THE UNIVERSITY OF CHICAGO

AN EVALUATION OF THE EFFECTIVENESS OF 2020 ONTARIO TEMPORARY COVID-19 PANDEMIC PAY

By

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Abstract

I empirically study the effect of the 2020 Ontario temporary pandemic pay program on health workers' labor market outcomes. By using a difference-in-differences approach, I found a positive causal effect on health workers' labor market outcomes. I also find heterogeneous effects of the program by gender, with a larger effect on women's likelihood of being employed than men, which could potentially balance the gender gap in labor force participation.

KEYWORDS: Hours of Work, Wage Subsidies, Female Labor, Labor Supply
JEL CLASSIFICATION: J38, J21, J22

1 Introduction

Since the first reported case was detected in December 2019 in Wuhan, COVID-19 is spreading around the world at an alarming rate. The World Health Organization declared a public health emergency within a month and subsequently designated the disease caused by COVID-19 a pandemic in March 2020 (Spoorthy et al., 2020). The pandemic has had a devastating impact on the global economy (Akbulaev et al., 2020), and Canada is no exception. The virus is continually affecting people from all walks of life and has always been one of the most concerning issues. In order to control the spread speed of the virus and protect people's lives, provincial governments across Canada made the difficult decision to shut down certain non-essential businesses and advocate to stay at home and reduce outdoor activities as much as possible. Meanwhile, front-line healthcare workers are also experiencing enormous pressure and challenges in a war without smoke against COVID-19.

Spoorthy et al. (2020) state that excessive working hours, shortage of personal protective equipment and constant COVID-19 infections among healthcare workers are significant factors contributing to the adverse psychological outcomes of front-line healthcare workers. In addition, Tella et al. (2020) point out that front-line healthcare workers are more likely to suffer mental illnesses such as post-traumatic stress syndrome (PTSS), depression, and anxiety during the COVID-19 outbreak. Additionally, Wilbiks et al. (2021) analyze a survey on the mental health and well-being of front-line healthcare workers in Canada during the COVID-19 period. Results suggest that front-line healthcare workers had overall poorer mental health status and its severity gradually increased over time (Hong et al., 2021; Wilbiks et al., 2021). To support front-line healthcare workers who are confronted with significant challenges and maintain their mental health. The Ontario government implemented a 4-month temporary pandemic pay program on April 24, 2020.

The Ontario 2020 temporary pandemic pay scheme is divided into two components of payment. The first type is referred to as a wage subsidy, in which every eligible healthcare worker grants an additional $4 on their hourly wages despite their starting salary level. Their employers cover the corresponding hourly pandemic pay. The second one is a lump-sum payment that the eligible healthcare workers grant a $250 lump-sum wage transfer for at least 100 hours of work performed in each designated four-week period. This represents that a qualified healthcare worker may earn a lump-sum payment of up to $1,000 for services or work performed over the four-month designated period. According to the Government of Ontario (2020), the Ontario temporary pandemic pay has the following three intentions. (1) It aims to provide more support and relief for front-line healthcare workers. (2) It encourages existing healthcare workers to stay on the job and attracts prospective employees. (3) It contributes to the maintenance of safe staffing levels and stabilizes the operation of related basic frontline services.

In this paper, I mainly focus on evaluating the effectiveness of the second objective of the Ontario temporary pandemic pay. Due to the lack of appropriate data sources to assess the effectiveness of the first and third points of the program as well as the difficulties in quantifying and measuring these two points. I only conduct constructive analysis to estimate the effect of the program on the intensive margin and the extensive margin of labor supply of front-line healthcare workers. More specifically, I use the employment rate and working hours of front-line healthcare workers as proxies to assess the impact of the temporary pandemic pay program on encouraging existing front-line healthcare workers to stay on their job (e.g intensive margin) and attracting prospective employees (e.g extensive margin), respectively.

I adopt the difference-in-differences (DID) method to answer the research question in this paper. I assign Alberta as the control group since it did not introduce the Critical Worker Benefit until October 2020 (Copping, 2021). Critical Worker Benefit is similar to Ontario Temporary Pandemic Pay but only provides a one-time lump-sum payment of $1200 to individuals who work for critical services and organizations at a minimum of 300 hours during the designated four-month period (Copping, 2021). Therefore, under the assumption that there are no time-variant group-specific unobservables and the employment rate and working hours trends of front-line healthcare workers in Ontario and Alberta are parallel in the absence of the Pandemic Pay program, DID estimates would provide the causal effect of the Ontario Temporary Pandemic Pay program on the intensive margin and extensive margin of the labor supply of the front-line healthcare workers. However, I recognize that the common trend assumption in DID research design is very restrictive, more detailed discussions are provided regarding the assumption examination and the validity of the causal inference in later sections.

Finally, the regression analysis shows that the average increase in employment rate and working hours is higher in Ontario relative to Alberta. Both estimates are statistically and economically significant, which suggests that the Ontario Temporary Pandemic Pay program is effective in terms of encouraging existing staff to continue to work as well as attracting new prospective employees.

The paper proceeds as follows. Past literature on the effect of the subsidy program can be found in the Literature Review section; the theoretical framework behind this paper is explained in the Theoretical Framework section; the econometric method used in this paper will be introduced and discussed in the Econometric Model section. The detail of the data collected for this study is in the Data section, the empirical result is shown in the Results section. A more specific discussion of the results will be in the Discussion and Robustness Checks section. The Conclusion section includes a summary of our study and the potential direction of future studies.

2 Literature Review

Not only is the COVID-19 pandemic a public health crisis, but it is also causing the most severe economic catastrophe since the Great Depression (Cassells & Duncan, 2020). Canada is not the first nor the last country to use a wage subsidy policy to mitigate the severe economic crisis induced by the pandemic. For instance, in response to the economic crisis caused by COVID-19, Australia introduced the JobKeeper wage subsidy scheme. One of the objectives of the JobKeeper program is to maintain the employment rate and the employer-employee relationships (Cassells & Duncan, 2020; Walkowiak, 2021). Moreover, New Zealand announced a national wage subsidy program in March 2020 that aims to stimulate the national economy by supporting domestic businesses and workers during the economic crisis induced by the pandemic (Duncan, 2020).

