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Did a Successful Fight against the COVID-19 Pandemic Come at a Cost? Impacts of the Outbreak on Employment Outcomes in Vietnam

Hai-Anh H. Dang and Cuong Viet Nguyen*

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Abstract

Vietnam is widely praised for its successful fight against the COVID-19 pandemic. The country has had an extremely low mortality rate of 35 deaths to date (out of a population of approximately 100 million) and currently has no community transmission. We offer the first study that examines the effects of the COVID-19-induced lockdown on various employment outcomes for Vietnam. We employ difference-in-differences econometric models to estimate the causal effects of the lockdown, using rich individual-level data from the quarterly Labor Force Surveys. We find that the lockdown increases the unemployment rate, the temporary layoff rate, and decreases the quality of employment. It also reduces workers' numbers of working hours and their monthly incomes and wages. Our estimation results remain robust to different model specifications and estimation samples. Further heterogeneity analysis suggests that the effects vary across education levels and occupation sectors but are similar across regions or provinces with different lockdown durations.

JEL classifications: E24, I30, J21, O12

Keywords: COVID-19, employment, income loss, differences-in-differences, Vietnam

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1. Introduction

Despite its modest status as a lower middle-income country, Vietnam has proved to be a successful model in the fight against the COVID-19 pandemic. The country received strong praise for outperforming richer countries that have far more developed medical systems. In particular, strict lockdown measures such as banning all commercial flights into and out of the country, strict quarantines, social distancing, and implementing staying-at-home orders are portrayed as actions of patriotism and are well supported by the public (Huynh, 2020; La *et al.*, 2020; Mandhana and Le, 2020; Trevisan *et al.*, 2020). As a result, while most other countries are still grappling with the outbreak, Vietnam has it under relatively good control. Tracking data from John Hopkins University suggest that to date, the country has registered an extremely low fatality rate of 35 deaths (Dong, Du, Gardner, 2020), which compares favorably with its population size of slightly more than 96 million.

But does this success come at a cost to the country, particularly regarding its young and dynamic labor force? If yes, how does the fight against the pandemic affect the various employment outcomes? Which population subgroups and which sectors are most impacted? We seek answers to these questions since they offer relevant policy implications for Vietnam, and other countries that want to adopt Vietnam's low-cost but efficient example. In particular, we exploit rich data from the country's labor force surveys and examine a number of employment outcomes such as unemployment, temporary layoff, having a wage job, having a job with contract, having a job with social insurance, the number of working hours during the last seven days, incomes, and wages.

We add to the small, but growing literature on the impacts of the pandemic in a poor country setting.¹ But to our knowledge, hardly any existing studies analyze a wide range of employment indicators as we do in this paper. Examining the effects of the Covid-19 pandemic on the gender gaps in India during April-August 2020, Deshpande (2020) find 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. Jain *et al.* (2020) observe a 40% decline in active employment after one month of intensive lockdown in South Africa, with half of this comprises job terminations.²

This paper consists of five sections. We describe the data and the general trend of employment in the next section before discussing the estimation method in Section 3. We subsequently provide the empirical results in Section 4.1 and various robustness checks and heterogeneity analysis in Section 4.2. We finally conclude in Section 5.

2. Data set and descriptive analysis

We analyze data from the most recent Labor Force Surveys (LFS) from 2017 to 2020, which are conducted annually by the General Statistics Office (GSO) of Vietnam. The LFS uses a two-stage stratified cluster design and has 126 strata comprising of urban and rural

¹ The COVID-19 pandemic is generally found to have negative effects on the labor market in richer countries (see, e.g., Adams-Prassl *et al.* (2020); Coibion, Gorodnichenko, and Weber (2020); Dang and Nguyen (2020)). See also Bloom *et al.* (2020) and Brodeur *et al.* (2020) for reviews of recent studies on the impacts of the pandemic.

² Other studies analyze certain population groups or a specific region in a country. For example, analyzing a survey of worker in low-income areas of urban India, Dhingra and Machin (2020) find that about a quarter of workers lost their job, 9 percent more were not working any hours, and earnings fell by 85 percent under lockdown. Mahmud and Riley (2020) analyze data from rural villages in western Uganda and find a large decline of 60% in household non-farm income due to the lockdown. Studying a web-based survey immediately after the removal of lockdown measures in Vietnam, Dang and Giang (2020) find that workers with permanent job contracts have fewer job worries and better assessments for the economy, and that individuals with good health and higher educational levels also have more positive evaluations for their current and future finance.

areas in 63 provinces throughout the country.³ In the first sampling stage, the number of enumeration areas in each stratum is selected by the method of probability proportional to size. For the second stage, 15 households are randomly selected from each enumeration area. The sample size is equally allocated for all the months throughout the year, with around one-twelfth of the sampled households being surveyed each month. The LFS is nationally representative on a quarter basis and at the urban (rural) and provincial levels.⁴

The LFS collects basic demographic information for all individuals. It also collects detailed data on employment and wages for people age 15 and older as well as data on unemployment for unemployed people. In this study, we restrict our analysis to individuals age 15 and older in the LFS in the four most recent years. At the time we conducted this study, the 2020 LFS data are available for the first three quarters only. As such, the number of observations are is 621,454, 622,752, 601,849 and 450,701, respectively for 2017, 2018, 2019 and 2020.

In this study, we examine the impacts of the COVID-19 pandemic on a wide range of employment outcomes including unemployment, temporary layoff, having a wage job, having a job with a contract, having a job with social insurance, the number of working hours (during the last seven days), incomes, and wages. The LFS collects data on individuals' total incomes that they earned in the last month and the wages that wage workers received in the

³ At the first-level administrative division, Vietnam consists of 58 provinces and 5 central-level cities or municipalities. A province is divided into districts, and a district is further divided into communes or wards. In 2018, there were around 700 districts and 11 thousand communes.

