Estimating the Dynamic Response of Canadian Labour Market Outcomes to the Onset of COVID-19, with a Focus on Migration Status

by

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Abstract

In this study, I review the impact of COVID-19 on Canadian labour market outcomes during the first wave of the pandemic with a focus on migration status. I examine changes in the employment rate, unemployment rate, participation rate, and hours worked for both immigrants and non-immigrants during the first six months of the pandemic in Canada.

Using Canadian Labour Force Survey microdata files from January 2018 to August 2020, I employ an event study methodology to track changes in each of the outcomes by migration status in comparison to the pre-pandemic baseline. I find that April 2020 was the month when Canadian labour market experienced the largest impact from the pandemic. After April 2020, labour market outcomes started to rebound toward the pre-pandemic baseline. I find that the adverse impact of COVID-19 was particularly severe for female immigrants, those aged 15 to 30, and those employed in low-remotability (difficult to do from home) jobs.

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I. Introduction

The COVID-19 pandemic, with government-imposed lockdowns, social distancing, and self-isolation induced a several global economic recession and had significant impacts on labour markets. The effect of the pandemic on the labour market outcomes of Canadian workers varied by age, gender, industry, occupation, and migration status. In this paper I use an event-study analysis of the effect of COVID-19 on the Canadian labour market, with a particular focus on immigrants and the differences between their labour market experiences and the experiences of non-immigrants.

By 2021, approximately 23% of Canada's population were landed immigrants, making this demographic group a significant part of Canada's labour force (Statistics Canada, 2022b). In response to a fertility rate below the replacement level and an increasing number of workers reaching retirement age, the Canadian government has implemented a welcoming immigration policy (Kustec, 2012). The primary objective of Canada's immigration policy is to promote economic development by encouraging immigrant labour market participation, addressing labour shortages in specific industries, and leveraging immigrants' skills and expertise according to Canadian labour market demand (Gilmore and Le Petit, 2008). Furthermore, immigrants play a vital role in offsetting the reduction in tax revenue due to the aging population, ultimately decreasing the likelihood of encountering challenges when financing important social services (El-Assal and Fields, 2018). The significant role of immigrants in the Canadian labour force motivates my analysis of immigrants' labour market experiences compared to that of non-immigrants during the first several months of the COVID-19 pandemic.

Researchers have noted a number of reasons that immigrants may be more susceptible than non-immigrants to economic downturns. Immigrants are disproportionately represented in several sectors that were particularly hard-hit by the crisis, including food services, non-essential retail, and domestic work (Guadagno, 2020). The concentration of recent immigrants in shorter-tenure and lower-paying occupations are additional reasons that they may be more susceptible to being laid off during an economic downturn (Hou et al., 2020). Cassidy (2020) finds that immigrants have a higher likelihood of working in jobs that cannot be done from home—what he calls "non-remotable" jobs. He argues that this made immigrants more susceptible to the pandemic compared to non-immigrants (Cassidy, 2020).

On the other hand, immigrants also make up a disproportionate share of the workforce in high-risk industries that continued to operate during the first wave of the pandemic--such as agriculture, construction, personal care, healthcare, and cleaning services--relative to non-immigrant workers (Guadagno, 2020). Immigrants are more likely not to be covered by the welfare system which includes programs like COVID-19 income support schemes, rental subsidies, and provision of basic assistance and integration services. Consequently, those in hard-hit sectors were at a higher risk of losing income as a result of lockdown measures (Guadagno, 2020). To meet their living expenses, they may have been more inclined to seek out employment that carries a higher risk of COVID-19 transmission, as well as positions that offer greater flexibility in terms of working hours.

The fact that immigrant workers follow economic opportunities across geographic regions and pursue jobs in occupations and industries that provide them with higher wages makes them geographically more mobile than non-immigrants (Borjas, 2011). Mobility can provide security for immigrants during economic recessions by giving them more employment options than less mobile workers. In response to economic turmoil and job loss, immigrants are more likely to return to their home country or move within their host country in search of better employment opportunities (Liu and Edward, 2015). However, the pandemic-induced economic recession differed from the earlier downturns that happened in the world during 2008/2009 and the early 1990s. The COVID-19 recession was caused by government-mandated shutdown policies aimed at controlling the spread of the pandemic (Picot and Hou, 2022). One of these policies was travel restrictions, which eliminated the opportunity for immigrant workers who had lost their jobs or experienced a reduction in hours to pursue better job opportunities elsewhere.

Some studies have sought to examine how the pandemic affected labour market outcomes by comparing the experiences of immigrants and non-immigrants. Cassidy (2022) documents the monthly rate of job losses by migration status across multiple developed countries and discovers that immigrants' employment rates declined more substantially than those of their native-born counterparts. This disparity is attributed to the concentration of immigrants in jobs that cannot be performed from home, which renders them more vulnerable than non-immigrants. Similarly, Borjas and Cassidy (2020) investigate the rate of job loss and acquisition in the United States' labour market and reach a similar conclusion. Meanwhile, Zhang and Gunderson (2022) employ a

Recentered Influence Function (RIF) to examine the labour market experiences of immigrants and non-immigrants in Canada during the COVID-19 pandemic. Recentered Influence Functions (RIF) are used to examine unconditional partial effects in regression analysis. This statistical tool enables researchers to estimate the impact of changes in independent variables on different quantiles of the unconditional distribution of the explained variable (Rios-Avila, 2020). By employing this methodology, Zhang and Gunderson (2022) reveal that immigrants were disproportionately impacted by the pandemic compared to non-immigrants.

There are a few important differences between my study and Zhang and Gunderson. They estimate the differential impact of COVID-19 on immigrants and native-born individuals by utilizing a conventional interaction term in a difference-in-differences methodology. This methodology allows them to analyze how the pandemic affected immigrants and non-immigrants on average, both before and after its onset. In contrast, I use an event study approach, which allows for the monthly analysis of dynamic leads and lags to the COVID-19 shock while controlling for fixed factors.

Additionally, Zhang and Gunderson (2022) utilize pooled cross-sectional data from June 2019 to July 2021 and restricted their sample to private sector workers aged between 21 to 65 years old. They analyze seven labour market outcomes, including employment, full-time employment, temporary job status, log of weekly hours worked, log of unpaid overtime hours, log of weekly hours of work, and changes in hours between schedule and actual hours worked. However, I employ repeated cross-sectional data from January 2018 to August 2020 to analyze the employment rate, unemployment rate, labour force participation rate, and hours worked for individuals aged 15 to 65.

Furthermore, while Zhang and Gunderson (2022) examine the differential impact of COVID-19 on immigrants and native-born individuals in three different waves of the pandemic, my study focuses only on the first wave from February to August 2020. My study tracks the monthly changes in labour market outcomes for both immigrants and non-immigrants relative to the pre-pandemic baseline. Finally, the study visualizes the existing heterogeneity of labour market outcomes for both groups.

Therefore, my study makes a contribution to the existing body of literature by comprehensively analyzing the monthly evolution of labour market outcomes in Canada, with a

particular focus on immigrant workers during the onset of COVID-19. I seek to ascertain whether the pandemic disproportionately affected immigrants compared to non-immigrants and to assess the extent to which any pre-existing gap between the two groups widened or narrowed during the first wave of COVID-19 in Canada. Furthermore, my study investigates how individual characteristics, influenced the gap between immigrants and non-immigrants in the labour market during the pandemic. Specifically, my analysis focuses on the labour market outcomes of immigrant and non-immigrant individuals during the initial wave of COVID-19, spanning from February 2020 to August 2020.

My findings suggest that the COVID-19 pandemic had a negative impact on the Canadian labour market outcomes, with a more unfavourable effect on immigrants compared to non-immigrants. This analysis shows that the adverse impacts of COVID-19 on the outcomes of both immigrants and non-immigrants were more pronounced during the initial stages of the pandemic, particularly for women, individuals aged 15 to 30 years old, and for jobs which had a lower possibility to be performed from home.

II. Literature Review

Governments across the world implemented a variety of policies, including travel restrictions, self-isolation, and social distancing, to limit the spread of COVID-19 within their jurisdictions and across the globe (Nicola et al., 2020). Many researchers have since examined different impacts of these policies.

The adverse impact of any recession on an economy is likely to vary depending on the nature of the downturn. Using employment and weekly hours worked as two indicators of labour supply, Lemieux et al. (2020) examine the initial effects of COVID-19 on the Canadian labour market. They show the pandemic caused a 15 percent drop in employment as well as a 32 percent reduction in weekly hours worked. It did not take long for it to become apparent that COVID-19's economic effects would differ from those of the prior recessions, including the worldwide one in the early 1990s and the Global Financial Crisis in 2008-2009. Hou and Picot (2022) analyze the severity and duration of these earlier recessions in the Canadian labour market. They find that compared to the previous two recessions, the pandemic's employment decline was significant but fleeting. Employment dropped significantly to about 87% of its pre-crisis level only two months after the start of the pandemic. However, during the previous downturns it took 8 months and 2.5 years respectively for employment to rebound to about 95% of its pre-crisis level, while total employment had fully recovered to its pre-crisis level by September 2021, only 1.5 years after the start of the pandemic. That means the pandemic recovery period lasted for a shorter duration compared to the 27-month recovery period of the 2008/2009 and the 53-month recovery period of the 1990s downturns

The abrupt shift toward remote work at the start of the pandemic raises an important question about the number of jobs that can be reasonably performed remotely. Dingel and Neiman (2020) examine the feasibility of remote work by analyzing two surveys, called the Work Context Questionnaire and the Generalized Work Activities Questionnaire from the Occupational Information Network (O*NET). The first survey extracts information related to the physical and social factors affecting the nature of work, and the latter provides information regarding the job behaviors occurring on multiple jobs. Classifying the likelihood of jobs performed at home and merging it with occupational employment counts result in the authors finding considerable heterogeneity across the type of jobs that can be performed remotely by cities and industries. They

show overall that 37 percent of jobs in the United States can be done remotely. They do the same analysis on 85 other countries, excluding Canada, and find a relationship between the income of countries and the remotability of jobs: the lower-income the economy, the lower the share of jobs that can be done remotely.

Gallacher and Hossain (2020) use Canadian data and apply the Dingel and Neiman (2020) methodology to estimate the viability of working from home as well as the heterogeneity of this variable along various dimensions in Canada. They calculate the correlations between the monthly percentage change in employment and the remote work index at two-digit occupation levels. These correlations reveal that workers in professions with lower remote work possibilities experienced greater employment losses. They find that 41% of jobs in Canada can be done remotely. They discover considerable variation across industries, cities, and provinces in the likelihood of jobs that can be performed remotely. An analysis of occupational tasks reveals that workers who are more susceptible to disease and those who work close to their coworkers experienced a more severe impact due to COVID-19 compared to essential employees and the ones that can work remotely (Beland et al., 2020a). These findings are in line with those of Deng et al. (2020), who determine the number of jobs that could feasibly be carried out from home in Canada using the concept of telework capacity. According to their data, 38.9% of Canadian workers are employed in jobs that can reasonably be performed from home, though the percentage varies greatly across industries and provinces. One possible explanation for the discrepancy of this study to the 41% found by Gallacher and Hossain (2020) may come from using different data sources. Gallacher and Hossain (2020) employ data from Statistics Canada's Employment Income Statistics (EIS), a tabulation from the 2016 Census, while Deng et al. (2020) use Labour Force Survey data to compute the number of jobs that can potentially be done at home.

Considering that the pandemic had an uneven impact on the economy's most vulnerable sectors, one interesting question is how businesses are affected during COVID-19. Using Labour Force Survey data and interpreting the number of active small businesses as the number of self-employed individuals, Beland et al. (2020b) examine the short-term impact of COVID-19 on self-employed workers. They discover a significant drop in ownership and total hours for both unincorporated and incorporated entities and highlight that the latter was less affected by the pandemic. Gu (2020) contributes to this literature by focusing on the production side of the

economy and analyzing the economic effects of the pandemic on Canadian businesses by firm size. For the first quarter of 2020, they find that small firms were the ones most negatively affected by the pandemic compared to other firm-size classes. These findings are consistent with Mo et al.'s (2020) findings regarding the evolution of businesses run by entrepreneurs from diverse groups during the pandemic. They define the diverse groups as racialized people, those with disabilities, indigenous people, immigrants, and women. They find that COVID-19 impacted self-employed individuals from the defined diverse groups and their businesses more negatively than self-employed individuals from non-diverse groups.

Other studies examine the impact of COVID-19 on marginalized groups and whether it led to an increase in economic disparities. Singh et al. (2022) study gender dynamics and identify the relationship between COVID-19 and gender disparities. They find women disproportionately experienced a higher reduction in employment and income, which worsened gender disparities. They find that sectors that are more likely to employ women, were subjected to intense negative pressure and had higher rates of dismissals. Fuller and Qian (2020) narrow down their focus on the gender gap in employment by exploring the evolution of employment among parents whose youngest child is between 0 to 12 years old in Canada between February and May 2020. They find a negative relationship between closure of schools and childcare centres and gender inequalities. According to their findings, the closure of schools and childcare centres initially caused a rise in pre-existing gender inequalities among parents. However, this gap may reduce once schools and childcare centres reopen.

The unexpected exogenous nature of the pandemic shock provides researchers with an opportunity to analyze the potential disparities between immigrants and non-immigrants populations as a result of COVID-19. Cassidy (2022) shows that not only in the US and Canada but also in the majority of EU countries and Australia, immigrants were more negatively impacted by the pandemic and lockdowns than non-immigrants. They show that immigrants have a higher likelihood of working in non-remotable jobs than non-immigrants do and argue that this made immigrants more vulnerable to the pandemic than non-immigrants. This finding is in line with the Borjas and Cassidy (2020) research on immigrant employment. The panel nature of the US Current Population Survey data enables them to track the employment opportunities of individuals over time. They find that as the economic lockdown took hold, the relative rate of immigrants losing

(finding) their jobs rose (declined) sharply. They also conclude that the negative employment impact of the COVID-19 labour market shock on immigrant employment can be partially attributed to the fact that people typically work in different occupations and immigrants were less likely to work in jobs that could be performed remotely.

