much as their peers in the industry.

It is also important to note that while gender has been accounted for in this regression, work type (FT/FY compared to part-time or part-year) has not been included in this regression. While it is possible that certain racialized groups are more likely to work part-year or part-time, further research is needed to understand the attribution of the availability of FT/FY work opportunities for these groups in explaining the disparity in incremental wage premiums. This would incorporate a better understanding of whether there are more pertinent barriers that restrict upward economic mobility for these workers.

Having a greater number of visible minorities and underrepresented groups in tech is not equitable within itself if these workers are not provided the same opportunities to achieve and earn as much as their peers in the industry.

Figure 13

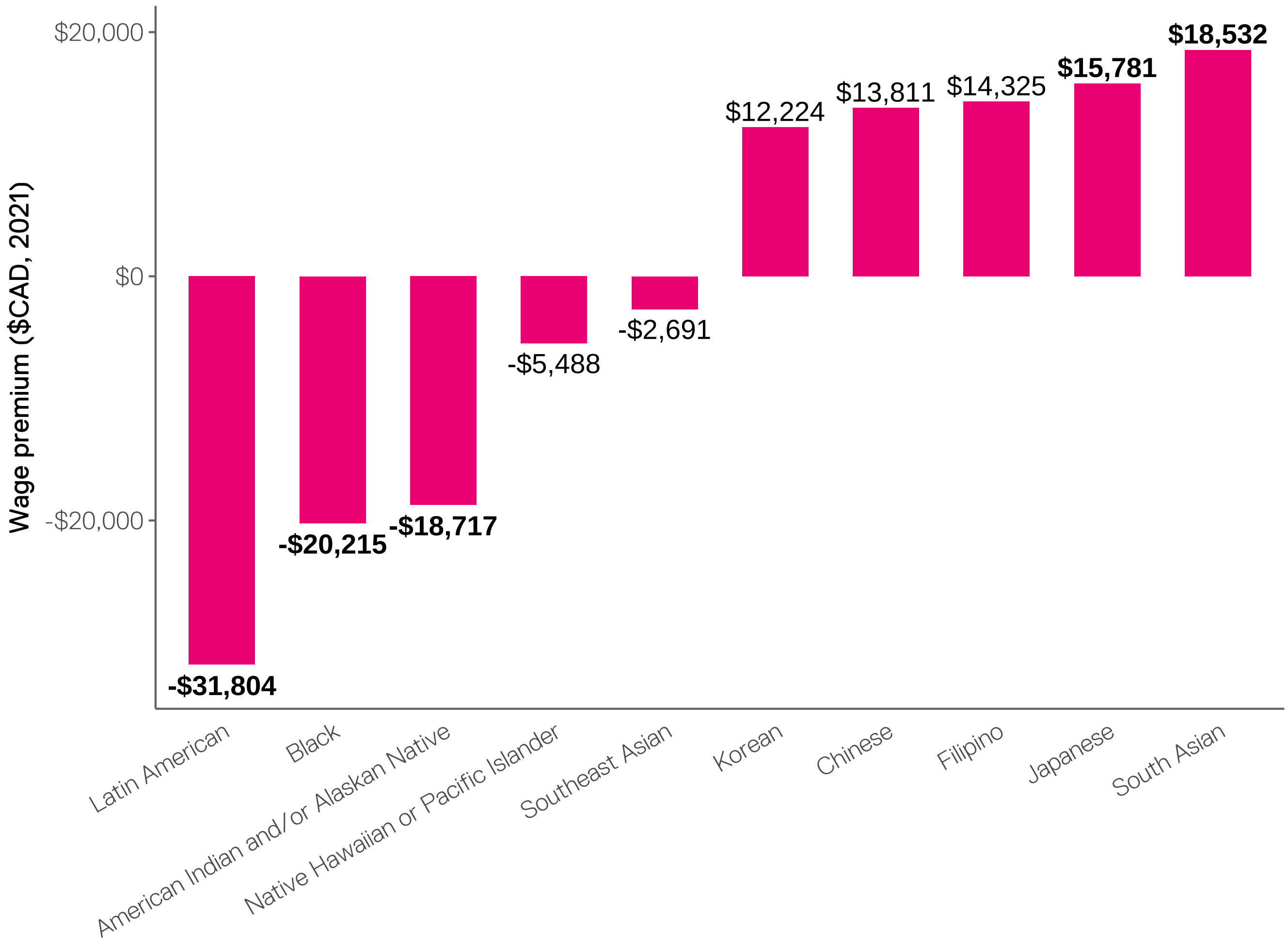
Incremental wage premium attributed to racial identities for tech workers in Canada



Bolded values indicate significance at a 5% level; results for Black tech workers are significant at a 10% level

Figure 14

Incremental wage premium attributed to racial identities for tech workers in the US



Bolded values indicate significance at a 5% level; results for Japanese tech workers are significant at a 10% level

Wage premiums by geographic area

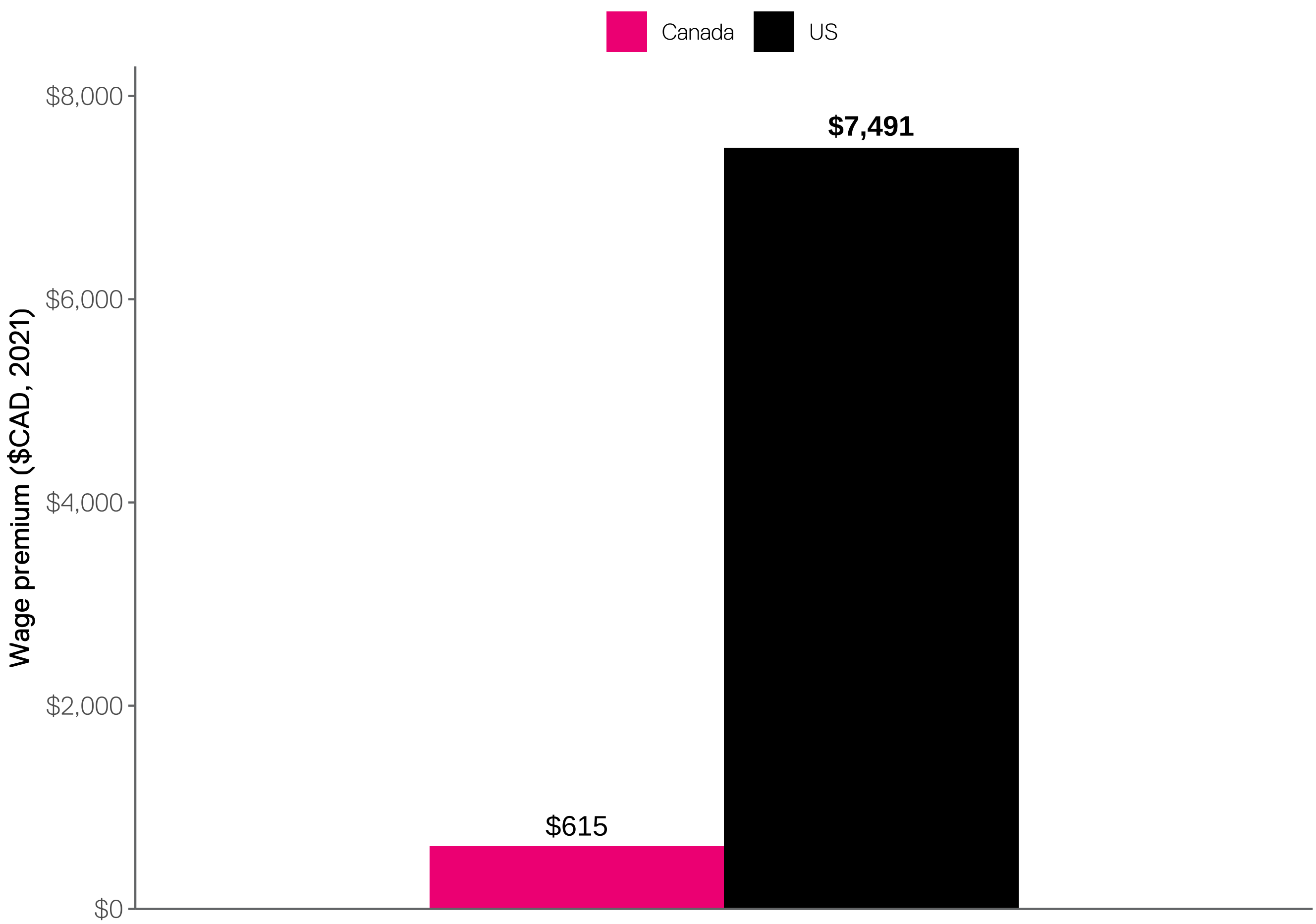
While wages for tech workers vary between the US and Canada, wages fluctuate depending on the geographic area as well. Certain areas that have a more prominent tech presence (known as "tech hubs") provide advantages over working in other non-tech hub areas.[65] Research by Moretti (2019) found that agglomeration and clustering effects support knowledge spillovers, attract larger talent pools, and boost innovation.[66] To analyze the impact on tech workers' wages of being in a tech hub, we assign a tech hub status to metropolitan and non-metropolitan areas across both US and Canada based on CBRE's market profiles of tech cities.[67] Tech hubs are analyzed based on thirteen metrics, with the concentration of tech talent available the largest consideration. Other considerations include tech diversity, tech degree completion and enrollment, costs to operate for tech companies, and cost of living for tech workers. In total, the top 25 tech hubs were identified (with 20 in the US and 5 in Canada).[68] For robustness, the regression was conducted with the top five tech hubs in each country, and again with all 25 tech hubs; the results between the two regressions were similar, and the findings remained relatively unchanged. The results with the top 25 tech hubs across both countries will be presented in this section.

Although being in an area that we've designated as a tech hub tends to be correlated with higher costs of living, shelter costs are factored in as well to understand whether there is a significant wage premium attached to geographic variations in household costs between areas. Average monthly shelter costs (which include mortgage payments, rent costs, utilities, etc.) are calculated for each area inferred from regional price parities in the US and 2021 census data in Canada.