⁴ In Vietnam, there are Vietnam Household Living Standard Surveys (VHLSSs) which also contain data on employment. Compared with VHLSSs, LFSs have a remarkably larger sample size and can be representative at the provincial level instead of regional level as VHLSSs. Moreover, LFS contains more information on employment and working than VHLSSs. Thus, we use LFSs instead of VHLSSs in this study.

last month, as well as the monthly incomes of non-wage workers. Table A.1 in Appendix A presents the summary statistics of the outcome variables for the 2017-2020 period.

In response to the COVID-19 pandemic, Vietnam implemented a nationwide lockdown for two weeks in April 2020. As such, any negative effects of the lockdown on employment and incomes would have occurred in the second and third quarters of 2020. Figure 1 compares the employment outcomes in the second and third quarters of 2020 against those of the previous three years. It shows that the unemployment rate in the second and third quarters of 2020 were higher in previous years, and the differences are statistically significant at the conventional levels. The temporary layoff rate was substantially higher in the second quarter of 2020. Before 2020, the temporary layoff rate was less than 0.1%, but it sharply increased to 3.1% in the second quarter of 2020, before decreasing to 0.3% in the third quarter of 2020. The sudden increased temporary layoff rate provides further evidence of the negative impacts of the national lockdown. The number of working hours and earned incomes were also lower in the second quarter of 2020 than those in the same period of the previous years.

3. Estimation method

We estimate the short-term effect of the COVID-19 pandemic on employment outcomes in Vietnam using the difference-in-differences (DID) econometric model. To control the COVID-19 pandemic, Vietnam has suspended all international flights since March 19, 2020. In April 2020, the country implemented a nationwide lockdown in all its 63 provinces, of which 27 provinces applied 15-day lockdown and 36 remaining provinces applied a

lockdown from 20 to 30 days. As such, we assume that the impacts of the COVID-19 pandemic takes place from the second quarter after the border closure and lockdown.

The observed difference in individuals' employment outcome between the first quarter and the second one can be expressed as the total of the effects of the COVID-19 pandemic and the effects of time as follows

$$\Delta Y = E(Y_{Q2}^{2020}) - E(Y_{Q1}^{2020}) = \Delta Y_{Covid}^{2020} + \Delta Y_{Time}^{2020} \quad (1)$$

where $E(Y_{Q1}^{2020})$ and $E(Y_{Q2}^{2020})$ are the expected outcomes of individuals in the first and second quarters in 2020, respectively. ΔY_{Covid}^{2020} and ΔY_{Time}^{2020} are the COVID-19 effects and time (or seasonal) effects, respectively. While we cannot observe these two effects separately, if we assume that the time effects in 2020 are similar to the time effects in previous years, we can use the latter to substitute for the former. More specifically, we assume that

$$\Delta Y_{Time}^{2020} = E(Y_{Q2}^{2017-2019}) - E(Y_{Q1}^{2017-2019}) \quad (2)$$

where $E(Y_{Q1}^{2017-2019})$ and $E(Y_{Q2}^{2017-2019})$ are the expected outcome of the first and second quarters in three recent years from 2017 to 2019. In these years, there were no employment or economic shocks between the first and second quarters, and as a result the differences in the employment outcomes between the first and second quarters can capture the time effects. Averaging the pre-pandemic outcomes in three preceding years help remove fluctuations and provide better comparison, but for robustness checks we also consider comparison with the outcomes in 2019—the year immediately before the pandemic.

Substitute (2) into (1), we obtain the following

$$E(Y_{Q2}^{2020}) - E(Y_{Q1}^{2020}) = \Delta Y_{Covid}^{2020} + E(Y_{Q2}^{2017-2019}) - E(Y_{Q1}^{2017-2019}) \quad (3)$$

and

$$\Delta Y_{Covid}^{2020} = [E(Y_{Q2}^{2020}) - E(Y_{Q1}^{2020})] - [E(Y_{Q2}^{2017-2019}) - E(Y_{Q1}^{2017-2019})] \quad (4)$$

Equation (4) is a DID estimator, in which we obtain the first differences regarding employment outcomes between individuals in the second quarter and the first quarter and subsequently subtract them from the second differences between the 2020 round of the LFS and the 2017-2019 round of the LFS. More generally, we can extend Equation (4) to examine the impacts of the pandemic in the other quarters as follows

$$\Delta Y_{Covid}^{2020} = [E(Y_{Qj}^{2020}) - E(Y_{Q1}^{2020})] - [E(Y_{Qj}^{2017-2019}) - E(Y_{Q1}^{2017-2019})] \quad (5)$$

where j indicates the quarter of the year.

Pooling the quarters together, we estimate Equation (5) with the following DID regression

$$y = \beta_0 + \beta_1 Q2 + \beta_2 Q3 + \beta_3 COVID + \beta_4 (COVID \cdot Q2) + \beta_5 (COVID \cdot Q3) + X' \beta_6 + \varepsilon \quad (6)$$

where y is an indicator of employment for individuals. The effects of the COVID-19 pandemic on employment outcomes in the second and third quarters are measured by the coefficients of the interaction terms between $COVID$ and $Q2$ and $Q3$, that is β_4 and β_5 , respectively.

$Q2$ and $Q3$ are the dummy variables corresponding to Quarter 2 and Quarter 3, respectively; Quarter 1 is used as the reference quarter and omitted from Equation (6). Since the data for Quarter 4 of 2020 are currently not available, we also drop the data for this quarter in the three years 2017-2019. $COVID$ is a dummy indicating year 2020, that is, the year when the COVID-19 pandemic occurs. X are control variables such as age, gender, and education. ε is the error term. We also control for year and province effects. Control variables should be

exogenous and unaffected by the COVID-19 pandemic (Angrist and Pischke, 2009; Heckman *et al.*, 1999).

