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Labor Markets in Crisis: The Causal Impact of Canada's COVD-19 Economic Shutdown on Hours Worked for Workers Across the Earnings Distribution

Kourtney Koebel (University of Toronto)

Dionne Pohler (University of Toronto)

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Kourtney Koebel
Dionne Pohler

Centre for Industrial Relations and Human Resources
University of Toronto
121 St. George Street
Toronto, Ontario, M5S 2E8
kourtney.koebel@mail.utoronto.ca
dionne.pohler@utoronto.ca

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ABSTRACT

We use Statistics Canada's Labour Force Survey to explore the labor market impacts of the novel coronavirus (COVID-19). Specifically, we adopt a unique identification strategy to examine the heterogeneous causal effects of the COVID-19 economic shutdown by governments on hours worked across the earnings distribution in Canada, focusing on individuals who remained employed in March and April. Most early crisis analyses found that workers in the bottom of the earnings distribution experienced a much larger negative shock to hours worked than workers in the top of the earnings distribution. However, some low-income individuals are also working more as a result of the COVID-19 economic shutdown, and this nuance is missed when only considering the net effect. When we condition on whether workers lost or gained hours, we find that workers in the bottom of the earnings distribution experienced not only the largest percentage reduction in hours, but also the largest percentage increase in hours.

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Keywords: COVID-19, Labor Demand, Labor Supply, Labor Market, Employment, Inequality, Public Policy

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1. INTRODUCTION

In this paper, we use Statistics Canada's Labour Force Survey (LFS) to explore the labor market impacts of the novel coronavirus (COVID-19). Specifically, we examine the heterogeneous effects of the COVID-19 economic shutdown on hours worked across the earnings distribution in Canada, focusing on individuals who remained employed in March and April. Most early crisis analyses found that workers in the bottom of the earnings distribution experienced a much larger negative shock to hours worked than workers in the top of the earnings distribution – we also document this finding. However, some low-income individuals are also working more as a result of the COVID-19 economic shutdown (e.g., Blackwell, 2020), and this nuance is missed when only considering the net effect. When we condition on whether workers lost or gained hours, we find that workers in the bottom of the earnings distribution experienced not only the largest percentage reduction in hours, but also the largest percentage *increase* in hours. The conditioned results thus reveal an interesting paradox in terms of how COVID-19 is impacting low-income workers.

To identify the *causal* effect of the COVID-19 economic shutdown on hours worked, we exploit the introduction of government-enforced public health restrictions and business shutdowns across Canada in mid-March. Because the shutdown impacted the entire country at once, there is no clear control group to obtain a causal effect. Unlike most COVID labor market analyses which rely on changes in actual hours between February and March, we exploit the fact that, in Canada's national labor force survey, respondents provide both their usual and actual hours worked in the survey reference week. We use both measures of labor supply in our identification strategy, as usual hours worked represents the ideal counterfactual for what respondents would have normally worked in March had COVID-19 not occurred (i.e., usual hours worked provides the non-COVID-19 March 2020 parallel universe of labor supply for each individual in the dataset). In this sense, we use actual hours worked as each respondent's 'treated' hours worked and usual hours worked as each respondent's 'control' hours worked. This counterfactual is particularly convincing given the timing of the March LFS reference week, which happened to fall on the same week that COVID economic shutdowns were ramped up by governments in Canada.

However, because the simple difference between the 'treated' response (actual hours worked) and 'control' response (usual hours worked) does not account for any normal differences between actual and usual hours in the absence of the COVID shutdown (for instance, in February), our identification comes from comparing the change in actual hours pre- and post-shutdown with usual hours pre and post-shutdown. We thus use a difference-in-difference research design (Card & Krueger, 1994) to obtain a causal estimate of the COVID-19 shutdown on hours worked.

In the next section, we provide background and review the small but growing literature on COVID-19 labor market impacts, outlining the unique contributions of our study. We then propose a very simple framework of the theoretical mechanisms through which COVID-19 disrupts the labor market, and describe the strategy we use to identify the causal impact of the COVID-19 economic shutdown on workers who remained employed during the crisis. In the last section, we discuss the implications of our findings for income support policies that seek to mitigate the impact of the crisis on low-income workers. We also highlight why these findings are important for post-crisis discussions about how low-paid work is valued.

2. CRISIS BACKGROUND AND RELEVANT LITERATURE

On March 11, 2020 the World Health Organization (WHO) classified COVID-19 as a global pandemic. Prior to the WHO declaration, the virus had already led to heavy death tolls in China and Italy, and was generating major concern among policy-makers in North America. In attempts to achieve the dual objectives of protecting vulnerable populations and preventing health care systems from becoming overwhelmed, federal and sub-national governments in both the United States and Canada enacted public health restrictions and/or declared states of emergency in an effort to "flatten the curve" (e.g., Treble, 2020).

These measures included border closures and requirements to shutter many non-essential businesses across states and provinces, which led to historic economic shutdowns in both countries almost overnight. In Canada, all provincial governments declared public health and/or states of emergency between March 13-20, apart from the small jurisdictions of Nova Scotia and the Yukon, which declared states of emergency on March 22 and 27, respectively (Dawson, 2020). The two largest provinces of Quebec and Ontario shut down non-essential businesses on March 24 (Stone, Van Praet, & Gray, 2020), though due to early government signals many businesses had already voluntarily closed down by that date or had all non-essential personnel working from home (Jones, 2020). Indeed, 1 million unemployment insurance claims were filed the week of March 16, representing 5 percent of all employees in the country (Parkinson & O'Kane, 2020). In the United States, analyses show that the major economic shutdown also occurred at roughly the same pace across the country during the week of March 16, with business shutdowns peaking on March 23 and 24 (Liesman, 2020). Both countries therefore experienced a nationwide economic shutdown over a very short period and at virtually the same time. Even the border between Canada and the U.S was the last border the two countries closed to all non-essential travel on March 20.

These government interventions wreaked havoc on labor markets. All analyses suggest that both Canada and the United States experienced a massive labor market shock. In the United States, an estimated 20 million jobs were lost by April 6 – more jobs than were lost during the entire Great Recession (Coibion, Gorodnichenko, & Weber, 2020). Moreover, while the estimated increase in the unemployment rate was fairly small – two percentage points from mid-January to early April – labor force participation rates declined by an unprecedented seven percentage points over the same time period (Coibion, Gorodnichenko, & Weber, 2020). In Canada, the aggregate working hours lost from February to March 2020 was the largest month-over-month decrease since 1976 (as far back as comparable labor market statistics are available). The unemployment rate increased by 2.2 percentage points between February and March to 7.8 percent, while Canada's employment rate decreased by 3.3 percentage points to 58.5 percent (Statistics Canada, 2020a). By April, the unemployment rate was estimated to be 17.8 percent when including both those who were unemployed as well as those who had worked recently and wanted a job but did not search for work (Statistics Canada, 2020b).

3. THEORETICAL CONSIDERATIONS

3.1 New Emerging and Diverging Classes of Workers

While most analyses have understandably focused on the unprecedented job losses resulting from the COVID-19-induced economic shutdowns, these aggregate labor market statistics mask important sources of variation for understanding the labor market effects of the shutdown across workers, and in particular, among workers that remain employed. We propose that the physical distancing rules and business closures imposed by governments have generated three new classes of workers: 1) those who have lost their jobs or had their work hours fully reduced; 2) those who are able to continue working mostly or exclusively from home; and 3) those who continue to work mostly or exclusively outside the home.

Among these new classes of workers, prior analyses suggest that the first class of workers – i.e. those experiencing job and hour losses – are more likely to be racialized, female and without a college degree in the U.S. (Mongey & Weinberg, 2020), while in Canada they tend to be disproportionately female, young, working part-time, less educated and low-income (Beland et al., 2020; Macdonald, 2020; Schirle, Milligan & Skuterud, 2020; Statistics Canada, 2020a). Dingel and Newman (2020) note that higher-income earners are disproportionately represented among the second class of workers who are employed in the roughly 37% of U.S. jobs that could plausibly be performed entirely at home.

The final class of workers who continue to work mostly or exclusively outside the home are likely employed in industries and occupations in healthcare, transit, and food production/retail, where the risk of regular exposure to COVID-19 is likely much higher than for the other two classes of workers (e.g., Beland et al., 2020). Paradoxically, some of these essential workers are employed in the lowest-paid occupations, and yet they may have experienced an increase in their normal hours of work during the crisis due to the essential nature of the services they perform. For instance, janitors and building cleaners experienced strong employment growth in March in the U.S. (Cortes, 2020) and frontline essential retail jobs did not experience the same decline in labor demand (measured by job postings) as most other occupations (Kahn, Lange, & Wiczer, 2020a).

There have been no COVID-19 labor market analyses that focus on the third class of workers we identify (i.e., those who are experiencing an increase in working hours). Yet in Canada, our analysis of the LFS suggests that 19 percent (17 percent) of employed workers experienced an increase in hours worked in March (April). Our study thus contributes to the emerging literature on the heterogeneous effects of the COVID-19 economic shutdown on the labor market by documenting its impact on workers across the earnings distribution who have experienced both increases and decreases in their working hours.

