Final Paper: Individual Section

Pallavi Maladkar

My individual research question is to look at the impact of childcare center reopenings on hours worked for female parents. I am interested in exploring this relationship because women are socially expected to raise and care for children in their early years, while it is more acceptable and encouraged for men to continue working and not disrupt their work schedules for their children. I hypothesize that the policy of childcare center reopenings will therefore positively impact the hours that women work significantly, because during the time of childcare center closures, women will be the ones bearing the brunt of caring for the children at home. Childcare center reopenings will relieve that burden for women to a greater degree, allowing them to re-enter the workforce. The contributions of this individual research to the group project are that I will be subsetting our data into women only, and thereby able to examine the true effect of the policy by gender. I will be changing the group variable to include only parents with kids aged 2-5. I will also be looking at the effects of the policy on part- vs full-time employment through the multinomial logit model, and using the heckprobit model to account for the probability of a woman working in the first place.

Multinomial Logit Model

The first advanced model I attempt is the multinomial logit model. I used the same independent variables, control variables, and fixed effects as our triple differences model, but in order to use multinomial logit, our outcome variable must be categorical. The categorical variable was constructed based on hours worked. Individuals that were not employed were in the"not working" category, individuals that worked less than 36 hours were in the "working part-time" category, and individuals that worked 36 hours or more were in the "working full-time" category. The tabulation of this new categorical variable is shown in Table 1.

Table 1: Tabulation of Categories of Hours of Work

Categories of hours of work	Freq.	Percent	Cum.
Not working	152156	38.90	38.90
Working part-time	57570	14.72	53.62
Working full-time	181402	46.38	100.00
Total	391128	100.00	

There were a few slight changes made to the independent variables. First, we kept the original policy stages as our policy treatment variable to avoid compounding the effects into one category. Our original policy treatment variable only had 3 groups: 0 for no policy or post-policy, 1 for childcare center restrictions, and 2 for partial childcare center restrictions. The new policy variable used in this model has 4 stages, and just splits the 0 category. It takes on a value of 0 for no policy and 3 for post-policy. In addition, our treated group became parents with only children aged 2-5. We believe this treatment group will be most affected by childcare center closures.

Table 2 displays the estimations from the multinomial logit model on women. We see that in the first stage of the policy, when all childcare centers were fully closed, women are less likely to work part time and full time. These coefficients are statistically significant. However, we see that no other stages of the policy had statistically significant results, implying that women did not necessarily work less or more during the other stages of the policy in comparison to the period with no policy. None of the interaction terms between the group variable and the policy treatement variable have statistically significant coefficients either, which is not a result I expected.

