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Who loses income during the COVID-19 outbreak? Evidence from China

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ABSTRACT

The COVID-19 pandemic has transformed every facet of society. In addition to directly affecting population health, the economic impact of this social shock has begun to be palpable at the individual level. Situated in this context, this research note draws on data collected from Mainland China in March–April, 2020 to examine the individual-level economic toll of the COVID-19 outbreak. We investigate how individuals' income (when surveyed) has changed relative to before the outbreak, and pay particular attention to the potentially unequal distribution of economic vulnerability based on structural (dis)advantages and COVID-19 related conditions. We show that education, family economic status, Communist Party membership, state-sector employment, and urban hukou—all long-standing status markers in China—mitigate the adverse effects of the COVID-19 outbreak on individuals' income losses. In addition, people who live in families or regions that were hit harder by COVID-19 are more likely to experience income losses. Taken together, this study shows that the COVID-19 pandemic not only exacerbates pre-existing social inequalities but also creates new forms of disparities. Therefore, instead of acting as a great equalizer, the pandemic may well magnify the social distribution of economic vulnerability. To alleviate inequality and aid post-pandemic recovery, public policies need to be oriented toward vulnerable and marginalized populations.

1. Introduction

The COVID-19 pandemic has transformed every facet of society. In addition to directly affecting population health, the economic fallout of this social shock has begun to emerge. For example, China, the initial epicenter of the outbreak, reported a 6.8 percent shrinkage in GDP in the first quarter of 2020, the first such decline since the 1990s (National Bureau of Statistics of China, 2020). Situated in this context, this research note examines the individual-level economic toll of the COVID-19 outbreak in China, paying particular attention to the potentially unequal distribution of economic vulnerability based on structural (dis) advantages and COVID-19 related conditions. As months-long economic shutdowns have been implemented across the globe to slow the spread of COVID-19, findings regarding who experiences income loss will help to identify the most economically vulnerable populations, thereby contributing to post-pandemic recovery interventions in not only China but also other countries.

The infectious nature of COVID-19 has led some to tout the pandemic as a "great equalizer," a systemic disadvantage that limits the economic activity of almost everyone regardless of social locations (Jones & Jones, 2020). Emerging evidence, however, begins to challenge this view, showing that some segments of the population are at a heightened risk of economic vulnerability. In particular, existing inequalities have placed individuals in unequal social positions, and the pandemic may exacerbate such inequalities by impacting vulnerable populations far more harshly than their advantaged counterparts (Kristal & Yaish, 2020; Wilson, 2020).

Building on these recent studies, we first examine how the risk of income losses is related to pre-existing structural (dis)advantages manifested through educational attainment, family economic status, Communist Party membership, employment sector, and *hukou* status. The earnings returns to education have increased rapidly in China (Wu, 2019). Given their greater human capital, job stability, and employability, better-educated people tend to exhibit higher economic resilience in the face of a social shock (Cutler et al., 2015; Kalleberg, 2011). Thus, we expect that more-educated individuals are less likely to suffer income losses associated with the COVID-19 outbreak. Similarly, the risk of income losses is likely lower for people in richer families, because such families may have various means and extended social networks to buffer against financial shocks brought about by crises (Pfeffer et al., 2013).

Unique to the Chinese setting, as a redistributive economy and a

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single-party state, the state and the Communist Party play a critical role in determining resource allocation in China (Bian, 2002; Wu, 2019). People closely connected to the state and party apparatus are privileged, as marked by party membership and state-sector employment. Party members, for example, had preferential access to scarce resources in times of crisis, such as food during the 1959–61 Chinese Famine (Fan & Qian, 2015). Additionally, in the Chinese labor market, work-unit (*danwei*) sector is a crucial status marker: State-sector jobs in the government, public institutions, and state-owned enterprises are more stable and less susceptible to business-cycle fluctuations (Bian, 2002; Wu, 2019). State-sector employment may be particularly risk-resilient during the COVID-19 outbreak: Whereas many private-sector companies and small businesses run by the self-employed are pushed to the margin or out of business altogether, state-sector jobs are usually left intact (Luo et al., 2020). Lastly, *hukou* (household registration) status influences every aspect of Chinese people's socioeconomic circumstances (Wu, 2019). In particular, over 150-million migrant workers hold rural *hukou* but work at low-end factory and service jobs in urban areas (Chan, 2010). They may be particularly vulnerable to income losses during the outbreak, when most service industries (e.g., restaurants) and factories were closed.