3.2 COVID-19 and the Labor Market: Underlying Mechanisms

The COVID-19 virus has an impact on workers' hours via direct and indirect channels. First, it has a *direct* impact by causing workers (and/or their family members) to fall ill, which could in turn affect their hours worked and/or their continued employment as they are required to stay home due to illness or caregiving responsibilities. Second, it has an *indirect* impact via government public health interventions to slow community transmission, including physical distancing requirements and closure of non-essential businesses and segments of the economy that lead to mass layoffs of workers. Beyond the layoffs, the closure of schools and daycares also requires some workers to stay home to care for children. These direct and indirect channels will have opposing effects: as

government-imposed public-health restrictions increase, less workers will fall ill than otherwise would have, at least in the short-term (hence "flattening" the curve). Thus, our empirical estimation relies on the fact that the indirect channel of government intervention through widespread economic and business shutdowns likely had a more substantial impact on the labor market and workers in the early stages of the crisis than the direct channel.

4. DATA AND IDENTIFICATION STRATEGY

Our analysis is based on public-use microdata files from Statistics Canada's Labour Force Survey (LFS). The LFS represents the primary data set used by economists and governments in Canada to understand the labor market. It is a mandatory monthly household survey that provides data on working-age individuals (15 years and older) across Canada. The LFS adopts a six-month rotating panel design. Households that are selected to participate are followed for six consecutive months; every month approximately 1/6 of the sample is dropped as new households are added.

Because the main goal of this paper is to identify the labor market effects of the COVID-19 economic shutdown on individuals who are still employed, the main labor statistic we examine is hours worked. To examine the effects across the earnings distribution, we generate a measure of weekly earnings by multiplying each respondent's usual hours worked in their main job by their market wage, and then group workers into earnings quintiles. We use weekly earnings rather than market wages to identify income status; by accounting for the number of hours worked, earnings is a more accurate measure of income status than raw market wages. The LFS does not contain wage information for self-employed individuals, and so this group of workers is excluded from all analyses. Finally, we identify individuals working more or less than usual by subtracting their usual hours from actual hours in every month. A positive (negative) difference between these two measures thus allows us to identify and condition on those individuals working more (less).

We use a difference-in-difference design to obtain a causal estimate of the COVID-19 shutdown on hours worked by exploiting the introduction of government-enforced public health restrictions and business shutdowns in mid-March. Prior approaches to COVID labor market analyses rely on changes in actual hours between February and March (Statistics Canada, 2020) and/or may include a double-difference with February and March 2019 to account for seasonality (Schirle et al., 2020).

We identify the causal effect of COVID-19 by comparing the change in workers' actual hours (in the main job) pre- and post-shutdown with usual hours (in the main job) pre and post-shutdown. Because workers report both their usual and actual hours worked, usual hours worked provides an ideal counterfactual for what the *same* worker would have worked during the March LFS reference week, absent COVID. In this sense, each treated worker simultaneously acts as their own control.[1]

The key assumption of our design is that the change in workers' actual hours would have been the same as workers' change in usual hours in the absence of government intervention (i.e., the parallel trends assumption). Figure 1 plots average actual (treatment) and average usual (control) hours

[1] Due to COVID-19 shutdowns, we are currently unable to access private-use data from Statistics Canada's Research Data Centers, which would provide us a panel of individuals across six-months. If we had access to the private-use data, an alternative design would be to use within-worker variation in the difference between usual and actual hours worked over time to identify the effect.

worked between January 2019 and April 2020 for: 1) the full sample; 2) respondents working more than usual; and 3) respondents working less than usual.

We observe in Figure 1 that the pre-treatment trend lines between usual (control) and actual (treatment) hours are virtually identical prior to the COVID intervention. The parallel trends assumption also holds for all of our sub-groups (i.e., across quintiles and among those working more or less hours) prior to the intervention (see Figures A.1, A.2 and A.3 in Appendix A).

The public-use LFS data does not allow us to identify individuals over time. As such, the pre and post observations for our treatment and control groups are similar to taking repeated cross-sections. Therefore, another potential limitation of our design is that the demographic composition and characteristics of employed workers across the earnings distribution may have changed as a result of the COVID economic shutdown, introducing an important source of omitted variable bias caused by time-varying unobservable covariates (see Cunningham, 2019, p. 276).

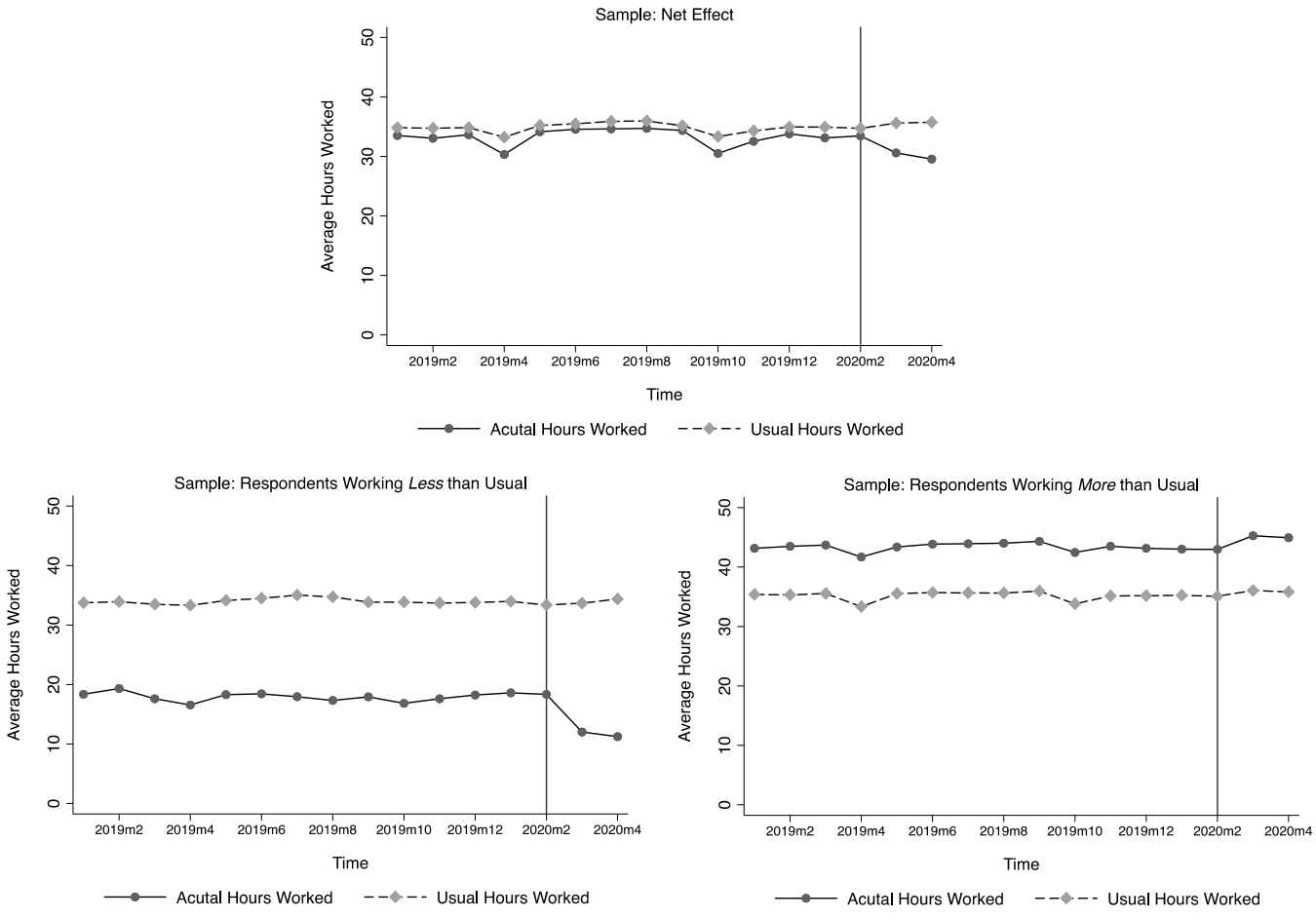

Fig. 1: Parallel Trends: Average actual hours and average usual hours, 2019 to 2020

One benefit of using the LFS is that the 6-month rotating panel sampling strategy employed by Statistics Canada means that approximately 5/6ths of the sample consists of the same workers each month. In addition, new households are selected using a stratified random sampling strategy that is unrelated to COVID. Moreover, because actual and usual hours are collected from the same worker in any given month, the distribution of covariates (i.e., worker characteristics) between our treatment and control groups are identical prior to (and after) treatment exposure. What matters most for the validity of our design is that "differences between the treatment and control groups are stable over time and that the changes in treatment exposure are not associated with changes in the distribution of covariates" (Wing, Simon & Bello-Gomez, 2018, p. 460). Because in each month we obtain the treated observations (actual hours) and the control observations (usual hours) for the same worker, this is true by construction. As a verification, when we run covariate balance regressions by replacing the outcome variable with a number of different covariates in our difference-in-difference regression model (see Equation (1) in Section 5), the difference-in-difference estimates are all zero. We also run Equation (1) including these covariates as controls, and our estimates do not change.[2]

Finally, our strategy may be problematic if the stable unit treatment value assumption (SUTVA) is violated; that is, if respondents adjust their reported usual hours in response to COVID. As shown in Figure 1, reported usual hours in March and April closely track the pre-treatment trends in usual hours, mitigating this as a concern. When we examine workers by quintiles (see Figures in Appendix A), average usual hours for workers in the bottom show a slight increase post treatment. Note that we should expect COVID to reduce workers' expectations of usual hours. The direction of bias in this case may reduce the size of our estimates for those workers experiencing an increase in hours worked and increase the size of our estimates among workers experiencing a decrease in hours worked. The most likely explanation for this small uptick in average usual hours is that low-income part-time workers were more likely to lose their jobs in March as a result of the COVID economic shutdown, and so the low-income workers who remain in our employed sample in March and April are slightly more likely to be employed full-time.

