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Covid-19 Crisis, Economic Hardships and Schooling Outcomes

Abstract

We combine phone-survey data from 2,200 students collected in July-August of 2020 with student-level administrative data from 54 schools in four Northwestern provinces of Cambodia to investigate the implications of the COVID-19 pandemic for grade 9 students. These students were particularly vulnerable to dropping out of school prematurely due to the crisis. We find that most students kept studying during the crisis, returned to school to participate in the lower-secondary graduation exam after schools reopened, and transitioned to high school thereafter. However, we also find that students' exposure to the economic downturn had substantial implications: The likelihood that the father experienced income losses due to the crisis is negatively associated with a student's propensity to study during school closure, participation and performance in the final exam, and with the likelihood to transition to high school. In contrast, the likelihood that the mother experienced income losses is positively associated with student studying during the crisis, with participation in the final exam and with transition to high school — potentially because mothers used the time at home to encourage their children to study.

JEL-Codes: I180, I250, O120.

Keywords: Covid-19, schooling, Cambodia.

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1 Introduction

The COVID-19 pandemic has forced governments around the globe to adopt severe measures to slow down the spread of the virus. In March 2020, schooling was put to an abrupt halt in almost every country of the world, forcing roughly 1.6 billion students out of school and into remote learning (United Nations, 2020).

For students from developing countries, the implications of the COVID-19 pandemic are expected to be particularly severe. On the one hand, students faced more difficulties in accessing learning material. Schools were less likely to offer online education, and students often did not own the equipment or have the internet connection necessary to participate in remote learning activities (United Nations Children's Fund and International Telecommunication Union, 2020). On the other hand, the economic hardships these children were exposed to were more taxing: Globally, the pandemic is believed to have pushed between 71 and 117 million people into extreme poverty (Lakner et al., 2020), and the immense economic fallout of the crisis has been documented in several developing countries (Egger et al., 2021). As poverty deepens, parents generally lack the financial resources to finance education, while more children have to enter the labor force in order to support their families financially (Jacoby and Skoufias, 1997; Jensen, 2000; Beegle et al., 2006; Duryea et al., 2007; Bjorkman-Nyqvist, 2013).

The situation in Cambodia, the context of our study, was similar to the COVID-19 related developments in many other countries of the Global South. Cambodia was only moderately affected by the virus itself in 2020. By the end of the year, 366 cases of COVID-19 had been registered in the entire country (Roser et al., 2020). Nonetheless, schools remained largely closed between March and November 2020 in order to contain the outbreak, shortly reopened in January 2021, and remained closed until November 2021. Meanwhile, the global economic recession and travel disruptions due to COVID-19 had drastic repercussions for the economic situation of many households in the country, as Cambodia's economy relies heavily on small-scale manufacturing, international tourism and remittances from Cambodians working abroad (Takenaka et al., 2020; World Bank Group, 2020b). Whether students who were confronted with increasing poverty continued their studies during school closure and were able to return to school once these reopened remains largely unknown.

In this paper, we investigate the consequences of the COVID-19 pandemic for schooling out-

comes of grade 9 students in Northwest Cambodia, focusing on the implications of the economic downturn in 2020. Grade 9 students were particularly vulnerable to dropping out of school because of the pandemic, as grade 9 is the final grade of lower-secondary school and the last year of compulsory schooling in Cambodia. Furthermore, during grade 9 most students turn 15, which is the official minimum working age in the country.

We combine student-level administrative data that cover the entire (prolonged) school year (November 2019 to November 2020) as well as the transition to high school (January 2021) — obtained from 54 schools across four provinces in Northwest Cambodia — with phone-survey data collected during July-August 2020 (*i.e.* roughly four months into the first school closure). Our final sample consists of 2,197 grade 9 students. In the phone survey, we collected information on students' study behavior, the type of remote learning activities in which students were engaged, time-use, COVID-19 perceptions, as well as some family characteristics (parental education and occupation before the COVID-19 outbreak and migration history in the family). The administrative data contain student characteristics, subject-specific monthly grades for the months December 2019 to February 2020 (pre-crisis), participation and performance in the final exam, which was conducted in person in November 2020, as well as information on whether the student transitioned to high school in January 2021.

In our empirical analysis, we examine whether a student's exposure to the economic repercussions of COVID-19 (measured by the probability of each parent to experience COVID-19 related income losses) affected schooling outcomes. In terms of outcomes, we focus on learning incidence during the period of school closure (student studied in the last 7 days), on participation in the final exam (which indicates that the student did not dropout before the end of the academic year), on performance in the final exam (if the student belonged to the group of best performing students), and on transition to high school. Our findings suggest that student exposure to the economic downturn had important implications for schooling outcomes. Students whose father had a higher probability to experience income losses due to COVID-19 studied less during school closure, were less likely to participate in the final exam or to rank among the top students, and were less likely to transition to high school. On the other hand, a higher probability that the mother experienced income losses is associated with increased studying during school closure, a higher likelihood to participate in the final exam and and a higher likelihood to transition to high school. These findings

suggest that income losses experienced by fathers had severe financial implications for households, forcing students to drop out of school prematurely. Indeed, students whose father worked in a sector that was more severely hit by the crisis were more likely to report COVID-19 related financial worries and were more likely to work for pay as their main activity. In contrast, it seems to have benefited students' schooling if mothers were more likely to experience income losses. We examine three different mechanisms that could explain a positive effect of the maternal shock but cannot conclusively determine which one is driving the observed pattern. The most plausible explanation seems to be that mothers who experienced an income shock spent more time at home and used this time to encourage their children to invest in their education.

Our study contributes to the emerging literature that seeks to understand the impact of the COVID-19 pandemic on student learning in three important aspects. *First*, to the best of our knowledge we are the first to combine survey data with administrative data. This allows us to compare reported behavior with recorded learning outcomes and to control for pre-crisis school performance. Administrative data is so far mostly available from high-income countries, and is used to shed light on learning losses and dropout during school closures.[1] The only evidence available so far from low- or middle-income countries that makes use of administrative data is from Brazil; it suggests that the rate of student dropout among high-school students is about two and a half times higher than in pre-crisis years (Lichand and Christen, 2021).

Second, our survey data is based on students' accounts directly, while most of the existing survey evidence is based on information collected from parents or other adult household members which is inherently imprecise and needs to be interpreted with caution.[2] The few research teams that were able to speak with students directly focus on high school students exclusively. Asanov et al. (2021) document that a vast majority of surveyed high school students in Ecuador were actively engaged in learning activities during school closure, yet students from lower socio-economic backgrounds faced

[1] Engzell et al. (2021) estimate substantial learning losses among primary school children after a short school closure (8 weeks) in the Netherlands, with students from low-income backgrounds and with lower initial performance having experienced the largest learning losses. Similar patterns of learning losses are documented for England, Belgium and the United States (Rose et al., 2021; Maldonado and De Witte, 2020; Bielinski et al., 2020).

[2] For example, Furbush et al. (2021) and Koos et al. (2020) use data from World Bank High-Frequency Phone Surveys to document large variation in learning during the lockdown across Sub-Saharan African countries, with learning incidence varying between 17% and 62% at the country level. Similarly, IPA's RECOVR surveys also unveil substantial variability across countries, with just 35% of secondary-school aged children having engaged in any learning activity between March and May 2020 in Zambia, as compared to 96% of secondary-school aged children in Colombia (Warren, 2020).

more difficulties in accessing learning material and were more likely to be working for a substantial part of the day. In a comparative study across four developing countries, Favara et al. (2021) show substantial variation in learning activities among 19-year olds who were still enrolled in school before the crisis. Learning incidence during the lockdown was at 80% in Vietnam and Peru, but only at 10% in Ethiopia. The same data also indicate that a considerable share of students was not intending to continue their education after the lockdown period.

Third, the existing literature on the implications of COVID-19 for student learning focuses exclusively on the effect of the school closures. Our data allows us to study the consequences of the economic shock associated with COVID-19 for learning outcomes, and to document the severe fallout school-aged children had to face due to the economic downturn.

Beyond advancing the understanding of the COVID-19 related consequences for students, this paper also contributes to the rich literature that investigates the implications of economic shocks for child human capital more generally. Previous work has highlighted that such shocks reduce resources available to finance education (Jensen, 2000; Skoufias and Parker, 2006; Gubert and Robilliard, 2008; Bjorkman-Nyqvist, 2013) and increase pressure that children start working (Jacoby and Skoufias, 1997; Beegle et al., 2006; Duryea et al., 2007). We add to this literature by separately investigating the effects of paternal and maternal income shocks on child schooling. In line with recent works that investigate the effects of parental unemployment shocks on child health (Page et al., 2019; Pieters and Rawlings, 2020), we find that paternal and maternal shocks have very different implications for schooling outcomes, which could be explained by differences in gender-roles that prevail within the household.

The remainder of the paper is structured as follows. In section 2 we provide background information about the COVID-19 related developments in Cambodia, describe the data and present descriptive evidence of learning activities during the first lockdown. Section 3 outlines our econometric specification and presents results on the implications of the economic shock experienced at the household level for schooling outcomes. Section 4 concludes.

2 Context and Data

2.1 Setting

Educational attainment among adults is very low in Cambodia due to the systematic destruction of the educational sector by the Khmer Rouge in the 1970s and the following period of civil unrest until the early 1990s (UNESCO, 2011). While higher education has seen a rapid expansion in recent years, the low levels of education of the parental generation still have strong implications for the younger generation — particularly in rural areas — as students often lack the necessary support and guidance to access higher education (Eng et al., 2014). Many students drop out of school early, *i.e.* during lower-secondary school (grades 7–9), and do not manage the transition to high school (grades 10–12), which is typically farther away and more expensive in terms of transportation, schooling material and fees. In rural areas, early drop-out is particularly prevalent, while those students that stay in school often work at the same time (typically in unpaid family work) which reduces their available study time (Huang et al., 2017).

The COVID-19 crisis likely aggravated this situation. Firstly, students were directly affected by the preventive measures the Cambodian government has put in place. Mid of March 2020, all schools were closed and largely remained closed until November 2020. For the period of school closure, the government set up a system of remote learning, consisting primarily of subject-specific television programs, and encouraged teachers to deliver assignments and new content to their students (World Bank Group, 2020c). In September 2020, only students of grade 9 and grade 12 were allowed to return to school in order to prepare for their final exams, which determine graduation from lower secondary and high school, respectively. The final exam of grade 9 took place in November 2020. In December 2020 (after the exams were graded), the Prime Minister announced that in response to the COVID-19 crisis all students of grade 9 who participated in the final exam would automatically pass and could thus transition to high school irrespective of their actual performance (Khmer Times, 2020). However, in January 2021 (high) schools only reopened for a few weeks; they were closed again in February 2021.

In addition, the measures that were adapted globally in response to COVID-19 had severe effects on the economic situation of many households in Cambodia and thereby likely also affected the educational outcomes of children. Survey evidence suggests that between 25% and 80% of

households experienced income or job losses as a result of the crisis (Morgan and Trinh, 2021; Karamba et al., 2021). The losses are expected to be particularly prevalent among households working in the tourism, garment or construction sector (International Labour Organization, 2020; World Bank Group, 2020b). Despite substantial relief programs, many households still suffer from income losses and the poverty rate has increased considerably, to 22.8% in rural areas (Ly, 2021).[3]

2.2 Sample

Our sample consists of grade 9 students from 54 schools in Northwest Cambodia. The schools are distributed across four provinces: Banteay Meanchey, Battambang, Oddar Meanchey, and Siem Reap, provinces that experience particularly high dropout rates during lower-secondary education (Ministry of Education, Youth and Sport, 2017). The geographical distribution of the 54 schools is displayed in Figure 1. The selected schools are a non-random sub-sample of the universe of lower-secondary schools in rural Cambodia.[4] Nevertheless, they are broadly comparable to rural schools along a number of dimensions (Ministry of Education, Youth and Sport, 2019). Schools in our sample are only slightly smaller than the average school in rural Cambodia (80 students in grade 9 across 1.74 classes on average, as compared to 90 students across 1.99 classes in rural areas). Also, the class size (46 students per class) and the share of female students in the class (54%) is roughly identical to the rural average.

The students in our sample were in the final year of lower-secondary school. As performance in the final exam at the end of grade 9 determines whether students can transition to high school, the months leading up to the exams are a critical time for those students that consider continuing with high school. Our main dataset combines student-level administrative data that cover the entire (prolonged) school year (November 2019 to November 2020) and the transition to high school in

[3]While the Government of Cambodia quickly expanded access to the country's cash transfer program, targeting of this program was based on the existing IDpoor database and could not take into account differential impacts of the economic downturn by economic sector (World Bank Group, 2021).

