Childcare Needs and Parents' Labor Supply:
Evidence from the COVID-19 Lockdown

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Abstract

School closure during the COVID-19 outbreak could cause disruptions to parents' labor market decisions. We use data from a unique survey on 1,354 junior high school students and their parents from Shaanxi province, China, to address this question. We find that this temporary shock that increased the needs for family-provided childcare significantly reduced the probability of parents returning to work when workplaces were already reopened, but schools were still closed. We document inequality both within and across households due to parents' heterogeneous responses. Mothers, migrant workers, and children from low-income families are the most vulnerable group. Since parents needed to spend more time supervising their children when classes moved online, such additional childcare needs further increased parents' burden of school closure.

Keywords: COVID-19, Childcare, School Closure, Female Labor Force Participation, Online Education

JEL Classification: J13, J16, J22

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1. Introduction

Schools all over the world are forced to shut down in response to the COVID-19 outbreak. According to the United Nations estimation, 1.38 billion children could be out of school or childcare facilities (UN News 2020). Meanwhile, online education is widely adopted as an alternative way to continue learning and teaching. As schooling moves online, parents need to invest more time and effort into children's education in the absence of formal supervision by teachers and schools. Thus, school closure, combined with online, classes is expected to raise the needs for family-provided childcare, which could affect parents' labor supply, especially working mothers (Alon et al. 2020). The disproportional unemployment burden on working mothers due to childcare has also caught increasing public attention (Tai 2020; Cohen and Hsu 2020). This unprecedented temporary childcare demand shock may induce heterogeneous responses across and within households, which may eventually affect education and gender inequality that calls for policymakers' attention.

In this study, we use a unique survey data on junior high school students from Shaanxi Province, China, to identify the impacts of childcare shock due to the COVID-19 school lockdown on parents' labor supply. Empirically, we take advantage of the timing of the baseline and the follow-up surveys as well as workplace and school reopening to pin down the impacts. Specifically, there was a two-month gap between workplace reopening and school reopening in Shaanxi province. Such timing of policy implementation allows us to study parents' labor market decisions when the workplaces were already reopened, but the schools were still closed. Our baseline survey was conducted two months before the pandemic (Oct 2019), conveniently allowing us to benchmark parents' choices during the normal time. Then, we conducted the follow-up phone survey a week before school reopened (April 2020) to track students' and parents' behaviors during the pandemic. In the survey, we elicit exact reasons parents are not returning to work during the follow-up surveys so that we can specifically isolate the childcare needs induced changes in labor supply decisions.

We find that the increase in childcare needs during the COVID-19 lockdown lowers the probability of parents returning to work. To identify the increase in childcare needs on parents' labor supply, we compare parents of boarding students (students who live in schools during weekdays) with parents of non-boarding students. Because parents of boarding students need to invest relatively less time on childcare before the pandemic, they will experience a higher increase in childcare needs due to school closure. We find that overall, parents of boarding students are 9.3 percentage points less likely to return to work than parents of non-boarding students. Such difference is mostly driven by the increase in childcare demands: parents of boarding students are 6.2 percentage points less likely to return to work due to this additional childcare burden. In contrast, the probability of not returning to work due to reasons other than childcare is quite similar between parents of boarding and non-boarding students.

Further heterogenous analyses reveal significant inequality both within and across households in response to the shock in childcare needs. First, women are the primary carriers of the increase in the childcare burden. The

probability that mothers did not return to work due to childcare increases by 5.3 percentage points, while the probability of fathers only increases by 1.1 percentage points. Second, migrant workers who work outside of their home township are more severely affected. The probability that migrant mothers did not return to work due to childcare increases by 8.2 percentage points. Third, mothers from low-income families were more likely to return to work. This finding contradicts the opportunity cost hypothesis, which predicts that low-income mothers should be less likely to return to work. Instead, the income effect plays the dominant role here. Low-income families might have lower savings, and the family resources can be more limited during the pandemic. Therefore, these households might have to give up on childcare in exchange for earnings from the labor market, leaving their children potentially more vulnerable to the school shut down policy. Finally, the type of jobs also significantly affects parents' responses. Mothers working in the private sector or were self-employed are less likely to return to work due to the childcare burden. In contrast, mothers employed in the government were relatively unaffected.

Our study also documents the switching of childcare burden from teachers and schools to the parents due to online education. Online education is widely considered as an effective, if not the only way to continue teaching and learning during the school lockdown period. However, online classes with homeschooling fundamentally shift the burden of supervision from teachers to the families, which might be unexpected and disruptive for many parents. Indeed, we find that compared to parents of non-boarding students, parents of boarding students spent around an additional 36 minutes per day (40 percent) on supervising students' learning during the pandemic. If we believe parents' supervision is complementary in the education production function, then such additional time investment could have positive impacts on students' learning outcomes. We also find that parents of boarding students, who experience a higher increase in the demands for childcare and are more likely to reduce labor supply, hold more negative opinions towards online education. These parents are especially concerned that online education requires more parents' time input in supporting or supervising students. Our findings suggest that the wide adoption of online schooling or other educational policies that call for higher family inputs may have unequal and sometimes significant social costs on parents and students, potentially exacerbating gender and income-based inequality.

Our study contributes to several strands of literature. First, we contribute to the fast-growing analysis of the impacts of COVID-19 on the labor market and provide one of the first empirical evidence linking childcare and labor market decisions. Montenovo et al. (2020) examine the latest Current Population Survey and find that there is a more significant increase in unemployment among women and those with larger families compared to the previous month. Occupation sorting could only explain less than a quarter of such a pattern. Our findings suggest that supply-side responses due to school closure and increased childcare demand is a critical element. Similarly, using US employment statistics, Alon et al. (2020) documents that compare to typical job loss during recessions, sectors with higher female employment share see a larger drop due to the social distance measuring. The authors then speculate that the division of labor within households combined with the closure of daycare centers and school implies working mothers could be impacted by the crisis disproportionally. Comparing to existing literature, we provide direct empirical evidence on how the increase in childcare needs lowers the labor supply of working mothers in the

short run when facing a contingent crisis. Also, adding to the discussion that school closure and online schooling might exacerbate income-based inequality (e.g., Burgess and Sievertsen 2020; Lancker and Parolin 2020), we provide concrete empirical support highlighting that children from families with lower income are more likely to experience a disruption in learning as their parents are less likely to invest additional time to supervise their children's online learning process.

Our study also contributes to the literature on childcare supports and female labor force participation. Previous studies show that extending school hours (Padilla-Romo and Cabrera-Hernández 2019), providing free or subsidized after school care (Berlinski and Galiani 2007; Barros et al. 2013; Martínez A. and Perticará 2017) and daycare (Clark et al. 2019; Hojman and López Bóo 2019) all lead to a sizable increase in mothers' labor force participation. On the other hand, losing supports from family members on childcare could often lead to a subsequent decline in employment (Talamas 2020). We make progress on two different fronts. First, previous studies mainly evaluate policies and programs that expand the public provision of childcare services during the normal time. Such policy changes have long-lasting consequences on the needs of childcare, which may induce lasting changes in the division of labor within the family.

In contrast, the COVID-19 pandemic provides a unique opportunity that allows us to examine how households respond to a short-run temporary shock changing the needs for childcare. In the short-run, families tend to rely more on the existing division of labor to mitigate the shocks. Whether the effects will be the same as in the long-run is an empirical question. Second, studies aforementioned predominantly focus on preschool or primary school children who require relatively intensive care. The idea that only young children will affect parents' labor supply is also reflected in a recent simulation study, which assumes that only children aged 3-12 years affect their parents (Bayham and Fenichel 2020). Our analysis, however, suggests that the binding constraint for mothers even extends beyond primary education level during the COVID-19 lockdown. Thus, simulations based only on young children will significantly underestimate the overall impacts. We provide evidence to suggest that the broader impacts of childcare needs during the COVID-19 lockdown are partially due to switching to online education, where parents need to invest more time supervising the learning process of the students.

