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COVID-19 shock**

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Abstract

People in developing economies face substantial income risks and use diverse strategies to mitigate the negative welfare impact. Rural households often send migrants to diversify income sources and depend on remittances to cope with income risks. To examine the risk-coping mechanism of urban migrants and their rural families against the aggregate shock due to the COVID-19 pandemic, we analyze the seven-round Bangladeshi household panel covering the period before and after the first implementation of COVID-19 lockdown policies. Our event study finds that urban migrants experienced more substantial income loss than their rural families and reduced but not ceased remittances to cope with the aggregate shock jointly. Notably, mobile money services allowed them to continue sending remittances even under the lockdown policies.

Keywords: migrants, remittances, risk coping, aggregate shock, mobile money, COVID-19

JEL code: O12, O15, F23

1. Introduction

People in developing economies face substantial risks, such as sickness of family members, crop pests and diseases, and erratic rainfalls. However, rural households have inadequate assets to cope with these shocks fully, intra-village informal insurance is often imperfect, and formal insurance is unavailable (Dercon, 2002; Rosenzweig, 1988; Townsend, 1994, 1995). Thus, they usually send migrants to urban areas to diversify income sources and rely on migrants' remittances to smooth consumption (De Janvry & Sadoulet, 2016; Lagakos, 2020; UNDP, 2009; World Bank, 2020a). Indeed, remittances enable rural households to meet daily needs (De Weerd & Dercon, 2006; Lucas & Stark, 1985; Rosenzweig & Stark, 1989) and cope with health and weather shocks (De Weerd & Dercon, 2006; Gröger & Zylberberg, 2016). Recently, there is a renewed scholarly interest in remittances because of the increased use of mobile money¹ in developing countries, dramatically reducing the cost of sending and receiving remittances (Aron, 2018; Jack & Suri, 2014; Munyegera & Matsumoto, 2016; Riley, 2018; UNDP, 2012).

Nevertheless, the existing studies typically focus on rural households' welfare and pay insufficient attention to migrant workers' welfare, e.g., whether intra-family remittances also help migrant workers to cope with shocks. This study attempts to address this gap by simultaneously examining the shock-coping behaviors of migrant workers in urban areas and their families in rural areas in Bangladesh under the COVID-19 pandemic. The spread of COVID-19 and related containment policies substantially reduced the employment and earnings opportunities, particularly in urban areas, and affected migrant workers' welfare probably more severely than rural households'

¹ Mobile money is an innovative technology that allows people to receive, store, and spend money using a mobile phone and has been increasingly used in developing economies (See, for example, Aron, 2018).

(World Bank, 2020a). In Bangladesh, the first cases of COVID-19 were reported on March 8, 2020,² and the government declared the nationwide lockdown and imposed movement restrictions on March 26, 2020, to contain the pandemic. Furthermore, with the earlier outbreak of COVID-19 in Europe and the United States, apparel companies in these countries suddenly canceled or postponed export orders from the garment factories in Bangladesh.³(Hossain, 2019) Consequently, urban migrant workers, particularly in the export sector, faced the closure of their workplaces and lost their earning opportunities for an extended period.

This study explores how domestic migrant workers and their rural families responded to and shared these shocks associated with the COVID-19 pandemic. We thus analyze a seven-round panel of 723 pairs of migrant workers of garment factories in Dhaka and their families in the rural area. The panel survey, which collected information such as income, consumption, and remittances roughly every three months, covers two years from October 2018 to August 2020, five rounds before and two rounds during and after the COVID-19 national lockdown through phone interviews.⁴ We adopt an event study approach to find how the migrant workers and their rural families responded to a significant drop in income under the COVID-19 pandemic. We find that the migrant workers reduced but not ceased their remittances to rural families. Consequently, both the migrant workers and their rural families shared the income shock. They prevented a considerable reduction of consumption of the urban migrant workers as well as their rural families. Notably, the migrant workers managed to send remittances to rural families via mobile money services despite travel restrictions under the COVID-19 pandemic.⁵

² The cumulative number of confirmed cases exceeded 0.74 million, which is the second-worst in South Asia after India, according to World Meters (<https://www.worldometers.info/coronavirus/#countries>: last access April 25, 2021).

³ The garment industry accounts for over 80% of Bangladesh's export (Hossain, 2019).

⁴ The phone interviews allow researchers to contact many remote and dispersed populations with a feasible logistics operation (Dabalén et al., 2016).

⁵ Bangladesh has shown high growth in mobile penetration, which reached 87% in 2017 (GSMA, 2018).

The main contribution of this study is to shed light on the shock-coping strategies of migrant workers and their rural families against the unprecedented aggregate shock. McKenzie (2003) shows that internal remittances and other strategies to cope with idiosyncratic shocks failed to cope with an aggregate shock of the Mexican peso crisis. Gröger & Zylberberg (2016) document that rural households in Vietnam coped with a catastrophic typhoon through long-distance migration and remittances. Furthermore, earthquakes in Pakistan and rainfall shocks and hurricanes in the Philippines increased remittances from abroad (Suleri & Savage, 2006; Yang & Choi, 2007; Yang, 2008). Our study contributes to the literature by showing that urban migrant workers and their rural families jointly coped with the aggregate shock. They smoothed food consumption fully and more general consumption partially—on both sides of migrants and rural families—by adjusting remittances from migrants to rural families in the face of the COVID-19 pandemic.

Secondly, this study also contributes to the literature on the consumption smoothing of migrant workers. To our knowledge, few empirical studies have investigated whether migrant workers receive insurance from rural families and their findings are mixed. De Weerd & Hirvonen (2016) present that rural families did not bear migrants' adverse shocks in Tanzania, suggesting a unilateral risk-sharing, whereas Millán (2020) documents a bilateral risk-sharing network in which rural-to-urban migrants are insured in Nicaragua. The current study adds to the literature by providing empirical evidence of bilateral risk sharing.

The third strand of the related literature examines how mobile money facilitated urban-to-rural remittances and consumption smoothing against shocks. Jack & Suri (2014) find that remittances through mobile money help smooth consumption against idiosyncratic shocks such as illness. Riley (2018) finds that remittances through mobile money successfully smooth consumption against weather shocks, including droughts and floods. We find that the adoption of mobile money allowed urban migrants to continue sending remittances through mobile money despite the travel restrictions of COVID-19 lockdown policies, which in contrast, hindered hand-carry remittances.

The rest of this paper is organized as follows. Section 2 provides the background of the COVID-19 pandemic and the emergence of mobile money services in Bangladesh. Section 3 describes the panel survey and the data collected. Section 4 proposes the empirical strategies. Section 5 presents the estimation results regarding the urban migrants' and their rural families' responses to the COVID-19 shock. Section 6 concludes the paper.

2. Background

COVID-19 pandemic and containment policies⁶

Shortly after the arrival of COVID-19 in March 2020, the Bangladesh government embarked on a lockdown. The first case was confirmed on March 8, 2020, and the Bangladesh government closed all the educational institutions on March 17. On March 23, the government announced the closure of all public and private offices from March 26 (i.e., lockdown⁷), and they implemented it accordingly. Initially, the lockdown was planned to end on April 4 but was extended to April 11. Eventually, the lockdown was extended seven times and continued until May 30. The government gradually lifted the lockdown by easing restrictions and reopening factories, markets, and offices except for educational institutions.⁸ The garment factories—the leading industry of Bangladesh—reopened on April 27.

⁶ The information related to the lockdown was drawn from the following websites: (i) <https://tbsnews.net/coronavirus-chronicle/COVID-19-bangladesh/general-holiday-not-extend-further-state-minister-85870>; (ii) https://spc.jst.go.jp/experiences/asiaplan/asiaplan_2032.html; (iii) <https://tbsnews.net/bangladesh/education/govt-orders-closure-all-educational-institutions-march-17-56947>; (iv) <https://www.business-humanrights.org/en/latest-news/bangladesh-500-garment-factories-reopen-amid-COVID-19-risks/>; (v) <https://www.aa.com.tr/en/asia-pacific/bangladesh-imposes-new-restrictions-on-public-movement/1828684>

⁷ The government called the lockdown “general holidays.”

⁸ Educational institutions have remained shut since March 16, 2020. The closure was extended several times, and most recently, until July 31, 2021.

During the lockdown, the government restricted public movement and ordered people to stay home except for emergencies such as medical needs, treatment, and funerals. Travel on water, rail, and air routes was banned, and road transportation was suspended. People were not allowed to go out from 8 p.m. to 6 a.m. Nevertheless, experts doubted the practicality and effectiveness of social distancing and staying at home for a densely populated country like Bangladesh. Indeed, most COVID-19 cases spread from Dhaka to all over the country quickly during the lockdown (Shammi, Bodrud-Doza, Islam, & Rahman, 2020).⁹ Given the failure, the government shifted from the nationwide lockdown to the flexible area-wise lockdown.

Pandemic influence on the garment sector in Bangladesh

Europe and the U.S. account for 80% of Bangladesh's exports; the economic downturn in the western countries critically affects the Bangladeshi economy (The Financial Express, 2020b).¹⁰ Because of the early COVID-19 outbreak and the lockdown policies in Europe and the U.S. in February 2020,¹¹ Bangladesh's exports substantially dropped by 20.1% year-on-year in March, 85.2% in April, and 62.0% in May (Anner, 2020). When the western economy recovered from the first wave of the COVID-19 outbreak around May (German press agency, 2020),¹² the exports quickly recovered after June.¹³ The year-on-year decline in export was only 11.1% in June and 2.1 % in July. Further, in August, the exports showed a sharp rebound of 45.3% year-on-year growth.

Due to the declining global orders that began in late February 2020, the garment workers experienced dismissal, furlough, back-pay, or partial payment of their salaries (NPR, 2020; The Daily

⁹ Despite the lockdown, people moved from the capital city to villages, and the COVID-19 quickly spread to the rural areas.

¹⁰ The garment industry contributes over 80 percent of the exports (Hossain, 2019).

¹¹ The United States declared public health emergency on February 3, 2020 (AJMC, 2020), and the first COVID-19 lockdown in Europe was implemented in Italy on February 21, 2020 (Metro, 2020).

¹² Italy ended its national lockdown in May 2020 (German press agency, 2020), while Britain also began easing its lockdown in May (BBC News, 2020).

¹³ A table of the export values is given in Appendix A.

Star, 2020). On March 25, 2020, the Prime Minister of Bangladesh announced a 588 million USD stimulus package for the garment industry to cover the salaries and wages of the workers (BenarNews, 2020). Still, factory owners did not pay the full salaries, nor did they pay on time. Some garment workers could no longer survive in Dhaka and returned to their home villages (World Economic Forum, 2020). Other thousands of garment workers blocked streets or highways demanding their unpaid wages (Reuters, 2020a). The government responded to this protest by warning factory owners to complete wage payments in March (Reuters, 2020b). The government also announced that it would pay at least 60% of April's salary to the workers of the temporarily closed factories (The Financial Express, 2020c). On April 27, the government granted garment factories to resume operation, and the workers returned to work (Aljazeera, 2020).

Mobile money in Bangladesh

Mobile money service companies in Bangladesh started to operate in 2011 (GSMA, 2016), and the proportion of mobile money access among adults increased rapidly from 22% in 2013 to 45% in 2017 (Financial inclusion insights, 2018). The penetration was fast because most adults (87 % in 2017) in Bangladesh had mobile phones (GSMA, 2018).¹⁴ In contrast, only 20% of adults owned bank accounts (GSMA, 2016).

Nevertheless, only less than half of the mobile money users owned their mobile money accounts (Financial inclusion insights, 2018).¹⁵ Instead, the rest of the users ask local mobile money agents to manage mobile money on their behalf and receive cash from the agents. In our sample (n=6,318), 73.1% of the garment workers, who regularly remitted money to rural families, used mobile money in 2018, and 49.6% owned their mobile money account. These figures are higher than those

¹⁴ GSMA (2014) explains the situation of mobile phone penetration in Bangladesh as follows: “*Bangladesh is a country ahead of its time in terms of mobile access. Despite being ranked as a low income country, mobile penetration levels are relatively high, even in rural areas*”.

¹⁵ While mobile money users account for 45% of the population, mobile money account holders account for 18%. The urban-rural gap in the account ownership is narrow, 21% in urban and 17% in rural population.

from the Global Findex report 2017 because migrant workers are more regularly remit than ordinary people.

3. Survey and data

This study analyzes a seven-round panel on migrant workers in the garment industry in Dhaka and their rural families. The data covers two years from October 2018 to August 2020, five rounds before and two rounds during and after the first implementation of the COVID-19 lockdown policies (see Table 1). Unlike existing studies interviewing only rural households (De Weerd & Dercon, 2006; Jack & Suri, 2014), we interviewed both the migrants (we call them the Dhaka households) and the village households that the migrants most frequently remit to. Thus, the data allows us to scrutinize how migrants and their rural families jointly coped with the aggregate shock due to the COVID-19 pandemic.

Table 1. Overview of EduMatch survey

	Pre-baseline survey	Baseline survey Round 1	Follow-up Round 2	Follow-up Round 3	Follow-up Round 4	Follow-up Round 5	Follow-up Round 6	Follow-up Round 7
Interview Periods	12/12/2017~8/10/2018	10/21/2018~11/30	4/19/2019~6/28	7/7/2019~8/20	9/13/2019~10/26	12/5/2019~1/1/2020	3/20/2020~5/16	7/20/2020~8/30
Dhaka Notes on HHs interviewed on different dates		40 HHs interviewed on 1/5/2019 ~ 4/17		One HH interviewed on 9/19/2019		Ten HHs interviewed on 1/22/2020~1/30		
# of HHs	6318	723	545	686	661	622	595	546
# of HHs returned to villages								111
Village Notes on households interviewed on different dates		40 HHs interviewed on 1/3/2019~6/24		Four HHs interviewed on 9/22/2019~9/30	Four HHs interviewed on 11/9/2019~11/20	33 HHs interviewed on 1/22/2020~1/30		
# of HHs		672	533	692	632	660	628	643

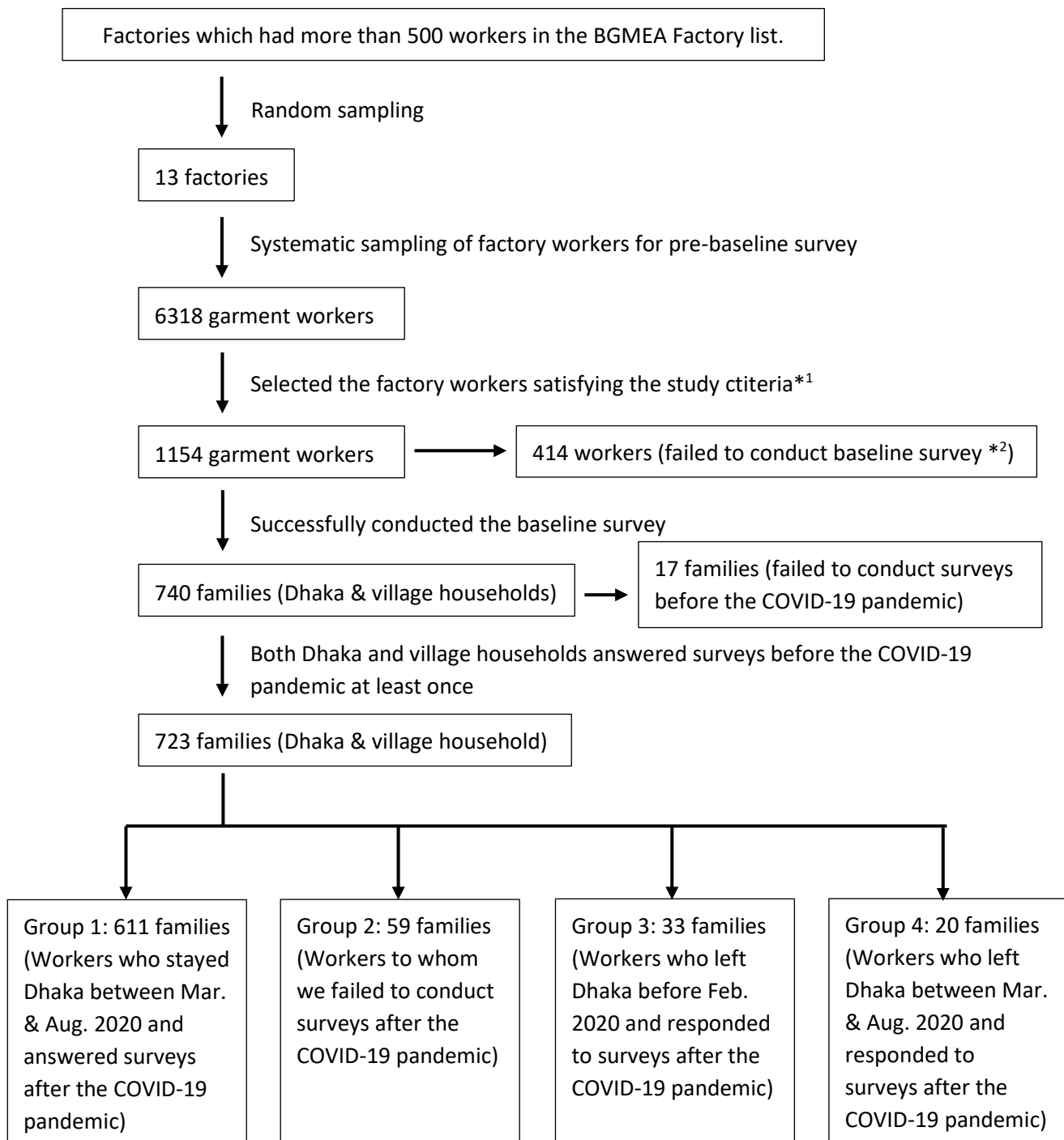
Note: The attrition rate for the Round 2 survey is relatively high because it was the first phone survey. We improved the survey implementation procedure in the following rounds.