[4]For our study, we collaborated with the NGO Child's Dream that provides scholarships to high school students in Northwest Cambodia. We initially sampled 39 lower-secondary schools that had a partnership with Child's Dream, and which had more than 30 students in grade 9 each. We then added 21 lower-secondary schools from other districts in the same provinces to our sample, that are similar in characteristics to the partner schools of Child's Dream. Over the course of the study, we had to drop six schools from the sample as school principals were not cooperating (these schools are somewhat smaller than the schools in our sample, but do not differ substantially in terms of distance from district or province capitals as well as to the border). Within the selected schools, we either targeted all grade 9 students of the school (when there was only one grade 9 class), or randomly selected one to two classes of grade 9 (and all students in these classes) to be part of our sample.

January 2021, with data from a phone survey that was conducted between July and August 2020, *i.e.* during the first school closure and a few month before the final exam was conducted.

In the phone survey, we attempted to reach all students that were still enrolled in grade 9 just before the onset of the COVID-19 crisis (February 2020), which gives a target sample of 3,258 students. As is common in phone surveys, we were able to reach and conduct the interview with only a selected group of students. Overall, we reached 2,197 students, which resulted in a response rate of 67%. Based on administrative data from before the onset of the COVID-19 crisis, we assess the degree of selection in our sample. Students who participated in the phone survey have substantially better grades than their peers who did not participate in the phone survey, see Figure 1 and Table B.1 (Figure A.1 and Tables B.1-B.11 are available in the Appendix). In order to attenuate concerns about selection bias in our phone-survey data, we therefore reweight all observations with the inverse of the probability of participating in the phone survey. The probabilities are calculated from a logistic regression that flexibly incorporates age, gender, pre-crisis grades, as well as teacher and school characteristics. The regression results are displayed in Table B.2 and the resulting weights in Figure 1. The reweighted sample is well balanced in terms of student and school characteristics that are available from administrative data, as shown in Table B.1. In the remainder of this study, we only present results for the weighted phone-survey sample, as these estimates are more likely to be representative of the targeted student population.

Table 1 shows that there are slightly more female than male students in grade 9, and students are on average about 15 years old. Student performance pre-crisis is satisfactory at best, with the average student obtaining only 57/100 points in Khmer, 48/100 in Math and 17/50 in English (grades are assigned monthly, and were averaged by the researchers across the months December, January and February).[5] Absence is relatively low in this sample, with students only missing 1.5 days of school per month on average.

Information about students' family background that was collected in the phone survey is also summarized in Table 1. As can be seen, 85% of students have access to a smartphone (either their own or of someone else in the family). For almost two thirds of the students, neither parent completed primary school. And more than a third of the households have at least one family

[5]The Cambodian school system knows three broad classifications of student performance: Satisfactory (55% of max. points), Good (72%), Excellent (89%). Student performance is assessed on the sum of points across all subjects (max. points is 470).

member who migrated in the past 12 months.

The economic repercussions of the crisis are well reflected in the students' responses to the phone survey. Seventy-three percent of students reported that at least one of their parents experienced income losses due to the COVID-19 crisis. Furthermore, about 15% of students reported that at least one parent changed their job(s) due to the COVID-19 pandemic.

The probability that parents were affected by the crisis varies substantially across occupational sectors. To show this more systematically, we report the sector of occupation of parents in Table 2, ordered by prevalence. As can be seen, the most important sectors are agriculture, construction and trade (buying & selling goods, repair of vehicles, hotels & restaurants).[6] Column (5) shows the probability of experiencing a negative income shock due to COVID-19 by sector, calculated as the fraction of parents in that particular sector for whom students reported COVID-19 related income losses in the phone survey.[7] Column (6) reports the sector-specific probability of income loss based on the Cambodia High-Frequency Phone Survey – LSMS – Round 1, which was conducted by the World Bank in May 2020 (World Bank Group, 2020a), and which elicited the pre-crisis sector of activity of the household head as well as the experience of income losses due to COVID-19.[8] In line with evidence from other developing countries (Egger et al., 2021), experiences of income losses due to COVID-19 are widespread and can be observed in most economic sectors. As can be seen in Table 2, the probability of experiencing income losses is slightly lower in the public sector (military, government, police) and in the education and health sector. Parents who were working in transportation, trade, construction and in manufacturing and mining have the highest probability of experiencing income losses.[9] The average probability (across all sectors) of an income loss by the father (mother) is 0.65 (0.68) with a standard deviation of 0.10 (0.08) (see Table 1).

[6]These sectors are obtained from open-ended questions that elicit the occupation/activity of each parent before the onset of COVID-19 (specifically we use the questions: "What is currently your mother's/father's occupation?", "Did one or both of your parents lose their job or change job because of the COVID-19 crisis?", "What was your father/mother doing before?"). Answers were subsequently coded by the interviewers and researchers and follow the ISIC, Rev.4 classification (United Nations, 2008). A few sectors (such as education and health, manufacturing and mining, financial, real estate and professional activities) were merged to increase power.

[7]More specifically, students were asked whether one or both of their parents had lower income because of the COVID-19 crisis.

[8]In the World Bank survey, one household member (mostly the household head) was asked about the main pre-crisis job, and the question about COVID-19 related income losses (Yes/No) referred to the entire household. The correlation coefficients between the shock measures calculated from our phone survey and from the World Bank survey are 0.80 for fathers and 0.63 for mothers.

[9]Workers in electricity, gas, water, waste, mining, in tourism and arts, and in professional activities were also strongly affected by the crisis, but are quantitatively less important in this sample.

2.3 Learning During and After the COVID-19 School Closure

The phone-survey data allows us to assess the extent to which learning activities continued during the period of school closure, in which form, and how students used their time more generally. We find substantial variation in the frequency of teacher contact across students. While the majority of students (70%) were in contact with the teacher in the last 7 days, a sizable share of students (30%) had much less or no contact at all since school closure (see Figure 2). Nevertheless, a large majority of students (88%) reportedly studied in the last 7 days, which is similar to the study incidence observed in many upper-middle income countries (Warren, 2020; Favara et al., 2021). In terms of types of education or learning activities students engaged in, we find that 57% of students interacted live with a teacher (in-person meeting with teacher or online session/meeting with teacher).[10] About three-quarters (74%) of all students also reported having worked on assignments provided by the teacher. These assignments could be distributed by the teacher individually, by class leaders, or through online messengers such as Telegram, Facebook or WhatsApp. Overall, only 9% of students were exclusively engaged in learning activities that were not guided by the teacher (such as studying without assignment, with a tutor or watching educational TV). This indicates that a substantial share of teachers indeed kept engaged with their students even four months into the school closure and compares favorably with other lower-middle income countries (Warren, 2020). The broadcast learning environment provided by the government was only used by about 25% of the students (*cf.* Figure 2).

Learning activities thus seem to have continued even months after schools were closed. Yet, students seem to have been subject to severe time constraints too, with only 24% of students reporting that studying was their main activity during the last 7 days, while 74% reportedly worked for pay, for the family or in the household as their main activity (*cf.* Table 1 and Figure 2).

Based on the administrative data, we can examine schooling outcomes after students were allowed to return to school. Out of all students who were enrolled in grade 9 just before the onset of the COVID-19 crisis, 92% participated in the final exam. The lower-secondary exit exam is a nationally standardized examination, which students take at their own school and is corrected by their own teachers (Maeda, 2021). Nearly all students who participated in the final exam (95%)

[10]The question was open ended, and students could give multiple answers, which were then categorized by the interviewer.

obtained a total grade of 260 points or higher, which is the threshold for obtaining the lower-secondary degree and for being admitted to high school (*cf.* Table B.1). The distribution of the final exam grade displays a stark discontinuity at 260 points, which indicates a substantial amount of manipulation (see Figure 1). The top 15% of students (a threshold that is commonly used to distinguish the best performing students) achieved a score higher than 397 points.

Finally, while all students that had registered for the final exam could have in principle transitioned to high school, only 86% of students did so (see Table 1).[11]

We find some clear patterns with respect to the characteristics that predict studying during school closure (*i.e.* whether students reported to have studied in the last 7 days), participation and performance in the final exam, as well as high school transition (results are reported in Table 3). Older students were less likely to continue studying during school closure and were also less likely to participate in the final exam, to rank among the top 15%, and to transition to high school. Female students were more likely to continue studying but were less likely to participate in the final exam and to transition to high school, especially when conditioning on pre-crisis grades. The gender-gap in high school transition is in line with previous evidence from Cambodia (Huang et al., 2017). Female students seem to have performed better than male students in the final exam, but this can be largely explained by better pre-crisis grades. Parental education seems to have mattered somewhat for schooling outcomes: the education of the father is positively associated with student learning, final exam participation, and transition to high school; and the education of the mother is positively associated with students' self-reported studying during the lockdown. Students, who were performing better before the crisis, were also more likely to study during the school closure, to participate in the final exam and to transition to high school, suggesting that the COVID-19 pandemic increased learning inequalities in this context.

3 Parental Income Shocks and Schooling Outcomes

To investigate whether students' schooling outcomes are affected by the global economic downturn, we leverage information about the sector in which parents were occupied before the onset of the COVID-19 crisis as well as variation across sectors in the impact of the crisis, and relate this to

[11] Note, that this information is missing for 55 students (2.5% of our sample).

the students' reported studying behavior during the crisis, to participation and performance in the final exam, and transition to high school.

3.1 Empirical Approach

We determine a student's exposure to the economic downturn by the sector of occupation (pre-crisis) of each parent and the associated probability of experiencing income losses for that parent (described in Section 2.2). We estimate:

$$Y_{ij} = \beta_0 + \beta_1 Shock_i^{fa} + \beta_2 Shock_i^{mo} + \beta_3' X_i + \mu_j + \varepsilon_{ij}. \quad (1)$$

In eq. (1), Y_{ij} is the outcome of interest of student i in school j, *i.e.* whether the student studied in the last 7 days (phone-survey response), participated in final exam, ranked in top 15% of students in final exam, or transitioned to high school (all from administrative records). $Shock_i^{fa}$ is the income shock of the father (probability of income loss), and $Shock_i^{mo}$ the income shock of the mother. X_i is a vector of student, family and interview characteristics, namely age, gender, pre-crisis grades, migration in the family, education of each parent, and interviewer fixed effects. μ_j are school fixed effects.[12] ε_{ij} is the error term. We account for non-random survey-response by estimating eq. (1) in weighted least squares (using the inverse probability weights discussed in Section 2.2). Because study outcomes likely correlate within class, we cluster our standard errors at the school level throughout. We additionally perform a wild cluster bootstrap of the t-statistic (4,999 replications, Rademacher weights) at the level of each parent's sector(s) of occupation and report the calculated p-values to account for potential correlation in outcomes within parental sector of occupation.

A few points are worth mentioning regarding the construction of the shock variables. *First*, we use a predicted measure rather than self-reported assessments of parental income losses in order to reduce reporting bias. This addresses the concern that more pessimistic students could be more likely to report that their parents experienced income losses, while also performing worse in school during the crisis; or conversely, that students who are more often exposed to shocks are more resilient, and therefore also less likely to report the COVID-19 related income losses. *Second*, this

[12] School fixed effects also account for very local shocks as students typically come from the same community; however, we expect that most relevant shock-related variation happens at a higher geographical level, *i.e.* at least district level (we observe on average six schools per district).

measure of income losses necessarily includes a substantial amount of noise, as the measure does not capture the severity of the income loss (relative to pre-crisis incomes), just its occurrence, while the severity of the loss likely also varies across households and sectors. We expect this type of measurement error to attenuate our estimated effect sizes. The advantage of this shock measure is that it is straightforward to ask and that student responses are presumably more accurate than for more complex questions about the magnitude of income losses. *Third*, as we are interested in investigating the effect of income shocks for both parents, we restrict the sample to students with two working parents initially. Note that this is the typical household setup in our setting. We extend the sample to households with only one working parent in the robustness checks.[13] *Fourth*, if more than one sector was reported per parent (each student could list up to three occupations per parent), we use the minimum of all constructed probabilities, assuming that parents with multiple occupations could switch somewhat flexibly between these, and were thus better able to cope with the economic downturn. *Fifth*, many parents have the same occupation (especially in the farming, trading and construction sectors).[14] In regressions in which both parents income loss probabilities are included, we will be identifying off of households with non-identical occupations, which is a selected sample.[15] To gauge the external validity of our results, we show regression results in which we separately include each parent's shock variable as a robustness check.

3.2 Identification

The identifying assumption underlying eq. (1) is that the parental income shocks are uncorrelated with the error term after controlling for X_i and μ_j. These controls are important as we have good reasons to suspect that parental characteristics are correlated with the probability of experiencing income losses during the COVID-19 crisis, and these characteristics could have a differential effect on student performance absent any income shock.

To gauge the plausibility of our identifying assumptions, we correlate a number of household

[13]Note that we do not observe the sector of all parents: A total of 31 fathers are not in the labor force (stay-at-home or retired), as well as 235 mothers. In addition, 102 fathers and 31 mothers are either deceased or divorced (with no activity being reported). Finally, students did not know or refused to name the occupation of 31 fathers and 13 mothers. As households with only one working parent are likely to be very different from the households with two working parents, we exclude these in the main analysis (238 students in total).

