

Not All That It Seems

Narrowing of Gender Gaps in Employment during the Onset of COVID-19 in Indonesia

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Abstract

This paper studies the impacts of the COVID-19 pandemic on Indonesia's labor market by exploiting the exogenous timing of the pandemic in a seasonal difference-in-differences framework. The analysis uses multiple rounds of Indonesia's National Labor Force Survey from 2016 to 2020 to establish a pre-pandemic employment trend and then attribute any excess difference in employment outcomes from this trend as the estimated effect of the pandemic on individual employment outcomes. The results suggest that the pandemic has had mixed effects on the Indonesian labor market. While the pandemic has narrowed the gender gaps in employment participation through the “added

worker effect” among women, it has also lowered the overall employment quality among both gender groups. The findings show that the increase in female employment is primarily driven by women in rural areas without high school education, entering informal work, agricultural employment, or unpaid family work. For men, the pandemic has had adverse impacts on their employment across the board in all sub-populations. Consistent with findings from other studies, steeper employment declines are observed in urban areas, particularly among males. Among those employed, both women and men work fewer hours and earn lower wages.

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1. Introduction

The COVID-19 pandemic had an unprecedented impact on the Indonesian economy in 2020. By the end of August 2020, only five months after the first COVID-19 case had been detected in Indonesia, around 172,000 COVID-19 cases and 7,300 deaths had been recorded across the country. In addition to the direct morbidity and mortality impacts, a succession of large-scale social restrictions, put in place in April 2020 to limit the spread of the virus, resulted in major negative economic consequences. Indonesia's GDP contracted by 5.3 percent and 3.5 percent during the second and third quarters of 2020, respectively. The unemployment rate in August 2020 soared to 7.07 percent, recording the highest year-on-year change since 1996. Moreover, the country's transformation toward better-quality jobs is being jeopardized, as the share of formal employment declined by 4.9 percentage points during the onset of the pandemic (i.e., in August 2020 relative to August 2019), and the share of middle-class jobs declined by about 5.2 percentage points by August 2020 compared with August 2019 (World Bank, 2021). This elevated level of economic loss resulted in Indonesia being downgraded from its newly attained status as an upper-middle income country.¹

Despite the massive losses in employment, the extent of the pandemic's gender effect on employment in Indonesia remains relatively unclear. Given the pre-existing gender differences in their economic activities and social norms, among others, the pandemic is likely to have affected women and men quite differently. These differences need to be recognized and measured so that policy responses and interventions can be designed to meet the various needs of population subgroups and government priorities, not only in addressing the initial pandemic shock, but also in supporting the recovery from it. A failure to do so will exacerbate the existing challenges in

¹ In July 2020, the World Bank report had re-classified Indonesia as being an "upper middle-income country", from its previous status as a "lower middle-income country". However, the pandemic-induced decline in GDP had caused the World Bank to re-classify Indonesia once again as a "lower middle-income country" in July 2021.

creating more middle-class jobs and harnessing the economic potential of women to build back better going forward.

This paper measures the gendered impacts of the COVID-19 pandemic on employment in Indonesia. While the existing literature is replete with studies that focus on the pandemic's effects on female employment in developed country contexts (Couch, Fairlie and Xu, 2020; Alon et al., 2021; Andrew et al., 2020; Adams-Prassl et al., 2020; Albanesi and Kim, 2021; Kikuchi et al., 2020), few studies focus on developing countries, particularly in the Southeast Asia region. Moreover, this paper also studies the pandemic's effect on the structure of Indonesia's labor market by analyzing its heterogeneous impacts on employment across sectors, occupations and population subgroups. In measuring the pandemic's impact, we employ a seasonal difference-in-differences approach. This approach is akin to that used in identifying "excess deaths" during the pandemic (Karlinsky and Kobak, 2021), in that the pre-pandemic between-season variations are used as a counterfactual for the between-season variations observed during the pandemic. It then becomes possible to attribute the difference between the actual and counterfactual variations to the impact of the pandemic.

Our empirical strategy relies on two identifying assumptions. First, we leverage the exogenous timing of the COVID-19 pandemic since it was largely unanticipated. Second, we assume that, in the absence of the pandemic, the between-season employment outcome variations in 2020 would largely follow the trends observed in the preceding years. For our analysis, we use Indonesia's nationally representative National Labor Force Survey (Sakernas²), administered biannually by Statistics Indonesia in February and August. We pool all observations from the

² Sakernas stands for *Survey Angkatan Kerja Nasional*.