Note that some respondents may not have worked their usual hours in March and April for reasons unrelated to the COVID-19 government shutdowns – for example, individuals who are employed but absent from work because they were on vacation. This might be particularly problematic as the March LFS reference week (March 15-21) fell during spring break for some people and the April reference week (April 12-18) fell around several religious holidays, including Easter Monday, a statutory holiday for federal employees in Canada. We thus remove respondents from our sample who report that they were partially or fully absent from work during the reference week because they were on vacation or holiday.

The timing of the March LFS reference week is most ideal to isolate the (early) effects of the COVID-19 shutdown on hours worked: as outlined in Section 2, the widespread physical distancing requirements and business shutdowns in Canada began just before the March LFS reference week, and were ramped up during that week. Given this timing, respondents would have been most likely to report their usual hours worked pre-COVID government intervention, while

[2] The covariates we examine include the following variables summarized in Table 1: employment status (full- and part-time), class of worker (public versus private), union membership, education, student status, immigrant status, gender, marital status, presence of child in the household and age group.

their actual hours were (at least beginning to be) affected by the government public health interventions.

While we document the effects of the economic shutdowns on hours for both March and April, our identification strategy becomes slightly less compelling at exploring the causal impact of COVID shutdowns the further removed the reference week becomes from the peak shutdown in mid-March. In future months, respondents may be more likely to report changes to usual hours worked that reflect the new realities of the post-COVID shutdown. In other words, respondents' reported usual hours of work on the April LFS survey may thus be less likely to reflect pre-COVID hours of work, though Figure 1 and Appendix A reveal that usual hours for April track closely with pre-COVID usual hours. However, because governments in Canada also introduced several crisis income support policies in the weeks following the shutdown, post-March data will make it more difficult to isolate the exogenous impact of COVID shutdowns. Any effects in future months will therefore capture both the ongoing impact of the economic shutdown as well as any behavioural responses to the crisis income support policies designed to mitigate the impact of the shutdown on workers and businesses.

To assess the validity of our design and identification strategy, we also conduct a number of placebo tests that should not produce any discernable effects on hours worked. We perform three different sets of placebo tests using: i) a time period just prior to COVID-19 (i.e., February 2020 and January 2020); ii) the same months in 2019 (i.e., February and March 2019 and February and April 2019); and iii) data from February and March 2020 in the U.S. For the latter placebo test, we exploit the fact that the timing of the Current Population Survey (CPS) reference week, March 8-14, predated most of the COVID-related business and school closures.

The results of the first two sets of placebo tests using different time periods in Canada are displayed in Tables B.1, B.2, and B.3 of Appendix B, and the U.S. placebo test is shown in Table B.4. Consistent with our logic, most of the results across the placebo tests are not statistically significant. More importantly, however, any significant coefficients are of a very small magnitude, and there is no discernable pattern that is similar to our main results reported in Section 6.

5. METHODS

To estimate the causal effect of COVID-19 government economic and business shutdowns on hours worked, we use a standard difference-in-difference estimator that takes the form:

$$Y_{it} = \alpha + \delta ActualHours_i * PostFebruary2020_t + \gamma ActualHours_i + \beta PostFebruary2020_t \quad (1)$$

The outcome variable Y_{it} captures either actual or usual hours worked for worker *i* in month *t*. $ActualHours_i$ is an indicator for whether actual hours (treatment) or usual hours (control) is observed, and $PostFebruary2020_t$ is an indicator for whether the worker was observed in some month after February 2020 (i.e., March or April). $ActualHours_i * PostFebruary2020_t$ is an interaction term indicating that the worker's response is in the treated group (i.e. actual hours) and is observed in March or April. In Equation (1), δ can therefore be interpreted as the causal effect of COVID-19 economic shutdowns on hours worked for employed workers, subject to the validity of our identifying assumptions.

Equation (1) is estimated for the entire sample of employed respondents, and separately for two subsamples of workers – those who are working more hours than usual and those who are working less hours than usual post-COVID. For each of these three samples, Equation (1) is also estimated separately for each quintile, for a total of 18 separate regressions. Weights are assigned to respondents based on the sampling design, though we report unweighted observations. Our results are estimated using OLS, noting that employed individuals with zero hours worked remain in the overall sample as well as in the subsample of individuals working less than usual.

6. EMPIRICAL RESULTS

6.1 Descriptive Statistics

Table 1 displays the summary statistics for workers who were employed in February 2020 by weekly earnings quintile. As the first row indicates, individuals in the bottom quintile work far fewer usual hours on average than individuals in other quintiles; indeed, they work about half the hours of workers in the second quintile. This difference most likely captures the fact that individuals in the bottom quintile are much more likely to work part-time: in February 2020, only 18 percent of individuals in the bottom quintile had full-time employment status, compared to 99 percent of individuals at the top of the earnings distribution.

There is a predictable increase in average wages as we look across the columns of Table 1. While the average hourly wage is only $15.98 for individuals in the first quintile, individuals in the fourth and fifth quintiles earn $32.37 and $50.14, respectively. Workers in the bottom quintile are less likely to have a permanent job or to be paid for time off than workers in other quintiles.

There are notable differences in terms of the type of workers across quintiles. While the majority of individuals are employed in the private sector, the likelihood of working in the private sector decreases as weekly earnings increase. For example, there is a 25 percentage point difference between the bottom and top quintiles in terms of the proportion of individuals that are employed in the public sector. Individuals in higher quintiles are also more likely to have union representation.

Table 1 reveals that as earnings increase, the proportion of women decreases. Sixty-three percent of individuals in the bottom quintile are women, compared to only 36 percent of individuals in the top quintile. There are also differences in marital status and parental status across the quintiles. For example, 63 percent of individuals in the bottom quintile are single and only 16 percent have children under 18 years old. Compare this to workers in the top quintile, where only 22 percent are single, and just under half have children. These differences reflect the fact that individuals at the bottom of the distribution tend to be younger than those at the top, and might lead us to expect a more negative impact of the shutdown on the hours of higher-income workers than lower-income workers, given the mandatory closure of schools and daycare centres.

Table 1
Summary statistics by quintile, February 2020

	Weekly Earnings Quintile				
	First	Second	Third	Fourth	Fifth
Average Usual Hours (main)	18.95	36.43	38.37	38.96	40.48
Average Actual Hours (main)	18.10	34.10	36.67	37.64	40.23
Average Hourly Wage	$15.98	$18.29	$23.88	$32.37	$50.14
Average Job Tenure (months)	43.45	66.08	85.73	99.00	117.37
Full-Time Employment	0.18	0.90	0.96	0.98	0.99
Class of Worker					
Public	0.13	0.14	0.24	0.31	0.38
Private	0.87	0.86	0.76	0.69	0.62
Union	0.16	0.24	0.35	0.39	0.40
Multiple Job Holders	0.08	0.07	0.05	0.04	0.04
Permanent Job	0.71	0.88	0.91	0.93	0.95
Paid for Time Off°	0.07	0.19	0.26	0.40	0.45
High Education*	0.58	0.66	0.74	0.81	0.90
Student	0.44	0.04	0.03	0.03	0.02
Immigrant	0.23	0.31	0.26	0.24	0.23
Female	0.63	0.58	0.51	0.42	0.36
Marital Status					
Married/Common-Law	0.37	0.56	0.62	0.70	0.78
Single**	0.63	0.44	0.38	0.30	0.22
Children					
None (or youngest > 17)	0.84	0.74	0.69	0.64	0.54
Youngest Child < 6	0.07	0.11	0.14	0.17	0.19
Youngest Child 6-12	0.06	0.09	0.10	0.11	0.17
Youngest Child 13-17	0.03	0.05	0.06	0.08	0.10
Age Group					
Age 15-24	0.46	0.16	0.09	0.04	0.01
Age 25-34	0.15	0.26	0.29	0.29	0.19
Age 35-44	0.10	0.19	0.23	0.26	0.31
Age 45-54	0.09	0.19	0.20	0.22	0.29
Age 55-64	0.12	0.16	0.17	0.16	0.17
Age 65+	0.07	0.04	0.03	0.02	0.02
N	**9,515**	**9,184**	**9,470**	**9,222**	**9,347**

*Note: Means are computed with LFS survey weights. Sample includes all employed individuals who were not on vacation or holiday in February 2020. Self-employed individuals are excluded from all analyses. °Full-week absences only. * High education includes individuals who have at least some post-secondary education or more. ** Single includes never married, divorced, separated and widowed individuals. Proportions may not sum to 1 due to rounding.*

Lastly, Table 1 reveals that individuals in the bottom quintile have much lower levels of education and are much more likely to be students than individuals in any of the other four quintiles. Immigrant status does not vary much across the earnings distribution with the exception of a slightly higher proportion of immigrants in the second quintile relative to the other quintiles.