A useful feature of the LFS is that its survey rounds are conducted monthly, so we can estimate the impacts of the outbreak on employment outcomes on a monthly basis. Specifically, we can replace the quarter dummy variable in Equation (5) with the dummy variables indicating the months instead

$$\Delta Y_{Covid}^{2020} = [E(Y_{Mk}^{2020}) - E(Y_{Q1}^{2020})] - [E(Y_{Mk}^{2017-2019}) - E(Y_{Q1}^{2017-2019})] \quad (7)$$

where k indicates the month of the year. Similar to Equation (6), we can estimate Equation (7) with the following DID regression

$$y = \alpha_0 + \sum_{k=1}^K \gamma_k M_k + \delta COVID + \sum_{k=1}^K \theta_k COVID.M_k + X'\vartheta + \pi \quad (8)$$

4. Empirical results

4.1. Main results

Table 1 reports the DID regressions of employment outcomes using data from the LFS from 2017 to 2020 (using Equation (6)). The interaction terms between the COVID-19 year and Quarter 2 are statistically significant in all regressions, which point to the negative effects of the pandemic on employment outcomes in the second quarter of 2020. The interaction terms between the COVID-19 year and Quarter 3 are also statistically significant in most regressions, but their magnitudes are smaller than those of the interaction terms between the COVID-19 year and Quarter 2. This suggests that the pandemic may have decreasing impacts over time.

The COVID-19 pandemic increases the probability of being unemployed by 1.1 and 0.9 percentage points in the second and third quarters, respectively. While the absolute

magnitudes are small, compared with the pre-pandemic average employment rates of around 2%, the one percentage-point increase in the unemployment rate is equivalent to a 50% increase. The COVID-19 pandemic also has a large effect on temporary layoffs. The pandemic increases the probability of temporary layoffs by 3 percentage points in the second quarter and 0.3 percentage points in the third quarter.

The pandemic affects not only the employment rate but also the quality of employment. The share of the labor force having a wage job was 47.4% in 2019, and the pandemic reduces the probability of having a wage job by 1.3 percentage point in the second quarter of 2020. There is no statistically significant effect on the probability of having a wage job in the third quarter. The proportion of the labor force having a labor contract and social insurance was 30% and 26% in 2019, respectively. The pandemic reduces the probability of having a job with a labor contract by 1.1 and 1.4 percentage points in the second and third quarters of 2020, respectively. The corresponding decreases in having social insurance due to the pandemic are 0.9 and 1.3 percentage points in the second and third quarters of 2020, respectively.⁵

Table 1 indicates that the pandemic reduces the number of working hours during the last seven days by 3.2 hours in the second quarter of 2020. This figure is equal to 8.2% of the average working hours in 2019. The number of working hours, however, returns to the pre-pandemic level in the third quarter (i.e., the estimated coefficient is not statistically significant). The increase in the layoff rate and decline in working hours could contribute to the decline in income and wages. Due to the pandemic, the monthly income is reduced by

⁵ In Vietnam, people who have social insurance are considered as those working in the formal sector. Without social insurance, workers do not receive benefits and pensions when unemployed and retired. Although the share of workers with social insurance has been increasing over time, this share is still very small.

11% in the second quarter and 6.3% in the third quarter. The effects on the monthly wages of wage workers and the monthly income of non-wage workers are similar, with the effects in the second quarter being larger than those in the third quarter. This result also implies that the pandemic has similar effects on wage and non-wage workers.

In Table 2, we estimate the impacts of the pandemic on a monthly basis from April to September of 2020 (using Equation (8)). The reference group still consists of the individuals who are surveyed in first quarter. The estimation results show that the effects of the COVID-19 pandemic are largest in April and May, 2020 and these effects decline in the subsequent months. Since April 2020 is the lockdown month, this suggests that the lockdown has an immediate effect on employment outcomes. But the effects of the pandemic on temporary layoffs, the number of working hours, and the probability of having a wage job have dissipated since June 2020. However, the effects of the pandemic on other employment outcomes remain statistically significant until September 2020. The pandemic increases the probability of unemployment by 1.2 percentage points and reduces the monthly income by 5.5% in September 2020.

4.2. Robustness and heterogeneous analysis

We conduct several robustness test using different specifications for the control variables and estimation samples. First, we estimate models without the control variables and models without the province fixed effects. Second, we restrict the estimation sample to the LFS in 2019 and 2020 only, which implies that the control group is 2019, just before the COVID year. We also include the data for Quarter 4 of the LFS in 2017 to 2019 in the analysis. The

results are presented in Table A.2 in Appendix A. This table reports only interactions between the COVID year and Quarters 2 and 3, which shows similar results as those in Table 1.

Since the LFS has a large sample size, we can examine the heterogeneous effects of the COVID-19 pandemic on different population sub-groups. To estimate the total effects of the pandemic on employment in the second and third quarters, we combine individuals surveyed in the second and third quarters into one group. We regress log of monthly income on a dummy indicating Quarters 2 and 3, the dummy of the COVID year, and the interaction term between these two variables, and other control variables. Figures 2 to 4 plot the heterogeneous effects of the pandemic on log of monthly income for different population sub-groups.

Figure 2 shows heterogeneous effects across demographic characteristics. It shows that people with less than primary education are less affected than those with higher education achievement. This is possibly due to the fact that people with low education achievement tend to work in the agricultural sector, which is less affected by the COVID-19 pandemic. Figure 2 also shows that middle-age people are more affected than older people. Regarding gender, there are no statistically significant differences for the effects of the pandemic between men and women.