Zhang and Gunderson (2022) analyze the impact of COVID-19 on Canadian labour market outcomes across different waves of the pandemic with a focus on immigrants from June 2019 to July 2021. They demonstrate that most severe pandemic effects on the Canadian labour market outcomes were concentrated in the first wave from March to August 2020 as a result of the labour market's immediate response to compulsory shutdowns and social distancing policies. They find that the adverse effect of the pandemic was more pronounced for immigrants than native-born people. Moreover, they find the largest gap between recent immigrants who were female, less educated, had childcare responsibilities, and those occupied in a higher-risk occupations that exposed them to the pandemic than non-immigrants in these same categories. They utilize unconditional quantile regression to study the differential effects across the distribution of outcomes. They show that, in comparison with native-born people, short-term immigrants at the lower end of the wage distribution work fewer hours relative to scheduled hours. According to Beland et al.'s (2020b) analysis of self-employed workers, immigrants, women, and those self-employed workers with less education experienced a greater decline in total hours worked.

Having access to a panel of data during the pandemic has shifted many researchers' attention to analyzing the transitions of workers between labour market states. Focusing only on the unemployment rate to examine the impact of a pandemic on the labour market would likely understate employment losses. The main reason for the underestimation of employment losses would be ignoring the decline in labour force participation and the rise in the number of people who report being temporarily absent from work (Cho and Winters, 2020). Taking into account the inflows and outflows to and from each labour market state provides a more complete picture of the pandemic's impacts on the labour market. Cowan (2020) analyzes individual worker transitions between U.S. labour-market states. The panel dimension of the US Current Population Survey enables the author to look at transitions to all potential employment states to determine which employees have been most negatively impacted by the COVID-19 pandemic. Cowan's findings show a considerable increase in the number of employees becoming unemployed and absent from

a job and a drop in hours worked and labour force participation. It also demonstrates how particularly hard the economic crisis brought on by the first two months of the COVID-19 pandemic hit workers born outside the U.S., women with children, those with the lowest levels of education, employees less than 30 and more than 60 years old, and workers with disabilities. Utilizing the longitudinal nature of the confidential-use files of the Canadian Labour Force Survey, Brochu et al. (2020) analyze the dynamics of the Canadian labour market from the start of the lockdown to the reopening of the economy. They measure the volume and composition of employment inflows and outflows from 2019 to April 2020 and find that many employees who lost their jobs between February and April 2020 found new jobs by July 2020. However, those who were jobless prior to the pandemic experienced a more challenging time being re-employed. Brochu et al. (2020) also demonstrate that young and female workers had a greater drop in the number of job losses relative to older and male counterparts.

I contribute to existing literature by applying an event study methodology to examine the effects of COVID-19 on labour market outcomes in Canada by focusing on migration status during the first wave of the pandemic. One key advantage of the Event Study methodology is that it allows one to capture the effects of an event or announcement over time (Ullah et al., 2021). My study explores the total monthly changes in each outcome for immigrants and non-immigrants during the first wave of the pandemic. This is the first study in Canada to provide a comprehensive overview of the monthly changes in the Canadian labour market outcomes solely based on migration status relative to the pre-pandemic baseline. This provides a comprehensive picture of the impact of COVID-19 on the Canadian labour market for both groups. Additionally, this approach allows me to analyze the heterogeneity in the Canadian labour market, by gender, age, and remotability of jobs for both immigrants and non-immigrants.

III. Methodology

I examine the monthly changes in Canadian labour market outcomes during the first wave of COVID-19 with a focus on migration status. It is important to determine how the pandemic altered labour market outcomes and, if so, whether the effects on immigrants were more pronounced than the effects on non-immigrants. In this study I examine the trend for each labour force outcome prior to and following the pandemic using repeated cross-sectional labour force survey data from Statistics Canada.

This methodology, as presented by Clarke and Schythe (2018), allows for the estimation of dynamic leads and lags to the event of interest (Clarke and Schythe, 2018). This approach enhances the comprehension of how outcomes develop over time in response to a shock (the event). The design of an event study facilitates the creation of an impact response graph of coefficients, which makes both post-event and pre-event trends observable (Schmidheiny and Siegloch, 2019). To capture the experiences of immigrants and non-immigrants during the first six months of COVID-19 and account for the repeated cross-sectional nature of data in the event study approach, I modify the methodology presented by Clarke and Schythe (2018) to estimate the equation (1):

$$y_{it} = \alpha + \sum_{j=2}^{J} \beta_j (Lead\ j)_{it} + Immigrant * \sum_{j=2}^{J} \beta_j (Lead\ j)_{it} + \sum_{k=1}^{K} \gamma_k (lag\ k)_{it} + \quad Immigrant * \sum_{k=1}^{K} \gamma_k (lag\ k)_{it} + \lambda_t + X'_{it}\Gamma + (X'_{it} * \lambda_t)\varphi + \varepsilon_{it} \qquad (1)$$

Individuals are indexed by *i* and years are indexed by *t.* The pandemic first struck in February 2020, and I examine how that event affected labour force outcomes for different groups of Canadians over the following 6 months. In equation (1), y_{it} is a labour market outcome (e.g., employment, unemployment, labour force participation, or hours worked) for an individual during a given month t. X'_{it} are (optionally) time-varying controls including gender, marital status, migration status, five-year age groups for individuals aged between 15 and 65 years old, highest educational background, province, occupation at the primary job, industry of main job, and remotability-index. λ_t captures month effects (seasonality), and ε_{it} denotes an unobserved individual error term. In equation (1), leads and lags are binary variables used to indicate the time difference between current time and the onset of COVID and they are defined as follows:

$$(Lead\ j)_t = \mathbb{I}[t = Event - j] \text{ for } j \in \{1, \dots, J-1\}, \qquad (2)$$

In equation (2), the term "Event" is a binary variable that indicates the occurrence of an event at a specific time. Meanwhile, leads in this equation are pre-event dummy variables that reflect the passage of time prior to the onset of COVID.

$$(Lag\ k)_t = \mathbb{I}[t = Event + k] \text{ for } k \in \{1, \dots, K-1\}, \qquad (3)$$

The "Lags" referred to in equation (3) are dummy variables that indicate the amount of time that has passed since the onset of COVID.

Leads and lags are a group of dummy variables that indicate the temporal distance between a given time period and the onset of COVID in February 2020 within a specific time frame. For the purpose of this study, as indicated in equations (2) and (3), I include leads for 12 months before ($J = 12$) and lags for 6 months after ($K = 6$) the first onset of the pandemic in Canada. The baseline period is omitted in an event study model and serves as a period of time against which all other periods are compared (Clarke and Schythe, 2018). The baseline reference time period in equation (1) is January 2020, which is one period prior to the onset of the pandemic, where $j = 1$.

Because COVID-19 affected society as a whole, a proper control group is unavailable. Therefore, the counterfactual for this study is based on trends before the pandemic, as there is no untreated group to provide a post-COVID counterfactual. Given my primary focus on analyzing the experiences of immigrants and non-immigrants following the onset of COVID-19, I have incorporated both groups' experiences in my model specification. To determine whether the pandemic had a disproportionate effect on the labour force outcomes of immigrant individuals relative to non-immigrant counterparts, I include in my specification interactions between leads and the immigrant variable and interactions between lags and the immigrant variable. Moreover, to control for seasonality in my model, I incorporate the interaction between the month variable and all other explanatory variables, except for the leads and lags and their interactions.

In many applications, a sequence of events may occur in a short period of time, or a specific treatment may recur at varying intensities over different units or periods. Consequently, valuable information that could identify the magnitude and direction of an event is eliminated (Schmidheiny and Siegloch, 2019). However, my study only focuses on the COVID-19 shock event. Any policies implemented during this period of time were intended to curtail the effects of COVID-19 and, thus, can be considered a subset of the COVID-19 shock. As the main objective of this research is to compare the experiences of immigrants and non-immigrants, the actual values of the lag coefficients are less important than the differences in outcomes between these two groups as the COVID-19 pandemic played out.

Models with simultaneous treatment adoption across all units are considered under-identified or identified only up to a linear trend (Schmidheiny and Siegloch, 2019). To estimate

equation (1), it is assumed that the treated and control groups exhibit parallel trends. This assumption relies on the concept that in the absence of treatment, the groups would have preserved their differences from the baseline period. Unbiased estimation in event study models relies on the underlying assumption that the occurrence of the event that affects a given group is non-systematic (Clarke and Schythe, 2020). Therefore, to achieve an unbiased estimate, it is crucial that both this assumption holds true. (Clarke and Schythe, 2018).

The widespread nature of COVID-19 within a society makes it difficult to identify proper control groups. This can result in the under-identification of the lag coefficient estimates in equation (1). However, as long as parallel trends exist, pre-COVID, between groups whose estimated dynamic effects I am comparing, the difference in dynamic effects between those groups should be unbiased. Therefore, my estimation strategy is valid for the purpose of discussing differential outcomes between groups. Much of the subsequent discussion will focus on the differences in lag coefficients between groups.

IV. Data

I obtain my data from Statistics Canada's Labour Force Survey (LFS) public use microdata. The LFS is a monthly survey that collects anonymized household-level information. The data collection methods encompass a combination of personal interviews or phone surveys administered by interviewers to roughly 56,000 non-institutionalized civilian households aged 15 years or older, resulting in labour market data for approximately 100,000 individuals.

To evaluate the current state of the Canadian labour market, interviewers initially collect socio-demographic data for each household member before obtaining labour market data in the LFS reference week, which typically corresponds to the week that contains the 15th day of the month. It is important to acknowledge that specific populations are excluded from the survey, such as individuals residing in provincial reserves and other Aboriginal settlements, full-time members of the Canadian Armed Forces, institutionalized residents, and households located in remote areas with low population densities.

The public-use LFS data is cross-sectional and utilizes a rotating panel sample design, ensuring that the selected respondents remain continuously within the sample for six months. Additionally, the LFS systematically replaces one-sixth of the sample with a new cohort of

Canadians each month. The LFS sample is weighted, enabling each of the six rotation groups to function independently as a representative sample. This distinctive feature, in combination with the prompt release of LFS survey results just 10 days after data collection completion, makes LFS an efficient and reliable data source for investigating the impact of COVID-19 on the Canadian labour market.

I utilize the LFS data to analyze how COVID-19 has affected the labour market outcomes of Canadians, paying particular attention to the labour market outcomes of immigrants to Canada. The use of repeated cross-sectional data from January 2018 to August 2020 enables me to assess any shifts in the disparity between labour market outcomes of immigrants and non-immigrants during the first wave of the pandemic. The currently available LFS data categorizes labour market outcomes by industry and occupation, alongside a diverse range of demographic variables that enable cross-classification. I use these classifications to examine the potential heterogeneity of the impact of COVID-19 on labour market outcomes for both immigrants and non-immigrants. According to immigration authorities, immigrants are individuals who have been granted permanent residency in Canada, which allows them to live and work in the country permanently. This definition excludes Canadian-born citizens and non-permanent residents, as well as individuals from foreign countries who currently reside in Canada with a work or study authorization, or those seeking refugee status, along with their accompanying family members.

Although the first documented case of COVID-19 in Canada was recorded on January 25th, 2020, a substantial surge in the daily incidence of the virus did not occur until mid-March, leading to the declaration of a national emergency in Canada (Public Health Agency of Canada, 2020). In my analysis I treat February 2020 as the onset of the pandemic. My decision to treat this as the first month of the pandemic is predicated on the widespread accessibility of news regarding the rapid global spread of the COVID-19 virus at that time, as well as the announcement of the first confirmed case of the virus in Canada in January 2020. There is a possibility that such news may have prompted some workers to feel hesitant about participating in the labour market or even to exit the labour market in order to ensure their own safety. Since March 2020 is widely recognized as the time when COVID-19 began to significantly impact Canada, I treat February 2020 as the period when the pandemic's shock first manifested in Canadian labour market outcomes in this research. Therefore, in analyzing the Canadian labour market's response to the shock of the

pandemic, I establish January 2020 as the pre-event period, and regard any months subsequent to February 2020 as post-event periods. These post-event periods are then compared to the pre-event baseline of January 2020.

Dependent variables in this research include the employment rate, the unemployment rate, the labour force participation rate, and hours worked, denoted by y in equation (2). These outcomes are explained by a range of explanatory variables, including a set of dummy variables indicating the proximity of individuals to the relevant event during a specific time period, province, month dummies, gender (men, women), highest educational background (high school or less, postsecondary credential, and university degree or above).

In addition, I also include dummy variables for occupation at the primary job (10 categories) and industry of main job (21 categories) in order to account for the job characteristics of respondents. To control for individual attributes, I include dummy variables for marital status (coupled, non-coupled), migration status (immigrants, non-immigrants), and five-year age groups for individuals aged between 15 and 65 years old.

Finally, I utilize the findings of a study conducted by Gallacher and Hossain (2020) to define a new variable that captures the flexibility of jobs within different industries to be performed from home. I classify industries into three categories which measure the extent to which jobs can be conducted remotely, namely low-, medium-, and high-remotability jobs. Low remotability jobs exhibit limited flexibility in being performed remotely, thereby heightening the vulnerability of individuals to contracting the COVID-19 infection. A table of summary statistics is presented in Table 1 and Table 2, which can be found in Appendix A.

For the purpose of my analysis, I use the same set of explanatory variables to evaluate the monthly changes in Canadian labor market outcomes during the first wave of the COVID-19 pandemic, except for the sections where I break down my analysis by remotability-index. In the sections where I examine remotability-index, in addition to the set of explanatory variables used for the other models, I control for the remotability-index categories.