We started the data collection initially to assess the impact of remittances on educational investment and children’s academic performance (“EduMatch project”). At 13 randomly selected large garment factories in Dhaka, we sampled migrant workers who (i) regularly remit to rural families and (ii) finance education of children left in villages.

Figure 1 describes the sampling procedures. We conducted face-to-face interviews with the migrant workers in the pre-baseline and baseline surveys. In the remaining surveys, we conducted phone interviews. As for the village households, we conducted interviews over the phone in the baseline and follow-up surveys. Figure 2 presents the locations of the garment factories and the village households.¹⁶

¹⁶ The survey details are given in Appendix B.

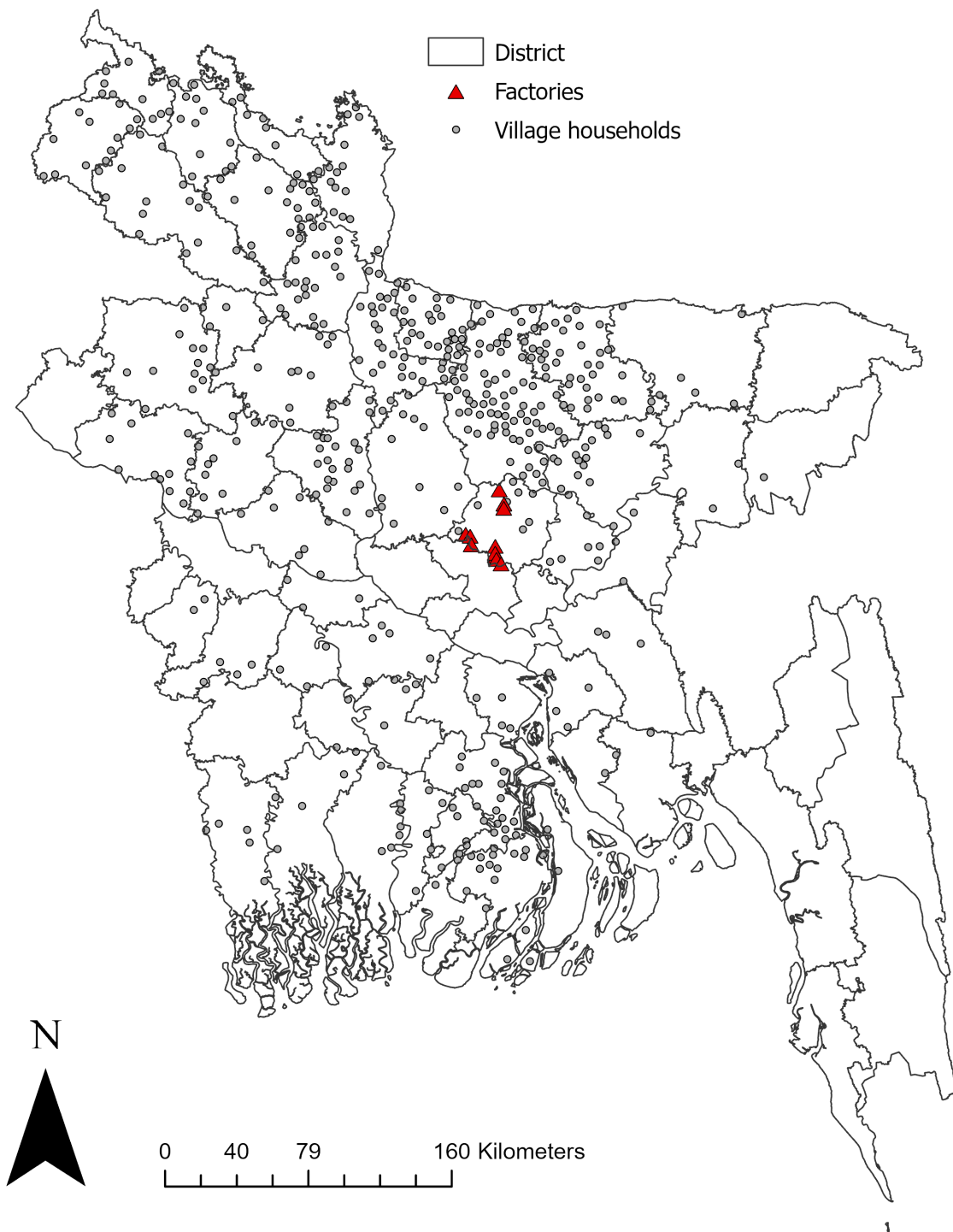
Figure 1. Sampling and contacting respondents before and after COVID-19 pandemic



*1 The study criteria are shown in Appendix B.

*2 Or not eligible for the EduMatch program.

Figure 2. Location of factories and village households

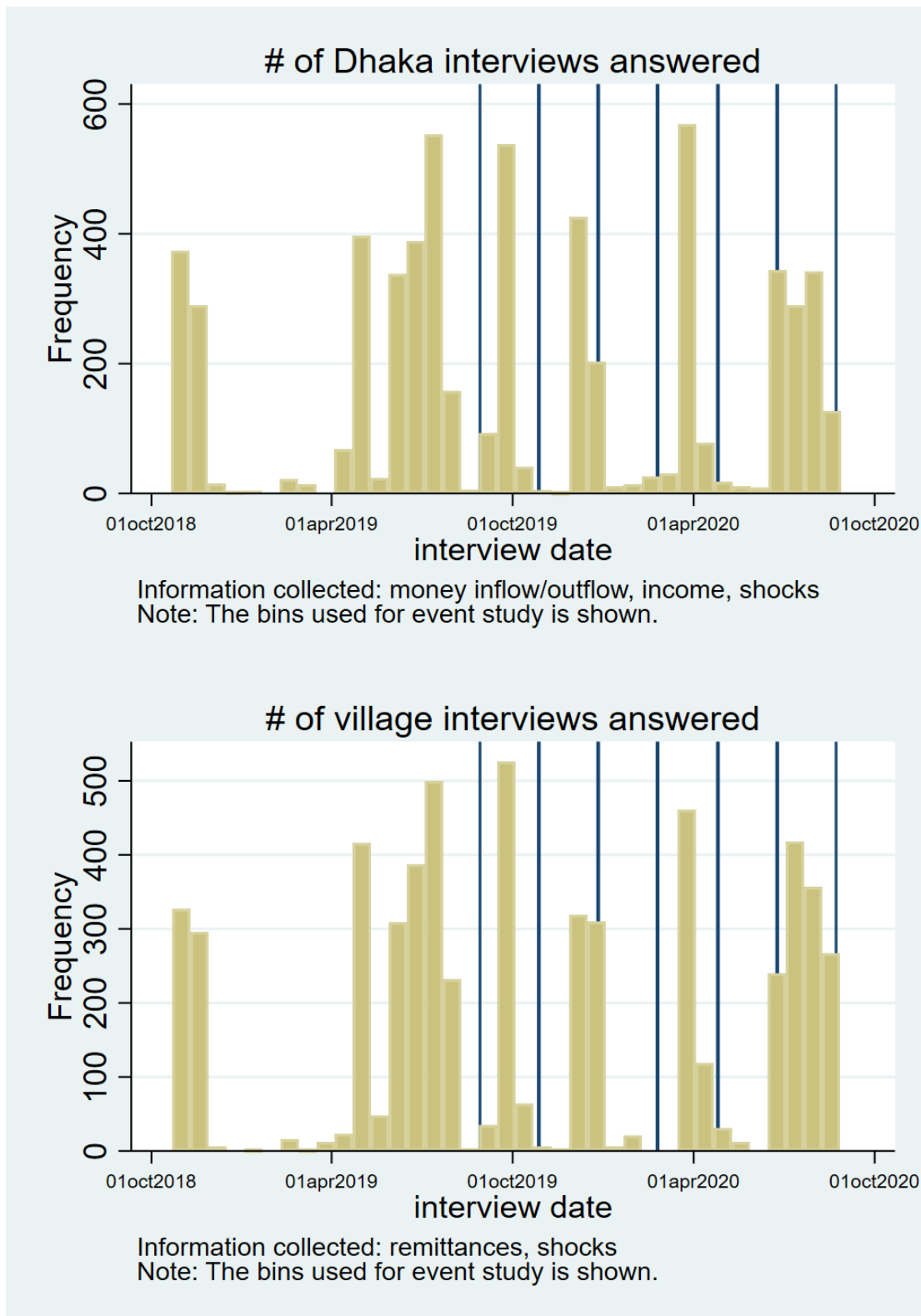


Notes: The location information is derived from the survey in round seven.

The entire sample consists of 723 pairs of the Dhaka households and their corresponding village households,¹⁷ both of which responded at least once before the COVID-19 pandemic (Table 1). The lockdown started on March 26, 2020, during the Round 6 survey. We conducted the Round 7 survey after the lockdown ended on May 30. Figure 3 presents the timing and frequency of interviews by the interview dates and the bins used in our event study—explained in the following section.

¹⁷ We interviewed 740 families in the baseline survey. For 17 families, we could only contact either the migrant workers or the village households until the Round 5 survey. We exclude these households from analysis because we want to examine the shock-coping behaviors of both the migrants and village households simultaneously.

Figure 3. Histogram of the number of interviews (with Dhaka respondents and village respondents) by interview dates



Notes: 1) March 26th, 2020 was the date of implementation of the lockdown in Bangladesh. 2) The bins for the event studies are shown.

In the course of the panel survey, attritions occur due to missed phone connections for interviews or relocations of the target households at different timings. There are complete 611 cases in which we successfully collected information from both the Dhaka households and their corresponding village households before and after the COVID-19 lockdown. However, there are 112 cases of attritions. We attempt to address possible attrition biases with several methods described in the next section.¹⁸

Tables 2 and 3 present baseline characteristics of the Dhaka households and their corresponding village households collected from October to November 2018.¹⁹ The characteristics are separately displayed by the attrition status of the Dhaka households: 1) the non-attriting sample of Dhaka households, which continuously stayed in Dhaka and were successfully tracked until the Round 7 survey (Group 1 in Figure 1) and 2) the attriting sample of Dhaka households, which moved outside of Dhaka or were failed to be tracked (Groups 2, 3, and 4 in Figure 1). Among the non-attriting sample (Column 1 in Table 2), the Dhaka workers are 29 years old on average; 57% are male; 77% are married; 65% are household heads. These households have two household members, earn a total monthly income of over 15,000 Taka (or 188 USD),²⁰ spend over 10,000 Taka on monthly consumption, and remit 3,000 Taka monthly. About 80% of them used mobile money in October 2018, while almost 100% used mobile money one year later, right before the COVID-19 pandemic. The Dhaka workers in the attriting sample (Column 2 in Table 2) are significantly younger, more likely to be female, and less likely to be married than the Dhaka workers in the non-attriting sample. Furthermore, they have fewer household members and consume less than the non-attriting sample.

¹⁸ Appendix C explains the attritions in detail.

¹⁹ For households that did not respond to the round 1 survey but responded to the following surveys (round 2~5), values answered at the following surveys are used as the baseline characteristics for complementation.

²⁰ 1 USD = 81.7 Taka in January 2019.

Table 2. Baseline characteristics of Dhaka households by Dhaka household attrition status

Variable	N	(1)	N	(2)	Diff in mean (1)-(2)
		The non-attribing sample Mean/SD		The attriting sample Mean/SD	
Dhaka households					
Age of the Dhaka worker	611	28.856 [6.689]	112	26.652 [6.336]	2.204***
1 if the Dhaka worker is male	611	0.565 [0.496]	112	0.429 [0.497]	0.136***
1 if the Dhaka worker is married	611	0.768 [0.423]	112	0.634 [0.484]	0.134***
1 if the Dhaka worker is household head	611	0.655 [0.476]	112	0.580 [0.496]	0.074
# of household members in Dhaka	611	2.013 [0.956]	112	1.830 [0.815]	0.183*
1 if using mobile money	611	0.823 [0.382]	112	0.821 [0.385]	0.002
Household income of last 30 days (Taka)	611	15484.710 [5748.215]	112	15532.634 [6519.007]	-47.924
Consumption of last 30 days (Taka)	611	10340.616 [3721.261]	112	9617.301 [3517.172]	723.315*
Amount of remittances sent to village HH (last 30 days) (Taka)	611	3064.746 [2707.509]	112	3205.357 [2591.178]	-140.611

Notes: 1) The value displayed for t-tests are the differences in the means across the groups. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level. 2) Taka is the currency of Bangladesh. As of December 21st, 2020, 1 USD is 85 Taka.