Data for housing costs were retrieved from Statistics Canada and the US Bureau of Labor Statistics. The average monthly shelter costs (including costs to rent and costs of ownership) is estimated for each Metropolitan Statistical Area (MSA) and Nonmetropolitan areas in the US, and census metropolitan area (CMA) and census agglomerations (CA) in Canada. As in 2021, housing and shelter costs make up one-third of total expenditures for the average US household,[69] and 22.8 percent for the average household in Canada;[70] this is assumed to capture the bulk of regional variations in cost of living.[71]

Figure 15

Incremental wage premium to working in a tech hub for tech workers

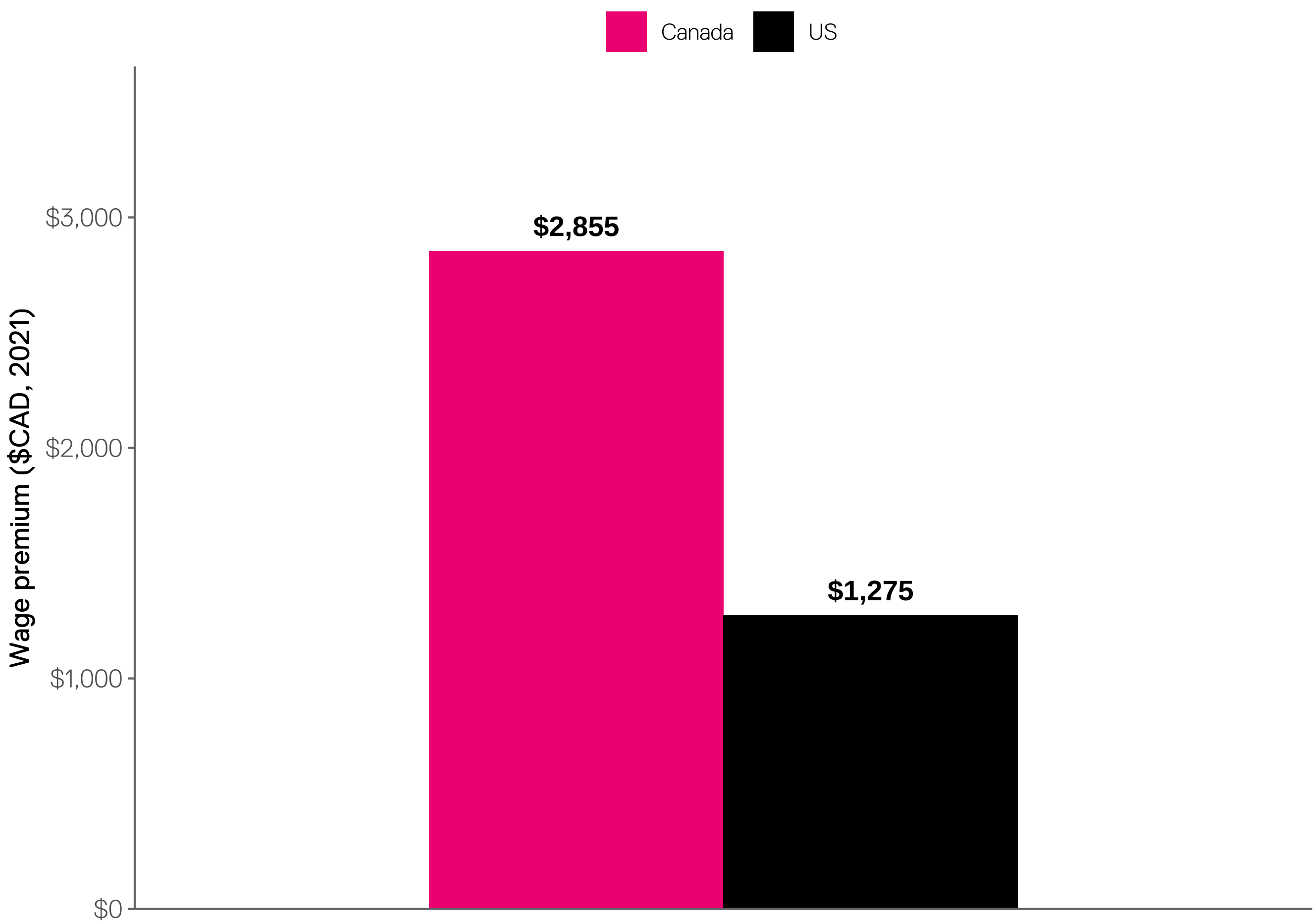


Bolded values indicate significance at a 5% level

After factoring in the tech hubs definition for each jurisdiction, we found that tech workers who are working in a tech hub in the US make a premium of $7,500 over those in a non-tech hub jurisdiction. However, working in a tech hub in Canada does not yield significant returns over working in a non-tech hub jurisdiction. Non-tech workers in the US also make a premium in working in areas that are designated as tech hubs, but not at the magnitude of tech workers ($4,650, compared to $7,500 for tech workers in tech hubs). This implies that agglomeration effects in tech hub cities are not specific to just tech industries.

Figure 16

Incremental wage premium to a $100 increase in average shelter costs for tech workers



Bolded values indicate significance at a 5% level

Finally, we explore the compensation impact of living in a jurisdiction with higher housing costs. Specifically, we focus on the net-pay increase associated with every $100 increase in housing costs. That is, what is the pay premium associated with moving from a city where one pays $1,600 in rent, to a city where one pays $1,700 in rent?

We find that in Canada, such a move is associated with an increase of $2,850 in annual wages for a tech worker. This at first glance is much larger than the $1,300 increase in annual wages to a tech worker in the US. However, we also need to keep in mind that shelter costs across the US have a wider range compared to Canada. The average monthly shelter cost in Canada ranges from $700 to $2,350 across all areas (with a standard deviation of $300), compared to a range of $1,050 to $5,650 in the US (with a standard deviation of $670). A worker who works in the area with the highest average monthly shelter costs in Canada (Wood Buffalo, Alberta) pays 1.7 times more than the national average, whereas a worker in the US area with the highest shelter costs (San Jose-Sunnyvale-Santa Clara) pays over twice the national average. This implies that in aggregate, it is likely that wage premiums to shelter costs are larger for tech workers in large US tech hubs such as San Francisco and Seattle compared to Canadian tech hubs such as Toronto and Vancouver, even if inter-city variations in shelter cost premiums are lower in the US.

As an example, the national average monthly shelter cost in Canada was $1,402 in 2021, whereas the average monthly shelter cost in Toronto was $1,936 (a $534 difference). This implies that a worker in tech who works in Toronto makes a premium of $15,250 over the average tech worker in Canada. Comparatively, the national average monthly shelter cost in the US was $2,360 in 2021, compared to $5,020 in San Francisco-Oakland-Berkeley. This indicates that roughly $34,000 in wages of a worker in tech in San Francisco-Oakland-Berkeley can be attributed to working in the metropolitan area when compared to the average tech worker across the US.

The combination of these results implies that while tech wages in Canada are compensated depending on shelter costs in an area, the agglomeration effects of being in a Canadian tech hub does not translate into higher wages and compensation. However, in the US, tech workers not only make a premium on higher shelter costs, but also have significant wage premiums attributed to working in areas with large tech networks. Though tech hubs capture some variation in the cost of living between areas, wage premiums continue to be significant for tech workers in the US, which is larger than wage premiums to working in the US for the average non-tech worker. After factoring in variation in shelter costs and the tech hubs in both countries, it is observed that the wage differential attributed to being in the US over Canada on tech workers' wages decreases to $15,800.

In aggregate, it is likely that wage premiums to shelter costs are larger for tech workers in large US tech hubs such as San Francisco and Seattle compared to Canadian tech hubs such as Toronto and Vancouver, even if inter-city variations in shelter cost premiums are lower in the US.

6

Non-wage compensation

As employment wages only capture a part of the benefits a tech worker receives, other types of benefits such as equity and stock options, refresh grants, and incentive pay for tech workers should be quantified. In addition, other factors and types of non-employer compensation that could affect a tech worker's decision on where to work could include health and dental benefits, tax rates, vacation days, and more. A high-level overview will compare and contrast these factors across the two countries.

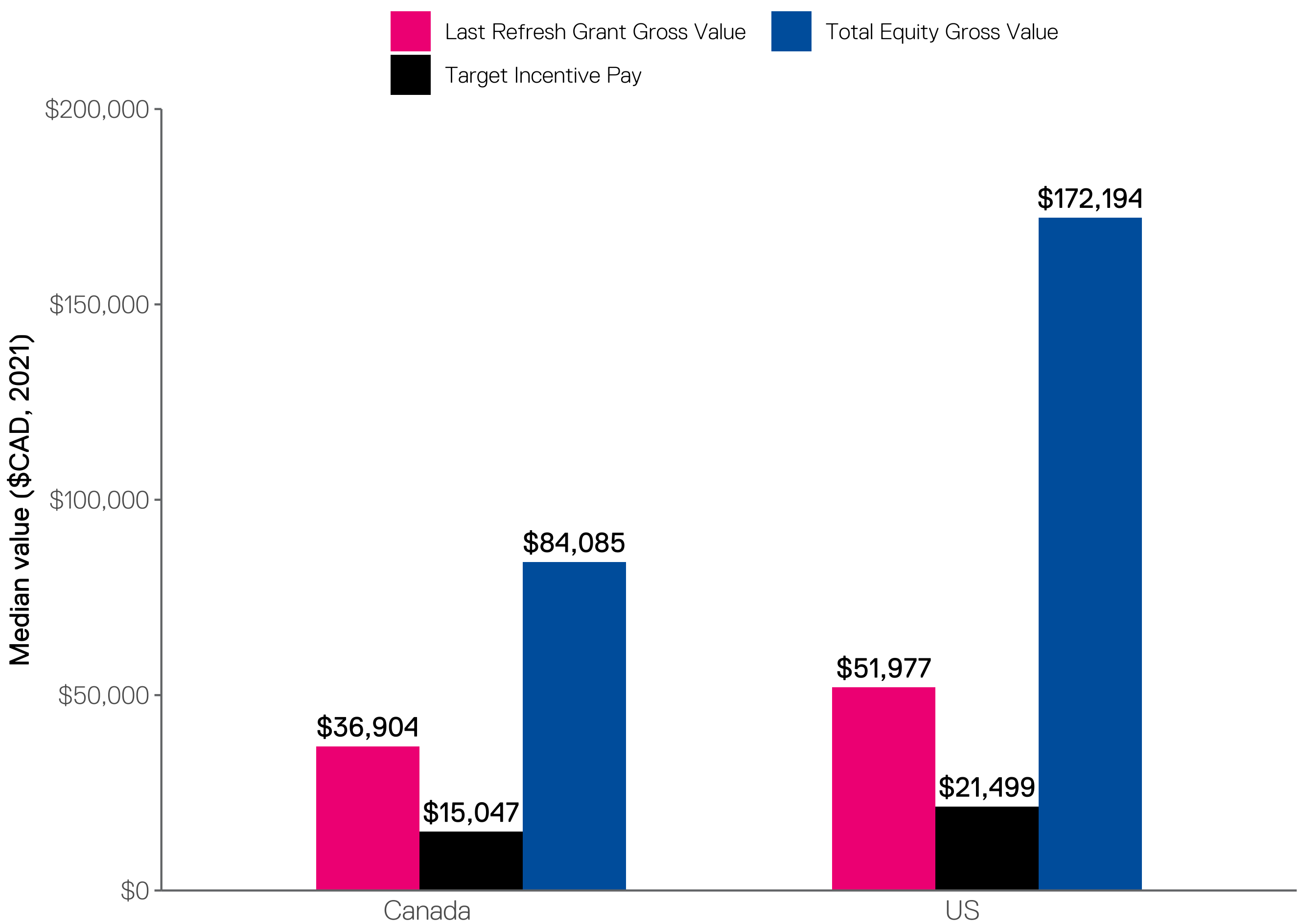
Using data from Option Impact by Pave,[72 73] we quantified three types of non-wage compensation for tech workers in the US and Canada.