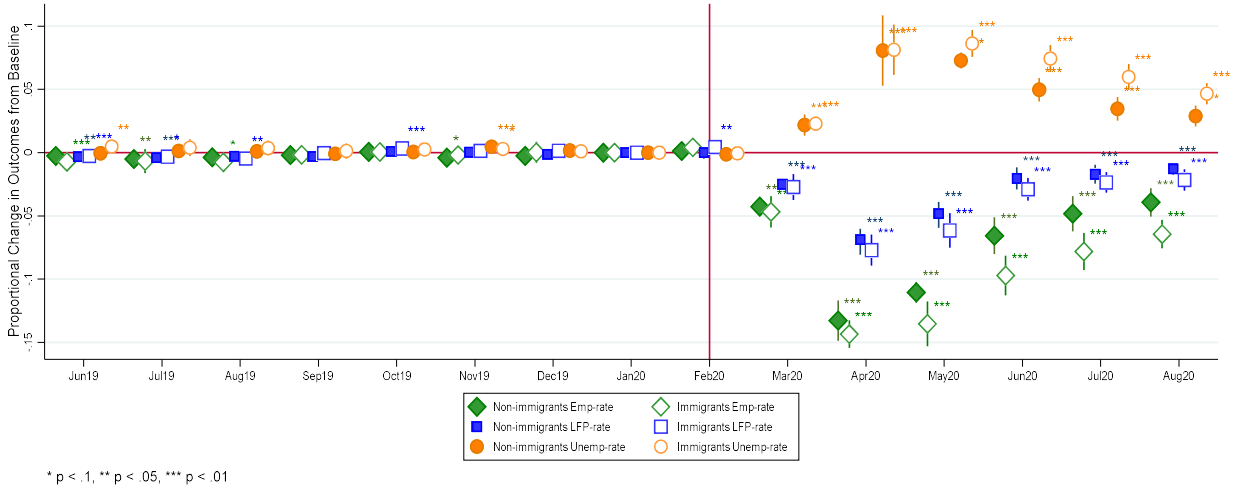
V. Results

On January 25th, 2020, the initial case of COVID-19 in Canada was reported. During February and March of the same year, the virus rapidly spread across several provinces, leading to the first recorded death in March and the subsequent declaration of public health emergencies in Canada (Beland et al., 2020a). To control the transmission of the virus, all provinces in Canada implemented various public health measures, including the closure of schools, childcare centres, and businesses, as well as the implementation of social distancing and self-isolation policies from March 2020. The resulting shutdowns in March and April 2020 negatively affected the Canadian economy, with a 15.7% decline in employment and a 13% increase in unemployment rates observed from February to April 2020. In May and June of 2020, nearly all provinces in Canada implemented a phased reopening plan involving a gradual easing of restrictions on activities, resulting in an improvement in labour market conditions in Canada (Clarke et al., 2020).

Considering the model's under-identification, the primary aim of this section is to contrast the experiences of immigrants and non-immigrants. Therefore, it is more beneficial to interpret the subsequent graphs based on the differences between the series of lag coefficients shown, rather than solely on the coefficients' numerical values. It is worth noting that the lag coefficients' estimates illustrate the deviation from the baseline, January 2020, for each series.

Figure 1 illustrates that the COVID-19 pandemic had a negative impact on labour market outcomes, including the employment rate, unemployment rate, and participation rate, for both immigrant and non-immigrant workers in Canada. This graphic enables the researcher to compare the labour market experiences of these two groups during the first six months of the pandemic, relative to the baseline month. Between the onset of COVID-19 in February 2020 and April 2020, employment fell by a similar amount for immigrants and non-immigrants. However, it is apparent from Figure 1 that between April 2020 and August 2020, the employment rate of immigrants recovered more slowly than the employment rate of non-immigrants. My findings are consistent with prior research (Zhang and Gunderson, 2022).

Figure 1: The Impact of COVID-19 on Canadian Labour Market Outcomes by Migration Status



Turning to the unemployment rate, we see a similar pattern. Between COVID's onset in February and April, the unemployment rate rose by a similar amount for immigrants and non-immigrants. However, between April and August, the unemployment rate of immigrants fell more slowly than the unemployment rate of non-immigrants.

The labour force participation rate (LFP) of immigrants and non-immigrants evolved similarly over the period from February to August 2020. A comparison of lag coefficients in Figure 1 suggests that LFP fell slightly more from baseline for immigrants than for non-immigrants. However, each of the monthly lag coefficients have overlapping 95% confidence intervals. To test whether these coefficients differ systematically between immigrants and non-immigrants over the entire March through August period I conduct an F-test of the following form:

$$H_0: \gamma_{Mar}^{Imm} - \gamma_{Mar}^{Non-imm} = 0 \;\&$$

$$\gamma_{Apr}^{Imm} - \gamma_{Apr}^{Non-imm} = 0 \;\&$$

$$\gamma_{May}^{Imm} - \gamma_{May}^{Non-imm} = 0 \;\&$$

$$\gamma_{Jun}^{Imm} - \gamma_{Jun}^{Non-i} = 0 \;\&$$

$$\gamma_{Jul}^{Imm} - \gamma_{Jul}^{Non-imm} = 0 \;\&$$

$$\gamma_{Aug}^{Imm} - \gamma_{Aug}^{Non-i} = 0$$

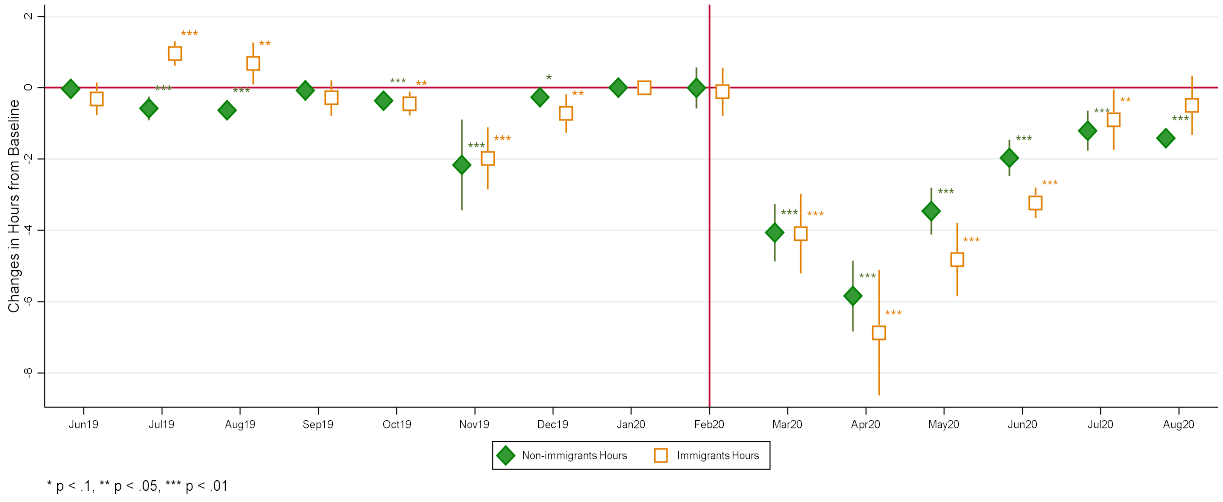
$$H_1\colon\ H_0\ is\ False$$

This test yields a p-value of 0.000, demonstrating that the difference between immigrants and non-immigrants is statistically significant at the 1% level. Results of F-tests for all such pairwise comparisons in figures throughout the paper are given in Table 5 in appendix A. Together these three labour market outcomes suggest that the differing experiences of immigrants from non-immigrants during COVID-19 was not driven by differences in voluntary withdrawal from the labour force. The table of regression results used to generate Figure 1 is included in Appendix 1[1].

While Figure 1 shows differences in post-COVID labour market outcomes on the extensive margin, Figure 2 shows differences between immigrants and non-immigrants on the intensive margin.

Figure 2 illustrates the evolution of hours worked, by migration status, during the initial wave of the pandemic relative to the baseline month. Immigrants experienced a more significant reduction in hours from April to June 2020, but after June, their hours rebounded more quickly compared to non-immigrants. By August 2020, immigrant hours were statistically indistinguishable from baseline, while non-immigrants hours remained below baseline. My findings are in line with prior research (Beland et al., 2020b).

Figure 2: The Impact of COVID-19 on Hours by Migration Status



[1] Coefficient estimates for other figures are available upon request.

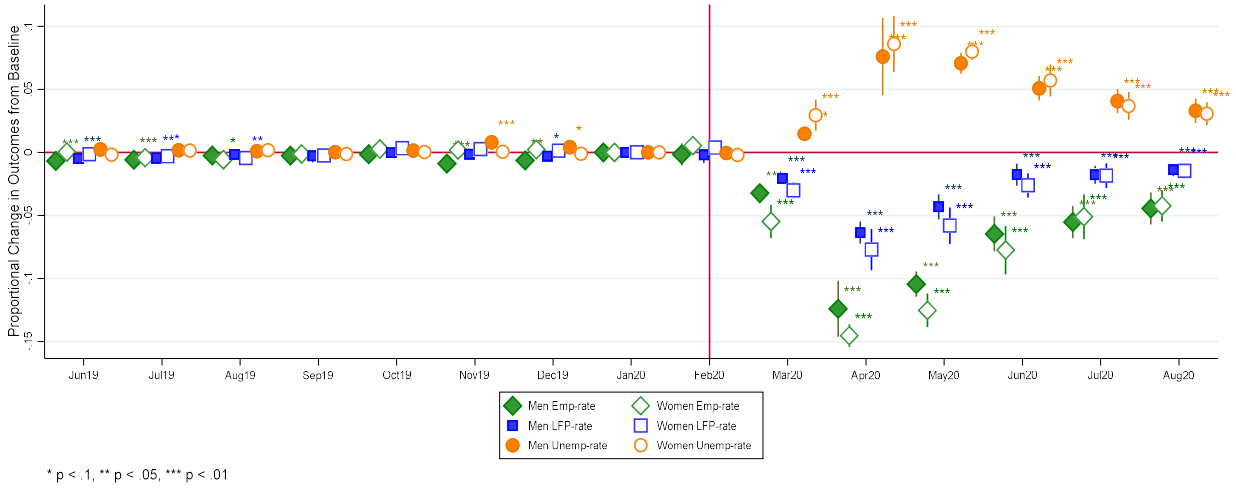
Overall, the information presented in Figures 1 and 2 suggests that immigrants had worse labour market experiences in the six months following the onset of COVID-19 than non-immigrants.

Before investigating in detail the difference in post-COVID labour market experiences of immigrants versus non-immigrants in Canada, I now provide some further background on the effect of COVID-19 on labour market outcomes by gender, age, and remotability-index (a measure of how easily one's occupation can be performed from home).

Figure 3 demonstrates the impact of COVID-19 on the employment rate, unemployment rate, and labour force participation rate for Canadian men and women between the ages of 15 and 64. The employment rate for both sexes sharply declined due to the pandemic. Between February and April 2020, women experienced a more significant decline in their employment rate than men. However, women's employment rate recovered faster than men's after May 2020.

The trends in the unemployment and participation rates of men and women followed a similar trajectory to their employment rate. Women's unemployment rose more sharply and their labour force participation rate fell more sharply than men's between February and April of 2020. However, both labour market outcomes recovered more quickly for women than for men after May 2020. By August, men and women's experiences had converged, relative to baseline, across all three of these labour market outcomes. My findings are consistent with previous studies (Singh et al., 2022; Hou and Picot, 2022).

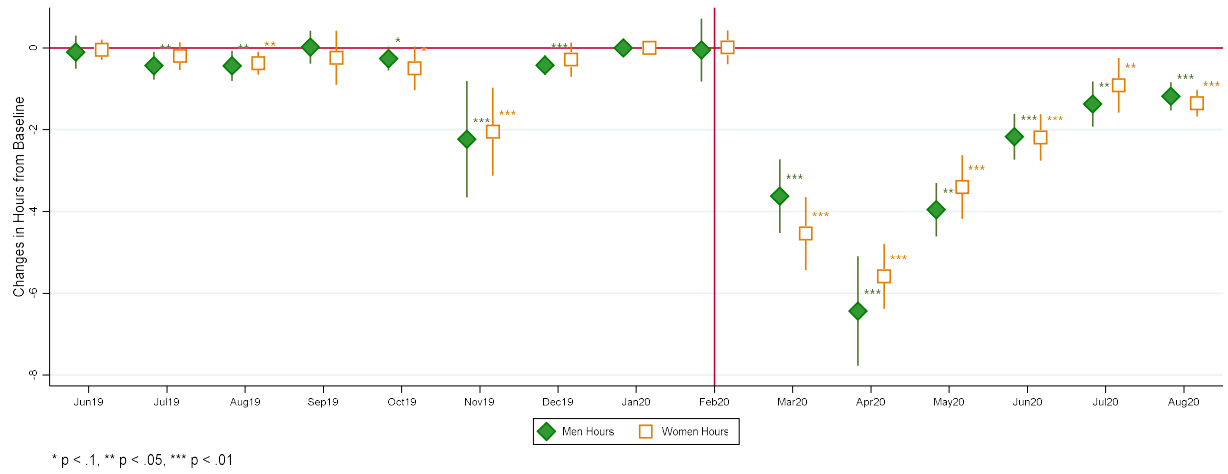
Figure 3: The Impact of COVID-19 on Canadian Labour Market Outcomes by Gender



Together the three labour market outcomes plotted in Figure 3 suggest that the decline in employment experienced by men and women in the first six months of COVID was largely, though not entirely, involuntary.

For insight into the intensive margin, Figure 4 depicts the trends in hours worked by gender. Although women's initial decline in hours due to the pandemic was more severe than men's, women's hours bounced back toward baseline more quickly than men's. Moreover, F-test results show a p-value of 0.00 (see Table 5 in appendix A), demonstrating that the difference between women and men is statistically significant at the 1% level over the entire March through August period.