Table 3. Baseline characteristics of village households by Dhaka household attrition status

Variable	N	(1)	N	(2)	Diff in mean (1)-(2)
		The non-attribing sample Mean/SD		The attriting sample Mean/SD	
Village households					
Age of HH head	611	54.227 [13.304]	112	54.545 [11.532]	-0.317
1 if HH head is male	611	0.728 [0.445]	112	0.723 [0.449]	0.005
1 if HH head is married	611	0.828 [0.378]	112	0.813 [0.392]	0.016
HH head: wife/husband/son/daughter of the Dhaka worker (=1)	611	0.074 [0.261]	112	0.045 [0.207]	0.029
HH head: father/mother/brother/sister/grandfa/grandmo of the Dhaka worker (=1)	611	0.710 [0.454]	112	0.723 [0.449]	-0.013
HH head: (In law) father/mother/brother/sister of the Dhaka worker (=1)	611	0.187 [0.390]	112	0.214 [0.412]	-0.028
# of household members	611	4.597 [1.611]	112	4.563 [1.626]	0.035
1 if using mobile money	611	0.866 [0.341]	112	0.821 [0.385]	0.044
Total value of assets per HH member (Taka)	611	3857.787 [4971.054]	112	3888.132 [4570.210]	-30.345
Total value of productive assets per HH member (Taka)	611	4921.773 [8212.589]	112	4489.689 [6072.310]	432.084
Consumption of last 30 days (Taka)	611	12525.885 [6322.756]	112	12134.615 [5006.142]	391.270
F-test of joint significance (F-stat)					1.496**
F-test, number of observations					723

Notes: 1) The value displayed for t-tests are the differences in the means between the groups. The value displayed for F-test is the F-statistic of the joint significance test for 49 baseline characteristics between the groups, including not only those shown in Table 2 and 3 but also the unreported observables. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level. 2) Taka is the currency of Bangladesh. As of December 21st, 2020, 1 USD is 85 Taka.

In Table 3, the baseline characteristics of village households are similar between the non-attributing and the attributing samples. The heads of village households are 54 years old on average; 72% are male; 82% are married. The village households have 4.6 members on average and consume 12,000 Taka worth of goods and services per month. About 86% of the village households used mobile money at the baseline, while almost 100% used it one year later. Note that about 70% of the village household heads are the migrant workers' parents or siblings, while 20% of them are the migrant workers' parents-in-law or siblings-in-law. In other words, some migrant workers regularly remit to support their spouses' families in our sample. In contrast, most existing studies focus only on migrant-sending households (De Weerd & Hirvonen, 2016; Millán, 2020).

Some baseline characteristics of the non-attributing and attributing samples are statistically different in their mean values, as shown in Column 3 in Tables 2 and 3. We also observe the joint significance of the differences in the full list of the baseline characteristics between the attributing and non-attributing samples, reflected in the significant F-value.²¹ In addition, we conduct an analogous joint significance test of the baseline characteristics by the attrition status of the village households and find that they are significantly different.²² We address possible attrition biases in the analysis below.

4. Empirical strategies

We analyze how Dhaka households (or village households) responded to the COVID-19 pandemic and containment policies by estimating the following equation:

$$y_{hbt} = \sum_{k=-3}^{k=3} \beta_k E_k + \mu_h + \gamma_b + \omega_t + \epsilon_{hbt}, \quad (1)$$

where y represents outcome variables of Dhaka household (or village household) h in two-month season b in year t , E_k the event study dummy, indicating time windows before or after the starting

²¹ The joint significance test is conducted by using the complete set of the baseline characteristics of both the Dhaka households and the village households. The full list of the baseline characteristics is presented in Table A1 in Appendix C.

²² A baseline characteristics table by the attrition status of the village households, including the joint-test result, are shown in Table A2 in Appendix C.

date of the lockdown (March 26, 2020). More precisely, E_{-3} to E_3 corresponds to each of the following period, respectively; [-542, -211], [-150, -91], [-90, -31], [-30, +30], [+31, +90], [+91, +150], [+151, +158], where the two numbers in a bracket indicate the first and the last day of the window period E_k counted from the day 0, or March 26, 2020. We set period [-210, -151] (i.e., October 27 to December 26, 2019) as the reference period.²³ We define the event dummy E_0 to represent [-30, +30] instead of [0, +60] because the drop in the garment export demand due to the COVID-19 pandemic started before the beginning of the lockdown.²⁴ It is worth noting that, in this specification, the coefficient of the event dummy E_0 will capture the difference in the outcome variables of Dhaka households (or village households) in the period of 30 days before and after the implementation of the lockdown in comparison with those in the reference period. The household fixed effect is denoted by μ_h ; γ_b denotes the bi-monthly season effect, ω_t the year effect, and ϵ_{hbt} the random error term.²⁵

The non-random attrition discussed in the previous section may bias the estimated coefficient. To address possible attrition biases, we adopt the inverse probability weighting (IPW) method (Wooldridge, 2011). Specifically, we run probit regressions of non-attrition of the Dhaka households and the village households, respectively. Then, we estimate regression Equation (1) using the inverse of the predicted non-attrition probability of the Dhaka households and the village households—respectively for regressions on each side—as weight.²⁶

We do not claim that this event study is for causal inference because the pandemic affected the entire sample and also because we do not make counterfactual comparisons. However, we can still make before-after comparisons under control for household-specific unobserved time-invariant factors

²³ Note that most of the outcome variables capture activities of the past 30 days from the interview dates. For example, a figure reported at an interview conducted on March 26th, 2020, is equal to the activity of [-30, 0] days relative to the lockdown implementation.

²⁴ To examine the robustness of this approach, we also analyzed the data by dividing the period [-30, +30] into two subperiods: [-30, -1] and [0, +30] and present the results in Appendix D. We discuss the results using this alternative definition in Section 5.

²⁵ Because the baseline survey started in October 2018, we define the year dummy taking one from October 2019 to September 2020 and zero from October 2018 to September 2019.

²⁶ See Appendix E for the estimation results of the first-stage probit regressions.

by exploiting the household-level panel structure of the data. Moreover, we can test the validity of our event study by checking the pre-trend. For example, a significant coefficient β_{-1} implies that our control variables are inadequate to obtain causal evidence.

In the regressions of the Dhaka households, standard errors are clustered at the household level, and there are about 700 clusters. In the regressions of the village households, standard errors are clustered at the Upazila level, the minimum administrative unit, and there are about 230 Upazila clusters.

5. Empirical results

We use the regression analyses to describe the COVID-19 pandemic shock to various economic activities of the migrant households and village households. In particular, we are interested in the change in the trend of their remittances and consumption before and after the implementation of the lockdown policy. The figures below present the estimated coefficients of the event dummies with 95% confidence intervals.²⁷

COVID-19 shock to income

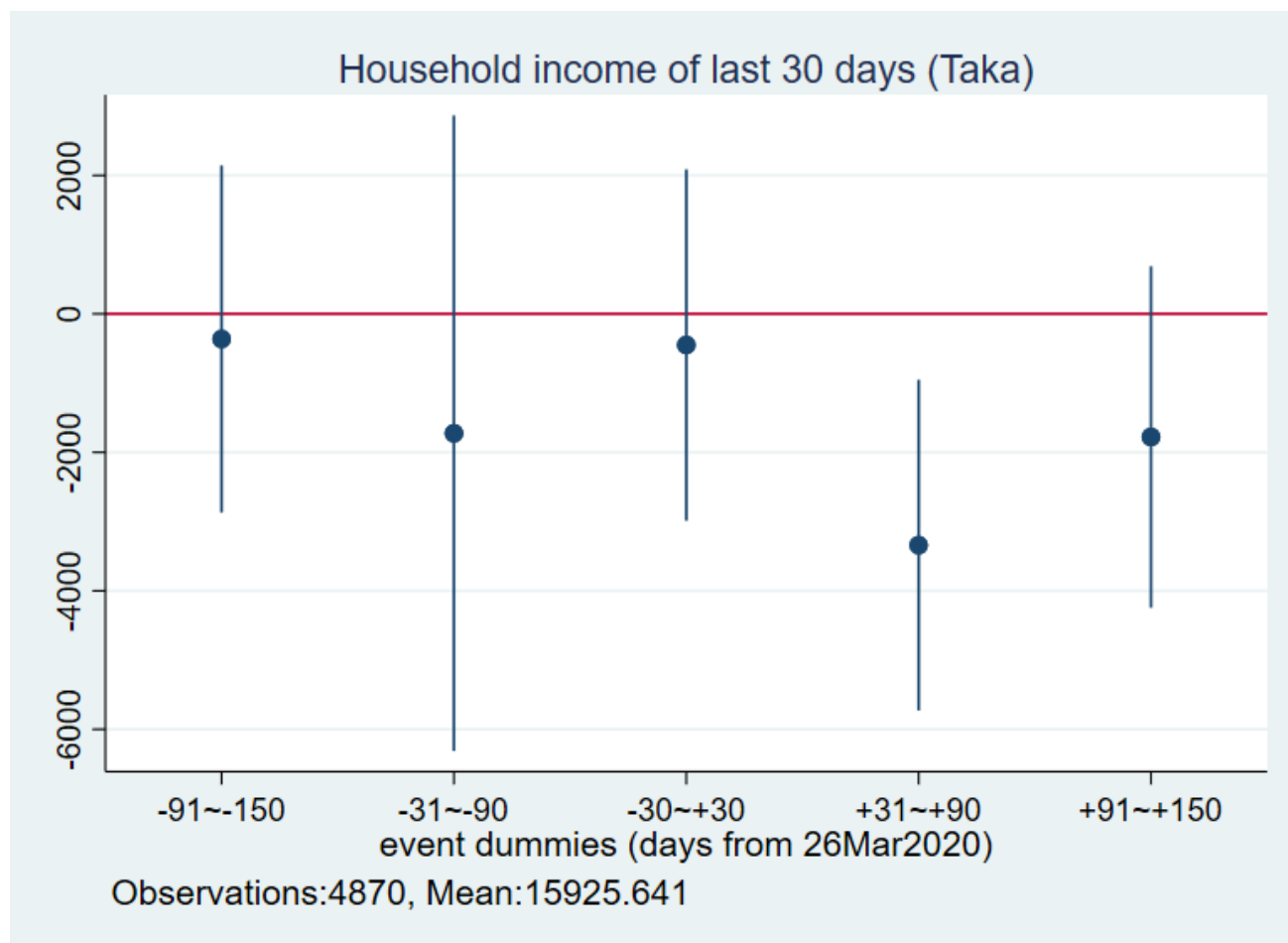
Figure 4 presents the event study estimates on the Dhaka households' income, and we do not observe a significant pre-trend. One may be surprised that there was no significant change in the income in [-30, +30], which is the period covering 30 days before and 30 days after the lockdown starting date. This is possible because the salary was paid on a monthly basis and reflected their work in the month before the lockdown.²⁸ Consistently with the explanation, the Dhaka households experienced a

²⁷ See Appendix I for the descriptive statistics of all the outcome variables examined.

²⁸ According to the anecdotal evidence collected from garment workers, although garment factories were affected by the downturn of the US and European economies, factory production in March 2020 did not dramatically decrease. This is because garment factories increased production before the lockdown start date (March 26, 2020) to cover the productions that had been scheduled during the lockdown. Indeed, we confirmed from the Dhaka household data that March's salary of garment workers (which were supposed to be paid in April) did not decrease significantly.

substantial income drop in [+31, +90] by about 3,000 Taka or 20% of average income. After the fall, in the period of [+91, +150], income recovered to the pre-shock level. These findings are consistent with the fact that the lockdown lasted for two months, and garment factories were closed for approximately 30 days.

Figure 4. COVID-19 shock to Dhaka households' income



Notes: 1) Standard errors are clustered at household-level. 2) Together with 95% confidence intervals, the figure reports the dynamic coefficients obtained from the specification of equation (1) in the main text.

COVID-19 shock to remittances

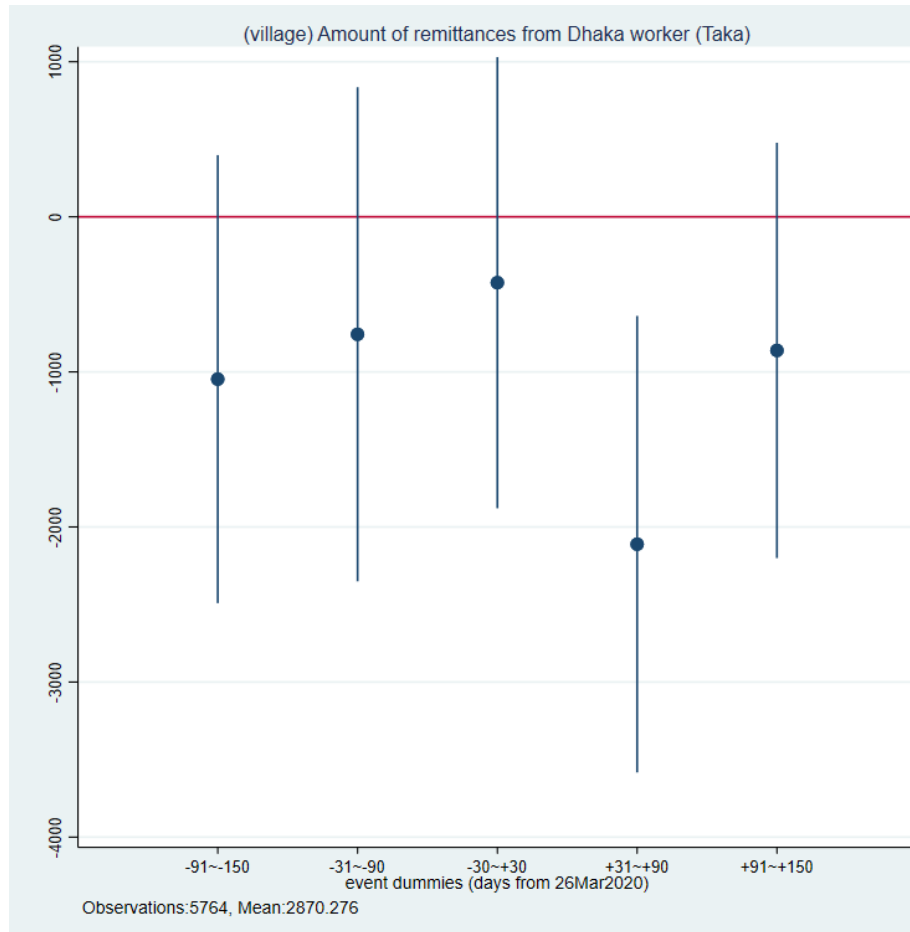
Figure 5 presents the event study estimates on the remittance sent by the Dhaka households to the village households during the 30 days before the interview date. We display two aspects of the remittances: the amount (Panel a) and a binary indicator of whether the Dhaka households sent

remittances to the village households (Panel b)—both based on the village household surveys.²⁹ The remittance amount significantly decreased by 2,000 Taka in [+31, +90], when the migrants' income dropped by 3,000 Taka. The likelihood of village households receiving remittances also decreased but not significantly in the same period. Both the amount and the likelihood of remittances recovered to the pre-shock level in [+91, +150].