By raising the benefits for labor market activities, wage subsidies are a typical policy instrument that is widely regarded for combating long-term unemployment and enhancing the overall employment rate (Connolly & Gottschalk, 2009; Sjögren & Vikström, 2015). Bruhn (2020) states that wage subsidy is a common method for many countries around the globe to encourage job retention and resolve unemployment issues during economic crises. She analyzes the employment impact of a Mexican program that provides wage subsidies to firms during the economic crisis. The results show that the employment rate recovered more quickly in eligible sectors than in non-eligible sectors after the conclusion of the program. She concludes that the wage subsidy program is an effective instrument for promoting employment retention and addressing unemployment during an economic downturn. Moreover, Sjögren and Vikström (2015) examine a wage subsidy program implemented in the

Swedish labor market in 2007. They find that wage subsidies have long-term consequences on employment for individuals who are eligible to claim, with job-finding rates increasing by around 16% to 20% throughout the program's earliest phases. Additionally, they discover evidence of job retention, indicating that individuals who gain employment via the subsidy are more likely to stay employed after the subsidy ends than those who obtain jobs through unsubsidized ways. Connolly and Gottschalk (2009) propose an analytical approach for estimating the influence of wage subsidy on employment length and using data from a large Canadian earning subsidy experiment. Their findings suggest that wage subsidy improves the incentive to work for certain qualified participants while also encouraging others to work for more hours. Last but not least, they find that individuals in the treatment group are less likely to quit their jobs.

In summary, many studies have shown that wage subsidy is a crucial policy instrument that positively affects employment and job retention, especially during an economic crisis. However, I notice that there are very few wage subsidy policies on the same large scale as Ontario Temporary Pandemic Pay during the same period, which aims at helping health-care workers who are on the front lines of the fight against the pandemic and are under tremendous psychological stress. Therefore, it would be valuable to investigate whether the Ontario Temporary Pandemic Pay program has a similar positive effect on employment and labor supply as other wage subsidy programs, particularly on health workers in our study.

3 Theoretical Framework

The hypothesis that a wage subsidy or lump-sum payment increases the labor employment level and total working hours is supported by the working mechanism of the labor market in economic theory. Figure 1 presents the basic framework that there is an upward-sloping labor supply and a downward-sloping labor demand in the labor market. The horizontal axis could indicate the number of labors or hours of working while the vertical axis indicates the wage rate. The intersection of labor supply and labor demand will set the equilibrium wage W1 and equilibrium supply L1 in the market. In Figure 2, when the labor supply shifts right, the equilibrium wage decreases to W2 and the equilibrium supply increases to L2; if the labor supply shifts left, the effect on equilibrium will be the opposite (W3 and L3). In Figure 3, when the labor demand shifts right, both equilibrium wage and equilibrium supply increase to W2 and L2 respectively, otherwise both decrease. In the context of the pandemic pay program, the wage subsidy and lump-sum payment both indicate a right shift of the labor supply, which suggests an increase in hired labor and total working hours but a decrease in wage rate. So in my data, we might observe a decrease in the wage rate and an increase in labor supply.