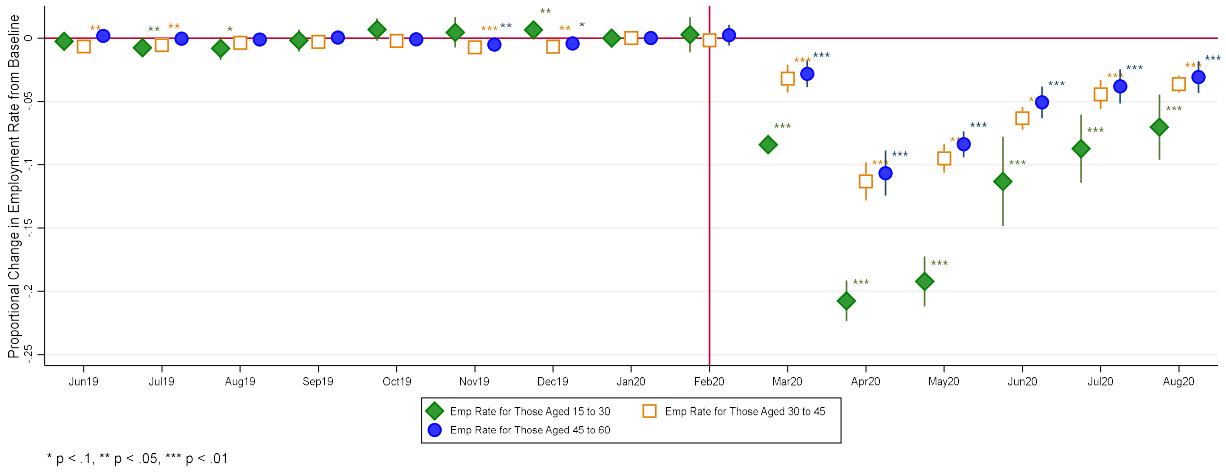
Figure 4: The Impact of COVID-19 on Hours by Gender



Figures 5 to 8 show how post-COVID labour market outcomes evolved by age cohorts, relative to the baseline month, and demonstrate that COVID-19 labour market experiences differed substantially by age. Figure 5 illustrates the evolution of the post-COVID employment rate for Canadian individuals by age. This figure indicates that individuals aged 15 to 30 experienced the most substantial reduction in their employment rate compared to older age groups. However, from April to August, this age group exhibited a more rapid rebound in their employment rate than the other age groups. Figure 5 and F-test[2] results suggest that there were statistically significant differences in employment rates, relative to baseline, between individuals aged 30 to 45 and those aged 45 to 60 for the months of March to August 2020.

[2] F-test results are reported in Table 5 in Appendix A.

Figure 5: The Impact of COVID-19 on the Employment Rate by Age Categories



A similar pattern emerges with the unemployment rate, which is depicted in Figure 6. Between February and May 2020, the unemployment rate of individuals aged 15 to 30 rose more relative to baseline than did the unemployment rate for the older two age groups. Between the onset of COVID in February and August, the unemployment rate rose similarly from baseline for those aged 30 to 45 and those aged 45 to 60. My findings are consistent with prior research (Beland et al., 2020a; Lemieux et al. 2020, Hou et al., 2020).

Figure 6: The Impact of COVID-19 on the Unemployment Rate by Age Categories

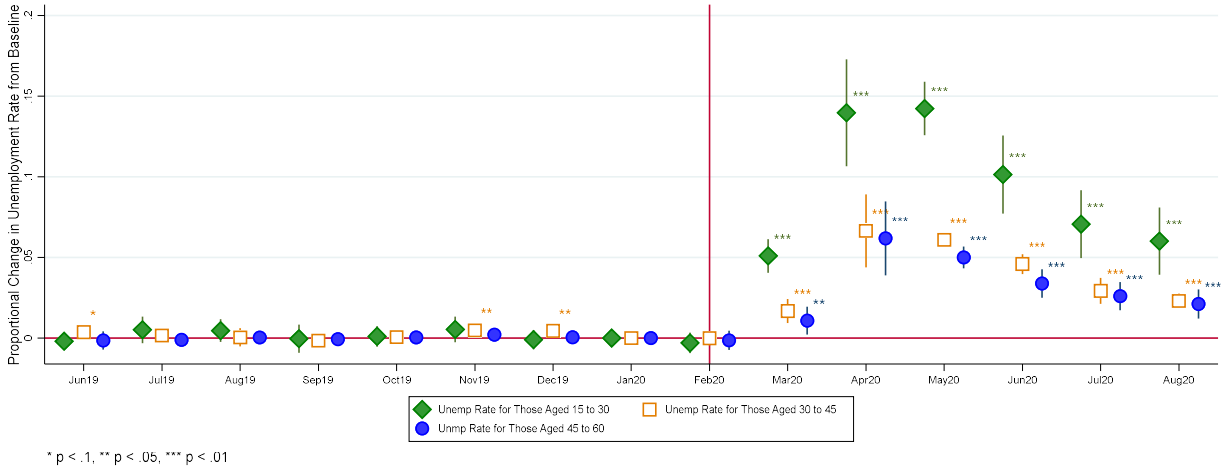


Figure 7 shows how the post-COVID labour force participation rate evolved for different age groups. Again, we see that the 15-30 age group was more adversely affected than the older two cohorts. However, while the employment rate and unemployment rate trends show a

significant disparity between the 15-30 age category and other age groups through August 2020, Figure 7 does not reveal any significant differences in labour force participation rates between the different age categories after May 2020.

Figure 7: The Impact of COVID-19 on the Labour Force Participation Rate by Age Categories

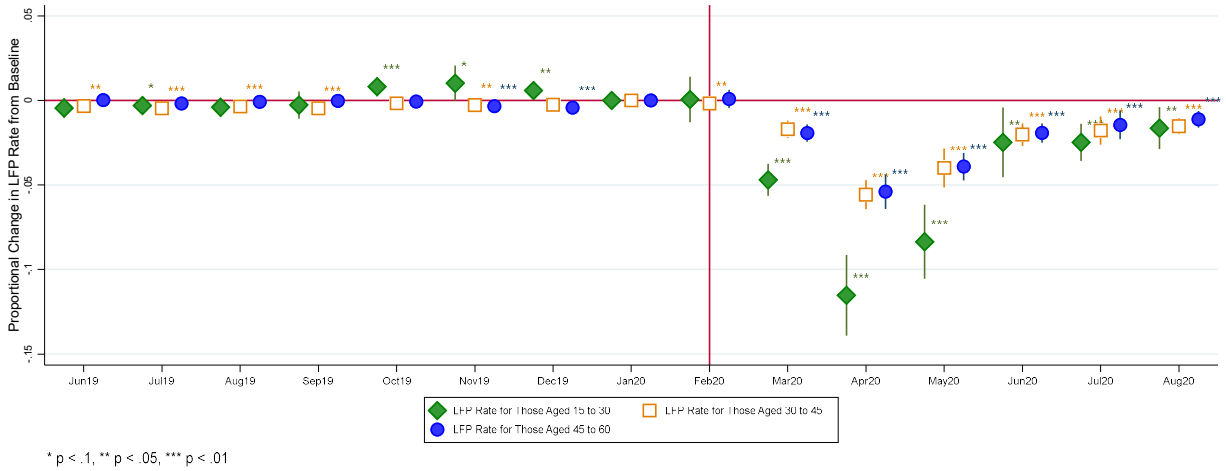
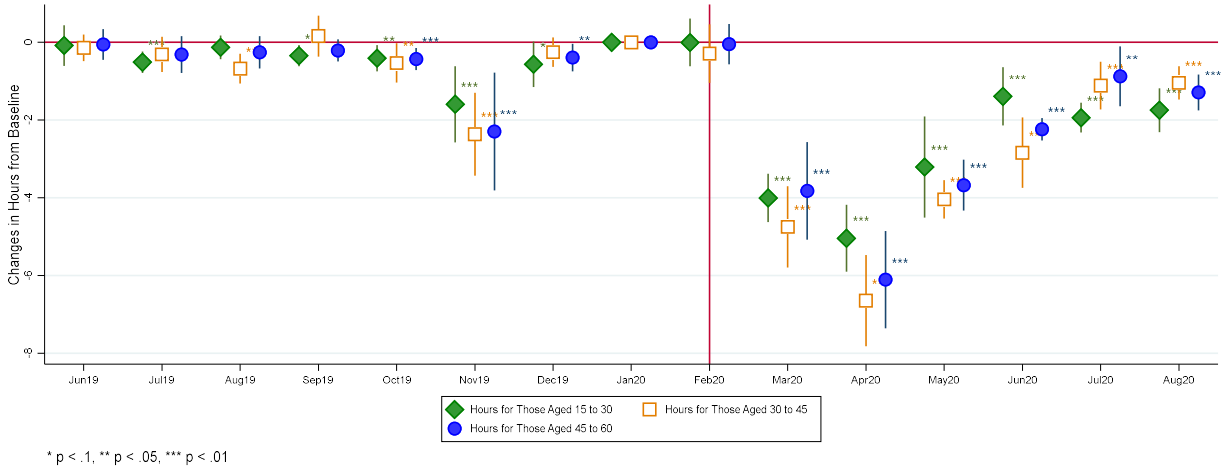


Figure 8 depicts the evolution of hours worked across different age cohorts following the onset of COVID-19. The monthly lag coefficients of different age categories have overlapping 95% confidence intervals. To test whether these coefficient differ systematically between age categories over the entire March through August period I conduct an F-test (see Table 5 in appendix A). This test yields a p-value of 0.000, demonstrating that the difference between age categories are statistically significant at the 95% level.

Figure 8: The Impact of COVID-19 on Hours Worked by Age Categories



When examining the labour market experience of different age cohorts following the onset of COVID, figures 5 to 8 reveal a complex narrative. Figure 5 to 7 indicate that the 15 to 30 age cohort experienced greater setbacks in the labour market on the extensive margin compared to other age cohorts. Nonetheless, figure 8 shows that hours did not evolve all that differently across groups, which means that young people who kept their jobs did about as well as older people who kept their jobs, relative to baseline. But young people lost their jobs at a much higher rate than older people. The big job losses of young people (relative to baseline) may be due to the high level of employment in the service and retail sectors which were particularly hard hit during the initial lockdowns. Additionally, a gradual easing of restrictions on activities in May and June 2020, resulted in a faster recovery of employment loss for the young age group compared to the initial lockdown period.

Figure 9 shows the fluctuations in the employment rate across different remotability-index categories during the initial surge of the pandemic. The remotability-index describes the extent to which jobs can be performed remotely (e.g., from home). To define this variable, I rely on a study conducted by Gallachar and Hossain (2020) wherein they assess the proportion of jobs that can be carried out from home across various industries in Canada. Figure 9 indicates that individuals employed in high remotability-index industries, which afford greater work-from-home flexibility, had the most modest decline in employment rate. In contrast, those engaged in low remotability-index industries experienced the most significant decrease in employment rate from February to May 2020. However, the employment rate of individuals in low-remotability industries rebounded more rapidly toward the baseline, resulting in similar deviations from the baseline employment rate for those in both low- and mid-remotability index industries after May 2020. This timing corresponds to the removal of social distancing orders. My findings are consistent with prior research (Beland et al., 2020a).

Figure 9: The Impact of COVID-19 on the Employment Rate by Remotability-Index Categories

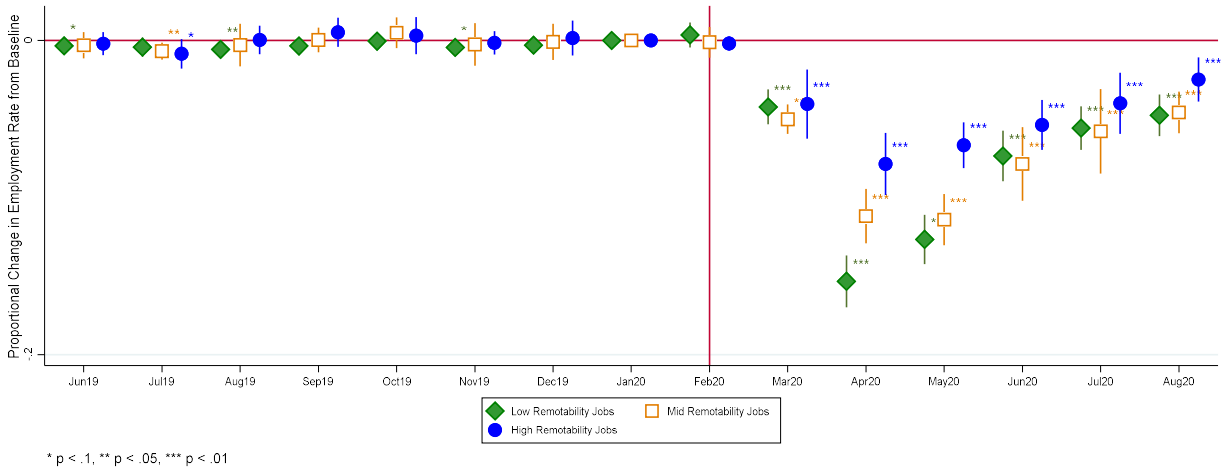
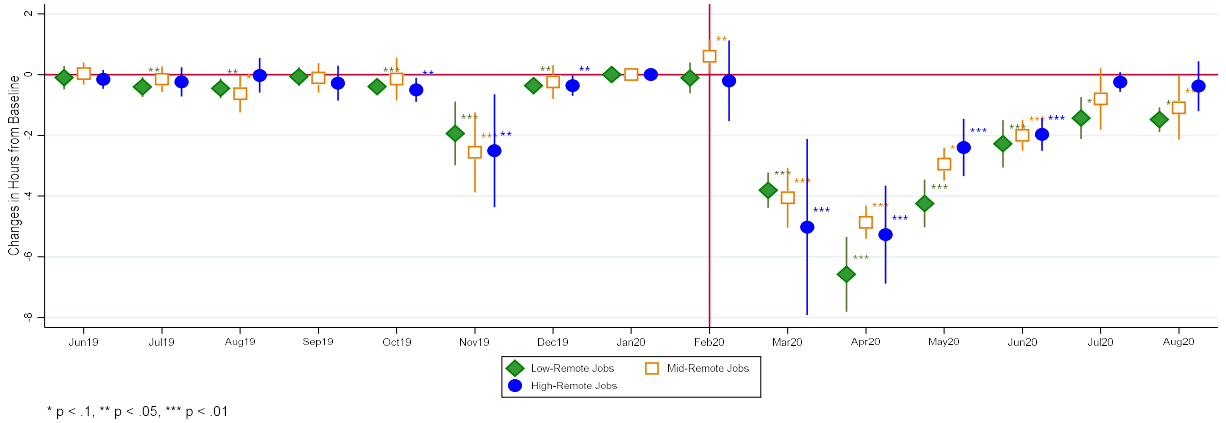


Figure 10 depicts the evolution of hours worked by remotability-index category during the first six months of the pandemic. It reveals that COVID-19 negatively affected hours worked in all remotability-index categories to almost the same extent. However, an F-test (see Table 5 in appendix A) shows that individuals in low-remotability jobs experienced a greater decrease in hours than individuals in the other remotability categories in April, May, and July 2020.