Figure 3 reports the heterogeneous effects across the employment sectors and occupations. The pandemic has the smallest effects on public sector workers, reducing their monthly incomes by 3.6%. Yet, it reduces the incomes of informal household workers, private sector workers, and FDI sector workers by more than twice as much at 9%. Regarding occupations, unskilled workers are least affected, while skilled workers and workers in the service and trade sectors are most affected by the pandemic. Figure 3 shows strong effects of

the pandemic on workers in the transportation, hotel, and restaurant sectors. In particular, workers in the transportation and tourism sectors are most heavily affected. The pandemic reduces the monthly incomes of workers in the transportation and tourism by around 17%. There are no statistically significant effects of the pandemic on workers in the mining, gas, water, and agricultural sectors.

Figure 4 shows that the point estimate of the effects of the pandemic on workers in the provinces with a lockdown duration of more than 15 days is larger than that in the provinces with a lockdown duration of 15 days. However, these differences are not statistically significant. There are no differences in the effects of the pandemic across regions. We find a smaller effect of the pandemic on the incomes of rural workers compared to urban workers. Compared with the latter, workers in rural areas tend to have lower education, and they are more likely to have an unskilled job and work in the agricultural sector. As such, the weaker effects of the pandemic on rural workers are consistent with the weaker effects on lowly-educated, unskilled, and agricultural workers.

5. Conclusion

We offer an early study on the impacts of the COVID-19 pandemic on employment outcomes in a poorer country setting. We analyze a wide range of employment outcomes from several rounds of Vietnam's LFS in 2017 to the third quarter in 2020. We find that the pandemic increases the unemployment rate, the temporary layoff rate, and decreases the quality of employment (such as having a wage job, or a job with a labor contract and social insurance). It also reduces workers' numbers of working hours and their monthly incomes and wages.

Our estimation results remain robust to different model specifications and estimation samples. Further heterogeneity analysis suggests that individuals with less than primary education are less affected than those with higher education achievement, possibly due to the former group's tendency to work in the agricultural sector. The pandemic has far stronger effects on informal household workers, private sector workers, and FDI sector workers than public sector workers. Workers in the transportation and tourism sectors are most heavily affected. There are no differences in the effects of the pandemic across regions, or provinces with different lockdown durations.

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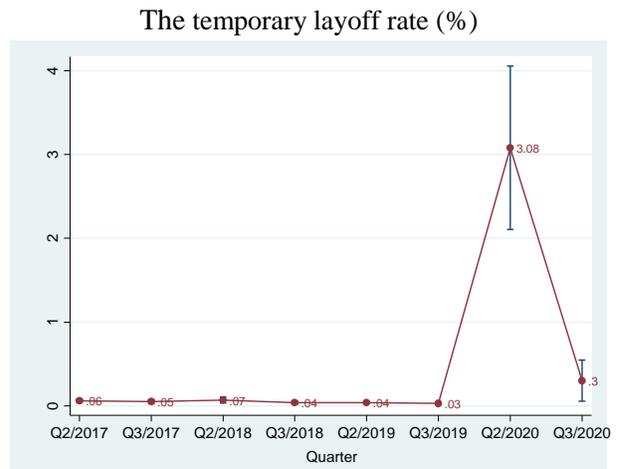
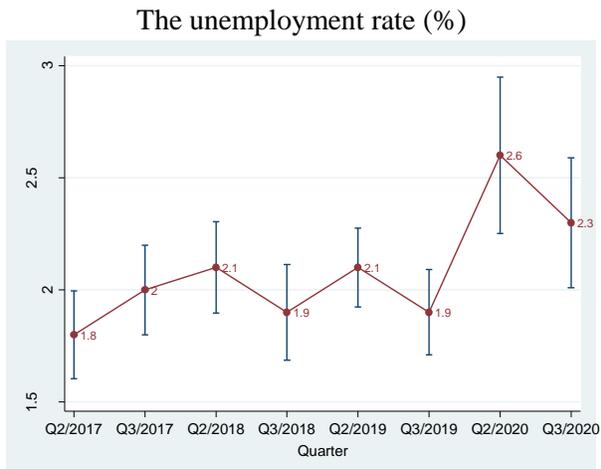
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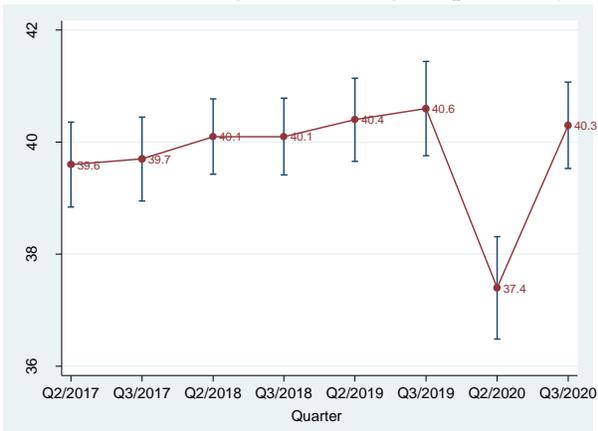
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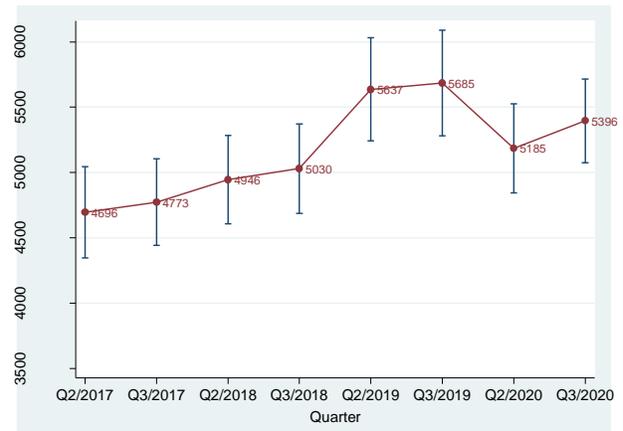
Figure 1. Employment variables over time