1. **Refresh grants:** Refresh grants, or equity refreshers, are equity compensation packages given to existing employees to match initial equity compensation provided to new hires. Equity refreshers are often given to support talent retention and recognize long-term employees for their contributions to the firm.[74]
2. **Target incentive pay (Bonus):** Target incentive pay is provided to employees at the end of a calendar period (usually in a time frame of a year), and depends on the employees' ability to reach performance targets.
3. **Total equity gross value:** Total equity gross value is the current value of equity paid to employees of a firm. This is calculated assuming the shares have not been exercised, and any fees attached to the sale of shares has not been included.

Non-founder and non-executive employees in establishments of over 10 employees were examined according to jobs encompassing 85 occupations of varying levels of seniority.[75 76] Between 8,000 and 31,000 employees (depending on the compensation type) in the US were examined, and 900 to 5,000 employees (depending on the compensation type) in Canada for the timeframe spanning 2021 to 2022. A weighted average of the fiftieth percentile of non-wage earnings was calculated for each country and compensation type.

Figure 17

Median non-wage compensation for tech workers in Canada and the US



Tech workers in the US received higher non-wage compensation across all three types analyzed. The median tech worker in the US received 41 percent higher refresh grants than the median tech worker in Canada. Incentive pay was also greater in the US to a similar degree, with the median tech worker in the US receiving 43 percent higher incentive pay compensation than the median tech worker in Canada. However, the largest difference in non-wage compensation stems from value from equities/stock options. The median tech worker in the US is compensated with over twice as much in equity value than the median tech worker in Canada. This is a byproduct of the market capitalization of US tech companies far exceeding the value of Canadian tech firms. Meta (formerly Facebook), Amazon, Apple, Netflix and Alphabet (formerly Google) together known as FAANG[77] companies account for 21 percent of the S&P 500 index, amounting to over $9 trillion CAD in 2023.[78] [79] In comparison, the entire S&P/TSX index is valued at $4.2 trillion CAD.[80] Shopify, the largest Canadian tech company, is valued at $111 billion CAD;[81] this is contrasted with Apple, the largest US tech company, having a market capitalization of over $3 trillion CAD.[82] The findings from analyzing these three types of non-wage compensation tells us that while there is a significant gap in wages between the US and Canada for annual wages, it is most likely severely understated.

In addition, the distribution of the weighted averages spanning the twenty-fifth percentile tech worker compared to the seventy-fifth percentile tech worker in the US was also greater compared to Canada for non-wage earnings, as seen in Table 1. This matches up with the finding that there is higher inequity in pay in the US, which we covered in the earlier wage compensation section.

Table 1

Distribution of non-wage compensation value

Type of compensation	25th to 75th percentile ($CAD)	
	Canada	US
Last refresh grant	$14,200 - $91,400	$23,200 - $116,500
Target incentive pay	$15,400 - $29,600	$10,300 - $19,100
Total gross equity value	$30,200 - $233,100	$41,200 - $425,600

Although incentive bonuses, equities, and refresh grants are among the largest components of non-wage compensation, a sample of other types of non-wage compensation is presented and compared below to help understand potential drivers of a tech workers' decision on where to work.

Table 2

Comparative table of various forms of non-wage compensation between US and Canada

Type of compensation	US	Canada	Comparison
Health insurance	• Though the US does not have universal health care coverage as Canada does, many employers in tech offer competitive health care coverage, which could come in the form of medical, dental, and vision coverage, which the employer may pay partially or fully. • Top employers offer access to provider networks[83] [84] such as Health Maintenance Organizations (HMOs), which provide coverage for certain services defined within the plan's network. • While this often does not fully cover all costs of health care, some tech companies cover premiums and deductibles as well.	• Basic coverage for Canadians is publicly funded and free. This covers services that are deemed "medically necessary,"[85] which could include hospital visits and stays, doctor visits for preventative check-ups, ambulance services, etc.[86] • For offerings not covered under the public system, many companies offer partial coverage for dental services, prescription drugs, mental health, etc.	• While tech workers are likely to have lower insurance premiums than the average American, overall Canadians pay less for health care coverage compared to the US in 2021 ($8,563 CAD per capita in Canada[87] compared to $16,182 CAD per capita in the US,[88] or a difference of around $7,600 CAD). • Self-employed tech workers in Canada are provided private health insurance premiums under Canada's public health care system.

Table 2

Comparative table of various forms of non-wage compensation between US and Canada (cont.)

Type of compensation	US	Canada	Comparison
Remote work	• Many tech companies have offered remote work as an option pre-pandemic. However, the COVID-19 pandemic accelerated the adoption of flexible work arrangements, which has become an important consideration for many tech workers. • A 2022 survey of tech workers found that 85 percent of tech workers in the US conduct their job partially or fully remotely, with 48 percent working entirely remotely.[89 90] • Major tech companies headquartered in Silicon Valley such as Meta, Dropbox, and Airbnb offer fully-remote arrangements, though some companies may adjust compensation depending on employee location.[91]	• A survey by the TAP Network in 2022 found that 99 percent of Canadian tech companies provide workers the option to work partially or fully remotely. In addition, 78 percent of Canadian tech companies allow workers to live interprovincially, and 40 percent to work internationally.[92 93 94] • Canadian tech companies have led the way in offering remote work, with Shopify as one of the first tech companies announcing at the start of the pandemic its intentions of providing remote work to all employees indefinitely.[95]	• There is no concrete evidence that remote work offerings from tech companies vary much between the two countries, as there is an abundance of tech companies that offer hybrid and fully-remote work options. • The nature of remote work provides the ability for workers to perform their jobs across borders. Conceivably, a Canadian resident could be employed at an American tech firm while living in Canada or a lower cost-of-living jurisdiction in the US, subject to potential compensation adjustments.

Table 2

Comparative table of various forms of non-wage compensation between US and Canada (cont.)

Type of compensation	US	Canada	Comparison
Retirement and pensions	• Offerings from large tech companies often provide dollar-for-dollar matching on their employees' 401(k) up to a certain dollar amount or percentage of salary, or a 50 percent match on contributions up to an employee's IRS limit.[96] • Some companies base matching on the length of time employed at the company; for example, Apple provides 50 percent matching on three to six percent of base salary (depending on seniority) for the first two years, which goes up to 100 percent after five years.[97]	• Similar to the US, employers often provide matching for employees' contributions to their defined contribution plans. • Canadian companies typically offer around three to five percent matching for RRSP contributions.[98] A competitive offering from a tech company could vary depending on the company.	• In both countries, tech companies often provide "defined contribution" plans[99] which provide some level of matching, which could vary by base salary percentage and match rate. • Given that base salaries on average are greater in the US, pension benefits may be more competitive in the US as a function of the size of wage compensation alone. • In the US, the most common "defined contribution" plan is the traditional 401(k),[100] which functions like RRSPs in Canada.

Table 2

Comparative table of various forms of non-wage compensation between US and Canada (cont.)

Type of compensation	US	Canada	Comparison
Paid time off (PTO) and vacation pay	• According to the Fair Labor Standards Act (FLSA), employers are not required to pay employees for time taken off from work for vacation, sick leave, or federal holidays.[101] • However, the tech industry is generally insulated from this, as most, if not all large tech companies in the US provide some PTO and vacation time for their employees. • For many large tech companies, 10 to 20 days of PTO is standard. In some instances, paid time off is unlimited for US-based employees at some companies such as Microsoft and LinkedIn.[102] [103]	• All federally regulated employers must provide employees a minimum of two weeks of paid vacation every year, with vacation pay matching at least four percent of gross wages.[104] • While at least three weeks of vacation is standard across tech companies, companies such as Shopify provide unlimited paid time off (similar to what top tech companies are offering in the US).	• The big difference between the two countries for PTO and vacation pay is in Canada, employers have a legal obligation to provide PTO whereas this is not the case in the US. • As tech companies would often need to provide PTO/vacation packages in order to remain competitive, there is not a large discernable difference in these offerings between countries.

7

Implications for industry and policy makers

Why is this important?

These findings regarding compensation differences have stark implications on the overall landscape of Canada's tech sector. Coupled with the increasing cost of living in metropolitan tech hubs in Canada (the Greater Toronto Area and Greater Vancouver Area, in particular), the gap in compensation erodes the attraction of working in Canada for tech workers. Though it is estimated that four in five STEM graduates in Canada stay and work in the country, the proportion of Canadian graduates within computer science and engineering fields (which are more directly related to tech) working in the US is estimated to be as high as two-thirds of graduates.[105] Although growth in demand for tech talent in Canada has outpaced the US (with cities such as Calgary, Vancouver and Toronto observing a growth of 6.3 percent in digital skills growth compared to 4.7 percent growth in US regions such as San Francisco/ the Bay Area, Seattle and New York City),[106] Canadian tech wages continue to trail their American counterparts.

Although the large gap in tech workers' compensation between the US and Canada is a glaring issue, achieving a competitive tech labour market involves much more than just equating compensation levels. Capitalizing on the prosperity of a sector should include ensuring that all workers have the chance to participate. To build a thriving and competitive tech industry in Canada, it is important to do so responsibly, which includes ensuring that the relatively larger disparity in racial and gender wage outcomes that exists in the US tech industry is not replicated in Canada.

What needs to be done to address this issue?

