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COVID-19 School Re-openings: The Effect on Women's Labor Force Participation

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Abstract:

As schools and daycares closed in March of 2020, mothers left the labor market in droves, either completely giving up their jobs or significantly cutting back on hours in order to care for children and/or help facilitate online learning. Furthermore, fields historically dominated by women were particularly hard hit, such as education, hospitality, and retail causing many women who may not be mothers to leave the work force as well. This paper considers how women's labor force participation has changed throughout the COVID-19 pandemic and how the re-opening of schools, in particular, has impacted women's return to the workforce. Triple difference estimation shows a small but statistically significant positive effect for both women's labor force participation and women's employment status as schools re-open.

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1.) Introduction

Women have steadily been making progress in the labor market over the past 100 years. Unfortunately, the pandemic has done significant damage to that progress. In an article written by Pallavi Gogoi for NPR titled “Stuck-At-Home Moms: The Pandemic's Devastating Toll On Women”, it’s said that “The pandemic's female exodus has decidedly turned back the clock by at least a generation, with the share of women in the workforce down to levels not seen since 1988.”

Many women throughout the pandemic have been forced to either give up their jobs or reduce their hours in order to care for their children. With daycares and schools closed, women were disproportionately expected to spend more time at home to care for and teach them. Furthermore, as women are overwhelmingly employed in the childcare and education sectors, these closures forced even more women, possibly without school age children, out of the work force as well. While the mass withdrawal of women from the workplace has been worrying in and of itself, a larger concern is that the reopening of these schools has not resulted in a full correction of the negative effects seen with the school closings. Many experts have feared that this exodus of women from the labor force has the potential to set women back in terms of labor force gains an entire generation.

Economically, the impact of women joining the labor force has been significant over time. Losing a large number has been detrimental to the progress made and as mentioned above, resulting in problems in the supply chain. In a speech given October 21, 2020 by Federal Reserve Governor Lael Brainard said “If not soon reversed, the decline in the participation rate for prime-age women could have longer-term implications for household incomes and potential growth," and if women continue to remain out of employment, it risks "harming not only the

prospects of these individuals, but also the economy's potential growth rate." Ideally, research like this would be principally beneficial to policy makers as a guide to stave off or correct some of these effects.

Research like this is especially important because it might help to guide policy which can be used to combat or constrain some of the damage being done. This research would be incredibly relevant to just about everyone in our society. For the average person, the effect of this has been staggering. Whether they are one of these women who have either lost or had to give up their job, a business who might now be understaffed due to women leaving, or families who are struggling to make ends meet with one less paycheck. As consumers, we see the employment shortages, even though not due solely to women leaving the labor force, as a massive inconvenience and creating problems in our day to day lives.

In my paper I use the triple difference method with year by month and state fixed effects in order to estimate the effect school re-openings have had on women's labor force participation and employment status. I look both at the whole sample of individuals taken, as well as a sub-sample of that which includes only the individuals who should be most affected by school closings/re-openings. The results show that for each of these groups, there is a positive effect on the dependent variable, either women's labor force participation or women's employment status, as schools re-open. This effect is small but statistically significant and I will discuss some of the reasons why this may be.

2.) Literature Review

This COVID-19 pandemic has impacted women more harshly than any economic recession before. Current research suggests that some of the reasons why this may be the case stem from the industries affected. While previous economic recessions have had a tendency to impact men more heavily "largely because men have a higher propensity to be employed in highly cyclical industries, such as construction and manufacturing" (Hoynes, Miller, Schaller, 2012). The recession caused by the COVID-19 pandemic is distinctly different due to the effects on occupations and industries which are more predominantly populated by women such as education, healthcare, and service (Alon, Doepke, et al., 2020).