Number of working hours during the past 7 days



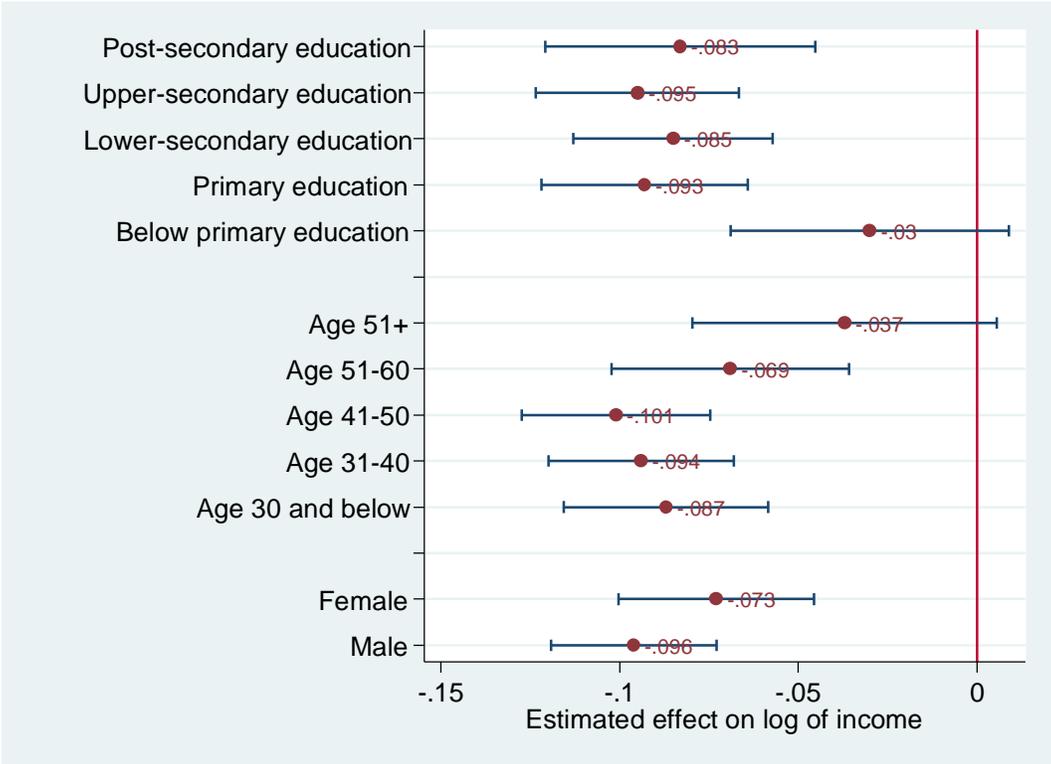
Income in the last month (thousand VND)



Note: Income is measured in the price of September 2020.

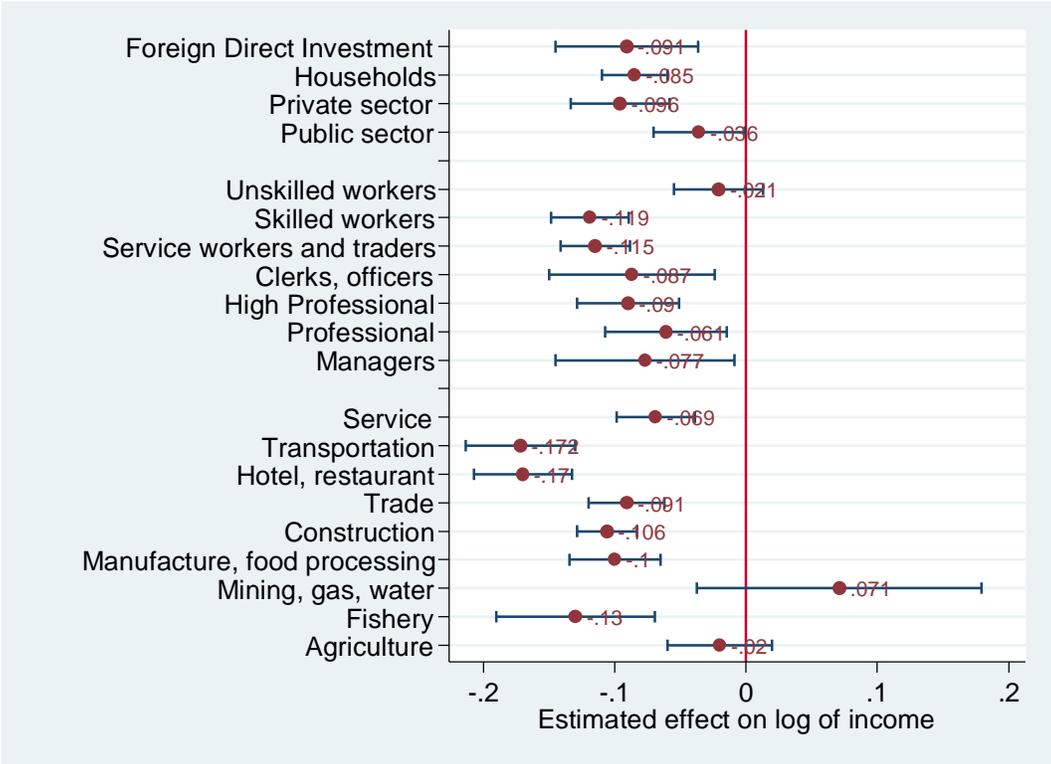
Source: Authors' estimations from LFSs.