Along with pre-existing stratification structure, we hypothesize that the COVID-19 outbreak may have created new forms of disparities that shape individuals' economic vulnerability. Geographically, the first COVID-19 case was identified in Wuhan, the capital city of Hubei province. As the epicenter, Hubei has over 80 percent of the confirmed COVID-19 cases in China (National Health Commission, 2020). In response to the COVID-19 outbreak, the entire Hubei province was shut down on January 23, 2020, and not until April 8, 2020 was the massive lockdown lifted (State Council Information Office, 2020). In comparison, the lockdown was on a smaller scale and lasted a much shorter time in other parts of China. Therefore, Hubei residents might be particularly susceptible to income losses during the outbreak. Additionally, due to concerns about within-household transmission, suspected/confirmed COVID-19 patients, as well as their family members, had to be mandatorily quarantined (State Council Information Office, 2020). In this case, lives are indeed linked (Elder et al., 2003), with one's capacity to move outside of home and perform economic activity affected by the lives of other family members. As such, we expect people who were once suspected or confirmed to have COVID-19, as well as those who had family members with suspected or confirmed COVID-19, to experience higher risks of income losses.

1.1. Data

We use data from an online national survey conducted in Mainland China between March 20 and April 29, 2020, when COVID-19 infections had ground to a near halt (National Health Commission, 2020). Data were collected by a professional survey firm in China from their well-managed panel. Panelists were recruited through various online and offline channels, and were extensively profiled to ensure representation of the diversity among Chinese adults. We pilot tested the survey to ensure clarity of question wording. To ensure data quality, the survey included attention check questions—only panelists who passed at least half of these items were kept; cell-phone verification was used to avoid multiple submissions from a single respondent (one rarely has two cell numbers under China's real-name registration system); 7–10 additional verifications (e.g., consistency between reported age group and year of birth) were applied to screen out panelists failing over half of these checks.

Because Hubei was hit hardest by COVID-19, we over-sampled Hubei residents. Within each stratum (Hubei, other provinces), quota was set based on gender, age, and education to ensure sample diversity. The final sample includes 5010 adults who lived in Hubei province and 3000 adults who lived in other provinces during the Chinese Spring Festival (January 24–February 8, 2020), when COVID-19 cases were surging and the shutdown was implemented. Although we are cautious about generalizing given the opt-in nature of the sample, the survey data allow us to provide an account of the differential economic vulnerabilities *across* social groups.

Our analytic sample consists of 4715 respondents, after limiting to 4733 respondents (59 percent of all respondents) who had a paid job before the COVID-19 outbreak and excluding 18 respondents with missing data on variables used.

1.2. Variables

Respondents were asked, compared with their income before the COVID-19 outbreak, whether they had higher, about the same, somewhat lower, or no income at all as of the survey. As only 305 individuals (6 percent) reported an increase in income, we create a three-category dependent variable to measure income change associated with the outbreak: no income loss ("higher"/"about the same", reference), partial income loss ("somewhat lower"), and no income.

To capture structural (dis)advantages, socioeconomic status is measured through education (less than high school [reference], high school, vocational college, university or above) and monthly family income in 2019 (less than 5000 *yuan* [reference], 5000–9999 *yuan*, 10,000–19,999 *yuan*, 20,000 *yuan* or above). Connections with the state and party apparatus are measured through Communist Party membership (1 = yes, 0 = no) and employment sector before the outbreak (state-sector [reference], private-sector, self-employment, other). To measure *hukou* status, we differentiate respondents with rural *hukou* (= 1) from those with urban *hukou* (= 0).