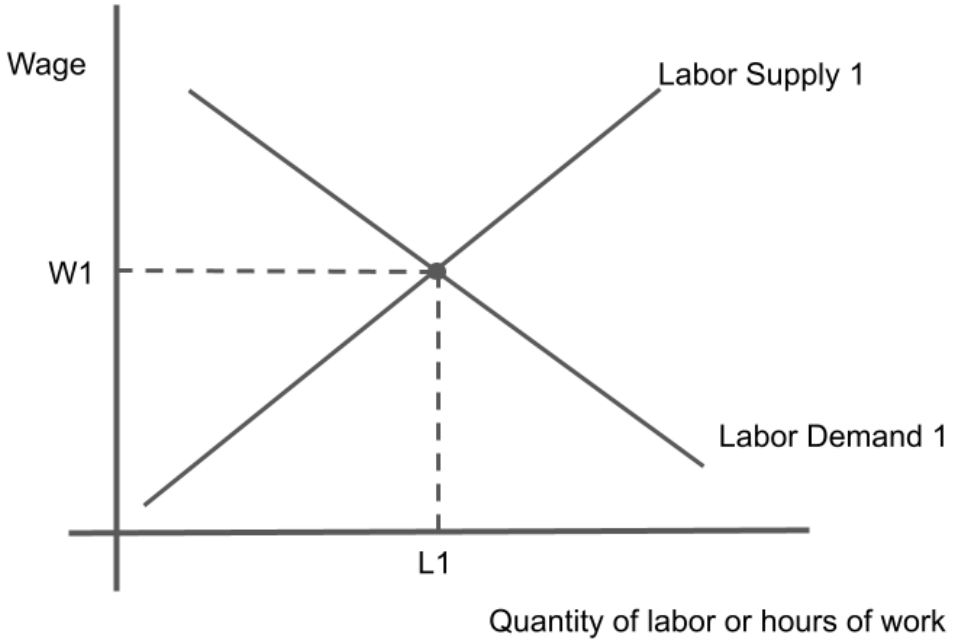


Figure 1: Labor Supply and Labor Demand

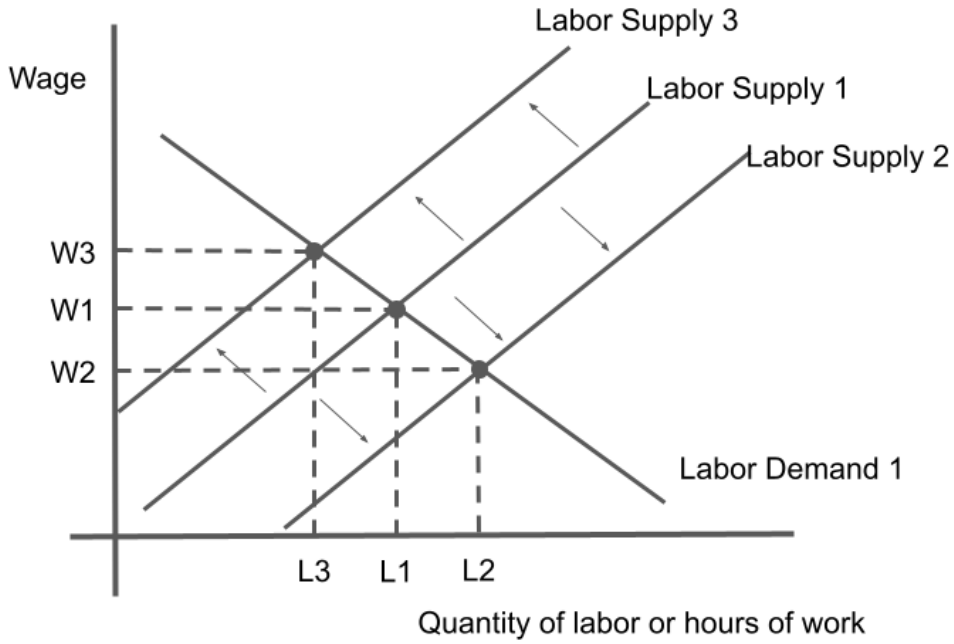


Figure 2: Labor Supply Shifts

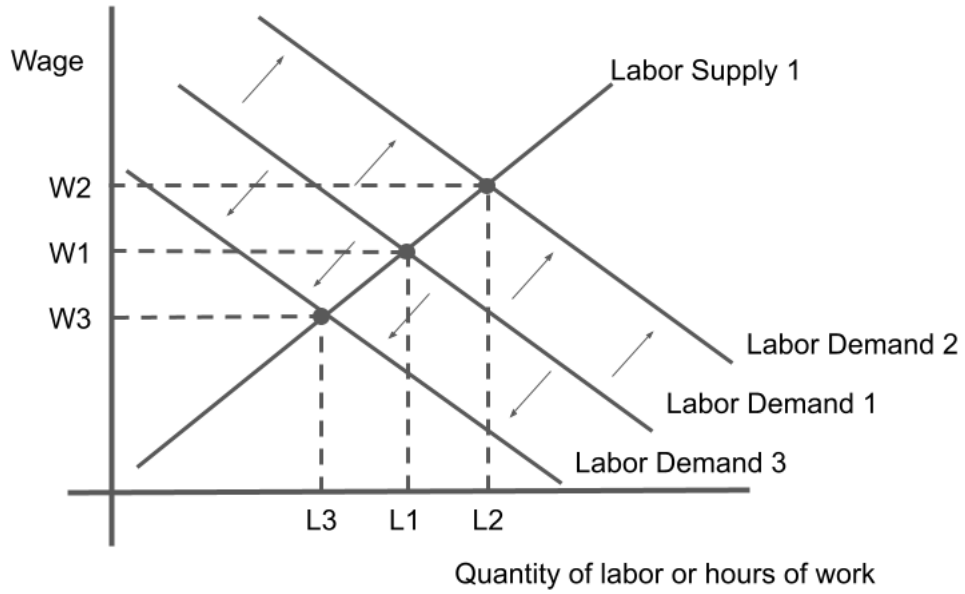


Figure 3: Labor Demand Shifts

4 Data and Methods

4.1 Data

The primary data source used in this paper is the Labour Force Survey (LFS) retrieved from Statistics Canada. The LFS is a monthly survey that provides information on the current status of the Canadian labor market during the survey month. It is often used to calculate national, provincial, and regional employment and unemployment rates (Statistics Canada, 2020). The Canadian government attaches great importance to this survey, especially during the raging COVID-19, it is very important to understand people's working conditions and living costs so that the government can formulate key measures to deal with the pandemic COVID-19 and restore the economy according to the current situation. Surveyed households are chosen based on a specific random sampling method to reflect the Canadian population as a whole. During the pandemic, out of consideration for people's safety, Statistics Canada's survey method has changed from face-to-face interviews to telephone interviews and online questionnaires. Online questionnaires allow people to answer questions very casually. We find there is a certain amount of participants claiming they work more than 600 hours a month at their main job. It is obvious to see that these are unrealistic data in that 600 hours means working 20 hours a day for 30 days. Therefore, the limitation of this LFS is that the credibility of the data completely relies on the goodwill of participants in that LFS is a self-reported survey. The raw data contains 532314 obser-

vations and 60 variables, from March 2020 to August 2020. Ontario began to implement pandemic pay in May 2020. In order to study the pure impact of policy implementation on people's employment status rather than the impact of months or other factors, I used the labor data of Alberta during the same period as a comparison in that Alberta did not adopt a similar policy during that time.

At last, the data is cleaned according to the above criteria. Cleaned data contains (1) only observations whose main job belongs to the industry of health care and social assistance according to the 2012 NAICS classification, (2) only observations who have no more than 600 working hours in a month and (3) only observations who are between 15 years old to 65 years old. There are 14406 observations satisfying requirements (1), (2) and (3) from 2020 March to 2020 August in Ontario and Alberta. There are two outcome variables employment status and actual hours worked at the main job, and 11 demographic control variables including age, sex, marital status, educational attainment, immigration status, economic family status and so on. I also include hourly wages to study the effect of the program on wages. The variable age is recorded in age groups; sex, marital status, educational attainment, immigration status and economic family status are all categorical variables that are discrete rather than continuous. Table 1 shows the summary statistics of outcome variables when classifying observations into different groups. There are obvious differences in outcomes across sex, college education and immigration status.

Table 1: Summary Statistics of Outcome Variables by Group

	Male	Female	College.	Non-College	Immigrant	Non-Immigrant
Employed	0.860	0.804	0.812	0.824	0.831	0.809
	(0.346)	(0.397)	(0.390)	(0.380)	(0.375)	(0.393)
Hours Worked	300.500	261.869	270.372	257.758	275.272	266.687
	(161.675)	(165.008)	(165.967)	(159.284)	(163.873)	(165.368)
Hourly Wages	33.936	30.313	32.203	23.488	28.843	31.444
	(15.353)	(12.104)	(12.835)	(9.3183)	(11.990)	(12.898)
Observations	2,500	11,906	12,333	2,073	3,138	11,268

Note: standard deviations in parentheses. This table presents the average outcomes of people with different sex, education and immigration statuses.

4.2 Methods

To evaluate the causal effect of the 2020 Ontario temporary pandemic pay program on employment status and labor supply of frontline health workers, I choose to implement a