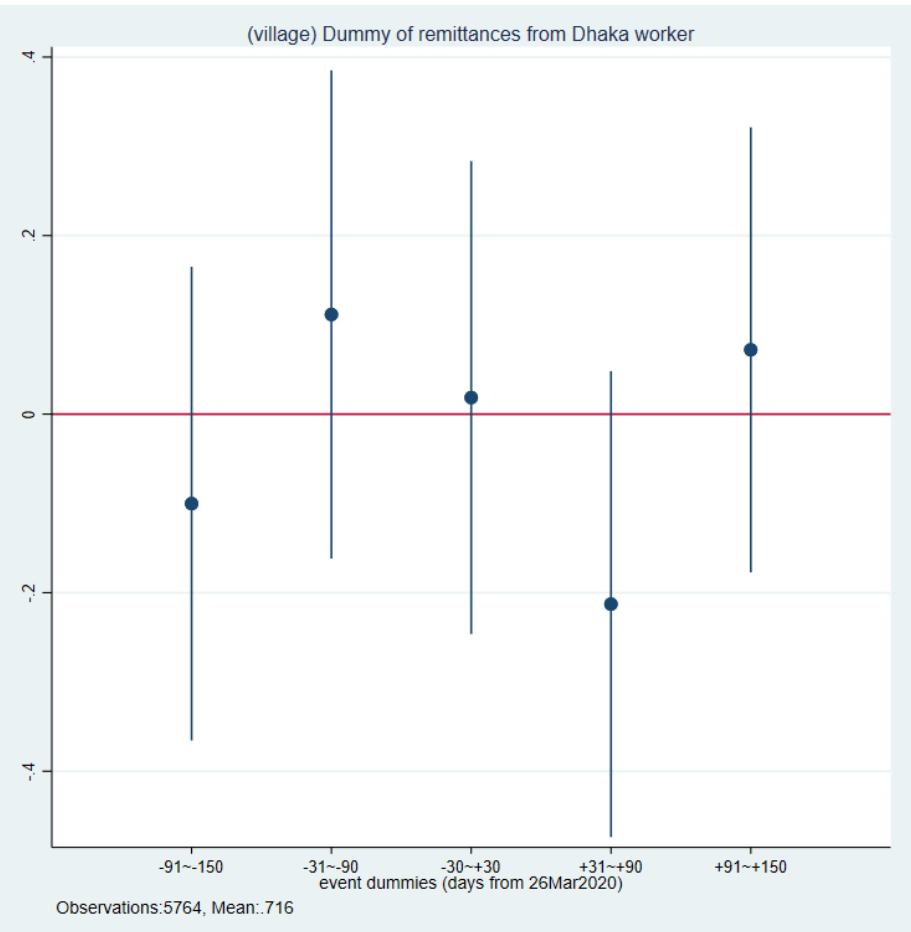
²⁹ Few households received international remittances.

Figure 5. Cut of remittances sent from Dhaka workers to village households in response to COVID-19 lockdown

(a) Amount of remittances (Taka)



(b) Dummy of remittances



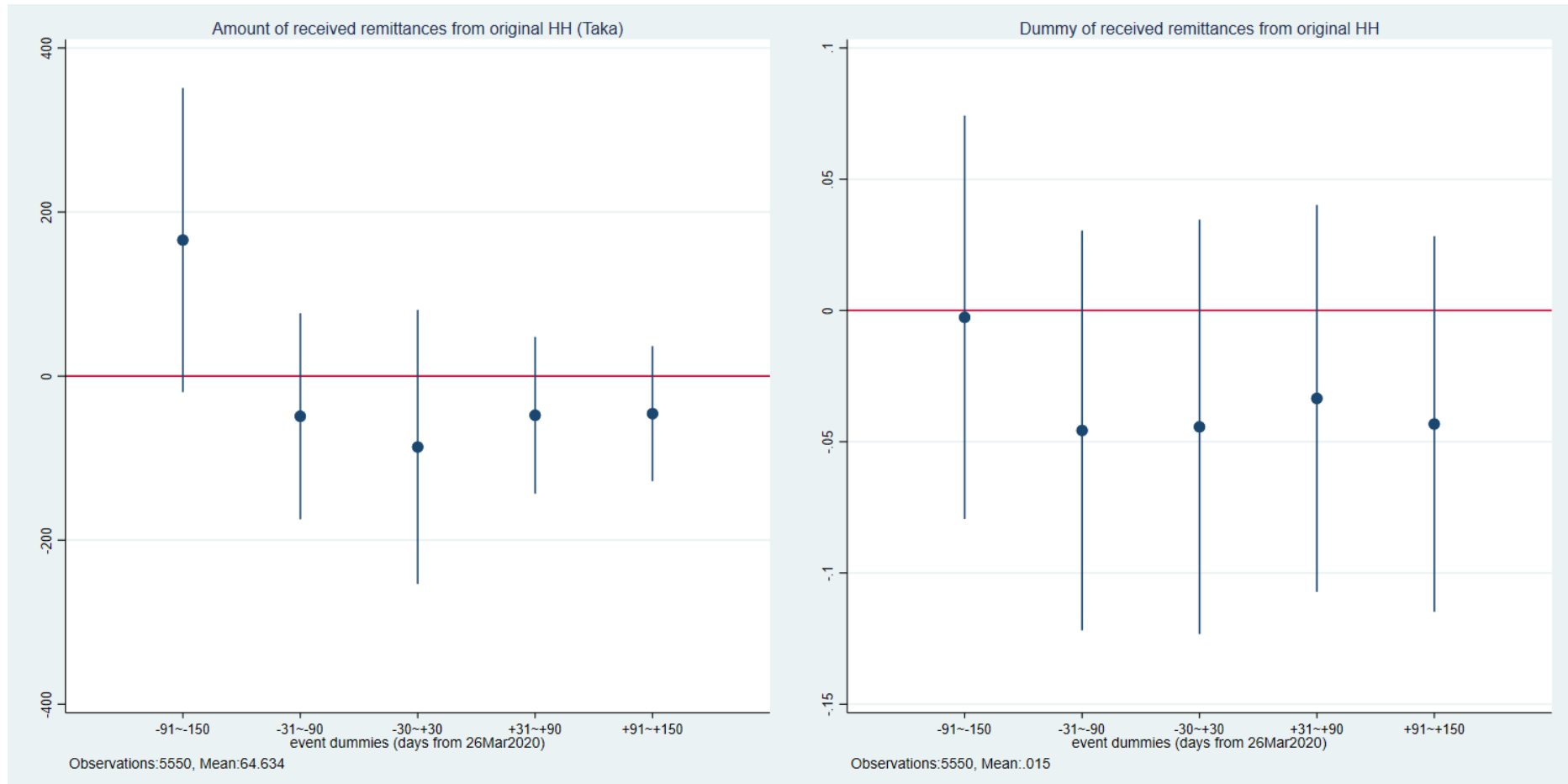
Notes: 1) Standard errors are clustered at Upazila-level. 2) Together with 95% confidence intervals, the figures report the dynamic coefficients obtained from the specification of equation (1) in the main text. 3) The measures of remittances in the figures are those answered by the village households.

Figure 6 presents the event study estimates on the remittance amount from the village households to their Dhaka families during the 30 days before the interview date (Panel a) and a binary indicator of whether the village households sent the remittance to the Dhaka households (Panel b). Because there is a marginally significant pre-trend in the remittance amount in [-150,-91], the estimates may not reflect only the pandemic effect. We find no significant change in the amount and the likelihood of remittances from the village households in response to the pandemic, unlike the significant reduction in migrant worker's remittance to the rural families (Figure 5).

Figure 6. No additional remittances sent from village households to Dhaka workers in response to COVID-19 shock

(a) Amount of remittances (Taka)

(b) Dummy of remittances



Notes: 1) Standard errors are clustered at household-level. 2) Together with 95% confidence intervals, the figures report the dynamic coefficients obtained from the specification of equation (1) in the main text. 3) The measures of remittances in the figures are those answered by the Dhaka households.

To sum up, the migrant workers, facing a substantial income drop, reduced but not ceased remittances to their village households, whereas the remittances from the village households did not change. These findings suggest that the adverse shock was more substantial for the migrant workers, which is consistent with the World Bank reporting that the COVID-19 shock was, at least in the short-term, more significant in the urban area than in the rural area (World Bank, 2020b).

COVID-19 shock to asset sales

Following Fafchamps & Lund (2003), we examine whether the migrants or the rural families sold assets to cope with the COVID-19 shock (figures shown in Appendix F).³⁰ The value of asset holdings of both the Dhaka households and the village households did not significantly change, suggesting no asset sales in response to the COVID-19 shock.

COVID-19 shock to consumption

Figure 7 presents the event study results regarding the consumption of the Dhaka and the village households.³¹ The Dhaka households' consumption decreased by about 2,000 Taka in [-30, +30] and more substantially by 4,000 Taka in [+31, +90] when they experienced a sharp income decline. The village households' consumption decreased by about 5,000 Taka in [-30, +30] and [+31, +90].³²

³⁰ Asset values are calculated based on self-reports. The questions are: i) Does your household have these assets now? ii) Report current value (=if the asset is sold today, how much will you receive?) in Taka.

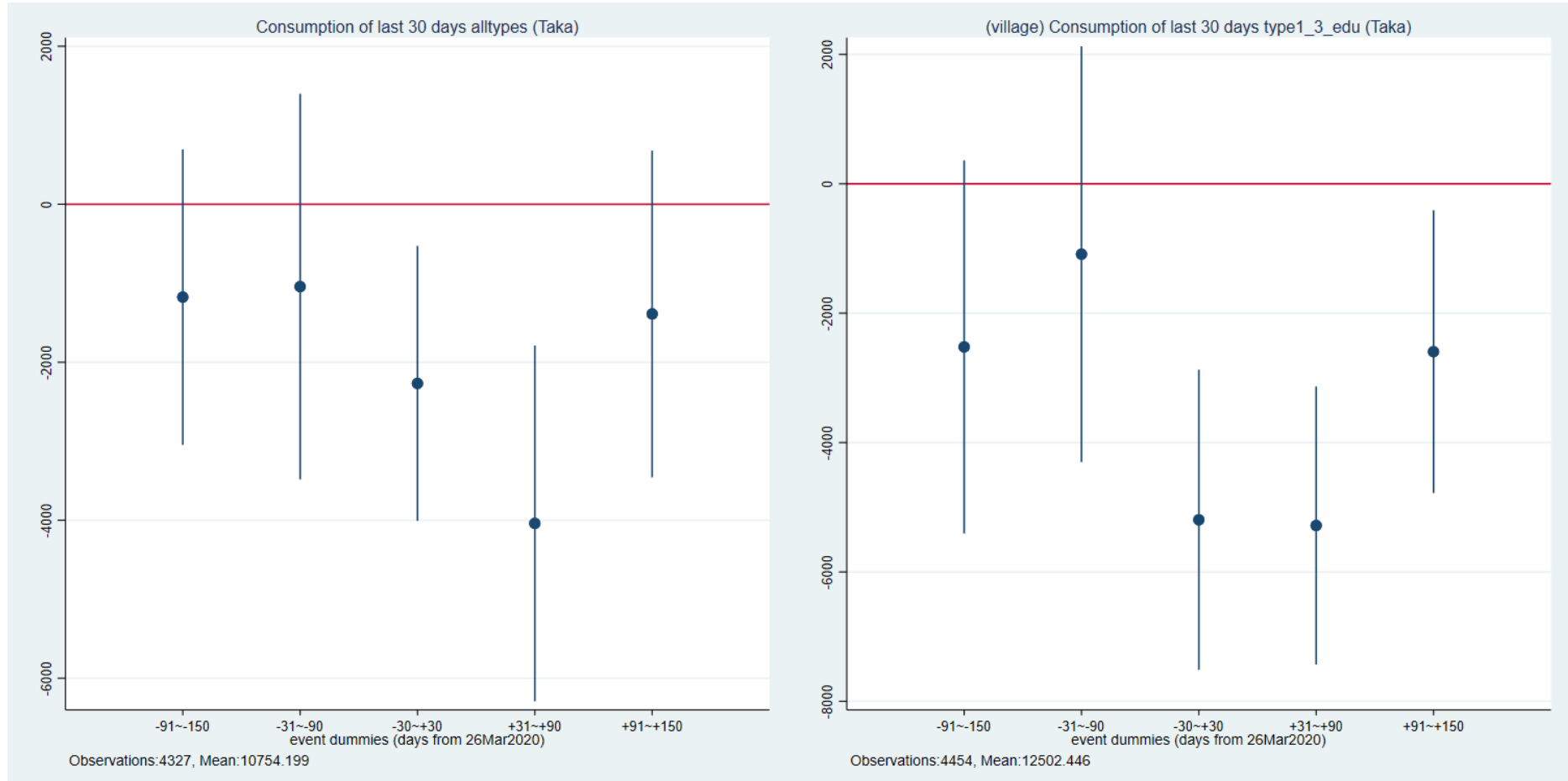
³¹ We use household-level consumption, which is not divided by the number of household members. This is useful for comparing with other household-level variables such as remittances and other kinds of money inflows and outflows. As a robustness check, we examine per-capita consumption and find that the results are essentially the same (Appendix G).

³² At the pre-COVID-19 periods, one may notice that the point estimates are already negative, though those are not statistically significant. This implies that the magnitude of the reduction in consumption after the COVID-19 shock is likely to be overestimated.

Figure 7. COVID-19 shock to consumption of Dhaka households and village households

(a) Dhaka household consumption of last 30 days (Taka)

(b) Village household consumption of last 30 days (Taka)



Notes: 1) For panel (a), standard errors are clustered at household-level. For panel (b), standard errors are clustered at upazila-level. 2) Together with 95% confidence intervals, the figures report the dynamic coefficients obtained from the specification of equation (1) in the main text.

To separately examine the effect of the early economic downturn right before the beginning of the lockdown and the effect of the lockdown implementation, we run a similar event study using an alternative definition of the event dummies (Appendix D). We divide E_o representing $[-30, +30]$ into two subperiods, $[-30, -1]$ and $[0, +30]$, allowing us to differentiate the effect of the early economic downturn and the lockdown. The results indicate that consumption declined more substantially after the lockdown for both the migrant households and the village households.

Although the Dhaka households' income did not change in $[-30, +30]$, their consumption declined substantially in the same period.³³ The migrant workers likely anticipated the future income drop because the foreign buyers canceled orders from the garment factories, and the COVID-19 pandemic changed their life substantially. By reducing consumption, the Dhaka households might have saved cash or stocked up on food and daily necessities to prepare for the anticipated income shock and future lockdown. However, our data does not allow us to confirm these possibilities directly. But we find suggestive evidence that the Dhaka households' savings increased by 25% in $[-30, 30]$.³⁴

Overall, the event study results imply that both the Dhaka households and the village households collectively tried to reduce the influence of the COVID-19 shock, although they did not entirely smooth consumption against it. Indeed, when we restrict the analysis on food consumption, presented in Figure 8, we find that food consumption was fully smoothed against the COVID-19 shock in both the Dhaka households and the village households. This is consistent with the literature such as McKenzie (2006) that shows reducing expenditure on other items in order to smooth food consumption is a major tool to cope with aggregate shocks.

