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Agricultural Production as a Coping Strategy during the Covid-19 Pandemic? Evidence from Rural Viet Nam

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Abstract*: We examine the Covid-19 pandemic-induced negative effects on household welfare in rural Viet Nam. Analysing recent Viet Nam Household Living Standard Surveys spanning 2016–2021, we find robust evidence that lockdown measures resulted in a 3.9% reduction in per capita income and a 2.6 percentage-point increase in the headcount poverty rate of rural households. It also had severe effects on rural households' wages and self-employed non-farm income, but rural households appeared to have relied on farm income to cope with the lockdowns. Each additional month under lockdown reduced wage income and non-farm income by 2.8% and 6.3% respectively but increased crop income by 9.5%, livestock income by 7.1%, and other farm income by 12.2%.*

Keywords: Covid-19, urban-rural gap, income, poverty, rural households, Viet Nam
JEL classifications: E24, I30, J21, O12

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1. Introduction

Viet Nam performed well in the fight against the early onsets of the Covid-19 pandemic. The country received strong praise for outperforming wealthier countries that have far more developed medical systems, and particularly for its success containing two waves of Covid-19 in 2020 (Huynh, 2020; Trevisan, 2020; Hartley, 2021). The first wave of Covid-19 started in late March 2020 with around 10 infection cases detected a day (MoH, 2020). Despite the low infection rate, Viet Nam closed its international borders from 22 March 2020 and imposed a nationwide one-month lockdown in April 2020.[1] The lockdown was successful, resulting in no new cases in April 2020 and the subsequent resumption of all economic activities in 2020. However, the arrival of the Omicron variant in May 2021 significantly increased the number of infection cases. The government implemented longer lockdown and social distancing, especially in southern provinces, in response.[2]

Like other countries, the country also has to struggle with the harmful economic consequences that went hand-in-hand with strict lockdown measures. In particular, Viet Nam's GDP growth rate was only 2.9% in 2020 and 2.6% in 2021 – the lowest growth rate in the past decade.[3] Furthermore, the country's economic growth in the third quarter of 2021 decreased by 6.2% for the first time in over two decades of high growth.

In this study, we examine the negative pandemic-induced impacts on household incomes, livelihood, and poverty in rural Viet Nam using the most recent data from Viet Nam Household Living Standard Surveys. These negative impacts consist of both lockdown effects and pandemic effects, but we focus on the former. For identification of the lockdown effects, we examine the variations of lockdown durations across the years and provinces.

Our calculations show that the lockdown had a detrimental effect on per capita income in Viet Nam. A month under lockdown resulted in a 3.9% reduction in per capita income and a 2.6 percentage-point increase in poverty for rural households, and it decreased wage income and non-farm income by 2.8% and 6.3%. To cope with the lockdown, rural people tended to increase agricultural production. A month of lockdown increased crop income by

[1] According to Directive No. 15/CT-TTg dated 27 March 2020, social isolation was implemented within 15 days from 1 April 2020 nationwide on the principles that families are isolated from families, villages are isolated from villages, communes are isolated from communes, districts are isolated from districts, and provinces are isolated from provinces. Of the country's 63 provinces, 27 provinces implemented a 15-day lockdown and the remaining provinces opted for a 20 to 30 day lockdown.

[2] Some southern cities such as Ho Chi Minh City, Binh Duong, Dong Nai and Long An experienced 3–4 months of lockdowns (MDRI and UNDP, 2022).

[3] See https://www.gso.gov.vn/en/data-and-statistics/2020/10/social-and-economic-situation-in-the-3rd-quarter-and-9-months-of-2020/. Accessed on 30 December 2020.

9.5%, livestock income by 7.1%, and other farm income by 12.2%. In total, the pandemic had a strong and negative effect on per capita income in 2020 and 2021. The pandemic reduced per capita household income by 6.3% in 2020 and 21% in 2021 and increased the probability of being poor by 0.014% in 2020 and by 0.06% in 2021.

Our study makes several new contributions to academic study of the economic impact of the pandemic. First, we add to the small, but growing literature on the impacts of the pandemic on welfare outcomes in a poorer country setting using household survey data.[4] Although a large number of studies exist on the effects of the pandemic on household employment and welfare outcomes in high income countries (e.g., Adams-Prassl, 2020; Béland, 2020; Coibion, 2020; Gupta, 2020; Albanesi and Kim, 2021; Dang and Nguyen, 2021), far fewer studies have been conducted on the impact on poorer countries. The few existing studies predominantly rely on smaller phone survey samples (e.g., Egger, 2021; Khamis, 2021; Mahmud and Riley, 2021; Bundervoet, Dávalos, and Garcia, 2022). Various challenges affect phone surveys such as low response rates or under-coverage and shorter questionnaires with much fewer variables than the typical household survey, which do not allow rigorous and comprehensive analysis as can be implemented with large scale household consumption survey data.[5] To our knowledge, Deshpande (2020) is the only exception that analyses nationally representative household survey data in India. Examining the effects of the pandemic on the gender gaps in India during April–August 2020, Deshpande (2020) found women to have higher unemployment levels than men after the first wave of the outbreak, and incomes in rural sector to decline more for both genders.

Second, we analyse a wide range of welfare indicators. Specifically, we look at household income, income diversification, and poverty. Finally, we analyse the most recent

[4] A few other studies restrict analysis to certain population subgroups or simulations for possible pandemic effects. For example, analysing a survey of workers in low-income areas of urban India, Dhingra and Machin (2020) find that about a quarter of workers lost their jobs, 9% more were not working any hours, and earnings fell by 85% under lockdown. Using simulation, a recent study predicts that Covid-19-related negative impacts could wipe out poverty reduction improvements over the past 30 years (Sumner, Hoy, and Ortiz-Juarez 2020). See also Brodeur (2021), Miguel and Mobarak (2021), and Bloom (2022) for recent review studies on the impacts of the pandemic.

[5] In particular, Jain (2020) observed that the response rate in their phone survey was approximately 40%, which is higher than the traditional attrition rate of 20–30%. Egger *et al.* (2021) acknowledged that by design, the short duration of the phone surveys offer relatively coarse measures of income and welfare and may not capture well very poor households, who may not own phones or live in areas with low connectivity. Miguel and Mobarak (2021) suggested that economic data is not as well1regulated in poorer countries as in richer countries, so phone surveys offer a good method of tracking economic conditions during the pandemic in poorer countries. Internet-based surveys offer a rapid assessment alternative but this survey type may not capture all population groups, especially vulnerable groups in Viet Nam (Dang, Giang, and Do, 2021).

five survey rounds of the VHLSS data from 2016 to 2021, some of which have not been used before. In addition, we have calculated the heterogeneous effects of the pandemic on different population subgroups such as gender, age, and education levels.

Finally, to our knowledge, we offer the first study that analyses the pandemic impacts using large-scale household consumption survey (VHLSS) data for Viet Nam. The only other study that employs large-scale data sets is that by Dang, Nguyen and Carletto (2023), which focuses on analysing labour market outcomes in Labour Force Surveys (LFSs) at the individual level. Using Difference-in-Differences (DID) and Regression Discontinuity Design (RDD) models and rich data from Labour Force Surveys (LFSs), (Dang et al., 2023) found that the unemployment and temporary layoff rates increased after the national lockdown in April 2020. The quality of employment – as measured by wage jobs, jobs with contracts, and formal jobs – was also reduced. Compared to the first quarter of 2020, workers' monthly wages decreased by 11% in the second quarter of 2020, 7.2% in the third quarter, and 8.2% in the fourth quarter. Informal household workers and FDI sector workers were more affected than public sector workers, and workers in the transport and tourism sectors were most heavily affected. More worrisomely, the proportion of workers working below the minimum wages increased by 32%, strongly fueling wage inequality growth. The detrimental effects of the pandemic on the labour market can happen through both government-mandated lockdowns and voluntary social distancing prompted by fear of virus infection (e.g., Aum 2021; Goolsbee and Syverson 2021). Analysing the LFS data, this study found these negative effects operated mainly through the pandemic-induced national lockdown.

Compared to the LFSs and the online survey discussed above, the VHLSSs offer much richer data regarding household consumption, income sources (including total income and other types of non-wage income), poverty, and inequality. The VHLSSs are the official data sources that are used by the government of Viet Nam and the international aid community to calculate poverty and inequality levels. Our study also adds to the fledgling literature on the pandemic-induced lockdown impacts in a developing country context.

This paper has five sections. We present the data in the following second section. The third section outlines our methodology, while we discuss the calculation method and results in Sections 4 and 5. Finally, the sixth section brings us to our conclusion.

2. Data and Descriptive Analysis

We analyse the most recent Viet Nam Household Living Standard Surveys (VHLSS) from 2016 to 2021. These surveys were conducted annually by General Statistics Office of Viet Nam (GSO) with technical support from the World Bank. Each VHLSS covers around 46 thousand households selected from around three thousand enumeration areas and collects detailed data on households and their household members. Household-level data include information on households' appliances, assets, production, income, housing condition, and participation in government's programs. Individual-level data consist of information on demographics, education, and employment. The sample of VHLSS is representative at the provincial level. The number of observations in the VHLSSs is as follows:

- VHLSS 2016: 46,987 households including 177,987 household members.
- VHLSS 2017: 46,972 households including 176,609 household members.
- VHLSS 2018: 46,965 households including 174,740 household members.
- VHLSS 2019: 46,988 households including 173,203 household members.
- VHLSS 2020: 46,963 households including 172,869 household members.
- VHLSS 2021: 46,995 households including 172,352 household members.

In this study, we focus on the effect of the pandemic lockdown on per capita income of rural households in Viet Nam. There is no VHLSS data on consumption for 2017, 2019, and 2021 and as a result we cannot measure the effect of the pandemic on household consumption as well as expenditure poverty. Table 1 presents the real per capita income of rural households in Viet Nam over the 2016–2021 period. It shows that per capita income increased annually by around 11% during the 2016–2019 period. However, in 2020 per capita income increased by only 2% compared with 2019 and decreased by 3% in 2021. This shows the negative impact of the pandemic on per capita income, especially in 2021.

Table 1: Household Welfare Indicators in Rural Viet Nam

Year	Per Capita Income (D million)	Poverty Rate (%)	Share of Income Sources (%)								
			Wage Income	Nonfarm Income	Crop Income	Livestock Income	Other Agricultural Income	Domestic Remittance	Foreign Remittance	Social Alowances	Other Income Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2016	32.4	21.9	41.0	14.4	19.3	7.1	5.6	6.1	1.0	1.9	3.8
	(0.3)	(0.6)	(0.4)	(0.3)	(0.4)	(0.2)	(0.2)	(0.1)	(0.1)	(0.1)	(0.1)
2017	34.8	17.7	43.2	14.7	18.8	5.6	5.7	6.3	0.9	1.9	3.0
	(0.4)	(0.6)	(0.4)	(0.3)	(0.4)	(0.1)	(0.2)	(0.1)	(0.1)	(0.1)	(0.1)
2018	39.4	12.2	43.8	15.0	16.9	5.2	5.2	6.9	1.1	1.9	4.0
	(0.4)	(0.5)	(0.4)	(0.3)	(0.4)	(0.1)	(0.2)	(0.1)	(0.1)	(0.1)	(0.1)
2019	42.8	10.2	47.2	15.4	15.5	4.9	4.7	7.0	1.1	1.6	2.7
	(0.4)	(0.4)	(0.4)	(0.3)	(0.3)	(0.1)	(0.2)	(0.1)	(0.1)	(0.0)	(0.1)
2020	43.5	7.0	49.4	15.8	13.3	4.5	4.4	6.7	1.1	1.6	3.2
	(0.5)	(0.3)	(0.4)	(0.4)	(0.3)	(0.1)	(0.2)	(0.1)	(0.1)	(0.0)	(0.1)
2021	42.0	8.3	49.8	15.7	14.0	4.4	4.2	6.8	1.2	1.4	2.6
	(0.4)	(0.4)	(0.4)	(0.3)	(0.3)	(0.1)	(0.2)	(0.1)	(0.1)	(0.0)	(0.1)

Note: Per capita income as measured using prices from December 2021 (adjusted using monthly CPI).
Standard errors are in parentheses.
Source: Estimates extrapolated from VHLSSs 2016 to 2020.