The differential responses on fathers' and mothers' labor supply suggest gendered decision-making processing within the households during the crisis. There is already mounting evidence showing that households are not unitary decision-makers, and many intra-household resource allocations are affected by gender-specific preference (e.g., Duflo 2000). It is also well-documented that females are more likely to invest in children's education (e.g., Thomas 1993; Qian 2008; Bobonis 2009) than males. We contribute to this line of research with evidence showing that during the crisis, when the households are more likely to be under resource constraints, females are more likely to forgo potential income to fulfill childcare needs. The fact that mothers are more likely to postpone returning to work

regardless of how much contribution they make to total family income suggests that preferences or norms, rather than efficiency is the primary consideration[4].

The rest of the paper is organized as follows. In section 2 we discuss sampling, data collection, and policy background. Section 3 presents the main empirical results, including heterogeneous analyses and parents' opinions toward online education, and in section 4 we conclude and make policy suggestions.

2. Surveys and data collection

We conducted two rounds of surveys in 70 junior high schools in Shaanxi Province, China. The baseline survey took place in October 2019 at the beginning of the fall semester, two months before the pandemic outbreak. The second round of the survey was a follow-up phone survey among a subset of students surveyed in April 2020This phone survey was conducted two months after the adoption of online schooling and about two weeks before students could physically return to school. The study sample was collected in Shaanxi, an inland and relatively rural province with a sizable population of migrant workers and left-behind children. In 2019, Shaanxi ranked 14th in terms of GDP per capita among the 31 provinces in mainland China (National Bureau of Statistics, 2019)[5].

In the baseline, we surveyed a total of 6,928 Grade 7 and 8 junior high school students, sampled from 70 schools in Shaanxi Province during the 2019–2020 academic year. We followed three steps to select our students' sample. First, the provincial Bureau of Education provided a list of 192 junior high schools across all ten prefectures in Shaanxi. Second, we selected schools from the list according to a pre-determined sampling standard[6], which was designed to study English learning in Shaanxi province. As a result, 70 out of the 192 schools met the standard and all of them were included in our sample. These 70 schools include 20 city schools, 28 county schools, and 22 township schools. The geographical distribution of the schools is presented in Figure 1. Third, in each school, we randomly chose two classes taught by different English teachers in each grade. Then, we randomly sampled 25 students from each class. We included all students in the sample if the class size is smaller than 25.

2.1 Data Collection

In the baseline survey, the enumeration team visited each sample school and conducted a student survey in-person. The survey elicits basic information about the students and their parents and includes a standardized English test. Student's basic information includes measures of the student's age, gender, whether the student is boarding at school, whether the student's home has access to the internet, whether the student is a class leader, which family

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[44] In our empirical analysis, we find that the relative income level of mothers and fathers does not affect mothers' labor market decisions (Table 6).

[5] Shaanxi's average annual per capita net income was 22,528 RMB (approximately 3176 USD; Shaanxi Bureau of Statistics, 2019), slightly below the average national at 28,228 RMB (National Bureau of Statistics, 2019).

[6] The purpose of the baseline survey is to study students' English learning in junior high schools in Shaanxi province. In order to get enough students and English teachers in our sample. We set our selection criteria as 1) at least two classes per grade, and 2) at least one English teacher per grade.

member supervises student's learning, and students' self-efficacy[7]. We also asked the students about their parents, collecting information on parents' age, education level, job types, working location and monthly income. Finally, we collected contact information for both the students and their parents for subsequent tracing. Descriptive statistics of these demographic and socioeconomic indicators are in Table 1. The English test is a 40-minute standardized test to compare student academic performance across schools.[8] In addition to the English test score, we also collected students' math, Chinese and English test scores from exams organized by their schools from the previous semester. We standardize all reported test scores by school-grade.

In the follow-up phone survey, we mainly collected information related to the response of students and their parents to the COVID-19 pandemic and online education. Due to resource constraints, we selected 20 percent of students and their parents from our baseline sample. We use a stratified sampling method to choose our call survey sample. First, we divided students from the same grade in a school into eight groups based on their gender, median family income, and median English test score. Then, we assigned a target number of call surveys that need to be completed for each group to make sure that the call survey sample is representative of the baseline survey sample along the dimensions of gender, family income, and test scores. Finally, we randomly sorted the order of students in each group. When the survey began, the enumeration team made phone calls to students and their parents according to the order in each group. If a survey was turned down or unable to be finished, enumerators were asked to turn to the next candidate student within the same group until the target number of completed surveys assigned to the group was reached.

We successfully finished call interviews with 1,354 students and their parents. The phone call survey collected detailed information on students' performance in online classes, parents' opinions on online education, parents' working status at the time of the survey, and the reasons that parents did not go back to work.

2.2 COVID-19 Policy

Like most of the provinces in China other than Hubei, Shaanxi province was not severely hit by the COVID-19 pandemic epidemiologically. The cumulative number of confirmed infected cases was 308, with only three deaths as for May 20th (National Health Commission of the People's Republic of China 2020). As shown in Figure 2, the number of new cases due to local transmission reached zero since February 12th, 2020(Caixin 2020). Despite the low number of confirmed cases, Shaanxi followed the guidelines by the Chinese central government and implemented strict lockdown policies to prevent the virus from spreading.

Figure 2 shows the timeline of events in Shaanxi province. The Spring Festival holiday was extended such that students would not return to school, and parents would not go back to work. On February 10th, when the daily newly

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[7] We adopted the General Self-Efficacy Scale (GSE) to measure self-efficacy (Jerusalem and Schwarzer 1992).
[8] Two versions of English tests with the same difficulty level were randomly assigned to students with each class. Our enumeration team strictly enforced time limits and proctored the examinations.

confirmed cases of infection fell steadily, the Shaanxi government decided to reopen the economy and gradually allowed people to go back to work. At the same time, students started their new semester with online learning. However, the local government was very cautious in their decisions to reopen schools physically. It was not until April 13th, nearly two months after the elimination of local transmission, that schools were reopened. Therefore, at the time of our phone call survey (from March 24th to April 13th), most workplaces were already reopened, but the schools were still closed. The timing difference between reopening the workplace and reopening the school makes it possible for us to identify the impacts of school closure on parents' labor supply.

Figure 3 shows the working status of parents in our sample. The working status is categorized into four groups: "Had a job before the pandemic and was back to work," "Had a job before the pandemic, but was not back to work", "Not working before and after the pandemic" and "Always working before and after the pandemic." For the empirical analysis, we focus on parents whose jobs might be disrupted by the COVID shock. Hence, we exclude those who have never worked or have always been working throughout and only examine the first two groups. Overall, mothers were significantly less likely to return to work than fathers.

We present the reasons that parents did not go back to work in Figure 4. We collect the reasons why parents did not go back to work using a multiple-choice question[9] with the following options: "Childcare", "Worry about the infection", "Cannot find a job", "Not allowed". We exclude the respondents from the analytic sample if they are not able to return to work due to government regulations (i.e., choosing "Not allowed"), since in this case, respondents are not facing a meaningful choice in terms of labor supply. Our final sample consists of 756 students and their parents. As shown in Figure 4, we find significant gender differences in the reasons for not going back to work. Women dominantly choose childcare, while men seem to be more worried about the infection. Surprisingly, not being able to find a job seems not to be the primary concern for both men and women.

We use boarding to capture the differentiated impacts of school shut down on childcare demand and identify the effects of a short-run increase in childcare demand on parents' labor supply. 42 out of the 70 schools (60 percent) in the sample offer boarding services. The share of boarding students among all students for each school varies greatly, but only one school exclusively recruits boarding students. Table 1 shows that in our sample, pooling across schools, around 25 percent of students are boarding. These students usually live at schools during the weekdays and return to their homes on weekends. Thus, compared to families with non-boarding students, a school closure will induce a higher increase in the demand for childcare among families with boarding students.