6.1 Difference-in-Difference Estimates

Table 2 displays the results of Equation (1) for each of the regressions in March, and Table 3 displays the April results. Note that modeling the percentage change rather than absolute change in hours would be more useful in this context because it captures the relative effect on workers across the earnings distribution.[3] For instance, workers in the bottom of the earnings distribution are more likely to work part-time pre-COVID and work fewer hours on average compared to workers in the top of the earnings distribution, who are more likely to work full-time pre-COVID. To compute percentage changes, we therefore divide the regression coefficients by the average actual hours for each sub-group in February 2020, which is included in square brackets below the coefficients in Table 2 and Table 3.

Table 2 shows the results of our difference-in-difference regressions for March. Panel A highlights that, overall, COVID-19 government interventions had a significant negative effect on hours worked. Within the whole sample of employed workers, there was an average reduction of 3.72 hours (11.13 percent) during the reference week. Looking across the quintiles, on net, higher-earners experienced smaller reductions in working hours, both in absolute terms and as a percentage of their pre-crisis hours: for instance, the hours of individuals in the bottom quintile were reduced by 4.70 hours (26 percent), whereas the hours of those at the top were reduced by less than half that number (2.23 hours), which only represents 5.6 percent of their average actual hours in February. This is equivalent to a reduction in average weekly earnings of $75.11 ($300.44/month) for workers in the bottom quintile, and $111.81 ($447.24/month) for workers in the top quintile.

Panel B of Table 2 limits the sample to individuals working more hours than usual and highlights that workers in the lower part of the earnings distribution are working more as a percent of their usual hours than workers with higher earnings. The hours of individuals in the bottom quintile have increased by 1.48 hours (6 percent); the average weekly earnings of these workers has thus increased by $23.65 ($94.60/month). The hours for individuals in the second to fifth quintiles increased by a similar number of absolute hours, however, this increase reflects a much smaller percentage of their pre-crisis hours.

Finally, Panel C of Table 2 presents the results conditional on individuals who are working less hours than usual. Again, there is little difference across the workers in terms of the absolute weekly hours lost, but the percentage change for each group of workers shows striking differences: workers at the bottom lost almost 59 percent of their pre-crisis hours while individuals at the top are lost around 32 percent. In terms of income, workers at the bottom of the earnings distribution are thus losing around $104.19 each week (or $416.76/month) on average, compared an average weekly earnings loss of $353.99 (or 1,415.96/month) for their higher-income counterparts. We

[3] The normal procedure to convert regression coefficients into percentages would be to take the natural log of hours worked. However, this approach is problematic because of the large magnitude of our coefficients.

also note from Table 1 that among workers who were absent from work for the entire week in February 2020 (a subset of the sample of employed workers), 45 percent of those in the top of the earnings distribution were paid for that absence, whereas only 7 percent of low-income workers were paid for their absence.

Table 2
Difference-in-difference estimates of the effect of COVID-19 economic shutdown on hours worked of employed respondents, February and March 2020

		Weekly Earnings Quintile				
	Overall	Bottom	Second	Third	Fourth	Fifth
Panel A: Overall (Net)						
DV: Hours Worked	-3.72*** [-11.13%] (.12)	-4.70*** [-25.97%] (.20)	-4.87*** [-14.29%] (.26)	-4.07*** [-11.10%] (.27)	-2.72*** [-7.23%] (.26)	-2.23*** [-5.55%] (.28)
N	175,788	35,528	35,716	34,486	34,928	35,130
Panel B: Individuals Working More than Usual						
DV: Hours Worked	1.35*** [3.14%] (.16)	1.48*** [5.96%] (.35)	1.14*** [2.74%] (.37)	.41 [0.90%] (.33)	1.49*** [3.19%] (.34)	1.87*** [3.78%] (.35)
N	35,066	6,036	4,914	5,998	7,978	10,140
Panel C: Individuals Working Less than Usual						
DV: Hours Worked	-6.62*** [-36.11%] (.25)	-6.52*** [-58.79%] (.31)	-7.09*** [-37.02%] (.56)	-7.75*** [-37.44%] (.61)	-7.05*** [-32.88%] (.64)	-7.06*** [-31.76%] (.71)
N	45,254	12,386	10,104	7,976	7,792	6,996

*Note: Difference-in-difference estimate obtained using OLS with hours worked as the outcome. Regressions are estimated with LFS survey weights. Cluster-robust standard errors are in parentheses. **, *** denotes statistical significance at the 5% and 1% levels. Percent change in square brackets computed for each sub-group using the following formula: coefficient/(average actual hours worked in February 2020). Clustered robust standard errors in parentheses. Sample includes all employed individuals who were not on vacation or holiday in February 2020 and March 2020. Self-employed individuals are excluded from all analyses.*

As shown in Table 3, the same general pattern identified in March holds for April, but both the increase and the decrease in hours for the lowest-income workers are much more pronounced in April relative to higher-income workers than in March.

We also perform a robustness check with a triple difference (using February and March 2019) to control for seasonal factors. These results are included in Appendix C. Using this approach, the higher percentage increase in hours we observed in March among low-income workers working more may be partly to do with seasonal factors (Table C.1). However, the triple-difference using April data (Table C.2) shows that the impact of both the increase and decrease in hours on workers

in the bottom quintile working more and less, respectively, is even more pronounced than our double-difference results.

Finally, to compare our results with prior approaches using only actual hours across time we obtain the difference-in-difference estimator for actual hours between February and March and across 2019 and 2020 (see Tables E.1 and E.2 in Appendix E). While the general patterns are similar to what we find in our main results (i.e., workers in the bottom are experiencing both the greatest percentage decrease and the greatest percentage increase), the economic significance of the effects are quite different from our design, particularly for workers in the bottom. Given that there is likely far more heterogeneity among low-income workers than among high-income workers, our approach, which takes into account workers' idiosyncratic deviations from the norm and is not affected by compositional changes, may provide less biased estimates.

Table 3
Difference-in-difference estimates of the effect of COVID-19 economic shutdown on hours worked of employed respondents, February and April 2020

		Weekly Earnings Quintile				
	Overall	Bottom	Second	Third	Fourth	Fifth
Panel A: Overall (Net)						
DV: Hours Worked	-4.91*** [-14.69%] (.13)	-6.12*** [-33.79%] (.25)	-6.84*** [-20.04%] (.31)	-5.22*** [-14.23%] (.31)	-3.94*** [-10.48%] (.30)	-2.64*** [-6.56%] (.29)
N	160,118	32,360	31,704	32,314	31,720	32,020
Panel B: Individuals Working More than Usual						
DV: Hours Worked	1.25*** [2.90%] (.18)	2.53*** [10.20%] (.43)	0.83** [2.01%] (.42)	1.37*** [3.05%] (.35)	0.66** [1.41%] (.34)	1.15*** [2.33%] (.38)
N	31,030	5,508	4,342	5,350	6,888	8,942
Panel C: Individuals Working Less than Usual						
DV: Hours Worked	-8.09*** [-44.12%] (.27)	-9.36*** [-84.38%] (.36)	-9.93*** [-51.85%] (.59)	-9.17*** [-44.33%] (.65)	-6.85*** [-31.96%] (.66)	-4.50*** [-20.22%] (.77)
N	41,534	10,960	8,964	7,714	7,420	6,476

*Note: Difference-in-difference estimate obtained using OLS with hours worked as the outcome. Regressions are estimated with LFS survey weights. Cluster-robust standard errors are in parentheses. **, *** denotes statistical significance at the 5% and 1% levels. Percent change in square brackets computed for each sub-group using the following formula: coefficient/(average actual hours worked in February 2020). Clustered robust standard errors in parentheses. Sample includes all employed individuals who were not on vacation or holiday in February 2020 and April 2020. Self-employed individuals are excluded from all analyses.*

Who are the workers in the bottom and top quintiles that experience an increase versus a decrease in hours? Among workers in the bottom, in March younger workers, women, and workers with children under the age of six are more likely to experience a decrease in hours than an increase in hours, though in April, the youngest workers and students are more likely to be working increased hours. Among the highest-earners, men, private sector employees, higher educated workers and individuals with no young children are more likely to experience an increase in hours than a decrease in hours. These descriptive statistics are summarized in Appendix D (Table D.1).

In March, the top two occupations of the lowest-income workers who both lost and gained hours are very similar – service support and other service occupations, and sales support occupations that are concentrated in the accommodation and food services and retail trade industries. This similarity most likely reflects the fact that some low-paid workers employed in these occupations and industries are considered essential (e.g., grocery stores and their cashiers/clerks) while others are not (e.g., retail clothing store cashiers/clerks, full-service bar and restaurant staff). The one exception is that workers in the bottom of the earnings distribution working more than usual are also likely to be heavily concentrated in the health care and social assistance industry – for instance, these workers may be low-paid personal support workers in long-term care facilities. We also find that workers in the top of the earnings distribution working less hours are mostly concentrated in the trades and professional occupations in educational services, while those high-earners who gained hours are working in specialized middle management occupations concentrated in health care and social assistance and public administration, as well as professional occupations in the natural and applied sciences.