In light of these findings, what are some actions that Canada could take to address this tech wage gap, and to support equitable distribution of opportunities in this sector within Canada? Though this report is concerned with competing with US tech firms in terms of wages, it is important to note that the goal is not necessarily to replicate the American model, as other goals such as equitable distribution should be prioritized as well.

While some may say a straightforward solution could be to simply pay workers more, this may not be feasible for many small- to medium-sized firms and start-ups. Policy on a national scale to construct a strategy to retain talent remains scant, even though the problem of brain drain and declining labour productivity has been recognized for a long time. Though Canada attracts top immigrant talent through relatively favourable immigration policies to patch some of its labour gaps, the problem of lower wages still persists. Furthermore, immigrants who work in Canada also have the potential to leave for the US in the future, which contributes to Canada's overarching struggles with retaining top tech talent.

Target #1: Boost growth in the tech ecosystem

In order for firms to be able to provide competitive wages, it is necessary to invest in home-grown tech companies that compete with US firms on a global scale. Fostering large anchor firms that are domestically headquartered could support the ability to afford higher wages for tech workers, create a more attractive and exciting environment for tech workers, and boost competitiveness and business dynamism. Business dynamism examines the rate of new entrant firms and exit rates of existing firms, and is linked to wage growth and worker mobility. A more dynamic start-up and scale-up ecosystem where there are a large number of highly productive firms correlates to a more competitive labour market for talent, which could incentivize companies to pay higher wages to workers through increased bargaining power for workers.[107] To achieve this, it is important to build a supportive start-up and scale-up environment, and provide investment-friendly incentives. A key part of this includes attracting foreign direct investment and venture capital.

Fostering large anchor firms that are domestically headquartered could support the ability to afford higher wages for tech workers, create a more attractive and exciting environment for tech workers, and boost competitiveness and business dynamism.

Case study: Estonia

Despite having a population of just over one million in 2021, Estonia boasts $915 in venture capital (VC) funding for start-ups per capita, which ranks the third highest among all countries with over one billion dollars in start-up investment.[108] This is greater than the US (with $808 in VC funding per capita), and Canada (with $271 in VC funding per capita). Among the supports which the Estonian government provide includes:

- No corporate tax on retained or reinvested profits: rather, a 20 percent tax on distributed profits is applied, in order to encourage reinvestment.
- A streamlined and low-cost start-up and scale-up visa program: Estonia's start-up visa is comparatively less expensive and has a shorter processing time (the fee in Canada is $2,140 for a five-year permanent residency[109] compared to €160-€190 in Estonia ($240-$285 in CAD),[110] and processing times in Canada span up to 36 months, compared to three to four weeks in Estonia).
- Lower barriers to post-secondary education: there are no tuition fees in Estonia for full-time students in Estonian programs; some programs taught in English, such as Bachelor of Science in Engineering programs cost between €4400-€6000 a year ($6,600 to $9,000 CAD)[111] and are free to EU citizens. Comparatively, the average engineering program in Canada costs $7,000 to $8,500 per semester. This supports a highly educated local workforce for firms looking to hire tech talent.

While the goal is not to replicate exactly the Estonian model or its outcomes, it is worth highlighting some policies which have supported the growth of a burgeoning tech ecosystem which could be leveraged to support attracting innovative firms and foreign capital.

Other considerations to boost the prosperity of the tech ecosystem in Canada include:

- R&D spending and supports: The federal government has a number of incentives to boost investment into tech R&D. This includes Scientific Research and Experimental Development (SR&ED) tax credits to Canadian businesses to encourage investment into research and development, and the Strategic Innovation Fund (SIF) which provides up to $10 million for companies to develop significant technological innovations.[112] [113] An expansion of these supports could be considered to specifically target growing technologies such as artificial intelligence, quantum computing, and clean tech, as well as funding specific to early-stage start-ups in tech.
- Support for employers to boost student and post-grad internship opportunities: Many students who completed an internship or co-op program returned to their employer full-time after graduation. Class profiles surveying the University of Waterloo's 2021 and 2020 Software Engineering graduates indicate that over 90 percent of students returned to their previous co-op employers for full-time opportunities.[114] [115] [116] While there is some selection bias present (91.4 percent of co-op students in 2021 worked in the US for at least one work term), establishing pathways to full-time employment (including with competitive compensation) could improve retention of Canadian-educated students.

Target #2: Develop fair, equitable and competitive distribution

While a growth-oriented policy (as presented above) is needed, if we only focus on that singular goal, we risk opening up new areas of pay inequity, and hazard the comparatively equal pay landscape in Canada. We need to ensure that our pursuit of growth and the ability to offer competitive wages does not come at the expense of equity-deserving communities. Some solutions could include:

- Reducing barriers to education (including training, skills, and digital literacy programs) especially for those with low-income: barriers could be from a cost perspective (which could be supported by grants and scholarships) or enrolment (which could be supported by the flexibility of programs, services to support the application process).
- Promoting pay transparency and salary reporting from employers, that serves to improve bargaining power by employees in negotiating pay.[117]
- Creating and supporting mentorship and career programs for underprivileged and equity seeking groups.
- Developing partnerships with universities and colleges to foster equitable tech talent growth.
- Fostering greater support for unions: evidence shows that more equitable pay distribution / smaller wage gaps are an outcome of unionized professions and sectors. Card, Riddell, and Lemieux (2020) found that while there are differences in wage outcomes when comparing private and public sectors, these gains were seen to be larger in Canada than the United States.[118] For workers in the professional, scientific and technical services industry, only 4.2 percent of employees belonged to a union as of 2022.[119] Supportive policies around unionization have the potential to reduce inequality in pay across race and gender.
- Extending in-demand skills pipelines starting from elementary school or high school: programs to increase awareness of the changing skills demand from employers would help students discover their interest and adequately prepare for a career in tech.

We need to ensure that our pursuit of growth and the ability to offer competitive wages does not come at the expense of equity-deserving communities.

8

Conclusion

Tech workers in the US were paid significantly more than tech workers in Canada. The pay gap between tech workers in Canada and the US is significant, even once purchasing power is taken into account. Accounting for all workers, the gap is 46 percent between countries. When examining full-time and full-year workers only, this gap reduces by 10 percent.

Pay inequity across gender, educational attainment, and race is much starker in the US than in Canada. Due to the underrepresentation of both women and those who don't hold a Bachelor's degree in both countries, closing the already smaller pay inequity in Canada did little to impact the overall pay gap. The dynamics of racial pay inequity in tech looked vastly different between the two countries; this is much more apparent in the US, where pay associated with one's racial identity ranges 83 percent from the highest paid tech workers (those who are South Asian) compared to the lowest paid tech workers (those who are American Indian / Alaskan Native (Indigenous) workers).

Tech pay in Canada was also geographically dispersed, while it paid to be a tech worker in a major tech hub in the US. Tech workers in the US had much to gain by working within key tech hubs in the country. While this effect is somewhat dampened when factoring in housing costs at those hubs, the pay premium is still notable, given that there are no strong pay benefits for tech workers in Canada who are located in tech hubs in this country.

Taking non-wage compensation into account, it is likely that the tech compensation gap is understated. The median compensation in terms of equity and stock options, refresh grants, and incentive pay for a tech worker in the US is significantly higher than for a tech worker in Canada. At a minimum, compensation from refresh grants and incentive pay is 40 percent higher for the median tech worker in the US, with equity value twice as large for tech workers in the US. In the same vein as wage compensation being comparatively higher, the gap in non-wage compensation is a function of tech companies in the US having greater valuations than Canadian tech firms.

As much as compensation is the main driver, fostering a flourishing ecosystem where workers can contribute to the development of innovative products and services is part of the consideration around retaining talent. Supporting the attraction and growth of early-stage tech companies and the development of home-grown anchor firms, and providing them with the right incentives to grow is a piece of the puzzle. Establishing a dynamic ecosystem of highly productive and innovative firms could support more competitive wage offerings, as workers are afforded increased mobility and bargaining power. Furthermore, providing incentives outside of wages for tech workers (e.g., internships with established career pathways, and mentorship programs) and the opportunity to contribute to the development of new and innovative technologies could support the retention of top talent in Canada.

In addition to growing its overall competitiveness, there are other important considerations to consider when achieving a competitive tech landscape. Namely, parity in compensation for equity-deserving groups is a main consideration to ensure that existing inequalities in the labour market are not exacerbated. We see this in the US, where the distribution in wage outcomes is comparatively more uneven across race, gender, and education credentials. Responsibly distributing the wealth and prosperity that would result from the expansion of the tech sector should include equal access to participation, skills and training in addition to compensation parity.

Appendices
Appendix A: Tech workers definition

Updates to the original crosswalk, outlined in Appendix A in "Who are Canada's Tech Workers?",[120] were published in 2022.[121] The changes were made to the crosswalk to accommodate the release of the 2021 NOC definitions. In addition, for the Canadian tech occupations classification, the NOC 21211 for Data Scientist was manually coded as a tech job, as it was not originally identified in the tech workers' definition crosswalk due to the lack of O*NET data available for this job. The following changes to occupations defined as tech jobs between the 2021 and 2016 NOC are outlined below.

Table A.1 - 2016 to 2021 NOC concordance

2021 NOC tech jobs	2016 NOC tech jobs
The following jobs (or equivalents) were included in both concordances:	
Computer systems developers and programmers	Computer programmers and interactive media developers
Software developers and programmers	
Software engineers and designers	
Aerospace engineers	
Mechanical engineers	
Computer network and web technicians	Computer network technicians
Computer engineers (except software engineers and designers)	
Telecommunication carriers managers	
Database analysts and data administrators	
Web designers	Web designers and developers
Web developers and programmers	
Information systems testing technicians	
Electrical and electronics engineers	
Mining engineers	
Geological engineers	
Chemical engineers	
Telecommunications equipment installation and cable television service technicians	Telecommunications line and cable workers
	Cable television service and maintenance technicians
Industrial designers	
Broadcast technicians	
Telecommunications installation and repair workers	
Information systems specialists	Information systems analysts and consultants
Computer and information systems managers	
Other professional engineers, n.e.c.	
Physicists and astronomers	

The following jobs were added in the 2021 concordance:	The following jobs were removed in the 2016 concordance:
Data scientists	Technical occupations in geomatics and meteorology
Other professional occupations in physical sciences	Engineering managers
Cybersecurity specialists	Mathematicians, statisticians and actuaries
	Petroleum engineers
	Audio and video recording technicians
	Electrical and electronics engineering technologists and technicians
	Civil engineers
	User support technicians
	Metallurgical and materials engineers

For the US tech occupations classification, some jobs were manually added to match the Canadian classification, in addition to the original output of identified tech jobs from the same methodology applied to SOC occupations. As SOC occupations are grouped together differently in each data set (CPS-ASEC, ACS, and OEWS) a different set of jobs were manually coded as tech occupations.