We analyse income poverty instead of expenditure poverty (since there are no data on consumption expenditure in the 2017, 2019, and 2021 VHLSSs). In Viet Nam, the income poverty line is defined by the Ministry of Labour, Invalids, and Social Affairs (MOLISA). In addition to the income poverty lines, poverty status in Viet Nam is also identified by a multidimensional poverty approach (Government of Viet Nam, 2015). Measuring the poverty rate using the income and multidimensional poverty approach in the VHLSSs is complicated. Thus in this study, we measure poverty using the income poverty line. In 2021, the national rates of poor and near-poor households were 2.23% and 3.11% respectively (MOLISA, 2022). In total, the rate of poor and near-poor households was 5.44%. For simplicity, we classified poor and near-poor households in the 2021 VHLSS using income poverty lines. The income poverty line was set equal to D12,140,000/person/year to get the rate of poor households at 5.34%. For other VHLSSs, we deflate this poverty line using the overall CPI. Poverty is mostly a rural phenomenon in Viet Nam. In 2021, the poverty rate was 8.3% in rural areas but less than 1% in urban areas. Table 1 shows that rural poverty decreased over the 2016–2020 period but increased between 2020 and 2021, which was likely caused by the pandemic negative effects.

We measure the effect of the pandemic on per capita income, poverty status, and per capita income from different sources. In rural Viet Nam, wage income accounts for around half of total household income (Table 1). The share of wage income increased from 41% to 50% during the 2016–2021 period. In 2021, income from non-farm and farm self-employment accounted for around 20% and 23% of total income, respectively. The share of domestic remittances and foreign remittances in total income was 7% and 1% respectively in 2021. Income from social allowances accounted for only 1.4% of total income.

3. Methodology

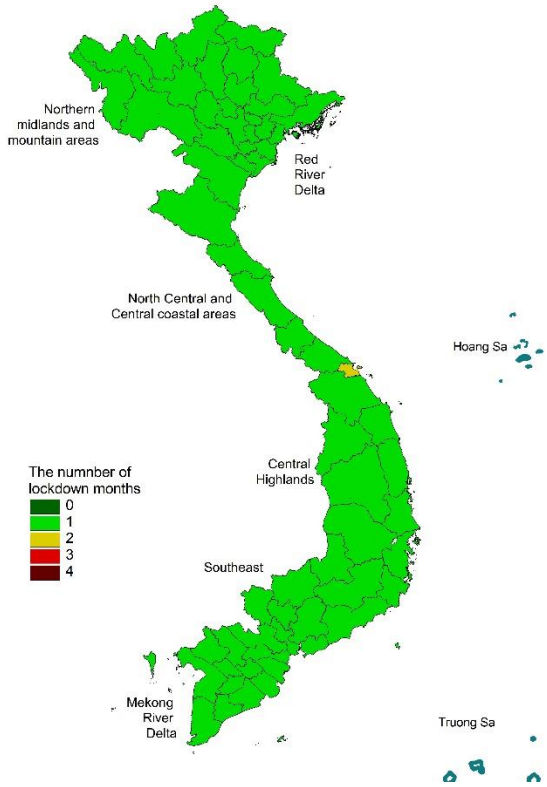
3.1. Impacts of Lockdown

In this study, we focus on the impact of the pandemic lockdown on household welfare in Viet Nam. The impact is identified due to the variation in the lockdown duration over time and across provinces. Specifically, we measure the lockdown duration by the number of months that a province implemented Directive No. 16 through the province (the government of Viet Nam, 2020). We do not count a lockdown which was

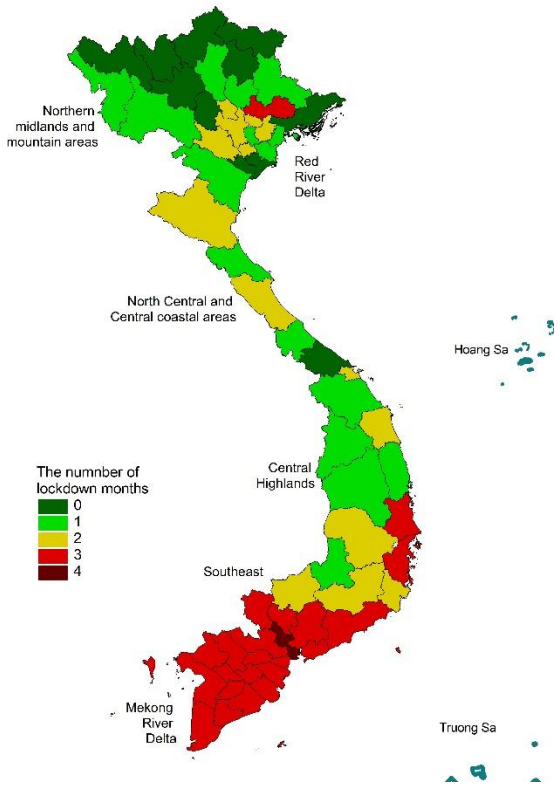
only applied in a few small areas such as communes within a province. In 2020, there was 1-month lockdown throughout the country (in April), and three was a 3-month lockdown in Da Nang city (in April, July and August). In 2021, the lockdown duration varied across provinces. There were 11 provinces without a lockdown in 2021, while Ho Chi Minh city had the longest lockdown duration of 4 months. Figure 1 presents a geographic map of the lockdowns in 2020 and 2021.

Figure 1: The Number of Months under Lockdown across Provinces

Panel A. Year 2020



Panel B. Year 2021



Source: Authors' preparation.

We estimate the effect of the pandemic lockdown on household outcomes using the following regression model:

$$y_{ijt} = \beta_0 + \beta_1 Lockdown_{jt} + X_{ijt}\beta_2 + P_j\beta_3 + Year_t\beta_4 + u_{ijt}, \qquad (1)$$

where y_{ijt} is an outcome variable of interest of household *i* living in province (or cities) *j* in year *t*. $Lockdown_{jt}$ is a count variable, which measures the number of months of lockdown in province *j* in year *t*. This variable receives zero in the years before 2020. In

2020, the variable $Lockdown_{jt}$ is equal to 3 for Da Nang city and 1 for other provinces. In 2021, the value $Lockdown_{jt}$ varies from 0 for provinces which did not implement lockdown to 4 (Ho Chi Minh city).

X_{ijt} are household-level control variables such as age, gender, ethnicity, the education level of household head, and household size. We tend to use a small set of control variables, since control variables should be exogenous and unaffected by the treatment variables (Angrist and Pischke, 2009; Heckman *et al.*, 1999). For further robustness, we also estimate the impact of lockdowns without control variables and with a larger set of control variables. Overall, the results from the alterative specifications are very similar to those from the small specifications. We use the results from the small specifications for interpretation.

P_j is a set of dummies of provinces. Controlling the province fixed effects reduces the bias in estimating the impact of lockdown, which is caused by time-invariant unobserved variables. $Year_t$ is the year dummies. Lastly, u_{ijt} denotes the error term.

We use the same model specification as equation (1) to estimate the effect of the lockdown on different outcome variables. We analyse a number of outcome variables at both the household level and the individual level. The household outcomes consist of per capita income, poverty status, and per capita income from different sources, while individual outcomes include working status and employment by different sectors.

We examine the heterogeneous effects of the lockdown for different population subgroups by estimating equation (1) for different population subgroups such as male/female-headed households, Kinh/ethnic minorities, households of different industries and education levels, households in different regions.

3.2. Impacts of the pandemic

Unlike the lockdown, the Covid-19 pandemic did not vary across geographic areas. Thus, the key challenge in estimating the effects of the pandemic is the lack of a control group since the pandemic affected all households in Viet Nam. In this study, we use the Difference-in-Differences (DID) econometric model to estimate the short-term effects of the pandemic on household outcomes.

A problem with measuring the effect of the pandemic is the lack of a control group. In this study, we measure the effects of the pandemic on households in 2020 and 2021.

We first estimate the effect in 2020 using the year 2019 as the control group. The difference in an economic outcome between 2019 and 2020 can be expressed as follows:

$$\mathrm{E}(Y_{2020}) - \mathrm{E}(Y_{2019}) = COVID_{2020} + Time_{2020} \quad (2)$$

In Equation (2), $\mathrm{E}(Y_{2020})$ and $\mathrm{E}(Y_{2019})$ are the averages of the outcome of households in 2020 and 2019, respectively. $COVID_{2020}$ is the effect of the pandemic in 2020, and $Time_{2020}$ is the time effect of 2020, which is equal to the difference in the outcomes between 2020 and 2019 in the absence of the pandemic. From equation (2), the effect of the pandemic is calculated as follows:

$$COVID_{2020} = \mathrm{E}(Y_{2020}) - \mathrm{E}(Y_{2019}) - Time_{2020}. \quad (3)$$

A problem with equation (1) is that we do not observe the time effect, $Time_{2020}$. To estimate the effect of the pandemic, we assume that the time effect in 2020 was the same as the time effect in the previous year. Put differently, in the absence of the pandemic, the difference in the household outcome between 2020 and 2019 is similar to the difference in household outcome between 2019 and 2018, 2018 and 2017, and 2017 and 2016. We use the average differences in two annual consecutive years to predict the time effect in 2020:

$$Time_{2020} = \{[\mathrm{E}(Y_{2019}) - \mathrm{E}(Y_{2018})] + [\mathrm{E}(Y_{2018}) - \mathrm{E}(Y_{2017})] + [\mathrm{E}(Y_{2017}) - \mathrm{E}(Y_{2016})]\}/3.$$

We therefore estimate equation (3) as follows:

$$COVID_{2020} = [\mathrm{E}(Y_{2020}) - \mathrm{E}(Y_{2019})] - \{[\mathrm{E}(Y_{2019}) - \mathrm{E}(Y_{2018})] + [\mathrm{E}(Y_{2018}) - \mathrm{E}(Y_{2017})] + [\mathrm{E}(Y_{2017}) - \mathrm{E}(Y_{2016})]\}/3. \quad (4)$$

Equation (4) is similar to a DID estimator, in which we obtain the first difference in the outcome between 2020 and 2019 and subsequently subtract the second difference, which is the average of the annual change in the outcome. Practically, we estimate equation (3) with a DID regression that further takes account of household characteristics.

The regression form of equation (3) is written as follows:

$$y_{ijtp} = \theta_0 + \theta_1 COVID_p + \theta_2 Time_{tp} + \theta_3 (COVID_p . Time_{tp}) + X_{ijtp}\theta_4 + P_j\theta_5 + Pair_p\theta_6 + \varepsilon_{ijtp}, \quad (5)$$

where y_{ijpt} is an outcome variable of interest of household *i* in province *j* in year *t* in the pair *p* of VHLSSs in equation (4). There are 4 pairs of VHLSSs as indicated in 4 brackets in equation (4). $COVID_{tp}$ is a dummy variable, which is equal to 1 for the 2020

VHLSS and the first 2019 VHLSS, i.e., for the first pair of VHLSSs (the first term) in equation (4), and equal to 0 for other VHLSSs. $Time_{tp}$ is a dummy variable, which is equal to 1 for the first VHLSS in each bracket and 0 for the second VHLSS in each bracket in equation (4). X_{ijtp} are the control variables, which are similar to those in equation (1). P_j denote the province fixed-effects. We also control for $Pair_p$ – dummies indicating pairs of VHLSSs in three brackets. Finally, ε_{ijtp} denotes the error term. The impact of the pandemic is measured by the coefficient of the interaction $(COVID_p.Time_{tp})$. To estimate equation (5), in addition to the original pooled data of VHLSSs from 2016 to 2020, we append additional VHLSSs from 2017 to 2019. It means that VHLSSs 2017 to 2019 appear twice in the data set.