Table 2 shows the differences in family characteristics between boarding and non-boarding students. Overall, a boarding student is 5.7 percentage points more likely to have a non-working parent due to childcare during the school closure period. Such an effect is more substantial on mothers than on fathers. Reassuringly, there is no

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[9] Multiple answers can be selected for this question. Our measure captures any mention of the following reasons by the parents.

difference between boarding and non-boarding families' labor supply decisions due to reasons other than childcare. Compared to non-boarding students, boarding students are less likely to have internet access at home; their parents tend to be less educated and earn a lower income. These patterns suggest that boarding students are more likely to be from disadvantaged families and could face more challenges when schools switch to online education.

3 Empirical Results

3.1 Empirical models

We use the following empirical model to estimate the effects of a short-run increase in childcare demand on parents' labor supply:

$$W^k_{i,after_{childcare}} = \beta_0 + \beta_1 Boarding_i + X_i\beta + \varepsilon_i \quad (1)$$

where i stands for each family, k stands for either parent. We estimate equation (1) separately for either parent, father only, and mother only. The dependent variable is a dummy variable indicating whether a parent, who had been working before the lockdown, did not go back to work at the time of the survey due to childcare. We exclude parents who had not been working before the lockdown from the main sample. For the simplicity of interpreting the results, we mainly use linear probability models. In appendix I, we also show that estimation results from logit and probit models are consistent with the linear probability models.

The key independent variable $boarding_i$ is a dummy variable indicating whether the student was boarding before the lockdown. We use boarding to approximate the changes in the need for additional childcare during the school lockdown period instead of estimating the causal effect of boarding[10]. Since boarding students induce a higher increase in the demand for childcare after the school closure, we expect the coefficient β_1 to be positive, indicating that higher demand for childcare will induce parents to make more adjustments, hence increase the chance that parents did not go back to work. X_i is a set of control variables, including broadband internet access at home, student's gender, test scores before the lockdown, parents' characteristics (age, education, income before lockdown), and the location of the school (city, county or township schools)

As placebo tests, we also estimate the effects of an increase in childcare demand on the chance that parents' did not go back to work due to the reasons other than childcare:

$$W^k_{i,after_{no\ job}} = \beta_0 + \beta_1 Boarding_i + X_i\beta + \varepsilon_i \quad (2)$$

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[10] The families can choose boarding for various unobservable reasons. For example, parents can send students to boarding schools because the grandparents are not able to help take care of the children. We argue that for whatever reasons that children are sent to boarding schools, the parents always face a larger increase in the demand for childcare when the school is shutdown. Therefore, the boarding status of children can help us to identify the effects of an increase in childcare demand on parents' labor market decisions.

$$W^k_{i,after_{worry\ about\ infection}} = \beta_0 + \beta_1 Boarding_i + X_i\beta + \varepsilon_i \quad (3)$$

Specifically, we consider two other reasons that are widely mentioned by parents in the survey: "can't find a job" and "worry about being infected by COVID-19". We expect β_1s estimated using equation (2) and (3) to be statistically insignificant, indicating that boarding students affect parents' labor supply only through childcare, instead of other channels.

3.2 Main Results

Table 3 shows that parents, especially mothers, are less likely to go back to work when childcare demand increased due to school closure. Table 3 shows the estimation results of equation (1). Column (1) uses whether either parent did not go back to work due to childcare as the dependent variable. We find that boarding students increase the probability that at least one parent did not go back to work due to childcare by 6.2 percentage points, and the effect is statistically significant. Given that the proportion of parents who did not go back to work is around 17 percent, the magnitude of the effect is also economically important. Column (2) and (3) separately estimate the effects by fathers or mothers. We find that mothers mainly drive the result. Boarding students increase the probability that mothers did not go back to work due to childcare by 5.3 percentage points, indicating that mothers are primarily responsible for childcare when the demand for childcare abruptly increased due to school shut down. The results using logit and probit models are in Table A1, which has similar results as Table 3.

Table 4 studies the different impacts of childcare demand increase on local workers and migrant workers. We expect to find more significant effects on migrant workers because it is difficult for migrant workers to take care of their children if they are working outside of their home township. We use the migration status of parents before the lockdown to categorize parents into "Local workers," "Work outside of the home township," and "Work outside of the home county." The estimation results for the three groups of fathers or mothers are shown in columns (1), (2), and (3) of Table 4. We find that the impacts on migrant mothers are substantial. Boarding students increase the chance that migrant mothers did not go back to work by around 6 to 7 percentage points. The effects on fathers are still small and statistically insignificant, indicating that even migrant fathers are less likely to be affected by the increase in family childcare demand.

In Table 5, we conduct placebo tests by studying the effects of boarding on the chance that parents did not go back to work due to the reasons other than childcare. Columns (2) and (3) show that boarding students do not affect the probability that parents did not go back to work due to not being able to find a job or worrying about virus infection. The magnitude of the coefficients is also small and close to zero. This finding indicates that the effects of boarding on parents' labor supply are unlikely to be driven by other unobservable characteristics except for the demand for childcare.

3.3 Heterogenous Analyses

In addition to gender inequality within the family, other family and student characteristics also yield different responses to the increase in childcare demand, which can generate more inequality across families. In this subsection, we address this question by studying the heterogeneous effects of student boarding before the pandemic on parents' labor supply. We use the following empirical model to estimate heterogeneous effects:

$$W^k_{i,after_{childcare}} = \beta_0 + \beta_1 Boarding_i + \beta_2 C_i * Boarding + X_i\beta + \varepsilon_i \quad (4)$$

where C_i is a specific family characteristic, β_2 measures how a family with characteristic C_i responds differently to the increase in childcare demand measured by boarding.

First, we analyze the heterogeneous impacts of parents' income levels. Theoretically, the sign of β_2 for family income is ambiguous. On the one hand, higher income may imply a higher opportunity cost of childcare. Therefore, high-income mothers will be more likely to return to work, and coefficient β_2 will be negative. On the other hand, during the COVID-19 lockdown, low-income families may not have enough resources to maintain the basic consumption needs of the household because income is also a proxy for wealth and saving. As a result, low-income parents are more likely to return to work and the coefficient β_2 will be positive. Our estimation results are consistent with the second story. Columns (2) and (3) of Table 6 shows the estimation results by interacting boarding with whether family income is larger than the median, and boarding with whether the mother's income is larger than the median. In both specifications, we find that high-income mothers are less likely to return to work when there is an increase in childcare demand. As a result, children from low-income families received relatively less care and supervision from their parents, which may lead to exacerbating inequality in the efficacy of education when schools are closed. In addition, we also explore whether the increase in the needs for childcare changes the division of labor between fathers and mothers within the family. Column (4) of Table 6 shows the estimation results by interacting boarding with the ratio of mothers' income over fathers' income. Yet, we did not find statistically significant results.

Second, we study the heterogeneous effects on labor supply as the mother's job type varies. The potential for remote working differs significantly across jobs (Dingel and Neiman 2020). Therefore, the cost of going back to work vary by mothers' occupation. Column (1) of Table 7 shows that compared with the baseline group (mothers' holding government jobs), mothers working in firms or the agricultural sector and those who are self-employed are less likely to return to work when there is an increase in childcare demand. Compared to other jobs, government jobs consist of more office work and can be covert more easily online. On the other hand, many mothers working in the private sectors are in the service industry, which requires more intense personal interactions and are less remotely communicable. The occupation type creates additional inequality even among women when they respond to a temporary but significant increase in childcare demand.

Third, following the literature on family structure and female labor supply (Sasaki 2002; Maurer-Fazio et al. 2011), we study whether the presence of other family members can help to reduce the childcare burden of mothers. In the

baseline survey, we asked about which family member mainly oversaw the learning process of the student before the lockdown. We interact the dummy variable of the family member with boarding, and the results are shown in Column (2) of Table 7. We find that the help of grandmothers can significantly reduce the probability that the mother did not go back to work. The effects of other family members are statistically insignificant, indicating that the grandmother is the only viable substitute for mother in childcare provision.

Finally, we study how students' characteristics affect parents' labor supply. Since online education requires students to exhibit a higher level of self-control, we expect to see that students with better cognitive and non-cognitive skills may increase parents' labor supply during the school shut down period. We use students' test scores to measure cognitive skills. In the baseline survey, students reported their test scores from the final exams of the last semester. We standardize students' test scores at the school and grade level. To measure non-cognitive skills, we adopt a self-efficacy measure and a dummy variable indicating whether the student holds leadership positions in the class. The results are shown in Columns (3), (4), and (5) of Table 7. We find that students' non-cognitive skills reduce the probability that parents did not go back to work. However, we do not have the statistical power to identify a significant effect.