February 2016 to the August 2020 Sakernas rounds, effectively providing about 3.2 million working age (aged 15–64) individuals for analysis.

Our examination of the effects of the pandemic on net employment illustrates that, six months into the pandemic (by August 2020), men of all age groups are less likely to be employed, while women are more likely to be employed, except those aged 19–29. With a 2.4 percent increase from pre-pandemic average employment participation rates for women and a 3.0 percent decrease for men, the COVID-19 pandemic has the effect of closing the gender gap in employment participation in Indonesia by about 14 percent. The findings suggest that women are more likely to enter employment for the first time following the onset of the pandemic and are also less likely to become unemployed. The overall increase in female employment suggests an “added workers effect”, with the entry of these additional workers necessitated by the impact of the economic shock on households. This is seen in the relatively low educational attainment of the new entrants and the low quality of employment they tend to engage in.

The pandemic has affected the quality of employment, with both women and men shifting toward more informal employment. We observe a lower likelihood of working as employees or working in white-collar occupations, while there is a higher likelihood of both women and men becoming casual workers or unpaid family workers. Consistent with this shift toward informality, we find that college-educated graduates are less likely to be employed. We also find that the increase in female employment is primarily driven by women in rural areas, while urban women are neither more nor less likely to be employed during the pandemic. Similarly, among males, negative employment effects are concentrated in the urban areas, with urban males being twice less likely to be employed than their rural counterparts. Moreover, the job search has also become more challenging for all sub-populations, with the duration of the unemployed spell increasing.

The COVID-19 crisis has also led to a lower likelihood of being employed full-time, with men more adversely affected than women. Among those working, the pandemic has reduced the weekly hours of women and men by 2.3 and 2.6 hours, respectively, relative to the average total hours worked per week pre-pandemic. Moreover, we find that employed women and men earn 16 percent and 15 percent less in monthly earnings, respectively.

The contribution of this paper is twofold. First, findings from Indonesia add to the rapidly growing literature on the gendered impacts of the pandemic-induced crisis on labor markets. This paper employs the seasonality difference-in-differences approach to investigate gender differences in the impact of the pandemic on employment. However, it improves on earlier work by extending the baseline period to 2016 to capture more years of seasonal pre-pandemic trends. The paper also goes one step further than earlier studies, as it not only measures the overall employment impacts, but also explores how the pandemic has impacted the structure and composition of the labor market.

Second, the paper contributes to the literature on the impacts of the COVID-19 pandemic on employment in developing countries, as it also considers pre-pandemic employment dynamics in measuring the causal effect of the pandemic on employment. Due to social distancing regulations, regular face-to-face (F2F) data collection efforts were halted in many countries. In the context of low- and middle-income countries which predominantly relied on F2F surveys prior to the pandemic, incredible efforts were undertaken to quickly roll out remote data collection to measure the early impacts of the COVID-19 pandemic, such as with the World Bank's High-Frequency Phone Surveys (HFPS) in more than 100 countries.³ However, this new wave of data

³ Given the importance, albeit difficult circumstances, of monitoring the welfare impacts of the COVID-19 pandemic on households, the World Bank administered High Frequency Phone Surveys (HFPS) in more than 100 countries, including Indonesia (for more details: <https://www.worldbank.org/en/country/indonesia/brief/indonesia-covid-19-observatory>). The surveys are conducted regularly and are aimed to gather information on key household socio-economic indicators, including employment, as well as access to public services and safety nets.

comes with its limitations, notably: less representative sample at the individual level⁴ and lack of pre-pandemic baseline data. This does not allow a direct comparison to employment trajectory before the pandemic.

This paper instead relies on a nationally representative labor force survey that extends multiple years prior to the pandemic, which allows us to establish counterfactual employment outcome trends and to improve the precision of our COVID-19 impact estimates. To the best of our knowledge, this paper is the first to provide quantitative assessments on the causal impact of the pandemic on female and male employment in Indonesia.