We used the same estimation strategy to calculate the effect of the pandemic on households in 2021, comparing the difference in household outcome between 2021 and 2019 (pre-pandemic) with the two-year difference in previous years. Specifically, the estimate in equation (4) is rewritten as follows:

$$COVID_{2021} = [\mathrm{E}(Y_{2021}) - \mathrm{E}(Y_{2019})] -$$

$$\{[\mathrm{E}(Y_{2019}) - \mathrm{E}(Y_{2017})] + [\mathrm{E}(Y_{2018}) - \mathrm{E}(Y_{2016})]\}/2. \quad (6)$$

The regression model we used was also similar to equation (5) but using a slightly different data arrangement, where we analyse the VHLSSs in all the years during 2016-2021, except for 2020.

4. Empirical Results

4.1. The Impact of the Pandemic Lockdown

In this section, we present an estimate of the impact of the pandemic on household welfare in Viet Nam using regression in equation (1). In Table 2, we first estimate the impact of the Covid-19 pandemic on per capita income and poverty using regression specification in equation (4). Although we focus on the impact on rural households, we also present the impact on urban ones for comparison. Column 1 shows that for the whole country an additional month of the pandemic lockdown reduced per capita income of households by 4.6%. The decrease in per capita income is translated into an increase in the income poverty rate. A 1-month increase in the lockdown duration increased the probability of having income below the income poverty line by 0.026 (column 2). We examine whether the effect of the lockdown differs for urban and rural households.

Overall, urban inhabitants are less affected by the pandemic than rural ones. A 1-month increase in the lockdown reduced per capita income of urban and rural households by 2.0% and 3.9% (columns 3 and 5), respectively. The effect of the lockdown on poverty is larger in rural areas than in rural ones. This is because the effect of the lockdown on per capita income is higher in rural areas and the poverty rate is much higher in rural areas. A 1-month increase in the lockdown increased the probability of being poor by 0.008 and 0.026 for urban and rural households (columns 4 and 6), respectively.

Table 2: Impacts of the Lockdown on Household Welfare Indicators

Explanatory Variables	The whole country		Urban Areas		Rural Areas	
	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Income	Income Poor (yes=1, no=0)
	(1)	(2)	(3)	(4)	(5)	(6)
The lockdown duration	–0.0461***	0.0258***	–0.0196**	0.0082***	–0.0389***	0.0255***
	(0.0063)	(0.0021)	(0.0094)	(0.0021)	(0.0072)	(0.0030)
Gender of household head (male=1, female=0)	0.0076	–0.0008	–0.0242***	0.0033*	0.0390***	–0.0077**
	(0.0056)	(0.0023)	(0.0082)	(0.0019)	(0.0075)	(0.0037)
Age of household head	0.0330***	–0.0115***	0.0209***	–0.0036***	0.0379***	–0.0148***
	(0.0013)	(0.0006)	(0.0019)	(0.0006)	(0.0017)	(0.0008)
Squared age of household head	–0.0003***	0.0001***	–0.0002***	0.0000***	–0.0004***	0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Household head is Kinh (yes=1, no=0)	0.3865***	–0.2012***	0.1754***	–0.0700***	0.4155***	–0.2130***
	(0.0162)	(0.0103)	(0.0313)	(0.0147)	(0.0178)	(0.0120)
Household size	–0.0406***	0.0028***	–0.0453***	–0.0022***	–0.0395***	0.0058***
	(0.0018)	(0.0009)	(0.0028)	(0.0007)	(0.0022)	(0.0013)
Urban dummy (urban=1, rural=0)	0.2451***	–0.0515***				
	(0.0095)	(0.0031)				
Household head less than primary education	Reference					
Household head with primary education	0.1707***	–0.0698***	0.1757***	–0.0356***	0.1596***	–0.0740***
	(0.0073)	(0.0042)	(0.0153)	(0.0057)	(0.0083)	(0.0052)
Household head with lower-secondary	0.2837***	–0.1011***	0.2765***	–0.0444***	0.2794***	–0.1146***
	(0.0079)	(0.0045)	(0.0158)	(0.0059)	(0.0092)	(0.0057)
Household head with upper-secondary	0.4033***	–0.1173***	0.3770***	–0.0506***	0.4079***	–0.1440***
	(0.0109)	(0.0049)	(0.0187)	(0.0057)	(0.0135)	(0.0070)
Household head with vocational degree	0.5470***	–0.1488***	0.4760***	–0.0625***	0.5770***	–0.1857***
	(0.0103)	(0.0049)	(0.0173)	(0.0061)	(0.0135)	(0.0066)
Household head with post-secondary	0.7581***	–0.1380***	0.7115***	–0.0620***	0.7868***	–0.1959***
	(0.0120)	(0.0047)	(0.0191)	(0.0061)	(0.0162)	(0.0068)

Explanatory Variables	The whole country		Urban Areas		Rural Areas	
	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Income	Income Poor (yes=1, no=0)
	(1)	(2)	(3)	(4)	(5)	(6)
Province-fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	9.0526***	0.6894***	9.9567***	0.2377***	8.8372***	0.8023***
	(0.0400)	(0.0191)	(0.0641)	(0.0241)	(0.0512)	(0.0247)
Observations	281,846	281,846	87,689	87,689	194,157	194,157
R-squared	0.413	0.226	0.297	0.080	0.342	0.228

Note: This table shows OLS regressions of logs of per capita income and income poor status on the number of lockdown months and control variables. Standard errors are clustered at the commune level.
*** p<0.01, ** p<0.05, * p<0.1.
Source: Estimates extrapolated from VHLSSs 2016 to 2021.

Rural households are more diversified in income sources than urban ones who mainly rely on wage and non-farm employment. To explore how the lockdown affects the livelihood of rural households, we run a regression log of per capita income from different sources on the pandemic lockdown for rural households in Table 3. The lockdown imposed restrictions on travelling and opening hours for businesses. As a result, companies as well as non-farm households were affected. Table 2 shows that the pandemic reduced wage income and non-farm income. Specifically, a 1-month increase in the lockdown reduces per capita wage income and nonfarm self-employment income by 2.8% and 6.3%. The effect of the lockdown on remittances was negative but not statistically significant at conventional levels. There were no significant effects of the lockdown on public allowances.

Interestingly, the lockdown had a positive effect on income from agricultural activities. An additional lockdown month increased crop income by 9.5%, livestock income by 7.1%, and other farm income by 12.2%. This finding is consistent with the finding on the coping strategies of households to the pandemic from Do (2021). In a household survey which was conducted by Do (2021) in late 2020, rural people in Viet Nam mentioned that one of their strategies in response to the adverse effect of the lockdown on food consumption was to grow crops and raise livestock. The lockdown also had a positive effect on income from other sources (column 9 of Table 3). Although the lockdown had a positive effect on agricultural incomes, it still had a negative effect on the total income of households. Agricultural income accounted for only 23% of total income, while wages and nonfarm income accounted for 65% of total income.

In Table 4, we estimate the effect of the lockdown on the employment of individuals. We examine whether the effect of the lockdown on household income happened through the effect on employment. Employment is measured by a person's the main job during the previous 12 months. It shows that the lockdown reduced the rate of employment. A 1-month increase in the lockdown reduced the probability of working by 0.011% The probability of having a waged job as well as non-farm self-employed work was also reduced by the lockdown. On the other hand, the lockdown increased employment in growing crops.

Table 3: Impacts of the Lockdown on Per Capita Income from Different Sources of Rural Households

Explanatory Variables	Dependent Variables								
	Log of per Capita Wage Income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricultural Income	Log of per Capita Domestic Remittances	Log of per Capita Foreign Remittances	Log of per Capita Social Allowances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
The lockdown duration	–0.0282**	–0.0632***	0.0945***	0.0709***	0.1221***	–0.0186	–0.0166	0.0191	0.1406***
	(0.0113)	(0.0204)	(0.0199)	(0.0231)	(0.0376)	(0.0273)	(0.0251)	(0.0799)	(0.0427)
Gender of household head (male=1, female=0)	–0.0888***	0.0219	0.3016***	0.2416***	0.2834***	0.0302	–0.1196***	–0.1770**	–0.2996***
	(0.0128)	(0.0252)	(0.0190)	(0.0238)	(0.0364)	(0.0289)	(0.0198)	(0.0808)	(0.0401)
Age of household head	0.0111***	0.0140***	0.0923***	0.0703***	0.0207***	0.0440***	0.0213***	0.0268*	–0.0357***
	(0.0033)	(0.0051)	(0.0034)	(0.0038)	(0.0072)	(0.0048)	(0.0034)	(0.0146)	(0.0064)
Squared age of household head	–0.0001***	–0.0002***	–0.0008***	–0.0006***	–0.0002***	–0.0002***	0.0000	–0.0002*	0.0006***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0001)
Household head is Kinh (yes=1, no=0)	0.4598***	0.8404***	–0.0311	0.2538***	0.0696	0.4668***	0.2495***	0.2460	–0.2189**
	(0.0282)	(0.0744)	(0.0375)	(0.0442)	(0.0751)	(0.0741)	(0.0509)	(0.1930)	(0.0897)
Household size	–0.0805***	–0.1322***	–0.1415***	–0.1765***	–0.0826***	–0.2267***	–0.3423***	–0.2240***	–0.2316***
	(0.0038)	(0.0065)	(0.0050)	(0.0073)	(0.0104)	(0.0077)	(0.0064)	(0.0228)	(0.0124)

Explanatory Variables	Dependent Variables								
	Log of per Capita Wage Income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricultural Income	Log of per Capita Domestic Remittances	Log of per Capita Foreign Remittances	Log of per Capita Social Allowances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Household less than primary	Reference								
Household head with primary education	0.1243***	0.1442***	0.1640***	0.1440***	0.0249	0.0942***	0.0491**	0.1620	–0.1485***
	(0.0149)	(0.0300)	(0.0205)	(0.0257)	(0.0325)	(0.0323)	(0.0243)	(0.1086)	(0.0460)
Household head with lower-secondary	0.2192***	0.2719***	0.2642***	0.2395***	0.0044	0.2915***	0.0879***	0.2714**	–0.1422***
	(0.0166)	(0.0310)	(0.0209)	(0.0268)	(0.0437)	(0.0388)	(0.0266)	(0.1143)	(0.0525)
Household head with upper-secondary	0.3310***	0.4303***	0.2491***	0.2589***	0.1046	0.4299***	0.0992***	0.3707**	–0.0334
	(0.0224)	(0.0386)	(0.0295)	(0.0372)	(0.0672)	(0.0641)	(0.0370)	(0.1633)	(0.0724)
Household head with vocational degree	0.5472***	0.5272***	–0.0279	0.1892***	–0.1077	0.4120***	0.0878**	0.2835*	0.0150
	(0.0216)	(0.0400)	(0.0318)	(0.0413)	(0.0706)	(0.0633)	(0.0350)	(0.1497)	(0.0771)
Household head with post-secondary	0.9714***	0.3746***	–0.2839***	0.0554	–0.2251**	0.4654***	0.2219***	0.0807	0.1806*
	(0.0228)	(0.0518)	(0.0491)	(0.0583)	(0.0915)	(0.0891)	(0.0431)	(0.1732)	(0.0951)
Province-fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Explanatory Variables	Dependent Variables								
	Log of per Capita Wage Income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricultural Income	Log of per Capita Domestic Remittances	Log of per Capita Foreign Remittances	Log of per Capita Social Allowances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	9.0839***	8.7825***	5.8340***	5.5665***	6.6999***	5.5261***	6.3844***	8.8581***	7.5178***
	(0.0999)	(0.1594)	(0.0986)	(0.1107)	(0.2141)	(0.1559)	(0.1067)	(0.4828)	(0.2022)
Observations	127,809	53,065	133,394	96,488	61,755	32,997	155,034	6,578	138,927
R-squared	0.314	0.319	0.215	0.124	0.257	0.406	0.345	0.205	0.138

Note: This table reports OLS regressions of logs of per capita income from different sources on the number of lockdown months and control variables. Standard errors are clustered at the commune level.