7. CONCLUSION AND POLICY IMPLICATIONS

In this paper, we use Statistics Canada's Labour Force Survey (LFS) to explore the impact of the COVID-19 economic shutdown on workers across the earnings distribution who remain employed in Canada. Most early analyses have noted that workers in the bottom of the earnings distribution experienced a much larger negative shock to hours worked than workers in the top of the earnings distribution, which we also document in our study. However, when we condition on whether workers lost or gained hours, we also find that workers in the bottom of the earnings distribution experienced not only the largest percentage reduction in hours, but that they also experienced the largest percentage increase in hours worked. These effects were even more pronounced in April than in March, particularly when we controlled for seasonal factors using a triple difference.

To mitigate the effect of the public health restrictions and business shutdowns on workers, governments have implemented a variety of crisis social policies. For example, in Canada, the federal government introduced the Canada Emergency Response Benefit (CERB) which provides a benefit of $2,000 per month for up to four months for workers whose jobs have been affected by COVID. In contrast, the U.S. federal government approved a one-time income-tested $1,200 payment to Americans.

The results of this study are thus important to inform current and future research evaluating the distributive and procedural justice of these different crisis policies, as well as quantifying their economic costs and benefits. For instance, the CERB addressed concerns about the limited access to Employment Insurance for low-income workers in need of crisis income supports (Harris,

2020), and it was also expanded to include workers who have not lost their jobs, but whose income has dropped to less than $1,000 per month. These are welcome developments given our findings that some workers at the bottom of the income distribution remain employed, yet have been hit particularly hard by a reduction in hours.

However, because the CERB is not currently available to workers who voluntarily quit their jobs, there is effectively no choice for low-income workers to decide what level of COVID exposure they wish to incur. As our results highlight, many low-income workers may actually be experiencing a disproportionate increase in their hours of work, and these workers are more likely to be employed in jobs that are less likely to be undertaken mostly or exclusively within the home. In this case, the income-tested U.S. cash transfer, which is not at all conditional on working, may be a better policy than the CERB for helping low-income workers during the crisis (noting that the U.S. benefit is a one-time cash transfer of $1,200, while the CERB provides up to $8,000 over four months).

During the crisis, we have come to recognize how reliant we are on low-paid workers to keep society's essential services operating. In both Canada and the United States, governments have introduced top-ups for low-paid essential workers during the crisis. While some workers who have seen their hours increase undoubtedly include higher-paid healthcare professionals (e.g., nurses and doctors), our results suggest that the risk of COVID-19 exposure at work, and the burden of increased hours during the crisis, has also been disproportionately shifted onto low-paid workers who are less likely to work from home (e.g., janitors, grocery-store clerks and personal support workers in long-term care homes). In Canada, these workers would be ineligible for most income supports if they quit their jobs during the crisis. We also document that younger workers in the bottom of the earnings distribution were relatively more likely to experience a decrease in hours in March rather than an increase. Therefore, our results suggest that it is not necessarily those that face the least risk from serious complications from COVID-19 that are taking on this additional low-paid – albeit essential – work outside the home.

Further research is required to determine the reasons why workers have experienced both increases and decreases in their hours, and any differences in these reasons across the earnings distribution. For example, higher income individuals are more likely to have children who require care when schools and daycares are closed. The reduction in hours at the top of the income distribution may reflect the need for those parents to provide childcare rather than a lack of work – i.e., a supply-side issue – (e.g., Kahn, Lange, & Weizer, 2020b), while a lack of work may be the more prevalent reason for a reduction in hours among low-income workers – i.e., a demand-side issue.

REFERENCES

Beland, L.P., Wright, T., Brodeur, A., & Mikola, D. (May 2020). The short-term economic consequences of COVID-19: Occupation tasks and mental health in Canada. IZA Institute of Labor Economics Discussion Paper Series No. 13254.

Blackwell, T. (2020, May 23). *Hundreds infected, several dead: How COVID-19 has affected the unsung essential workers in retail.* National Post. Retrieved from https://nationalpost.com/news/canada/hundreds-infected-several-dead-how-covid-19-has-affected-the-unsung-essential-workers-in-retail.

Card, D., Krueger, A. (1994). Minimum wages and employment: A case study of the fast-food survey in New Jersey and Pennsylvania. The American Economic Review, 84(4), 772-793.

Coibion, O., Gorodichenko, Y., & Weber, M. (2020). Labor markets during the COVID-19 crisis: A preliminary view. *NBER Working Paper Series.* Retrieved from http://www.nber.org/papers/w27017.

Cortes, G.M. (2020, April 18). Heterogeneous labor market impacts during the early stages of the COVID-19 pandemic. Working paper. Retrieved from https://drive.google.com/file/d/1wV1FFA8_3OggKTrOcT0eb1FGyrOsaomb/view

Dawson, T. (2020, April 15). *As the COVID-19 pandemic hit, provinces declared states of emergency. Now many are up for renewal*. National Post. Retrieved from https://nationalpost.com/news/provincial-states-of-emergencies-were-issued-a-month-ago-most-are-coming-up-for-renewal

Dingel, J., & Neiman, B. (2020). *How many jobs can be done at home?* Becker Friedman Institute White Paper. University of Chicago. Retrieved at https://bfi.uchicago.edu/wp-content/uploads/BFI_White-Paper_Dingel_Neiman_3.2020.pdf

Director General, WHO. (2020, March 11). WHO Director General's opening remarks at the media briefing on COVID-19. Retrieved from https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020

Harris, K. (2020, April 15). *Part-time, contract and seasonal workers now qualify for COVID0-19 emergency benefits.* CBC News. Retrieved from https://www.cbc.ca/news/politics/cerb-emergency-benefits-trudeau-1.5532767

Jones, R. P. (2020, March 24). *Shutdown order will kill some businesses, advocates warn*. CBC News. Retrieved from https://www.cbc.ca/news/canada/ottawa/non-essential-businesses-local-reaction-1.5507686

Kahn, L., Lange, F., & Wiczer, D. (April 2020a). Labor demand in the time of COVID19: Evidence from vacancy postings and UI claism. Working paper. Retrieved from http://www.fabianlange.ca/linked_files/papers/LD_NBER_w27061.pdf

Kahn, L., Lange, F., & Wiczer, D. (March 2020b). Labor supply in the time of COVID19. Working paper. Retrieved from https://clef.uwaterloo.ca/wp-content/uploads/2020/04/NOWcasting.pdf

Liesman, S. (2020). *North or south, red or blue – states shut down their economies at about the same pace, CNBC analysis shows.* CNBC. Retrieved from https://www.cnbc.com/2020/04/27/north-or-south-red-or-blue---states-shut-down-their-economies-at-about-the-same-pace-cnbc-analysis-shows.html

MacDonald, D. (2020). *Early warning: Who's bearing the brunt of COVID-19's labour market impacts?* Retrieved from the Canadian Centre of Policy Alternatives website: http://behindthenumbers.ca/2020/04/09/early-warning-covid19-labour-market-impacts/

Parkinson, D., & O'Kane, J. (2020, March 25). *Unemployment claims reach nearly 1 million as businesses battered by coronavirus pandemic*. The Globe and Mail. Retrieved from https://www.theglobeandmail.com/business/article-unemployment-claims-reach-nearly-one-million-as-businesses-battered-by/

Rubin, D. (2005). Causal inference using potential outcomes. Journal of the American Statistical Association, 100(469), 322–331.

Rubin, D. (1974). Estimating causal effects of treatments in randomized and nonrandomized studies. Journal of Education Psychology, 66(5), 688–701.

Schirle, T., Milligan, K. & Skuterud, M. (2020). *Digging one level deeper into March's workforce numbers*. Retrieved from the C.D. Howe Institute website: https://www.cdhowe.org/sites/default/files/IM-Sch-Mil-Sku-2020-0414.pdf

Statistics Canada. 2020a. *Labour Force Survey, March 2020*. Statistics Canada Catalogue no. 11-001-X. Ottawa. Retrieved from https://www150.statcan.gc.ca/n1/en/daily-quotidien/200409/dq200409a-eng.htm

Statistics Canada. 2020b. *Labour Force Survey, April 2020*. Statistics Canada Catalogue no. 11-001-X. Ottawa. Retrieved from https://www150.statcan.gc.ca/n1/daily-quotidien/200508/dq200508a-eng.htm

Stone, L., Van Praet, N., & Gray, J. (2020, March 24). *Ontario and Quebec order non-essential businesses to close.* Globe and Mail. Retrieved from https://www.theglobeandmail.com/politics/article-ontario-quebec-order-non-essential-businesses-to-close/

Treble, P. (2020, April 16). *Coronavirus in Canada: These charts show how our fight to 'flatten the curve'* is going. Maclean's. Retrieved from https://www.macleans.ca/society/health/coronavirus-in-canada-these-charts-show-how-our-fight-to-flatten-the-curve-is-going/

Wing, C., Simon, K., & Bello-Gomez, R. A. (2018). Designing difference in difference studies: best practices for public health policy research. *Annual Review of Public Health*, 39: 453-69.