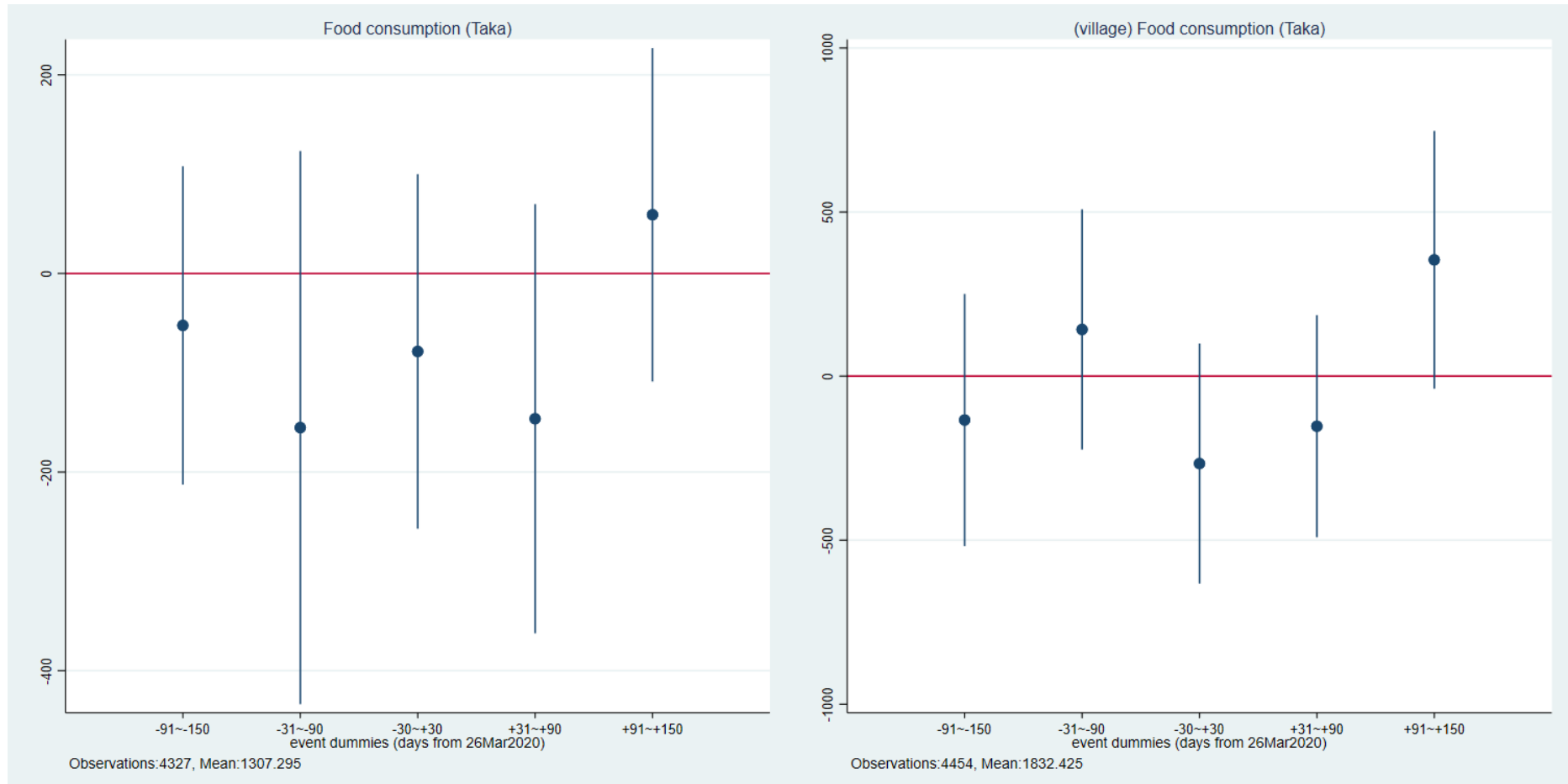
³³ With respect to the decrease of consumption of the village households during the period $[-30, 30]$, it is relatively easier to conjecture the reason. As the figure in Appendix D indicates that there was a sharp decrease in consumption in the period $[0,30]$, the decrease was likely to be a response to the lockdown implementation. Thereby, they might have simply responded to their income decrease caused by the lockdown. Also, they might have curtailed consumption and stocked up on food or everyday supplies in preparation (even if they did not experience a sudden income decline).

³⁴ We run a simple regression of savings controlling for household fixed effects. The estimation results are given in Appendix H. We collected the data of savings less frequently than the data of other variables, thus we cannot run the same regression used in our main analyses.

Figure 8. Fully smoothed food consumption of Dhaka households and village households

(a) Dhaka household food consumption of last 7 days (Taka)

(b) Village household food consumption of last 7 days (Taka)



Notes: 1) For panel (a), standard errors are clustered at household-level. For panel (b), standard errors are clustered at upazila-level. 2) Together with 95% confidence intervals, the figures report the dynamic coefficients obtained from the specification of equation (1) in the main text.

The results of the event study of the total consumption presented in Figure 7 has another important implication. The average consumption in the reference period was 10,228 Taka for the Dhaka households and 12,465 Taka for their village households. Due to the pandemic, the Dhaka households' consumption declined by 39% (about 4,000 Taka), and the village households' consumption dropped by 40% (about 5,000 Taka). Recall that the urban-to-rural remittances dropped by 2,000 Taka. If there were no drop in remittances, the Dhaka households' consumption could have dropped by 59% (about 6,000 Taka), whereas the village households' consumption by only 24% (3,000 Taka). These results imply that the risk-sharing mechanism through the family network was effective in sharing the shock between the migrants and the village households.³⁵

There is a question remaining. Why did the Dhaka households decrease their consumption by 4,000 Taka in [+31, 90]? Although their income declined by 3,000 Taka, they reduced remittances by 2,000 Taka; this suggests that their disposal income declined only by 1,000 Taka. Therefore, besides the possibility of precautionary saving discussed above, we also check other kinds of money flows.

COVID-19 shock to borrowing and loaning behavior

To explore how the COVID-19 pandemic affected money flows of the Dhaka households other than remittances, we examine the change in borrowing and loaning behavior of the migrant workers. Figure 9 presents the event study regarding borrowing money from friends and neighbors³⁶ and borrowing money from institutions such as shops and microfinance institutions, which we call “loaning.”³⁷ The COVID-19 shock made it difficult for the Dhaka households to borrow money from individuals. The amount and the likelihood of borrowing money declined from the period of the lockdown

³⁵ The hypothetical case of “no remittance cuts” should not be taken as a counterfactual. Rather, it is an extreme case. For example, if there were no remittance cuts, the migrant workers might have used loans or other methods to avoid further consumption reductions. The hypothetical case of “no remittance cuts” assumes that the migrant workers did not exploit such alternative shock coping strategies.

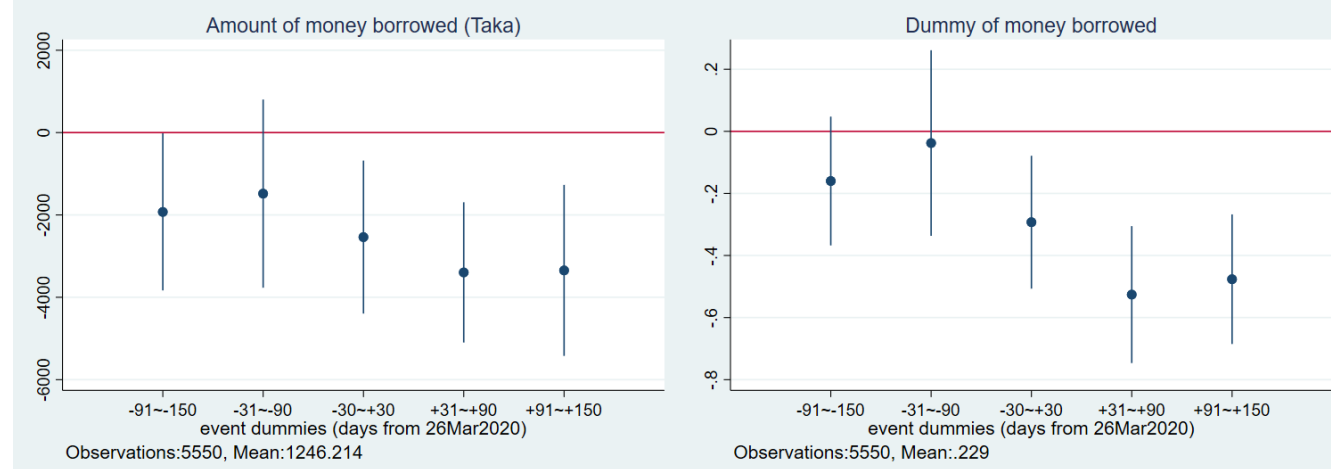
³⁶ This can include money borrowed with interest. Also, repaid money is included in “borrowing.”

³⁷ Pawning, using rent arrears, and other informal lending schemes such as ROSCA are also included.

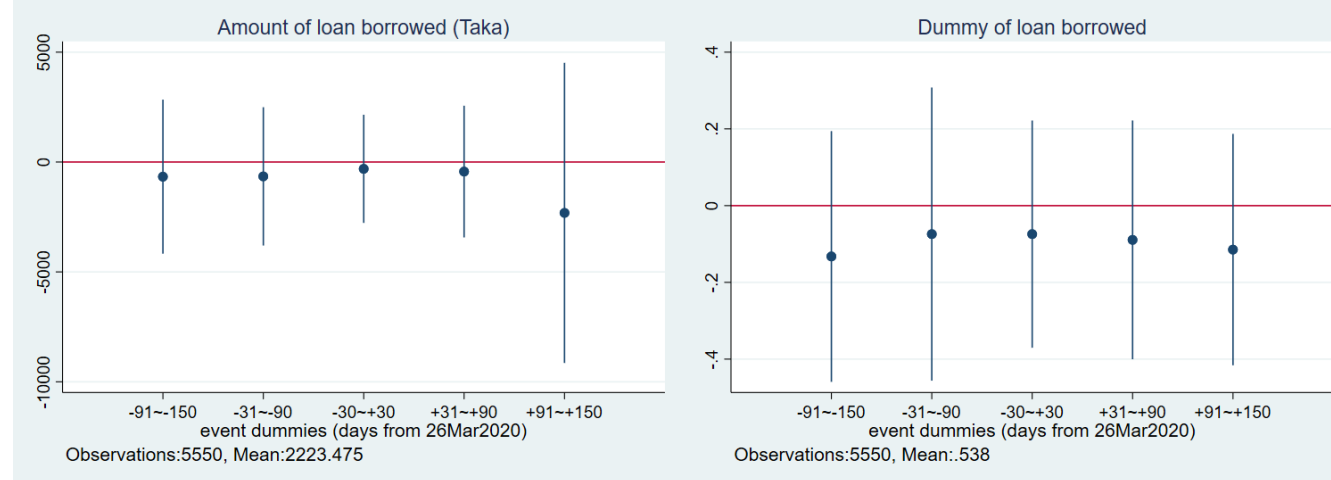
implementation. In contrast, the loaning behavior did not change. This constraint of borrowing from friends and neighbors during the pandemic seems to be a key to explain the consumption decline of the Dhaka households during the pandemic.

Figure 9. COVID-19 shock to borrowing and loaning behavior

(a) Amount of money borrowed by Dhaka HHs (Taka) (b) Dummy of money borrowed by Dhaka HHs



(c) Amount of loan by Dhaka HHs (Taka) (d) Dummy of loan by Dhaka HHs



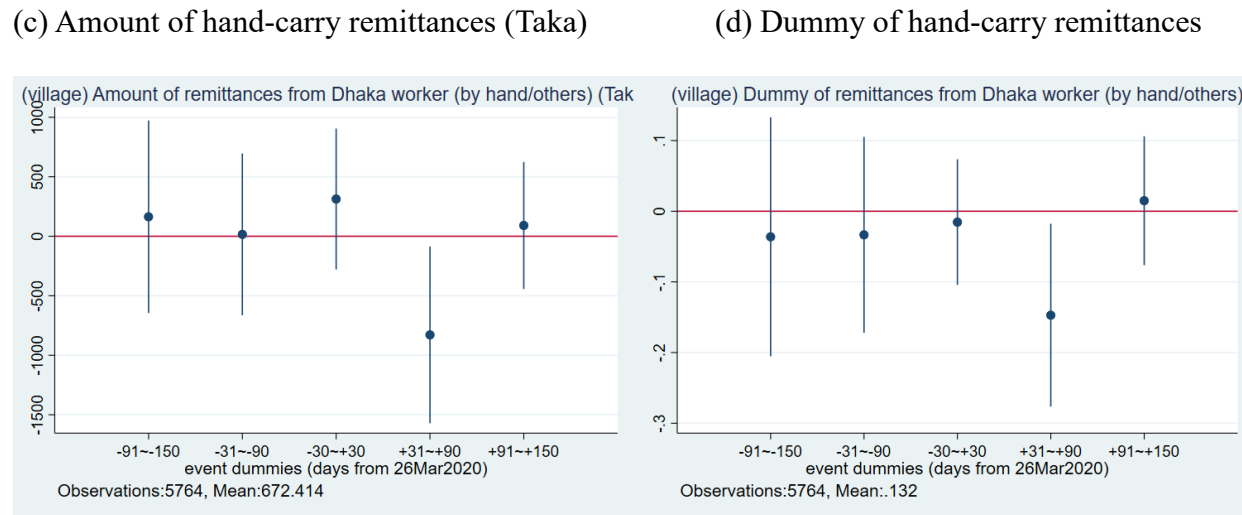
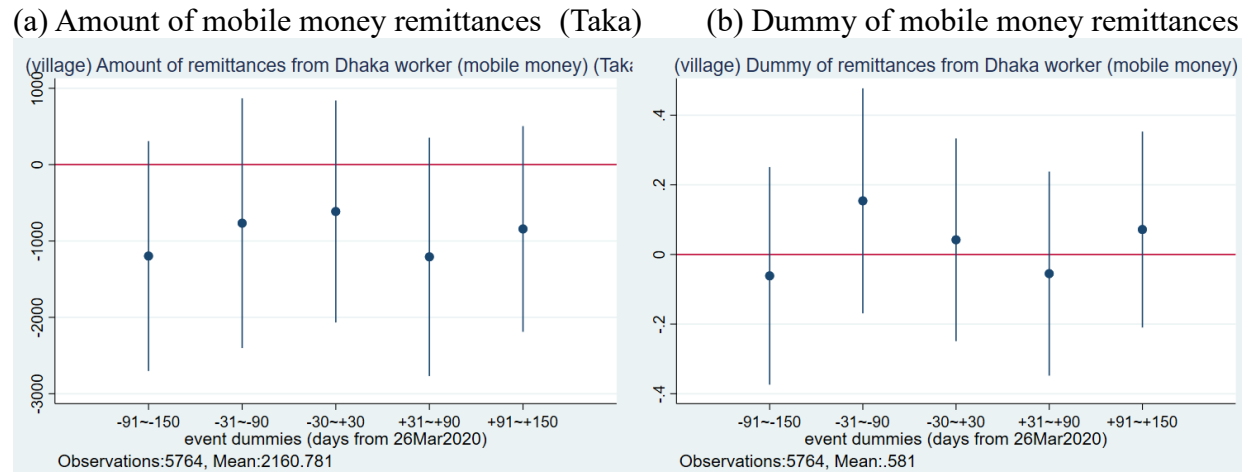
Notes: 1) Standard errors are clustered at household-level. 2) Together with 95% confidence intervals, the figures report the dynamic coefficients obtained from the specification of equation (1) in the main text.

Mode of remittances amid COVID-19 lockdown

Before the pandemic, the Dhaka workers used to bring money by themselves or ask someone to do so for 21% of the remittances, whereas they remit through mobile money for 77%. However, the containment regulations prevented the Dhaka workers from physically bringing money. We examine the role of mobile money in remittance during the pandemic. Figure 10 presents the event study regarding the amount and the likelihood of remittances from the migrant workers to the village households by mode.³⁸ The hand-carry remittances significantly declined during the pandemic (panels c and d of Figure 10). In contrast, the amount and the likelihood of remittances through mobile money did not significantly change (panels a and b), despite the income drop. The mobile money services enabled the migrant workers to remit to rural families in spite of the travel restrictions.

³⁸ The migrants also used bank transfer, post office, and other modes for less than 1% of the remittances. We categorized them into hand-carry remittances.

Figure 10. Stable mobile money remittances and no hand-carry remittances amid COVID-19 lockdown



Notes: 1) Standard errors are clustered at Upazila-level. 2) Together with 95% confidence intervals, the figures report the dynamic coefficients obtained from the specification of equation (1) in the main text. 3) The measures of remittances are those answered by the village households.

Limitations

We admit that this study has some limitations. First, the event study is not a causal inference but a description of facts. In order to serve as causal inference, the event study needs to control all the confounding factors. It is difficult to make valid counterfactual comparisons because the COVID-19 shock affected everyone. We still examined the existence of a pre-trend to check the validity of the analysis.

Second, some migrants returned home during the pandemic (World Economic Forum, 2020), but we excluded them from our sample—as mentioned in the explanation of the attrition issue. We admit that returning home is another shock-coping strategy, but we did not observe many returning migrants in our sample (only 20 out of 723 families). We thus decided to focus on shock-coping through remittances within the family network.