In all, our heterogenous analyses identify additional inequality across families, especially along the dimensions of income and occupation types when the demand for childcare increased due to the school shut down.

3.4 Online Education, Parents' supervision and Parents' Opinions

Remote education is widely considered as an effective, if not the only way to continue teaching and learning during the school shut down period. However, online learning also brings negative side-effects, which can reduce the efficacy of teaching. In an online course, teachers will not be able to monitor students as carefully as in an onsite course. Therefore, parents and other family members will have to step in and invest more time and effort into overseeing the learning process, especially when students lack self-control. Thus, remote education partially requires families, instead of schools to provide more educational inputs, which may not be desirable or sometimes feasible for all parents.

Table 8 documents that compared with parents of non-boarding students before the lockdown, parents of boarding students spent more additional time on supervising the learning process of children. We asked about the time family members spent overseeing the learning process of the children in both the baseline and the phone call surveys. We use the increases of this variable before and after the pandemic as the dependent variable (After - Before) and estimate equation (1). Column (1) shows that the time spent by parents of boarding students on supervision increased by 36.14 minutes per day (40 percent) more than parents of non-boarding students during the pandemic. The effect is statistically significant at the 1 percent level. This finding implies that one possible reason that parents of boarding students did not go back to work is to help children with their studies during the online course period. We further explore the heterogeneous effects on parents' supervision and find that parents from more wealthy and

better educated families, or parents of students with higher test scores, are more likely to increase time spent on supervision. However, we do not have enough statistical power to identify significant effects.

Then, we analyze how parents' opinions on online education are shaped by their experience during the COVID-19 lockdown period. Following our previous analysis, we study parents whose work is more adversely affected by the increase in childcare demand and analyze whether their opinion towards online education will also become more negative. In the survey, we asked whether the parents were willing to accept any form of online education in the future. If they answered "No," we asked about possible negative aspects of online education that they did not like. We categorize the negative aspects of online education into three groups. First, parents may complain that online education requires more parents' support or supervision. Second, families may not have a good environment for learning and the appropriate equipment. Third, the communication quality between teachers and students may not be satisfactory.

We regress the negative aspects of online education in parents' opinions on the boarding dummy variable. The results in Table 8 show how parents' opinions are affected when their work is disrupted by the increase in childcare demand due to schools switching to online education. We find that parents of boarding students are more likely to complain about the increased demand for parental support when online education is adopted. They are more likely to insist that they have no time to support the student and no time to help students with their homework. They are also more concerned that their children may become addicted to the internet. In terms of learning environment, equipment, and the quality of communication, there is no significant difference between parents of boarding students and parents of non-boarding students.

In all, we find that parents whose work is disrupted by the increase in the demand for childcare hold more negative opinions towards online education. Probably due to the relatively higher opportunity cost, they are more concerned that online education may require more time inputs from the parents. The successful implementation of online education programs requires the corporation between schools and families. Our findings indicate that online education may have a side-effect to increase the burden of childcare in numerous families, which should not be neglected by policymakers.

4. Conclusions and Policy Suggestions

Using a unique survey dataset on junior high school students and their parents, we find that the increase in childcare demand due to COVID-19 school closure significantly disrupted the labor supply of parents, especially mothers.

Two major takeaways of our findings point to novel policy implications. First, we find significant inequality across families, especially along the dimensions of income and occupation types. We show that children from families with lower income levels are less likely to receive enough childcare. Also, the working status of mothers from the private sector or self-employed is more likely to be disrupted by school closure. These findings suggest the need to design

policies that specifically target the disadvantaged groups to mitigate the disruptions due to the epidemic in order to avoid further worsening inequality.

Second, we find that parents' supervision on students' learning process even beyond the primary school level is an important component of childcare that can affect parents' labor market decisions during the pandemic. The massive scale of remote education partially requires families, instead of schools to provide more educational inputs, which may not be desirable or sometimes feasible for all parents. Typical policies tend to focus on providing adequate infrastructure such as internet access to limit the disruption among disadvantaged households. Our results suggest that parents' time inputs could also be a critical component. If we want to maintain the quality and equality of education, those families who could not provide enough time inputs need additional care from policymakers. In addition, our findings imply that the impacts of childcare on parents' labor supply during the COVID-19 period are not only restricted to young children (below 12) but extend to most school-aged children. The overall effects on parents' labor supply may be larger than previously expected. Such consideration could be critical components to evaluate the impacts of education policy on households' labor supply decisions even beyond the pandemic period.

References

Alon T, Doepke M, Olmstead-Rumsey J, Tertilt M (2020) The Impact of COVID-19 on Gender Equality. National Bureau of Economic Research, Cambridge, MA

Barros P de B, Olinto P, Lunde T, Caralho M (2013) The Impact of Access to Free Childcare on Women's Labor Market Outcomes: Evidence from a Randomized Trial in Low-income Neighborhoods of Rio de Janeiro.pdf. World Bank Economists' Forum

Bayham J, Fenichel EP (2020) Impact of school closures for COVID-19 on the US health-care workforce and net mortality: a modelling study. The Lancet Public Health 5:e271–e278. https://doi.org/10/ggrdg7

Berlinski S, Galiani S (2007) The effect of a large expansion of pre-primary school facilities on preschool attendance and maternal employment. Labour Economics 14:665–680. https://doi.org/10/dvgtxb

Bobonis GJ (2009) Is the Allocation of Resources within the Household Efficient? New Evidence from a Randomized Experiment. Journal of Political Economy 117:453–503. https://doi.org/10/frmhff

Burgess S, Sievertsen HH (2020) Schools, skills, and learning: The impact of COVID-19 on education. In: VoxEU.org. https://voxeu.org/article/impact-covid-19-education. Accessed 23 May 2020

Caixin (2020) Real-time dynamics of confirmed cases of COVID-19. https://datanews.caixin.com/interactive/2020/pneumonia-h5/#live-data. Accessed 18 Jun 2020

Clark S, Kabiru CW, Laszlo S, Muthuri S (2019) The Impact of Childcare on Poor Urban Women's Economic Empowerment in Africa. Demography 56:1247–1272. https://doi.org/10/ggbxx4

Cohen P, Hsu T (2020) Pandemic Could Scar a Generation of Working Mothers. The New York Times

Dingel JI, Neiman B (2020) How Many Jobs Can be Done at Home? National Bureau of Economic Research

Duflo E (2000) Child Health and Household Resources in South Africa: Evidence from the Old Age Pension Program. American Economic Review 90:393–398. https://doi.org/10/b6pxh5

Hojman A, López Bóo F (2019) Cost-Effective Public Daycare in a Low-Income Economy Benefits Children and Mothers. Social Science Research Network, Rochester, NY

Jerusalem M, Schwarzer R (1992) Self-Efficacy: Thought Control Of Action. Taylor & Francis

Lancker WV, Parolin Z (2020) COVID-19, school closures, and child poverty: a social crisis in the making. The Lancet Public Health 5:e243–e244. https://doi.org/10.1016/S2468-2667(20)30084-0

Martínez A. C, Perticará M (2017) Childcare effects on maternal employment: Evidence from Chile. Journal of Development Economics 126:127–137. https://doi.org/10/ggwzqr

Maurer-Fazio M, Connelly R, Chen L, Tang L (2011) Childcare, Eldercare, and Labor Force Participation of Married Women in Urban China, 1982–2000. J Human Resources 46:261–294. https://doi.org/10/ggwzqv

National Health Commission of the People's Republic of China (2020) Behind the zero growth in Shaanxi: the first zero growth of confirmed cases of COVID-19 in Shaanxi Province. http://www.nhc.gov.cn/xcs/fkdt/202002/97dc714e6b5546699c72946b883334ee.shtml. Accessed 18 Jun 2020