APPENDIX A

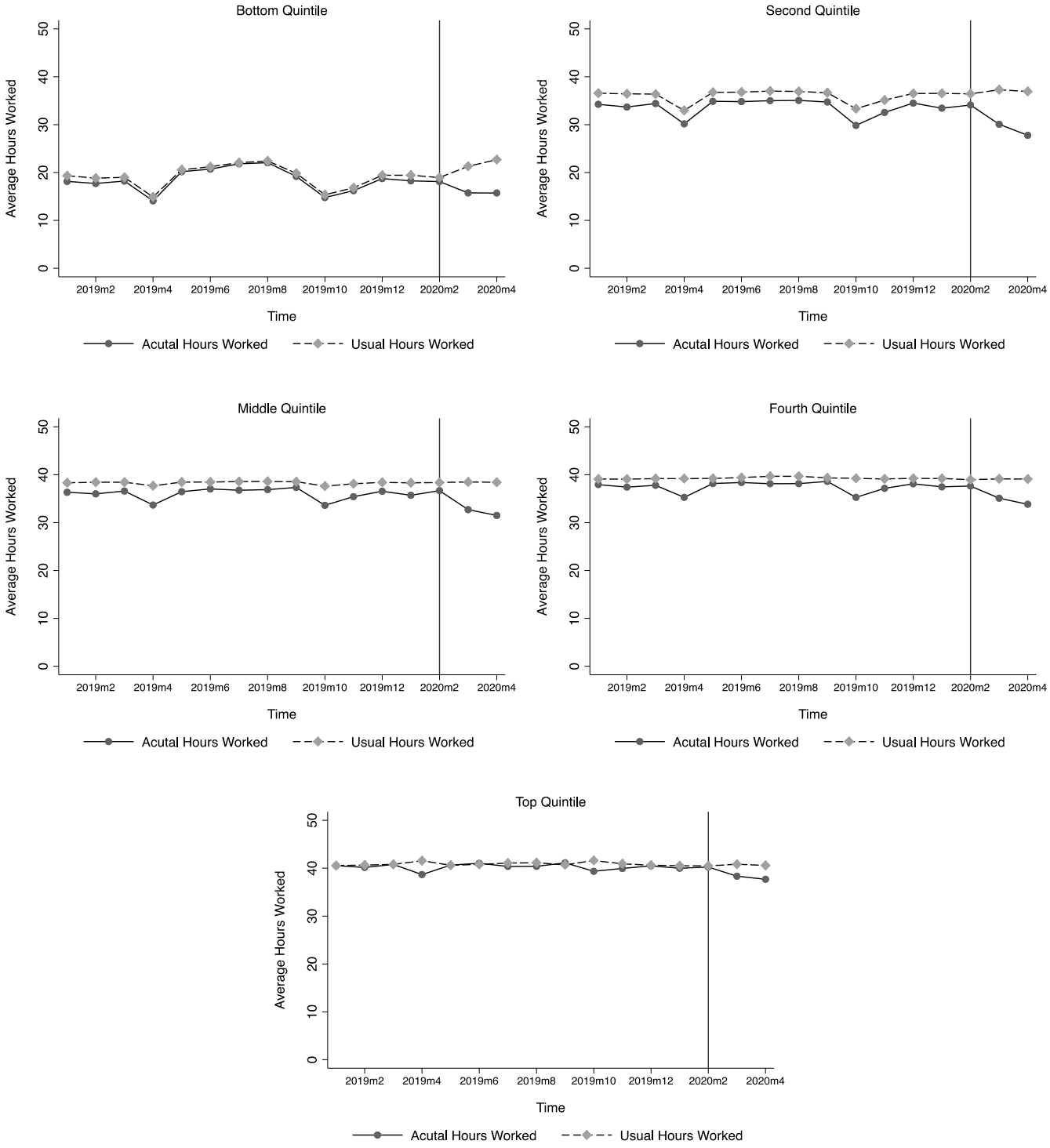

Fig. A.1: Parallel Trends: Average actual hours and average usual hours, net effect, 2019 to 2020

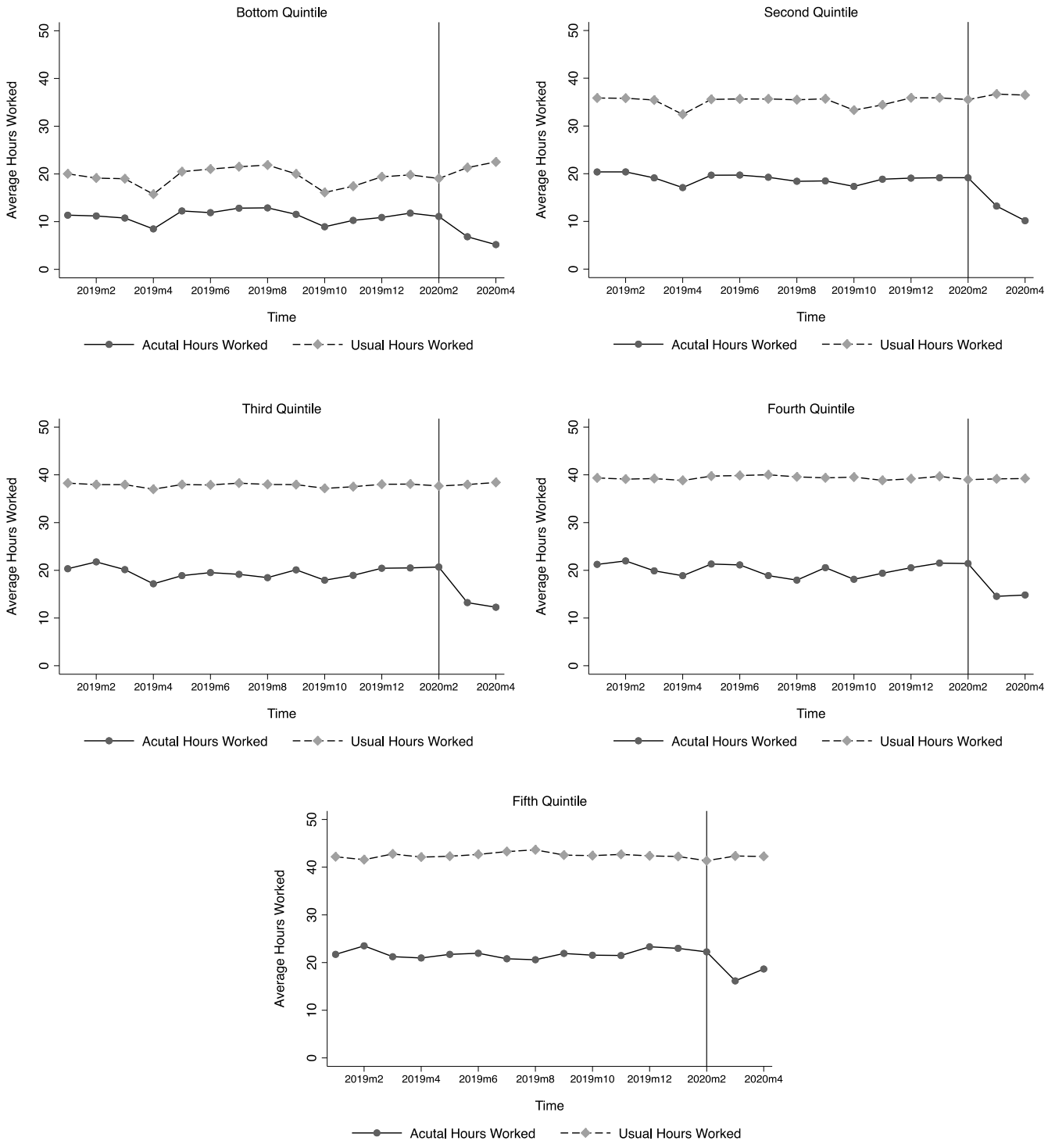

Fig. A.2: Parallel Trends: Average actual hours and average usual hours, respondents working less than usual, 2019 to 2020