Third, we do not have data on village households' income and detailed information on money inflows and outflows other than remittances. It is challenging to conduct an extended interview through phone surveys. We rather concentrated on collecting accurate data regarding village households' consumption and shock-coping strategies within the family network.

6. Conclusion

The COVID-19 pandemic has affected more severely in the urban area than in the rural area (World Bank, 2020b). This study examines how migrant workers and their rural families coped with the shock with an event study approach. Firstly, we show that the migrant workers responded to a substantial income drop after the lockdown mainly by reducing, but not ceasing, remittances to their rural families. McKenzie (2003) argued that internal remittances—which is known as a major self-insurance tool against idiosyncratic shocks—declined their role in coping with aggregate shocks. However, McKenzie did not directly examine the role of internal remittances during the crisis due to data limitations. Importantly, we find that the consumption of both the migrants and their rural families

declined in a similar proportion due to the flexible adjustment of remittances. Thus, this study contributes to understanding the roles of family networks in coping with aggregate shocks. Moreover, our study serves as evidence of bilateral risk-sharing between migrant workers and their rural families.

Secondly, we reconfirm the importance of mobile money. This innovative technology allowed people to mitigate the negative influence of the income shock through the remittance between family members even during the lockdown period. In contrast, hand-carry remittances decreased during the lockdown. This contrast sheds light on the importance of mobile money as a tool of financial inclusion that helps poor households' self-insurance against the COVID-19 pandemic.

Finally, we find the resilience of migrants and their families from the first wave of the COVID-19 pandemic; the income of the migrant workers and the consumption of both the migrant and the village households recovered, responding to the quick recovery of garment exports. Given the country's current situation of the COVID-19 pandemic coupled with various extended restrictions on movement, business activities, and education among others, however, we are concerned about the persistence of family networks in mitigating the adverse effects. In addition, our study reveals that the migrant workers remained unable to borrow money from the local network after the lockdown in contrast to the quick recovery of the remittance. It is plausible that people might have believed that the recovery in income was only temporary, and they might be reluctant to lend money to others. The disruption in the local informal risk-sharing network would deteriorate the livelihood of the poor, particularly those isolated from family networks, suggesting room for public interventions.

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Appendix A.

Bangladesh RMG (Ready-Made-Garments) Export Value per month

Calendar Month, Year	RMG export nominal value (Million US\$)	Year to year growth
Jan-2020	3,039	-3.0%
Feb-2020	2,784	-4.3%
Mar-2020	2,256	-20.1%
Apr-2020	375	-85.2%
May-2020	1,231	-62.0%
Jun-2020	2,240	-6.6%
Jul-2020	3,240	-2.1%
Aug-2020	3,240	45.3%

Source: The Financial Express (2020a), which brought the data from BGMEA.

Appendix B.

Survey details

Pre-baseline survey

To create a list of garment workers, we conducted the pre-baseline survey at 13 randomly selected factories³⁹ from garment factories in Dhaka,⁴⁰ the capital city of Bangladesh. Creating the list of garment workers was necessary because we aimed to conduct panel surveys to the garment workers who had migrated from outside of the capital city. To do so, we needed a list of garment workers with the information of where they were from. In the pre-baseline survey, we collected a list of basic information (i.e., household structure, age of children) on about 6,318 workers and their original village families. We used systematic sampling at each factory and interviewed the randomly selected garment workers.⁴¹

Baseline survey

Using the list of 6,318 garment workers obtained in the pre-baseline survey, we conducted the baseline survey to 740 families of migrant workers who were eligible for the EduMatch project since October

³⁹ We used the factory list of the BGMEA (Bangladesh Garment Manufacturers and Exporters Association) website (<https://www.bgmea.com.bd/>) and selected the factories randomly from those which had more than 500 workers (we did not include small factories in the pool because we wanted to secure a certain number of samples from each factory). However, one should not interpret that those randomly drawn factories represent the garment factories in Dhaka. Those factory managements that rejected our request of conducting surveys to their workers are not included in the 13 factories. Obviously, the factory managements that continue to support the project team do not represent the garment factory. Although, at least, we conducted the sampling of factories in a transparent manner.

⁴⁰ Most of the factories are located in Gazipur, which is a town next to Dhaka. For simplicity, when the word “Dhaka” is used, it may include Gazipur in this study.

⁴¹ The number of samples drawn from each factory is calculated based on the number of workers working in each factory. Namely, at a large factory we interviewed a relatively large number of workers while at a small factory we interviewed a relatively small number of workers. As a result, the minimum number of samples from each factory is 137 and the maximum is 1140.

2018. From 6,318 workers, we contacted 1,154 migrant workers that were eligible to the project. The eligibility conditions are given as the following two points: 1) a student of a particular grade who was scheduled to take the exam was in the Dhaka worker's village home (students who will be in the grade 4, 5, 7, 8, 10 in 2019), and 2) the worker remitted money to his or her village home on a regular basis. As a result, 740 families responded and accepted to be interviewed in the coming surveys.⁴²

From both the Dhaka workers and the village households, we collected a number of basic socio-economic information. When we collect the information of flow of funds such as income, consumption, and remittances, for most of the variables, we asked about the information of the last 30 days from the interview dates.

Follow-up surveys

The migrant workers and their original households answered the follow-up surveys up to six times. The timings of the follow-up surveys are displayed in Table 1.

The migrant workers of our sample occasionally go back to their home villages and stay there for a while. Some of them decided to leave the capital city and moved to their home villages during the survey period. All of those may create missing observations and affect our regression results. Thereby, we explain how we treat the issue in the following paragraphs.

As for Round 2-7, if a migrant worker answered that he/she is not in the capital city, the surveys for the migrant workers (hereafter, 'Dhaka survey') were not conducted to that person. Thus, when the Dhaka workers went back to their home village, attritions of the data from the Dhaka surveys occur.

⁴² The reasons why around 400 families were dropped is as follows: (i) the subject did not answer the survey phone, (ii) the phone number was no longer used, (iii) the subject refused to cooperate with the survey, (iv) the worker had already finished migrating and returned to his or her village home. (v) the subject had called his or her village family to the capital city, and lived together when the survey was conducted. (vi) there were errors in the answers from the pre-baseline survey, and subjects were not actually eligible for the EduMatch surveys (for example, the one was not from outside of the capital city).

In contrast, whether the Dhaka workers left Dhaka or not does not matter for conducting the surveys to the village households (hereafter, ‘village survey’). Thus, village surveys’ attritions only include missing values due to no-response to our mobile phone surveys. In the regressions, we attempt to treat those attrition problems by the inverse probability weighting model.

To know how the COVID-19 shock influenced the migrant workers’ decision on where to work, at Round 7 (July-August of 2020), we additionally collected information on where the migrant workers live. At that time, we conducted the survey to the people including those who returned to their original village. When we contacted the migrant workers and found that they were not in Dhaka anymore, we asked when they had left Dhaka. Thus, for the migrant workers who answered the survey of Round 7, we have the information on whether the migrant workers left Dhaka or not and when they left Dhaka.

There is another type of information that was supplementarily collected. In addition to the last 30 days, we collected the information of the last 31-60 days at Round 3 and Round 7. This is to make up for the information when the survey interval was too long. The information collected as such is money inflow, money outflow (i.e., remittances), and income.

Appendix C.

Attritions of Dhaka households

Initially, we categorized samples into 4 groups based on the status and timing of attritions of the Dhaka households: Group 1 is the Dhaka households that continued to stay in Dhaka (as Round 7 survey conducted in August 2020); Group 2 is the Dhaka households that we lost contact with since March 2020; Group 3 is the Dhaka households that left Dhaka by February 2020; Group 4 is the Dhaka households that left Dhaka after March 2020. Comparing their baseline characteristics between groups, we found that the baseline characteristics are statistically different between Group 1 and other groups but not different between Groups 2 to 4 based on the F-test statistics for the joint significance tests. Thus, we regroup the samples into two groups: the non-attriting sample (corresponding to Group 1) and the attriting sample (corresponding to households in Group 2-4). Table A1 presents the baseline characteristics by the four groups and their mean differences. The attrition rate is 15.4 percent.

Attritions of village households during and after COVID-19 crisis

Next, we compare the baseline characteristics by the attrition status of the village households. If a village household answered surveys at least once between March 2020 and August 2020, the household is counted as a non-attriting sample and an attriting sample otherwise. The attrition rate of the village household surveys is 7.7 percent. Between the non-attriting and attriting samples, a significant difference is found by the joint F-test. Table A2 presents the baseline characteristics by the attrition status by the village households and their mean differences.

Table A1. Full list of baseline characteristics of Dhaka households and village households by attrition status of Dhaka households

Variable	(1)		(2)		(3)		(4)		Diff in mean	Diff in mean	Diff in mean
	N	Mean/SD	N	Mean/SD	N	Mean/SD	N	Mean/SD			
Dhaka households											
Age of the Dhaka worker	611	28.856 [6.689]	59	27.542 [6.809]	33	25.970 [6.018]	20	25.150 [5.133]	1.314	2.886**	3.706**
1 if the Dhaka worker is male	611	0.565 [0.496]	59	0.424 [0.498]	33	0.424 [0.502]	20	0.450 [0.510]	0.141**	0.140	0.115
1 if the Dhaka worker is married	611	0.768 [0.423]	59	0.576 [0.498]	33	0.606 [0.496]	20	0.850 [0.366]	0.191***	0.162**	-0.082
1 if Dhaka respondent is widow/widower/divorced/separated	611	0.049 [0.216]	59	0.153 [0.363]	33	0.030 [0.174]	20	0.000 [0.000]	-0.103***	0.019	0.049
1 if the Dhaka worker is household head	611	0.655 [0.476]	59	0.627 [0.488]	33	0.545 [0.506]	20	0.500 [0.513]	0.028	0.109	0.155
1 if the Dhaka worker is spouse of the household head	611	0.314 [0.465]	59	0.305 [0.464]	33	0.394 [0.496]	20	0.500 [0.513]	0.009	-0.080	-0.186*
# of household members in Dhaka	611	2.013 [0.956]	59	1.797 [0.761]	33	1.818 [0.917]	20	1.950 [0.826]	0.216*	0.195	0.063
Dhaka worker did not get PSC or did not attend school (=1)	611	0.133 [0.339]	59	0.237 [0.429]	33	0.091 [0.292]	20	0.250 [0.444]	-0.105**	0.042	-0.117
Dhaka worker completed PSC (=1)	611	0.188 [0.391]	59	0.203 [0.406]	33	0.182 [0.392]	20	0.150 [0.366]	-0.015	0.006	0.038
Dhaka respondent completed grade 6 ~ grade 9 (=1)	611	0.401 [0.490]	59	0.407 [0.495]	33	0.424 [0.502]	20	0.350 [0.489]	-0.006	-0.023	0.051
Dhaka respondent graduated from SSC or above SSC (=1)	611	0.272 [0.445]	59	0.153 [0.363]	33	0.303 [0.467]	20	0.250 [0.444]	0.119**	-0.031	0.022
1 if Dhaka respondent's job: RMG worker	611	0.992 [0.090]	59	0.983 [0.130]	33	1.000 [0.000]	20	0.950 [0.224]	0.009	-0.008	0.042*
1 if Dhaka respondent's job: Housewifery	611	0.002 [0.040]	59	0.000 [0.000]	33	0.000 [0.000]	20	0.000 [0.000]	0.002	0.002	0.002
1 if Dhaka respondent's job: Business, Other industries' employee, else	611	0.007 [0.081]	59	0.000 [0.000]	33	0.000 [0.000]	20	0.000 [0.000]	0.007	0.007	0.007
1 if using mobile money	611	0.823 [0.382]	59	0.847 [0.363]	33	0.818 [0.392]	20	0.750 [0.444]	-0.024	0.005	0.073

1 if using mobile money through agent account	611	0.311 [0.463]	59	0.356 [0.483]	33	0.364 [0.489]	20	0.300 [0.470]	-0.045	-0.053	0.011
1 if using mobile money through own account	611	0.453 [0.498]	59	0.424 [0.498]	33	0.364 [0.489]	20	0.400 [0.503]	0.030	0.090	0.053
1 if using mobile money through family members' account	611	0.057 [0.233]	59	0.068 [0.254]	33	0.091 [0.292]	20	0.050 [0.224]	-0.011	-0.034	0.007
Household income of last 30 days (Taka)	611	15484.710 [5748.215]	59	15822.153 [6416.066]	33	15325.091 [7602.970]	20	15021.000 [4964.228]	-337.442	159.619	463.710
Total value of assets (Taka) per HH member	611	5796.609 [7341.398]	59	8960.113 [18651.414]	33	6910.354 [7983.285]	20	5387.500 [4297.070]	-	3163.504**	-1113.744
Consumption of last 30 days (Taka)	611	10340.616 [3721.261]	59	9359.579 [3006.655]	33	9321.753 [3507.740]	20	10865.233 [4685.495]	981.036**	1018.863	-524.618
Amount of sent remittances to village HH (last 30 days) (Taka)	611	3064.746 [2707.509]	59	3296.610 [2598.273]	33	3424.242 [2989.882]	20	2575.000 [1741.710]	-231.864	-359.496	489.746
Cognitive skill measure of the Dhaka worker (low~high:0~6)	611	4.108 [1.653]	59	4.085 [1.601]	33	3.879 [1.746]	20	4.300 [1.895]	0.023	0.229	-0.192
Village households											
Age of HH head	611	54.227 [13.304]	59	54.339 [12.619]	33	53.909 [9.674]	20	56.200 [11.381]	-0.111	0.318	-1.973
1 if HH head is male	611	0.728 [0.445]	59	0.695 [0.464]	33	0.727 [0.452]	20	0.800 [0.410]	0.033	0.001	-0.072
1 if HH head is married	611	0.828 [0.378]	59	0.780 [0.418]	33	0.818 [0.392]	20	0.900 [0.308]	0.048	0.010	-0.072
1 if HH head is widow/widower/divorced/separated	611	0.160 [0.367]	59	0.220 [0.418]	33	0.182 [0.392]	20	0.100 [0.308]	-0.060	-0.021	0.060
HH head: wife/husband/son/daughter of the Dhaka worker (=1)	611	0.074 [0.261]	59	0.034 [0.183]	33	0.061 [0.242]	20	0.050 [0.224]	0.040	0.013	0.024
HH head: father/mother/brother/sister/grandfa/grandmo of the Dhaka worker (=1)	611	0.710 [0.454]	59	0.746 [0.439]	33	0.667 [0.479]	20	0.750 [0.444]	-0.035	0.044	-0.040
HH head: (In law) father/mother/brother/sister of the Dhaka worker (=1)	611	0.187 [0.390]	59	0.203 [0.406]	33	0.242 [0.435]	20	0.200 [0.410]	-0.017	-0.056	-0.013
# of household members	611	4.597 [1.611]	59	4.627 [1.639]	33	4.364 [1.765]	20	4.700 [1.380]	-0.030	0.234	-0.103
HH head did not get PSC or did not attend school (=1)	611	0.661 [0.474]	59	0.695 [0.464]	33	0.818 [0.392]	20	0.650 [0.489]	-0.034	-0.157*	0.011
HH head completed PSC (=1)	611	0.124 [0.330]	59	0.186 [0.393]	33	0.091 [0.292]	20	0.150 [0.366]	-0.062	0.033	-0.026