Padilla-Romo M, Cabrera-Hernández F (2019) Easing the Constraints of Motherhood: The Effects of All-Day Schools on Mothers' Labor Supply. Economic Inquiry 57:890–909. https://doi.org/10/ggwzm4

Qian N (2008) Missing Women and the Price of Tea in China: The Effect of Sex-Specific Earnings on Sex Imbalance. Q J Econ 123:1251–1285. https://doi.org/10/fw4sxp

Sasaki M (2002) The Causal Effect of Family Structure on Labor Force Participation among Japanese Married Women. The Journal of Human Resources 37:429. https://doi.org/10/ck2sw6

Tai C (2020) Why More Women Have Lost Jobs During the Pandemic. The Wallstreet Joutnal

Talamas M (2020) Grandmothers and the Gender Gap in the Mexican Labor Market. 48

Thomas D (1993) The Distribution of Income and Expenditure within the Household. Annales d'Économie et de Statistique 109–135. https://doi.org/10/ggwzqt

UN News (2020) How can schools open up again safely? The UN has some new guidelines. In: UN News. https://news.un.org/en/story/2020/04/1062902. Accessed 18 Jun 2020

Table 1 Summary Statistics

	Mean	Standard Deviation	Min	Max	N
Not Back to Work Reason: Childcare					
Either Parent	0.073	0.260	0	1	756
Father	0.007	0.083	0	1	722
Mother	0.087	0.283	0	1	584
Not Back to Work Reason: No Job					
Either Parent	0.011	0.102	0	1	756
Father	0.006	0.074	0	1	722
Mother	0.009	0.092	0	1	584
Not Back to Work Reason: Worry About Infection					
Either Parent	0.082	0.274	0	1	756
Father	0.053	0.223	0	1	722
Mother	0.058	0.234	0	1	584
Students' Characteristics					
Boarding Before Lockdown	0.251	0.434	0	1	756
Male	0.530	0.499	0	1	756
Grade Eight	0.505	0.500	0	1	756
Has Access to the Internet	0.836	0.371	0	1	756
Test Score Before Lockdown	0.903	0.929	-3.303	2.399	756
Parents' Characteristics					
Father Age	41.855	4.801	30	67	756
Mother Age	39.560	4.666	30	56	756
Father Education	10.019	3.784	0	19	756
Mother Education	9.537	4.164	0	19	756
Father Income	4404.152	3681.816	0	25000	756
Mother Income	2973.884	2521.047	0	15000	756
Father Migrant	0.603	0.490	0	1	756
Mother Migrant	0.429	0.495	0	1	756
Increase in time for supervising students	90.586	147.322	-445	600	756
Grandparents taking care	0.033	0.179	0	1	756
Schools' Characteristics					
County Schools	0.388	0.488	0	1	756
Township Schools	0.280	0.450	0	1	756

Table 2 Comparison between Boarding and Non-Boarding Students

	N	(1) Non-Boarding Mean/SE	N	(2) Boarding Mean/SE	T-test Difference (1)-(2)
Either Parent Not Back to Work	566	0.217 [0.017]	190	0.311 [0.034]	-0.093***
Not Back to Work Reason: Childcare					
Either Parent	566	0.058 [0.010]	190	0.116 [0.023]	-0.057***
Father	536	0.004 [0.003]	186	0.016 [0.009]	-0.012*
Mother	433	0.074 [0.013]	151	0.126 [0.027]	-0.052*
Not Back to Work Reason: No Job					
Either Parent	566	0.009 [0.004]	190	0.016 [0.009]	-0.007
Father	536	0.004 [0.003]	186	0.011 [0.008]	-0.007
Mother	433	0.007 [0.004]	151	0.013 [0.009]	-0.006
Not Back to Work Reason: Worry About Infection					
Either Parent	566	0.081 [0.011]	190	0.084 [0.020]	-0.003
Father	536	0.050 [0.009]	186	0.059 [0.017]	-0.009
Mother	433	0.060 [0.011]	151	0.053 [0.018]	0.007
Students' Characteristics					
Male	566	0.534 [0.021]	190	0.521 [0.036]	0.013
Grade Eight	566	0.489 [0.021]	190	0.553 [0.036]	-0.063
Has Access to the Internet	566	0.855 [0.015]	190	0.779 [0.030]	0.076**
Test Score Before Lockdown	566	0.086 [0.040]	190	0.104 [0.061]	-0.018
Parents' Characteristics					
Father Age	566	41.708 [0.195]	190	42.289 [0.380]	-0.581
Mother Age	566	39.443 [0.184]	190	39.905 [0.395]	-0.462
Father Education	566	10.548 [0.153]	190	8.442 [0.274]	2.106***

Mother Education	566	10.231 [0.166]	190	7.468 [0.300]	2.763***
Father Income	566	4723.452 [164.312]	190	3452.974 [195.409]	1270.479***
Mother Income	566	3211.175 [105.532]	190	2267.005 [175.832]	944.170***
Father Migrant	566	0.618 [0.020]	190	0.558 [0.036]	0.060
Mother Migrant	566	0.443 [0.021]	190	0.384 [0.035]	0.059
Increase in time for supervising students	566	80.580 [6.249]	190	120.395 [10.111]	-39.815***
Grandparents taking care	566	0.032 [0.007]	190	0.037 [0.014]	-0.005
Schools' Characteristics					
County Schools	566	0.438 [0.021]	190	0.237 [0.031]	0.201***
Township Schools	566	0.201 [0.017]	190	0.516 [0.036]	-0.314***

Notes: This table shows the comparison between boarding and non-boarding students. *,**,*** indicates statistical significance at 10 percent, 5 percent, and 1 percent level.

Table 3 Boarding on Parents' Labor Supply

Dependent Variable: Not Back to Work - Childcare	(1) Either Parent	(2) Father	(3) Mother
Boarding Before Lockdown	0.063**	0.012	0.055*
	(0.027)	(0.010)	(0.031)
Male	-0.002	-0.004	0.002
	(0.018)	(0.006)	(0.023)
Has Access to the Internet	0.009	-0.010	-0.007
	(0.026)	(0.011)	(0.036)
Test Score Before Lockdown	0.000	0.003	-0.002
	(0.011)	(0.002)	(0.014)
Father Age	0.002	-0.001	0.003
	(0.004)	(0.001)	(0.004)
Mother Age	0.001	0.001	0.001
	(0.004)	(0.001)	(0.005)
Father Education	0.001	-0.000	0.001
	(0.003)	(0.001)	(0.004)
Mother Education	-0.001	-0.000	-0.001
	(0.003)	(0.001)	(0.004)
Father Income	0.001	0.001	0.004
	(0.005)	(0.001)	(0.006)
Mother Income	0.000	-0.000	-0.003
	(0.004)	(0.002)	(0.005)
Grade Eight	-0.007	0.002	-0.003
	(0.019)	(0.006)	(0.024)
County School	-0.044*	-0.001	-0.041
	(0.023)	(0.007)	(0.028)
Rural School	-0.048*	-0.009	-0.058*
	(0.029)	(0.011)	(0.034)
Grandparents taking care	0.060	-0.006	0.088
	(0.066)	(0.004)	(0.086)
R-Square	0.019	0.013	0.023
N	756	722	584

Notes: This table shows the effects of school shut down on parents' labor supply by comparing boarding students with day students. The dependent variable is a dummy variable indicating whether either parent did not go back to Work due to childcare at the time of the survey. The independent variable is a dummy variable indicating whether the child was boarding or not before the lockdown. Robust standard errors are in parenthesis. *,**,*** indicates statistical significance at 10 percent, 5 percent, and 1 percent level.