Analyzing the intensive margin shows that hours did not evolve all that differently across remotability categories, which means that individuals engaged in low-remotability jobs who kept their jobs did about as well as individuals in other remotability categories, relative to baseline. However, individuals employed in low-remotability jobs lost their jobs at a much higher rate than others as we saw in Figure 9.

Figure 10: The Impact of COVID-19 on Hours Worked by Remotability-Index Categories



The primary objective of this investigation is to examine labour market outcomes during the first six months of the pandemic in Canada, with a particular focus on the experience of immigrants versus non-immigrants. Figures 1 and 2 indicate that immigrants were more severely impacted than non-immigrants during the initial wave of the pandemic. In what follows, I assess the experience of immigrants compared to non-immigrants during the same period in greater detail by examining characteristics such as gender, age, and job remotability which I showed to be important determinants of post-COVID labour market outcomes for Canadians generally in Figures 3-10. This closer examination is important for two reasons. First, it enables the researcher to identify the groups of immigrants that were most impacted by the pandemic. Second, it allows the researcher to investigate the possibility that differences in outcomes by migration status might be driven by differences in characteristics of immigrants versus non-immigrants. For example, immigrants might work more in low-remotability jobs, as suggested by (Borjas and Cassidy??)

Table 4 in Appendix A provides an overview of various characteristics, including those examined in Figures 3 to 10, for the sample between January 2018 and August 2020 split out by migration status. The table reveals that although women accounted for over 50% of the sample population in both groups, the proportion of immigrants who are female is higher than that of non-immigrants. In addition, non-immigrants are more likely to fall into the 15-30 age category than are immigrants. Immigrants are more likely to work in low or high remotability jobs, while non-immigrants are more likely to work in mid-remotability jobs. For the rest of this study I analyze the impact of COVID-19 on outcomes of interest by gender, age categories, and remotability of jobs with a particular focus on migration status.

Figure 11 shows the impact of COVID-19 on the employment rate, unemployment rate, and labour force participation rate of men in Canada by migration status. We see that the employment rate of both immigrant and non-immigrant men fell similarly sharply from baseline through April 2020. However, the employment rate of non-immigrant men returned more quickly toward baseline between April and August 2020 than did the employment rate of immigrant men. A similar pattern is noticeable in the unemployment rate. Both groups experienced a significant jump in the unemployment rate, but the unemployment rate of non-immigrant men returned more quickly toward baseline than that of immigrant men. Although Figure 11 demonstrates that immigrant and non-immigrant men had similar deviations from the baseline in their labour force

participation rates, the results of the F-test (see Table 5 in appendix A) indicate notable differences between the two groups during the six-month period following the onset of COVID-19.

Figure 11: The Impact of COVID-19 on Canadian Men's Labour Market Outcomes by Migration Status

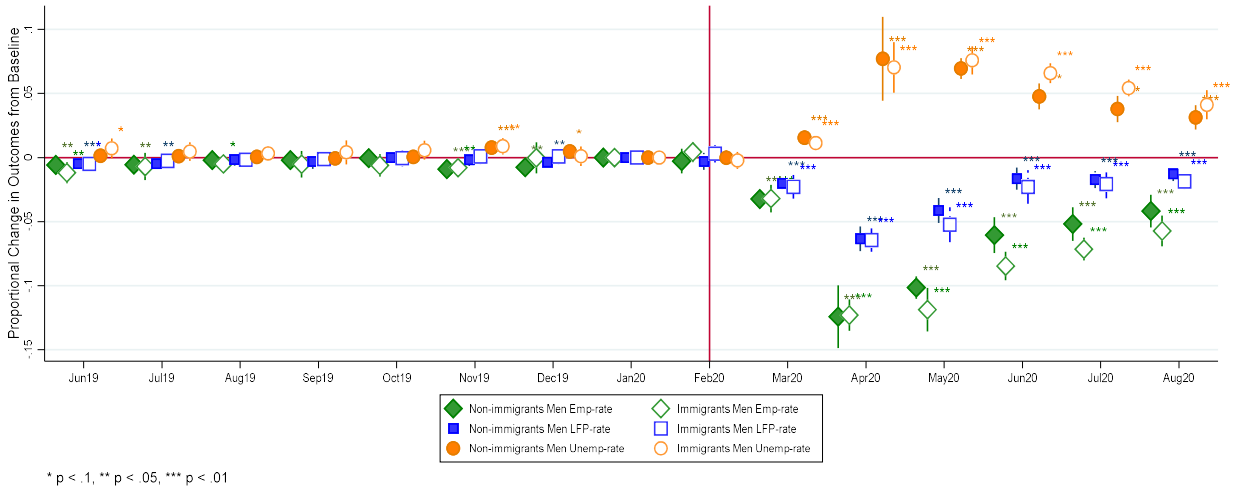
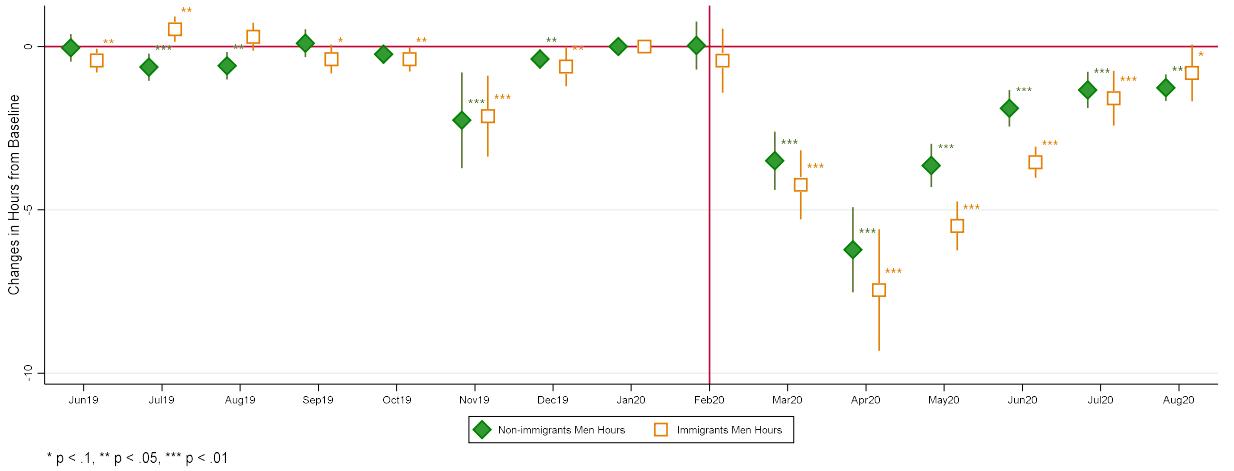


Figure 12 shows hours worked of Canadian men by migration status. The figure reveals that male immigrants experienced a greater reduction in hours compared to their non-immigrant counterparts. However, by July 2020 immigrant men's hours had largely caught up with non-immigrants men's hours relative to baseline. Taken together, Figures 11 and 12 suggest that overall immigrant men's labour market outcomes worsened more than those of non-immigrant men over the 6 months from the onset of COVID-19.

Figure 12: The Impact of COVID-19 on Canadian Men's Hours by Migration Status



I turn next to the labour market experience of female immigrants and non-immigrants during the first six months of COVID-19. Figure 13 shows how employment rate, unemployment rate, and labour force participation rate of immigrant and non-immigrant women changed after COVID-19 hit. By April 2020, immigrant women's labour market position had worsened more than that of non-immigrant women relative to baseline for all three outcomes. After April 2020, non-immigrant women's employment and unemployment rates returned toward baseline more quickly than those of immigrant women. Differences between immigrant and non-immigrant women in the labour force participation rate were less pronounced. The slow return of immigrant women's unemployment rate toward baseline suggests that involuntary unemployment played a significant role in their difficult experience in the post-COVID labour market. My findings are in line with prior research (Hou and Picot, 2022).

Figure 13: The Impact of COVID-19 on Canadian Women's Labour Market Outcomes by Migration Status

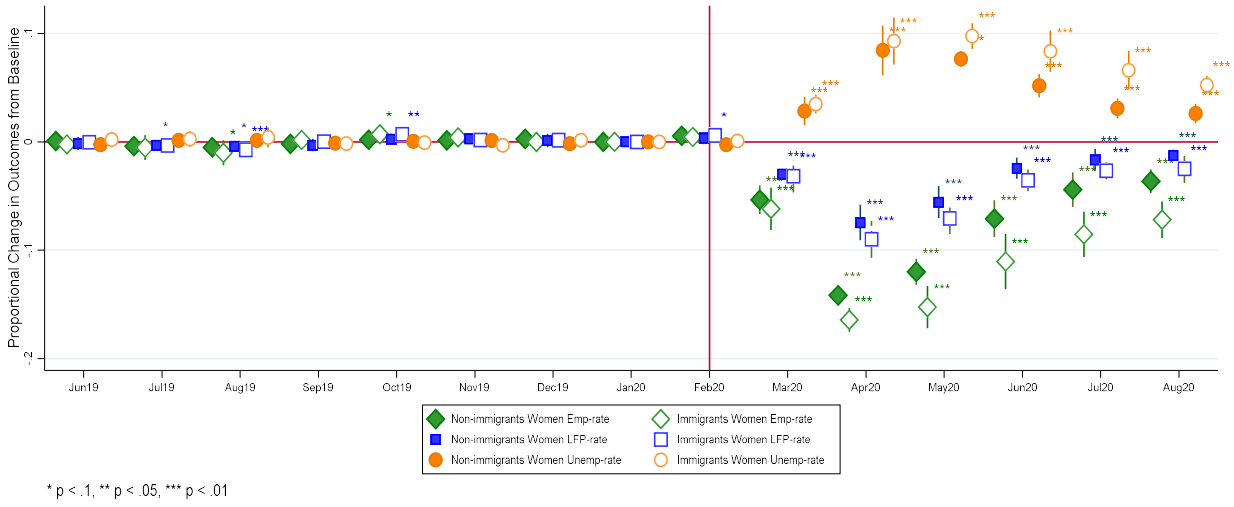


Figure 14 shows how hours worked evolved for immigrant and non-immigrant women following the onset of COVID-19. Immigrant women's hours fell from baseline by more than non-immigrant hours by April 2020, although differences in the decline in hours from baseline between immigrants and non-immigrants are statistically indistinguishable in April 2020. But by July 2020, immigrant women were statistically back to baseline, while non-immigrant women lagged behind. Together, Figures 13 and 14 tell a somewhat mixed story of the labour market experience of immigrant versus non-immigrant women after the onset of COVID. Figure 13 suggests that immigrant women's labour market experience suffered more on the extensive margin

than that of non-immigrant women. Figure 14 suggests that immigrant women had a somewhat more favourable experience relative to non-immigrant women on the intensive margin after June 2020. Comparing Figure 13 (extensive margin outcomes for women) to Figure 11 (extensive margin outcomes for men) suggests a greater immigrant versus non-immigrant disparity for women than for men on the extensive margin. Comparing Figure 14 (intensive margin for women) to Figure 12 (intensive margin for men) suggests a greater immigrant versus non-immigrant disparity for men than for women on the intensive margin.

Figure 14: The Impact of COVID-19 on Canadian Women's Hours by Migration Status

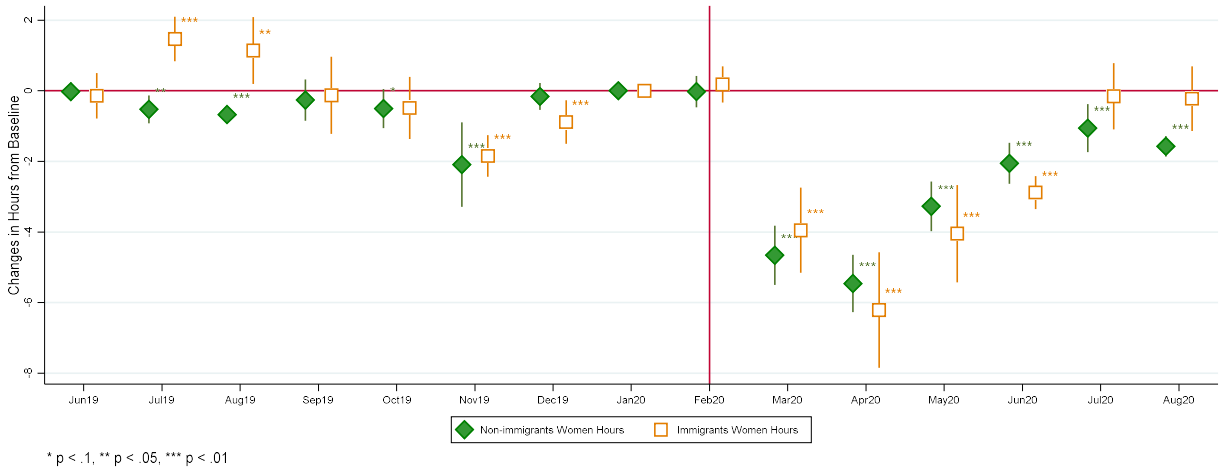


Figure 15 depicts the employment rate's evolution across different age cohorts, by migration status. The monthly lag coefficients of immigrants and non-immigrants in each age cohort have overlapping 95% confidence intervals. To test whether these coefficients differ systematically between immigrants and non-immigrants in each age category over the entire March through August period I conduct an F-test (see Table 5 in appendix A). This test yields a p-value of 0.00, demonstrating that the difference between immigrants and non-immigrants in each cohort is statistically significant at the 1% level. Figure 15 suggests that for both immigrants and non-immigrants, individuals aged 15 to 30 encountered the most severe impact in contrast to other age groups. As this age group experienced the highest reduction in employment rate during the first wave of the pandemic, I focus on how immigrants and non-immigrants in this age group fared during the first six months of COVID in Figures 16 and 17.