HH head completed grade 6 ~ grade 9 (=1)	611	0.154	59	0.051	33	0.030	20	0.150	0.103**	0.124*	0.004
		[0.361]		[0.222]		[0.174]		[0.366]			
HH head graduated from SSC or above SSC (=1)	611	0.061	59	0.068	33	0.061	20	0.050	-0.007	-0.000	0.011
		[0.239]		[0.254]		[0.242]		[0.224]			
HH head's occupation: farming (=1)	611	0.411	59	0.356	33	0.515	20	0.450	0.055	-0.104	-0.039
		[0.492]		[0.483]		[0.508]		[0.510]			
HH head's occupation: self-employment, trader, wage-labor (=1)	611	0.124	59	0.153	33	0.091	20	0.150	-0.028	0.033	-0.026
		[0.330]		[0.363]		[0.292]		[0.366]			
HH head's occupation: salaried workers (i.e.government, teacher) (=1)	611	0.016	59	0.017	33	0.061	20	0.000	-0.001	-0.044*	0.016
		[0.127]		[0.130]		[0.242]		[0.000]			
HH head's occupation: non-earning occupations (i.e.housewife) (=1)	611	0.448	59	0.475	33	0.333	20	0.400	-0.026	0.115	0.048
		[0.498]		[0.504]		[0.479]		[0.503]			
1 if using mobile money	611	0.866	59	0.797	33	0.818	20	0.900	0.069	0.048	-0.034
		[0.341]		[0.406]		[0.392]		[0.308]			
1 if using mobile money through agent account	611	0.399	59	0.356	33	0.364	20	0.300	0.043	0.036	0.099
		[0.490]		[0.483]		[0.489]		[0.470]			
1 if using mobile money through own account	611	0.403	59	0.373	33	0.424	20	0.400	0.030	-0.022	0.003
		[0.491]		[0.488]		[0.502]		[0.503]			
1 if using mobile money through family members' account	611	0.064	59	0.068	33	0.030	20	0.200	-0.004	0.034	-0.136**
		[0.245]		[0.254]		[0.174]		[0.410]			
minutes to the closest mobile money agent by foot	611	17.136	59	17.220	33	17.121	20	14.400	-0.084	0.015	2.736
		[14.668]		[12.312]		[11.876]		[8.894]			
Total value of assets per HH member (Taka)	611	3857.787	59	3284.187	33	4258.086	20	5059.345	573.600	-400.299	-1201.559
		[4971.054]		[3418.427]		[5483.015]		[5736.162]			
Total value of productive assets per HH member (Taka)	611	4921.773	59	3564.338	33	5544.535	20	5478.976	1357.435	-622.762	-557.203
		[8212.589]		[5608.176]		[6680.123]		[6215.090]			
Total value of lands per HH member (Taka)	611	1.08e+05	59	81377.253	33	1.05e+05	20	1.33e+05	26219.025	2490.219	-2.55e+04
		[1.83e+05]		[1.04e+05]		[2.85e+05]		[1.32e+05]			
Consumption of last 30 days (Taka)	611	12525.885	59	11792.966	33	11897.919	20	13533.025	732.919	627.966	-1007.140
		[6322.756]		[4494.306]		[5379.821]		[5786.947]			
Educational consumption (~SSC) of last 30 days (Taka)	611	1772.473	59	1678.158	33	1707.823	20	1907.958	94.315	64.650	-135.485
		[1248.472]		[876.405]		[1144.332]		[962.648]			
Number of students (~SSC)	611	1.714	59	1.898	33	1.848	20	1.800	-0.185	-0.135	-0.086
		[0.873]		[0.687]		[0.795]		[0.768]			
F-test of joint significance (F-stat)									1.480**	0.724	1.386**
F-test, number of observations									670	644	631

Notes: 1) The value displayed for t-tests are the differences in the means across the groups. The value displayed for F-tests are the F-statistics. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level. 2) Taka is the currency of Bangladesh. As of December 21st,2020, 1 USD is 85 Taka.

Table A2. Baseline characteristics of Dhaka households and village households by village household attrition status

Variable	N	(1)	N	(2)	Diff in mean (1)-(2)
		The non-attributing sample Mean/SD		The attributing sample Mean/SD	
Dhaka households					
Age of the Dhaka worker	667	28.573 [6.646]	56	27.821 [7.084]	0.751
1 if the Dhaka worker is male	667	0.549 [0.498]	56	0.482 [0.504]	0.067
1 if the Dhaka worker is married	667	0.760 [0.427]	56	0.589 [0.496]	0.171***
1 if the Dhaka worker is household head	667	0.642 [0.480]	56	0.661 [0.478]	-0.019
1 if the Dhaka worker is spouse of the household head	667	0.327 [0.469]	56	0.268 [0.447]	0.059
# of household members in Dhaka	667	1.994 [0.946]	56	1.875 [0.833]	0.119
Dhaka worker did not get PSC or did not attend school (=1)	667	0.136 [0.344]	56	0.214 [0.414]	-0.078
Dhaka worker completed PSC (=1)	667	0.186 [0.389]	56	0.214 [0.414]	-0.028
Dhaka respondent completed grade 6 ~ grade 9 (=1)	667	0.405 [0.491]	56	0.357 [0.483]	0.048
Dhaka respondent graduated from SSC or above SSC (=1)	667	0.267 [0.443]	56	0.214 [0.414]	0.053
1 if Dhaka respondent's job: RMG worker	667	0.990 [0.102]	56	1.000 [0.000]	-0.010
1 if Dhaka respondent's job: Housewifery	667	0.001 [0.039]	56	0.000 [0.000]	0.001
1 if Dhaka respondent's job: Business, Other industries' employee, else	667	0.006 [0.077]	56	0.000 [0.000]	0.006
1 if using mobile money	667	0.823 [0.382]	56	0.821 [0.386]	0.002
1 if using mobile money through agent account	667	0.310 [0.463]	56	0.393 [0.493]	-0.083
1 if using mobile money through own account	667	0.453 [0.498]	56	0.357 [0.483]	0.096
1 if using mobile money through family members' account	667	0.058 [0.235]	56	0.071 [0.260]	-0.013
Household income of last 30 days (Taka)	667	15469.334 [5817.407]	56	15763.696 [6508.240]	-294.362
Total value of assets (Taka) per HH member	667	5835.663 [7287.031]	56	9174.628 [19104.134]	-3338.965***
Consumption of last 30 days (Taka)	667	10290.252 [3747.120]	56	9493.851 [2971.946]	796.401
Amount of sent remittances to village HH (last 30 days) (Taka)	667	3078.051 [2711.591]	56	3187.500 [2416.915]	-109.449
Cognitive skill measure of the Dhaka worker (low~high:0~6)	667	4.081 [1.674]	56	4.339 [1.443]	-0.258
Village households					
Age of HH head	667	54.436 [13.066]	56	52.375 [12.669]	2.061
1 if HH head is male	667	0.729	56	0.714	0.014

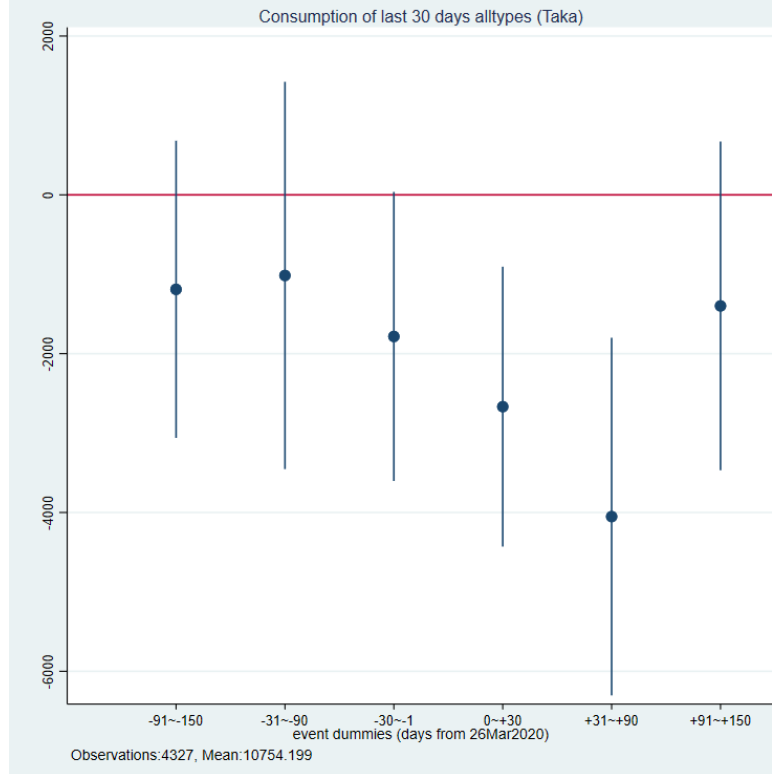
1 if HH head is married	667	[0.445] 0.823	56	[0.456] 0.857	-0.034
1 if HH head is widow/widower/divorced/separated	667	[0.382] 0.166	56	[0.353] 0.143	0.024
HH head: wife/husband/son/daughter of the Dhaka worker (=1)	667	[0.373] 0.070	56	[0.353] 0.054	0.017
HH head: father/mother/brother/sister/grandfa/grandmo of the Dhaka worker (=1)	667	[0.256] 0.708	56	[0.227] 0.768	-0.060
HH head: (In law) father/mother/brother/sister of the Dhaka worker (=1)	667	[0.455] 0.196	56	[0.426] 0.125	0.071
# of household members	667	[0.398] 4.586	56	[0.334] 4.661	-0.075
HH head did not get PSC or did not attend school (=1)	667	[1.637] 0.675	56	[1.283] 0.625	0.050
HH head completed PSC (=1)	667	[0.469] 0.118	56	[0.489] 0.250	-0.132***
HH head completed grade 6 ~ grade 9 (=1)	667	[0.323] 0.147	56	[0.437] 0.054	0.093*
HH head graduated from SSC or above SSC (=1)	667	[0.354] 0.060	56	[0.227] 0.071	-0.011
HH head's occupation: farming (=1)	667	[0.238] 0.420	56	[0.260] 0.321	0.098
HH head's occupation: self-employment, trader, wage-labor (=1)	667	[0.494] 0.115	56	[0.471] 0.250	-0.135***
HH head's occupation: salaried workers (i.e.government, teacher) (=1)	667	[0.320] 0.016	56	[0.437] 0.036	-0.019
HH head's occupation: non-earning occupations (i.e.housewife) (=1)	667	[0.127] 0.448	56	[0.187] 0.393	0.055
1 if using mobile money	667	[0.498] 0.865	56	[0.493] 0.786	0.079
1 if using mobile money through agent account	667	[0.342] 0.388	56	[0.414] 0.429	-0.040
1 if using mobile money through own account	667	[0.488] 0.409	56	[0.499] 0.304	0.106
1 if using mobile money through family members' account	667	[0.492] 0.067	56	[0.464] 0.054	0.014
minutes to the closest mobile money agent by foot	667	[0.251] 16.997	56	[0.227] 17.893	-0.896
Total value of assets per HH member (Taka)	667	[14.354] 3884.350	56	[12.746] 3602.090	282.260
Total value of productive assets per HH member (Taka)	667	[4904.284] 4903.956	56	[4990.388] 4269.820	634.135
Total value of lands per HH member (Taka)	667	[8061.033] 1.06e+05	56	[5962.580] 1.12e+05	-6069.923
Consumption of last 30 days (Taka)	667	[1.77e+05] 12498.091	56	[2.40e+05] 12074.393	423.698
Educational consumption (~SSC) of last 30 days (Taka)	667	[6210.658] 1777.547	56	[5194.444] 1622.955	154.592
Number of students (~SSC)	667	[1232.242] 1.730	56	[887.795] 1.821	-0.091
		[0.868]		[0.664]	
F-test of joint significance (F-stat)					1.564**
F-test, number of observations					723

Notes: 1) The value displayed for t-tests are the differences in the means across the groups. The value displayed for F-tests are the F-statistics. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level. 2) Taka is the currency of Bangladesh. As of December 21st,2020, 1 USD is 85 Taka.

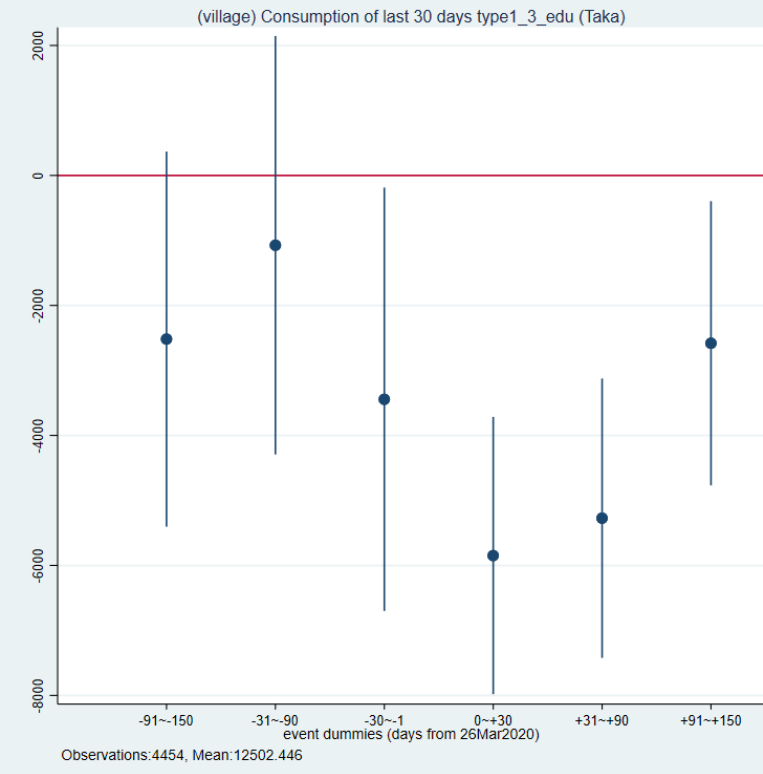
Appendix D.

Consumption event study based on alternative event dummies

(a) Dhaka household consumption of last 30 days (Taka)



(b) Village household consumption of last 30 days (Taka)



Notes: 1) For Panel (a), standard errors are clustered at household-level. For Panel (b), standard errors are clustered at Upazila-level. 2) Together with 95% confidence intervals, the figures report the dynamic coefficients obtained from the specification of equation (1), with a small modification as follows: the event dummy for the dates [-30, +30] is divided into two parts: [-30, -1] and [0, +30].

Appendix E.