Table 2: Multinomial Logit Model for Women

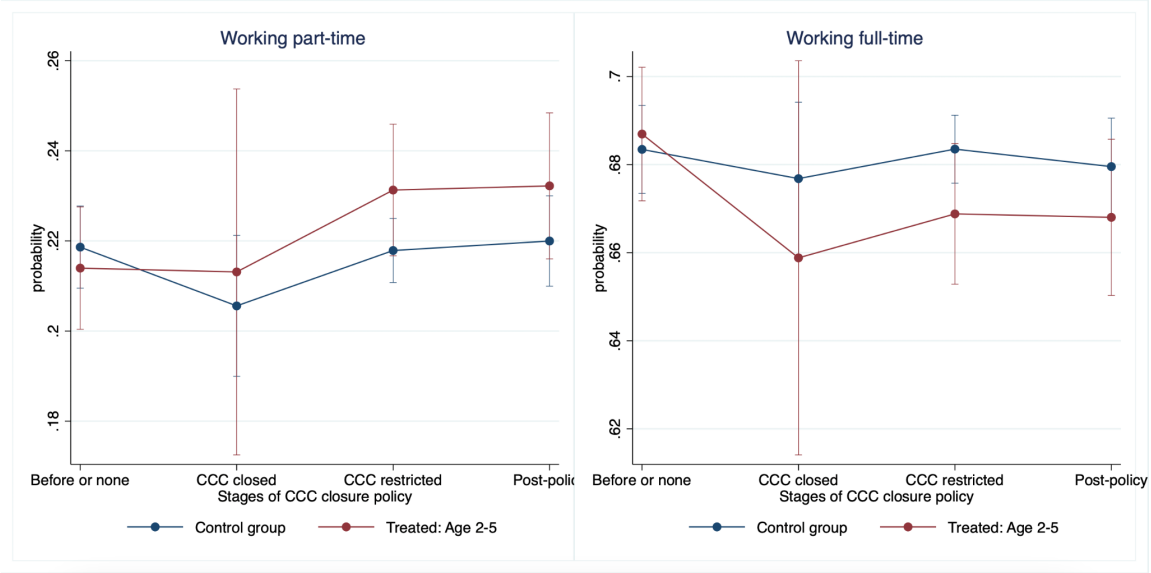
VARIABLES	(2) Working_part_time	(3) Working_full_time
Stages of CCC closure policy = 1, CCC closed	-0.250***	-0.199***
	(0.088)	(0.075)
Stages of CCC closure policy = 2, CCC restricted	-0.011	-0.007
	(0.064)	(0.056)
Stages of CCC closure policy = 3, Post-policy	-0.020	-0.033
	(0.082)	(0.072)
Child's age categories = 1, Treated: Age 2-5	-0.034	-0.006
	(0.059)	(0.053)
1.ccc_closure#1.group	-0.017	-0.114
	(0.176)	(0.148)
2.ccc_closure#1.group	0.082	-0.033
	(0.084)	(0.076)
3.ccc_closure#1.group	0.097	-0.007
	(0.085)	(0.077)
number of own children in household	0.035***	0.026**
	(0.013)	(0.012)
Race-ethnicity categories = NH Black	-0.647***	-0.319***
	(0.035)	(0.030)
Race-ethnicity categories = NH American Indian	-0.774***	-0.509***
	(0.103)	(0.088)
Race-ethnicity categories = NH Asian	-0.335***	-0.202***
	(0.047)	(0.041)

Race-ethnicity categories = NH other/mixed	-0.206***	-0.389***
	(0.079)	(0.072)
Race-ethnicity categories = Hispanic (any race)	-0.353***	-0.194***
	(0.033)	(0.029)
=1 if essential occupation	0.024	-0.445***
	(0.022)	(0.020)
Educational attainment = HS degree	-0.316***	0.802***
	(0.036)	(0.036)
Educational attainment = Bachelor's degree	-0.323***	1.363***
	(0.041)	(0.040)
Educational attainment = Graduate degree	0.008	1.948***
	(0.051)	(0.048)
Observations	133,880	133,880
State FE	Yes	Yes
Month FE	Yes	Yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 1 provides a visualization of the multinomial logit model. It is clear to see that there is no difference in the probability of working part- or full-time for the treated and control groups due to the large standard errors. We see a general downward trend for the first stage of the policy (CCC closed) for both part-time and full-time, but we cannot confirm a relationship. The control group tracks the treated group fairly closely for both part- and full-time, except for the pre-policy stage. It is important to note that the probability of women working full-time is overall higher for the control group than it is for the treatment group, while the probability of womrn working part-time is overall higher for the treatment group than for the control group. This supports the idea that women with young children are more likely to work part time during childcare center closures to support their children, but less likely to work full time during the closures because they need to care for their children most of the day and cannot dedicate a full workday to earning.

Figure 1: Visualization of Multinomial Logit Model



Heckprobit Model

The second advanced model I estimated was the heckprobit model, a combination of the heckman and probit model. This model requires one continuous outcome partially observed and one binary outcome fully observed. The chosen continuous outcome that is partially observed is hours worked, and the chosen binary outcome fully observed is employment. The descriptive statistics for hours worked are shown in Table 3, and the tabulation of employment is shown in Table 4. Roughly 63% of our sample is employed.