Figure 15: The Impact of COVID-19 on the Employment Rate by Migration Status and Age Category

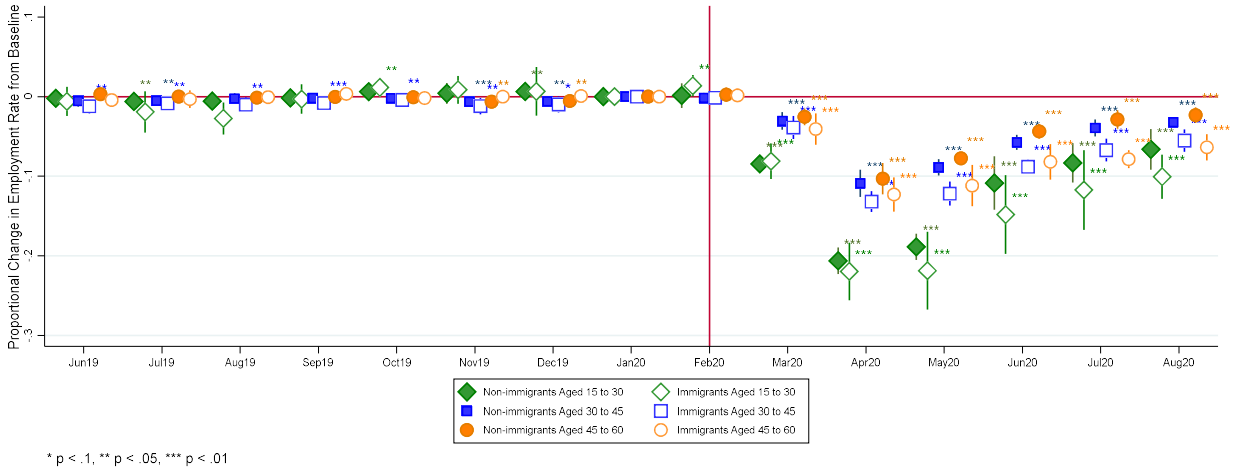
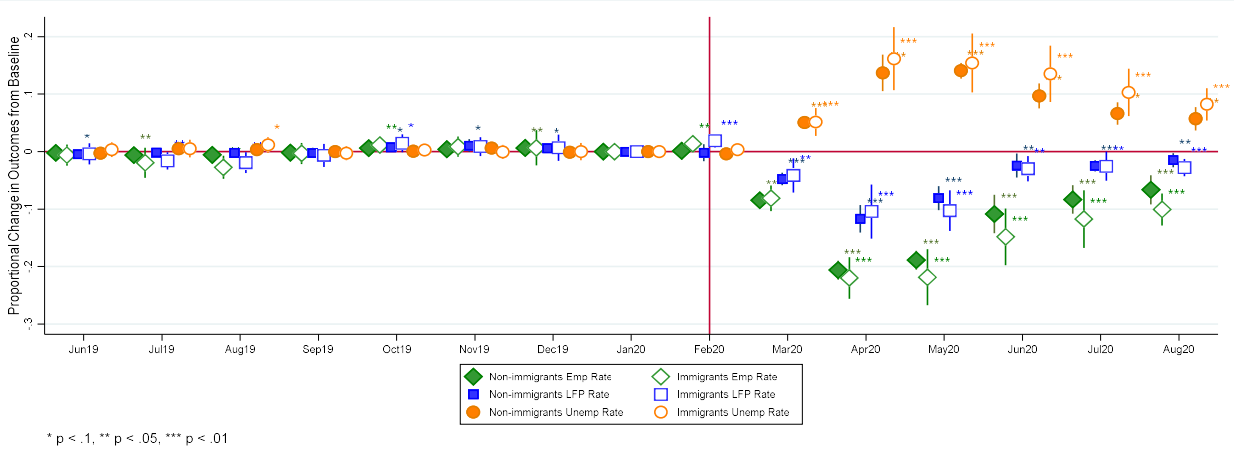


Figure 16 illustrates the impact of the COVID-19 pandemic on employment, unemployment, and labour force participation rates of individuals aged 15 to 30, by migration status. Both immigrants and non-immigrants experienced a considerable decline in employment rates due to the pandemic. There was a comparable decrease in employment rates for both groups between February and April 2020. However, the employment rate immigrants recovered slower than that of non-immigrants after May 2020. According to an F-test (see Table 5 in Appendix A), there were statistically significant differences in the deviation of employment rates from baseline between immigrants and non-immigrants aged 15 to 30 over the entire March through August period.

Figure 16: The Impact of COVID-19 on Canadian Labour Market Outcomes by Migration Status for Those Aged 15 to 30



The patterns in the unemployment rates of immigrants and non-immigrants aged 15 to 30 are comparable to those observed in employment rates. During the first wave of the pandemic, immigrants experienced a steeper increase in unemployment rates and a slower recovery than non-immigrants. Figure 16 suggests that labour force participation rates of those aged 15 to 30 fell slightly more from baseline for immigrants than for non-immigrants. However, the monthly lag coefficients have overlapping 95% confidence intervals. F-test results demonstrate that the difference between immigrants and non-immigrants is statistically significant at the 5% level. The gradual return of the unemployment rate among age 15-30 immigrants to its baseline level suggests that involuntary unemployment played a significant role in the experience of young Canadian immigrants in the immediate post-COVID period.

Figure 17 illustrates the changes in hours worked for the 15 to 30 age cohort by migration status over time. According to F-test (see Table 5 in Appendix A) over the 6 months from the onset of COVID-19, there was no statistically significant difference in the reduction of hours worked between young immigrants and young non-immigrants at the 5% level. These findings suggest that immigrants between the ages of 15 and 30 who were able to maintain their jobs performed similarly to non-immigrants in the same age range who also kept their jobs, compared to the baseline. However, immigrants in this age group were more likely to lose their jobs than their non-immigrant counterparts.

Figure 17: The Impact of COVID-19 on Hours Worked by Migration Status and for Those Aged 15 to 30

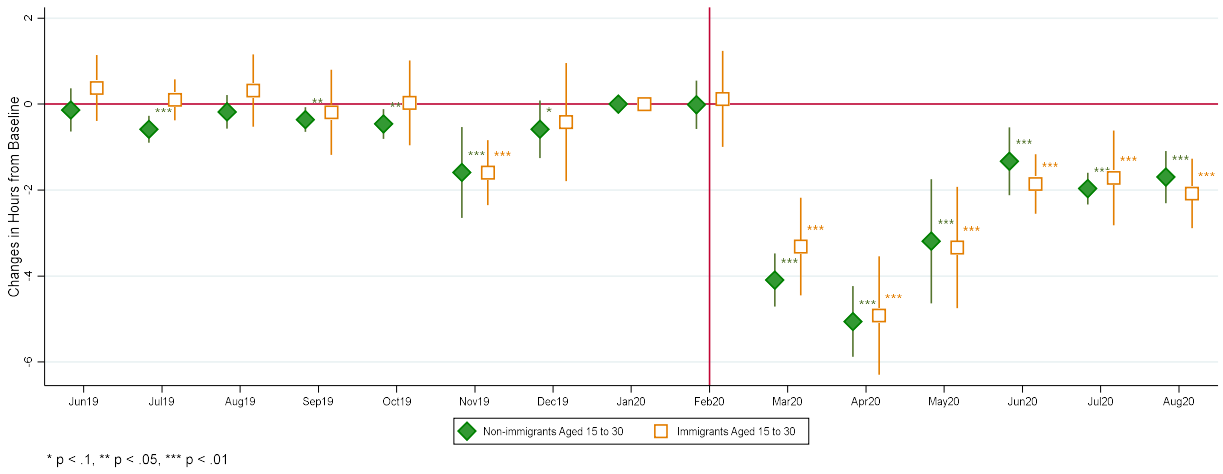


Figure 18 shows the evolution of employment rates by migration status across the three different remotability-index categories. The figure indicates that immigrants' employment rate fell

more sharply than non-immigrants' among those in low-remotability jobs. Based on F-test results (see Table 5 in Appendix A), I find that there were significant disparities in the employment rate between immigrant and non-immigrant individuals occupied in low-remotability jobs over the March through August period.

Figure 18 suggests that employment rate fell slightly more from baseline for immigrants than for non-immigrants in mid- and high-remotability jobs. However, the monthly lag coefficients have overlapping 95% confidence intervals. To test whether these coefficient differ systematically between immigrants and non-immigrants over the entire March through August period I conduct an F-test (see Table 5 in Appendix A). This test shows that the difference between immigrants and non-immigrants is statistically significant at the 95% level.

Given the pronounced differences in the post-COVID evolution of employment rates between immigrants and non-immigrants in the low-remotability category, I focus my attention on this category in Figures 19 and 20. Figure 19 focuses on outcomes along the extensive margin of work; Figure 20 focuses on the intensive margin.

Figure 18: The Impact of COVID-19 on the Employment rate by Migration Status and Remotability-Index Categories

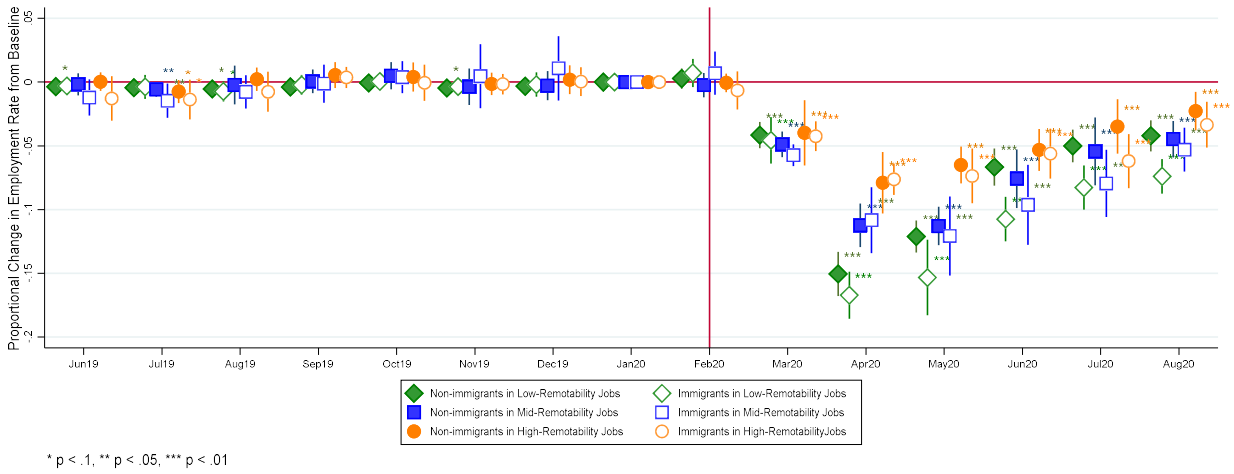


Figure 19 demonstrates the effect of the COVID-19 pandemic on employment, unemployment, and labour force participation rates for individuals in low-remotability jobs by migration status. Both immigrant's and non-immigrant's employment rates declined significantly due to the pandemic. However, immigrants' employment rate returned towards the pre-pandemic baseline slower than non-immigrants' after May 2020.

The trends in the unemployment and labour force participation rates for immigrants and non-immigrants in low-remotability jobs followed a similar trajectory to their employment rate. During the first wave of the pandemic, immigrants experienced a considerable increase in unemployment rates, and their recovery towards baseline was slower than that of non-immigrants. In contrast, immigrants experienced a more rapid rebound in labour force participation rates. Together these facts suggest that that involuntary unemployment was an important feature in the labour market of immigrants in low-remotability industries. According to F-test results (see Table 5 in Appendix A), there were statistical significant differences between immigrants and non-immigrants in outcomes of interest over the 6 months from the onset of COVID-19.