In the CPS-ASEC and ACS, the following jobs were manually coded as tech jobs:

Table A.2 - Manually identified tech occupations in the CPS-ASEC and ACS

SOC code	Occupation name
15-1230 (15-1231 and 15-1232)	Computer support specialists, including: • Computer network support specialists • Computer user support specialists
15-124X (15-1241, 15-1242, 15-1243, 15-1244)	Database and Network Administrators and Architects, including: • Computer network architects • Database administrators • Database architects • Network and computer systems administrators
15-1252	Software developers
17-2121	Marine engineers and Naval architects
17-2199	Engineers, All other
19-2010 (19-2011 and 19-2012)	Astronomers and Physicists
19-2099	Physical scientists, All other
49-2020 (49-2021 and 49-2022)	Radio and Telecommunications Equipment Installers and Repairers, including: • Radio, Cellular, and Tower equipment installers and repairers • Telecommunications equipment installers and repairers, except line installers

In the OEWS, the following jobs were manually coded as tech jobs:

Table A.3 - Manually identified tech occupations in the OEWS

SOC code	Occupation name
15-1252	Software developers
19-2099	Physical scientists, All other
15-2051	Data scientists
17-2071	Electrical engineers
17-2151	Mining and geological engineers, including Mining safety engineers
17-2199	Engineers, All other
17-2111	Health and safety engineers, except Mining safety engineers and Inspectors
17-2121	Marine engineers and Naval architects

The full list of SOC occupations classified as tech that were available in all data sets are detailed below.

Table A.4 - SOC tech occupations

SOC code	Occupation name
11-3021	Computer and information systems managers
15-1211	Computer systems analysts
15-1212	Information security analysts
15-1221	Computer and information research scientists
15-1230	Computer support specialists
15-1241	Computer network architects
15-1244	Network and computer systems administrators
15-124X	Database administrators and architects
15-1251	Computer programmers
15-1252	Software developers
15-1253	Software quality assurance analysts and testers
15-1254	Web developers
15-1255	Web and digital interface designers
17-2011	Aerospace engineers
17-2031	Bioengineers and biomedical engineers
17-2041	Chemical engineers
17-2061	Computer hardware engineers
17-2070	Electrical and electronics engineers
17-2121	Marine engineers and naval architects
17-2141	Mechanical engineers
17-2199	Engineers, all other
19-2010	Astronomers and physicists
19-2099	Physical scientists, all other
27-1021	Commercial and industrial designers
49-2020	Radio and telecommunications equipment installers and repairers
49-9052	Telecommunications line installers and repairers

Appendix B - Regression analysis

A series of three regressions were constructed. The first regression follows the functional form:

$$wages_i = \beta_0 + \beta_1 GEO_i + \beta_2 GENDER_i + \beta_3 WORK_i + \beta_4 TECH_i + \beta_5 EDU_i + \epsilon_i$$

where the dependent variable $wages_i$ represents the average annual before-tax wages in an occupation, $GEO_i \in \{0, 1\}$, $GENDER_i \in \{0, 1\}$, $WORK_i \in \{0, 1\}$ and $TECH_i \in \{0, 1\}$ are dummy variables representing the country of work (US or Canada), gender (Male or Female workers), work type (full-time and full-year workers or otherwise), and an identifier for tech or non-tech occupations. EDU_i is a categorical variable representing the highest education credential obtained. The base groups for the variables are male for gender, no degree or high school diploma for education credential, Canada for country of work, and full-time/full-year for work type. The regression was run subsetting for Canada data only and US data only, as well as for both data sets together to estimate the attribution of wage premiums to the US for a tech worker. The index i represents each occupation (NOC or SOC).

The second regression follows the form:

$$wages_i = \beta_0 + \beta_1 RACE_i + \beta_2 GENDER_i + \beta_3 TECH_i + \epsilon_i$$

where the dependent variable $wages_i$ represents the average annual before-tax wages in an occupation, $RACE_i$ is a categorical variable representing racial identity, $GENDER_i$ is a dummy variable representing Male or Female workers, and $TECH_i$ is an identifier for tech or non-tech occupations. The index i represents each occupation (NOC or SOC).

The third regression follows the form:

$$wages_{i,j} = \beta_0 + \beta_1 SHELTER_{i,j} + \beta_2 TECHHUB_{i,j} + \beta_3 TECH_{i,j} + \beta_4 GEO_{i,j} + \epsilon_{i,j}$$

where the dependent variable $wages_{i,j}$ represents the average annual before-tax wages in an occupation, $SHELTER_{i,j}$ is a numeric variable representing the average shelter cost of a region, $TECHHUB_{i,j}$ is a dummy variable identifying whether a region is classified as a tech hub, $TECH_i$ is an identifier for tech or non-tech occupations, and $GEO_{i,j}$ is a variable representing the country of work (US or Canada). The index *i* represents each occupation (NOC or SOC), and the index *j* represents a geographic region (which could either be a specific metropolitan area or a non-metropolitan area).

It is assumed that the OLS assumptions of exogeneity, zero-mean and heteroscedastic errors hold. Given the availability of characteristics in the data that was present at the time of the creation of this report, the set-up of these regressions may be subject to some omitted variable bias. However, we assume that the messaging of the findings in this report do not vary materially as a result.

Appendix C - All regression tables

Table A.5: US and Canada, all occupations (education credential, gender, work type, country)

Variable	Estimates and standard errors	Occupation type
Intercept	**84,849.2*** ** (9,018.1)	Tech
Bachelor's degree	**23,438.1** ** (9,569.0)	
College diploma	14,613.5 (9,779.6)	
Doctorate	**54,951.4*** ** (10,056.9)	
High school	4,220.3 (9,802.2)	
Master's degree	**36,374.9*** ** (9,636.2)	
Female	**-18,779.5*** ** (3,872.5)	
US	**30,741.1*** ** (3,984.7)	
Part-time	**-53,163.6*** ** (3,870.0)	
Intercept	**61,453.7*** ** (1,118.1)	Non-tech
Bachelor's degree	**20,276.9*** ** (1,247.4)	
College diploma	**12,997.1*** ** (1,264.3)	
Doctorate	**50,337.4*** ** (1,651.7)	
High School	**7,682.8*** ** (1,238.1)	
Master's degree	**31,951.0*** ** (1,325.5)	
Female	**-12,694.7*** ** (721.6)	
US	**11,828.8*** ** (742.7)	
Part-time	**-39,572.1*** ** (722.1)	

OLS regression on average annual wages paid to workers (in 2021 Canadian dollars). ***:p<0.01; **:p<0.05; *:p<0.1
Highlighted text indicates numbers presented in the main body of the report.

Table A.6: Canada, all occupations (education credential, gender, work type)

Variable	Estimates and standard errors	Occupation type
Intercept	**96,239.3***** (5,116.0)	Tech
Bachelor's degree	**11,925.4**** (5,552.0)	
College diploma	4,891.2 (5,629.0)	
Doctorate	**28,117.0***** (5,732.2)	
High School	-1,126.9 (5,671.7)	
Master's degree	**16,375.5***** (5,581.3)	
Female	**-15,667.3***** (2,315.2)	
Part-time	**-51,451.7***** (2,311.3)	
Intercept	**63,045.5***** (822.1)	Non-tech
Bachelor's degree	**16,033.2***** (959.2)	
College diploma	**11,889.3***** (956.6)	
Doctorate	**31,544.8***** (1,225.4)	
High School	**6,764.7***** (958.3)	
Master's degree	**22,680.1***** (1,002.2)	
Female	**-10,323.0***** (562.5)	
Part-time	**-36,389.4***** (561.7)	

OLS regression on average annual wages paid to workers (in 2021 Canadian dollars). ***:p<0.01; **:p<0.05; *:p<0.1
Highlighted text indicates numbers presented in the main body of the report.

Table A.7: US, all occupations (education credential, gender, work type)

Variable	Estimates and standard errors	Occupation type
Intercept	**88,064.8*** ** (23,496.7)	Tech
Bachelor's degree	**51,595.0**** (24,895.3)	
College diploma	37,834.8 (25,699.5)	
Doctorate	**116,825.6***** (26,946.4)	
High School	21,974.5 (25,559.3)	
Master's degree	**76,469.5***** (25,115.8)	
Female	**-24,993.2***** (9,461.1)	
Part-time	**-55,298.2***** (9,463.7)	
Intercept	**68,807.3***** (2,544.8)	Non-tech
Bachelor's degree	**28,549.2***** (2,848.5)	
College diploma	**15,933.2***** (2,956.0)	
Doctorate	**89,565.5***** (4,010.7)	
High School	**11,751.6***** (2,805.3)	
Master's degree	**49,009.6***** (3,104.1)	
Female	**-16,942.8***** (1,603.1)	
Part-time	**-43,669.5***** (1,609.5)	

OLS regression on average annual wages paid to workers (in 2021 Canadian dollars). ***:p<0.01; **:p<0.05; *:p<0.1
Highlighted text indicates numbers presented in the main body of the report.

Table A.8: Canada, all occupations (race, gender)[122]

Variable	Estimates and standard errors	Occupation type
Intercept	**75,301.4***** (3,167.2)	Tech
Arab	**-9,913.8**** (4,883.4)	
Black	**-8,690.9*** (4,644.9)	
Chinese	-1,024.3 (4,391.4)	
Filipino	-4,442.5 (4,904.7)	
Japanese	**18,357.8***** (6,008.0)	
Korean	3,371.5 (5,347.6)	
Latin American	2,688.8 (4,929.8)	
Multiple visible minorities	1,527.8 (5,268.2)	
South Asian	**-9,052.7**** **(4,432.5)**	
Southeast Asian	-2,029.5 (5,100.4)	
Visible minority, n.i.e.	**11,611.9**** (5,876.4)	
West Asian	-1,948.5 (4,831.3)	
Female	**-8,504.6***** (2,153.7)	
Intercept	**52,740.5***** (734.6)	Non-Tech
Arab	**-5,511.0***** (1,173.3)	
Black	**-5,880.5***** (1,083.5)	
Chinese	**-3,406.8***** (1,084.0)	
Filipino	**-2,142.6*** (1,127.2)	
Japanese	**10,585.9***** (1,503.9)	
Korean	-1,905.4 (1,351.3)	

Latin American	**-2,841.3**** (1,140.7)	
Multiple visible minorities	-492.3 (1,246.3)	
South Asian	**-5,507.0***** (1,053.3)	
Southeast Asian	**-2,472.8**** (1,207.4)	
Visible minority, n.i.e.	1,831.0 (1,333.0)	
West Asian	**-6,941.4***** (1,239.7)	
Female	**-9,606.3***** (517.4)	

OLS regression on average annual wages paid to workers (in 2021 Canadian dollars). ***:p<0.01; **:p<0.05; *:p<0.1
Highlighted text indicates numbers presented in the main body of the report.