Estimation results for probit model for non-attrition of Dhaka households and village households

Table A3. Estimation results for probit model

VARIABLES	(1) Non-attrition indicator based on Dhaka responses	(2) Non-attrition indicator based on village responses
Age of the Dhaka worker	.0349*** (.0134)	.0113 (.0167)
1 if the Dhaka worker is male	.136 (.226)	.129 (.277)
1 if the Dhaka worker is married	.252 (.211)	.345 (.27)
1 if Dhaka respondent is widow/widower/divorced/separated	-.0171 (.348)	-.14 (.41)
1 if the Dhaka worker is household head	.0832 (.367)	.0522 (.423)
1 if the Dhaka worker is spouse of the household head	-.0254 (.398)	.163 (.483)
# of household members in Dhaka	.0849 (.114)	-.0895 (.145)
Dhaka worker did not get PSC or did not attend school (=1)	-.644*** (.24)	-.728** (.307)
Dhaka worker completed PSC (=1)	-.201 (.205)	-.394 (.262)
Dhaka respondent completed grade 6 ~ grade 9 (=1)	-.242 (.172)	-.22 (.225)
1 if Dhaka respondent's job: RMG worker	.624 (.53)	
1 if using mobile money	4.02 (391)	3.17 (627)
1 if using mobile money through agent account	-4.13 (391)	-3.36 (627)
1 if using mobile money through own account	-3.97 (391)	-3.15 (627)
1 if using mobile money through family members' account	-4.16 (391)	-3.59 (627)
Household income of last 30 days (Taka)	-.0000127 (.0000145)	-.0000197 (.0000176)
Total value of assets (Taka) per HH member	-.000016** (6.84e-06)	-.0000231*** (7.88e-06)
Consumption of last 30 days (Taka)	.0000317 (.0000276)	.0000594 (.0000386)
Amount of sent remittances to village HH (last 30 days) (Taka)	7.81e-06 (.0000237)	8.60e-06 (.00003)
Cognitive skill measure of the Dhaka worker (low~high:0~6)	-.0171 (.0393)	-.13** (.0549)
(village) age of HH head	-.002 (.00648)	-.000408 (.00829)
(village) 1 if HH head is male	-.0847 (.263)	.299 (.317)
(village) 1 if HH head is married	-.4 (138)	-3.92 (206)
(village) 1 if HH head is widow/widower/divorced/separated	-4.15	-3.52

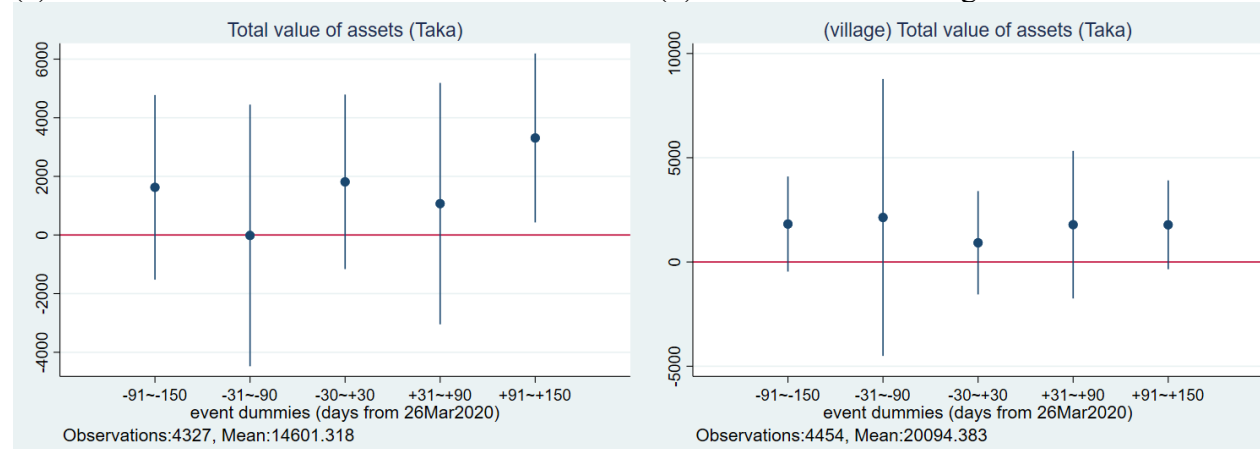
	(138)	(206)
(village)HH head: wife/husband/son/daughter of Dhaka respondent	-.236	.25
	(.499)	(.564)
(village)HH head: father/mother/brother/sister/grandfa/grandmo	-.111	.19
	(.414)	(.438)
(village)HH head: (In law) father/mother/brother/sister	-.124	.419
	(.437)	(.484)
(village) # of household members	.0755	.0211
	(.0576)	(.0717)
(village) HH head did not get PSC or did not attend school	.368	.276
	(.289)	(.378)
(village) HH head completed PSC	.177	-.265
	(.306)	(.385)
(village) HH head completed grade 6 ~ grade 9	.821**	.687
	(.339)	(.444)
(village) HH head's occupation: farming	-.024	.0512
	(.186)	(.246)
(village) HH head's occupation: self-employment, trader, wage-labor	-.13	-.578*
	(.246)	(.297)
(village) HH head's occupation: salaried workers (i.e.government, teacher)	-.265	-.67
	(.453)	(.544)
(village) 1 if using mobile money	.135	.386
	(.276)	(.369)
(village) 1 if using mobile money through agent account	.171	-.189
	(.249)	(.339)
(village) 1 if using mobile money through own account	.0355	-.0206
	(.247)	(.342)
(village) minutes to the closest mobile money agent by foot	-.000689	-.00601
	(.00434)	(.00514)
(village) Total value of assets per HH member (Taka)	-7.26e-06	.0000225
	(.0000152)	(.0000229)
(village) Total value of productive assets per HH member (Taka)	2.94e-06	5.32e-06
	(8.70e-06)	(.0000125)
(village) Total value of lands per HH member (Taka)	2.70e-07	-4.12e-07
	(4.24e-07)	(5.17e-07)
(village) Consumption of last 30 days (Taka)	-.0000114	-8.60e-06
	(.0000154)	(.0000188)
(village) Educational consumption (~SSC) of last 30 days (Taka)	.000106	.000131
	(.0000766)	(.000103)
(village) Number of students (~SSC)	-.25**	-.168
	(.113)	(.145)
Constant	3.11	4.87
	(138)	(206)
Observations	723	723

Notes: Standard errors are in parentheses. ***p < 0.01; **p<0.05; *p<0.1

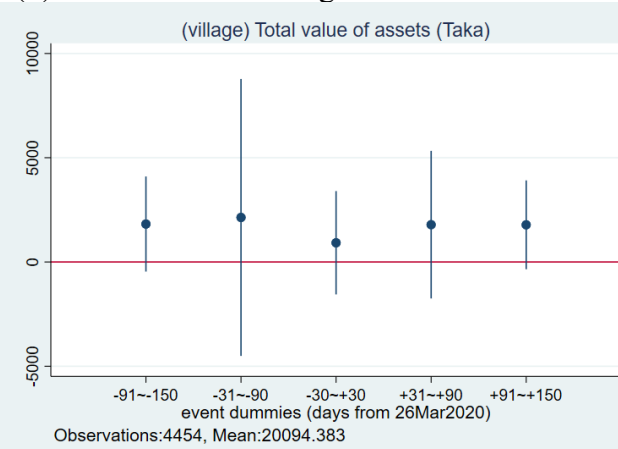
Appendix F.

Asset sales in response to COVID-19 shock

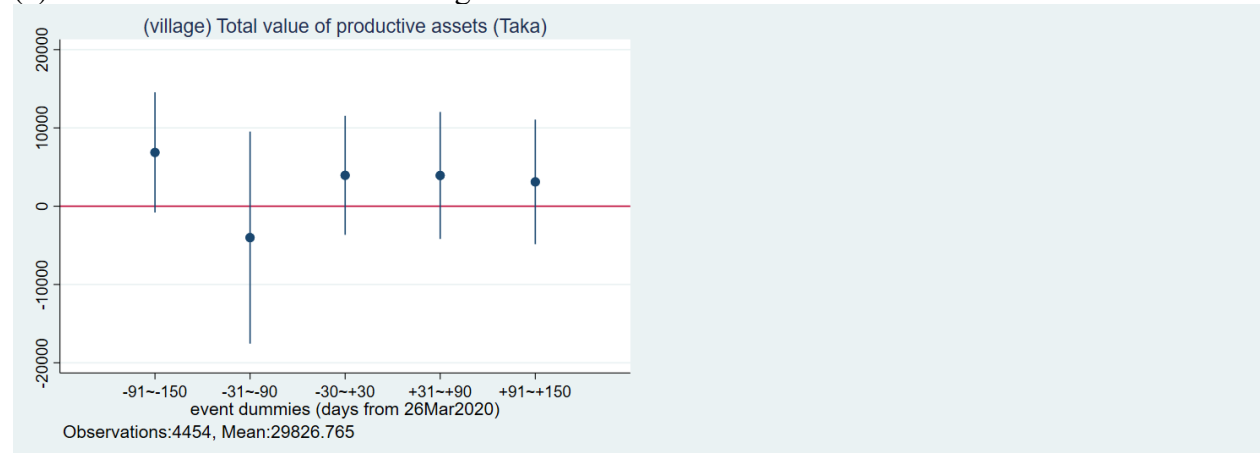
(a) Asset values of Dhaka HHs



(b) Asset values of village HHs



(c) Productive asset values of village HHs



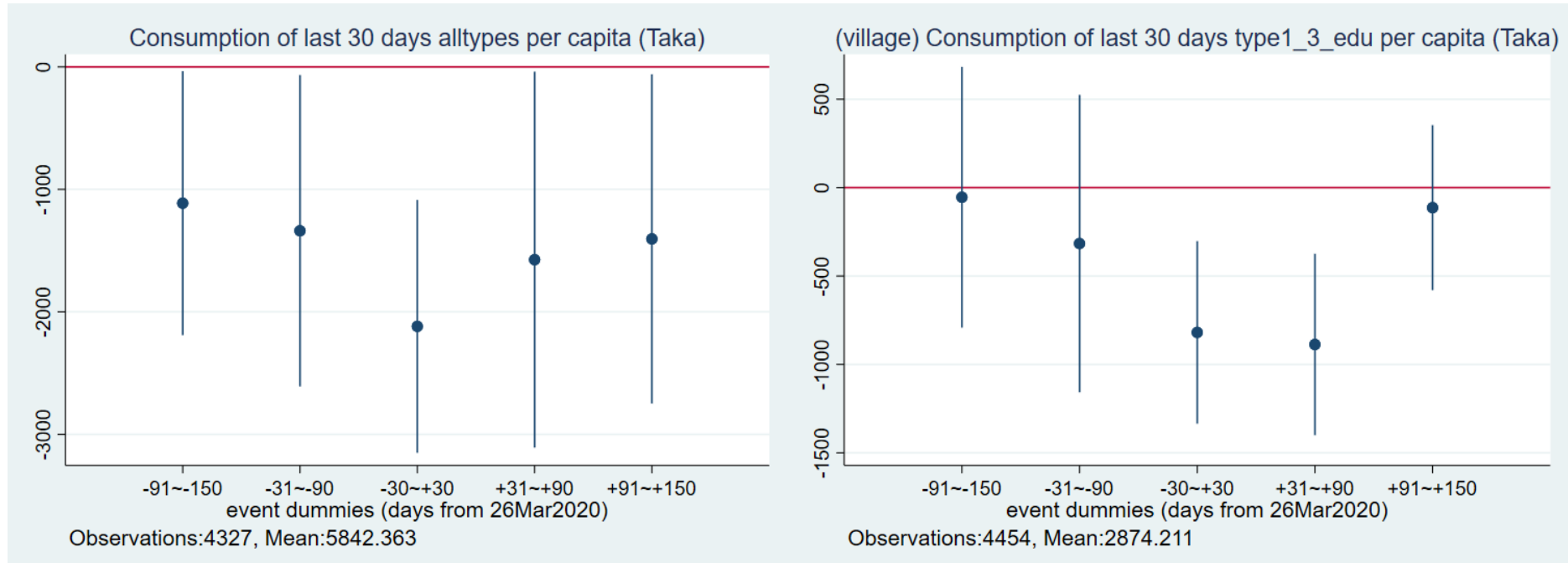
Notes: 1) For panel (a), standard errors are clustered at household-level. For panel (b) and (c), standard errors are clustered at Upazila-level. 2) Together with 95% confidence intervals, the figures report the dynamic coefficients obtained from the specification of equation (1) in the main text.

Appendix G.

Alternative measure of consumption: COVID-19 shock to consumption per capita

(a) Consumption per capita of Dhaka HHs

(b) Consumption per capita of village HHs



Notes: For panel (a), standard errors are clustered at household-level. For panel (b), standard errors are clustered at Upazila-level. Together with 95% confidence intervals, the figures report the dynamic coefficients obtained from the specification of equation (1), in the main text.

Appendix H.

Savings of Dhaka households

Table A4. Savings of Dhaka households increased during COVID-19 crisis

VARIABLES	(1) Dhaka Total value of savings (Taka)
Dummy: 1 = [-30,30] and 0 = [-120,-31]	2,938** (1,462)
Observations	1,126
R-squared	.759
Household FE	Yes
Mean	11701.882

Notes: 1) The results of a regression based on the following equation is shown: $y_{ih} = \beta Post + \mu_h + \epsilon_{ih}$, where $Post$ is a dummy variable that takes one for dates [-30,30] surrounding the lockdown implementation day (March 26th, 2020) and zero for dates [-120,-31]. Observations of the dates outside of [-120,30] are not used. The regression is weighted by the same weight used in the main regressions. 2) Standard errors are clustered at household-level. 3) Significance level: * p<0.1, ** p<0.05, *** p<0.01.

Appendix I.

Descriptive statistics of outcome variables at the baseline

Table A5. Dhaka households' outcome variables at the baseline by Dhaka attrition status

Variable	N	(1)	N	(2)	t-test
		The non-attriting sample Mean/SD		The attriting sample Mean/SD	Difference (1)-(2)
Dhaka					
Household income of last 30 days (Taka)	611	15484.710 [5748.215]	112	15532.634 [6519.007]	-47.924
Amount of received remittances from village HH of last 30 days (Taka)	611	18.003 [406.508]	112	0.000 [0.000]	18.003
Dummy of received remittances from village HH of last 30 days	611	0.003 [0.057]	112	0.000 [0.000]	0.003
Consumption of last 30 days (Taka)	611	10340.616 [3721.261]	112	9617.301 [3517.172]	723.315*
Food consumption of last 7 days (Taka)	611	1338.849 [511.328]	112	1239.529 [492.341]	99.320*
Amount of money borrowed of last 30 days (Taka)	611	1030.278 [11195.698]	112	89.286 [665.137]	940.993
Dummy of money borrowed of last 30 days	611	0.070 [0.256]	112	0.018 [0.133]	0.053**
Amount of loan borrowed of last 30 days (Taka)	611	2821.039 [8782.235]	112	1369.643 [1814.883]	1451.396*
Dummy of loan borrowed of last 30 days	611	0.588 [0.493]	112	0.491 [0.502]	0.096*

Notes: 1) The value displayed for t-tests are the differences in the means across the groups. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level. 2) Taka is the currency of Bangladesh. As of December 21st, 2020, 1 USD is 85 Taka.

Table A6. Village households' outcome variables at the baseline by village attrition status

Variable	N	(1)	N	(2)	t-test
		The non-attriting sample Mean/SD		The attriting sample Mean/SD	Difference (1)-(2)
Village					
Amount of remittances from Dhaka worker of last 30 days(Taka)	667	3123.568 [2435.642]	56	3251.786 [2184.490]	-128.217
Dummy of remittances from Dhaka worker of last 30 days	667	0.867 [0.340]	56	0.911 [0.288]	-0.044
Consumption of last 30 days (Taka)	667	12498.091 [6210.658]	56	12074.393 [5194.444]	423.698
Food consumption of last 7 days (Taka)	667	1874.321 [904.524]	56	1772.500 [615.352]	101.821
Amount of remittances from Dhaka worker (mobile money) (Taka)	667	2668.846 [2377.445]	56	2671.429 [2214.474]	-2.583
Dummy of remittances from Dhaka worker (mobile money)	667	0.777 [0.417]	56	0.786 [0.414]	-0.009
Amount of remittances from Dhaka worker (by hand/others) (Taka)	667	442.729 [1618.517]	56	580.357 [1739.323]	-137.629
Dummy of remittances from Dhaka worker (by hand/others)	667	0.090 [0.286]	56	0.125 [0.334]	-0.035

Notes: 1) The value displayed for t-tests are the differences in the means across the groups. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level. 2) Taka is the currency of Bangladesh. As of December 21st, 2020, 1 USD is 85 Taka.