Figure 19: The Impact of COVID-19 on Canadian Labour Market Outcomes by Migration Status for Low Remotability-Index

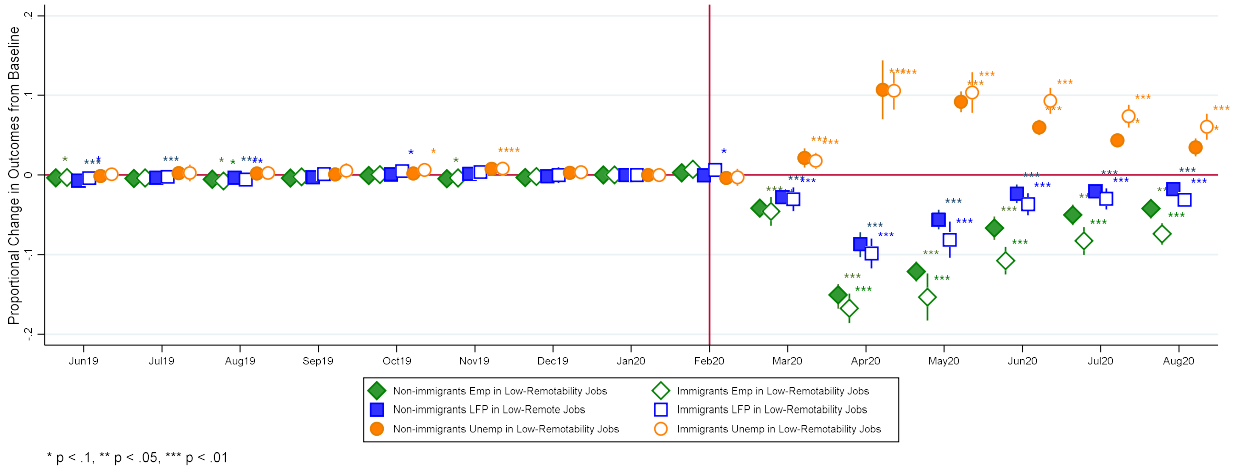
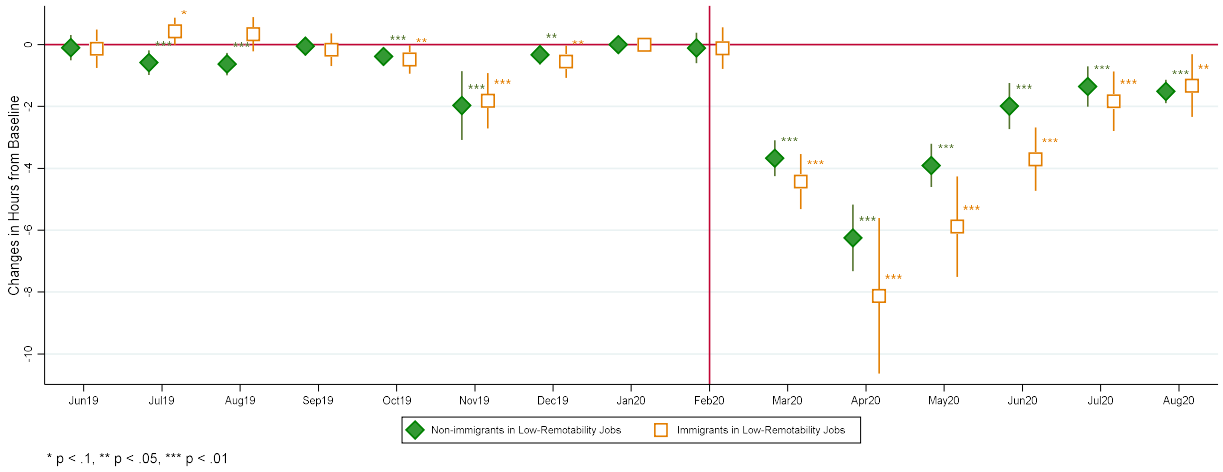


Figure 20 shows the evolution in hours worked in low-remotability industries by migration status during the first wave of the pandemic. The figure implies that immigrants experienced a comparatively higher reduction in hours worked than non-immigrants during the first four months of the pandemic. The insights into intensive and extensive labour market outcomes for low-remotability jobs indicate that immigrants were more severely affected by COVID-19 than non-immigrants.

Figure 20: The Impact COVID-19 on Hours Worked by Migration Status for Low Remotability-Index



The concentration of immigrants in occupations that have a lower possibility to be performed remotely is regarded as one of the principal factors responsible for the more negative impact experienced by immigrants in the pandemic as compared to non-immigrants (Gallacher and Hossain, 2020). A detailed overview of the distribution of immigrants and non-immigrants across jobs with different remotability-indexes is presented in Table 4 in Appendix A. The distribution of workers across these remotability-index categories is almost identical for both groups. However, two additional factors may explain why immigrants, who had a comparable distribution of workers in low-remotability jobs as non-immigrants, fared worse than their non-immigrant counterparts during the initial wave of the pandemic. In the sample of data examined from January 2018 to August 2020, non-immigrants had longer job tenure and higher rates of union coverage on average. Workers with short tenure jobs were more vulnerable to layoffs during the pandemic (Hou et al., 2020). Additionally, a lower rate of union coverage made immigrants more susceptible to job losses during the first wave of the COVID-19. Occupations covered by unions are typically associated with higher wages and more job security, which reduces the likelihood of dismissals in comparison to non-unionized positions (Statistics Canada, 2022a). Thus, lower rates of coverage by unions and employment in jobs with shorter tenure were two factors that may have contributed to the higher susceptibility of immigrants as compared to non-immigrants during the initial wave of the pandemic.

VI. Conclusion and discussion of my findings in the context of the existing literature

This paper presents an analysis of the Canadian labour market during the initial six months of the COVID-19 pandemic, with a particular focus on migration status. To give a full picture of the impact of COVID-19 on the Canadian labour market, I examine the resulting shifts in employment rates, unemployment rates, participation rates, and hours worked for both immigrants and non-immigrants. By examining the extensive and intensive margins of the Canadian labour market, I can provide a more complete picture of the impact of COVID-19 on workers.

The examination of labour market outcomes during the first wave of the COVID-19 pandemic, spanning from February to August 2020, by migration status, indicates that immigrants experienced more unfavourable outcomes than non-immigrants in terms of employment rates, unemployment rates, participation rates, and hours worked. The analysis also reveals that the labour market experienced the largest hit in April 2020, and outcomes began to improve gradually towards the pre-pandemic level after that month. These results are in line with previous research conducted by Borjas and Cassidy (2020), Beland et al. (2020a), Mo et al. (2020), Cassidy (2022), Zhang and Gunderson (2022), and Hou and Picot (2022), which also find that the labour market outcomes of immigrants were more severely impacted by the pandemic compared to non-immigrants.

These studies directly measure the differential impact of COVID-19 on labour outcomes of immigrants. In my study, I also define a variable to capture the differential impact of COVID-19 on migration status. However, instead of only focusing on the differential impact terms, I employ an event study model to illustrate the overall experience of immigrants and non-immigrants in the first six months following the onset of the pandemic. This approach allows us to trace the evolution of labour market outcomes for both groups in a single graph, enabling us to observe how the outcomes of immigrants and non-immigrants changed during the first wave of the pandemic and, more significantly, how quickly they rebounded towards pre-pandemic levels.

Moreover, my findings reveal that for both men and women, immigrants were more negatively affected than their non-immigrant counterparts in the first six months following the onset of the pandemic. However, it appears that the disparity between immigrant and non-immigrant women was more significant than that of men along the extensive margin. Conversely, my findings show that the disparity between immigrants and non-immigrants was greater for men

than women in terms of hours worked during the first wave of the pandemic. My findings align with Borjas and Cassidy's (2020) research, which examined the likelihood of job loss based on migration status and gender. They discovered that for both men and women, immigrants were more negatively impacted than non-immigrants. Other studies, including Beland et al. (2020a), singh et al. (2020), Mo et al. (2020), and Brochu et al. (2020), concentrate on different aspects of labour market outcomes and demonstrate that women experienced more hardship than men.

Additionally I find that, regardless of migration status, individuals aged 15 to 30 had the highest reduction in extensive margin outcomes compared to other age cohorts. With a focus on this age group and an emphasis on migration status, my analysis shows that immigrants in this cohort had more unfavourable experiences in terms of their employment, unemployment, and participation rates than their non-immigrants counterparts during the first six months of the pandemic. On the other hand, both immigrants and non-immigrants aged 15 to 30 displayed similar trends in terms of hours worked during this period. Previous research on the impact of COVID-19 on labour market outcomes, including Beland et al. (2020b), Lemieux et al. (2020), and Brochu et al. (2020), does not consider the breakdown of the population by migration status. However, their findings align with the conclusions of my research, which indicates that younger individuals faced more unfavorable consequences than other age groups.

Finally, categorizing industries by the remotability of jobs, I find that high-remotability jobs had more favorable outcomes regardless of migration status, compared to low- and mid-remotability categories. My findings indicate that a greater disparity can be observed between immigrants and non-immigrants by examining the extensive and intensive margins of the Canadian labour market. Immigrants in low-remotability jobs were worse off than non-immigrants in this remotability-index category during the first six months after the onset of COVID-19. Previous studies used different approaches, including occupation, proximity to coworkers, and probability of exposure to the pandemic, to categorize jobs by remotability-indexes. However, my findings are consistent with previous research by Gallachar and Hossain (2020b), Beland et al. (2020b), Borjas and Cassidy (2020), and Zhang and Gunderson (2022), which show that the adverse effects of COVID-19 were greater on those employed in low-remotability jobs.

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VII. Appendix A

Table 1: Summary Statistics

		Mean	Standard error
Labour Market Outcomes	Employment	0.721	0.00029
	Unemployment	0.054	0.00014
	Participation	0.225	0.00027
	Hours Worked	32.288	16.35362
Migration Status	Immigrants	0.167	0.00024
	Non-immigrants	0.833	0.00024
Couple Status	Couple	0.596	0.00031
	Non-couple	0.404	0.00031
Sex	Male	0.493	0.00032
	Female	0.507	0.00032
Industry	Agriculture	0.022	0.00011
	Forestry and logging and support activities for forestry	0.005	0.00005
	Fishing, hunting and trapping	0.004	0.00004
	Mining, quarrying, and oil and gas extraction	0.022	0.00010
	Utilities	0.008	0.00006
	Construction	0.083	0.00020
	Manufacturing - durable goods	0.048	0.00015
	Manufacturing - non-durable goods	0.042	0.00014
	Wholesale trade	0.029	0.00012
	Retail trade	0.116	0.00023
	Transportation and warehousing	0.050	0.00015
	Finance and insurance	0.034	0.00013
	Real estate and rental and leasing	0.015	0.00009
	Professional, scientific and technical services	0.059	0.00017
	Business, building and other support services	0.038	0.00014
	Educational services	0.077	0.00019
	Health care and social assistance	0.136	0.00024
	Information, culture and recreation	0.041	0.00014

		Mean	Standard error
	Accommodation and food services	0.071	0.00018
	Other services (except public administration)	0.042	0.00014
	Public administration	0.058	0.00017
Education	0 to 8 Years	0.027	0.00010
	Some High School	0.115	0.00020
	High School Graduate	0.205	0.00026
	Some Postsecondary	0.070	0.00016
	Postsecondary certificate or diploma	0.349	0.00031
	Bachelor's degree	0.162	0.00024
	Above bachelor's degree	0.072	0.00017
Age	15 to 19 years	0.086	0.00018
	20 to 24 years	0.082	0.00018
	25 to 29 years	0.090	0.00018
	30 to 34 years	0.097	0.00019
	35 to 39 years	0.101	0.00019
	40 to 44 years	0.098	0.00019
	45 to 49 years	0.099	0.00019
	50 to 54 years	0.108	0.00020
	55 to 59 years	0.122	0.00021
	60 to 64 years	0.116	0.00020
Occupation at main job	Management occupations	0.080	0.00019
	Business, finance and administration occupations	0.148	0.00025
	Natural and applied sciences and related occupations	0.067	0.00018
	Health occupations	0.076	0.00019
	Occupations in education, law and social, community and government services	0.115	0.00023
	Occupations in art, culture, recreation and sport	0.027	0.00011
	Sales and service occupations	0.245	0.00031
	Trades, transport and equipment operators and related occupations	0.159	0.00026

		Mean	Standard error
	Natural resources, agriculture and related production occupations	0.036	0.00013
	Occupations in manufacturing and utilities	0.048	0.00015
Province	Newfoundland and Labrador	0.035	0.00012
	Prince Edward Island	0.026	0.00010
	Nova Scotia	0.050	0.00014
	New Brunswick	0.049	0.00014
	Quebec	0.173	0.00024
	Ontario	0.277	0.00029
	Manitoba	0.087	0.00018
	Saskatchewan	0.074	0.00017
	Alberta	0.111	0.00020
	British Columbia	0.118	0.00021
Remotability Index	Low Remotability Industries	0.679	0.00033
	Mid Remotability Industries	0.151	0.00025
	High Remotability Industries	0.170	0.00027
Education level	Less than High School Graduate	0.142	0.00022
	Some Postsecondary or Diploma	0.275	0.00029
	Bachelor's Degree and Above	0.583	0.00032
Age level	Less than 30 Years Old	0.293	0.00031
	Between 30 to less than 45 Years Old	0.335	0.00032
	Between 45 to less than 60 Years Old	0.372	0.00033

Table 2: Summary Statistics by Migration Status

		Immigrant		Non-immigrant	
		Mean	Standard error	Mean	Standard error
Labour Market Outcomes	Employment	0.733	0.00069	0.719	0.00032
	Unemployment	0.055	0.00036	0.054	0.00016
	Participation	0.212	0.00064	0.228	0.00029
	Hours Worked	32.834	15.47457	32.175	16.52621
Couple Status	Couple	0.693	0.00072	0.576	0.00035
	Non-couple	0.307	0.00072	0.424	0.00035
Sex	Male	0.479	0.00078	0.495	0.00035
	Female	0.521	0.00078	0.505	0.00035
Industry	Agriculture	0.013	0.00020	0.024	0.00012
	Forestry and logging and support activities for forestry	0.001	0.00006	0.006	0.00006
	Fishing, hunting and trapping	0.001	0.00004	0.004	0.00005
	Mining, quarrying, and oil and gas extraction	0.011	0.00018	0.025	0.00012
	Utilities	0.005	0.00013	0.009	0.00007
	Construction	0.058	0.00041	0.088	0.00022
	Manufacturing - durable goods	0.057	0.00040	0.046	0.00016
	Manufacturing - non-durable goods	0.058	0.00041	0.038	0.00015
	Wholesale trade	0.027	0.00028	0.029	0.00013
	Retail trade	0.104	0.00053	0.118	0.00025
	Transportation and warehousing	0.065	0.00043	0.047	0.00016
	Finance and insurance	0.046	0.00036	0.032	0.00014
	Real estate and rental and leasing	0.018	0.00023	0.014	0.00009
	Professional, scientific and technical services	0.079	0.00047	0.055	0.00018
	Business, building and other support services	0.047	0.00037	0.036	0.00014
	Educational services	0.062	0.00042	0.080	0.00021
	Health care and social assistance	0.147	0.00062	0.134	0.00027
	Information, culture and recreation	0.032	0.00031	0.042	0.00016