Table A.9: US, all occupations (race, gender)[123]

Variable	Estimates and standard errors	Occupation type
Intercept	**125,084.7***** (6,475.3)	Tech
American Indian and/or Alaskan Native	**-18,716.9**** (9,266.7)	
Black	**-20,215.0**** (8,840.5)	
Chinese	13,811.2 (8,887.1)	
Filipino	14,324.9 (9,149.0)	
Japanese	**15,781.0*** (9,398.3)	
Korean	12,224.1 (9,206.6)	
Latin American	**-31,803.7***** (8,076.3)	
Multiple visible minorities	-5,456.2 (8,795.7)	
Native Hawaiian or Pacific Islander	-5,487.8 (11,082.8)	
South Asian	**18,531.7**** (8,887.1)	
Southeast Asian	-2,691.3 (9,036.8)	
Visible minority, n.i.e.	-8,958.4 (8,886.8)	
Female	**-11,803.4***** (3,604.5)	
Intercept	**80,164.2***** (1,862.0)	Non-Tech
American Indian and/or Alaskan Native	**-12,160.5***** (2,656.8)	
Black	**-9,129.8***** (2,548.7)	
Chinese	**9,986.5***** (2,701.9)	
Filipino	951.7 (2,676.9)	
Japanese	**14,058.9***** (3,023.1)	
Korean	**10,156.3***** (2,846.9)	

Latin American	**-21,725.6***** (2,270.1)	Non-Tech
Multiple visible minorities	**-4,750.2*** (2,533.3)	
Native Hawaiian or Pacific Islander	**-9,408.1***** (3,119.4)	
South Asian	**11,749.2***** (2,724.3)	
Southeast Asian	-2,845.1 (2,711.0)	
Visible minority, n.i.e.	**-7,932.3***** (2,555.5)	
Female	**-12,994.4***** (1,073.0)	

OLS regression on average annual wages paid to workers (in 2021 Canadian dollars). ***:p<0.01; **:p<0.05; *:p<0.1
Highlighted text indicates numbers presented in the main body of the report.

Table A.10: Canada, all occupations (average shelter costs, tech hub status)

Variable	Estimates and standard errors	Occupation type
Intercept	**46,930.4***** (3,536.2)	Tech
Average shelter cost	**2,855.0***** (2.7)	
Tech hub	615.0 (2,996.2)	
Intercept	**38,065.0***** (783.7)	Non-Tech
Average shelter cost	**1,712.0***** (0.6)	
Tech hub	**-3,952.0***** (754.0)	

OLS regression on average annual wages paid to workers (in 2021 Canadian dollars). ***:p<0.01; **:p<0.05; *:p<0.1
Highlighted text indicates numbers presented in the main body of the report.

Table A.11: US, all occupations (race, gender)

Variable	Estimates and standard errors	Occupation type
Intercept	**83,098.9***** (1,122.9)	Tech
Average shelter cost	**1,275.0***** (0.6)	
Tech hub	**7,490.7***** (1,318.9)	
Intercept	**53,918.3***** (334.4)	Non-Tech
Average shelter cost	**8,638.0***** (0.2)	
Tech hub	**4,658.0***** (430.3)	

OLS regression on average annual wages paid to workers (in 2021 Canadian dollars). ***:p<0.01; **:p<0.05; *:p<0.1

Highlighted text indicates numbers presented in the main body of the report.

Appendix D - Tech workers classification in Option Impact

Seventy jobs across nine job families in the Option Impact data set were manually classified as tech. Table A.12 details the job titles and families below.

Table A.12: List of jobs identified as tech within Option Impact

Job Family	Job Titles

Software (SW) development & engineering	Software Engineering
	SW Engineering, Manager
	SW Engineering, Director
	SW Engineer (Levels 1-6)
	SW Intern
	SW Technician, Senior

Software Quality Assurance (QA) and Test	SQA, Manager SQA, Director SQA Engineer (Levels 1-5) SQA Technician SQA Technician, Senior
Hardware engineering	HW Engineering, Manager HW Engineering, Director HW Engineer (Levels 1-6) HW Technician HW Technician, Senior
Hardware Quality Assurance (QA) & Test	HQA Engineer (Levels 2-3) HQA Technician HQA Technician, Senior
Web engineering	Web Engineering, Manager Web Engineering, Director Web Engineer (Levels 1-4)
Information technology	IT, Manager IT, Director IT Engineer (Levels 1-5) IT Technician IT Technician, Senior
Data science	Data Science, Manager Data Science Director Data Science (Levels 1-5) Data Science Intern
Development operations (DevOps)	DevOps, Manager DevOps, Director DevOps (Levels 1-6)
Data/Algorithm engineering	Data/Algo Engineering Manager Data/Algo Engineer (Levels 1-5)

Appendix E - Race, racialized identity and visible minority classifications

When citing information from reports, journal articles, or other research sources, we adhere to the terminology employed by the authors of those sources. For Canada, this involves the use of the term ‘visible minorities,’ a phrase utilized by Statistics Canada for statistical purposes, which is also outlined in the Employment Equity Act. Visible minority status refers to a person’s racialized identity or ethnic origin to describe “persons, other than Indigenous peoples, who are non-Caucasian in race or non-white in colour”.[124] In the US, the U.S. Census Bureau equivalent to describing visible minorities or racialized identities is referred to as race. Canada categorizes Latin American (or Latino) as a visible minority identity, whereas in the US this is a separate categorization from race. Rather, it is categorized as a Hispanic origin status, where a worker can identify as having an ethnic background from a Hispanic country (where a Latin American identity is a subset of these countries), or if they do not identify as Hispanic. This would invariably would lead to some double counting (e.g., someone can identify as White and Latin American, and will be counted in the average wage estimation for both categories), but we assume that this does not significantly distort the income estimates for race given that there are 25 million who identify as Latin American compared to 166 million total workers.

Visible minority identity in Canada is separate from Indigenous identity, whereas in the US this is included as a categorization under race (referred to as “American Indian and/or Alaskan Native”). An analysis on Indigenous workers in Canada is not included in this study given that the employment and wage data for the 2021 Canadian census was not available during the writing of the report.

Furthermore, the alignment of visible minority and race is not exact - for example Arab, Middle Eastern, West Asian and North African identities are classified as “White” under Race (in the US), while these are separate categorizations in the Canadian context for visible minority. The racial identities of Chinese, Japanese, Korean, Filipino, South Asian, Southeast Asian were separately identified, following the breakdown of visible minority identities in the Canadian census. This was done to provide understanding of broader racial labour market outcomes according to the specificity that the data allows throughout both data sets.

End Notes

[1] Viet Vu, *Further and Further Away: Canada's Unrealized Digital Potential*, Brookfield Institute for Innovation + Entrepreneurship, https://brookfieldinstitute.ca/wp-content/uploads/Further-and-Further-Away-report.pdf.

[2] QS World University Rankings, QS World University Rankings by Subject 2022: Engineering & Technology, https://www.topuniversities.com/university-rankings/university-subject-rankings/2022/engineering-technology.

[3] Hired, State of Salaries Report: 2018, https://hired.com/state-of-salaries-2018.

[4] Sean Silcoff, "Canada Facing 'Brain Drain' As Young Tech Talent Leaves for Silicon Valley," *The Globe and Mail*, May 3, 2018, https://www.theglobeandmail.com/business/technology/article-canada-facing-brain-drain-as-young-tech-talent-leaves-for-silicon/.

[5] Holly Oegema, Ryan Wang, Spencer Dobrik, Stephen Melinyshyn and William Lo, Software Engineering 2020 Class Profile, University of Waterloo, June 2020, https://uw-se-2020-class-profile.github.io/profile.pdf.

[6] Statistics Canada, Gross Domestic Product (GDP) at Basic Prices, By Industry, Monthly, Growth Rates (x 1,000,000), https://doi.org/10.25318/3610043401-eng.

[7] Organisation for Economic Co-operation and Development (OECD), Gross Domestic Spending on R&D, https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm.

[8] Specifically, this compares the compound annual growth rate in expenditures for research and development into natural sciences and engineering as a percentage of GDP between 1981-2000 and 2000-2021.

[9] Statistics Canada, Gross Domestic Expenditures on Research and Development, by Science Type and by Funder and Performer Sector (x 1,000,000), https://doi.org/10.25318/2710027301-eng.

[10] Statistics Canada, Gross Domestic Product, Expenditure-based, Provincial and Territorial, Annual (x 1,000,000), https://doi.org/10.25318/3610022201-eng.

[11] National Science Foundation, National Center for Science and Engineering Statistics, and U.S. Census Bureau, Survey of Industrial R&D, Table 8: Funds for industrial R&D performance in the United States, by industry and size of company and by technology area: 2002, https://wayback.archive-it.org/5902/20160210163622/http://www.nsf.gov/statistics/nsf06322/tables.htm.

[12] National Center for Science and Engineering Statistics. Business Enterprise Research and Development (BERD) Survey, 2020, Table 19: Companies with domestic R&D paid for by the company and others and performed by the company in the software products and embedded software technology focus area, by industry and company size, https://ncses.nsf.gov/pubs/nsf23314.

[13] The compound average growth rates compare the years 2002 to 2020. US tech R&D is calculated as domestic R&D investment in software products.

[14] Statistics Canada, Labour Productivity and Related Measures by Business Sector Industry and by Non-commercial Activity Consistent with the Industry Accounts, https://doi.org/10.25318/3610048001-eng.

[15] Oegema et al, Software Engineering 2020 Class Profile, University of Waterloo, June 2020, https://uw-se-2020-class-profile.github.io/profile.pdf.

[16] Patrick Lam, Derek Rayside, Kashish Goel, Andrew Xia, Roxanne Fruytier, Nader Sabahi, Jaxon Lin, Jenny Wills, Aravinda Segu and Akshay Pall, Software Engineering 2021 Class Profile, University of Waterloo, 2021, https://sexxis.github.io/classprofile/.