[14]The correlation coefficient between $Shock_i^{fa}$ and $Shock_i^{mo}$ is 0.41.

[15]Indeed, as can be seen in table B.3, students whose parents do not have the same occupation are on average younger, perform somewhat better in math before the crisis, and fared somewhat better throughout the crisis (more likely to be studying during crisis, and more likely to transition to high school).

and student characteristics as well as pre-crisis student outcomes with the shock variables. We find that, in our sample, the probability of paternal (but not maternal) income losses are more common among households who have at least one member that migrated in the past, and among households with less educated fathers. Reassuringly, however, our shock measures do not seem to correlate systematically with pre-crisis grades, family structure and wealth (see Table B.4).[16] We also use the 2017 Cambodia Socio-Economic Survey (CSES) to investigate if the probability of parental income losses is correlated with pre-crisis consumption levels. As reported in Table B.5, we do not find any evidence that this is the case.[17]

Our identification strategy, however, cannot rule out that other unobserved characteristics might correlate with the parental occupation pre-crisis, the extent to which this sector was affected by the crisis, and child school performance, even after controlling for X_i and μ_j, such that the nature of this analysis remains largely descriptive.

3.3 Results

Our results indicate that student exposure to the COVID-19 economic downturn had important implications for learning during school closure, for final exam participation, and for high school transition, with paternal and maternal shocks working in opposite directions (see Table 4). Students whose fathers were more likely to experience COVID-19 related income losses were (weakly) less likely to report that they studied in the last 7 days, and were less likely to participate in the final exam and to transition to high school. However, students whose mothers were more likely to experience COVID-19 related income losses were more likely to study during the school closure, to participate in the final exam, and to transition to high school. Both parents' shocks are negatively associated with performance in the final exam, though the coefficient of the maternal shock is not statistically significant.[18] In terms of magnitudes, these coefficients suggest that a 10 percentage point (pp) increase in the probability that the father experienced an income loss is associated with a 1.1 pp reduction in the incidence of studying during the lockdown, a 1.6 pp reduction in the

[16] Family structure and wealth are only observed in a baseline survey for a sub-sample of students. This baseline survey was administered in 18 schools as part of an educational RCT, which had to be interrupted as schools were closed on March 16 due to the COVID-19 pandemic. More information can be found in Gehrke et al. (2020).

[17] To do this, we restrict the sample to families with at least one child of secondary-school age, and merge the shock probabilities from our survey by the occupation of the parent (as reported in the CSES).

[18] We show results for different grade thresholds in table B.6. Coefficients are negative across all thresholds and for both parents.

probability of participating in the final exam, a 1.7 pp reduction of performing among the top 15% of students, and a 2.7 pp decrease in the probability of transitioning to high school. An increase of the same magnitude in the probability that the mother experienced an income loss is associated with a 1.9 increase in the incidence of studying during lockdown, a 3.0 pp increase in the participation in the final exam, and a 3.7 pp increase in the probability of transitioning to high school.

The results are highly robust: we find no changes in our findings if we base our income shock measure on the main (first-mentioned) occupation, or if we use the average of up to three probabilities (*cf.* Table B.7, Panels A and B). The results are also qualitatively similar if we use the shock measures calculated from the Cambodia High-Frequency Phone Survey, and if we use the student-reported parental income loss as explanatory variables rather than the predicted values (Panels C and D of Table B.7).[19] Our results are also not driven by the empirical approach: controlling for district and Child's Dream partnership fixed effects instead of school fixed effects does not change the results, nor does omitting the sampling weights (*cf.* Table B.8, Panels A and B). As smartphone ownership is positively correlated with the maternal shock in the baseline sub-sample, we also control for smartphone ownership (Panel C of Table B.8); our results are unchanged. Furthermore, we expand the sample to students for whom we observe only one working parent (Panel D of Table B.8). In this sample, the negative association of a paternal shock prevails while the positive association of the maternal shock is attenuated.

Because information on high school transition is missing for 49 students in these regressions, we also assess if selective attrition might be influencing the results on high school transition based on the procedure described by Horowitz and Manski (2000). We find that estimated coefficients are virtually unchanged if we replace all missing values by 0 or all by 1, suggesting that non-random attrition is not influencing the results on high school transition (*cf.* Table B.9).

Finally, we include parental shocks in separate regressions to address the concern that when including both shocks simultaneously our identification comes from parents with different occupations which might be a selected sample. The coefficients are somewhat attenuated, but have the same signs as in our main results and are mostly statistically significant (see Tables B.10 and B.11). The

[19]Note, that the Cambodia High-Frequency Phone Survey has a considerably smaller sample size: only 700 households are interviewed in total.

fact that coefficients are attenuated could be due to omitted variable bias: as parental occupations are indeed correlated and take opposite signs, omitting one variable biases the coefficient on the other variable towards zero.

In terms of within-sample heterogeneity, we find that the implications of parental shocks for studying during school closure, participation in the final exam and transition to high school seem to be fairly similar for both genders (see Figure 3, Panel A). Interestingly, while the maternal shock is associated with higher participation in the final exam both for boys and girls, it seems to be positively associated with boys' but negatively associated with girls' performance (probability of ranking in the top 15%). This might be a selection effect (more girls who were at the margin of dropping out were encouraged to obtain their lower-secondary diploma) or evidence of different goals that parents have set for boys (transition to high school) versus girls (obtain a lower-secondary degree). Splitting the sample by students' pre-crisis grades (above median student in class vs. below) reveals that the estimated negative paternal and positive maternal effects on studying, participation in the final exam and on transition to high school are predominantly driven by low-performing students (see Figure 3, Panel B). We find no differential effects on final exam performance.

3.4 Mechanisms

The finding that parental shocks seemingly had opposing effects on studying during lockdown, participation in the final exam and on high school transition is highly surprising. A negative effect of the paternal income shock could be explained with financial constraints: paternal income losses reduced the financial resources available for schooling and increased pressure on students to take up remunerative work. Indeed, we find that students whose fathers were more likely to experience income losses were more likely to report working for pay as their main activity during school closure (Table 5). Furthermore, students were more likely to agree with statements which indicate that the COVID-19 pandemic increased their financial worries (*cf.* Table 6, columns 1-2), and reportedly expect to achieve fewer years of education by the age of 25 (Table 6, columns 11-12).[20]

On the other hand, the positive association between a mother's probability of experiencing

[20]In the phone survey, students were asked for their agreement with different statements related to COVID-19. Figure A.1 depicts an overview of all statements and responses.

income losses and schooling is more difficult to explain. The income shares of mothers and fathers are typically not widely different among households in which both parents are working: survey evidence from 2017 suggests that 45% of couples' income is earned by the wife and 55% by the husband (National Institute of Statistics, 2017).[21] We also find no evidence that mothers are more likely to report switching jobs than fathers (*cf.* Table 1). Nevertheless, even if fathers earned a higher share of household income or mothers were more flexible in finding a new occupation in order to compensate for income losses, such evidence could only explain a null effect of the maternal shock on study time and dropout, yet hardly a positive effect, if the main mechanism was financial.

There are at least three alternative mechanisms that might explain why the maternal shock could have be positively associated with schooling. *First*, COVID-19 related job losses might have signaled the benefits of (higher) education attainment to parents and children if low-education occupations were more severely affected by the economic downturn. If the positive signaling effect was outweighed by the negative income effects for paternal shocks but not for maternal shocks, this could explain the observed pattern. Indeed, jobs with lower educational requirements seem to have been affected by the crisis more severely: The probability of income loss is negatively correlated with the average educational attainment of parents in a given sector (correlation coefficient of -0.47). However, we find no evidence that students exposed to parental income losses were more likely to agree to statements that imply that the COVID-19 pandemic increased the benefits of higher education (see Table 6, columns 3-4), nor are the aspired years of education differentially associated with the shock variables (columns 7-8).

Second, income losses could imply more free time for both parents, which mothers might have used differently than fathers. Mothers might have responded to income losses by spending more time in the household or on the family farm, time that otherwise their children would have spent on these activities, thus freeing up time for their children to study. While we cannot look at parental time-use directly, we can look at students' time use. Yet, we find no concluding evidence: students whose mothers were more likely to experience income losses were not less likely to report to be working (in paid work or on household chores) as their main activity, nor were they more likely to report that studying was their main activity (see Table 5). Unfortunately, time use is only available

[21] This exercise is limited to couples in which both are working and to income sources that can be clearly attributed to one household member such as wage income and business earnings, and is necessarily imprecise as it omits farm income and other income sources (such as remittances).

in terms of main activity, and we cannot rule out meaningful adjustments in terms of hours studied.

Third, related to the mechanism above, mothers who were spending more time at home could have used this time to encourage their children to study more continuously during the school closure and to participate in the final exam, or even have supervised their learning activities. While maternal income shocks do not seem to increase self-reported motivation and continuity in learning (see Table 6, columns 5-6), we find that students whose mothers were more likely to experience income losses were more likely to believe that they would achieve their aspired level of education (columns 9-10). This estimated effect, however, is not statistically significant if inference is based on bootstrap p-values. Also consistent with an encouragement-related explanation is the finding that the estimated positive effect of the maternal shock is driven by low-performing students (see Figure 3).

Taken together, these results suggest that paternal income shocks (weakly) reduced child studying during school closure, and reduced participation and performance in the final exam as well as transition rates to high school. Maternal income shocks, in contrast, seem to have increased students' studying during school closure, participation in the final exam, and transition rates to high school, but did not necessarily imply better performance. While we cannot conclusively determine why maternal shocks might have had a positive effect on child schooling (in terms of continuation of studies during school closure, lower-secondary completion and high school transition rate), we do find some evidence that is supportive of an encouragement-related explanation.

4 Conclusion

The COVID-19 pandemic forced 1.6 billion students worldwide into remote learning. Administrative data combined with phone-survey data from Northwest Cambodia reveals that the vast majority of grade 9 students continued to study during the first lockdown period, returned to school when schools reopened, participated in the final exam and — to somewhat less extent — transitioned to high school. However, studying was the main activity during school closure only for a minority of students, suggesting that very few students maintained high study hours and that learning losses were likely substantial.

While almost all students were given the opportunity to transition to high school, and many

did so, it is unclear whether students were able to catch up with the material they missed in the first lockdown and whether they are able to succeed in high school. Without intensive support in form of remedial classes and activities, low-performing students are at risk of being left behind even further, and to drop out of high school before graduation.

In response to a second COVID-19 wave, schools in Cambodia were closed again shortly after the new school year started in early 2021. After almost 1.5 years of school closure, the necessity of providing adequate responses to the disruption in education (from targeting remedial education to those in need, to continued engagement with those who are most vulnerable to dropping out) is extremely urgent.

Our results also suggest that part of the variation in schooling outcomes across students can be attributed to the extent to which a student's family was exposed to the economic downturn. Students whose fathers worked in sectors particularly affected by the crisis were less likely to study during school closure, more likely to drop out, and performed less well in the final exam. Our findings suggest that this is likely driven by economic hardships which forced students to take up paid work. Maternal likelihood of experiencing income losses, on the other hand, is positively associated with a child's studying during lockdown, participation in the final exam and transition to high school. Potentially, mothers who experienced income losses had more time to support their children in such a difficult situation and to encourage them to invest in their education. Such encouragement seems to have been crucial, particularly for low-performing students.

By documenting that gender-roles shape the effects of economic shocks, our findings contribute to the rich literature that investigates the implications of economic shocks for schooling outcomes. More research is needed to understand the differential roles parents play in influencing studying behavior in times of economic crisis and the underlying mechanisms.