The paper is structured as follows. Following Section 1 (this introduction), Section 2 presents the contextual background of the COVID-19 spread in Indonesia. Section 3 then presents a summary of existing studies on the COVID-19 pandemic's gendered impact on employment. Section 4 discusses the data used in this study. Section 5 outlines the empirical strategy that this paper uses in measuring the pandemic's effect on female and male employment in Indonesia. Section 6 presents the research findings, and Section 7 concludes.

2. COVID-19 Pandemic in Indonesia

The COVID-19 outbreak hit Indonesia two months after it was first detected in late December 2019 in Wuhan, China. On March 2, 2020, President Joko Widodo officially announced the country's first two COVID cases detected in Jakarta, and the country subsequently announced its first COVID death on March 11. By mid-March, the outbreak had spread to other provinces outside Jakarta, with authorities confirming multiple COVID cases in West Java, Special Region of Yogyakarta, Bali, West Kalimantan, and North Sulawesi. By the end of August 2020, Indonesia

⁴ Brubaker, Kilic, and Wollburg (2021) propose a recalibration mechanism to reweight observations in HFPS. While the reweighted estimates get closer to the true population averages, they still fail to overcome selection biases.

reported 172,000 and 7,300 confirmed COVID cases and deaths, respectively. Indonesia recorded the highest and the second-highest confirmed deaths and COVID cases per capita in the Southeast Asia region.

The Indonesian government declared a public health emergency on April 13, 2020,⁵ and issued large-scale social restriction (LSSR) policies⁶ effectively closing schools, workplaces, and other public places; barring dine-in restaurants; and suspending tourist and business visa entries.

The implementation and timing of the restriction policies varied significantly between and within provinces because the provision of LSSR was delegated to local governments (at the province, district, or city level) in consideration of the severity of the COVID spread in each locality. As the epicenter of the pandemic, Jakarta became the first province to adopt LSSR policies. By May 2020, West Java followed suit, first, in major cities (e.g. Depok, Bogor, Bekasi, and Bandung), before being gradually extended to every other district in the province. Most other provinces—such as Central Java, East Java, Riau Islands, and South Sumatera—only implemented localized restrictions in districts with high risk of COVID spread. Some other provinces, such as East Nusa Tenggara, did not implement any restrictions at all.

Containing the spread of the COVID-19 virus comes with significant economic costs. Workplace closures caused massive layoffs, with the unemployment rate rising to 7.07 percent by August 2020, the highest year-on-year increase since the Asian Financial Crisis in 1998. Poverty also increased dramatically. Suryahadi, Izzati and Suryadarma (2020) estimated that the pandemic dragged 1.3 million people below the poverty line, undoing the progress in poverty eradication over the last decade. The worsening poverty can be partially attributed to widespread job losses and income reductions—one out of four breadwinners stopped working during the early onset of

⁵ See presidential decree (*Keppres*) 12/2020.

⁶ In Bahasa Indonesia, the policies are commonly referred to by the acronym, *PSBB*, which stands for “*Pembatasan Sosial Berskala Besar*”. See government regulation (*Peraturan Pemerintah*) 21/2020.

the pandemic, and 64 percent of those who continued working worked with reduced income (World Bank 2020).

To balance between the health and economic crises, nearing mid-2020 the government began transitioning to the “New Normal,” relaxing mobility restrictions and establishing health protocols to limit COVID spread. In early June 2020, Jakarta, Bogor, Depok and Bekasi began reopening workplaces, shopping centers, places of worship, and other public places with 50 percent capacity. Additionally, to support the poor and vulnerable, the government launched the National Economic Recovery (PEN) program, allocating a total of IDR 695 trillion⁷ (i.e. 4.2 percent of the country’s GDP), to stimulate the economy via assistance programs for both households and micro, small, and medium enterprises (Sparrow, Dartanto, and Hartwig 2020).

3. Literature Review

Existing studies have documented several factors that might cause the pandemic to affect male and female employment differently. The first factor is the sex-segregation across employment sectors and/or occupations (Coskun and Dalgic, 2022; de Paz Nieves, Gaddis and Muller, 2021). The pandemic crisis tends to hit high-contact sectors the hardest, and these sectors are highly populated with female workers (Alon, et al. 2021; Albanesi and Kim 2021).⁸ Gender differentiated impacts may also arise through increased childcare needs and other domestic care responsibilities due to school closures during the pandemic, for which the burden has been disproportionately shouldered by females (de Paz Nieves, Gaddis and Muller, 2021; Alon et al., 2020; Beauregard et al., 2020). While these two factors are expected to induce more negative employment effects among females during the pandemic recession, studies have also demonstrated the possibility of the ‘added-worker effect’, where non-employed spouses (more often to be female, particularly in

⁷ It is equivalent to USD 149 billion at PPP exchange rate of 1 USD = 4,675.22 in 2020.