COVID-19 related factors include an indicator of living in Hubei province during the Spring Festival (1 = Hubei; 0 = otherwise) and whether the respondent or his/her family member was ever a confirmed/suspected COVID-19 case (no [reference], yes, prefer not to answer).

We control for a series of basic demographic variables: gender (1 = female, 0 = male), age and age squared (to capture any nonlinearity of age), marital status (never married [reference], married, previously married), presence of preschoolers at home (1 = yes, 0 = no), and self-rated health (excellent [reference], very good, good, fair or poor). In supplementary analysis, we also included survey date indicators to capture possible economic fluctuations over time; results remained the same and these variables were seldom significant. Thus, we excluded survey date from our analysis for parsimony.

1.3. Analytic strategies

We use multinomial logit regression models to assess how the risk of income losses associated with the outbreak is shaped by individuals' structural locations and COVID-19 related situational factors. We did not use weights because our regression model has included all auxiliary variables that would be used to construct post-stratification weights (region, age, education, gender); in such a case, unweighted estimates are preferred (Winship & Radbill, 1994).

2. Results

Table 1 presents the descriptive statistics for variables used in our analysis. Recall that our sample consists of those who had a job prior to the COVID-19 outbreak. When surveyed, almost half (48 percent) of the respondents reported partial income loss, that is, a somewhat lower income compared with before the COVID-19 outbreak. About 11 percent of the respondents had no income whatsoever at the time of the survey, presumably because of job losses or furloughs given that they had a job before the outbreak. Thus, the economic impact of COVID-19 looms large in China. But are all groups equally affected? We turn to multinomial logit regression models to address this question.

As shown in Table 2, consistent with our expectations, higher

Table 1
Descriptive Statistics for Variables Used in the Analysis.

	Mean/%
Income change	
No income loss	41.15%
Partial income loss	47.51%
No income	11.35%
Education	
Less than high school	4.79%
High school	15.57%
Vocational college	26.02%
University or above	53.62%
Monthly family income in 2019 (in *yuan*)	
< 5000	20.17%
5000–9999	34.93%
10,000–19,999	30.86%
> = 20,000	14.04%
Communist Party member	17.79%
Employment sector	
State sector	38.30%
Private sector	53.66%
Self-employment	2.93%
Other	5.11%
Rural *hukou*	38.03%
Hubei province	60.62%
Suspected/confirmed COVID-19 (self/family)	
No	95.10%
Yes	3.08%
Prefer not to answer	1.82%
Female	46.41%
Age	32.27
Marital status	
Never married	38.05%
Married	60.06%
Previously married	1.89%
Presence of preschoolers at home	33.91%
Self-rated health	
Excellent	38.24%
Very good	35.86%
Good	19.47%
Fair/poor	6.43%

Note: Standard deviation for age is 7.88.

educational attainment, greater family income, party membership, and state-sector employment protect workers from losing some or all of their income. People with urban *hukou* have lower risk of partial income loss (but not all income loss) than rural *hukou* holders.[2] As for COVID-19 related factors, people living in the epicenter (Hubei province) are more likely to experience partial income loss or no income; people who or whose family members were once suspected/confirmed COVID-19 cases are more likely to have a reduced income.[3] To facilitate interpretation, we present predicted probabilities of partial income loss (Fig. 1) or no income (Fig. 2) by key independent variables with 95% confidence intervals, while setting other variables at their means.

As shown in Fig. 1, while the probability of partial income loss varies little by education, it is significantly lower for people with the highest family income (0.46), compared with those with a family income below 20,000 *yuan* (over 0.50). Party membership and employment sector also make a difference: The probability of having a reduced

[2] In supplementary analysis, we separated rural *hukou* holders into those living in urban areas and those living in rural areas. Compared with urban *hukou* holders, only rural *hukou* holders in urban areas (likely migrant workers) had significantly higher log-odds of partial income loss (relative to no income loss) ($b = 0.181$, $p = 0.025$).