Table 3: Descriptive Statistics for Hours Worked

Variable	Obs	Mean	Std. Dev.	Min	Max
uhrswork	238972	37.805	10.754	0	140

Table 4: Tabulation of Employment

=1 if employed	Freq.	Percent	Cum.
[0] No	152156	37.44	37.44
[1] Yes	254200	62.56	100.00
Total	406356	100.00	

In the heckprobit model, there is a selection equation, which models the probability of being in the sample, and an outcome equation. The selection equation must include exclusion variables, variables which impact employment, but not hours worked. The exclusion variables I used in the selection equation were marital status (binary), whether the individual is currently in school (categorical), if the person experiences physical difficulties (binary), and if the person experiences any difficulties (binary). Table 5 shows the estimates from the heckprobit model for

women. Column (1) displays the results of the outcome equation, and column (2) displays the results of the selection equation.

Table 5: Heckprobit Model for Women

VARIABLES	(1) Heckprobit uhrsworkt	(2) employed
Stages of CCC closure policy = 1, CCC closed	0.184	-0.188***
	(0.292)	(0.028)
Stages of CCC closure policy = 2, CCC restricted	-0.108	-0.016
	(0.073)	(0.013)
Stages of CCC closure policy = 3, Post-policy	0.014	-0.044***
	(0.079)	(0.014)
Child's age categories = 1, Treated: Age 2-5	0.068	-0.005
	(0.134)	(0.027)
1.ccc_closure#1.group	4.707***	-0.051
	(0.303)	(0.079)
2.ccc_closure#1.group	-0.231	0.003
	(0.162)	(0.038)
3.ccc_closure#1.group	4.628***	0.018
	(0.140)	(0.038)
=1 if married		0.166***
		(0.010)
Currently in school, age 16-54		0.000
		(0.002)
Experiences physical difficulty		-0.057
		(0.043)
Experiences any difficulty		-0.349***
		(0.028)
number of own children in household	-0.090***	-0.010*
	(0.026)	(0.006)
Race-ethnicity categories = 2, [2] NH Black	0.108	-0.202***
	(0.104)	(0.015)
Race-ethnicity categories = 3, [3] NH American Indian	4.802***	-0.221***
	(0.066)	(0.046)
Race-ethnicity categories = 4, [4] NH Asian	0.035	-0.195***
	(0.123)	(0.020)
Race-ethnicity categories = 5, [5] NH other/mixed	-0.020	-0.151***
	(0.215)	(0.037)

Race-ethnicity categories = 6, [6] Hispanic (any race)	0.054	-0.154***
	(0.089)	(0.015)
=1 if essential occupation	0.042	-0.151***
	(0.058)	(0.010)
Educational attainment = 2, [2] HS degree	-0.125	0.150***
	(0.136)	(0.018)
Educational attainment = 3, [3] Bachelor's degree	-0.000	0.345***
	(0.145)	(0.021)
Educational attainment = 4, [4] Graduate degree	-0.147	0.584***
	(0.148)	(0.024)
Observations	133,880	133,880
Region FE	Yes	Yes
Month FE	Yes	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

From the selection equation, we see that employment is negatively affected by childcare center closures (policy stage 1), and interestingly enough, also childcare center full openings (policy stage 3). The coefficients on these specific policy stages were statistically significant at the $p < 0.01$ level. There were no statistically significant coefficients on the interaction terms between the policy stages and the group variable. We also see that the variable denoting whether the individual experiences any difficulty decreases the probability of their employment, as expected. From the outcome equation, we see that hours worked are positively impacted by the interaction term between the group variable and policy stages 1 and 3 respectively. Both coefficients are statistically significant at the $p < 0.01$ level.

Figure 2 displays a visualization of the heckprobit model. We see that the probability of employment for women decreases drastically in policy stage 1, as expected. We see that stages 1 and 3 of the policy very clearly have positive impacts on hours worked. We expected hours worked of women to decrease during childcare center closures, but it seems that after accounting for the tendency of people to stop working altogether during childcare center closures, women that still work actually work longer hours, which is an interesting result. Policy stage 3 shows that hours worked became significantly higher for those in the treated group as well, which is what we expected, as women will now be able to enter the workforce when they can send their children to daycare centers. Overall, the control group tracks the same trends as the treated group in both equations, just to a lesser magnitude.

Figure 2: Visualization of Heckprobit Model