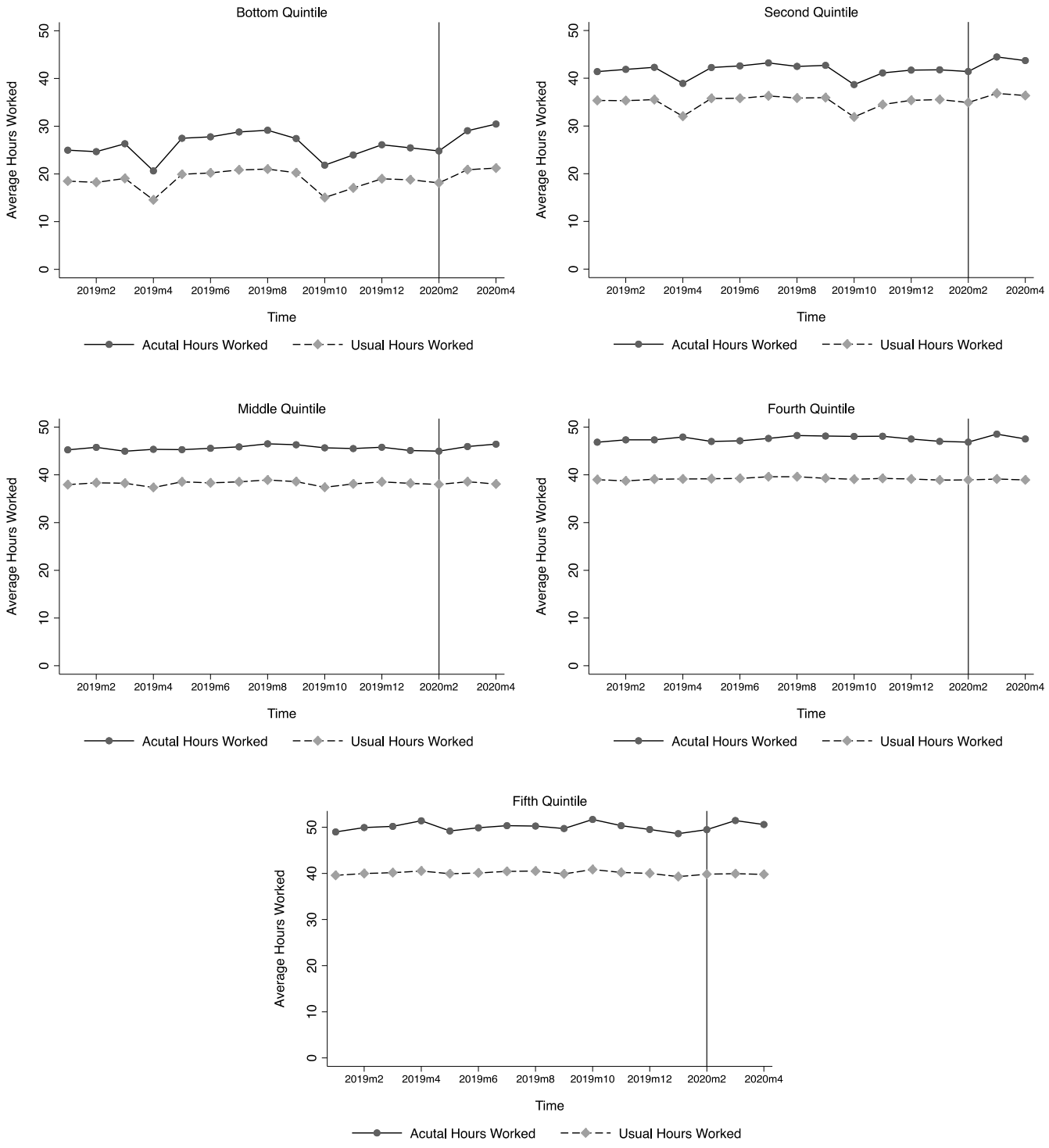

Fig. A.3: Parallel Trends: Average actual hours and average usual hours, respondents working more than usual, 2019 to 2020

APPENDIX B

Table B.1
Placebo test: Estimates of the effect of COVID-19 economic shutdown on hours worked of employed respondents, January and February 2020

		Weekly Earnings Quintile				
	Overall	Bottom	Second	Third	Fourth	Fifth
Panel A: Overall (Net)						
DV: Hours Worked	.53*** (.09)	.33*** (.13)	.76*** (.20)	.89*** (.20)	.43** (.21)	.26 (.22)
N	187,778	37,900	37,264	38,088	36,972	37,554
Panel B: Individuals Working More than Usual						
DV: Hours Worked	.11 (.14)	.01 (.34)	.27 (.32)	.09 (.30)	-.20 (.28)	.35 (.27)
N	38,548	6,502	5,442	6,642	8,608	11,354
Panel C: Individuals Working Less than Usual						
DV: Hours Worked	.33 (.26)	.06 (.29)	.36 (.59)	.59 (.61)	.60 (.66)	.14 (.72)
N	41,094	10,364	8,662	7,816	7,462	6,790

*Note: Difference-in-difference estimate obtained using OLS with hours worked as the outcome. Regressions are estimated with LFS survey weights. Cluster-robust standard errors are in parentheses. **, *** denotes statistical significance at the 5% and 1% levels. Sample includes all employed individuals who were not on vacation or holiday in January 2020 and February 2020. Self-employed individuals are excluded from all analyses.*

Table B.2
Placebo test: Estimates of the effect of COVID-19 economic shutdown on hours worked of employed respondents, February and March 2019

		Weekly Earnings Quintile				
	Overall	Bottom	Second	Third	Fourth	Fifth
Panel A: Overall (Net)						
DV: Hours Worked	.48*** (.09)	.34*** (.14)	.77*** (.20)	.59*** (.20)	.27 (.22)	.49** (.24)
N	187,394	37,542	37,428	37,958	37,148	37,318
Panel B: Individuals Working More than Usual						
DV: Hours Worked	-.02 (.14)	.84** (.35)	.21 (.35)	-.71** (.31)	-.36 (.30)	.07 (.28)
N	39,816	6,618	5,678	6,820	8,936	11,764
Panel C: Individuals Working Less than Usual						
DV: Hours Worked	-1.29*** (.27)	-.29 (.30)	-.87 (.57)	-1.62*** (.62)	-2.18*** (.66)	-3.47*** (.81)
N	40,464	10,020	8,244	8,016	7,504	6,680

*Note: Difference-in-difference estimate obtained using OLS with hours worked as the outcome. Regressions are estimated with LFS survey weights. Cluster-robust standard errors are in parentheses. **, *** denotes statistical significance at the 5% and 1% levels. Sample includes all employed individuals who were not on vacation or holiday in February 2019 and March 2019. Self-employed individuals are excluded from all analyses.*

Table B.3
Placebo test: Estimates of the effect of COVID-19 economic shutdown on hours worked of employed respondents, February and April 2019

		Weekly Earnings Quintile				
	Overall	Bottom	Second	Third	Fourth	Fifth
Panel A: Overall (Net)						
DV: Hours Worked	-1.20*** (.11)	.30 (.14)	-.07 (.23)	-1.59*** (.26)	-2.24*** (.28)	-2.39*** (.31)
N	154,718	31,048	30,842	31,124	30,934	30,770
Panel B: Individuals Working More than Usual						
DV: Hours Worked	-.02 (.14)	-.35 (.33)	.33 (.37)	.56 (.39)	.19 (.34)	.92** (.37)
N	39,816	5,520	4,880	5,400	6,966	9,110
Panel C: Individuals Working Less than Usual						
DV: Hours Worked	.20 (.17)	.67** (.27)	.10 (.57)	-3.62*** (.62)	-2.80*** (.64)	-3.08*** (.73)
N	31,876	8,732	7,906	7,826	7,700	6,972

*Note: Difference-in-difference estimate obtained using OLS with hours worked as the outcome. Regressions are estimated with LFS survey weights. Cluster-robust standard errors are in parentheses. **, *** denotes statistical significance at the 5% and 1% levels. Sample includes all employed individuals who were not on vacation or holiday in February 2019 and April 2019. Self-employed individuals are excluded from all analyses.*

Table B.4
Placebo test: Estimates of the effect of COVID-19 economic shutdown on hours worked of employed respondents in the United States, February and March 2020

		Weekly Earnings Quintile				
	Overall	Bottom	Second	Third	Fourth	Fifth
Panel A: Overall (Net)						
DV: Hours Worked	-.07 (.10)	-.10 (.22)	-.36 (.20)	-.26 (.20)	.09 (.22)	.11 (.23)
N	46,422	9,075	9,358	9,468	9,170	9,351
Panel B: Individuals Working More than Usual						
DV: Hours Worked	1.61*** (.61)	1.39 (1.21)	.67 (1.20)	-1.58 (1.02)	.89 (1.05)	2.81*** (1.14)
N	5,204	1,225	816	1,010	1,076	1,077
Panel C: Individuals Working Less than Usual						
DV: Hours Worked	-2.09*** (.40)	-1.63** (.75)	-2.26*** (.85)	-2.96*** (.96)	-1.22 (.93)	-2.97*** (.99)
N	5,244	1,148	1,088	958	994	1,056

*Note: Data is from the March Current Population Survey (CPS) collected in the United States. Difference-in-difference estimate obtained using OLS with hours worked as the outcome. Regressions are estimated with CPS survey weights. Cluster-robust standard errors are in parentheses. **, *** denotes statistical significance at the 5% and 1% levels. Sample includes all employed individuals who were not on vacation or holiday in February 2020 and March 2020. Self-employed individuals are excluded from all analyses.*

APPENDIX C

Table C.1
Triple-difference estimates of the effect of COVID-19 economic shutdown on hours worked of employed respondents, February and March, 2019-2020

		Weekly Earnings Quintile				
	Overall	Bottom	Second	Third	Fourth	Fifth
Panel A: Overall (Net)						
DV: Hours Worked	-4.21*** [-12.59%] (.12)	-5.05*** [-25.97%] (.20)	-5.65*** [-27.87%] (.27)	-4.66*** [-12.70%] (.28)	-2.99*** [-7.94%] (.29)	-2.72*** [-6.76%] (.31)
N	538,970	108,598	108,860	106,930	107,004	107,578
Panel B: Individuals Working More than Usual						
DV: Hours Worked	1.37*** [3.18%] (.18)	.63 [2.58%] (.43)	.92** [2.23%] (.43)	1.11*** [2.49%] (.39)	1.85*** [3.95%] (.39)	1.80*** [3.64%] (.37)
N	109,948	18,690	15,506	18,816	24,892	32,044
Panel C: Individuals Working Less than Usual						
DV: Hours Worked	-5.34*** [-29.10%] (.33)	-6.23*** [-56.18%] (.37)	-6.23*** [-32.47%] (.70)	-6.12*** [-29.60%] (.75)	-4.86*** [-22.71%] (.80)	-3.58*** [-16.14%] (.95)
N	130,972	34,792	28,452	23,968	23,088	20,672