Table 4 Boarding on Parents' Labor Supply by Migration Status

	Local Workers	Work Outside of Home Township	Work Outside of Home County
Dependent Variable: Not Back to Work - Childcare			
Panel A Either Parent			
	(1)	(2)	(3)
Boarding Before Lockdown	-0.007	0.100***	0.115***
	(0.041)	(0.036)	(0.044)
N	261	495	341
Panel B Father			
	(4)	(5)	(6)
Boarding Before Lockdown	0.004	0.021	0.018
	(0.013)	(0.015)	(0.018)
N	290	432	292
Panel C Mother			
	(7)	(8)	(9)
Boarding Before Lockdown	0.038	0.067	0.056
	(0.043)	(0.046)	(0.052)
N	330	254	137

Notes: This table shows the effects of school shut down on parents' labor supply by parents' migration status. Same control variables are used here as in Table 3. Robust standard errors are in parenthesis. *,**,*** indicates statistical significance at 10 percent, 5 percent, and 1 percent level.

Table 5 Different Reasons for Not Working

	Childcare	No Job	Worry About Infection
Dependent Variable: Reasons for Not Back to Work			
Panel A Either Parent			
	(1)	(2)	(3)
Boarding Before Lockdown	0.063**	0.006	-0.004
	(0.027)	(0.010)	(0.024)
N	756	756	756
Panel B Father			
	(4)	(5)	(6)
Boarding Before Lockdown	0.012	0.005	-0.002
	(0.010)	(0.007)	(0.021)
N	722	722	722
Panel C Mother			
	(7)	(8)	(9)
Boarding Before Lockdown	0.055*	0.006	-0.011
	(0.031)	(0.012)	(0.022)
N	584	584	584

Notes: This table shows the effects of school shut down on parents' labor supply by different reasons for not going back to work. Columns (1), (4), and (7) estimate the effects on parents who did not go back to work due to childcare. Columns (2), (5), and (8) estimate the effects on parents who did not go back to work due to job opportunities. Columns (3), (6), and (9) estimate the effects on parents who did not go back to work due to the worry about being infected. Same control variables are used here as in Table 3. Robust standard errors are in parenthesis. *, **,*** indicates statistical significance at 10 percent, 5 percent, and 1 percent level.

Table 6 Heterogenous Effects of Boarding on Mother's Labor Supply by Income

	(1)	(2)	(3)	(4)
Dependent Variable: Mother Not Back to Work - Childcare				
Boarding Before Lockdown	0.053*	-0.010	-0.025	0.072
	(0.031)	(0.034)	(0.029)	(0.051)
Boarding * Family Income (Higher than median)		0.124**		
		(0.054)		
Boarding * Mother's Income (Higher than median)			0.195***	
			(0.063)	
Boarding * (Mother's income/Father's income)				-0.028
				(0.061)
N	584	584	584	584

Notes: This table shows the heterogenouse effects of school shut down on mothers' labor supply by income levels. Columns (2) interacts boarding with whether total family income is larger than the median. Columns (3) interacts boarding with whether mother's income is larger than the median. Columns (4) interacts boarding with the ratio of mother's income over father's income. Same control variables are used here as in Table 3. Robust standard errors are in parenthesis. *, **,*** indicates statistical significance at 10 percent, 5 percent, and 1 percent level.

Table 7 Heterogeneous Effects by Other Family Characteristics

Characteristics	(1) Mothers' Job Type (Baseline: Government)	(2) Family Members Supervise Learning (Baseline: Mother)	(3) Students' Test Score	(4) Students' Non-Cognitive	(5) Students' Leadership
Dependent Variable: Either Parent Not Back to Work - Childcare					
Boarding * State Firms	0.139*				
	(0.084)				
Boarding * Private Firms	0.184***				
	(0.065)				
Boarding * Self-employ	0.210**				
	(0.095)				
Boarding * Agriculture	0.149***				
	(0.055)				
Boarding * Other	0.010				
	(0.068)				
Boarding * Father		0.024			
		(0.061)			
Boarding * Grandfather		0.328			
		(0.230)			
Boarding * Grandmother		-0.126*			
		(0.071)			
Boarding * Other members		0.145			
		(0.094)			
Boarding * None		0.028			
		(0.058)			
Boarding * Score (>median)			0.037		
			(0.048)		
Boarding * Self-efficacy				-0.043	
				(0.039)	
Boarding * Class Leader					0.030

					(0.082)
N	584	756	756	756	756

Notes: This table shows the heterogeneous effects of school shut down on parents' labor supply. Column (1) interacts boarding with the mother's job type, with the government job as the baseline. Column (2) interacts boarding with the family member who oversees the students' learning, with the mother as the baseline. Column (3) interacts boarding with student's average test scores. Column (4) interact boarding with a measure of student's non-cognitive skill (self-efficacy). Column (5) interacts boarding with a dummy variable indicating whether the student is a class leader. Same control variables are used here as in Table 3. Robust standard errors are in parenthesis. *, **, *** indicates statistical significance at 10 percent, 5 percent, and 1 percent level.

Table 8 Boarding on the Increase in Time for Learning Supervision

	(1)	(2)	(3)	(4)
Dependent Variable: Time Spent on Learning Supervision				
Boarding Before Lockdown	25.466**	18.906	8.280	17.867
	(12.061)	(16.600)	(30.160)	(15.683)
Boarding * Family Income		12.742		
(Higher than median)		(21.947)		
Boarding * Parents' Education			1.997	
(Higher than median)			(3.204)	
Boarding * Students' Test Score				14.907
(Higher than median)				(21.533)
N	756	756	756	756

Notes: This table shows the effects of boarding on the increase in family members' time spent on supervising the online learning process of the student. The dependent variable is the difference in time spent on student supervision before and after the pandemic (After - Before). Column (2) interacts boarding with total family income. Column (3) interacts boarding with parents' average education level. Column (4) interacts boarding with the test scores of students. Same control variables are used here as in Table 3. *, **,*** indicates statistical significance at 10 percent, 5 percent, and 1 percent level.

Table 9 Lockdown Experience and Parents' Opinions on Online Education

Panel A Parents Support or Supervision

	(1)	(2)	(3)	(4)	(5)
	No Time to Take Care of Children	No Time to Help with Homework	Student Poor Self Control	Bad Time Management	Internet Addiction
Boarding	0.084***	0.063**	-0.050	0.017	0.057*
	(0.031)	(0.026)	(0.037)	(0.016)	(0.029)
N	756	756	756	756	756

Panel B Equipment and Environment

	(6)	(7)	(8)	(9)	(10)
	Bad Home Internet Quality	No Device	High Cost	Disturbing Environment	Worsen Eyesight
Boarding	0.027	-0.005	0.004	-0.012	0.068*
	(0.033)	(0.009)	(0.008)	(0.015)	(0.040)
N	756	756	756	756	756

Panel C Teaching and Learning

|	(11)	(12)	(13)	(14)	(15)
	Low Teaching Quality	Poor Communication with Teachers	Poor Communication with Classmates	Hard to Concentrate	Study not Important
Boarding	-0.023	0.020	0.003	-0.000	-0.000
	(0.015)	(0.029)	(0.018)	(0.031)	(0.001)
N	756	756	756	756	756

Notes: This table shows the effects of lockdown experience on parents' attitudes towards online education. We categorize parents' negative opinions towards online education into three groups: online education requires parents' support and supervision (Panel A), the quality of online education can be affected by family surroundings and equipment (Panel B), and online education can affect the quality of teaching and learning (Panel C). Same control variables are used here as in Table 3. Robust standard errors are in parenthesis. *, **, *** indicates statistical significance at 10 percent, 5 percent, and 1 percent level.