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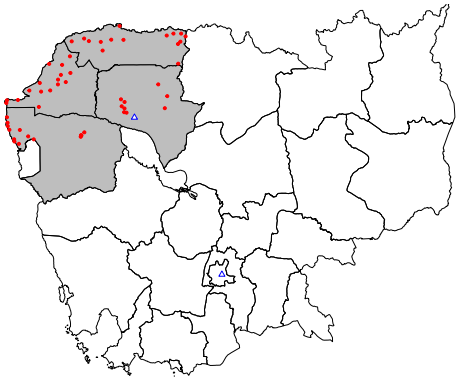
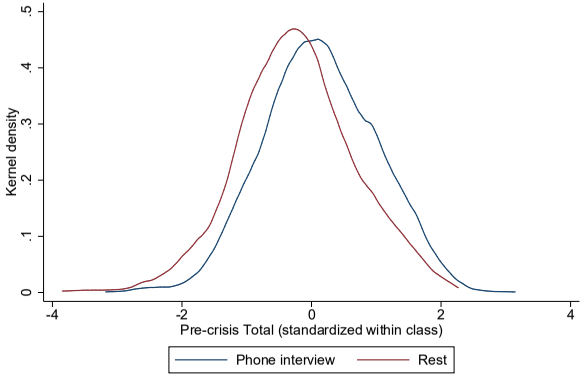
Figures

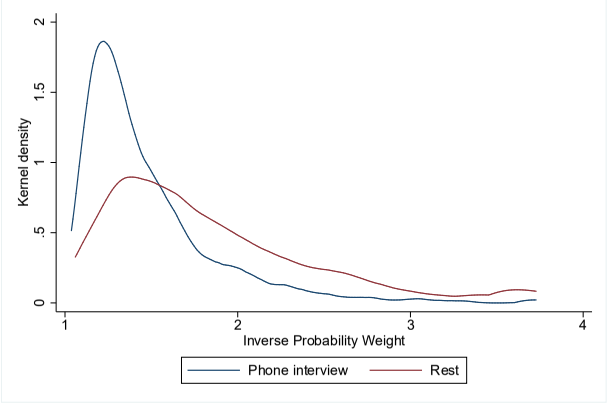
Figure 1: Sample Characteristics



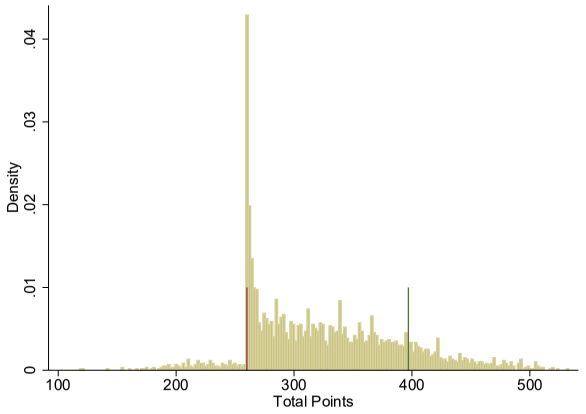
(a) Map of Survey Schools, Cambodia



(b) Pre-crisis Grades by Phone Survey Participation



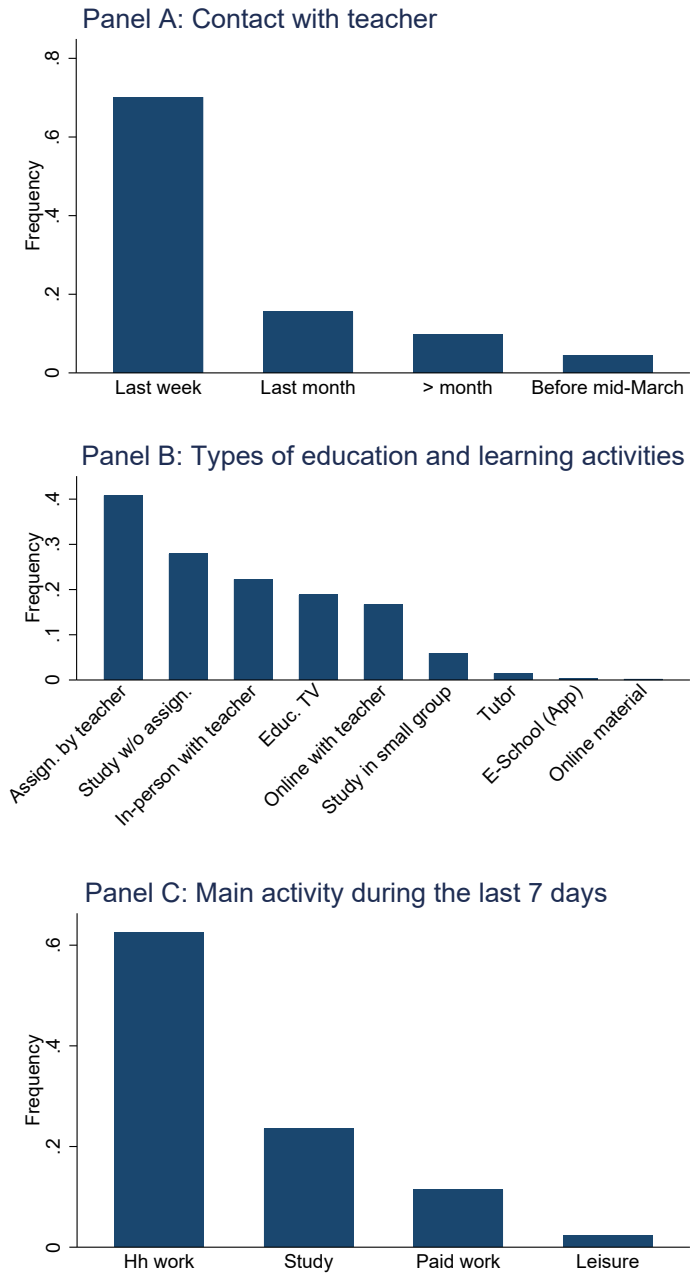
(c) Inverse Probability Weights by Phone Survey Participation



(d) Distribution of Total Points in Final Exam

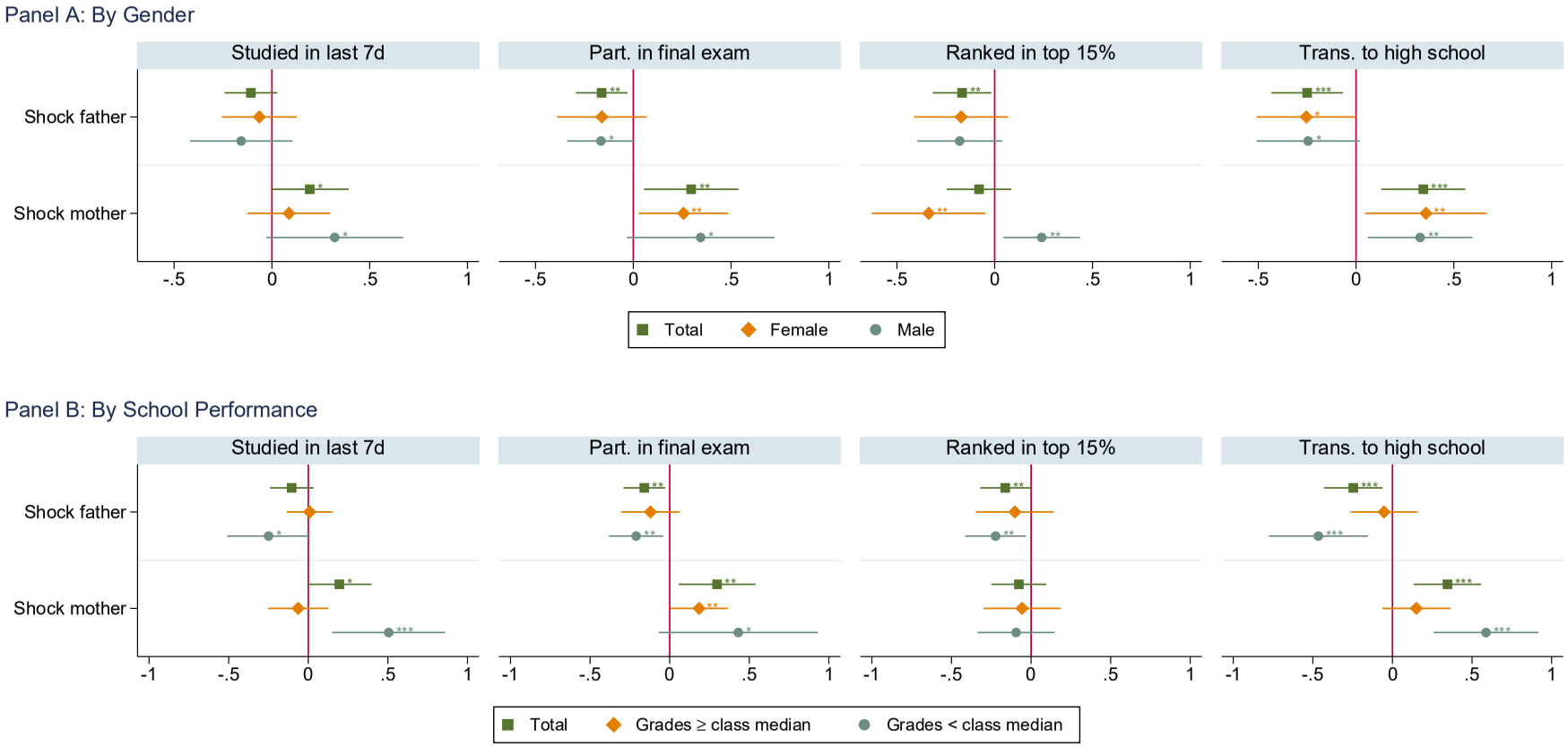
Notes: Panel (a) maps the locations of all survey schools in our sample (red dots). Gray-shaded areas are the 4 provinces of interest, blue triangle in the South is Phnom Penh, blue triangle in the North is Siem Reap. Panel (b) shows the kernel densities of pre-crisis (3-month average) total grade (standardized within class) for phone survey participants and non-participants. Panel (c) shows the calculated inverse probability weights for phone survey participants and non-participants. The weights are based on the regression results displayed in Table B.2. Panel (d) shows the distribution of the total points students obtained in the final exam. Vertical lines represent cut-off points to pass final exam (red) and for belonging to the top 15% of students (green)

Figure 2: Learning Activities and Time Use during Lockdown



Notes: Contact with teacher refers to the last time the student heard from his/her teacher (in person, phone, facebook group, through class leader etc.). Types of education and learning activities reports answers to an open-ended question about these activities in the last 7 days, coded by the interviewer. Multiple answers were possible. Main activity during the last 7 days is the student-reported main activity on a typical week-day (mo-fr) during the previous week.

Figure 3: Treatment Effect Heterogeneity



Notes: This figure shows the effect of paternal and maternal income shocks on schooling outcomes disaggregated by gender or school performance (pre-crisis). Dependent variables are in the column header (Studied in last 7d (phone survey), Part. in final exam (adm. data), Ranks in top 15% (adm. data)). Weighted Least Squares (weights are inverse probability weights calculated from Table B.2) reported throughout. All regressions control for age, gender, pre-crisis grades, and for school, parental education, migration and interviewer fixed effects. Horizontal spikes are 95% confidence intervals, with standard errors clustered at the school level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Tables

Table 1: Summary Statistics

	Mean	SD	Min	Max	Count
Administrative Data					
Age (adm. data)	15.047	1.309	11	20	2197
Female student (adm. data)	0.533	0.499	0	1	2197
Pre-crisis Khmer	56.791	18.993	0	98	2197
Pre-crisis Math	47.902	22.397	0	100	2197
Pre-crisis English	17.031	12.474	0	50	2197
Pre-crisis Total (std. within class)	0.020	0.896	-3	3	2197
Pre-crisis absence	1.482	2.034	0	14	2011
Participated in final exam	0.917	0.276	0	1	2197
Ranks in top 15% in final exam	0.134	0.341	0	1	2197
Transitioned to high school	0.859	0.348	0	1	2142
Survey Data					
Smartphone ownership	0.849	0.358	0	1	2197
At least one parent $\geq$ primary	0.357	0.479	0	1	2197
Any member migrated	0.363	0.481	0	1	2196
Studied in last 7 days	0.881	0.324	0	1	2197
Main activity in last 7 days: study	0.236	0.425	0	1	2193
Main activity in last 7 days: paid work	0.114	0.318	0	1	2193
Main activity in last 7 days: hh work	0.625	0.484	0	1	2193
Main activity in last 7 days: leisure	0.024	0.152	0	1	2193
Father experienced income loss	0.634	0.482	0	1	2194
Mother experienced income loss	0.654	0.476	0	1	2194
Father changed job(s)	0.109	0.311	0	1	2192
Mother changed job(s)	0.095	0.293	0	1	2192
Father exp. income loss (probability)	0.654	0.099	0	1	2033
Mother exp. income loss (probability)	0.677	0.076	0	1	1918

Notes: This table shows the population means and standard deviations of student and family characteristics collected from administrative data and in the phone survey, restricted to those students that participated in the phone survey. Variables are weighted using the inverse probability of survey participation. Pre-crisis Khmer, English and Math are the students' monthly grade in the subject averaged over the months December, January and February. The maximum points achievable per subject are 100, 50 and 100, respectively. Pre-crisis Total (std.) is the 3-month average total grade (sum over all subjects) with each month being standardized within class to account for differences in the number of subjects across schools/classes. Pre-crisis absence is the average number of days absent per month over the months December, January, February. Participated in final exam equals 1 if the student participated in the final exam on November 30, 2020. The statistics for job changes for mother and father include net job losses due to the crisis (status changed to stay-at-home). Roughly 17% of mothers and 6% of fathers who changed their jobs, *de facto* lost their jobs. Probability of income loss is the parental sector of occupation specific probability of experiencing income losses due to COVID-19, as calculated in Table 2.