Compounding this effect is the closure of the majority of schools and daycares throughout the United States which occurred early on in the pandemic. Not only are women more likely to be employed in these professions, but many working mothers rely on schools and daycares to provide childcare, allowing them to be active in the labor force (Waldfogel, 1998)

In the paper "Schools, Job Flexibility, and Married Women's Labor Supply: Evidence From The COVID-9 Pandemic" Hansen, Sabia, and Schaller (2022) consider a similar research question to mine. Their research centers on women who are married and have school aged children to analyze the effect school re-openings have had on their employment.

In my research I intend to determine whether women have returned to work as schools reopened or if the school closings have had a longer-term effect on women's labor force participation. With this determined, we can then focus our attention on policy to correct this.

3.) Theoretical Discussion

Leading off the research of Hansen, Sabia, and Schaller (2022), there are quite a few reasons as to why a particular group of women would be impacted by school re-openings significantly more than the general whole. Namely, married women would be the most likely to be able to leave the workforce to care for their children as they can rely on their spouse's income while a single mother would have little choice but to continue working. Furthermore, women with children should be more affected by these closures than those without, as women without children who may have lost jobs due to the closures should be able to find alternate employment of some kind. Those with children are constrained by lack of childcare.

In theory, finding ways to keep childcare accessible to working mothers, be it through a day care or a school, should allow for women to remain present in the labor force. I expect that as schools re-open, women's unemployment status will decrease as they return to the workforce. Additionally, women's labor force participation should increase. The bigger questions are how quickly this will happen and to what extent? Will we see women return to work soon after schools reopen? And will women return to the labor force in the same numbers which left?

The worry is that even after schools reopen, the closure will have done lasting damage to women's labor force participation. As discussed in the introduction, many of the strides made by women in the labor market over the past century were set back significantly by this pandemic and subsequent economic recession. It is unlikely that the questions asked in the paragraph above can be answered accurately now. With a central concern being the length of time which it will take for the effects of the pandemic to subside, it is probable that it will be many years before the true effects of the pandemic can be quantified. It is my hope that this research can use the data currently available to consider the impact of school re-openings so far.

4.) Empirical Methodology

The model I am using in this study to estimate the probability of an individual returning to work is as follows

$$DV_{ist} = \beta_1 SO_{ist} + \beta_2 F_{ist} + \beta_3 FSO_{ist} + \beta_3 SOPC_{ist} + \beta_4 FSOPC_{ist} + X_{ist} + +\varepsilon_{ist}$$