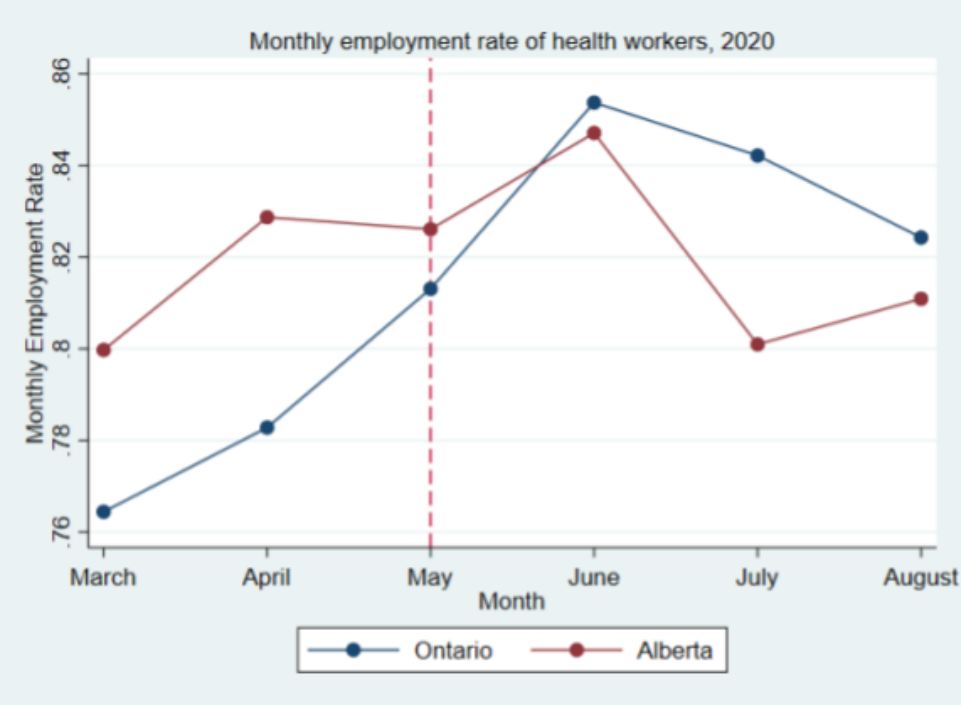
difference-in-difference model. The model specification is shown below:

$$y_{igt} = \beta_0 + \beta_1 Treat_g + \beta_2 Post_t + \beta_3 Treat_g * Post_t + X_{igt} + \epsilon_{igt}$$

y_{igt} could be one of three outcomes of interest: one dummy variable that equals to 1 if an individual is currently employed and actively working, it equals to 0 otherwise; a continuous variable that records how many hours an individual worked in a month at the main job; the other one measures the hourly wage rate. The variable $Treat_g$ has a value of 1 if an individual is from Ontario and a value of 0 if an individual is from Alberta, it eliminates any time-invariant unobserved confounders at the province level that might bias the estimation. Ontario is our treatment group and Alberta is our control group as Alberta has no similar subsidy program in 2020. The variable $Post_t$ is 1 if the observations are in May, June, July and August, which is the period that Ontario health workers have the pandemic pay program and are facing the pandemic, it is 0 if the observations are in March and April which is the period of pandemic without the pandemic pay program. The estimated β_3 from the interaction term of $Treat_g$ and $Post_t$ is our parameter of interest, β_3 measures the ITT (intention to treat) effect of the program, which could be interpreted as the causal effect of the pandemic pay program on our outcome variables if the parallel trend assumption is satisfied.

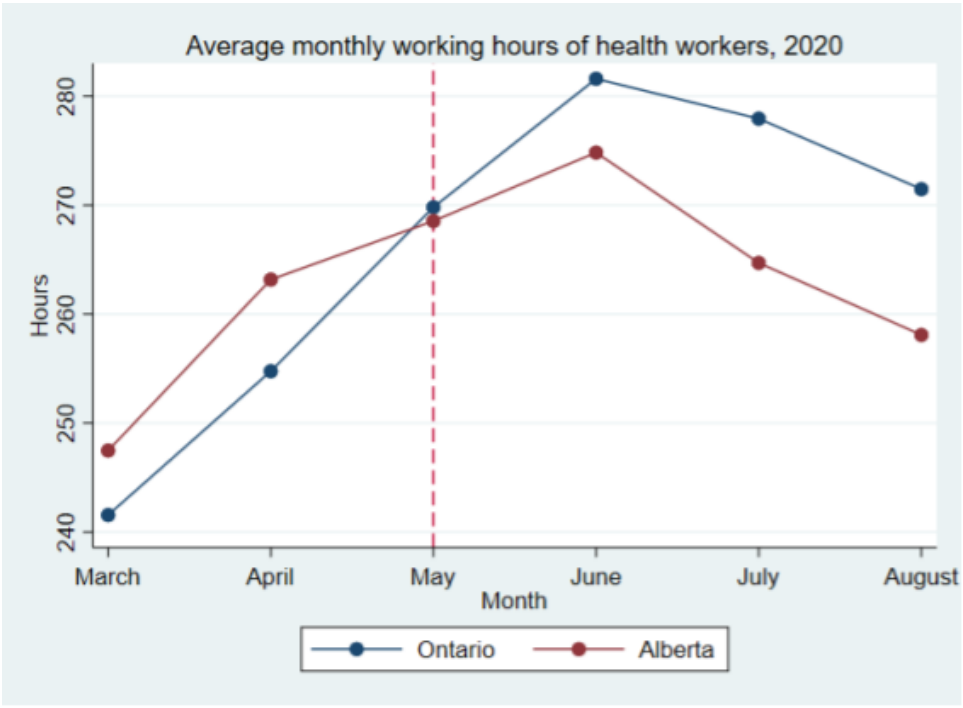
Moreover, to control for more undesired variation, we add a series of personal-level control variables to reduce the residual variance thus increasing the precision of our estimation, the personal-level control variables X_{igt} include sex, age, education, marital status, immigration status, and type of economic family. Furthermore, since the outcome variable *Employed* is binary, the parallel trend assumption might not hold due to its limited support. In light of this, we also implement non-linear difference-in-difference models. The estimated results can be found in the Robustness Checks section.

As mentioned, the key assumption of our model is the parallel trend assumption, that health workers' labor supply in Ontario and Alberta would have a parallel time trend in the absence of the pandemic pay program between March 2020 and August 2020. This key assumption is also a major limitation of our method because it is impossible to prove the satisfaction of the parallel trend assumption. We could never observe Ontario's employment trend or hours of working trend in the absence of the pandemic pay program between May 2020 and August 2020 as it is a counterfactual trend, so there is no way to verify that Ontario and Alberta have the same trend during this period. The best we could do is to compare the pre-treatment trend of Ontario and Alberta to make an inference on how likely the assumption is satisfied, and a comparison of the historical time trend is shown in Figure 4 and Figure 5. Figure 4 plots the employment trend of health workers, graph



Note: This graph presents the employment rate of health workers in 2020 from March to August.

Figure 4: Monthly employment rate by province



Note: This graph presents the average working hours of health workers in 2020 from March to August.