⁸ Using O*NET data, Albanesi and Kim (2021) showed that women are overrepresented in high-contact and inflexible occupations; 73% of workers in these sectors were female.

the LMIC context) are incentivized to participate in labor markets as a form of insurance against household income shocks that occurred during the crisis (Lundberg, 1985; Ellieroth, 2019; Attanasio, Low and Sanchez-Marcos, 2005), thus causing female employment to rise during economic downturn.

There is a large body of empirical literature examining the net effect of the above three factors on employment in developed countries during the pandemic (Couch, Fairlie and Xu, 2020; Alon et al., 2021; Andrew et al., 2020; Adams-Prassl et al., 2020; Albanesi and Kim, 2021; Kikuchi et al., 2020). While many of these studies confirm the predicted negative net impacts on overall employment (Albanesi and Kim, 2021, in the United States; Lemieux et al., 2020, in Canada; Kikuchi, Sagiri and Mikoshiba, 2020, in Japan; Galasso and Foucault, 2020, in 12 developed countries),⁹ these studies also observe that women's employment is disproportionately negatively impacted during the pandemic, reversing the gender differential pattern that had been observed in the 2007–08 global financial crisis (Alon et al., 2021; Albanesi and Kim, 2021), in which female employment tended to be relatively less affected by that crisis. During the COVID-19 pandemic, it is apparent that women have been shifting to unemployment and/or non-participation to a larger degree than men (Albanesi and Kim, 2021; Montenovolo et al., 2021; Dang and Nguyen, 2020), and that they are also more likely to be furloughed by their employers (Adams-Prassl et al., 2020a; Moehring, Reifenscheid and Weiland, 2021).

While the existing literature is replete with studies in the high-income context, there have been fewer studies on the COVID-19 employment impacts in the low- and middle-income countries (LMIC) context. Generally, developing countries tend to have higher degrees of informality in their labor markets and, consequently, one might expect to observe a lower degree

⁹ Includes Australia, Austria, France, Germany, Italy, the United Kingdom, the United States, New Zealand, Poland, Sweden, Brazil and Canada.

of job protection in developing countries, particularly among females (Bonnet, Vanek and Chen, 2019; de Paz Nieves, Gaddis and Muller, 2021). Jobs that are amenable to working from home, which have been found to moderate the impact of the pandemic on employment (Dingel and Neiman, 2020), while also reducing its gender effects (Alon et al., 2021), are relatively scarce across LMIC countries. As such, the impact of the COVID-19 crisis within these countries may differ substantially from the impacts that have been observed across developed countries.

Indeed, there are indications that the declines in employment seen in developing countries are steeper than those observed in developed countries; descriptive evidence from the HFPS studies undertaken in developing countries suggests that about 30 to 40 percent of workers stopped working during the second quarter of 2020¹⁰ (Khamis et al., 2021; Bundervoet, Davalos and Garcia, 2021; Schotte et al., 2021). Such a magnitude is similar to that reported in other non-HFPS studies in developing countries as well (Jain et al., 2020, in South Africa; Biscaye, Egger and Pape, 2021, in Kenya and Nigeria). Consistent with the findings in developed countries, some of these studies report that females are significantly more likely to lose their jobs and to report larger declines in earnings (Hoehn-Velasco et al., 2021; Kugler et al., 2021; Deshpande, 2020; Jain et al., 2020). In South Africa, the findings of Jain et al. (2020) suggest that women experienced a 49 percent reduction in active employment over the February–April 2020 period, which is 15 percentage points larger than the reduction experienced by men in the same period.