*** p<0.01, ** p<0.05, * p<0.1.

Source: Estimates extrapolated from VHLSSs 2016 to 2021.

Table 4: Impacts of the Lockdown on Employment of Rural Individuals (age 15+)

Explanatory Variables	Have Work During the Past 12 Month (yes=1, no=0)	Have a Wage-Paying Job (yes=1, no=0)	In Self-Employed Nonfarm Work (yes=1, no=0)	In Self-Employed Crop Work (yes=1, no=0)	In Self-Employed Livestock Work (yes=1, no=0)	In Other Self-Employed Agricultural Work (yes=1, no=0)
	(1)	(2)	(3)	(4)	(5)	(6)
The lockdown duration	–0.0114***	–0.0078**	–0.0075***	0.0065*	–0.0007	–0.0020
	(0.0021)	(0.0036)	(0.0027)	(0.0033)	(0.0015)	(0.0015)
Gender (male=1, female=0)	0.0473***	0.1421***	–0.0338***	–0.0510***	–0.0271***	0.0171***
	(0.0021)	(0.0027)	(0.0017)	(0.0027)	(0.0016)	(0.0013)
Age	0.0689***	0.0486***	0.0211***	0.0011**	–0.0034***	0.0014***
	(0.0006)	(0.0006)	(0.0005)	(0.0005)	(0.0004)	(0.0002)
Squared age	–0.0008***	–0.0007***	–0.0002***	0.0001***	0.0001***	–0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Kinh (yes=1, no=0)	–0.1001***	–0.0511***	0.0845***	–0.1374***	0.0025	0.0014
	(0.0041)	(0.0097)	(0.0036)	(0.0107)	(0.0037)	(0.0037)
Household head less than primary education	Reference					
Household head with primary education	0.0765***	–0.0033	0.0453***	0.0297***	0.0096***	–0.0048**
	(0.0032)	(0.0048)	(0.0032)	(0.0048)	(0.0024)	(0.0023)
Household head with lower-secondary	0.0527***	–0.0299***	0.0616***	0.0212***	0.0111***	–0.0114***
	(0.0036)	(0.0055)	(0.0036)	(0.0053)	(0.0026)	(0.0025)
Household head with upper-secondary	–0.0074	–0.0247***	0.0596***	–0.0265***	–0.0017	–0.0142***
	(0.0047)	(0.0068)	(0.0047)	(0.0058)	(0.0034)	(0.0029)
Household head with vocational degree	0.1087***	0.1556***	0.0995***	–0.1136***	–0.0083**	–0.0245***
	(0.0042)	(0.0073)	(0.0057)	(0.0060)	(0.0033)	(0.0028)
Household head with post-secondary	0.1250***	0.3253***	–0.0325***	–0.1203***	–0.0216***	–0.0259***
	(0.0042)	(0.0067)	(0.0045)	(0.0058)	(0.0029)	(0.0027)
Province-fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes

Explanatory Variables	Have Work During the Past 12 Month (yes=1, no=0)	Have a Wage-Paying Job (yes=1, no=0)	In Self-Employed Nonfarm Work (yes=1, no=0)	In Self-Employed Crop Work (yes=1, no=0)	In Self-Employed Livestock Work (yes=1, no=0)	In Other Self-Employed Agricultural Work (yes=1, no=0)
	(1)	(2)	(3)	(4)	(5)	(6)
Pair of year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	–0.4870***	–0.3934***	–0.3605***	0.1959***	0.0791***	–0.0080
	(0.0123)	(0.0151)	(0.0105)	(0.0151)	(0.0075)	(0.0063)
Observations	545,663	545,663	545,663	545,663	545,663	545,663
R-squared	0.287	0.186	0.063	0.194	0.041	0.096

Note: This table reports OLS regressions of logs of employment of individuals on the number of lockdown months and control variables. The education level of individuals is measured by dummies indicating the highest education completed by household heads (Less than primary education, Primary education, Lower-secondary education, Upper-secondary education, Vocational degree, Tertiary education).
Standard errors are clustered at the commune level.
*** p<0.01, ** p<0.05, * p<0.1.
Source: Estimates extrapolated from VHLSSs 2016 to 2021.

4.2. Robustness Analysis

We conducted several robustness tests to verify our estimates of the effect of the lockdown on household income. Firstly, we conducted a placebo test by estimating the effect of the lockdown on several exogenous characteristics of households. We ran regression of dependent variables including Kinh status, age of household head, education and gender of household head, household size and proportion of female members on the lockdown variable. We controlled for single province and year fixed-effects in this regression. Table A.1 in the appendix shows that for all the dependent variables, the lockdown had no significant impacts. This finding indicates the exogeneity of the lockdown when province and time effects are taken into account.

Secondly, we implemented another placebo test as follows. We created a 'fake' lockdown variable at the provincial level for the years from 2016 to 2019. We use the number of lockdown months in 2021 and assigned this value to other years before the pandemic. The fake lockdown mimics the number of lockdown using the number of lockdown months in other years. Then we estimated the effect of this fake lockdown on per capita income. If the lockdown variable is correlated with unobserved variables, it can be correlated with per capita income before the pandemic. Table A.2 in the Appendix shows that the fake lockdown variable is of very small magnitude and not statistically significant at the 10% level for all the years from 2016 to 2019.

Thirdly, we examined whether the effect estimates are sensitive to control variables. We used regression models without control variables and models with extended control variables. The extended control variables included occupation dummies of household head, the proportion of children, the proportion of older people, the proportion of female members in households, log of per capita living areas, type of houses (permanent, semi-permanent, and temporary). The results are reported in Tables A.3 and A.4 in the appendix. We also examined models with district and commune fixed-effects instead of province fixed-effects (Tables A.5 and A.6 in the Appendix). The results are very similar to those presented in Table 2.

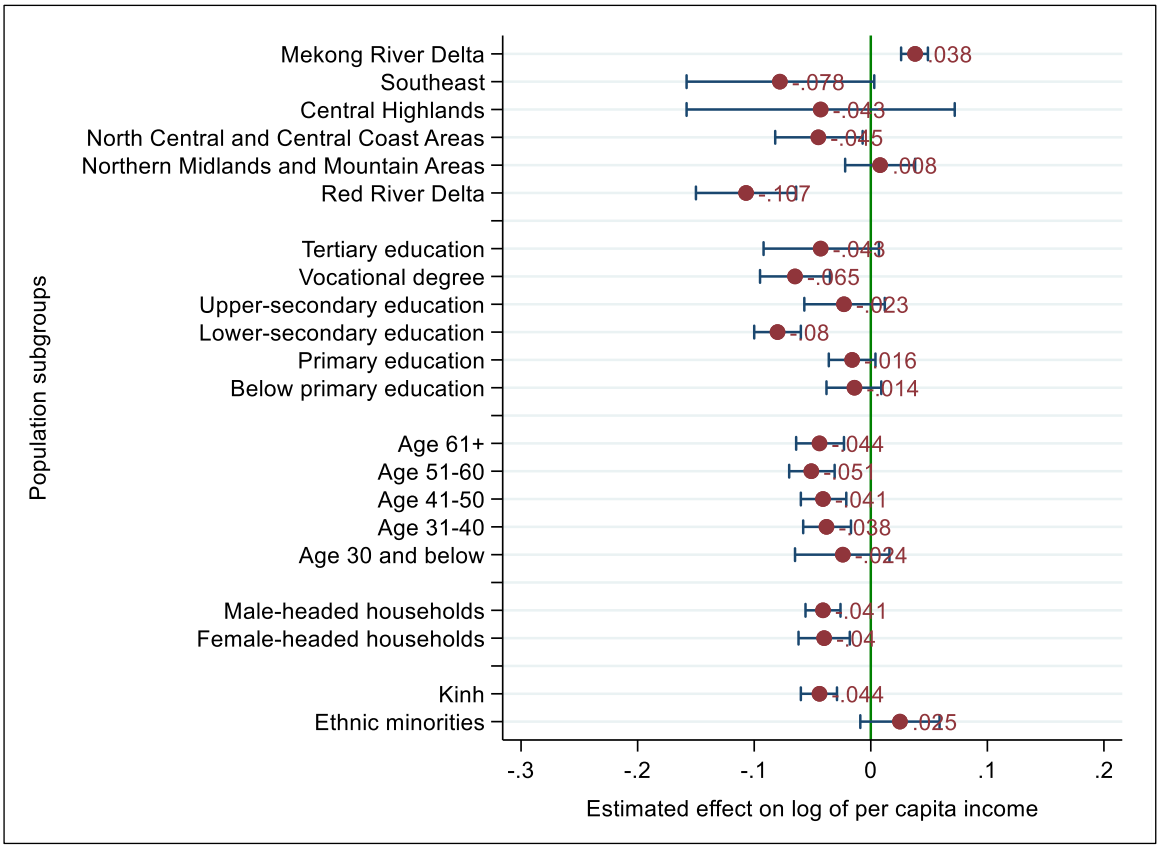
Fourthly, we examined whether our estimates are sensitive to the control group of different years. In Table A.7 in the appendix, we present regression of equation (1) using a sample which excludes the 2016 and 2017 VHLSSs. We use the sample including VHLSSs from 2018 to 2021. Overall, the effect estimates of the pandemic are similar to those presented in Table 2.

4.3. Heterogeneous Analysis

The large sample of the VHLSSs allowed us to examine the heterogeneous effects of the lockdown on different population sub-groups. We examined the heterogeneous effect of the lockdown on per capita income of households by running regressions of logs of per capita income during the lockdown and other control variables using the same model specification in equation (1) for different population groups.

Figure 2 plots the heterogeneous effects of the lockdown on logs of per capita income for different population sub-groups in the rural areas. In general, the effect of the pandemic on per capita income is negative for most population subgroups. By regions, the effect is highest for the South-east and Red River Delta. These are the two richest regions, in which people are more likely to have waged and non-farm employment. As a result, they are more affected. The effect of the lockdown was positive but not statistically significant in the Northern Midlands and Mountain Areas. A possible reason for the negligible effect of the lockdown in this region is that the lockdown duration was very small in this area (see Figure 1). Interestingly, we found a positive effect of the lockdown on per capita income in the Mekong River Delta, perhaps because the region has more intensive agricultural production and households benefited from the increase in agricultural income.