Figure 2. Heterogeneous effects across demographic characteristics



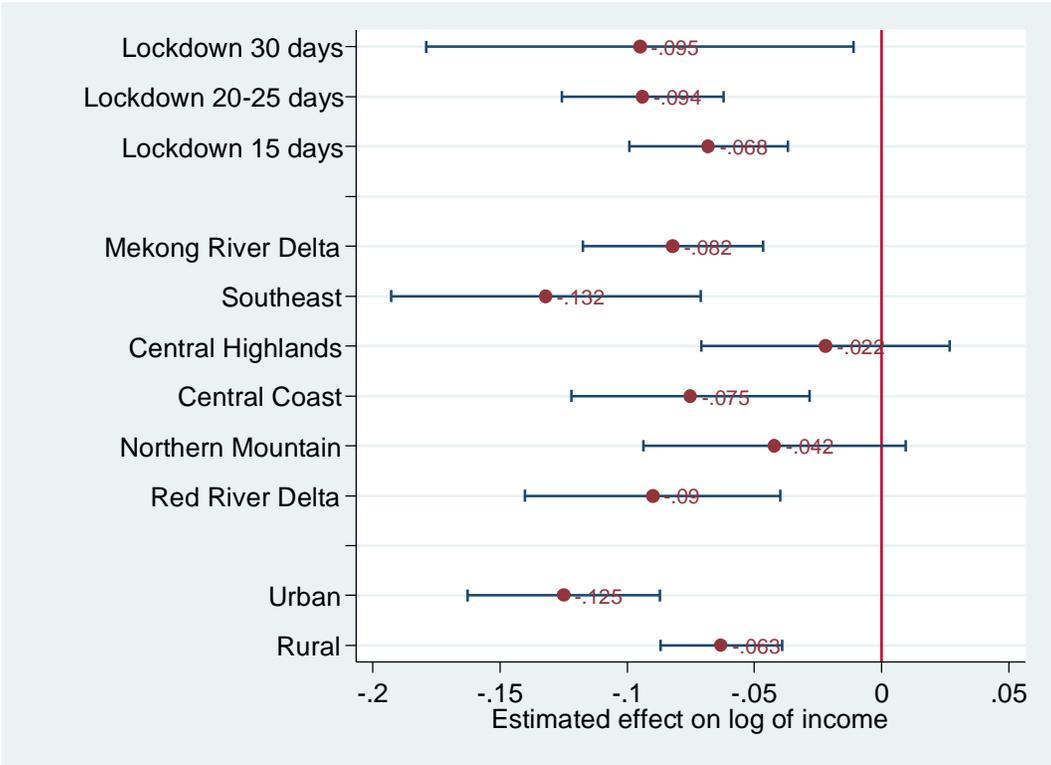
Note: This figures report the effect and the 95% confidence interval of the COVID-19 pandemic on log of income in the second and third quarters by characteristic variables.

Figure 3. Heterogeneous effects across employment sector and occupation



Note: This figures report the effect and the 95% confidence interval of the COVID-19 pandemic on log of income in the second and third quarters by employment characteristics.

Figure 4. Heterogeneous effects across geographic areas



Note: This figures report the effect and the 95% confidence interval of the COVID-19 pandemic on log of income in the second and third quarters by geographic areas.

Table 1. OLS regression of employment variables

Explanatory variables	Dependent variables								
	Unemployed (yes=1, no=0)	Temporary layoff (yes=1, no=0)	Having wage job (yes=1, no=0)	Having job with contract (yes=1, no=0)	Having social insurance (yes=1, no=0)	Number of working hours in the last week	Log of monthly income (all workers)	Log of monthly wage (wage workers)	Log of monthly income (non- wage workers)
Quarter 2 * COVID year	0.011*** (0.002)	0.030*** (0.005)	-0.013** (0.006)	-0.011** (0.005)	-0.009* (0.005)	-3.166*** (0.736)	-0.110*** (0.016)	-0.110*** (0.016)	-0.102*** (0.020)
Quarter 3 * COVID year	0.009*** (0.001)	0.003** (0.001)	-0.009 (0.006)	-0.014** (0.006)	-0.013** (0.005)	-0.359 (0.615)	-0.063*** (0.013)	-0.073*** (0.013)	-0.051*** (0.017)
Quarter 1	Reference								
Quarter 2	-0.005*** (0.001)	-0.001*** (0.000)	0.010*** (0.003)	0.005* (0.003)	0.004 (0.002)	2.796*** (0.294)	-0.004 (0.006)	-0.020*** (0.006)	0.011 (0.007)
Quarter 3	-0.005*** (0.001)	-0.001*** (0.000)	0.010*** (0.003)	0.004 (0.003)	0.003 (0.003)	2.931*** (0.286)	0.016*** (0.006)	-0.003 (0.006)	0.032*** (0.007)
COVID year	-0.006*** (0.001)	-0.000 (0.000)	0.045*** (0.004)	0.000 (0.004)	0.000 (0.003)	1.227* (0.636)	0.155*** (0.010)	0.121*** (0.012)	0.191*** (0.012)
Male (male=1, female=0)	-0.002*** (0.000)	-0.000* (0.000)	0.089*** (0.001)	-0.036*** (0.001)	-0.043*** (0.001)	2.592*** (0.042)	0.326*** (0.002)	0.174*** (0.001)	0.439*** (0.003)
Age	-0.006*** (0.000)	0.000 (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.005*** (0.000)	0.838*** (0.009)	0.069*** (0.000)	0.058*** (0.001)	0.083*** (0.001)
Age squared	0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.011*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Less than primary education	References								
Primary education	0.000 (0.001)	0.001** (0.000)	-0.138*** (0.004)	-0.171*** (0.005)	-0.162*** (0.005)	0.553*** (0.074)	-0.044*** (0.005)	-0.091*** (0.007)	0.056*** (0.005)
Lower-secondary education	0.000 (0.001)	0.001*** (0.000)	-0.146*** (0.004)	-0.143*** (0.006)	-0.138*** (0.006)	0.931*** (0.082)	0.007 (0.006)	-0.038*** (0.007)	0.115*** (0.005)
Upper-secondary education	0.005*** (0.001)	0.002*** (0.000)	-0.101*** (0.005)	-0.019*** (0.007)	-0.027*** (0.007)	1.696*** (0.097)	0.140*** (0.006)	0.019** (0.008)	0.278*** (0.007)
Post-secondary education	0.020*** (0.002)	-0.000 (0.000)	0.150*** (0.007)	0.366*** (0.009)	0.371*** (0.009)	-2.316*** (0.150)	0.393*** (0.007)	0.273*** (0.009)	0.527*** (0.009)
Urban area (urban=1, rural=0)	0.012*** (0.001)	0.002*** (0.000)	0.076*** (0.002)	0.082*** (0.003)	0.069*** (0.003)	2.298*** (0.087)	0.235*** (0.004)	0.102*** (0.003)	0.350*** (0.005)
Year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.161*** (0.003)	-0.000 (0.002)	0.704*** (0.009)	0.508*** (0.012)	0.360*** (0.011)	22.817*** (0.845)	7.108*** (0.018)	7.551*** (0.020)	6.419*** (0.025)
Observations	1,370,735	1,370,735	1,370,735	1,370,735	1,370,735	1,370,735	1,159,028	573,995	585,033
R-squared	0.028	0.022	0.214	0.297	0.292	0.105	0.323	0.296	0.337