The negative employment effects among females are also confirmed by similar results from simulation exercises using pre-pandemic data. For example, Lavado et al. (2022) find that, during the onset of the pandemic, female workers in the Philippines experienced a 4.5-percentage-point

¹⁰ Whereas in the United States and Canada previous studies have found that employment had dropped by only 21 percent and 15 percent, respectively, in April 2020. One should cautiously interpret the magnitude of the differences, as they could arise due to the different respondent types and sampling methodologies between the HFPS and non-HFPS studies. HFPS studies, such as Khamis et al. (2021) and Kugler et al. (2021), are typically only representative at the household level.

higher employment loss than male workers. Other CGE-based simulations implemented in other contexts confirm such negative employment effects among females (Escalante and Maisonnave, 2021, in Bolivia; Chitiga et al., 2021 in South Africa). In addition, these studies suggest that, having lost their jobs, female workers are less likely to return to work than male workers. Moreover, by using a difference-in-differences framework to estimate the COVID-19 effects on the employment of Indian workers, Deshpande (2020) observes that, while employment among men recovered by August 2020, employment among women remained 9.5 percentage points lower than that of their male counterparts in August 2020, relative to the pre-pandemic period.

On the other hand, other studies seem to indicate that female employment has fared relatively better than that of males during the onset of the pandemic. Deshpande (2020) notes that the COVID-19 pandemic initially caused a 20-percentage-point reduction in the gender employment gap in the Indian labor market, mainly through greater employment reductions among the male population. Similar results have been observed in Ethiopia (Hossain, 2021), Türkiye (İlkkaracan and Memiş, 2021), Central America¹¹ (Webster, Khorana and Pastore, 2021) and, most notably, in Indonesia (Asian Development Bank, 2021). Some studies cite women's disproportionate pre-pandemic concentration in occupations with a high suitability to working-from-home (WFH) as the most likely factor in explaining women's relative employment increase during the onset of the pandemic (Montenovo et al., 2021; Mongey and Weinberg, 2020). In developing countries, employment among females is sustained by the overall transition into "lower quality" employment during the onset of the pandemic, such as more informal work (Asian Development Bank, 2021), indicating that the relative increase in female employment is not an entirely good story.

¹¹ El Salvador, Guatemala, Honduras, and Nicaragua. See Webster et al. (2021) for more details.

Thus far, causal empirical studies on the pandemic’s employment effects have not provided strong evidence to support the presence of a female “added worker effect” during the onset of the pandemic, defined as a temporary increase in the labor supply of married women whose husbands have become unemployed (Lundberg, 1985). For example, by employing a triple-differences approach on granular Dutch administrative data, Meekes et al. (2020) observe no significant effect of household composition and spouses’ employment status on workers’ labor supply in the Netherlands. Peluffo and Viollaz (2021) provide a plausible explanation behind the lack of an “added worker effect”, in which they argue that the nature of the current pandemic has made it less likely for previously unemployed spouses to acquire new employment during the crisis.

4. Data

4.1 Data Source

We draw data on employment and other labor market outcomes from Indonesia’s National Labor Force Survey (Sakernas), a nationally representative labor force survey that has been implemented since 1976. In August 2020, Sakernas covered all 514 districts spread across 34 provinces in Indonesia.

The Sakernas survey contains individual-level information on employment outcomes, such as labor force participation, employment status, employment sector, occupation, working hours, and incomes/wages, among others. The survey also contains individual-level demographics that are used as control variables in our estimations, such as gender, age, household size, education, and work experience, among others. However, the survey does not publish the household identifiers of each respondent, limiting the ability to capture explicitly the within-household dynamic in our analysis.

Since 2005, the Sakernas survey has been conducted biannually, in February and August.¹² The biannual nature of the survey helps to capture seasonality in labor market dynamics across the two semesters. The two rounds of Sakernas differ primarily in terms of their representativeness; since 2007, sampling for the August round has been designed in such a way as to ensure representativeness up to the district level.¹³ Meanwhile, sampling for the February round has been designed to ensure representativeness only at the provincial level. As such, we only include the provincial regional identifiers as fixed effects, as well as for clustering the standard errors, to facilitate a proper comparison between the rounds. Sakernas is not generally designed to be a longitudinal survey.¹⁴ Instead, different Sakernas rounds contain different individual samples that are randomly drawn within each of the 30,000 census blocks spread across Indonesia.