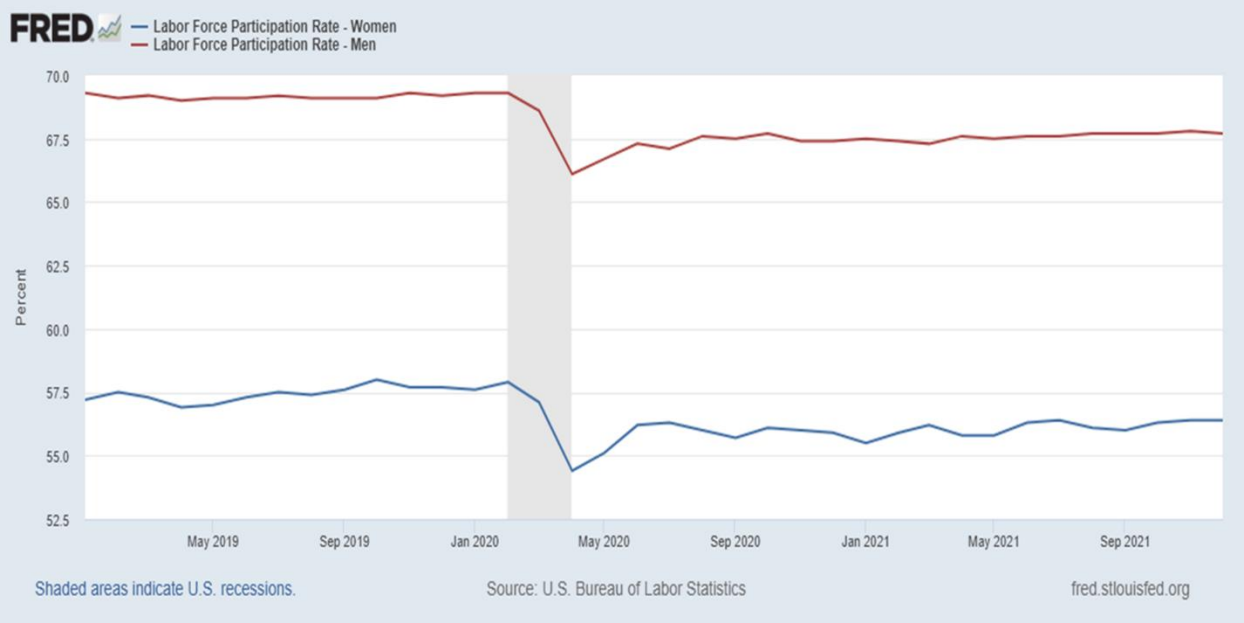
Where DV represents the dependent variable which is an indicator variable with a value of 1 if the individual is in the labor force and 0 if they are not. The subscript of i stands for individual, s represents the state (50 states, excludes DC and Puerto Rico), and t represents the month and year. SO represents Schools Open and is an indicator variable where it is equal to 0 if a state's schools are closed in a given month and year and equal to 1 if a state's schools are open in a given month and year. PC stands for Post Covid and, for the purposes of this project, consists of all dates March 2020 and beyond. SOPC represents Schools Open Post Covid and is an indicator variable which is equal to 1 if schools in a state are open in a given month and year and it is "post Covid", it will be 0 otherwise. X includes a number of control variables which I used in my model: age, education level, sex, race, marital status, occupation, and the number of children an individual has.

This triple difference model allows me to control for month, year, and state. By doing so I can more accurately determine the effect had by the treatment, in this case school re-openings.

5.) Preview of the Data

The data being used in this project comes from two main sources: IPUMS CPS for population data and Education Week for data regarding school closings and re-openings during the COVID-19 Pandemic.

My data from IPUMS CPS spans the years 2019 through 2021 and is broken up by month and state. The variables collected are sex, age, race, marital status, number of children, number of children under 5, employment status, labor force participation, occupation, and education.



In regard to the data from Education Week, it details the status of COVID-19 school closures by state and month from March of 2020 through June of 2021 for K-12 public schools. The original data set classifies the status of the state's schools into nine different categories: 1=no order in place, 2=full closure of the state's schools, 3=state's schools ordered open, 4=partial closure of a state's schools, 5=some of the state's schools are ordered to be open, 6=the status varies by district, 7= in-person instruction is ordered either full or part time, 8=state

ordered regional closure, 9=only hybrid or online instruction permitted. In order to simplify the analysis and create an indicator variable for the model, I have condensed these categories into two: 0=closed and 1=in person instruction. Of the original nine categories, only 1, 3, 7, and schools in category 6 with over one half of their schools open are considered open, the rest are considered closed.

Table 1: Summary Statistics of Whole Sample

Variable	N	Mean	Std. Dev.	Min	Max
Age	2,802,956	41.157	14.442	16	65
Female	2,802,956	0.513	0.499	0	1
NChild	2,802,956	0.775	1.139	0	9
Labor Force	2,802,956	0.731	0.443	0	1
Employment Status	2,802,956	0.694	0.461	0	1

Notes: Sub-sample consists of individuals aged 20-50, who are married, and have at least one child.

Table 2: Summary Statistics of Sub-Sample

Variable	N	Mean	Std. Dev.	Min	Max
Age	630,820	39.156	6.739	20	50
Female	630,820	0.535	0.499	0	1
NChild	630,820	2.121	1.047	1	9
Labor Force	630,820	0.824	0.381	0	1
Employment Status	630,820	0.798	0.401	0	1

Notes: Sub-sample consists of individuals aged 20-50, who are married, and have at least one child.