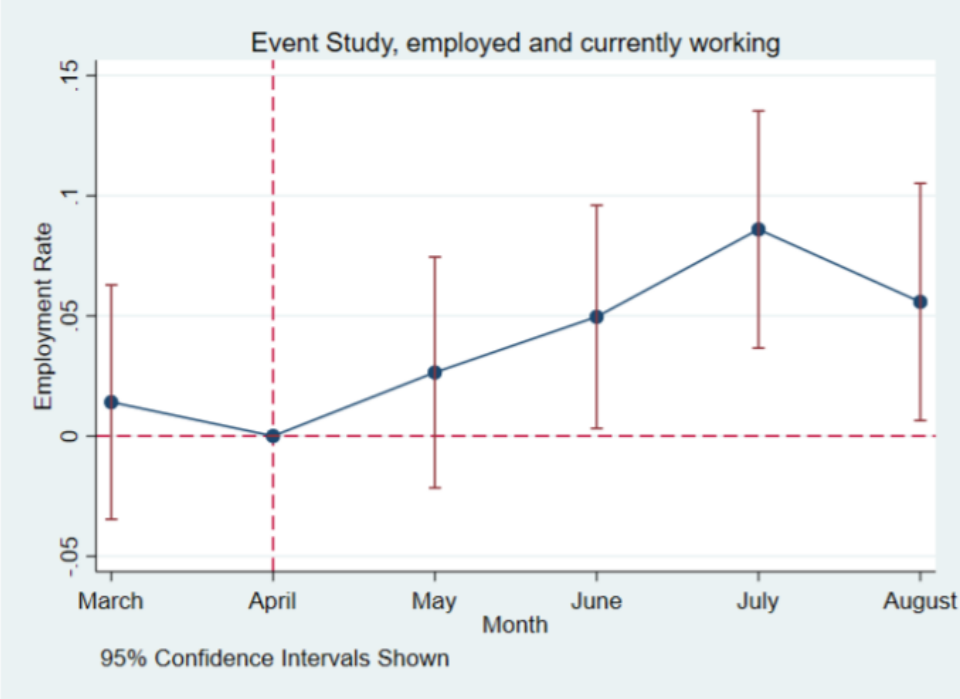
Figure 5: Average monthly hours worked by province

shows the trend before and after the pandemic pay program. The graph shows that Ontario and Alberta have a non-parallel trend during the period of the pandemic when there is no pandemic pay program (March to April). Thus, if you believe the differential trend between Ontario and Alberta is due to the heterogeneous effect of the pandemic, then the parallel trend assumption is unlikely to be satisfied. But this difference from March to April may be from some month-specific shock in Alberta, if this is the case, we could still believe the parallel trend assumption is met. Although there is a significant difference in the trend between April and May, the employment rate in Ontario in May should already reflect the impact of the pandemic pay program since the employment data is collected at the end of each month. So we could only rely on the trend between March and April to assess whether the pandemic has heterogeneous effects on Ontario and Alberta. Overall, if you believe the pandemic would similarly affect Ontario and Alberta and the trend difference from March to April is due to some month-specific shock in Alberta, then it is reasonable to believe the satisfaction of the parallel trend assumption in the estimation of the program's effect on health workers' employment rate. Figure 5 plots the hours of work trend of health workers, it has the same structure as in Figure 4. Before May, the two provinces appear to have a parallel trend between March and April. So it is also reasonable to believe the satisfaction of the parallel trend assumption in the estimation of the program's effect on hours worked, and its likelihood of satisfying this assumption should be higher as the result from Figure 5 is more promising than in Figure 4.

5 Results

In addition to examining the historical trend of the outcome variables, I also implemented an event study to further evaluate the conditional parallel trend assumption. Figures 6, 7 and 8 present the effect of the pandemic pay program on the employment rate, working hours and hourly wage rate of people who are 25 to 65 years old, respectively. All figures show that the control group and the treatment group had no statistically significant difference in outcomes before the pandemic pay program and started to have a more and more significant difference after the program. These results suggest a satisfaction of the conditional parallel trend assumption.

Table 2 presents the estimated effect of the pandemic pay program on the employment status and working hours of observations who are 25 to 65 years old. The estimated results using the linear difference-in-difference model are shown in columns 1 to 2, where column 2 uses the most completed model described in the Econometric Model section. Across all specifications, the estimated effects are statistically significant. Column 1 gives the estimation from the model without any personal control variables, it suggests on average



Note: this figure shows the effect of the pandemic pay program on the employment rate of health workers who are 25 to 65 years old.

Figure 6: Event study graph, employed and currently working

Note: this figure shows the effect of the pandemic pay program on the working hours of health workers who are 25 to 65 years old.

Figure 7: Event study graph, hours worked at main job

Note: this figure shows the effect of the pandemic pay program on the hourly wages of health workers who are 25 to 65 years old.

Figure 8: Event study graph, hourly wage

Table 2: Regression Results for Main Working Ages

Outcomes:	Employed (1/0)		Actual Hours Worked		Hourly Wage
	No Control	Full Control	No Control	Full Control	Full Control
$Post$	0.005	0.006	9.231*	9.712*	-0.167
	(0.013)	(0.013)	(5.616)	(5.585)	(0.460)
$Treat$	-0.053***	-0.054***	-8.263	-9.301	-3.321
	(0.013)	(0.013)	(5.416)	(5.393)	(0.424)
$Post * Treat$	0.055***	0.052***	17.147***	16.306**	0.808
	(0.016)	(0.016)	(6.683)	(6.639)	(0.527)
Observations	13,466	13,466	13,466	13,466	13,466
R-squared	0.0042	0.0206	0.0044	0.0238	0.1782
F-statistic	17.17	29.34	19.10	34.76	225.86

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. Standard errors in parentheses. This table shows the estimated effect of the pandemic pay program on the 3 outcomes while only including people who are 25 to 65 years old.

the Ontario pandemic pay program increases health workers' likelihood of being employed by 5.46 percentage points. After adding personal-level controls into the model, in column 2, the model estimated a positive effect of 5.17 percentage points which is relatively similar to the result in column 1. The fact that adding more control variables does not change our estimation significantly provides evidence that our result is quite robust. Moreover, the magnitude of the estimated effect is quite considerable, a 5 percentage points increase is about a 6% increase relative to the mean employment rate of Ontario health workers in March and April 2020. Ontario has more than 850000 health workers, so in terms of employment level, a 6% increase equals at least 51000 new health workers. And one thing to note is that our definition of being employed is that you are employed and you are currently working, an individual who is employed but currently on leave does not count as being employed in our study. So our result could purely reflect the increase in the number of working health workers and the estimated effect is highly economically significant.