[17] Andy Zhang, Software Engineering 2018 Class Profile, University of Waterloo, 2021, https://classprofile.andyzhang.net.

[18] Statistics Canada. Labour Productivity and Related Measures By Business Sector Industry, https://doi.org/10.25318/3610048001-eng

[19] Viet Vu, *Further and Further Away: Canada's Unrealized Digital Potential*, Brookfield Institute for Innovation + Entrepreneurship, https://brookfieldinstitute.ca/wp-content/uploads/Further-and-Further-Away-report.pdf.

[20] The gap is similar on a per-hour basis, inflation adjusted.

[21] 2021 Census data for employment income was collected for the 2020 calendar year, according to Statistics Canada; Statistics Canada, Dictionary: Census of Population, 2021: Employment Income, https://www12.statcan.gc.ca/census-recensement/2021/ref/dict/az/definition-eng.cfm?ID=pop027.

[22] This includes net self-employment income and paid employment with a business, for all farm and non-farm businesses. Income from the Canada Emergency Response Benefit (CERB) does not count under employment income.

[23] The 2021 version of the National Occupational Classification has 516 five-digit occupations, more than the 500 occupations in the 2016 version.

[24] Jointly sponsored between the U.S. Census Bureau and the U.S. Bureau of Labor Statistics (BLS).

[25] The American Community Survey is conducted by the U.S. Census Bureau.

[26] Metropolitan Statistical Areas correspond to the Canadian equivalent of Census Metropolitan Areas, where at least 50,000 inhabitants live in an urban centre. Non-metropolitan areas correspond to the Canadian equivalent of Census Agglomerations, with at least 10,000 inhabitants but no more than 50,000.

[27] Organisation for Economic Co-operation and Development (OECD), Purchasing Power Parities (PPP), https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm.

[28] Viet Vu and Sihwa Kim, Are Tech Jobs More Pandemic-proof? Brookfield Institute for Innovation + Entrepreneurship, August 2020, https://brookfieldinstitute.ca/are-tech-jobs-more-pandemic-proof.

[29] Calculations were made using data from the May 2020 and 2021 tables published by the U.S. Bureau of Labour Statistics' Occupational Employment and Wage Statistics (OEWS), https://www.bls.gov/oes/tables.htm.

[30] Averaged over an assumed 1.7 percent and 2.1 percent for all occupations from two Statistics Canada sources; Statistics Canada, Employee Wages by Occupation, Annual, 1997 to 2022, https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=1410034001; Statistics Canada. Employee Wages by Industry, Annual, https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410006401.

[31] Viet Vu, Asher Zafar and Creig Lamb, *Who are Canada's Tech Workers?* Brookfield Institute for Innovation + Entrepreneurship, January 2019, https://brookfieldinstitute.ca/wp-content/uploads/FINAL-Tech-Workers-ONLINE.pdf.

[32] See Appendix A for modifications made to the tech workers definition.

[33] 867 detailed SOC codes were grouped into 566 occupations in the 2021 CPS-ASEC (cross-walked from 2018 Census Occupation codes), 826 occupations in the 2021 OEWS, and 531 occupations in the 2021 ACS. Occupations in the 2021 Canadian Census are classified into 516 five-digit NOC codes.

[34] These proportions only include those who are employed and/or at work.

[35] LinkedIn STEM Classification Methodology, LinkedIn Technical Note, February 2023, https://economicgraph.linkedin.com/content/dam/me/economicgraph/en-us/PDF/linkedin-stem-classification-methodology-egtn01.pdf.

[36] U.S. Bureau of Labor Statistics, Employment Projections: Employment in STEM Occupations, https://www.bls.gov/emp/tables/stem-employment.htm.

[37] See Appendix A for a full list of occupations and more information on how the definitional framework was constructed.

[38] See Appendix E for details on race categorizations between the US and Canada.

[39] Full-time workers are defined as those who usually work 35 or more hours per week, according to the Bureau of Labor Statistics, Concepts and Definitions (CPS); U.S. Bureau of Labor Statistics, Labor Force Statistics from the Current Population Survey: Concepts and Definitions (CPS), https://www.bls.gov/cps/definitions.htm#fullparttime.

[40] A full-year or year-round worker is defined as a worker who worked 50 to 52 weeks a year, as defined by the Bureau of Labor Statistics', "Work Experience Technical Note"; U.S. Bureau of Labor Statistics, Work Experience Technical Note, Economic News Release, https://www.bls.gov/news.release/work.tn.htm.

[41] For those who report being at work within the past year.

[42] Full-time work is defined by Statistics Canada as working at least 30 hours per week at a worker's primary job. However, in the CPS-ASEC, full-time work is defined as working at least 35 hours a week. It is assumed that this disparity has a negligible impact on aggregated wage outcomes.

[43] Government of Canada, EI Maternity and Parental Benefits, https://www.canada.ca/en/services/benefits/ei/ei-maternity-parental.html.

[44] U.S. Department of Labor, Family and Medical Leave (FMLA), https://www.dol.gov/general/topic/benefits-leave/fmla.

[45] Lisa Kim, "Google Just Increased Parental Leave to 24 Weeks-Here's How That Compares to Other Tech Giants," Forbes, April 14, 2022, https://www.forbes.com/sites/lisakim/2022/01/27/google-just-increased-parental-leave-to-24-weeks-heres-how-that-compares-to-other-tech-giants/?sh=37e44842b33d.

[46] Statistics Canada, Labour Force Characteristics by Sex and Detailed Age Group, Annual, https://doi.org/10.25318/1410032701-eng.

[47] U.S. Bureau of Labor Statistics, Employment Projections: Civilian Labor Force Participation Rate by Age, Sex, Race, and Ethnicity, https://www.bls.gov/emp/tables/civilian-labor-force-participation-rate.htm.

[48] Valerie Wilson and William Darity Jr., *Understanding Black-White Disparities in Labor Market Outcomes Requires Models that Account for Persistent Discrimination and Unequal Bargaining Power.* Economic Policy Institute, March 25, 2022, https://epi.org/215219.

[49] Flo Nicolas, "Women in Technology: The Problematic Statistics & The Change Required," LinkedIn, December 12, 2022, https://www.linkedin.com/pulse/women-technology-problematic-statistics-change-flo-nicolas-esq/; Abby McCain, "40 Telling Women in Technology Statistics," Zippia, October 31, 2022, https://www.zippia.com/advice/women-in-technology-statistics/.

[50] Wage outcomes for Indigenous people in Canada were not analyzed due to the lack of data available.

[51] Indigenous peoples in the United States are categorized in the ACS as "American Indian and/or Alaskan Native."

[52] In the ACS, the race categorization of "White" refers to those who have origins in Europe, the Middle East, or North Africa, whereas in the Canadian census these groups are analyzed separately.

[53] BPTN, "The State of Black Canadians in STEM," Obsidi by BPTN, February 13, 2023, https://obsidi.com/the-state-of-black-canadians-in-stem/.

[54] Jan Shelly Brown, Matthew Finney, Mark McMillan, and Chris Perkins, "How to Close the Black Tech Talent Gap," McKinsey & Company, February 3, 2023, https://www.mckinsey.com/bem/our-insights/how-to-close-the-black-tech-talent-gap.

[55] Valerie Wilson and William Darity Jr. 2022, *Understanding Black-White Disparities in Labor Market Outcomes Requires Models that Account for Persistent Discrimination and Unequal Bargaining Power*, Economic Policy Institute, March 25,2022, https://epi.org/215219.

[56] U.S. Bureau of Labor Statistics, "Labor Force Characteristics by Race and Ethnicity, 2021," BLS Reports, January 2023, https://www.bls.gov/opub/reports/race-and-ethnicity/2021/home.htm.

[57] Rose Khattar, Jessica Vela and Lorena Roque, *Latino Workers Continue to Experience a Shortage of Good Jobs*, Centre for American Progress, July 18, 2022, https://www.americanprogress.org/article/latino-workers-continue-to-experience-a-shortage-of-good-jobs/.

[58] United States Census Bureau, QuickFacts - United States, https://www.census.gov/quickfacts/fact/table/US/PST045222.

[59] Genevieve Carleton, "Why the Tech Diversity Gap Continues to Persist," *BestColleges*, April 18, 2023, https://www.bestcolleges.com/bootcamps/guides/tech-diversity-gap-persists.

[60] Dean, Sam and Johana Bhuiyan, "Black, Latino People Are Being Left Out of the Tech Workforce," Government Technology (Los Angeles Times), June 24, 2020, https://www.govtech.com/workforce/black-latino-people-are-being-left-out-of-the-tech-workforce.html.

[61] U.S. Bureau of Labor Statistics, "American Indians and Alaska Natives in the U.S. Labor Force," *Monthly Labor Review*, November 2019, https://www.bls.gov/opub/mlr/2019/article/american-indians-and-alaska-natives-in-the-u-s-labor-force.htm.

[62] Organisation for Economic Co-operation and Development (OECD), Indigenous Employment and Skills Strategies in Canada, https://doi.org/10.1787/9789264300477.-en.

[63] From the author's own calculations using the Current Population Survey.

[64] Stuart Anderson, *Immigrant Entrepreneurs and U.S. Billion-Dollar Companies*, National Foundation for American Policy, July 2022, https://nfap.com/wp-content/uploads/2022/07/2022-BILLION-DOLLAR-STARTUPS.NFAP-Policy-Brief.2022.pdf.

[65] Tech hubs and workers tend to be based in metropolitan areas. Fully 86 percent of tech workers in the US work in a MSA and 91 percent of tech workers in Canada work within a CMA (according to the author's own calculations based on OEWS and Statistics Canada data).

[66] Enrico Moretti, *The Effect of High-Tech Clusters on the Productivity of Top Inventors*, NBER Working Paper 26270, August 2021, https://doi.org/10.3386/w26270.

[67] CBRE, *Scoring Tech Talent 2022*, https://www.cbre.com/insights/books/scoring-tech-talent-2022.

[68] The five Canadian tech hubs identified include the CMAs of Toronto, Vancouver, Kitchener-Waterloo-Cambridge, Ottawa, and Montreal.

[69] U.S. Bureau of Labor Statistics, Consumer Expenditures – 2021, https://www.bls.gov/news.release/pdf/cesan.pdf.