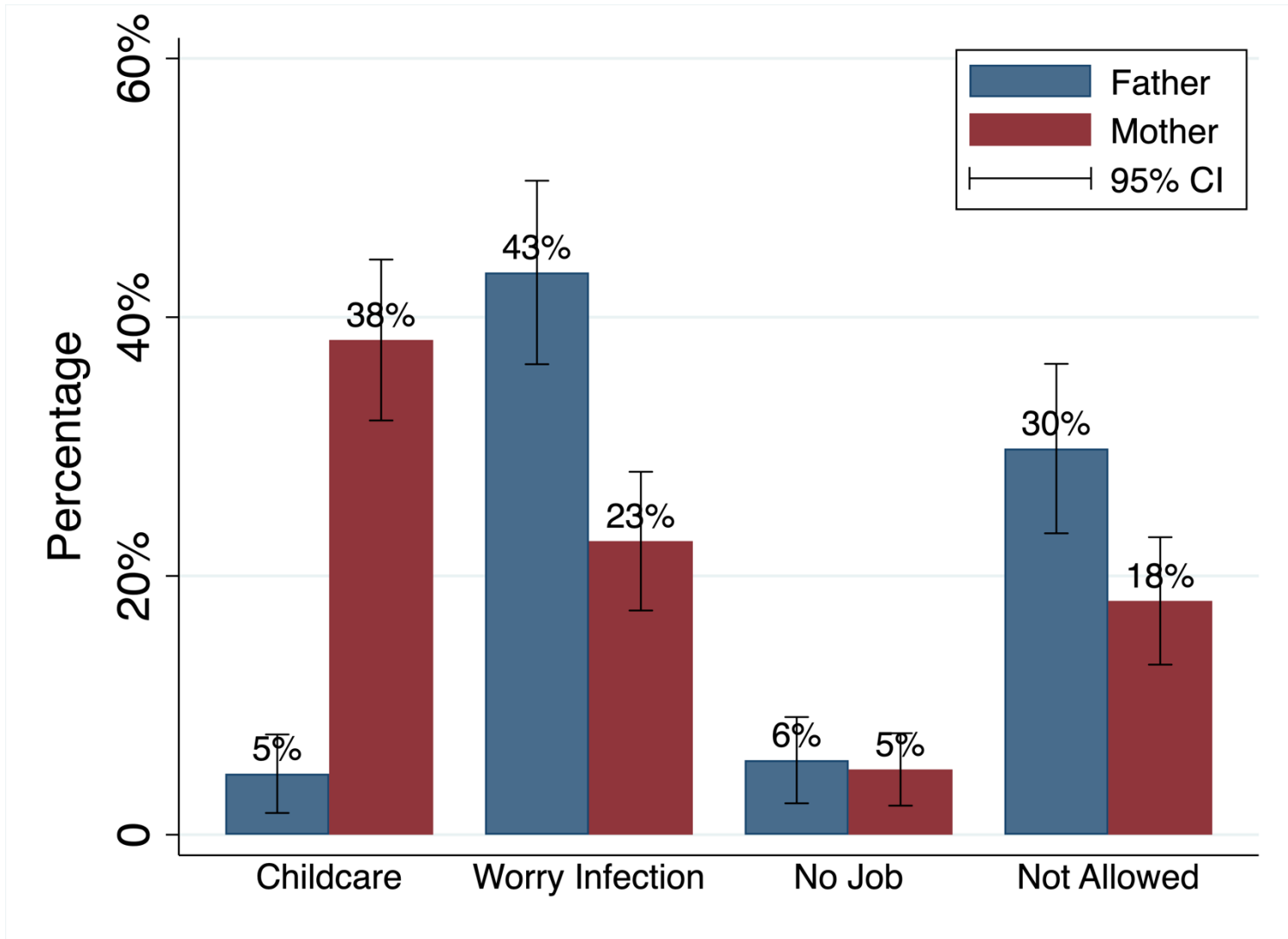● City Center + City School ◇ County School ○ Township School
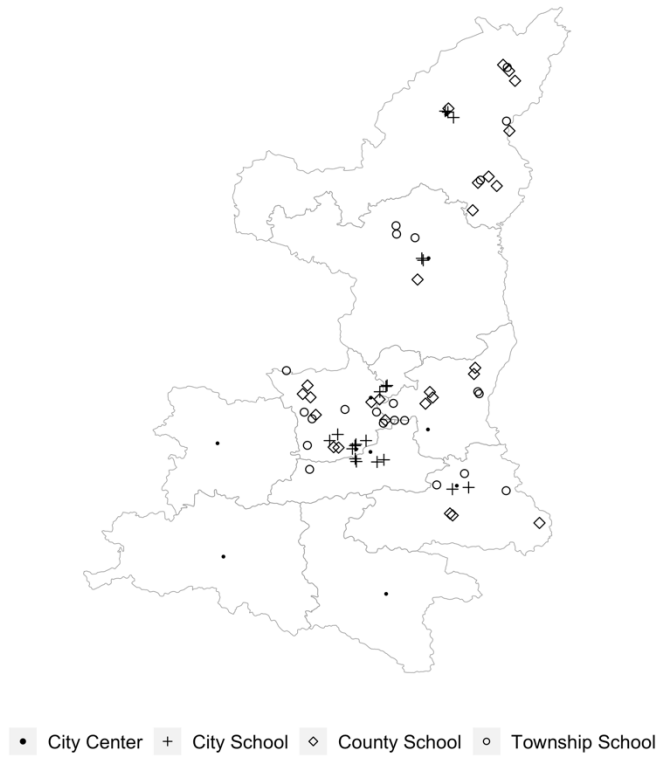
Fig. 1 The Geographical Distribution of Sample Schools in Shaanxi Province
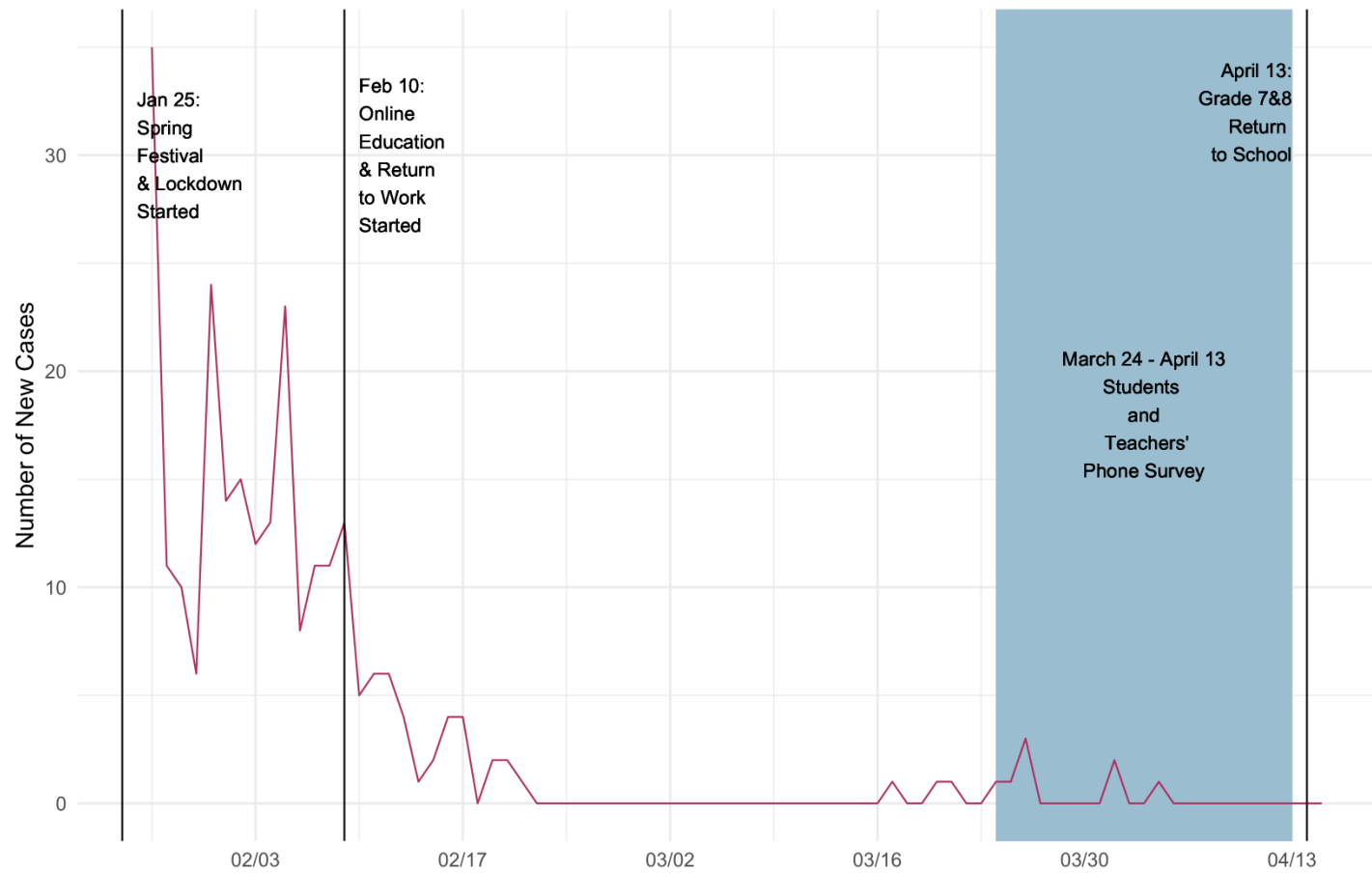
Fig. 2 Timeline of COVID-19, Work, and Education in Shaanxi Province
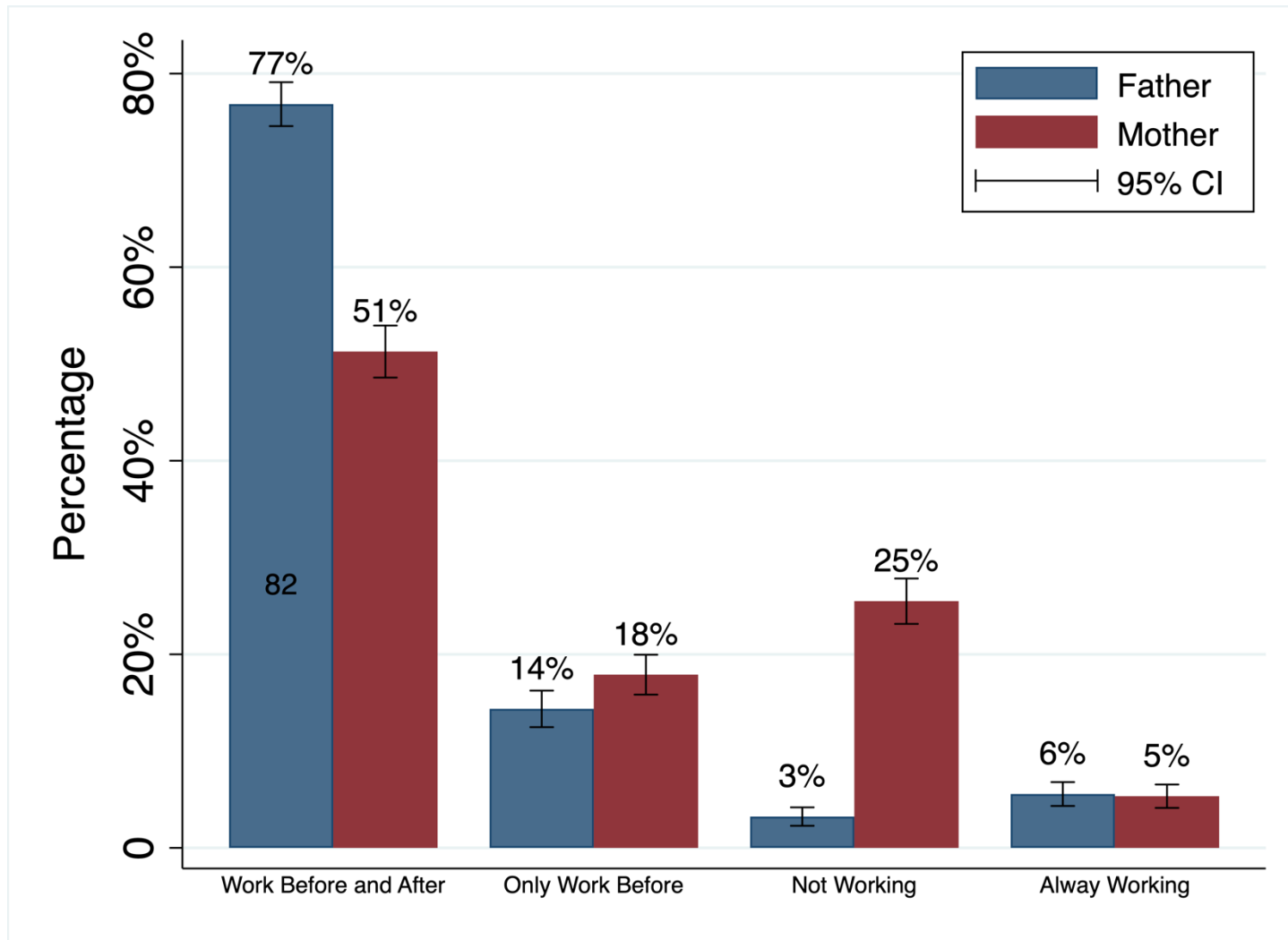
Fig. 3 Parents' working status