For the estimated effect of the pandemic pay program on health workers' hours of work, column 4 estimates that on average the pandemic pay program increases health workers' monthly hours of work by 17.15 hours. After adding all the controls, the estimated increase in hours of work drops to 16.31 hours which is only a 50-minute difference. A 15-hour increase in monthly work time equals a 6% increase relative to the mean work time of Ontario health workers in March and April 2020, so the estimated effect should be economically significant. Moreover, the results are also relatively robust as they do not change with different control variables and they are all statistically significant. Thus, the pandemic pay program is also likely to have a positive effect on health workers' work time.

Table 3: Regression Results for 15 to 24 years old

Outcomes:	Employed (1/0)		Actual Hours Worked		Hourly Wage
	No Control	Full Control	No Control	Full Control	Full Control
$Post$	0.121**	0.113**	59.415***	67.461***	-0.855
	(0.055)	(0.054)	(22.549)	(22.625)	(1.001)
$Treat$	0.056	0.048	8.800	-9.180	-1.041
	(0.055)	(0.055)	(22.200)	(22.207)	(0.998)
$Post * Treat$	-0.050	-0.061	-13.500	-17.365	1.557
	(0.062)	(0.061)	(25.826)	(25.922)	(1.122)
Observations	940	940	940	940	940
R-squared	0.0149	0.0506	0.0230	0.0629	0.1613
F-statistic	3.74	5.55	6.76	7.86	16.10

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. Standard errors in parentheses. This table shows the estimated effect of the pandemic pay program on the 3 outcomes while only including people who are 16 to 24 years old.

In addition to studying the effect on the main working-age group, I also evaluate the program's effect on students because the increase in earnings might encourage students to join the labor force early and quit school. Table 3 presents the regression results on observations who are 15 to 24 years old. There is no effect found in either of the two outcomes, which indicates the pandemic pay program could not motivate the student-age group to drop out of school to work. More analysis is done on how the pandemic pay program might affect different groups differently. Table 4 shows the estimated effect of the pandemic pay program on groups with different sexes, immigration statuses, education and marital statuses. The statistical significance of group differences could also be found in the table. The results show that the pandemic pay program only has a heterogeneous effect on the likelihood of being employed for men and women. On average, the effect on employment is 6 percentage points higher for women than men.

6 Robustness Checks

As mentioned in the Econometric Model section, since whether an individual is employed is a binary variable, a non-linear difference-in-difference model should be implemented in case the parallel trend assumption fails in the linear difference-in-difference model. The estimated effect by using a non-linear difference-in-difference model is shown in Table 5. The estimated coefficient of 0.1855 from the Probit model is statistically significant and it can be interpreted as the pandemic pay program on average increasing the probability of being employed by 0.1855 z-scores. If using a Logit model, the estimated coefficient becomes

Table 4: Heterogeneous Analysis, 25 to 65 years old

	Employed	Actual Hours Worked
Men		
$Post * Treat$	-0.006	17.085
	(0.037)	(16.714)
Observations	2,500	2,500
Women		
$Post * Treat$	0.063***	14.354**
	(0.017)	(6.962)
Observations	11,906	11,906
$\beta^M = \beta^W[pvalue]$	[0.068]	[0.915]
College Education		
$Post * Treat$	0.043***	13.199*
	(0.017)	(7.033)
Observations	12,333	12,333
Non-College Education		
$Post * Treat$	0.067*	24.846
	(0.038)	(15.768)
Observations	2,073	2,073
$\beta^C = \beta^{NC}[pvalue]$	[0.221]	[0.418]
Immigrant		
$Post * Treat$	0.028	0.078
	(0.029)	(12.769)
Observations	3,138	3,138
Non-Immigrant		
$Post * Treat$	0.054***	19.679***
	(0.018)	(7.469)
Observations	11,268	11,268
$\beta^I = \beta^{NI}[pvalue]$	[0.308]	[0.233]
Married		
$Post * Treat$	0.057	17.771
	(0.018)	(7.729)
Observations	9,882	9,882
Not Married		
$Post * Treat$	0.023	6.886
	(0.027)	(11.584)
Observations	4,524	4,524
$\beta^M = \beta^{NM}$[p-value]	[0.240]	[0.654]

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. This table presents the estimated effect of the pandemic pay program on different groups. The P-value of the effect differences are in square brackets.

Table 5: Non-Linear DID Results on Employment Rate, 25 to 65 years old

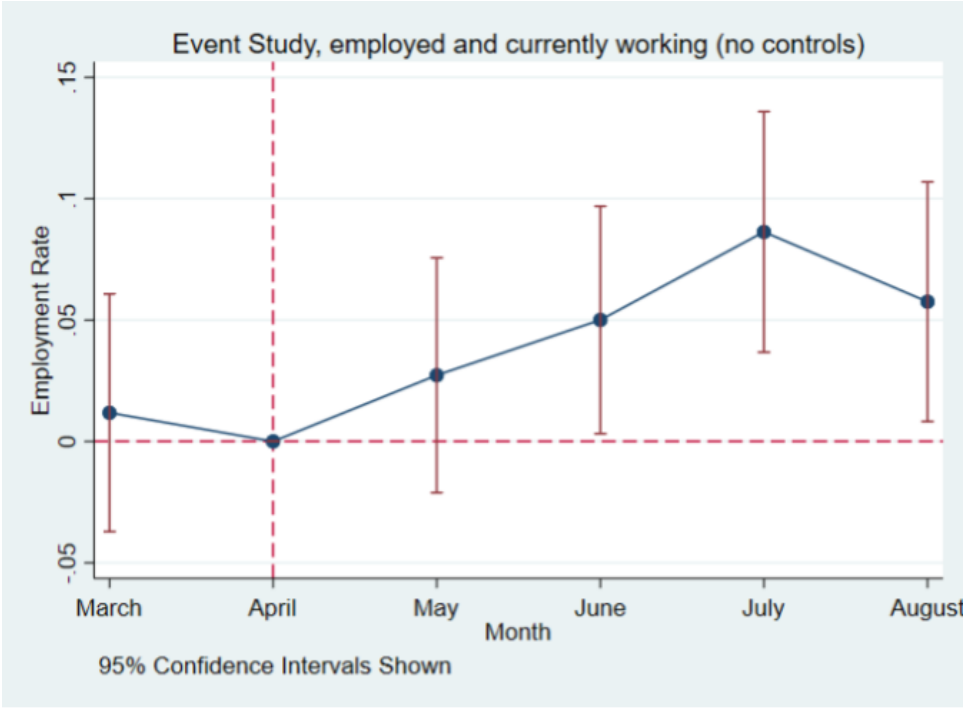
	Probit	Logit
$Post$	0.025	0.095
	(0.052)	(0.089)
$Treat$	-0.191***	-0.309***
	(0.048)	(0.082)
$Post * Treat$	0.186***	0.296***
	(0.060)	(0.103)
Marginal Effect	0.049***	0.043***
Observations	13,466	13,466

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. Standard errors in parentheses. This table presents the estimated effect of the pandemic pay program on the likelihood of being employed using non-linear DID.