It is important to note the limitations of data here as it almost certainly has an impact on the results of the model. To begin with, the data I have is at the state level. When schools first began

to re-open, the decision to return to in-person instruction was oftentimes not decided at the state level and was instead left up to the individual school districts, making it difficult to determine the state level open status of schools. Additionally, states' schools are coded as a categorical variable being 0 if the state's schools were closed and 1 if opened. In many instances, however, schools first opened in a hybrid manner which could vary drastically between school districts and months.

6.) Findings

All four models showed that school re-openings have had a statistically significant effect on women's labor force participation, albeit a small one. To determine the true impact of school re-openings on women, the output of the variables FSOPC and FSO must be combined. In the entire sample using labor force participation as its dependent variable as well as the entire sample using employment status as its dependent variable, the coefficient for FSOPC is not statistically significant. Therefore, the final impact of school re-openings in these models is a 0.09% increase in female labor force participation and 0.2% increase in women being employed respectively. When looking towards the sub-sample, FSOPC and FSO are statistically significant for both and in combining them, we see an impact of school re-openings as a 0.43% increase in female labor force participation and a 0.67% increase of women being employed.

Table 3: Estimated Effects of School Re-Openings on Women's Labor Force Participation or Employment Status

	Labor Force		Employment Status	
	Whole Sample	Sub-Sample	Whole Sample	Sub-Sample
FSOPC(Female*SchoolOpen*PostCovid)	-0.0004	0.0011**	-0.0004	0.0031***
	(0.0003)	(0.0005)	(0.0004)	(0.0009)
FSO(Female*SchoolOpen)	0.0009**	0.0032***	0.002***	0.0036***
	(0.0003)	(0.0007)	(0.0004)	(0.0014)
Year by Month & State Fixed Effects	Yes	Yes	Yes	Yes
Control Variables Included	Yes	Yes	Yes	Yes
Observations	2758610	2758610	624814	624814
Adjusted R-Squared	0.9493	0.8154	0.9652	0.8244
Overall Significance	438748***	266022***	383852***	150052***

Notes: Sub-sample consists of individuals aged 20-50, who are married, and have at least one child.
Significance is indicated at 99%, 95%, and 90% by ***, **, and * respectively.

While the effect of school openings on women's labor force participation and employment status are shown to be rather small, it is important to note that the standard deviations are extremely small, and these models have fairly high adjusted r-squared values. The aforementioned indicates that the models are relatively accurate in accounting for the true effects of the variables on the dependent variable.

7.) Policy Applications

Determining the true effect of the school and daycare closures on women's labor force participation will be critical in finding ways to best mitigate or avoid it in the future. To an extent, the problem we are seeing in the United States is unique because of the culture and policy we have in this country. Work from home arrangements have been significant for working parents and the paper *The Impact of COVID-19 on Gender Equality* (Alon, Doepke, et al., 2020) argues that more flexible working arrangements along with changes in social norms are necessary to achieve gender equality and mitigate the effect of something such as this happening again. However, for the time being, they also offer some policy recommendations that can be used to alleviate the current crisis:

> *1.) government subsidies to pay workers who are unable to work due to childcare restrictions 2.) suspension of work requirements in order to qualify for Temporary Assistance for Needy Families (TANF) and Medicaid until schools and day cares have reopened 3.) suspend the requirement to be actively seeking work in order to qualify for unemployment insurance until day cares and schools have reopened 4.) Extend unemployment benefits to those employees who need to step back from work in order to provide care for their children.*

With a better understanding of the impact these closings have had on women and society as a whole; it is my hope that some of these policy recommendations might be adopted. In the future, these policies could then be put in place immediately in the event that something of this magnitude occurs and potentially mitigate the current effects we are seeing.