[3] In supplementary analysis, we separated respondents who were suspected/confirmed COVID-19 cases from those whose family members were suspected/confirmed COVID-19 cases; both groups had higher log-odds of partial income loss (relative to no income loss) ($b_{self} = 0.277$, $p = 0.351$; $b_{family} = 0.489$, $p = 0.050$), although the small size of the former group (n = 66) limited the power to detect statistical significance.

Table 2
Multinomial Logit Regression Models Predicting Relative Log-odds of Partial Income Loss or No Income (vs. No Income Loss) Associated with the COVID-19 Outbreak.

	Partial income loss vs. No income loss	No income vs. No income loss
Education		
Less than high school (ref.)		
High school	−0.192	−0.384
	(0.185)	(0.235)
Vocational college	−0.129	−0.530*
	(0.179)	(0.232)
University or above	−0.035	−0.907***
	(0.178)	(0.235)
Monthly family income in 2019 (in *yuan*)		
< 5000 (ref.)		
5000–9999	−0.023	−0.554***
	(0.095)	(0.140)
10,000–19,999	−0.067	−0.607***
	(0.099)	(0.153)
> = 20,000	−0.363**	−1.029***
	(0.117)	(0.195)
Communist Party member	−0.314***	−0.501**
	(0.088)	(0.185)
Employment sector		
State sector (ref.)		
Private sector	0.764***	2.097***
	(0.070)	(0.159)
Self-employment	1.620***	3.698***
	(0.264)	(0.319)
Other	0.418**	1.510***
	(0.152)	(0.255)
Rural *hukou*	0.153*	0.129
	(0.074)	(0.120)
Hubei province	0.641***	1.850***
	(0.068)	(0.139)
Suspected/confirmed COVID-19 (self/family)		
No (ref.)		
Yes	0.471*	−0.081
	(0.199)	(0.330)
Prefer not to answer	−0.018	0.111
	(0.250)	(0.355)
Female	−0.164*	0.024
	(0.066)	(0.110)
Age	0.001	0.110*
	(0.030)	(0.050)
Age squared	−0.000	−0.002*
	(0.000)	(0.001)
Marital status		
Never married (ref.)		
Married	0.191*	−0.075
	(0.093)	(0.150)
Previously married	−0.029	0.069
	(0.261)	(0.355)
Presence of preschoolers at home	−0.102	−0.123
	(0.079)	(0.133)
Self-rated health		
Excellent (ref.)		
Very good	0.085	0.314*
	(0.075)	(0.129)
Good	0.027	0.269
	(0.091)	(0.150)
Fair/poor	0.270	0.749***
	(0.144)	(0.213)
Constant	−0.345	−4.884***
	(0.557)	(0.928)

Note: Standard errors are in parentheses. ref. = reference category.
*** p < 0.001.
** p < 0.01.
* p < 0.05.