		Immigrant		Non-immigrant	
		Mean	Standard error	Mean	Standard error
	Accommodation and food services	0.091	0.00050	0.067	0.00020
	Other services (except public administration)	0.040	0.00034	0.042	0.00016
	Public administration	0.039	0.00034	0.062	0.00019
Education	0 to 8 Years	0.034	0.00028	0.025	0.00011
	Some High School	0.074	0.00041	0.124	0.00023
	High School Graduate	0.170	0.00059	0.212	0.00029
	Some Postsecondary	0.059	0.00037	0.072	0.00018
	Postsecondary certificate or diploma	0.274	0.00070	0.364	0.00034
	Bachelor's degree	0.253	0.00068	0.144	0.00025
	Above bachelor's degree	0.136	0.00054	0.059	0.00017
Age	15 to 19 years	0.055	0.00036	0.093	0.00020
	20 to 24 years	0.059	0.00037	0.087	0.00020
	25 to 29 years	0.075	0.00041	0.094	0.00020
	30 to 34 years	0.107	0.00048	0.095	0.00021
	35 to 39 years	0.124	0.00052	0.096	0.00021
	40 to 44 years	0.121	0.00051	0.093	0.00020
	45 to 49 years	0.125	0.00052	0.094	0.00020
	50 to 54 years	0.123	0.00051	0.105	0.00021
	55 to 59 years	0.113	0.00050	0.124	0.00023
	60 to 64 years	0.099	0.00047	0.119	0.00023
Occupation at main job	Management occupations	0.081	0.00048	0.080	0.00021
	Business, finance and administration occupations	0.144	0.00061	0.148	0.00028
	Natural and applied sciences and related occupations	0.098	0.00052	0.061	0.00019
	Health occupations	0.090	0.00050	0.074	0.00020
	Occupations in education, law and social, community and government services	0.097	0.00051	0.118	0.00025
	Occupations in art, culture, recreation and sport	0.021	0.00025	0.028	0.00013

		Immigrant		Non-immigrant	
		Mean	Standard error	Mean	Standard error
	Sales and service occupations	0.257	0.00076	0.243	0.00033
	Trades, transport and equipment operators and related occupations	0.129	0.00058	0.165	0.00029
	Natural resources, agriculture and related production occupations	0.016	0.00022	0.040	0.00015
	Occupations in manufacturing and utilities	0.067	0.00044	0.044	0.00016
Province	Newfoundland and Labrador	0.006	0.00012	0.041	0.00014
	Prince Edward Island	0.012	0.00017	0.029	0.00012
	Nova Scotia	0.019	0.00021	0.056	0.00016
	New Brunswick	0.015	0.00019	0.055	0.00016
	Quebec	0.112	0.00049	0.186	0.00027
	Ontario	0.365	0.00075	0.260	0.00031
	Manitoba	0.119	0.00051	0.799	0.00019
	Saskatchewan	0.060	0.00037	0.077	0.00019
	Alberta	0.133	0.00053	0.107	0.00022
	British Columbia	0.160	0.00057	0.109	0.00022
Remotability Index	Low Remotability Industries	0.692	0.00080	0.676	0.00036
	Mid Remotability Industries	0.121	0.00057	0.157	0.00028
	High Remotability Industries	0.187	0.00068	0.167	0.00029
Education level	Less than High School Graduate	0.108	0.00048	0.149	0.00025
	Some Postsecondary or Diploma	0.229	0.00066	0.284	0.00032
	Bachelor's Degree and Above	0.663	0.00074	0.567	0.00035
Age level	Less than 30 Years Old	0.209	0.00067	0.310	0.00035
	Between 30 to less than 45 Years Old	0.391	0.00080	0.323	0.00035
	Between 45 to less than 60 Years Old	0.400	0.00081	0.367	0.00036

Table 3: Coefficient Estimates for Labour Market Outcomes for Immigrants and Non-immigrants

	Non-immigrants Outcomes				Immigrants Outcomes			
	(1) Emp-rate	(2) LFP-rate	(3) Unemp-rate	(4) hours	(5) Emp-rate	(6) LFP-rate	(7) Unemp-rate	(8) hours
lead_12	-0.000695	-0.00183	-0.00122	-0.380***	0.00729**	0.00437*	-0.00388**	-0.537**
	(-0.25)	(-1.10)	(-0.71)	(-3.29)	(2.76)	(2.03)	(-2.38)	(-2.59)
lead_11	0.00126	-0.00298	-0.00449**	-0.0500	0.000922	-0.000346	-0.00161	-0.0924
	(0.57)	(-1.69)	(-2.66)	(-0.31)	(0.22)	(-0.14)	(-0.73)	(-0.54)
lead_10	-0.000112	-0.00167	-0.00164	-3.393***	-0.00117	-0.00211	-0.000181	-3.953***
	(-0.08)	(-1.17)	(-1.03)	(-16.17)	(-0.26)	(-1.37)	(-0.05)	(-10.24)
lead_9	-0.00141	-0.00336*	-0.00178	-0.373**	-0.00488	-0.00438**	0.00117	-0.620***
	(-1.52)	(-1.83)	(-1.23)	(-2.71)	(-1.60)	(-2.36)	(0.48)	(-5.00)
lead_8	-0.00262	-0.00326**	-0.000457	-0.0334	-0.00724***	-0.00267***	0.00486**	-0.314
	(-1.77)	(-2.29)	(-0.31)	(-0.28)	(-4.59)	(-3.61)	(2.52)	(-1.55)
lead_7	-0.00502**	-0.00401***	0.00138	-0.579***	-0.00666	-0.00323*	0.00397	0.958***
	(-2.55)	(-5.74)	(0.80)	(-3.97)	(-1.57)	(-1.95)	(1.33)	(6.30)
lead_6	-0.00366	-0.00275	0.00106	-0.631***	-0.00770*	-0.00461**	0.00363	0.680**
	(-1.52)	(-1.74)	(0.72)	(-5.65)	(-2.23)	(-2.89)	(1.38)	(2.61)
lead_5	-0.00192	-0.00301	-0.000913	-0.0754	-0.00172	-0.000394	0.00138	-0.284
	(-0.77)	(-1.53)	(-0.61)	(-0.59)	(-0.58)	(-0.21)	(0.51)	(-1.29)
lead_4	0.000598	0.00114	0.000540	-0.367***	0.000538	0.00331***	0.00253	-0.449**
	(0.32)	(1.18)	(0.41)	(-3.72)	(0.39)	(3.56)	(1.62)	(-3.06)
lead_3	-0.00400*	0.000433	0.00464***	-2.164***	-0.00184	0.00139	0.00292*	-1.982***
	(-2.02)	(0.25)	(5.25)	(-3.84)	(-1.16)	(0.93)	(1.87)	(-5.15)
lead_2	-0.00256	-0.00121	0.00166	-0.268*	0.000254	0.00149	0.00107	-0.721**
	(-1.20)	(-0.84)	(1.10)	(-2.19)	(0.07)	(0.66)	(0.50)	(-3.04)
lag_0	0.00126	0.000116	-0.00130	-0.00442	0.00421	0.00441**	-0.000513	-0.113
	(0.44)	(0.05)	(-0.72)	(-0.02)	(1.35)	(2.90)	(-0.25)	(-0.38)
lag_1	-0.0427***	-0.0249***	0.0218***	-4.065***	-0.0468***	-0.0272***	0.0229***	-4.095***
	(-13.97)	(-20.60)	(5.86)	(-11.48)	(-8.52)	(-6.02)	(11.29)	(-8.29)
lag_2	-0.133***	-0.0687***	0.0807***	-5.841***	-0.144***	-0.0771***	0.0814***	-6.872***
	(-18.77)	(-13.05)	(6.54)	(-13.31)	(-29.82)	(-14.15)	(9.27)	(-8.83)
lag_3	-0.110***	-0.0483***	0.0729***	-3.462***	-0.135***	-0.0615***	0.0864***	-4.821***
	(-30.17)	(-9.71)	(25.85)	(-11.90)	(-17.30)	(-10.12)	(18.24)	(-10.65)
lag_4	-0.0657***	-0.0203***	0.0498***	-1.968***	-0.0972***	-0.0290***	0.0744***	-3.230***
	(-10.27)	(-5.31)	(12.31)	(-8.78)	(-14.10)	(-7.24)	(15.85)	(-17.24)
lag_5	-0.0483***	-0.0170***	0.0347***	-1.206***	-0.0782***	-0.0235***	0.0599***	-0.899**
	(-7.88)	(-5.11)	(8.33)	(-4.86)	(-11.97)	(-6.51)	(13.25)	(-2.40)
lag_6	-0.0393***	-0.0128***	0.0289***	-1.417***	-0.0644***	-0.0217***	0.0467***	-0.494
	(-7.90)	(-6.20)	(7.92)	(-12.44)	(-13.03)	(-5.74)	(12.66)	(-1.34)

Equivalent estimates for each Figure are available upon request.

Table 4: Average of Key Variables for Immigrants vs. Non-Immigrants from January 2018 to August 2020

	Immigrant	Non-immigrant
Gender		
Men	0.478	0.495
Women	0.521	0.504
Age Level		
15 to 30 Years Old	0.209	0.310
30 to 45 Years Old	0.390	0.322
45 to 60 Years Old	0.400	0.366
Remotability Index		
Low-Remotability	0.692	0.676
Mid-Remotability	0.121	0.156
Low-Remotability	0.186	0.167
Union Status		
Covered by Union	0.562	0.591
Not-Covered by Union	0.437	0.408
Current Tenure in Months		
Tenure	79.592	93.827

Table 5: F-Test of the Overall Difference between Groups in March through August Lag Coefficients

Figure	Description	Prob>chi2
Figure 1	Immigrants vs. Non-immigrants: Employment Rate	0.000
	Immigrants vs. Non-immigrants: Unemployment Rate	0.000
	Immigrants vs. Non-immigrants: Participation Rate	0.000
Figure 2	Immigrants vs. Non-immigrants: Hours	0.000
Figure 3	Men vs. Women: Employment Rate	0.000
	Men vs. Women: Unemployment Rate	0.000
	Men vs. Women: Participation Rate	0.000
Figure 4	Men vs. Women: Hours	0.000
Figure 5	Aged 15 to 30 vs. Aged 30 to 45: Employment Rate	0.000
	Aged 15 to 30 vs. Aged 45 to 60: Employment Rate	0.000
	Aged 30 to 45 vs. Aged 45 to 60: Employment Rate	0.000
Figure 6	Aged 15 to 30 vs. Aged 30 to 45: Unemployment Rate	0.000
	Aged 15 to 30 vs. Aged 45 to 60: Unemployment Rate	0.000
	Aged 30 to 45 vs. Aged 45 to 60: Unemployment Rate	0.000
Figure 7	Aged 15 to 30 vs. Aged 30 to 45: Participation Rate	0.000
	Aged 15 to 30 vs. Aged 45 to 60: Participation Rate	0.000
	Aged 30 to 45 vs. Aged 45 to 60: Participation Rate	0.000
Figure 8	Aged 15 to 30 vs. Aged 30 to 45: Hours	0.000
	Aged 15 to 30 vs. Aged 45 to 60: Hours	0.000
	Aged 30 to 45 vs. Aged 45 to 60: Hours	0.000
Figure 9	Low- Remotability vs. Mid-Remotability: Employment Rate	0.000
	Low- Remotability vs. High-Remotability: Employment Rate	0.000

Figure	Description	Prob>chi2
	Mid- Remotability vs. High-Remotability: Employment Rate	0.000
Figure 10	Low- Remotability vs. Mid-Remotability: Hours	0.000
	Low- Remotability vs. High-Remotability: Hours	0.000
	Mid- Remotability vs. High-Remotability: Hours	0.092
Figure 11	Men Immigrants vs. Men Non-immigrants: Employment Rate	0.000
	Men Immigrants vs. Men Non-immigrants: Unemployment Rate	0.000
	Men Immigrants vs. Men Non-immigrants: Participation Rate	0.011
Figure 12	Men Immigrants vs. Men Non-immigrants: Hours	0.000
Figure 13	Women Immigrants vs. Women Non-immigrants: Employment Rate	0.000
	Women Immigrants vs. Women Non-immigrants: Unemployment Rate	0.000
	Women Immigrants vs. Women Non-immigrants: Participation Rate	0.000
Figure 14	Women Immigrants vs. Women Non-immigrants: Hours	0.000
Figure 15	Immigrants vs. Non-immigrants Aged 15 to 30: Employment Rate	0.000
	Immigrants vs. Non-immigrants Aged 30 to 45: Employment Rate	0.000
	Immigrants vs. Non-immigrants Aged 45 to 60: Employment Rate	0.000
Figure 16	Immigrants vs. Non-immigrants Aged 15 to 30: Employment Rate	0.000
	Immigrants vs. Non-immigrants Aged 15 to 30: Unemployment Rate	0.000
	F Immigrants vs. Non-immigrants Aged 15 to 30: Participation Rate	0.000
Figure 17	Immigrants vs. Non-immigrants Aged 15 to 30: Hours	0.106
Figure 18	Immigrants vs. Non-immigrants in Low-Remotability Jobs: Employment Rate	0.000
	Immigrants vs. Non-immigrants in Mid-Remotability Jobs: Employment Rate	0.000
	Immigrants vs. Non-immigrants in High-Remotability Jobs: Employment Rate	0.026
Figure 19	Immigrants vs. Non-immigrants in Low-Remotability Jobs: Employment Rate	0.000

Figure	Description	Prob>chi2
	Immigrants vs. Non-immigrants in Low-Remotability Jobs: Unemployment Rate	0.000
	Immigrants vs. Non-immigrants in Low-Remotability Jobs: Participation Rate	0.026
Figure 20	Immigrants vs. Non-immigrants in Low-Remotability Jobs: Hours	0.000