Table 2: Parental Occupation before COVID-19

	Father		Mother		Prob. of income loss	
	N	pct.	N	pct.	Survey	World Bank
	(1)	(2)	(3)	(4)	(5)	(6)
Agriculture, Forestry and Fishery	1,164	57.26	1,166	60.79	0.629	0.812
Construction	281	13.82	151	7.87	0.764	0.804
Buying & selling goods, Repair of vehicles, Hotels & restaurants	204	10.03	430	22.42	0.778	0.884
Public administration (gov. empl., police, soldier)	169	8.31	15	0.78	0.440	0.546
Manufacturing and Mining	71	3.49	88	4.59	0.758	0.760
Transportation	50	2.46	2	0.10	0.882	1.000
Education and Health	43	2.12	23	1.20	0.522	.
Other services	18	0.89	25	1.30	0.636	0.852
Electricity, Gas, Water, Waste, Demining	11	0.54	2	0.10	0.750	.
Administrative and support services	9	0.44	5	0.26	0.714	.
Arts, Entertainment, Tourism, Recreation	8	0.39	10	0.52	0.947	.
Professional activities	5	0.25	1	0.05	0.667	0.900
Total	2,033		1,918			

Notes: Columns (1)-(4) show the frequency and percentage share of parental sectors of occupation before the onset of the COVID-19 crisis by gender, and ordered by frequency of the father's occupation. These sectors are obtained from open-ended questions that elicit the occupation/activity of each parent before the onset of COVID-19 (specifically we use the questions: "What is currently your mother's/father's occupation?", "Did one or both of your parents lose their job or change job because of the COVID-19 crisis?", "What was your father/mother doing before?"). For each parent, students could list up to three occupations. If multiple occupations were listed, we report the first entry for each parent (main occupation) in this table. Sectors follow the ISIC Rev.4 classification (United Nations, 2008). Some sectors were merged for reasons of power. Columns (5) and (6) show the probability of experiencing income losses (fraction of individuals in the sector for which COVID-19 related income losses were reported) by sector, as calculated in the phone survey (col. 5) and in the Cambodia High-Frequency Phone Survey – LSMS – Round 1, conducted by the World Bank (col. 6). To calculate these probabilities in the phone survey, we restrict the sample to parents for which students only reported one job, such that the reported income losses could be linked to one specific sector. In the World Bank survey, respondents report only the main job. We restrict that sample to rural households to make it comparable to our setting.

Table 3: Correlates of Schooling during COVID-19

	Studied in last 7d		Part. in final exam		Ranked in top 15%		Trans. to high school	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age (adm. data)	-0.018***	-0.019***	-0.011*	-0.011*	-0.010*	-0.009*	-0.021**	-0.020**
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.008)	(0.008)
Female student (adm. data)	0.072***	0.044***	-0.002	-0.024**	0.065***	-0.012	-0.002	-0.040**
	(0.017)	(0.016)	(0.012)	(0.011)	(0.018)	(0.013)	(0.017)	(0.016)
Father education ≥ primary	0.034**	0.026	0.035***	0.026**	0.043**	0.010	0.044***	0.029**
	(0.015)	(0.016)	(0.012)	(0.012)	(0.018)	(0.014)	(0.014)	(0.014)
Mother education ≥ primary	0.044**	0.040**	0.018	0.014	0.023	0.007	0.033*	0.024
	(0.020)	(0.020)	(0.018)	(0.018)	(0.020)	(0.017)	(0.017)	(0.018)
Any member migrated	-0.009	-0.001	-0.016	-0.010	-0.024	-0.003	-0.031*	-0.020
	(0.015)	(0.014)	(0.015)	(0.014)	(0.019)	(0.015)	(0.017)	(0.015)
Pre-crisis Total (std. within class)		0.041***		0.034*		0.088***		0.044
		(0.015)		(0.020)		(0.021)		(0.026)
Pre-crisis Khmer		0.001*		0.000		0.001		0.001
		(0.001)		(0.001)		(0.001)		(0.001)
Pre-crisis English		-0.001		0.000		0.006***		0.003**
		(0.001)		(0.001)		(0.002)		(0.002)
Pre-crisis Math		0.001		0.001*		0.003***		0.001
		(0.001)		(0.001)		(0.001)		(0.001)
Observations	2196	2196	2196	2196	2196	2196	2141	2141
Adjusted R^2	0.066	0.098	0.029	0.063	0.088	0.354	0.117	0.172
Dep. var. mean	0.881	0.881	0.917	0.917	0.134	0.134	0.859	0.859

Notes: Dependent variables are in the column header (Studied in last 7 days (phone survey), Participated in the final exam (adm. data), Ranked in top 15% in final exam (adm. data), Transitioned to high school (adm. data)). Weighted Least Squares (weights are inverse probability weights calculated from Table B.2) reported throughout. All regressions control for school and interviewer fixed effects. Standard errors (clustered at the school level) are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Effect of COVID-19 Economic Downturn on Schooling

	Studied in last 7d		Part. in final exam		Ranked in top 15%		Trans. to high school	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Father exp. income loss (probability)	-0.122*	-0.108	-0.178**	-0.162**	-0.233***	-0.167**	-0.297***	-0.270***
	(0.070)	(0.067)	(0.069)	(0.066)	(0.081)	(0.075)	(0.101)	(0.095)
	[0.517]	[0.500]	[0.028]	[0.029]	[0.057]	[0.058]	[0.000]	[0.000]
Mother exp. income loss (probability)	0.184*	0.194*	0.296**	0.296**	-0.078	-0.080	0.351***	0.362***
	(0.103)	(0.099)	(0.120)	(0.120)	(0.088)	(0.082)	(0.101)	(0.110)
	[0.144]	[0.048]	[0.022]	[0.028]	[0.153]	[0.149]	[0.042]	[0.045]
Age (adm. data)	-0.021***	-0.021***	-0.013**	-0.013**	-0.010	-0.007	-0.026***	-0.025***
	(0.007)	(0.007)	(0.006)	(0.006)	(0.007)	(0.006)	(0.008)	(0.008)
Female student (adm. data)	0.086***	0.055***	0.000	-0.023*	0.079***	-0.005	-0.007	-0.048**
	(0.018)	(0.018)	(0.014)	(0.013)	(0.018)	(0.015)	(0.020)	(0.018)
Pre-crisis Total (std. within class)		0.050**		0.047**		0.098***		0.058**
		(0.019)		(0.019)		(0.024)		(0.026)
Pre-crisis Khmer		0.001		0.000		0.001		0.001
		(0.001)		(0.001)		(0.001)		(0.001)
Pre-crisis English		-0.001		-0.001		0.005***		0.003*
		(0.001)		(0.001)		(0.002)		(0.002)
Pre-crisis Math		0.001		0.001		0.004***		0.001
		(0.001)		(0.001)		(0.001)		(0.001)
Observations	1789	1789	1789	1789	1789	1789	1740	1740
Adjusted R^2	0.076	0.109	0.033	0.067	0.088	0.356	0.120	0.178
Dep. var. mean	0.882	0.882	0.918	0.918	0.138	0.138	0.862	0.862

Notes: Dependent variables are in the column header (Studied in last 7 days (phone survey), Participated in the final exam (adm. data), Ranked in top 15% in final exam (adm. data), Transitioned to high school (adm. data)). Weighted Least Squares (weights are inverse probability weights calculated from Table B.2) reported throughout. All regressions control for school, parental education, migration and interviewer fixed effects. Standard errors (clustered at the school level) are in parentheses. Wild cluster bootstrap p-values are in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Effect of COVID-19 on Main Activity

	Study		Paid work		Hh work		Leisure	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Father exp. income loss (probability)	-0.138	-0.117	0.213**	0.208**	-0.115	-0.132	0.047	0.048
	(0.112)	(0.107)	(0.092)	(0.093)	(0.146)	(0.140)	(0.045)	(0.046)
	[0.303]	[0.360]	[0.071]	[0.082]	[0.484]	[0.415]	[0.360]	[0.350]
Mother exp. income loss (probability)	-0.028	-0.018	-0.078	-0.089	0.121	0.123	-0.027	-0.028
	(0.193)	(0.193)	(0.148)	(0.144)	(0.215)	(0.216)	(0.049)	(0.050)
	[0.773]	[0.813]	[0.664]	[0.627]	[0.617]	[0.611]	[0.675]	[0.657]
Age (adm. data)	0.001	0.002	0.012*	0.012*	-0.013	-0.014	0.001	0.001
	(0.009)	(0.009)	(0.007)	(0.006)	(0.009)	(0.009)	(0.003)	(0.003)
Female student (adm. data)	0.030	-0.004	-0.084***	-0.067***	0.071***	0.088***	-0.015*	-0.014**
	(0.020)	(0.022)	(0.016)	(0.015)	(0.025)	(0.025)	(0.008)	(0.006)
Pre-crisis Total (std. within class)		0.014		-0.003		-0.011		-0.001
		(0.022)		(0.020)		(0.027)		(0.012)
Pre-crisis Khmer		0.002*		-0.001		-0.000		-0.000
		(0.001)		(0.001)		(0.001)		(0.000)
Pre-crisis English		0.002		-0.002*		-0.001		0.000
		(0.002)		(0.001)		(0.002)		(0.001)
Pre-crisis Math		0.001		0.001		-0.002		0.000
		(0.001)		(0.001)		(0.001)		(0.000)
Observations	1785	1785	1785	1785	1785	1785	1785	1785
Adjusted R^2	0.105	0.125	0.091	0.097	0.073	0.079	0.063	0.061
Dep. var. mean	0.229	0.229	0.112	0.112	0.636	0.636	0.022	0.022

Notes: Dependent variables are in the column header: Study equals 1 if main activity on a typical week-day in the last 7 days was studying, etc. Hh work equals 1 if main activity was household chores, work in family business or on family farm. Weighted Least Squares (weights are inverse probability weights calculated from Table B.2) reported throughout. All regressions control for school, parental education, migration and interviewer fixed effects. Standard errors (clustered at the school level) are in parentheses. Wild cluster bootstrap p-values are in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Mechanisms of COVID-19 Effect