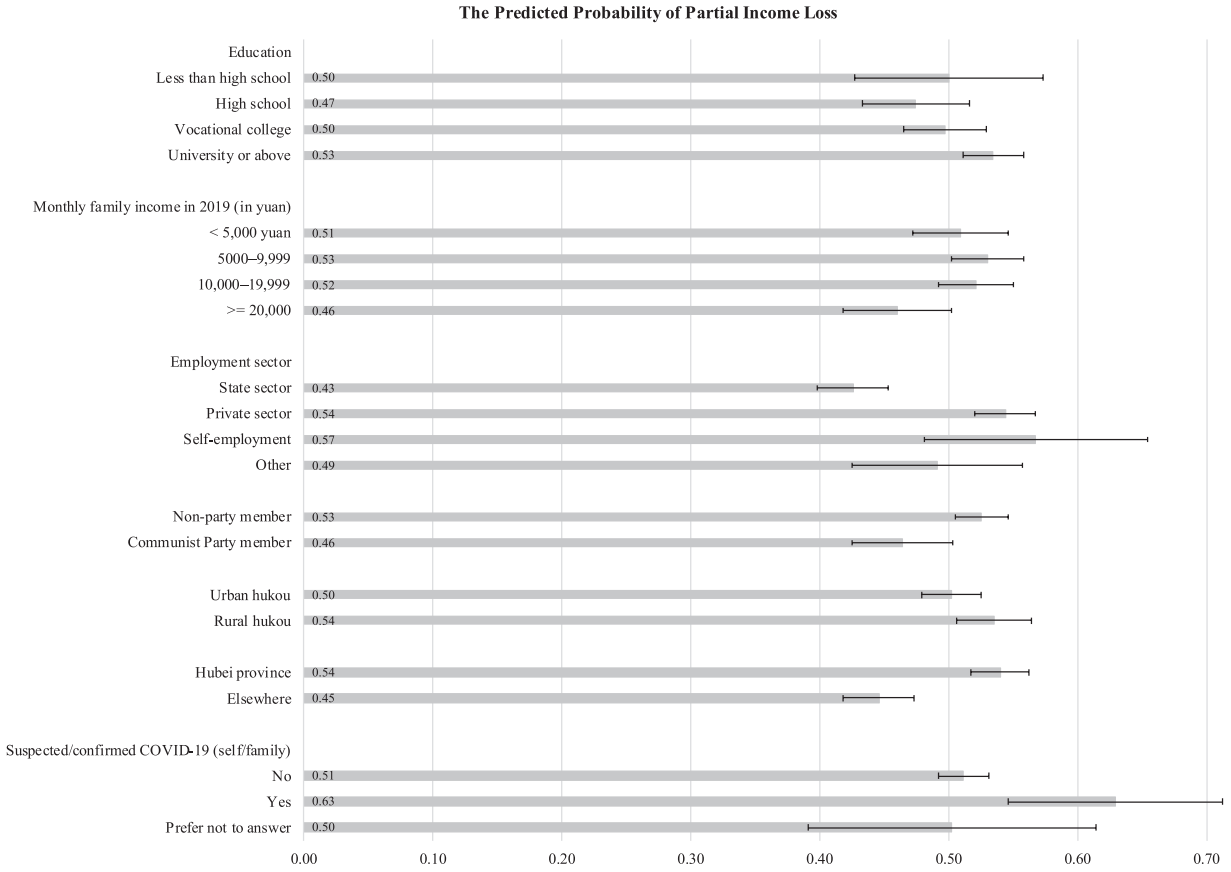

Fig. 1. Predicted Probabilities of Partial Income Loss Associated with the COVID-19 Outbreak, by Key Independent Variables.