0.2955 which is quite different from 0.1855. These z-scores are not intuitive enough so I calculate the marginal effect of the pandemic pay program using the estimated coefficient. The estimated marginal effect of the pandemic pay program is pretty similar between the two models, which indicates that on average the pandemic pay program increases health workers' likelihood of being employed by about 4.60 percentage points. The estimated effect from the non-linear difference-in-difference model is slightly smaller than the result from the linear difference-in-difference model, but the magnitude is still economically significant. Thus, the estimation from the non-linear DID supports the robustness of our results from using the linear DID.

Moreover, to further check the robustness of my results, I exclude months before or after the intervention to see if the results change. In Table 6, the estimated effect on employment remains statistically and economically significant regardless of which month of data is removed. Mostly the estimated coefficient fluctuates between 0.04 and 0.056, but it dropped to 0.0362 when the data of July is excluded. This is reasonable because the program's effect on employment is the highest in July according to the event study graph in Figure 4. In terms of the effect on working hours, the estimation is still statistically significant except for when April or July is removed from the data. The explanation for July is similar in that the effect is highest in July on working hours. Although the estimated effects are not all statistically significant, the magnitude of the coefficient does not change too much. So I could say my results are quite robust while the estimated effect on employment might be more robust than the estimated effect of working hours. Furthermore, the event study graphs for regressions without control variables are shown in Figures 9, 10 and 11. The overall trend is similar to the event study graphs with the control variables, which suggests

the parallel trend assumption might be satisfied without the control variables. Nevertheless, the summary statistics in Table 1 show that people with different characteristics differ in outcomes, so including these control variables could improve the validity and credibility of my results.



Note: this figure shows the effect of the pandemic pay program on the employment rate of health workers who are 25 to 65 years old. (No control variables in the regression)

Figure 9: Event study graph, employed and currently working with no controls

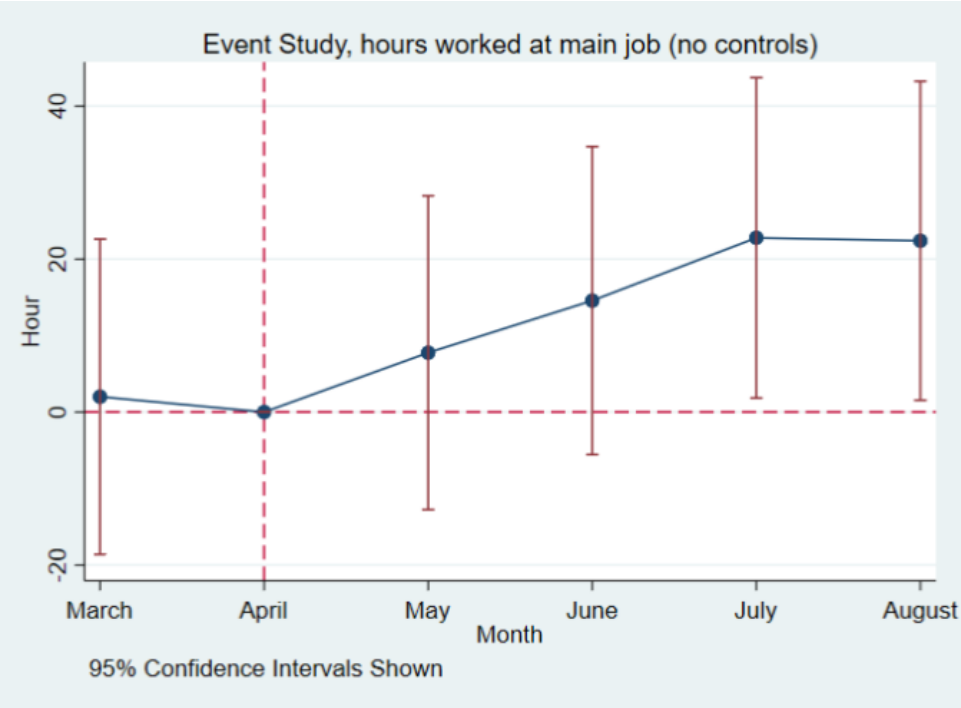
7 Mechanisms and Discussion

The main results support that the pandemic pay program has a statistically and economically significant effect on both outcomes, the program on average increases the likelihood of being employed for health workers and the monthly work time of health workers by approximately 5 percentage points and 16 hours respectively. However, due to my method, the credibility of my results relies on the parallel trend assumption, only the satisfaction of this key assumption could ensure the accuracy of my estimation. But both the historical data trend and the event study figures provide promising results on the likelihood of meeting the conditional parallel trend assumption. And the robustness checks prove my results to be quite robust. My results could provide valuable empirical evidence of the effectiveness