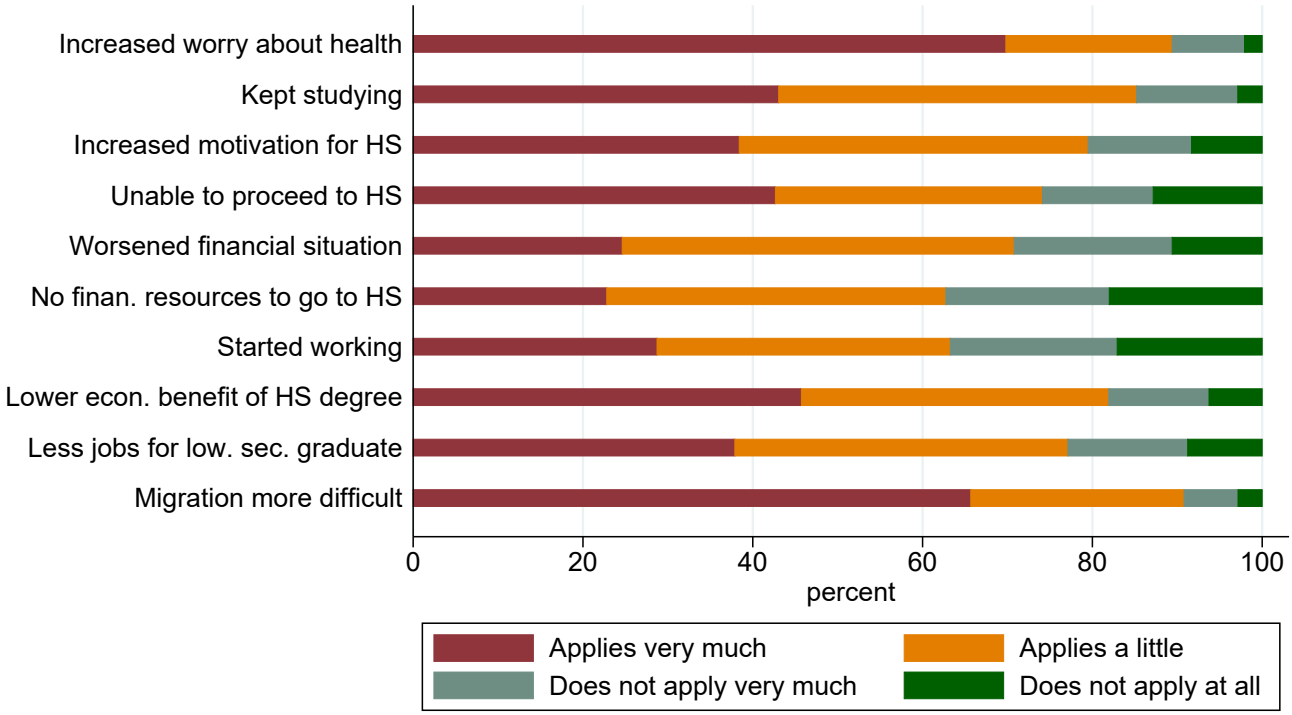
	Finan. worries		Benefits of educ.		Motiv. for school		Aspired years		Prob. of achv. lvl		Expected years	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Father exp. income loss (probability)	0.685***	0.671***	0.082	0.098	-0.125	-0.104	-0.097	0.067	-0.734*	-0.702*	-1.357**	-1.204*
	(0.223)	(0.228)	(0.113)	(0.116)	(0.151)	(0.151)	(0.498)	(0.539)	(0.410)	(0.411)	(0.592)	(0.627)
	[0.000]	[0.000]	[0.466]	[0.351]	[0.534]	[0.599]	[0.850]	[0.886]	[0.126]	[0.101]	[0.028]	[0.032]
Mother exp. income loss (probability)	-0.407	-0.413	0.035	0.049	0.064	0.072	0.459	0.458	0.995*	1.066**	0.866	0.772
	(0.272)	(0.275)	(0.189)	(0.188)	(0.254)	(0.236)	(0.699)	(0.727)	(0.547)	(0.527)	(0.745)	(0.779)
	[0.375]	[0.361]	[0.883]	[0.849]	[0.689]	[0.618]	[0.422]	[0.318]	[0.319]	[0.241]	[0.645]	[0.662]
Age (adm. data)	0.053***	0.052***	0.001	0.001	-0.031***	-0.032***	-0.118***	-0.108***	-0.078**	-0.083**	-0.156***	-0.145***
	(0.015)	(0.015)	(0.009)	(0.009)	(0.009)	(0.010)	(0.032)	(0.033)	(0.033)	(0.032)	(0.039)	(0.040)
Female student (adm. data)	0.076**	0.092**	0.030	-0.002	0.049	0.008	0.459***	0.284**	-0.093	-0.219**	0.095	-0.007
	(0.032)	(0.037)	(0.021)	(0.023)	(0.029)	(0.027)	(0.097)	(0.106)	(0.073)	(0.085)	(0.093)	(0.091)
Pre-crisis Total (std. within class)		0.039		0.055*		0.055		0.066		0.178**		0.240**
		(0.041)		(0.029)		(0.036)		(0.099)		(0.067)		(0.100)
Pre-crisis Khmer		-0.002		0.001		0.001		0.006		0.008*		-0.008**
		(0.002)		(0.001)		(0.002)		(0.006)		(0.004)		(0.004)
Pre-crisis English		-0.000		-0.000		-0.001		0.013		-0.007		0.003
		(0.003)		(0.002)		(0.002)		(0.008)		(0.006)		(0.008)
Pre-crisis Math		-0.002*		0.000		0.001		0.013***		-0.001		0.015***
		(0.001)		(0.001)		(0.001)		(0.004)		(0.003)		(0.004)
Observations	1785	1785	1767	1767	1758	1758	1772	1772	1771	1771	1771	1771
Adjusted R^2	0.098	0.100	0.034	0.047	0.072	0.091	0.117	0.156	0.034	0.052	0.121	0.154
Dep. var. mean	2.751	2.751	2.795	2.795	2.769	2.769	13.475	13.475	5.821	5.821	12.541	12.541

Notes: Dependent variable is in the column header. *Financial worries* is an index representing the level of student agreement (on a 4-point Likert scale) with statements that the COVID-19 crisis increased financial worries. The index is calculated as the average of three statements: a) "The COVID-19 crisis worsened the financial situation of my family."; b) "Because of the COVID-19 crisis, my family will not have the financial resources to allow me to go to high school."; c) "Because of the COVID-19 crisis, I had to start working in order to support my family financially.". *Benefits of education* is the average of three statements: a)"The COVID-19 crisis reduces the economic benefit of having a high school degree." (reversed); b) "There are no more well-paid jobs for lower-secondary graduates (such as in in tourism or garment) due to the COVID-19 crisis."; c) "Migrating for work is difficult due to the COVID-19 crisis.". *Motivation for school* is the average of three statements: a) "During the COVID-19 school closure I keep studying for school."; b) "My motivation to go to high school increased due to COVID-19."; c) "I am worried I will not be able to continue to grade 10 because of the COVID-19 crisis." (reversed). *Aspired years* represents the aspired educational level of the student at age 25 (expressed in years of schooling). *Probability of achieving level* is the self-reported likelihood (between 0-10) of achieving the aspired educational level. *Expected years* represents the educational level (in schooling years) the student expects to achieve at age 25. Weighted Least Squares (weights are inverse probability weights calculated from Table B.2) reported throughout. All regressions control for school, parental education, migration and interviewer fixed effects. Standard errors (clustered at the school level) are in parentheses. Wild cluster bootstrap p-values are in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

ONLINE APPENDIX

A Supplementary Figures

Figure A.1: Perceptions of COVID-19 crisis



Note: This Figure shows students' agreement on a 4-point Likert scale with 10 COVID-19 related statements. The exact wording of the statements is: 1) "The COVID-19 crisis increased my worry for my personal and my family's health."; 2) "During the COVID-19 school closure I keep studying for school."; 3) "My motivation to go to high school increased due to COVID-19."; 4) "I am worried I will not be able to continue to grade 10 because of the COVID-19 crisis."; 5) "The COVID-19 crisis worsened the financial situation of my family."; 6) "Because of the COVID-19 crisis, my family will not have the financial resources to allow me to go to high school."; 7) "Because of the COVID-19 crisis, I had to start working in order to support my family financially."; 8) "The COVID-19 crisis reduces the economic benefit of having a high school degree."; 9) "There are no more well-paid jobs for lower-secondary graduates (such as in in tourism or garment) due to the COVID-19 crisis."; 10) "Migrating for work is difficult due to the COVID-19 crisis.".

B Supplementary Tables

Table B.1: Balance Table

			Unweighted sample				Weighted sample			
	Full sample		Phone survey		Difference		Phone survey		Difference	
Variable	Mean	SD	Mean	SD	(3)-(1)	p-value	Mean	SD	(7)-(1)	p-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Age (adm. data)	15.063	(1.316)	15.017	(1.264)	-0.046	(0.202)	15.047	(1.309)	-0.015	(0.663)
Female student (adm. data)	0.529	(0.499)	0.554	(0.497)	0.026*	(0.060)	0.533	(0.499)	0.004	(0.743)
Pre-crisis Khmer	56.627	(19.021)	58.466	(18.538)	1.840***	(0.000)	56.791	(18.993)	0.165	(0.749)
Pre-crisis English	16.940	(12.484)	17.633	(12.537)	0.693**	(0.045)	17.031	(12.474)	0.090	(0.789)
Pre-crisis Math	47.833	(22.401)	49.911	(22.588)	2.078***	(0.001)	47.902	(22.397)	0.069	(0.910)
Pre-crisis Total (std. within class)	0.014	(0.902)	0.136	(0.877)	0.122***	(0.000)	0.020	(0.896)	0.006	(0.803)
Pre-crisis Absence	1.477	(1.906)	1.375	(1.892)	-0.102*	(0.062)	1.482	(2.034)	0.005	(0.934)
Teacher has uni. degree	0.486	(0.500)	0.475	(0.499)	-0.010	(0.452)	0.481	(0.500)	-0.004	(0.756)
Female Teacher	0.301	(0.459)	0.309	(0.462)	0.007	(0.571)	0.301	(0.459)	-0.001	(0.966)
Age of teacher	32.260	(6.062)	32.141	(6.088)	-0.119	(0.477)	32.249	(6.099)	-0.011	(0.946)
Dist. village to school	3.468	(3.727)	3.441	(3.742)	-0.027	(0.790)	3.417	(3.692)	-0.051	(0.611)
Dist. village to district town	11.739	(9.095)	11.766	(8.817)	0.028	(0.910)	11.874	(9.117)	0.136	(0.582)
Dist. village to province town	42.629	(29.357)	42.394	(29.734)	-0.234	(0.773)	42.280	(29.289)	-0.348	(0.661)
Dist. teacher's home to school	7.806	(9.119)	8.026	(9.044)	0.219	(0.382)	7.769	(9.098)	-0.038	(0.879)
Dist. teacher's home to student's village	8.907	(8.899)	9.170	(8.819)	0.263	(0.283)	8.921	(8.854)	0.014	(0.954)
No. of students living in 1km radius	13.440	(10.209)	13.557	(10.267)	0.117	(0.679)	13.593	(10.320)	0.152	(0.584)
Participated in final exam	0.879	(0.326)	0.948	(0.223)	0.043***	(0.000)	0.917	(0.276)	0.038***	(0.000)
Student passed final exam (cond. on part.)	0.948	(0.223)	0.947	(0.224)	-0.000	(0.946)	0.939	(0.240)	-0.009	(0.174)
Ranks in top 15% in final exam	0.131	(0.337)	0.155	(0.362)	0.024**	(0.011)	0.134	(0.341)	0.003	(0.720)
Transitioned to high school	0.830	(0.376)	0.871	(0.336)	0.041***	(0.000)	0.859	(0.348)	0.030***	(0.003)
Observations	3,258		2,197				2,197			

Notes: This table shows sample means and standard deviations for the full sample of students and students that participated in the phone survey without weights (cols. 3-4) and weighted by the inverse probability weights calculated from regression in Table B.2 (cols. 7-8). Pre-crisis Khmer, English and Math are the students' monthly grade in the subject averaged over the months December, January and February. The maximum points achievable per subject are 100, 50 and 100, respectively. Pre-crisis Total (std.) is the 3-month average total grade (sum over all subjects) with each month being standardized within class to account for differences in the number of subjects across schools/classes. Pre-crisis absence is the average number of days absent per month over the months December, January, February. Participated in final exam equals 1 if the student participated in the final exam on November 30, 2020. Student passed final exam equals 1 if the student obtained 260 points or more in the final exam (conditional on participating in the exam). Columns 5 and 6, and 9 and 10 show the difference in means and the p-value relating to t-tests of equality of means between the phone survey sample and the full sample.

Table B.2: Determinants of Participation in Phone Survey (Logit)

	(1)	
Pre-crisis Math	-0.003	(0.008)
Pre-crisis Khmer	0.003	(0.011)
Pre-crisis English	0.029***	(0.011)
Pre-crisis Math × Pre-crisis Math	0.000	(0.000)
Pre-crisis Khmer × Pre-crisis Khmer	-0.000	(0.000)
Pre-crisis English × Pre-crisis English	-0.000	(0.000)
Pre-crisis Total (std. within class)	0.430***	(0.078)
Teacher has univ. degree	-0.458***	(0.101)
Female Teacher	-0.098	(0.111)
Teacher's yrs. of experience at resp. school	0.005	(0.016)
Age of teacher	-0.019	(0.015)
Dist. teacher's home to school	0.017***	(0.006)
Priority classes=1	-0.002	(0.939)
Age (admin. data)	1.225***	(0.454)
Priority classes=1 × Age (admin. data)	0.035	(0.061)
Age (admin. data) × Age (admin. data)	-0.041***	(0.014)
Female student (admin. data)=1	-0.214**	(0.108)
Priority classes=1 × Female student (admin. data)=1	0.696***	(0.165)
Student participated in RCT	0.053	(0.134)
School district=1	0.000	(.)
School district=2	-0.149	(0.254)
School district=3	-1.587***	(0.285)
School district=4	-1.573***	(0.304)
School district=5	-0.779**	(0.341)
School district=6	0.020	(0.245)
School district=7	-0.543***	(0.201)
School district=8	-0.658**	(0.286)
School district=9	-0.624***	(0.217)
School district=10	-0.402	(0.292)
School district=11	-0.565**	(0.251)
School district=12	-0.508**	(0.239)
School partners with Child's Dream=1	-0.445**	(0.174)
Observations	3258	
Pseudo R^2	0.098	

Notes: This table shows coefficients and standard errors of a logit regression with survey participation as the dependent variable. Pre-crisis Khmer, English and Math are the students' monthly grade in the subject averaged over the months December, January and February. Pre-crisis Total (std.) is the 3-month average total grade (sum over all subjects), with each month being standardized within class to account for differences in the number of subjects across schools/classes. Priority class equals 1 whenever the class is part of the educational RCT described in Gehrke et al. (2020). Student participated in RCT equals 1 if the student participated in the intervention.