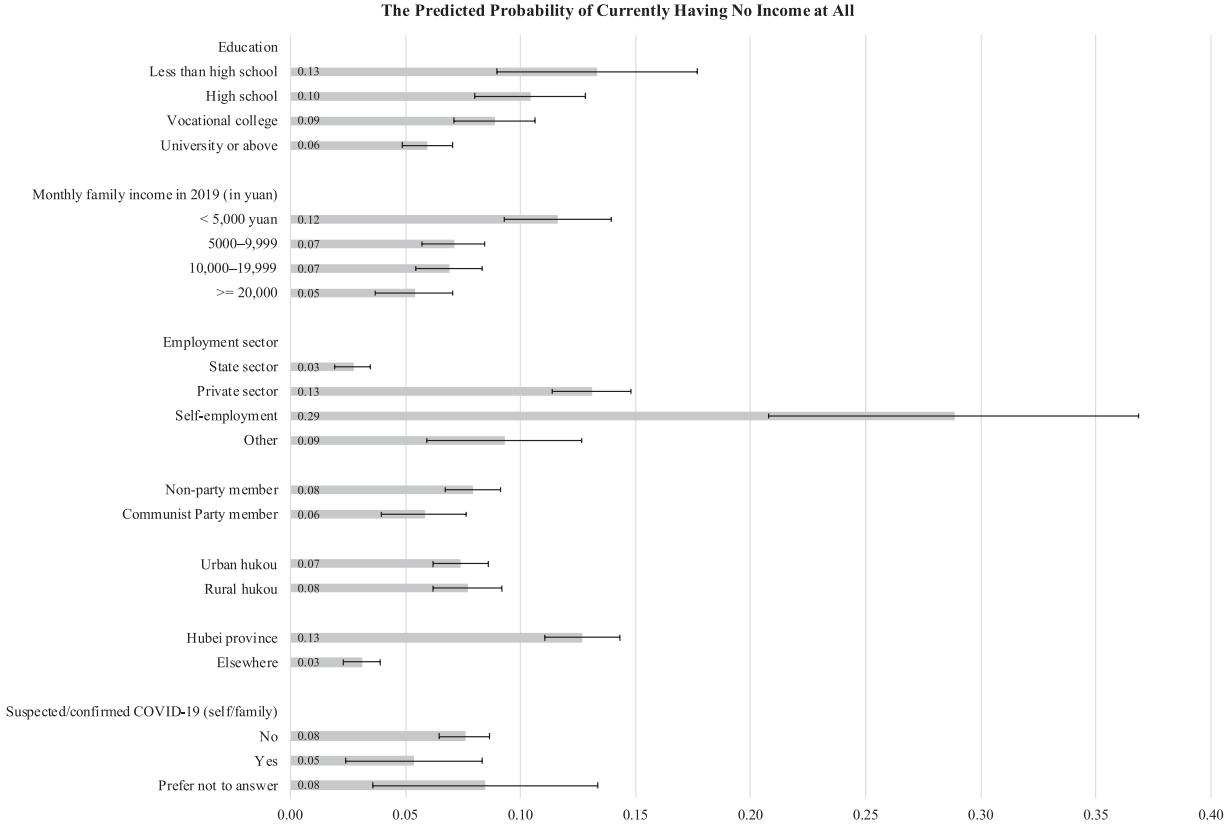

Fig. 2. Predicted Probabilities of Currently Having No Income at All, by Key Independent Variables.

income is 0.53 for non-party members but 0.46 for party members; it is 0.43 for state-sector workers but 0.54 for private-sector workers and 0.57 for self-employed individuals.[4] In terms of *hukou* status, the probability of partial income loss is 0.54 for rural *hukou* holders and 0.50 for urban *hukou* holders. As for COVID-19 related factors, people hit harder by the pandemic are more likely to have a partial loss of income, including Hubei residents (0.54 vs. 0.45 for non-Hubei residents) and being a suspected/confirmed COVID case or having an infected family member (0.63 vs. 0.51).

Parallel to Fig. 1, we present the probability of currently having no income at all in Fig. 2. People without a high school education are more than twice as likely as the university-educated to have lost all their income (0.13 vs. 0.06). Similarly, people from the lowest-income families are more than twice as likely as those from the highest-income families to have a zero income (0.12 vs. 0.05). State-sector workers are the least likely to have a zero income (0.03), whereas those who were self-employed are especially vulnerable, with a probability of no income as high as 0.29. In addition, people in Hubei province are more than four times as likely as people elsewhere to have lost their income altogether (0.13 vs. 0.03).

3. Conclusions and discussions

Disaster provides a unique opportunity to examine the social distribution of deep-seated as well as emerging inequalities. By investigating how individuals' income has changed relative to before the COVID-19 outbreak, we show that education, family income, Communist Party membership, state-sector employment, and urban *hukou*—all long-standing status markers in China—shield one from COVID-19 related financial troubles. Pre-existing social inequalities are therefore magnified. In addition, the coronavirus crisis produces new forms of inequality. Situational COVID-19 related vulnerabilities, including living in the epicenter and COVID-19 infection status, pose economic challenges for individuals and families involved. Together, our study adds to the growing stream of research showing that, far from being a great equalizer, the COVID-19 outbreak may have exacerbated pre-existing social inequalities while creating new forms of disparities. To alleviate social inequality and aid post-pandemic recovery, we advise more public policies oriented toward vulnerable and marginalized populations.

[4] In supplementary analysis, we separated the state sector into government, public institutions, and state-owned enterprises. The predicted probability of partial income loss was 0.12, 0.43, and 0.49, respectively. We interpret the result with caution as only 192 respondents had a government job (22 of them reported a partial loss of income).

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