8.) Conclusion

This analysis has shown that this is a statistically significant positive impact on women's labor force participation and employment status. This shows us that having schools opened has provided a form of childcare to these women, allowing them to be present in the work force.

A great deal goes into a woman's decision to work or not, particularly if they have children to consider. This can explain why the effect seen in the model is so small. However, there is also a possibility that the effect will prove greater over time, i.e. women might not return to the labor force immediately upon schools re-opening. Research will have to be conducted further as more data becomes available in order to capture the full impact of the school re-openings on women in terms of work. Additional research which I hope to conduct in the future would look at the impact on single mothers and, if I am able to find the data, county level analysis.

It is important to recognize that this research is not relevant solely in the face of major economic shocks such as the current COVID-19 pandemic. Rather, this pandemic has highlighted how necessary childcare is to enable women's participation in the labor force. Public policy should reflect this need and demand for affordable and available childcare, be it in schools or daycares.

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Appendix:

SAS Code:

```
*Project Code*;

LIBNAME Covid "/home/u53699942/Research Project";

PROC IMPORT file="/home/u53699942/Research Project/cps_00005.csv"
	DBMS=CSV
	OUT=WORK.cps;
	GETNAMES=YES;
RUN;

proc import file="/home/u53699942/Research Project/2019 Data.xlsx"
	out=work.pre
	dbms=xlsx;
	getnames=yes;
run; quit;

proc import file="/home/u53699942/Research Project/2020 Data.xlsx"
	out=work.during
	dbms=xlsx;
	getnames=yes;
run; quit;

proc import file="/home/u53699942/Research Project/2021 Data.xlsx"
	out=work.post
	dbms=xlsx;
	getnames=yes;
run; quit;

proc sort data=work.cps;
by statefip month year;
run; quit;

Data work.cps;/*categorization of ind*/
set work.cps;
if year >=2020 and ind >=170 and ind<=490 then ind2=1;
else if year>=2020 and ind = 770 then ind2=2;
else if year >=2020 and ind >=1070 and ind <=3990 then ind2=3;
else if year >=2020 and ind >= 4070 and ind <=4590 then ind2=4;
else if year >=2020 and ind >= 4670 and ind <= 5790 then ind2=5;
else if year >=2020 and ind >= 6070 and ind <=6390 then ind2=6;
else if year >=2020 and ind >= 570 and ind <= 690 then ind2=6;
else if year >=2020 and ind >= 6470 and ind <=6780 then ind2=7;
else if year >=2020 and ind >= 6870 and ind <= 7190 then ind2=8;
else if year >=2020 and ind >=7270 and ind <= 7790 then ind2=9;
else if year >=2020 and ind >= 7860 and ind<= 8470 then ind2=10;
else if year >=2020 and ind >= 8561 and ind <= 8690 then ind2=11;
else if year >=2020 and ind >= 8770 and ind<=9290 then ind2=12;
else if year >=2020 and ind >=9370 and ind<=9590 then ind2=13;
else if year >=2020 then ind2=0;
If year<2020 and Ind>=170 and ind<=490 then ind2 =1;
```

```
else if year<2020 and Ind>=770 then ind2=2;
else if year<2020 and Ind>=1070 and ind<=3990 then ind2=3;
else if year<2020 and Ind>=4070 and ind<=4590 then ind2 =4;
else if year<2020 and Ind>=4670 and ind<=5790 then ind2=5;
else if year<2020 and Ind>=6070 and ind<=6390 then ind2=6;
else if year<2020 and Ind>=570 and ind<=690 then ind2 = 6;
else if year<2020 and Ind>=6470 and ind<=6780 then ind2=7;
else if year<2020 and Ind>=6870 and ind<=7190 then ind2=8;