Table B.3: Student characteristics by parents with different and identical occupations

	(1)	(2)	(3)	(4)	(5)	(6)
	Different occ.		Identical occ.		Difference	
Variable	Mean	SD	Mean	SD	Diff	p-value
Age (adm. data)	14.836	(1.216)	15.110	(1.343)	0.274***	(0.000)
Female student (adm. data)	0.510	(0.500)	0.549	(0.498)	0.039	(0.126)
Pre-crisis Khmer	56.330	(18.860)	56.741	(18.935)	0.411	(0.668)
Pre-crisis Math	49.576	(22.966)	47.083	(22.183)	-2.493**	(0.029)
Pre-crisis English	17.535	(13.038)	16.754	(12.119)	-0.781	(0.215)
Pre-crisis Total (std. within class)	0.006	(0.918)	0.030	(0.874)	0.024	(0.593)
Pre-crisis Absence	1.328	(1.727)	1.444	(1.985)	0.116	(0.255)
Participated in final exam	0.929	(0.257)	0.910	(0.287)	-0.019	(0.171)
Ranks in top 15% in final exam	0.153	(0.361)	0.129	(0.335)	-0.024	(0.160)
Highschool	0.894	(0.308)	0.844	(0.363)	-0.050***	(0.005)
Owns smartphone	0.869	(0.338)	0.840	(0.366)	-0.028	(0.119)
At least one parent $\geq$ primary	0.477	(0.500)	0.302	(0.459)	-0.174***	(0.000)
Any member migrated	0.296	(0.457)	0.397	(0.489)	0.100***	(0.000)
Studied in last 7 days	0.907	(0.291)	0.871	(0.335)	-0.036**	(0.029)
Main activity in last 7 days: study	0.242	(0.429)	0.222	(0.416)	-0.020	(0.340)
Main activity in last 7 days: paid work	0.103	(0.305)	0.120	(0.325)	0.016	(0.314)
Main activity in last 7 days: hh work	0.633	(0.482)	0.633	(0.482)	-0.000	(0.998)
Main activity in last 7 days: leisure	0.019	(0.136)	0.025	(0.155)	0.006	(0.449)
Father experienced income loss	0.639	(0.481)	0.674	(0.469)	0.035	(0.144)
Mother experienced income loss	0.712	(0.453)	0.664	(0.472)	-0.048**	(0.043)
Father changed job(s)	0.161	(0.368)	0.094	(0.292)	-0.067***	(0.000)
Mother changed job(s)	0.126	(0.332)	0.087	(0.281)	-0.039***	(0.009)
Father exp. income loss (probability)	0.639	(0.140)	0.661	(0.064)	0.022***	(0.000)
Mother exp. income loss (probability)	0.707	(0.088)	0.661	(0.064)	-0.046***	(0.000)
Observations	553		1,271		2,197	

Notes: This table shows sample means and standard deviations for the group of students whose parents have different occupations and students whose parents have identical occupations. All statistics are weighted by the inverse probability weights calculated from regression in Table B.2 (cols. 7-8). Pre-crisis Khmer, English and Math are the students' monthly grade in the subject averaged over the months December, January and February. The maximum points achievable per subject are 100, 50 and 100, respectively. Pre-crisis Total (std.) is the 3-month average total grade (sum over all subjects) with each month being standardized within class to account for differences in the number of subjects across schools/classes. Pre-crisis absence is the average number of days absent per month over the months December, January, February. Participated in final exam equals 1 if the student participated in the final exam on November 30, 2020. Student passed final exam equals 1 if the student obtained 260 points or more in the final exam (conditional on participating in the exam). Columns 5 and 6 show the difference in means and the p-value relating to t-tests of equality of means between both groups.

Table B.4: Correlation of Income Shock with Family and Student Characteristics

	Migration	Mo. educ	Fa. educ	Total std.	Khmer	Math	English	No. siblings	Owns moto	Owns bike	Owns smartph.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Father exp. income loss (probability)	0.488***	0.071	-0.448***	-0.220	-2.049	-7.430	-3.107	-3.286	0.009	-0.227	-0.090
	(0.125)	(0.126)	(0.142)	(0.259)	(4.800)	(6.171)	(2.799)	(2.620)	(0.391)	(0.193)	(0.330)
	[0.019]	[0.575]	[0.057]	[0.508]	[0.598]	[0.307]	[0.403]	[0.072]	[0.964]	[0.305]	[0.700]
Mother exp. income loss (probability)	0.266	-0.144	0.179	-0.049	-6.695	2.801	0.884	0.944	0.317	-0.151	0.770*
	(0.194)	(0.174)	(0.143)	(0.369)	(5.781)	(8.127)	(2.117)	(2.109)	(0.336)	(0.229)	(0.373)
	[0.502]	[0.842]	[0.603]	[0.893]	[0.394]	[0.726]	[0.742]	[0.598]	[0.341]	[0.540]	[0.115]
Age (adm. data)	0.043***	-0.029***	-0.030***	-0.000	0.252	-0.530	-0.321*	0.156**	-0.003	-0.016	0.025
	(0.011)	(0.007)	(0.008)	(0.023)	(0.321)	(0.444)	(0.163)	(0.067)	(0.022)	(0.018)	(0.021)
Female student (adm. data)	-0.000	-0.014	-0.026	0.423***	8.844***	4.758***	2.884***	-0.031	-0.008	-0.000	-0.034
	(0.021)	(0.016)	(0.024)	(0.059)	(0.902)	(1.313)	(0.438)	(0.193)	(0.045)	(0.028)	(0.044)
Observations	1789	1789	1789	1789	1789	1789	1789	493	493	493	493
Adjusted R^2	0.167	0.118	0.134	0.072	0.405	0.362	0.624	0.162	0.093	0.125	0.057
Dep. var. mean	0.365	0.167	0.284	0.026	56.709	47.958	17.090	2.584	0.432	0.731	0.423

Notes: Migration equals 1 if at least one family member migrated in the past 12 months. Mother (father) education equals 1 if the mother (father) finished at least primary education. Total std., Khmer, Math, English are the average monthly grades from December, January, February (Total is additionally standardized within class). No. siblings is a count of the student's sibling(s). Owns moto/ bike/ smartphone equals 1 whenever the student owns a motorcycle/ bicycle/ smartphone. Weighted Least Squares reported throughout. All columns control for school and interviewer fixed effects. Col. 1 additionally controls for parental education fixed effects. Cols. 2-3 additionally control for migration fixed effects, and for father (mother) education fixed effects in col. 2 (3). Columns 4-11 additionally control for parental education and migration fixed effects. Standard errors (clustered at the school level) are in parentheses. Wild cluster bootstrap p-values are in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.5: Effect of Income Shock on Pre-crisis Consumption Levels

	(1)	(2)
Father exp. income loss (probability)	-0.400	-0.549
	(0.209)	(0.549)
	[0.387]	[0.328]
Mother exp. income loss (probability)	0.214	0.695
	(0.292)	(1.024)
	[0.689]	[0.531]
Observations	741	76
Adjusted R^2	0.165	0.128
Dep. var. mean	15.035	14.893

Notes: Dep. var. is log annual consumption expenditures (per capita). Each regression controls for district fixed effects. Data come from the Cambodian Socio-Economic Survey 2017. Sample consists of households with children aged 11-19 who live with both parents (max. one child per hh to avoid double counting households). Column 1 restricts the sample to households in rural Cambodia, column 2 to rural households in the five Northwestern provinces. Standard errors are in parentheses and clustered at the district level. Wild cluster bootstrap p-values are in brackets. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table B.6: Robustness of COVID-19 Effects: Different Grade Thresholds

	Ranked in top 20%		Ranked in top 15%		Ranked in top 10%		Ranked in top 5%	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Father exp. income loss (probability)	-0.185*	-0.108	-0.233***	-0.167**	-0.158*	-0.112	-0.100	-0.070
	(0.099)	(0.084)	(0.081)	(0.075)	(0.084)	(0.073)	(0.063)	(0.056)
	[0.203]	[0.215]	[0.091]	[0.052]	[0.118]	[0.044]	[0.114]	[0.102]
Mother exp. income loss (probability)	-0.161	-0.160	-0.078	-0.080	-0.009	-0.009	-0.027	-0.026
	(0.116)	(0.104)	(0.088)	(0.082)	(0.074)	(0.058)	(0.071)	(0.065)
	[0.289]	[0.105]	[0.494]	[0.151]	[0.947]	[0.908]	[0.849]	[0.800]
Age (adm. data)	-0.009	-0.005	-0.010	-0.007	-0.005	-0.003	-0.005	-0.004
	(0.007)	(0.006)	(0.007)	(0.006)	(0.005)	(0.005)	(0.004)	(0.004)
Female student (adm. data)	0.103***	0.002	0.079***	-0.005	0.056***	-0.007	0.043***	0.005
	(0.020)	(0.018)	(0.018)	(0.015)	(0.014)	(0.012)	(0.010)	(0.008)
Pre-crisis Total (std. within class)		0.128***		0.098***		0.088***		0.032**
		(0.027)		(0.024)		(0.024)		(0.016)
Pre-crisis Khmer		0.002		0.001		0.001		0.001**
		(0.001)		(0.001)		(0.001)		(0.001)
Pre-crisis English		0.005***		0.005***		0.004***		0.003**
		(0.002)		(0.002)		(0.001)		(0.001)
Pre-crisis Math		0.004***		0.004***		0.002**		0.002**
		(0.001)		(0.001)		(0.001)		(0.001)
Observations	1789	1789	1789	1789	1789	1789	1789	1789
Adjusted R^2	0.103	0.402	0.088	0.356	0.073	0.281	0.041	0.181
Dep. var. mean	0.188	0.188	0.138	0.138	0.090	0.090	0.046	0.046

Notes: Dependent variables are in the column header (Ranked in top 20%, top 15%, top 10% and top 5% in final exam, respectively (adm. data)). Weighted Least Squares (weights are inverse probability weights calculated from Table B.2) reported throughout. All regressions control for school, parental education, migration and interviewer fixed effects. Standard errors (clustered at the school level) are in parentheses. Wild cluster bootstrap p-values are in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.7: Robustness of COVID-19 Effects: Alternative Income Shocks

	Studied in last 7d		Part. in final exam		Ranked in top 15%		Trans. to high school	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PANEL A: Probabilities based on main occupation								
Father exp. income loss (probability)	-0.159**	-0.146*	-0.195***	-0.180**	-0.206***	-0.146*	-0.288***	-0.262***
	(0.076)	(0.074)	(0.070)	(0.068)	(0.073)	(0.074)	(0.100)	(0.094)
	[0.290]	[0.272]	[0.030]	[0.020]	[0.107]	[0.090]	[0.001]	[0.000]
Mother exp. income loss (probability)	0.165	0.174	0.262**	0.260**	-0.110	-0.112	0.280***	0.289***
	(0.112)	(0.108)	(0.124)	(0.123)	(0.086)	(0.084)	(0.103)	(0.107)
	[0.192]	[0.075]	[0.087]	[0.049]	[0.389]	[0.047]	[0.137]	[0.117]
Observations	1789	1789	1789	1789	1789	1789	1740	1740
Adjusted R^2	0.076	0.110	0.033	0.067	0.088	0.356	0.118	0.176
Dep. var. mean	0.882	0.882	0.918	0.918	0.138	0.138	0.862	0.862
PANEL B: Probabilities averaged across occupations								
Father exp. income loss (probability)	-0.153**	-0.141**	-0.197***	-0.186***	-0.226***	-0.171**	-0.273***	-0.250***
	(0.069)	(0.066)	(0.069)	(0.066)	(0.080)	(0.073)	(0.099)	(0.092)
	[0.305]	[0.274]	[0.029]	[0.014]	[0.104]	[0.058]	[0.007]	[0.002]
Mother exp. income loss (probability)	0.147	0.147	0.293**	0.285**	-0.051	-0.082	0.339***	0.334***
	(0.113)	(0.108)	(0.125)	(0.124)	(0.090)	(0.084)	(0.112)	(0.118)
	[0.236]	[0.113]	[0.069]	[0.038]	[0.679]	[0.135]	[0.085]	[0.101]
Observations	1789	1789	1789	1789	1789	1789	1740	1740
Adjusted R^2	0.076	0.109	0.033	0.067	0.087	0.356	0.119	0.176
Dep. var. mean	0.882	0.882	0.918	0.918	0.138	0.138	0.862	0.862
PANEL C: Probabilities calculated from World Bank survey								
Father exp. income loss (probability)	-0.073	-0.063	-0.149	-0.141	-0.123	-0.076	-0.271**	-0.245**
	(0.078)	(0.073)	(0.094)	(0.094)	(0.092)	(0.082)	(0.102)	(0.099)
	[0.313]	[0.366]	[0.208]	[0.213]	[0.467]	[0.482]	[0.007]	[0.006]
Mother exp. income loss (probability)	0.333*	0.267	0.598**	0.539***	-0.189	-0.343**	0.511***	0.479**
	(0.197)	(0.163)	(0.229)	(0.191)	(0.212)	(0.158)	(0.184)	(0.190)
	[0.295]	[0.296]	[0.015]	[0.010]	[0.218]	[0.048]	[0.013]	[0.059]
Observations	1766	1766	1766	1766	1766	1766	1718	1718
Adjusted R^2	0.078	0.110	0.034	0.069	0.083	0.356	0.117	0.176
Dep. var. mean	0.881	0.881	0.918	0.918	0.140	0.140	0.861	0.861
PANEL D: Student-reported income loss								
Father experienced income loss (0/1)	-0.030	-0.026	-0.017	-0.014	0.024	0.035	-0.061**	-0.058**
	(0.025)	(0.025)	(0.025)	(0.023)	(0.025)	(0.022)	(0.026)	(0.025)
	[0.183]	[0.259]	[0.504]	[0.569]	[0.537]	[0.387]	[0.058]	[0.051]
Mother experienced income loss (0/1)	0.051**	0.049**	0.058**	0.056**	-0.023	-0.035**	0.049*	0.044*
	(0.020)	(0.020)	(0.024)	(0.024)	(0.023)	(0.017)	(0.025)	(0.025)
	[0.052]	[0.047]	[0.032]	[0.034]	[0.237]	[0.291]	[0.033]	[0.031]
Observations	1789	1789	1789	1789	1789	1789	1740	1740
Adjusted R^2	0.077	0.110	0.032	0.067	0.084	0.354	0.116	0.174
Dep. var. mean	0.882	0.882	0.918	0.918	0.138	0.138	0.862	0.862
Grade controls	N	Y	N	Y	N	Y	N	Y