Fig. 4 Reasons for not back to Work

Table A1 Boarding School on Parents' Labor Supply (Non-linear Models)

	Logit			Probit		
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	Both Parents Back to Work (Childcare)	Father Back to Work (Childcare)	Mother Back to Work (Childcare)	Both Parents Back to Work (Childcare)	Father Back to Work (Childcare)	Mother Back to Work (Childcare)
Boarding	0.832***	1.467	0.623*	0.416***	0.564**	0.323*
	(0.311)	(0.945)	(0.324)	(0.156)	(0.270)	(0.166)
Boarding (ME)	0.055**	0.010	0.048*	0.056**	0.010	0.050*
	(0.021)	(0.008)	(0.025)	(0.021)	(0.001)	(0.026)
Student Gender	-0.028	-0.536	0.051	-0.009	-0.128	0.023
	(0.275)	(0.788)	(0.290)	(0.134)	(0.229)	(0.146)
Internet Access	0.115	-1.010	-0.087	0.058	-0.338	-0.045
	(0.395)	(0.898)	(0.416)	(0.187)	(0.262)	(0.207)
Student Grade	0.006	0.505	-0.027	0.006	0.181*	-0.011
	(0.175)	(0.423)	(0.191)	(0.080)	(0.106)	(0.089)
Father Age	0.030	-0.101	0.038	0.015	-0.043	0.021
	(0.046)	(0.120)	(0.045)	(0.024)	(0.033)	(0.024)
Mother Age	0.013	0.128	0.015	0.005	0.053	0.005
	(0.052)	(0.115)	(0.052)	(0.026)	(0.034)	(0.026)
Father Education	0.016	-0.020	0.009	0.010	-0.003	0.006
	(0.051)	(0.106)	(0.054)	(0.024)	(0.029)	(0.026)
Mother Education	-0.018	-0.042	-0.020	-0.011	-0.029	-0.011
	(0.050)	(0.175)	(0.053)	(0.023)	(0.048)	(0.026)
Father Income	0.012	0.166	0.055	0.002	0.064	0.026
	(0.078)	(0.187)	(0.086)	(0.036)	(0.068)	(0.040)
Mother Income	0.010	-0.031	-0.032	0.005	-0.003	-0.017
	(0.055)	(0.139)	(0.056)	(0.027)	(0.052)	(0.029)
Grade Eight	-0.091	0.271	-0.021	-0.050	0.128	-0.014
	(0.289)	(0.918)	(0.309)	(0.139)	(0.338)	(0.152)
County School	-0.664*	-0.089	-0.540	-0.329**	0.056	-0.278
	(0.345)	(0.900)	(0.358)	(0.163)	(0.289)	(0.175)
Rural School	-0.658*	-1.147	-0.683*	-0.349*	-0.499	-0.361*
	(0.385)	(1.541)	(0.408)	(0.189)	(0.520)	(0.205)
Grandparents taking care	0.741	0.000	0.908	0.371	0.000	0.469
	(0.664)	(0.000)	(0.688)	(0.339)	(0.000)	(0.367)
N	756	698	584	756	698	584

Notes: This table shows the estimation results of table 3 using logit and probit models. The first row shows the coefficients for the boarding dummy variable. The second row shows the marginal effects of the boarding dummy variable. Robust standard errors are in parenthesis. *, **,*** indicates statistical significance at 10 percent, 5 percent, and 1 percent level.