else if year<2020 and Ind>=7270 and ind<=7790 then ind2=9;
else if year<2020 and Ind>=7860 and ind<=8470 then ind2 = 10;
else if year<2020 and ind >= 8560 and ind <= 8690 then ind2=11;
else if year<2020 and ind >= 8770 and ind<=9290 then ind2=12;
else if year<2020 and ind >=9370 and ind<=9590 then ind2=13;
else if year<2020 then ind2=0;
run; quit;

data work.cps;/*Occupation categorization*/
set work.cps;
if year>=2020 and occ=>10 and occ=<3270 then occ2=1;
else if year>=2020 and occ>=3300 and occ<=4655 then occ2=2;
else if year>=2020 and occ>=4700 and occ<=5940 then occ2=3;
else if year>=2020 and occ>=6005 and occ<=7640 then occ2=4;
else if year>=2020 and occ>=7700 and occ<=9840 then occ2=5;
else if year>=2020 then occ2=0;
if year<2020 and occ>=10 and occ<=3260 then occ2=1;
else if year<2020 and occ>=3300 and occ<=4650 then occ2=2;
else if year<2020 and occ>=4700 and occ<=5940 then occ2=3;
else if year<2020 and occ>=6005 and occ<=7630 then occ2=4;
else if year<2020 and occ>=7700 and occ<=9840 then occ2=5;
else if year<2020 then occ2=0;
run;quit;

proc sort data=work.pre;
by statefip month year;
run; quit;

proc sort data=work.during;
by statefip month year;
run; quit;

proc sort data=work.post;
by statefip month year;
run; quit;

data table_combine;
merge work.cps work.pre work.during work.post;
by statefip month year;
run; quit;

data table_combine2;
set table_combine;
where labforce ne 0;
laborforce_new=labforce-1;
female=sex-1;
where empstat ne 0 or empstat ne 1;
if empstat=10 or empstat=12 then empstat2=1;
```

```
else empstat2=0;
if (year=2020 and month>=3) or year>2020 then postcovid=1;
else postcovid=0;
schoolopenpostcovid=status*postcovid;
run; quit;

proc sort data=table_combine2;
by laborforce_new;
run;

proc sort data=table_combine2;
by year;
run;

*Equation 1*;
proc surveyreg data=table_combine2;
class statefip year month race marst age occ2 ind2;
*where female=1 and postcovid=1*/;
model laborforce_new = female female*schoolopenpostcovid female*status female*postcovid schoolopenpostcovid
      status postcovid nchild statefip year*month race marst age occ2 ind2 / solution adjrsq;
run;


*Equation 2*;
proc surveyreg data=table_combine2;
class statefip year month race marst age occ2 ind2;
*where female=1 and postcovid=1*/;
model empstat2 = female female*schoolopenpostcovid female*status female*postcovid schoolopenpostcovid status
      postcovid nchild statefip year*month race marst age occ2 ind2 / solution adjrsq;
run;

*Equation 6*;
proc surveyreg data=table_combine2;
class statefip year month race marst age occ2 ind2;
where age>=20 and age<=50;
where marst=1 or marst=2;
where nchild>0;
model laborforce_new = female female*schoolopenpostcovid female*status female*postcovid schoolopenpostcovid
      status postcovid nchild statefip year*month race marst age occ2 ind2 / solution adjrsq;
run;

*Equation 7*;
proc surveyreg data=table_combine2;
class statefip year month race marst age occ2 ind2;
where age>=20 and age<=50;
where marst=1 or marst=2;
where nchild>0;
*where female=1 and postcovid=1*/;
model empstat2 = female female*schoolopenpostcovid female*status female*postcovid schoolopenpostcovid status
      postcovid nchild statefip year*month race marst age occ2 ind2 / solution adjrsq;
run;

proc means data=table_combine2;
var age female nchild laborforce_new empstat2;
run; quit;
```

```
proc means data=table_combine2;
var age female nchild laborforce_new empstat2;
where nchild>0;
where age>=20 and age<=50;
where marst=1 or marst=2;
run; quit;
```