Note: This table presents estimates of the effect of COVID-19 on employment using the DID method. The effects are estimated by the interaction between the second and third quarter and the 2020 year.

Standard errors in parentheses (corrected for sampling weight and intra-cluster correlation). *** p<0.01, ** p<0.05, * p<0.1.

Table 2. OLS regression of employment variables on month dummies

Explanatory variables	Dependent variables								
	Unemployed (yes=1, no=0)	Temporary layoff (yes=1, no=0)	Having wage job (yes=1, no=0)	Having job with contract (yes=1, no=0)	Having social insurance (yes=1, no=0)	Number of working hours in the last week	Log of monthly income (all workers)	Log of monthly wage (wage workers)	Log of monthly income (non- wage workers)
April * COVID year	0.012*** (0.002)	0.083*** (0.007)	-0.019* (0.010)	-0.012 (0.008)	-0.008 (0.007)	-7.533*** (0.820)	-0.132*** (0.021)	-0.124*** (0.020)	-0.132*** (0.030)
May * COVID year	0.017*** (0.003)	0.008*** (0.001)	-0.022*** (0.008)	-0.019*** (0.007)	-0.016** (0.006)	-1.799** (0.744)	-0.164*** (0.021)	-0.160*** (0.020)	-0.157*** (0.026)
June * COVID year	0.003 (0.002)	0.000 (0.000)	0.001 (0.007)	-0.001 (0.008)	-0.002 (0.007)	-0.148 (0.634)	-0.038** (0.018)	-0.048*** (0.014)	-0.020 (0.028)
Jul * COVID year	0.007*** (0.002)	0.000 (0.000)	-0.005 (0.009)	-0.012 (0.009)	-0.011 (0.008)	0.083 (0.633)	-0.063*** (0.017)	-0.075*** (0.016)	-0.056** (0.022)
August * COVID year	0.007*** (0.002)	0.004 (0.003)	-0.013 (0.008)	-0.017** (0.008)	-0.014* (0.007)	-0.762 (0.696)	-0.070*** (0.017)	-0.069*** (0.014)	-0.066*** (0.024)
September * COVID year	0.012*** (0.002)	0.004* (0.002)	-0.009 (0.008)	-0.015 (0.010)	-0.014 (0.010)	-0.399 (0.690)	-0.055*** (0.019)	-0.073*** (0.014)	-0.031 (0.028)
April	-0.004*** (0.001)	-0.001*** (0.000)	0.015*** (0.004)	0.007** (0.004)	0.005 (0.003)	3.460*** (0.303)	-0.006 (0.007)	-0.027*** (0.007)	0.011 (0.010)
May	-0.004*** (0.001)	-0.001** (0.000)	0.012*** (0.004)	0.005 (0.004)	0.004 (0.003)	1.293*** (0.330)	-0.007 (0.008)	-0.023*** (0.008)	0.006 (0.011)
June	-0.005*** (0.001)	-0.001** (0.000)	0.002 (0.004)	0.001 (0.004)	0.001 (0.004)	3.614*** (0.305)	0.002 (0.008)	-0.011 (0.007)	0.015 (0.010)
Jul	-0.005*** (0.001)	-0.001*** (0.000)	0.008* (0.004)	0.002 (0.004)	0.003 (0.004)	3.478*** (0.311)	0.008 (0.007)	-0.005 (0.007)	0.022** (0.010)
August	-0.004*** (0.001)	-0.001*** (0.000)	0.013*** (0.004)	0.004 (0.004)	0.002 (0.003)	2.834*** (0.325)	0.015** (0.007)	-0.006 (0.007)	0.031*** (0.010)
September	-0.007*** (0.001)	-0.001*** (0.000)	0.009** (0.004)	0.006 (0.004)	0.005 (0.004)	2.481*** (0.303)	0.025*** (0.007)	0.004 (0.007)	0.042*** (0.010)
Quarter 1	References								
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	0.161*** (0.003)	-0.000 (0.002)	0.704*** (0.009)	0.508*** (0.012)	0.360*** (0.011)	22.817*** (0.845)	7.108*** (0.018)	7.551*** (0.020)	6.419*** (0.025)
Observations	1,370,735	1,370,735	1,370,735	1,370,735	1,370,735	1,370,735	1,159,028	573,995	585,033
R-squared	0.028	0.022	0.214	0.297	0.292	0.105	0.323	0.296	0.337

Note: This table reports OLS regressions of employment variables in month dummies, year dummies, interactions between month dummies and year 2020, and other control variables. The control variables are the same as those in Table 1. Quarter 1 is used as the reference group. This table aims to show the effect of the COVID-19 pandemic on employment in April to September 2020.