Figure 2: Heterogeneous Effects of the Covid-19 Pandemic on Logs of Per Capita Income for Different Demographic Groups



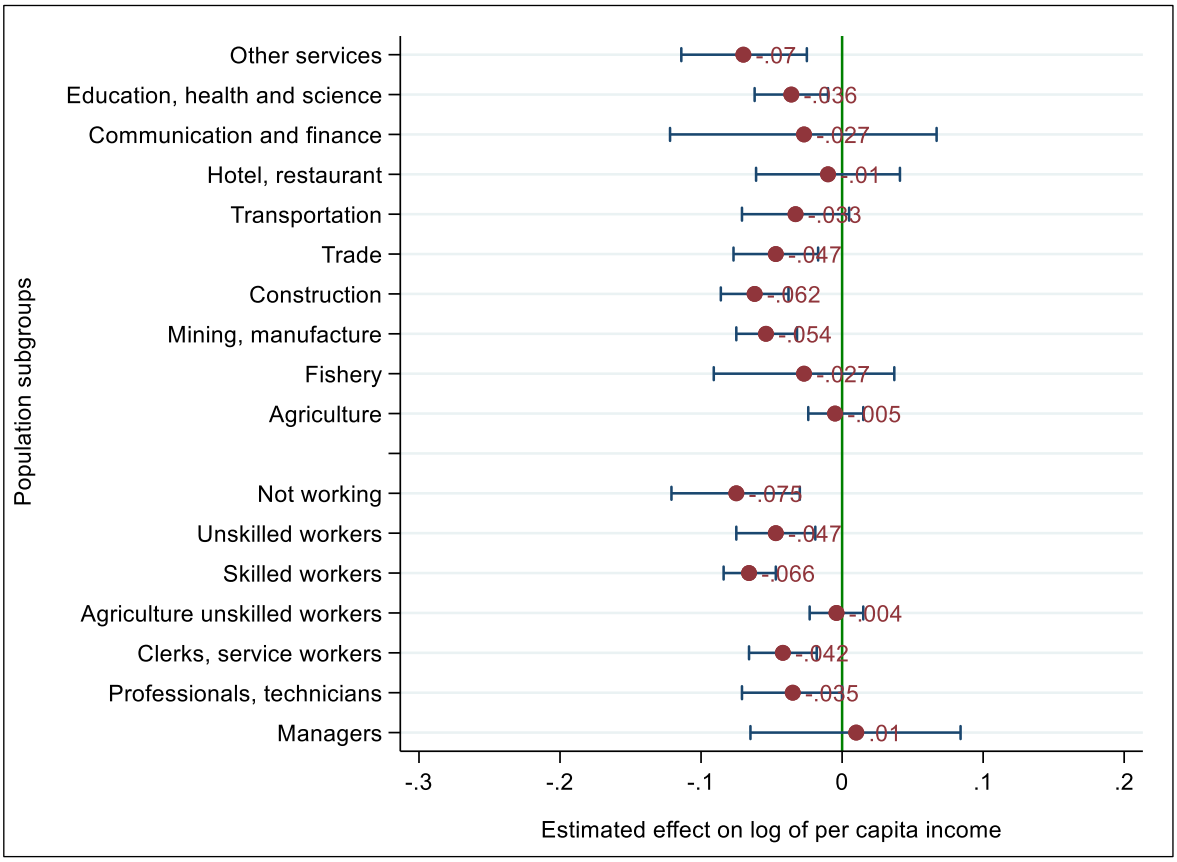
Note: This figure reports the effects and the 95% confidence interval of the Covid-19 pandemic on logs of per capita income in 2020 for different population subgroup.
Source: Estimates extrapolated from VHLSSs 2016 to 2020.

Kinh households were more affected than ethnic minorities. The effect of the lockdown on ethnic minorities was not statistically significant. One reason for the small effect on ethnic minorities is that they tend to live in the Northern mountains, where the lockdown was of short duration. Compared with Kinh households, ethnic minorities have a smaller share of wages and non-farm income, and were less impacted by the lockdown.

Figure 3 reports the heterogeneous effects across employment sectors and occupations. We classify households into different groups by the occupation of the household member with the highest education level in the household. We do not use the occupation of household heads to classify households, since there is a large proportion of household heads who are not working. Moreover, education is strongly correlated with wage and income. The employment status of the household member with the highest level of education can be strongly correlated with household income. Figure 3 shows that the

lockdown strongly affected households in the construction, trade and service sectors. Households in the agricultural sector were less affected.

Figure 3: Heterogeneous Effects of the Covid-19 Pandemic on Logs of Per Capita Income by Employment Sectors



Note: This figure reports the effects and the 95% confidence interval of the Covid-19 pandemic on logs of per capita income in 2020 for different population subgroups, which are defined by employment of a member who have the highest education in households.
Source: Estimates extrapolated from VHLSSs 2016 to 2020.

4.4. The Impact of the Covid-19 Pandemic

We estimate the impact of the pandemic on rural households in 2020 and 2021 using regression in equation (5). For compactness, Table 5 reports the main coefficients of the impact of the pandemic on income of rural households. The full regression results are reported in Tables A.8 and A.9 in the appendix. Panel A of Table 5 presents the impact of the pandemic in 2020. The dummy variable 'Covid-19 year' captures the effect of pair years '2020 and 2019'. This variable has a positive estimate, meaning a higher income in the two years '2020 and 2019' than the average of the previous years. The variable 'Time effect' is a measure of the annual change in per capita income. The estimate of this

variable is also positive, indicating the positive annual growth of per capita income. The interaction between ‘Covid-19 year’ and ‘Time’ reflects the effect of the pandemic on logs of per capita income. Column 1 shows that the pandemic reduced per capita income of households by 6.3%. The decrease in per capita income translated into an increase in the income poverty rate. The probability of having income below the poverty line increased by 0.014% (column 2). The pandemic had a negative and strong impact on wages and non-farm income. Unlike the effect on the lockdown, the pandemic had a negative effect on crop income in 2020. It should be noted that this panel estimates the total effect of the pandemic in 2020, while Table 3 estimates the effect of the lockdown, which mainly happened in 2021.

Panel B of Table 5 shows higher impacts of the pandemic on household income in 2021. Specifically, the pandemic reduced per capita income of households by 21% and increase the probability of being poor by 0.06%. The pandemic had a negative and significant effect on wages and non-farm income. There are no significant effects of the pandemic on agricultural incomes.

Table 5: Impacts of the Covid-19 Pandemic

Explanatory Variables	Dependent variables										
	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Wage Income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricul-tural Income	Log of per Capita Domestic Remittance	Log of per Capita Foreign Remittance	Log of per Capita Social Allow-ances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(8)	(9)
Panel A. Impacts of the COVID-19 pandemic in 2020											
Covid-19 year (2020) * Time effect	–0.0630***	0.0171***	–0.0962***	–0.1140***	–0.0685**	0.0409	–0.0358	0.0495	–0.0820***	–0.0086	2.3874***
	(0.0102)	(0.0045)	(0.0144)	(0.0291)	(0.0277)	(0.0285)	(0.0551)	(0.0389)	(0.0286)	(0.0970)	(0.0540)
Covid-19 year (2020)	0.2863***	–0.1049***	0.3944***	0.3266***	–0.0425*	0.0221	0.1955***	0.0640*	0.5011***	0.2500**	–0.0182
	(0.0102)	(0.0047)	(0.0149)	(0.0289)	(0.0256)	(0.0272)	(0.0494)	(0.0374)	(0.0279)	(0.0997)	(0.0557)
Time effect	0.0909***	–0.0386***	0.1275***	0.1174***	–0.0028	–0.0328***	0.0647***	0.0363***	0.1467***	0.0857***	–0.3276***
	(0.0031)	(0.0015)	(0.0046)	(0.0085)	(0.0073)	(0.0085)	(0.0144)	(0.0124)	(0.0086)	(0.0275)	(0.0211)
Panel B. Impacts of the COVID-19 pandemic in 2021											
Covid-19 year (2021) * Time effect	–0.2069***	0.0581***	–0.2016***	–0.1453***	0.0544	0.0020	0.1001	0.0580	–0.2441***	–0.4081***	1.2626***
	(0.0140)	(0.0062)	(0.0205)	(0.0383)	(0.0356)	(0.0389)	(0.0709)	(0.0482)	(0.0380)	(0.1299)	(0.0715)
Covid-19 year (2021)	0.2306***	–0.0984***	0.3213***	0.2947***	–0.0081	–0.0795***	0.1614***	0.0974***	0.3721***	0.2172***	-1.4899***
	(0.0078)	(0.0039)	(0.0118)	(0.0216)	(0.0184)	(0.0208)	(0.0358)	(0.0319)	(0.0214)	(0.0707)	(0.0354)
Time effect	0.1974***	–0.0665***	0.2670***	0.2064***	–0.0420*	0.0612**	0.1315***	0.0295	0.3625***	0.1511*	0.3778***
	(0.0090)	(0.0041)	(0.0133)	(0.0252)	(0.0225)	(0.0243)	(0.0444)	(0.0317)	(0.0245)	(0.0859)	(0.0436)

Note: This table reports the impact of the COVID-19 pandemic on the dependent variables in 2020 and 2021. The impact is measured by interactions between COVID year and time effect. The full regressions are reported in Tables A.8 and A.9 in the Appendix.

*** p<0.01, ** p<0.05, * p<0.1.

Source: Estimates extrapolated from VHLSSs 2016 to 2020.

5. Conclusions

Viet Nam was successful in containing the Covid-19 pandemic in 2020. However, Viet Nam faced a substantially high number of cases in 2021 due to a new virus variant. To contain the pandemic, Viet Nam had to implement more stringent lockdowns in 2021. In this study, we examined the impacts of the lockdown on household income, livelihood and poverty of households in rural Viet Nam. We found robust evidence on the serious impact of the lockdown on per capita income. Each additional month of lockdown resulted in a 3.9% reduction in per capita income and a 2.6 percentage-point increase in the poverty rate of rural households. The lockdown mainly affected wage and non-farm employment. A 1-month increase in the lockdown decreased wage income and non-farm income by 2.8% and 6.3%, respectively. However, each additional lockdown month increased crop income by 9.5%, livestock income by 7.1%, and other farm income by 12.2%. This suggests that rural households resorted to agricultural production as a coping strategy to the lockdown.

Finally, our study shows the negative effect of the whole pandemic on rural households. Specifically, the pandemic reduced per capita income of households by 6.3% in 2020 and 21% in 2021. The decrease in per capita income translated into an increase in the income poverty rate. The pandemic increased the probability of being poor by 0.014% in 2020 and by 0.06% in 2021.

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Appendix A

Table A.1: OLS Regression of Explanatory Variables on Lockdown

Explanatory Variables	Dependent Variables					
	Household Head is Kinh (yes=1, Ethnic Minorities =0)	Age of Household Head	Gender of household Head (male=1, female=0)	The Number of Schooling Year of Household Head	Household Size	Proportion of Female Members in Households
	(1)	(2)	(3)	(4)	(5)	(6)
The lockdown duration	–0.0087	–0.1936	–0.0032	–0.0172	–0.0227	–0.0027
	(0.0055)	(0.1473)	(0.0037)	(0.0182)	(0.0165)	(0.0018)
Province-fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.8153***	51.7284***	0.7836***	2.5357***	3.7661***	0.5172***
	(0.0061)	(0.1190)	(0.0029)	(0.0124)	(0.0136)	(0.0014)
Observations	194,157	194,157	194,157	194,157	194,157	194,157
R-squared	0.424	0.055	0.016	0.107	0.051	0.006

Note: This table reports OLS regressions of several exogenous variables on the number of lockdown months. The control variables are province and year fixed-effects.
Standard errors are clustered at the commune level.
*** p<0.01, ** p<0.05, * p<0.1.
Source: Estimates extrapolated from VHLSSs 2016 to 2021.

Table A.2: Placebo Test: OLS Regression of Log of Per Capita Income on Fake Lockdown Variables

Explanatory Variables	Model 1	Model 2	Model 3	Model 4
	(1)	(2)	(3)	(4)
Lockdown 2016	–0.0108			
	(0.0073)			
Lockdown 2017		0.0034		
		(0.0064)		
Lockdown 2018			–0.0058	
			(0.0072)	
Lockdown 2019				0.0067
				(0.0073)
Gender of household head (male=1, female=0)	0.0395***	0.0395***	0.0395***	0.0395***
	(0.0083)	(0.0083)	(0.0083)	(0.0083)
Age of household head	0.0383***	0.0383***	0.0383***	0.0383***
	(0.0019)	(0.0019)	(0.0019)	(0.0019)
Squared age of household head	–0.0004***	–0.0004***	–0.0004***	–0.0004***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Household head is Kinh (yes=1, no=0)	0.4206***	0.4205***	0.4205***	0.4206***
	(0.0193)	(0.0193)	(0.0193)	(0.0193)
Household size	–0.0383***	–0.0384***	–0.0384***	–0.0383***
	(0.0025)	(0.0025)	(0.0025)	(0.0025)
Education level of household head	Yes	Yes	Yes	Yes
Province-fixed-effects	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes
Constant	8.8324***	8.8124***	8.8125***	8.8124***
	(0.0591)	(0.0565)	(0.0566)	(0.0566)
Observations	131,144	131,144	131,144	131,144
R-squared	0.341	0.341	0.341	0.341

Note: This table reports OLS regressions of log of per capita income on the number of fake lockdown months in years from 2016 to 2019 and control variables. The fake lockdown mimics the number of lockdown using the number of lockdown months in 2021. The education level of household head is measured by dummies indicating the highest education completed by household heads (Less than primary education, Primary education, Lower-secondary education, Upper-secondary education, Vocational degree, Tertiary education).