[70] Based on a calculation of 2019 national average shelter costs; Statistics Canada, Household Spending, Canada, Regions and Provinces, https://doi.org/10.25318/1110022201-eng; Statistics Canada, Consumer Price Index, Annual Average, Not Seasonally Adjusted, https://doi.org/10.25318/1810000501-eng.

[71] Larissa Klick and Sandra Schaffner, "Do Housing Costs Eat Up All Regional Income Disparities?" VfS Annual Conference 2019 (Leipzig): 30 Years after the Fall of the Berlin Wall - Democracy and Market Economy, https://ideas.repec.org/p/zbw/vfsc19/203621.html.

[72] More information on the dataset from Pave: https://www.advanced-hr.com/products-overview

[73] A fuller description of the three compensation types were outlined by Option Impact as follows:

Bonus: The total number of positions receiving a bonus is reported at the top of the section. Bonus is the reported variable target amount of cash an employee may receive each year.

Total Target Pay: The total target pay is the calculated amount of base plus bonus that an employee receives each year. Please Note: The calculation is done at the employee level, so the summarized data reported for base salary plus the summarized data for bonus may (or may not) equal the calculation for total target pay.

% Total Equity: The % total equity is calculated as the actual total shares held divided by the reported fully diluted shares and reported as a percentage.

Total Equity Gross Value: Gross Value = % Fully Diluted Shares x Est. Company Value. Does not consider strike price.

% Last Refresh Grant: The % last refresh grant, regardless of the type of shares received, is calculated as the actual number of shares provided in the last refresh grant divided by the reported fully diluted shares and reported as a percentage.

% Last Refresh Gross Value: Gross Value = % Fully Diluted Shares x Est. Company Value. Does not consider strike price.

[74] Conrad Lee and Dan Kapinos, "Revising Equity Refresh Programs to Retain Talent at Private Companies," *Aon Human Capital Insights*, May 2022, https://humancapital.aon.com/insights/articles/2022/revising-equity-refresh-programs-to-retain-talent-at-private-companies.

[75] While not all tech jobs are covered, the job families examined include Hardware and Software development, engineering, QA and testing, Web Engineering, Development Operations, Information Technology, Data Science, and Data/Algorithm Engineering. A full list of jobs covered here is included in Appendix A.

[76] The distribution of jobs across both countries is similar, with no more than a 5.5 percent variation in count between countries for the same job.

[77] This consists of Meta (formerly referred as Facebook), Amazon, Apple, Netflix and Alphabet (formerly referred to as Google).

[78] Ellie Caruso, "Apple and Microsoft Weight in S&P 500 Reaches Record High," *ETF Trends*, March 22, 2023, https://www.etftrends.com/portfolio-strategies-channel/apple-microsoft-weight-sp-500-reaches-record-high/.

[79] Market capitalization is based on the author's own calculations.

[80] Toronto Stock Exchange, *The MiG Report*, April 2023, https://www.tsx.com/resource/en/3011.

[81] Toronto Stock Exchange, Shopify Inc. Class A Subordinate Voting Shares, https://money.tmx.com/en/quote/SHOP.

[82] NASDAQ, Apple Inc. Common Stock, https://www.nasdaq.com/market-activity/stocks/aapl.

[83] Other plans could include Exclusive Provider Organizations (EPOs) or Preferred Provider Organizations (PPOs), which could cover a larger network of services for an additional cost or higher premiums.

[84] Centers for Medicare and Medicaid Services, What You Should Know About Provider Networks, https://marketplace.cms.gov/outreach-and-education/what-you-should-know-provider-networks.pdf.

[85] Government of Canada, Canada's Health Care System, https://www.canada.ca/en/health-canada/services/canada-health-care-system.html.

[86] This could vary depending on the province.

[87] Canadian Institute for Health Information, National Health Expenditure Trends, November 3, 2022, https://www.cihi.ca/en/national-health-expenditure-trends.

[88] Centers for Medicare and Medicaid Services, National Health Expenditures 2021 Highlights, https://www.cms.gov/files/document/highlights.pdf.

[89] Morning Consult, National Tracking Poll #2204173: Crosstabulation Results, April 28-May 12, 2022, https://assets.morningconsult.com/wp-uploads/2022/05/24103209/2204173_crosstabs_Tech_Workers_Tech_Workers_v1_HD.pdf.

[90] The results were based on an online survey of 750 tech workers across the US between April 28 and May 12, 2022, with a margin of error of plus or minus four percentage points.

[91] Levels.fyi, List of Companies Going Remote, https://www.levels.fyi/remote/.

[92] TAP Network, "2022 Salary Survey," https://tapnetwork.ca/news/trends-and-insights-from-tap-networks-2022-salary-survey.

[93] Isabelle Kirkwood, "The Great Resignation has Intensified Canadian Tech's War for Talent: Report," Vancouver Tech Journal, September 27, 2022, https://www.vantechjournal.com/p/the-great-resignation-has-intensified.

[94] 216 companies were surveyed, representing around 30,000 employees.

[95] CBC News, "Shopify Permanently Moves to Work-from-Home Model," *CBC News*, May 21, 2020, https://www.cbc.ca/news/canada/ottawa/shopify-pandemic-staff-ottawa-1.5578614.

[96] Levels.fyi, Benefits - 401k, https://www.levels.fyi/benefits/401k/.

[97] Levels.fyi, Apple benefits, https://www.levels.fyi/companies/apple/benefits.

[98] Emily Brust, "RRSP Matching Program: Top 5 Things Employers Should Consider," *Wealthsimple*, March 1, 2022, https://www.wealthsimple.com/en-ca/work/learn/employer-rrsp-matching-program.

[99] There are five types of defined contribution retirement plans: savings & thrift, deferred profit sharing, money purchase pension, employee stock option (ESOP), and savings incentive match plan. 401(K) and 403(B), are some of the defined contribution plans; U.S. Bureau of Labor Statistics, Beyond the Numbers: Defined Contribution Retirement Plans: Who Has Them and What Do They Cost? https://www.bls.gov/opub/btn/volume-5/defined-contribution-retirement-plans-who-has-them-and-what-do-they-cost.htm/.

[100] 401(k) plans are less rigid for the employer as they are linked to the company's profitability; Audrey McNay, "Ranking FAANG 401k Plans," *Levels.fyi blog*, December 15, 2020, https://www.levels.fyi/blog/ranking-faang-401k-plans.html.

[101] U.S. Department of Labor, Vacation leave, https://www.dol.gov/general/topic/workhours/vacation_leave.

[102] Levels.fyi, PTO (Vacation / Personal Days), https://www.levels.fyi/benefits/PTO-Vacation-Personal-Days/.

[103] Megan Cerullo, "Microsoft Giving Workers Unlimited Time Off," CBS News, January 11, 2023, https://www.cbsnews.com/news/microsoft-giving-workers-unlimited-time-off/.

[104] Employment and Social Development Canada, Annual vacations and general holidays for employees working for federally regulated employers, https://www.canada.ca/en/services/jobs/workplace/federal-labour-standards/vacations-holidays.html.

[105] Invest in Canada, STEM talent: Canada's Shift From Brain Drain to Brain Gain, https://www.investcanada.ca/news/stem-talent-canadas-shift-brain-drain.

[106] Ibid.

[107] Jay Shambaugh, Ryan Nunn and Patrick Liu, How Declining Dynamism Affects Wages, Brookings Institution, February 2018, https://www.brookings.edu/wp-content/uploads/2018/02/es_2272018_how_declining_dynamism_affects_wages.pdf.

[108] Joanna Glasner, "These Countries Have the Most Startup Investment for Their Size," *Crunchbase News*, November 2, 2021, https://news.crunchbase.com/startups/countries-most-startup-investment/.

[109] Government of Canada, Immigrate with a Start-up Visa: About the Process, https://www.canada.ca/en/immigration-refugees-citizenship/services/immigrate-canada/start-visa/about.html.

[110] Startup Estonia, Start-up visa Eligibility - Foreign Founders, https://startupestonia.ee/visa/eligibility-foreign-founder.

[111] Tallinn University of Technology, Programmes taught in English, https://taltech.ee/en/programmes.

[112] Government of Canada, Scientific Research and Experimental Development (SR&ED) Tax Incentives," https://www.canada.ca/en/revenue-agency/services/scientific-research-experimental-development-tax-incentive-program.html.

[113] Innovation, Science and Economic Development Canada, Strategic Innovation Fund, https://ised-isde.canada.ca/site/strategic-innovation-fund/en.

[114] There were 82 respondents in the 2020 survey and 50 respondents in the 2021 survey.

[115] Oegema et al., Software Engineering 2020 Class Profile, https://uw-se-2020-class-profile.github.io/profile.pdf.

[116] Lam et al., "Software Engineering 2021 Class Profile," https://sexxis.github.io/classprofile/.

[117] Michael Baker, Yosh Halberstam, Kory Kroft, Alexandre Mas, Derek Messacar, *Pay Transparency and the Gender Gap*, December 2021, http://www.korykroft.com/files/bhkmm_Dec082021_Resubmission.pdf.

[118] David Card, Thomas Lemieux and W. Craig Riddell, "Unions and Wage Inequality: The Roles of Hender, Skill and Public Sector Employment," *Canadian Journal of Economics* 53, no. 1 (2020): 140-173 https://doi.org/10.1111/caje.12432.

[119] Statistics Canada, Union Status By Industry," https://doi.org/10.25318/1410013201-eng.

[120] Vu, V., Zafar, A., Lamb, C. (2019). "Who are Canada's Tech Workers?" p. 38-44, https://brookfieldinstitute.ca/wp-content/uploads/FINAL-Tech-Workers-ONLINE.pdf

[121] Vu, V. (2022). "The O*NET/NOC Crosswalk, an update". https://brookfieldinstitute.ca/crosswalk-blog-post/

[122] According to Statistics Canada, n.i.e. is an abbreviation for "not included elsewhere"; In this context, visible minority identities that were not analyzed as its own separate group are included in this categorization. Examples of identities that would be placed in this category include 'Guyanese,' 'West Indian,' 'Tibetan,' 'Polynesian,' 'Pacific Islander,' etc.

[123] According to Statistics Canada, n.i.e. is an abbreviation for "not included elsewhere"; In this context, visible minority identities that were not analyzed as its own separate group are included in this categorization. Examples of identities that would be placed in this category include Guyanese, West Indian, Tibetan, Polynesian, Pacific Islander, etc.

[124] Statistics Canada, Visible minority of person, https://www23.statcan.gc.ca/imdb/p3Var.pl?Function=DECI&Id=1323413.