Standard errors in parentheses (corrected for sampling weight and intra-cluster correlation). *** p<0.01, ** p<0.05, * p<0.1

Appendix A: Additional Tables

Table A.1. Outcome variables

	2017	2018	2019	2020
The unemployment rate (%)	2.140 (0.062)	2.086 (0.059)	2.304 (0.068)	2.335 (0.081)
The temporary layoff rate (%)	0.075 (0.008)	0.084 (0.010)	0.054 (0.006)	1.138 (0.192)
The proportion of having a wage job (%)	41.7 (0.8)	42.8 (0.7)	47.4 (0.8)	48.1 (0.7)
The proportion of having a job with contract (%)	24.9 (0.8)	25.4 (0.8)	29.7 (0.9)	30.0 (0.8)
The proportion of having social insurance (%)	21.5 (0.7)	22.5 (0.7)	26.1 (0.8)	26.7 (0.8)
Number of working hours in the last week	38.3 (0.3)	40.1 (0.2)	39.0 (0.3)	38.5 (0.3)
Total income (thousand VND/month)	5670.3 (103.6)	5913.8 (99.7)	6535.6 (111.2)	6411.6 (110.4)
Wage of wage workers (thousand VND/month)	6018.7 (101.0)	6226.2 (91.2)	6963.9 (102.5)	6821.1 (108.6)
Income of non-wage workers (thousand VND/month)	5327.1 (113.3)	5595.2 (114.8)	6027.6 (124.1)	5907.8 (114.3)

Note: standard errors are in parentheses.

The estimates are for the first three quarters of the year.

Income is measured in the price of September 2020.

Source: Authors' estimations from LFSs.

Table A.2. Regression of employment variables using different model specifications

Model specification	Explanatory variables	Dependent variables								
		Unemployed (yes=1, no=0)	Temporary layoff (yes=1, no=0)	Having wage job (yes=1, no=0)	Having job with contract (yes=1, no=0)	Having social insurance (yes=1, no=0)	Number of working hours in the last week	Log of monthly income (sample of all workers)	Log of monthly wage (sample of wage workers)	Log of monthly income (sample of non-wage workers)
Control variables: No	Quarter 2 *	0.010***	0.030***	-0.014**	-0.011**	-0.009*	-3.183***	-0.109***	-0.102***	-0.111***
Province fixed-effects: Yes	COVID year	(0.002)	(0.005)	(0.006)	(0.005)	(0.005)	(0.733)	(0.016)	(0.016)	(0.022)
Sample of quarters: Quarter 1-3	Quarter 3 *	0.008***	0.003**	-0.011*	-0.015**	-0.013**	-0.328	-0.063***	-0.071***	-0.053***
Sample of years: 2017-2020	COVID year	(0.001)	(0.001)	(0.006)	(0.006)	(0.006)	(0.613)	(0.013)	(0.013)	(0.019)
Control variables: Yes	Quarter 2 *	0.011***	0.030***	-0.013	-0.010	-0.008	-3.161***	-0.110***	-0.109***	-0.101**
Province fixed-effects: No	COVID year	(0.002)	(0.005)	(0.015)	(0.016)	(0.015)	(0.791)	(0.036)	(0.032)	(0.043)
Sample of quarters: Quarter 1-3	Quarter 3 *	0.009***	0.003**	-0.009	-0.014	-0.013	-0.353	-0.061*	-0.074**	-0.042
Sample of years: 2017-2020	COVID year	(0.002)	(0.001)	(0.015)	(0.016)	(0.015)	(0.729)	(0.035)	(0.030)	(0.042)
Control variables: Yes	Quarter 2 *	0.011***	0.030***	-0.013**	-0.011*	-0.009*	-3.166***	-0.110***	-0.110***	-0.102***
Province fixed-effects: Yes	COVID year	(0.002)	(0.005)	(0.006)	(0.006)	(0.005)	(0.739)	(0.016)	(0.016)	(0.020)
Sample of quarters: Quarter 1-4	Quarter 3 *	0.009***	0.003**	-0.009	-0.014**	-0.013**	-0.358	-0.063***	-0.073***	-0.051***
Sample of years: 2017-2020	COVID year	(0.001)	(0.001)	(0.006)	(0.006)	(0.006)	(0.616)	(0.013)	(0.013)	(0.018)
Control variables: Yes	Quarter 2 *	0.013***	0.030***	-0.014**	-0.012**	-0.008*	-4.654***	-0.100***	-0.098***	-0.093***
Province fixed-effects: Yes	COVID year	(0.002)	(0.005)	(0.006)	(0.005)	(0.004)	(0.810)	(0.016)	(0.017)	(0.020)
Sample of quarters: Quarter 1-3	Quarter 3 *	0.012***	0.003**	-0.015**	-0.016***	-0.013***	-1.926***	-0.051***	-0.058***	-0.040**
Sample of years: 2019-2020	COVID year	(0.002)	(0.001)	(0.006)	(0.005)	(0.005)	(0.704)	(0.013)	(0.015)	(0.017)

Note: This table reports OLS regressions of employment variables in quarter dummies, year dummies, interactions between quarter dummies and the COVID year, and other control variables. The control variables are the same as those in Table 1. Quarter 1 is used as the reference group. This table aims to show the effect of the COVID-19 pandemic on employment in the second and third quarter in 2020. Standard errors in parentheses (corrected for sampling weight and intra-cluster correlation). *** p<0.01, ** p<0.05, * p<0.1