*Note: Triple-difference estimate obtained using OLS with hours worked as the outcome. Regressions are estimated with LFS survey weights. Cluster-robust standard errors are in parentheses. **, *** denotes statistical significance at the 5% and 1% levels. Percent change in square brackets computed for each sub-group using the following formula: coefficient/(average actual hours worked in February 2020). Clustered robust standard errors in parentheses. Sample includes all employed individuals who were not on vacation or holiday in February and March in 2019 or 2020. Self-employed individuals are excluded from all analyses.*

Table C.2
Triple-difference estimates of the effect of COVID-19 economic shutdown on hours worked of employed respondents, February and April, 2019-2020

		Weekly Earnings Quintile				
	Overall	Bottom	Second	Third	Fourth	Fifth
Panel A: Overall (Net)						
DV: Hours Worked	-3.71*** [-11.10%] (.15)	-6.42*** [-35.47%] (.23)	-6.77*** [-19.85%] (.32)	-3.63*** [-9.90%] (.34)	-1.71*** [-4.52%] (.35)	-.25 [-.61%] (.37)
N	474,954	95,768	94,250	95,752	94,374	94,810
Panel B: Individuals Working More than Usual						
DV: Hours Worked	1.05*** [2.44%] (.21)	2.89*** [11.63%] (.45)	.50 [1.21%] (.48)	.81* [.90%] (.46)	.47 [1.80%] (.41)	.24 [.48%] (.45)
N	93,936	16,536	13,564	16,100	20,742	26,994
Panel C: Individuals Working Less than Usual						
DV: Hours Worked	-5.93*** [-32.33%] (.33)	-10.03*** [-90.39%] (.38)	-10.03*** [-52.38%] (.70)	-5.54*** [-26.80%] (.77)	-4.04*** [-18.88%] (.79)	-1.42 [-6.34%] (.91)
N	122,204	30,652	25,834	23,254	22,540	19,924

*Note: Triple-difference estimate obtained using OLS with hours worked as the outcome. Regressions are estimated with LFS survey weights. Cluster-robust standard errors are in parentheses. *, **, *** denotes statistical significance at the 10%, 5% and 1% levels. Percent change in square brackets computed for each sub-group using the following formula: coefficient/(average actual hours worked in February 2020). Clustered robust standard errors in parentheses. Sample includes all employed individuals who were not on vacation or holiday in February and April in 2019 or 2020. Self-employed individuals are excluded from all analyses.*

APPENDIX D

Table D.1
Summary statistics by type of hours change among employed workers, 2020

	March				April			
	Bottom Quintile		Top Quintile		Bottom Quintile		Top Quintile	
	Less	More	Less	More	Less	More	Less	More
Female	0.65	0.59	0.40	0.33	0.66	0.61	0.39	0.36
Student	0.34	0.33	0.02	0.01	0.28	0.31	0.03	0.02
Immigrant	0.22	0.19	0.18	0.22	0.26	0.19	0.20	0.23
High Education**	0.60	0.61	0.86	0.92	0.59	0.59	0.87	0.93
Full-Time Status	0.26	0.25	0.99	1.00	0.32	0.27	0.99	0.99
Class of Worker								
Public	0.13	0.13	0.44	0.35	0.14	0.14	0.41	0.36
Private	0.87	0.87	0.56	0.65	0.86	0.86	0.59	0.64
Union	0.15	0.26	0.56	0.30	0.18	0.29	0.51	0.30
Marital Status								
Married	0.39	0.38	0.79	0.78	0.43	0.35	0.79	0.80
Single	0.61	0.62	0.21	0.22	0.57	0.65	0.21	0.20
Children								
None (or youngest > 17)	0.82	0.86	0.51	0.56	0.81	0.89	0.51	0.55
Youngest Child < 6	0.09	0.06	0.26	0.17	0.09	0.04	0.25	0.18
Youngest Child 6-12	0.06	0.06	0.15	0.15	0.06	0.04	0.16	0.16
Youngest Child 13-17	0.03	0.02	0.08	0.12	0.04	0.04	0.09	0.11
Age Group								
Age 15-24	0.43	0.43	0.02	0.00	0.37	0.43	0.01	0.00
Age 25-34	0.19	0.15	0.23	0.18	0.18	0.15	0.23	0.17
Age 35-44	0.11	0.10	0.33	0.30	0.12	0.09	0.31	0.31
Age 45-54	0.10	0.13	0.26	0.32	0.12	0.12	0.26	0.31
Age 55-64	0.12	0.15	0.16	0.17	0.15	0.13	0.17	0.18
Age 65+	0.06	0.05	0.01	0.02	0.06	0.07	0.03	0.02
N	**3,726**	**1,308**	**1,830**	**2,191**	**3,013**	**1,044**	**1,570**	**1,592**

*Note: Sample includes all employed individuals who were not on vacation or holiday in March or April 2020. Self-employed individuals are excluded from all analyses. * Single includes individuals who have never been married, as well as those who are divorced, separated and widowed. ** High education includes individuals who have at least some post-secondary education or more.*

APPENDIX E

Table E.1
Difference-in-difference estimates of the effect of COVID-19 economic shutdown on actual hours worked of employed respondents, February-March, 2019-2020

		Weekly Earnings Quintile				
	Overall	Bottom	Second	Third	Fourth	Fifth
Panel A: Overall (Net)						
DV: Hours Worked	-4.60*** [-10.30%] (.33)	-3.82*** [-15.81%] (.42)	-4.68*** [-13.92%] (.72)	-5.83*** [-12.40%] (.77)	-4.80*** [-7.74%] (.82)	-3.80*** [-6.28%] (.93)
N	65,486	17,396	14,226	11,984	11,544	10,336
Panel B: Individuals Working More than Usual						
DV: Hours Worked	2.08*** [4.84%] (.31)	2.58*** [10.40%] (.70)	2.62*** [6.33%] (.59)	1.78*** [3.95%] (.49)	1.68*** [3.58%] (.47)	1.72*** [3.48%] (.46)
N	54,974	9,345	7,753	9,408	12,446	16,022
Panel C: Individuals Working Less than Usual						
DV: Hours Worked	-3.44*** [-25.08%] (.16)	-2.86*** [-34.38%] (.29)	-4.75*** [-24.45%] (.30)	-4.55*** [-28.18%] (.30)	-2.91*** [-22.39%] (.31)	-2.52*** [-17.09%] (.33)
N	269,485	54,299	54,430	53,465	53,502	53,789

*Note: Difference-in-difference estimate obtained using OLS with hours worked as the outcome. Regressions are estimated with LFS survey weights. Robust standard errors are in parentheses. **, *** denotes statistical significance at the 5% and 1% levels. Percent change in square brackets computed for each sub-group using the following formula: coefficient/(average actual hours worked in February 2020). Clustered robust standard errors in parentheses. Sample includes all employed individuals who were not on vacation or holiday in 2019 and 2020. Self-employed individuals are excluded from all analyses.*

Table E.2
Difference-in-difference estimates of the effect of COVID-19 economic shutdown on actual hours worked of employed respondents, February-April, 2019-2020

		Weekly Earnings Quintile				
	Overall	Bottom	Second	Third	Fourth	Fifth
Panel A: Overall (Net)						
DV: Hours Worked	-1.18***	1.25***	-2.81***	-2.84***	-1.68***	-1.06***
	[-3.52%]	[6.93%]	[-8.24%]	[-7.74%]	[-4.45%]	[-2.64%]
	(.19)	(.30)	(.36)	(.37)	(.38)	(.40)
N	237,477	47,884	47,125	47,876	47,187	47,405
Panel B: Individuals Working More than Usual						
DV: Hours Worked	3.76***	9.66***	5.23***	1.88***	0.07	-.35
	[8.75%]	[38.92%]	[12.64%]	[4.18%]	[.15%]	[-.71%]
	(.37)	(.68)	(.66)	(.59)	(.52)	(.55)
N	46,968	8,268	6,782	8,050	10,3718	13,497
Panel C: Individuals Working Less than Usual						
DV: Hours Worked	-4.33***	-3.19***	-5.71***	-3.84***	-3.50***	-1.05
	[-23.59%]	[-28.74%]	[-29.81%]	[-18.56%]	[-16.35%]	[-4.73%]
	(.34)	(.42)	(.71)	(.79)	(.82)	(.91)
N	61,102	15,326	12,917	11,627	11,270	9,962

*Note: Difference-in-difference estimate obtained using OLS with hours worked as the outcome. Regressions are estimated with LFS survey weights. Robust standard errors are in parentheses. **, *** denotes statistical significance at the 5% and 1% levels. Percent change in square brackets computed for each sub-group using the following formula: coefficient/(average actual hours worked in February 2020). Clustered robust standard errors in parentheses. Sample includes all employed individuals who were not on vacation or holiday in 2019 and 2020. Self-employed individuals are excluded from all analyses.*