Standard errors are clustered at the commune level.

*** p<0.01, ** p<0.05, * p<0.1.

Source: Estimates exptrapolated from VHLSSs 2016 to 2019.

Table A.3: Impacts of the Lockdown on Rural Households using the Small Model Specification

Explanatory Variables	Dependent Variables										
	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Wage income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricul-tural Income	Log of per Capita Domestic Remit-tance	Log of per Capita Foreign Remit-tance	Log of per Capita Social Allow-ances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
The lockdown duration	–0.046***	0.0286***	–0.0305**	–0.0739***	0.0896***	0.0651***	0.1190***	–0.0394	–0.0091	0.0470	0.1435***
	(0.0086)	(0.0033)	(0.0130)	(0.0225)	(0.0201)	(0.0237)	(0.0381)	(0.0324)	(0.0267)	(0.0793)	(0.0420)
Province-fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	10.172***	0.2036***	9.5458***	9.4135***	8.1162***	7.2530***	7.0170***	7.1203***	6.5132***	9.0543***	6.1798***
	(0.0082)	(0.0042)	(0.0122)	(0.0192)	(0.0147)	(0.0180)	(0.0270)	(0.0356)	(0.0200)	(0.0614)	(0.0278)
Observations	194,157	194,157	127,809	53,065	133,394	96,488	61,755	32,997	155,034	6,578	138,927
R-squared	0.189	0.141	0.206	0.243	0.149	0.052	0.244	0.194	0.177	0.146	0.083

Note: This table reports OLS regressions of log of per capita income from different sources on the number of lockdown months and control variables. The education level of household head is measured by dummies indicating the highest education completed by household heads (Less than primary education, Primary education, Lower-secondary education, Upper-secondary education, Vocational degree, Tertiary education).
Standard errors are clustered at the commune level.
*** p<0.01, ** p<0.05, * p<0.1.
Source: Estimation from VHLSSs 2016 to 2021.

Table A.4: Impacts of the Lockdown on Rural Households using the Large Model Specification

Explanatory Variables	Dependent Variables										
	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Wage Income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricul-tural Income	Log of per Capita Domestic Remittance	Log of per Capita Foreign Remit-tance	Log of per Capita Social Allow-ances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
The lockdown duration	–0.0404***	0.0261***	–0.0342***	–0.0595***	0.0813***	0.0698***	0.1204***	–0.0143	–0.0084	0.0292	0.1697***
	(0.0068)	(0.0029)	(0.0102)	(0.0192)	(0.0189)	(0.0227)	(0.0362)	(0.0263)	(0.0246)	(0.0774)	(0.0433)
Gender of household head (male=1, female=0)	–0.0386***	0.0180***	–0.1843***	0.0996***	0.3010***	0.2538***	0.2680***	–0.0655**	0.0270	–0.1173	–0.1032**
	(0.0074)	(0.0039)	(0.0128)	(0.0262)	(0.0197)	(0.0240)	(0.0364)	(0.0333)	(0.0212)	(0.0930)	(0.0468)
Age of household head	0.0071***	–0.0084***	–0.0070**	0.0024	0.0352***	0.0277***	–0.0124	0.0285***	0.0607***	0.0322**	0.0181***
	(0.0018)	(0.0009)	(0.0033)	(0.0054)	(0.0037)	(0.0043)	(0.0082)	(0.0050)	(0.0040)	(0.0148)	(0.0065)
Squared age of household head	–0.0001***	0.0001***	0.0001***	–0.0001	–0.0003***	–0.0003***	0.0000	–0.0002***	–0.0004***	–0.0003**	–0.0001
	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0001)
Household head is Kinh (yes=1, no=0)	0.2979***	–0.1690***	0.3433***	0.6524***	0.0275	0.2797***	0.0674	0.3815***	0.2173***	0.1295	–0.2336***
	(0.0160)	(0.0108)	(0.0252)	(0.0659)	(0.0372)	(0.0426)	(0.0726)	(0.0684)	(0.0504)	(0.1703)	(0.0872)
Household size	0.0159***	–0.0047***	–0.0310***	–0.0618***	–0.0424***	–0.0927***	–0.0139	–0.1147***	–0.3200***	–0.1982***	–0.1645***
	(0.0029)	(0.0016)	(0.0044)	(0.0083)	(0.0064)	(0.0098)	(0.0137)	(0.0107)	(0.0094)	(0.0309)	(0.0167)
Household less than primary	Reference										
Household head with primary education	0.1176***	–0.0617***	0.1068***	0.1073***	0.1251***	0.1169***	–0.0172	0.0532*	0.0429*	0.1591	–0.1571***
	(0.0075)	(0.0050)	(0.0141)	(0.0280)	(0.0193)	(0.0249)	(0.0329)	(0.0312)	(0.0238)	(0.1064)	(0.0449)
	0.1932***	–0.0897***	0.1712***	0.1920***	0.2160***	0.1919***	–0.0608	0.2261***	0.0919***	0.2556**	–0.1367***

Explanatory Variables	Dependent Variables										
	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Wage Income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricul-tural Income	Log of per Capita Domestic Remittance	Log of per Capita Foreign Remit-tance	Log of per Capita Social Allow-ances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Household head with lower-secondary	(0.0085)	(0.0054)	(0.0156)	(0.0285)	(0.0199)	(0.0258)	(0.0480)	(0.0362)	(0.0264)	(0.1098)	(0.0513)
Household head with upper-secondary	0.2794***	–0.1071***	0.2710***	0.2771***	0.2114***	0.2087***	0.0310	0.3248***	0.0858**	0.3289**	–0.0690
	(0.0122)	(0.0066)	(0.0208)	(0.0362)	(0.0278)	(0.0361)	(0.0627)	(0.0597)	(0.0372)	(0.1553)	(0.0725)
Household head with vocational degree	0.4179***	–0.1373***	0.4524***	0.3353***	0.0157	0.2019***	–0.1272*	0.2533***	0.0213	0.2610*	–0.0947
	(0.0122)	(0.0062)	(0.0221)	(0.0379)	(0.0314)	(0.0405)	(0.0752)	(0.0625)	(0.0355)	(0.1497)	(0.0792)
Household head with post-secondary	0.5615***	–0.1400***	0.8274***	0.1649***	–0.2478***	0.0500	–0.2960***	0.1395	0.0831*	0.0277	–0.1226
	(0.0186)	(0.0069)	(0.0269)	(0.0540)	(0.0552)	(0.0703)	(0.1048)	(0.1036)	(0.0472)	(0.2088)	(0.0961)
Additional control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province-fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	9.3415***	0.6614***	9.8166***	8.3141***	5.9289***	5.3377***	6.4231***	6.1753***	3.8562***	7.3580***	4.8323***
	(0.0792)	(0.0291)	(0.1325)	(0.2132)	(0.1459)	(0.1692)	(0.2948)	(0.2801)	(0.1740)	(0.6566)	(0.3122)
Observations	194,056	194,056	127,740	53,050	133,359	96,464	61,735	32,979	154,955	6,576	138,849
R-squared	0.449	0.271	0.376	0.402	0.278	0.158	0.288	0.445	0.373	0.244	0.157

Explanatory Variables	Dependent Variables										
	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Wage Income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricul-tural Income	Log of per Capita Domestic Remittance	Log of per Capita Foreign Remit-tance	Log of per Capita Social Allow-ances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)

Note: This table reports OLS regressions of log of per capita income from different sources on the number of lockdown months and control variables. Additional control variables include occupation of household heads, living areas, housing type, proportion of children, proportion of older members, and proportion of female members in households.
Standard errors are clustered at the commune level.
*** p<0.01, ** p<0.05, * p<0.1.
Source: Estimation from VHLSSs 2016 to 2021.

Table A.5: Impacts of the Lockdown on Rural Households with District Fixed-effects

Explanatory Variables	Dependent Variables										
	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Wage Income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricul-tural Income	Log of per Capita Domestic Remit-tance	Log of per Capita Foreign Remit-tance	Log of per Capita Social Allow-ances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
The lockdown duration	–0.0401***	0.0230***	–0.0345***	–0.0530***	0.1012***	0.0716***	0.0728**	–0.0432	–0.0054	0.0230	0.1501***
	(0.0068)	(0.0027)	(0.0098)	(0.0193)	(0.0170)	(0.0207)	(0.0303)	(0.0273)	(0.0206)	(0.0708)	(0.0419)
Gender of household head (male=1, female=0)	0.0601***	–0.0168***	–0.0457***	0.0627***	0.2889***	0.2363***	0.2103***	0.0415	–0.1293***	–0.1312*	–0.3207***
	(0.0068)	(0.0036)	(0.0116)	(0.0236)	(0.0174)	(0.0221)	(0.0327)	(0.0287)	(0.0181)	(0.0727)	(0.0365)
Age of household head	0.0362***	–0.0129***	0.0094***	0.0120**	0.0941***	0.0704***	0.0264***	0.0345***	0.0196***	0.0105	–0.0230***
	(0.0013)	(0.0007)	(0.0024)	(0.0047)	(0.0031)	(0.0036)	(0.0062)	(0.0044)	(0.0031)	(0.0130)	(0.0059)
Squared age of household head	–0.0004***	0.0001***	–0.0001***	–0.0002***	–0.0008***	–0.0006***	–0.0003***	–0.0001***	0.0000	–0.0001	0.0006***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0001)
Household head is Kinh (yes=1, no=0)	0.3055***	–0.1223***	0.2519***	0.7667***	0.0205	0.2122***	–0.0031	0.3045***	0.1980***	0.1496	–0.2120***
	(0.0148)	(0.0093)	(0.0229)	(0.0689)	(0.0392)	(0.0369)	(0.0502)	(0.0623)	(0.0391)	(0.1710)	(0.0794)
Household size	–0.0396***	0.0042***	–0.0842***	–0.1331***	–0.1422***	–0.1798***	–0.0982***	–0.2178***	–0.3316***	–0.2172***	–0.2437***
	(0.0019)	(0.0011)	(0.0033)	(0.0060)	(0.0046)	(0.0059)	(0.0072)	(0.0088)	(0.0058)	(0.0217)	(0.0104)
Hh. less than primary	Reference										
	0.1434***	–0.0626***	0.0971***	0.0978***	0.1667***	0.1176***	0.0573**	0.0905***	0.0505**	0.1294	–0.0374