Notes: Dependent variables are in the column header (Studied in last 7 days (phone survey), Participated in the final exam (adm. data), Ranked in top 15% in final exam (adm. data), Transitioned to high school (adm. data)). Weighted Least Squares (weights are inverse probability weights calculated from Table B.2) reported throughout. All regressions control for age and gender, as well as for school, parental education, migration and interviewer fixed effects. Grade controls are pre-crisis average Total (std. within class), Khmer, Math and English. Standard errors (clustered at the school level) are in parentheses. Wild cluster bootstrap p-values are in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.8: Robustness of COVID-19 Effects: Alternative Specifications

	Studied in last 7d		Part. in final exam		Ranked in top 15%		Trans. to high school	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PANEL A: District and Child's Dream Partnership FE instead of school FE								
Father exp. income loss (probability)	-0.135*	-0.113*	-0.172**	-0.149**	-0.236***	-0.162**	-0.298***	-0.270***
	(0.069)	(0.065)	(0.068)	(0.067)	(0.084)	(0.071)	(0.101)	(0.094)
	[0.466]	[0.471]	[0.057]	[0.046]	[0.070]	[0.032]	[0.017]	[0.014]
Mother exp. income loss (probability)	0.209**	0.229**	0.260**	0.270**	-0.017	-0.014	0.31***	0.393***
	(0.103)	(0.102)	(0.124)	(0.127)	(0.085)	(0.089)	(0.114)	(0.123)
	[0.130]	[0.045]	[0.076]	[0.057]	[0.972]	[0.973]	[0.024]	[0.009]
Observations	1789	1789	1789	1789	1789	1789	1740	1740
Adjusted R^2	0.065	0.099	0.014	0.052	0.059	0.310	0.050	0.114
Dep. var. mean	0.882	0.882	0.918	0.918	0.138	0.138	0.862	0.862
PANEL B: No reweighing for survey non-response								
Father exp. income loss (probability)	-0.114	-0.092	-0.175**	-0.153**	-0.233***	-0.143*	-0.272***	-0.235**
	(0.071)	(0.068)	(0.069)	(0.067)	(0.086)	(0.075)	(0.092)	(0.091)
	[0.432]	[0.464]	[0.039]	[0.037]	[0.085]	[0.093]	[0.002]	[0.000]
Mother exp. income loss (probability)	0.116	0.122	0.247***	0.248**	-0.079	-0.072	0.305***	0.314***
	(0.088)	(0.087)	(0.091)	(0.094)	(0.101)	(0.078)	(0.101)	(0.106)
	[0.191]	[0.071]	[0.042]	[0.019]	[0.449]	[0.137]	[0.036]	[0.036]
Observations	1789	1789	1789	1789	1789	1789	1740	1740
Adjusted R^2	0.073	0.105	0.033	0.062	0.100	0.379	0.095	0.156
Dep. var. mean	0.889	0.889	0.922	0.922	0.159	0.159	0.874	0.874
PANEL C: Controlling for smartphone ownership								
Father exp. income loss (probability)	-0.111	-0.097	-0.183**	-0.167**	-0.233***	-0.168**	-0.299***	-0.272***
	(0.071)	(0.069)	(0.070)	(0.066)	(0.081)	(0.075)	(0.102)	(0.095)
	[0.554]	[0.563]	[0.037]	[0.023]	[0.091]	[0.056]	[0.001]	[0.000]
Mother exp. income loss (probability)	0.162	0.173*	0.306**	0.307**	-0.078	-0.077	0.355***	0.366***
	(0.102)	(0.098)	(0.122)	(0.121)	(0.091)	(0.082)	(0.101)	(0.110)
	[0.153]	[0.051]	[0.060]	[0.036]	[0.495]	[0.155]	[0.037]	[0.045]
Observations	1789	1789	1789	1789	1789	1789	1740	1740
Adjusted R^2	0.079	0.112	0.034	0.068	0.087	0.355	0.119	0.177
Dep. var. mean	0.882	0.882	0.918	0.918	0.138	0.138	0.862	0.862
PANEL D: Extending sample to households with only one working parent								
Father exp. income loss (probability)	-0.129**	-0.107*	-0.095*	-0.076	-0.216***	-0.143**	-0.177**	-0.145*
	(0.063)	(0.063)	(0.055)	(0.054)	(0.067)	(0.058)	(0.081)	(0.073)
	[0.320]	[0.321]	[0.237]	[0.381]	[0.050]	[0.036]	[0.003]	[0.085]
Mother exp. income loss (probability)	0.092	0.089	0.072	0.067	-0.028	-0.042	0.087	0.084
	(0.069)	(0.067)	(0.069)	(0.071)	(0.066)	(0.059)	(0.061)	(0.065)
	[0.221]	[0.161]	[0.496]	[0.506]	[0.531]	[0.286]	[0.509]	[0.486]
Observations	2027	2027	2027	2027	2027	2027	1974	1974
Adjusted R^2	0.066	0.098	0.032	0.064	0.092	0.363	0.115	0.172
Dep. var. mean	0.883	0.883	0.920	0.920	0.138	0.138	0.864	0.864
Grade controls	N	Y	N	Y	N	Y	N	Y

Notes: Dependent variables are in the column header (Studied in last 7 days (phone survey), Participated in the final exam (adm. data), Ranked in top 15% in final exam (adm. data), Transitioned to high school (adm. data)). Weighted Least Squares (weights are inverse probability weights calculated from Table B.2) reported in Panels A, C and D, OLS reported in Panel B. All regressions control for age and gender, as well as for parental education, migration and interviewer fixed effects. Panel A additionally controls for district and Child's Dream partnership fixed effects, Panels B, C and D for school fixed effects. Grade controls are pre-crisis average Total (std. within class), Khmer, Math and English. Standard errors (clustered at the school level) are in parentheses. Wild cluster bootstrap p-values are in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.9: Upper and lower bounds to COVID-19 Effects on High School Transition

	Missings to 0		Missings to 1	
	(1)	(2)	(3)	(4)
Father exp. income loss (probability)	-0.324***	-0.290***	-0.277***	-0.250***
	(0.112)	(0.106)	(0.097)	(0.091)
	[0.002]	[0.003]	[0.000]	[0.000]
Mother exp. income loss (probability)	0.363***	0.365***	0.340***	0.344***
	(0.123)	(0.134)	(0.100)	(0.107)
	[0.022]	[0.021]	[0.051]	[0.059]
Age (adm. data)	-0.029***	-0.028***	-0.026***	-0.025***
	(0.008)	(0.008)	(0.008)	(0.008)
Female student (adm. data)	0.008	-0.043**	-0.009	-0.050***
	(0.021)	(0.019)	(0.019)	(0.018)
Pre-crisis Total (std. within class)		0.069**		0.054**
		(0.027)		(0.025)
Pre-crisis Khmer		0.001		0.001
		(0.001)		(0.001)
Pre-crisis English		0.004**		0.003*
		(0.002)		(0.002)
Pre-crisis Math		0.001		0.001
		(0.001)		(0.001)
Observations	1789	1789	1789	1789
Adjusted R^2	0.099	0.169	0.117	0.170
Dep. var. mean	0.834	0.834	0.866	0.866

Notes: Dependent variable equals 1 if student transitioned to high school. Missing values in dependent variable replaced with 0 in columns 1-2, and replaced with 1 in columns 3-4. Weighted Least Squares (weights are inverse probability weights calculated from Table B.2) reported throughout. All regressions control for school, parental education, migration and interviewer fixed effects. Standard errors (clustered at the school level) are in parentheses. Wild cluster bootstrap p-values are in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.10: Effect of Paternal Shock on Schooling

	Studied in last 7d		Part. in final exam		Ranked in top 15%		Trans. to high school	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Father exp. income loss (probability)	-0.079	-0.054	-0.066	-0.045	-0.222***	-0.147**	-0.165**	-0.129*
	(0.065)	(0.063)	(0.067)	(0.065)	(0.065)	(0.061)	(0.079)	(0.074)
	[0.569]	[0.629]	[0.656]	[0.650]	[0.054]	[0.049]	[0.161]	[0.172]
Age (adm. data)	-0.019***	-0.020***	-0.012**	-0.013**	-0.009	-0.008*	-0.024***	-0.024***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.007)	(0.007)
Female student (adm. data)	0.072***	0.043**	-0.003	-0.025**	0.071***	-0.009	-0.007	-0.048***
	(0.018)	(0.017)	(0.012)	(0.011)	(0.018)	(0.014)	(0.017)	(0.016)
Pre-crisis Total (std. within class)		0.047***		0.039**		0.091***		0.058**
		(0.017)		(0.018)		(0.023)		(0.025)
Pre-crisis Khmer		0.001		0.000		0.001		0.001
		(0.001)		(0.001)		(0.001)		(0.001)
Pre-crisis English		-0.001		-0.000		0.005***		0.002
		(0.001)		(0.001)		(0.002)		(0.002)
Pre-crisis Math		0.001		0.001		0.004***		0.001
		(0.001)		(0.001)		(0.001)		(0.001)
Observations	2033	2033	2033	2033	2033	2033	1980	1980
Adjusted R^2	0.065	0.097	0.030	0.062	0.094	0.361	0.111	0.169
Dep. var. mean	0.883	0.883	0.920	0.920	0.137	0.137	0.864	0.864

Notes: Notes: Dependent variables are in the column header (Studied in last 7 days (phone survey), Participated in the final exam (adm. data), Ranked in top 15% in final exam (adm. data), Transitioned to high school (adm. data)). Weighted Least Squares (weights are inverse probability weights calculated from Table B.2) reported throughout. All regressions control for school, parental education, migration and interviewer fixed effects. Standard errors (clustered at the school level) are in parentheses. Wild cluster bootstrap p-values are in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table B.11: Effect of Maternal Shock on Schooling

	Studied in last 7d		Part. in final exam		Ranked in top 15%		Trans. to high school	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mother exp. income loss (probability)	0.144	0.153	0.228*	0.230*	-0.161*	-0.149*	0.209**	0.223**
	(0.113)	(0.108)	(0.121)	(0.119)	(0.081)	(0.076)	(0.097)	(0.106)
	[0.419]	[0.309]	[0.014]	[0.019]	[0.099]	[0.107]	[0.182]	[0.194]
Age (adm. data)	-0.019***	-0.020***	-0.010	-0.009	-0.010	-0.007	-0.022***	-0.021***
	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)	(0.008)	(0.008)
Female student (adm. data)	0.091***	0.059***	0.003	-0.021	0.075***	-0.008	0.001	-0.040**
	(0.017)	(0.017)	(0.014)	(0.013)	(0.018)	(0.015)	(0.020)	(0.019)
Pre-crisis Total (std. within class)		0.049***		0.044**		0.097***		0.050*
		(0.016)		(0.021)		(0.023)		(0.029)
Pre-crisis Khmer		0.001		-0.000		0.001		0.001
		(0.001)		(0.001)		(0.001)		(0.001)
Pre-crisis English		-0.001		0.000		0.005***		0.004**
		(0.001)		(0.001)		(0.002)		(0.002)
Pre-crisis Math		0.001		0.001		0.004***		0.001
		(0.001)		(0.001)		(0.001)		(0.001)
Observations	1917	1917	1917	1917	1917	1917	1867	1867
Adjusted R^2	0.078	0.113	0.031	0.069	0.084	0.353	0.127	0.188
Dep. var. mean	0.880	0.880	0.916	0.916	0.137	0.137	0.858	0.858

Notes: Dependent variables are in the column header (Studied in last 7 days (phone survey), Participated in the final exam (adm. data), Ranked in top 15% in final exam (adm. data), Transitioned to high school (adm. data)). Weighted Least Squares (weights are inverse probability weights calculated from Table B.2) reported throughout. All regressions control for school, parental education, migration and interviewer fixed effects. Standard errors (clustered at the school level) are in parentheses. Wild cluster bootstrap p-values are in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.