Table 6: Regression Results for Robustness Checks

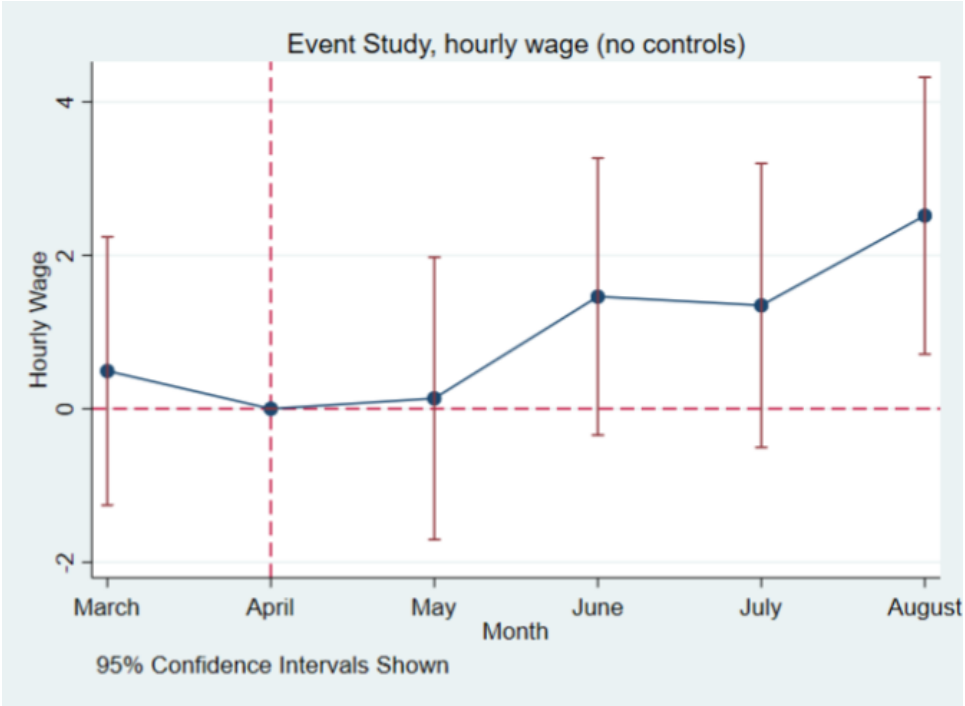
	Employed	Actual Hours Worked
March Excluded		
$Post * Treat$	0.054^{***}	16.314^{**}
	(0.020)	(8.190)
Observations	11,826	11,826
April Excluded		
$Post * Treat$	0.040^{**}	12.938
	(0.020)	(8.344)
Observations	12,027	12,027
May Excluded		
$Post * Treat$	0.057^{***}	17.812^{***}
	(0.016)	(6.795)
Observations	12,023	12,023
June Excluded		
$Post * Treat$	0.049^{***}	15.302^{**}
	(0.016)	(6.831)
Observations	12,002	12,002
July Excluded		
$Post * Treat$	0.036^{**}	12.402^{*}
	(0.016)	(6.745)
Observations	12,080	12,080
August Excluded		
$Post * Treat$	0.046^{***}	15.544^{*}
	(0.016)	(6.749)
Observations	12,072	12,072

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. Standard errors in parentheses. This table presents the estimated effect of the pandemic pay program while excluding one month of data.



Note: this figure shows the effect of the pandemic pay program on the working hours of health workers who are 25 to 65 years old. (No control variables in the regression)

Figure 10: Event study graph, hours worked at main job with no controls



Note: this figure shows the effect of the pandemic pay program on the hourly wages of health workers who are 25 to 65 years old. (No control variables in the regression)

Figure 11: Event study graph, hourly wage with no controls

of the pandemic pay program. Moreover, the program appears to have a more significant effect on women's chances of being employed than men. During the COVID-19 Pandemic, women's labor participation rate and employment rate dropped significantly compared to men (Albanesi & Kim, 2021). because of the lack supply of reliable childcare and in-person schooling options. Women in Canada and the US make about 20 percentage points less than men, the wage difference could lead to families deciding to let mothers stay home for child care. And women make up the majority of the healthcare industry in Canada, this might explain the higher effect on the employment rate for women than men from the pandemic pay program. The wage subsidy and lump-sum payment could make the mother the higher-income earner, thus it becomes more beneficial for the mother to work rather than stay home. So the pandemic pay program could also improve the gender balance in the labor force during the pandemic.

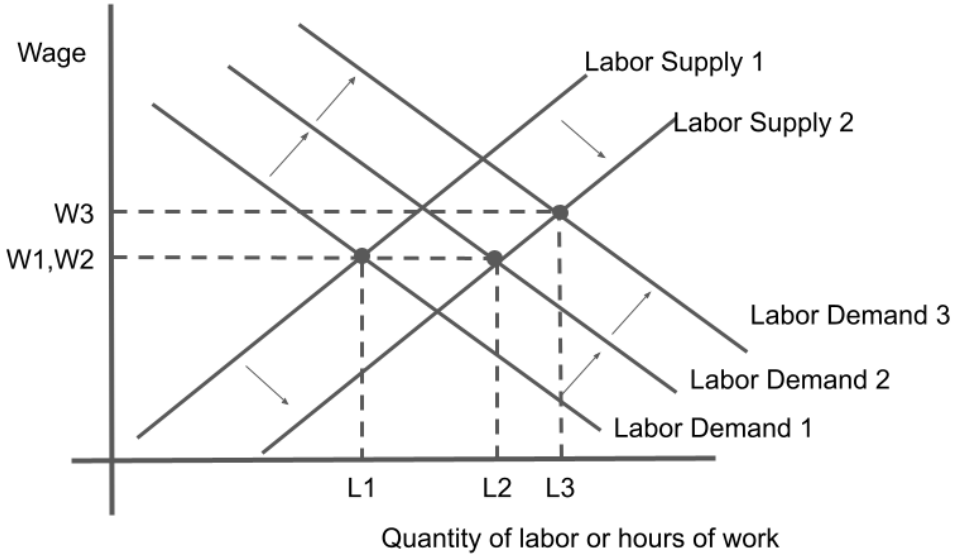


Figure 12: Demand and supply shifts illustration

Besides the main results, I also study whether the pandemic pay program has any effect on the wage rate because the employer might also behave in response to the wage subsidy provided by the government. Figure 8 shows that the pandemic pay program does not have an effect on wages except a positive effect in August. This contradicts the theoretical framework that a right shift of labor supply would decrease the equilibrium wage rate. One explanation might be that the worsening pandemic had led to a right shift in labor demand for front-line health workers. According to my theoretical framework, illustrated in Figure 12, the decrease in equilibrium wage from the labor supply right shift (LS1 to LS2) could

be offset by a right shift in labor demand (LD1 to LD2). So from May to July, the demand shift should be on a similar scale to the supply shift, which results in no change of wages. And then the demand shift (LD2 to LD3) outweighed the supply shift in August because the pandemic in Ontario got worse and worse, leading to an increase in equilibrium wage.

8 Conclusion

Using the LFS from Statistics Canada, I empirically assess the effect of the 2020 Ontario temporary pandemic pay program on health workers' employment status and work time. The detected positive effect on the likelihood of being employed is a sign of the pandemic pay program's success in attracting more new employees to work on the front line and encouraging current health workers to continue working. The resulting increase in work time demonstrates the positive impact of the pandemic pay program on health workers' motivation to work. This paper provided empirical evidence to support that the 2020 Ontario temporary pandemic pay program achieved its expected goals successfully in encouraging existing workers to continue working and attract new employees. By providing empirical evidence of the success of the temporary pandemic pay program, policymakers now can confidently implement similar programs in the future when Canada faces a similar situation again.

For future studies, similar subsidy programs in other provinces could be evaluated because the findings from other subsidy programs could imply the reliability of our study. The cost side of the program could also be studied since the extra government spending on the pandemic pay program might imply decreased spending in other aspects, and the potential budget shrinkage in other aspects might lead to unexpected harm to the economy.

Data and Code Availability Statement

here is the link to the Canada Labor Force Survey.

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