Explanatory Variables	Dependent Variables										
	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Wage Income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricul-tural Income	Log of per Capita Domestic Remit-tance	Log of per Capita Foreign Remit-tance	Log of per Capita Social Allow-ances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Household head with primary education	(0.0075)	(0.0046)	(0.0135)	(0.0277)	(0.0184)	(0.0229)	(0.0271)	(0.0304)	(0.0222)	(0.1039)	(0.0420)
Household head with lower-secondary	0.2524***	–0.0965***	0.1710***	0.2045***	0.2636***	0.2228***	0.0680**	0.2381***	0.0913***	0.2346**	–0.0078
	(0.0081)	(0.0050)	(0.0149)	(0.0283)	(0.0188)	(0.0235)	(0.0334)	(0.0371)	(0.0239)	(0.1100)	(0.0462)
Household head with upper-secondary	0.3651***	–0.1209***	0.2607***	0.3518***	0.2546***	0.2485***	0.1863***	0.3643***	0.1217***	0.2905*	0.1022
	(0.0117)	(0.0061)	(0.0191)	(0.0352)	(0.0263)	(0.0344)	(0.0621)	(0.0555)	(0.0334)	(0.1588)	(0.0661)
Household head with vocational degree	0.5256***	–0.1593***	0.4770***	0.4467***	–0.0078	0.1910***	–0.0201	0.3152***	0.0954***	0.2655*	0.0767
	(0.0119)	(0.0060)	(0.0197)	(0.0367)	(0.0294)	(0.0381)	(0.0586)	(0.0615)	(0.0306)	(0.1421)	(0.0702)
Household head with post-secondary	0.7397***	–0.1741***	0.9030***	0.3054***	–0.2697***	0.0377	–0.1450**	0.3337***	0.2204***	0.0659	0.2898***
	(0.0150)	(0.0061)	(0.0214)	(0.0486)	(0.0463)	(0.0543)	(0.0734)	(0.0850)	(0.0404)	(0.1605)	(0.0927)
District-fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	8.9892***	0.6674***	9.3365***	8.9235***	5.7460***	5.6366***	6.6247***	5.9824***	6.4606***	9.3217***	6.9989***
	(0.0394)	(0.0207)	(0.0690)	(0.1435)	(0.0900)	(0.1005)	(0.1734)	(0.1435)	(0.0924)	(0.4022)	(0.1828)
Observations	194,157	194,157	127,809	53,062	133,394	96,485	61,739	32,992	155,034	6,513	138,926

Explanatory Variables	Dependent Variables										
	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Wage Income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricul-tural Income	Log of per Capita Domestic Remit-tance	Log of per Capita Foreign Remit-tance	Log of per Capita Social Allow-ances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
R-squared	0.401	0.292	0.396	0.405	0.307	0.220	0.458	0.492	0.418	0.438	0.220

Note: This table reports OLS regressions of log of per capita income from different sources on the number of lockdown months and control variables. Standard errors are clustered at the commune level.

*** p<0.01, ** p<0.05, * p<0.1.

Source: Estimation from VHLSSs 2016 to 2021.

Table A.6: Impacts of the Lockdown on Rural Households with Commune Fixed-effects

Explanatory Variables	Dependent Variables										
	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Wage Income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricul-tural Income	Log of per Capita Domestic Remit-tance	Log of per Capita Foreign Remit-tance	Log of per Capita Social Allow-ances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
The lockdown duration	–0.0385***	0.0145***	–0.0265***	–0.0538***	0.0887***	0.0455**	–0.0006	–0.0361	–0.0012	–0.0520	0.1093**
	(0.0069)	(0.0028)	(0.0098)	(0.0188)	(0.0154)	(0.0209)	(0.0269)	(0.0273)	(0.0222)	(0.0810)	(0.0482)
Gender of household head (male=1, female=0)	0.0740***	–0.0221***	–0.0254**	0.0870***	0.2905***	0.2354***	0.1825***	0.0454	–0.1396***	–0.2433***	–0.3571***
	(0.0068)	(0.0036)	(0.0119)	(0.0246)	(0.0178)	(0.0230)	(0.0339)	(0.0317)	(0.0183)	(0.0877)	(0.0372)
Age of household head	0.0353***	–0.0120***	0.0078***	0.0108**	0.0953***	0.0706***	0.0335***	0.0310***	0.0167***	–0.0148	–0.0224***
	(0.0012)	(0.0007)	(0.0021)	(0.0050)	(0.0030)	(0.0036)	(0.0067)	(0.0049)	(0.0031)	(0.0145)	(0.0061)
Squared age of household head	–0.0004***	0.0001***	–0.0001***	–0.0002***	–0.0008***	–0.0006***	–0.0003***	–0.0001**	0.0001**	0.0001	0.0006***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0001)
Household head is Kinh (yes=1, no=0)	0.2041***	–0.0743***	0.1230***	0.4827***	–0.0107	0.1664***	–0.0079	0.1787**	0.1272***	–0.3037	–0.1450
	(0.0158)	(0.0087)	(0.0252)	(0.0566)	(0.0359)	(0.0414)	(0.0624)	(0.0756)	(0.0434)	(0.3142)	(0.0907)
Household size	–0.0399***	0.0041***	–0.0796***	–0.1299***	–0.1429***	–0.1815***	–0.1089***	–0.2119***	–0.3296***	–0.2409***	–0.2475***
	(0.0019)	(0.0011)	(0.0032)	(0.0062)	(0.0043)	(0.0051)	(0.0065)	(0.0102)	(0.0054)	(0.0286)	(0.0105)
Household less than primary	Reference										
Household head with primary education	0.1320***	–0.0560***	0.0823***	0.0676**	0.1675***	0.1084***	0.0867***	0.0886***	0.0525**	0.3205***	0.0146
	(0.0076)	(0.0047)	(0.0139)	(0.0285)	(0.0182)	(0.0232)	(0.0269)	(0.0329)	(0.0223)	(0.1242)	(0.0431)

Explanatory Variables	Dependent Variables										
	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Wage Income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricul-tural Income	Log of per Capita Domestic Remit-tance	Log of per Capita Foreign Remit-tance	Log of per Capita Social Allow-ances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Household head with lower-secondary	0.2378***	–0.0880***	0.1424***	0.1535***	0.2661***	0.2108***	0.1424***	0.2247***	0.0925***	0.4839***	0.0736
	(0.0082)	(0.0051)	(0.0153)	(0.0293)	(0.0177)	(0.0239)	(0.0330)	(0.0407)	(0.0239)	(0.1410)	(0.0464)
Household head with upper-secondary	0.3398***	–0.1097***	0.2072***	0.2848***	0.2614***	0.2593***	0.2454***	0.3271***	0.1281***	0.5725***	0.2195***
	(0.0115)	(0.0062)	(0.0196)	(0.0370)	(0.0251)	(0.0353)	(0.0615)	(0.0608)	(0.0332)	(0.2092)	(0.0659)
Household head with vocational degree	0.4901***	–0.1446***	0.4252***	0.3620***	0.0186	0.2345***	0.0076	0.3405***	0.0984***	0.3870**	0.1329*
	(0.0118)	(0.0061)	(0.0201)	(0.0381)	(0.0291)	(0.0399)	(0.0580)	(0.0716)	(0.0311)	(0.1882)	(0.0732)
Household head with post-secondary	0.7044***	–0.1631***	0.8529***	0.1820***	–0.2555***	0.0297	–0.0647	0.3371***	0.2282***	0.3808	0.3736***
	(0.0156)	(0.0063)	(0.0224)	(0.0524)	(0.0449)	(0.0538)	(0.0691)	(0.0953)	(0.0406)	(0.2337)	(0.0944)
Commune fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	9.0991***	0.6005***	9.4820***	9.2263***	5.7214***	5.6774***	6.4410***	6.1404***	6.5937***	10.396***	6.8639***
	(0.0351)	(0.0209)	(0.0620)	(0.1428)	(0.0857)	(0.1031)	(0.1878)	(0.1610)	(0.0940)	(0.5522)	(0.1903)
Observations	194,157	194,157	127,803	52,877	133,349	96,374	61,419	32,611	155,010	5,827	138,862
R-squared	0.455	0.349	0.460	0.527	0.413	0.323	0.593	0.603	0.473	0.655	0.293

Note: This table reports OLS regressions of log of per capita income from different sources on the number of lockdown months and control variables. Standard errors are clustered at the commune level.

*** p<0.01, ** p<0.05, * p<0.1.

Source: Estimates extrapolated from VHLSSs 2016 to 2021.

Table A.7: Impacts of the Lockdown on Rural Households without the Sample of VHLSSs 2016 and 2017

Explanatory Variables	Dependent Variables										
	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Wage Income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricultural Income	Log of per Capita Domestic Remittance	Log of per Capita Foreign Remittance	Log of per Capita Social Allowances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
The lockdown duration	–0.0387***	0.0101***	–0.0288***	–0.0733***	0.0617***	0.0283	0.1253***	–0.0144	–0.0239	–0.0522	0.1318***
	(0.0062)	(0.0024)	(0.0093)	(0.0185)	(0.0189)	(0.0215)	(0.0345)	(0.0228)	(0.0223)	(0.0674)	(0.0378)
Gender of household head (male=1, female=0)	0.0356***	–0.0070***	–0.0655***	0.0001	0.3521***	0.2577***	0.3387***	0.0608***	–0.1219***	–0.2385***	–0.2201***
	(0.0050)	(0.0020)	(0.0084)	(0.0154)	(0.0140)	(0.0161)	(0.0262)	(0.0194)	(0.0129)	(0.0496)	(0.0252)
Age of household head	0.0370***	–0.0101***	0.0077***	0.0145***	0.0964***	0.0786***	0.0420***	0.0369***	0.0243***	0.0306***	–0.0068
	(0.0010)	(0.0004)	(0.0017)	(0.0038)	(0.0026)	(0.0029)	(0.0042)	(0.0036)	(0.0024)	(0.0112)	(0.0043)
Squared age of household head	–0.0004***	0.0001***	–0.0001***	–0.0002***	–0.0008***	–0.0007***	–0.0005***	–0.0002***	0.0000	–0.0003***	0.0003***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)
Household head is Kinh (yes=1, no=0)	0.3824***	–0.1393***	0.3941***	0.7235***	–0.0282	0.1806***	0.3525***	0.3098***	0.2853***	0.4037**	–0.2242***
	(0.0120)	(0.0070)	(0.0181)	(0.0610)	(0.0255)	(0.0301)	(0.0525)	(0.0440)	(0.0341)	(0.1662)	(0.0569)
Household size	–0.0468***	0.0053***	–0.0905***	–0.1402***	–0.1466***	–0.1901***	–0.0968***	–0.2451***	–0.3417***	–0.2435***	–0.2272***
	(0.0014)	(0.0007)	(0.0024)	(0.0044)	(0.0032)	(0.0043)	(0.0073)	(0.0054)	(0.0037)	(0.0160)	(0.0076)

Explanatory Variables	Dependent Variables										
	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Wage Income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricultural Income	Log of per Capita Domestic Remittance	Log of per Capita Foreign Remittance	Log of per Capita Social Allowances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Hh. less than primary	Reference										
Household head with primary education	0.1433***	–0.0520***	0.1038***	0.2000***	0.1475***	0.1190***	0.0174	0.0343	0.0655***	0.1824**	–0.0218
	(0.0056)	(0.0029)	(0.0095)	(0.0221)	(0.0145)	(0.0173)	(0.0244)	(0.0213)	(0.0159)	(0.0746)	(0.0309)
Household head with lower-secondary	0.2535***	–0.0754***	0.1814***	0.3114***	0.2201***	0.1912***	–0.0120	0.2029***	0.1094***	0.2237***	0.0830**
	(0.0063)	(0.0031)	(0.0103)	(0.0235)	(0.0158)	(0.0183)	(0.0275)	(0.0251)	(0.0170)	(0.0768)	(0.0336)
Household head with upper-secondary	0.3597***	–0.0902***	0.2728***	0.4331***	0.2169***	0.2177***	–0.0657	0.1848***	0.1629***	0.2767***	0.1839***
	(0.0088)	(0.0037)	(0.0142)	(0.0288)	(0.0221)	(0.0268)	(0.0437)	(0.0392)	(0.0226)	(0.0919)	(0.0454)
Household head with vocational degree	0.5011***	–0.1150***	0.4178***	0.5654***	–0.0966***	0.1286***	–0.0881*	0.3438***	0.1461***	0.0542	0.2409***
	(0.0086)	(0.0036)	(0.0133)	(0.0298)	(0.0239)	(0.0281)	(0.0476)	(0.0412)	(0.0220)	(0.1096)	(0.0488)
Household head with post-secondary	0.6993***	–0.1216***	0.8250***	0.4084***	–0.2421***	–0.0008	–0.2304**	0.3733***	0.2270***	0.1611	0.3791***
	(0.0104)	(0.0037)	(0.0146)	(0.0353)	(0.0356)	(0.0369)	(0.0900)	(0.0529)	(0.0267)	(0.1213)	(0.0571)
Province fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Explanatory Variables	Dependent Variables										
	Log of per Capita Income	**Income Poor (yes=1, no=0)**	**Log of per Capita Wage Income**	**Log of per Capita Nonfarm Income**	**Log of per Capita Crop Income**	**Log of per Capita Livestock Income**	**Log of per Capita Other Agricultural Income**	**Log of per Capita Domestic Remittance**	**Log of per Capita Foreign Remittance**	**Log of per Capita Social Allowances**	**Log of per Capita Income from Other Sources**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**
Year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	9.1613***	0.5068***	9.5736***	9.0774***	5.6863***	5.3539***	6.1845***	6.2546***	6.6129***	8.9539***	5.3736***
	(0.0337)	(0.0150)	(0.0535)	(0.1214)	(0.0745)	(0.0873)	(0.1210)	(0.1219)	(0.0753)	(0.3529)	(0.1370)
Observations	128,528	128,528	85,842	35,101	85,396	60,792	38,312	21,447	102,058	4,671	89,572
R-squared	0.334	0.189	0.307	0.322	0.218	0.128	0.230	0.386	0.349	0.242	0.165

Note: This table reports OLS regressions of log of per capita income from different sources on the number of lockdown months and control variables.
Standard errors are clustered at the commune level.
*** p<0.01, ** p<0.05, * p<0.1.
Source: Estimates extrapolated from VHLSSs 2016 to 2021.

Table A.8: Impacts of the Covid-19 Pandemic in 2020

Explanatory Variables	Dependent Variables										
	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Wage Income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricul-tural Income	Log of per Capita Domestic Remit-tance	Log of per Capita Foreign Remi-ttance	Log of per Capita Social Allow-ances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(8)	(9)
Covid-19 year (2020) * Time effect	–0.0630***	0.0171***	–0.0962***	–0.1140***	–0.0685**	0.0409	–0.0358	0.0495	–0.0820***	–0.0086	2.3874***
	(0.0102)	(0.0045)	(0.0144)	(0.0291)	(0.0277)	(0.0285)	(0.0551)	(0.0389)	(0.0286)	(0.0970)	(0.0540)
Covid-19 year (2020)	0.2863***	–0.1049***	0.3944***	0.3266***	–0.0425*	0.0221	0.1955***	0.0640*	0.5011***	0.2500**	–0.0182
	(0.0102)	(0.0047)	(0.0149)	(0.0289)	(0.0256)	(0.0272)	(0.0494)	(0.0374)	(0.0279)	(0.0997)	(0.0557)
Time effect	0.0909***	–0.0386***	0.1275***	0.1174***	–0.0028	–0.0328***	0.0647***	0.0363***	0.1467***	0.0857***	–0.3276***
	(0.0031)	(0.0015)	(0.0046)	(0.0085)	(0.0073)	(0.0085)	(0.0144)	(0.0124)	(0.0086)	(0.0275)	(0.0211)
Gender of household head (male=1, female=0)	0.0389***	–0.0076*	–0.0887***	0.0218	0.2988***	0.2399***	0.2808***	0.0274	–0.1172***	–0.1516*	–0.3146***
	(0.0083)	(0.0041)	(0.0142)	(0.0278)	(0.0206)	(0.0259)	(0.0392)	(0.0315)	(0.0218)	(0.0918)	(0.0424)
Age of household head	0.0382***	–0.0151***	0.0116***	0.0145**	0.0920***	0.0696***	0.0202***	0.0443***	0.0216***	0.0212	–0.0401***
	(0.0019)	(0.0009)	(0.0037)	(0.0057)	(0.0037)	(0.0041)	(0.0077)	(0.0052)	(0.0037)	(0.0165)	(0.0067)
Squared age of household head	–0.0004***	0.0001***	–0.0001***	–0.0002***	–0.0008***	–0.0006***	–0.0002***	–0.0002***	0.0000	–0.0002	0.0007***
	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0001)
Household head is Kinh (yes=1, no=0)	0.4191***	–0.2178***	0.4658***	0.8446***	–0.0323	0.2578***	0.0437	0.4722***	0.2398***	0.2360	–0.2154**
	(0.0194)	(0.0130)	(0.0307)	(0.0799)	(0.0408)	(0.0479)	(0.0806)	(0.0793)	(0.0555)	(0.2142)	(0.0942)
Household size	–0.0384***	0.0058***	–0.0787***	–0.1306***	–0.1409***	–0.1757***	–0.0808***	–0.2254***	–0.3430***	–0.2183***	–0.2296***
	(0.0024)	(0.0014)	(0.0043)	(0.0072)	(0.0054)	(0.0080)	(0.0112)	(0.0084)	(0.0070)	(0.0257)	(0.0130)
Education of household head	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province-fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Explanatory Variables	Dependent Variables										
	Log of per Capita Income	**Income Poor (yes=1, no=0)**	**Log of per Capita Wage Income**	**Log of per Capita Nonfarm Income**	**Log of per Capita Crop Income**	**Log of per Capita Livestock Income**	**Log of per Capita Other Agricul-tural Income**	**Log of per Capita Domestic Remit-tance**	**Log of per Capita Foreign Remi-ttance**	**Log of per Capita Social Allow-ances**	**Log of per Capita Income from Other Sources**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(8)**	**(9)**
Pair year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	8.7774***	0.8153***	9.0383***	8.7940***	5.8587***	5.4868***	6.7071***	5.5145***	6.2661***	9.0504***	5.9547***
	(0.0575)	(0.0280)	(0.1136)	(0.1765)	(0.1078)	(0.1198)	(0.2229)	(0.1663)	(0.1169)	(0.5510)	(0.2163)
Observations	260,988	260,988	170,632	71,786	183,741	134,465	86,991	46,319	211,324	8,464	218,160
R-squared	0.342	0.230	0.313	0.321	0.214	0.125	0.259	0.411	0.344	0.210	0.114

Note: This tables report OLS regressions of per capita income from different sources on variables of Covid-19 and control variables. The impact of the COVID-19 pandemic on the dependent variables in 2020 is measured by interaction between COVID year and Time. The education level of individuals is measured by dummies indicating the highest education completed by household heads (Less than primary education, Primary education, Lower-secondary education, Upper-secondary education, Vocational degree, Tertiary education). Standard errors are clustered at the commune level.

*** p<0.01, ** p<0.05, * p<0.1.

Source: Estimates extrapolated from VHLSSs 2016 to 2020.

Table A.9: Impacts of the Covid-19 Pandemic in 2021

Explanatory Variables	Dependent Variables										
	Log of per Capita Income	Income Poor (yes=1, no=0)	Log of per Capita Wage Income	Log of per Capita Nonfarm Income	Log of per Capita Crop Income	Log of per Capita Livestock Income	Log of per Capita Other Agricul-tural Income	Log of per Capita Domestic Remit-tance	Log of per Capita Foreign Remittance	Log of per Capita Social Allow-ances	Log of per Capita Income from Other Sources
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(8)	(9)
Covid-19 year (2021) * Time effect	–0.2069***	0.0581***	–0.2016***	–0.1453***	0.0544	0.0020	0.1001	0.0580	–0.2441***	–0.4081***	1.2626***
	(0.0140)	(0.0062)	(0.0205)	(0.0383)	(0.0356)	(0.0389)	(0.0709)	(0.0482)	(0.0380)	(0.1299)	(0.0715)
Covid-19 year (2021)	0.2306***	–0.0984***	0.3213***	0.2947***	–0.0081	–0.0795***	0.1614***	0.0974***	0.3721***	0.2172***	-1.4899***
	(0.0078)	(0.0039)	(0.0118)	(0.0216)	(0.0184)	(0.0208)	(0.0358)	(0.0319)	(0.0214)	(0.0707)	(0.0354)
Time effect	0.1974***	–0.0665***	0.2670***	0.2064***	–0.0420*	0.0612**	0.1315***	0.0295	0.3625***	0.1511*	0.3778***
	(0.0090)	(0.0041)	(0.0133)	(0.0252)	(0.0225)	(0.0243)	(0.0444)	(0.0317)	(0.0245)	(0.0859)	(0.0436)
Gender of household head (male=1, female=0)	0.0382***	–0.0080**	–0.0886***	0.0170	0.3045***	0.2423***	0.2848***	0.0237	–0.1201***	–0.1842**	–0.3098***
	(0.0076)	(0.0037)	(0.0128)	(0.0252)	(0.0189)	(0.0238)	(0.0362)	(0.0289)	(0.0198)	(0.0815)	(0.0391)
Age of household head	0.0382***	–0.0149***	0.0111***	0.0151***	0.0927***	0.0700***	0.0209***	0.0452***	0.0218***	0.0265*	–0.0371***
	(0.0017)	(0.0008)	(0.0033)	(0.0052)	(0.0034)	(0.0038)	(0.0072)	(0.0048)	(0.0034)	(0.0146)	(0.0062)
Squared age of household head	–0.0004***	0.0001***	–0.0001***	–0.0002***	–0.0008***	–0.0006***	–0.0003***	–0.0002***	0.0000	–0.0002*	0.0007***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0001)
Household head is Kinh (yes=1, no=0)	0.4163***	–0.2134***	0.4629***	0.8332***	–0.0328	0.2498***	0.0595	0.4673***	0.2349***	0.2460	–0.2210**
	(0.0178)	(0.0119)	(0.0281)	(0.0739)	(0.0374)	(0.0441)	(0.0748)	(0.0741)	(0.0508)	(0.1918)	(0.0877)
Household size	–0.0388***	0.0057***	–0.0802***	–0.1316***	–0.1412***	–0.1763***	–0.0825***	–0.2273***	–0.3431***	–0.2286***	–0.2310***
	(0.0022)	(0.0013)	(0.0038)	(0.0066)	(0.0049)	(0.0073)	(0.0103)	(0.0078)	(0.0064)	(0.0230)	(0.0121)
Education of household head	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province-fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Explanatory Variables	Dependent Variables										
	Log of per Capita Income	**Income Poor (yes=1, no=0)**	**Log of per Capita Wage Income**	**Log of per Capita Nonfarm Income**	**Log of per Capita Crop Income**	**Log of per Capita Livestock Income**	**Log of per Capita Other Agricul-tural Income**	**Log of per Capita Domestic Remit-tance**	**Log of per Capita Foreign Remittance**	**Log of per Capita Social Allow-ances**	**Log of per Capita Income from Other Sources**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(8)**	**(9)**
Pair year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	8.8095***	0.8050***	9.0604***	8.7433***	5.8063***	5.5630***	6.6698***	5.4735***	6.3756***	8.8782***	7.5358***
	(0.0515)	(0.0248)	(0.1004)	(0.1601)	(0.0984)	(0.1102)	(0.2118)	(0.1569)	(0.1072)	(0.4800)	(0.1977)
Observations	195,292	195,292	127,837	53,317	135,525	97,659	62,897	33,142	156,074	6,660	153,349
R-squared	0.342	0.229	0.314	0.322	0.214	0.125	0.256	0.408	0.345	0.207	0.125

Note: This tables report OLS regressions of per capita income from different sources on variables of COVID-19 and control variables. The impact of the COVID-19 pandemic on the dependent variables in 2020 is measured by interaction between Covid year and Time. The education level of individuals is measured by dummies indicating the highest education completed by household heads (Less than primary education, Primary education, Lower-secondary education, Upper-secondary education, Vocational degree, Tertiary education). Standard errors are clustered at the commune level.

*** p<0.01, ** p<0.05, * p<0.1.

Source: Estimates extrapolated from VHLSSs 2016 to 2021.

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