4.2 Adjustments to Sakernas Data Collection during the Pandemic

Amid the pandemic, Statistics Indonesia implemented a few adjustments to the August 2020 data collection process. For example, supervisor and enumerator trainings were held virtually, instead of the typical face-to-face format in previous rounds. However, we anticipate the switch to virtual training to pose minimal threat to our identification strategy.

The most important adjustment (given our empirical strategy) lies in the enumeration process. Enumeration areas are categorized into two groups based on their COVID risk status: green zone (low risk) areas and red zone (high risk) areas. For targeted households in green zone areas, the survey process was done *per normal*: (i) verification and updating of household location were carried out by field officers via door-to-door method and (ii) interviews were conducted face-

¹² Since then, Sakernas has not always been conducted biannually. In 2011–14, the survey was conducted on a quarterly basis, i.e., in February, May, August, and November. However, since 2015, Sakernas has reimplemented its biannual data collection design.

¹³ Except for 2016, where the August round is only representative up to the province level.

¹⁴ Although, since 2006, Sakernas allows one to develop a partial panel data through the partial rotation of household sample packages.

to-face (F2F). For those in red zone areas, in lieu of going door-to-door, the field officers relied on the assistance of village/community/neighborhood chiefs¹⁵ to verify household location. In addition, interviews were carried out via the Drop-Off-Pick-Up (DOPU) method, where the respondents first fill out the questionnaires on their own account. These questionnaires are then picked up by the fieldwork officers, who then proceed to verify the respondents' answers on select key variables¹⁶ via phone calls, using the quick questions format. If the implementation of the DOPU method was not feasible, then Statistics Indonesia resorted to the Computer-Assisted Telephone Interviewing (CATI) method instead.

This raises the concern that the August 2020 round is inherently different from previous Sakernas rounds, which challenges the parallel trends assumption. The different survey processes in green and red zone areas could also increase measurement errors and potentially bias our estimated COVID effect. Unfortunately, Statistics Indonesia does not disseminate the list of green and red enumeration areas.

To establish credibility in our estimates, we compare sample distributions in the August 2020 round vis-à-vis the preceding round (August 2019). Appendix Figure 1 overwhelmingly suggests a close match in the unweighted distributions of respondents by age and gender between the August 2020 and 2019 rounds.

¹⁵ In Indonesia, community units are referred to as *Rukun Warga* (RW), while neighborhood units are referred to as *Rukun Tetangga* (RT), and these are the smallest administration units in Indonesia. Each RT/RW usually consists of several households in close proximity to each other, with an elected chief who play instrumental roles in administrative functions, such as issuing family cards, individual identity cards, and reference letters indicating household poverty status.

¹⁶ These variables include: (1) whether the respondent has been working for the past week; (2) whether the respondent has been engaged in any income-earning activities; (3) whether the respondent has been assisting family/non-family businesses; (4) whether the respondent actually has a job/business, but has been temporarily not working in the past week; (5) the respondent's main task in their workplace; (6) main product/services from the respondent's occupation; (7) the respondent's main work sector; (8) the respondent's main work status; (9) the respondent's income from their main employment; (10) whether the respondent has been looking for jobs in the past week; (11) whether the respondent has been preparing for a new business in the past week; (12) why has the respondent not been looking for work or preparing for new businesses, if their answer to (11) is "No".

4.3 Descriptive Statistics

For our analysis, we pool together all individuals sampled in all the 2016–2020 Sakernas rounds. Since the first COVID-19 case in Indonesia was recorded in early March 2020, we consider the 2016 February until the 2020 February Sakernas rounds to be the pre-pandemic baseline period, while the August 2020 round is taken as the pandemic (treatment) period. We limit our data to individuals aged 15 to 64 years old to represent the main working population. This gives us a total of 3,254,366 observations for the analysis.

We examine the impact of the COVID-19 pandemic on several key labor market outcomes, including: (i) employment status; (ii) unemployment; (iii) working hours; and (iv) wages. Consistent with Statistics Indonesia’s definition, employment is defined as either working for at least one hour in the past week, or usually working but have not been working in the past week (seasonal workers, on paid leave, etc.). Sakernas collects information on individuals’ working hours and wages at both their main occupation and their side occupation. Statistics Indonesia defines the main occupation as the job/occupation that takes up a higher proportion of the respondent’s time.¹⁷ Throughout our analysis, we only report the impact of the pandemic on working hours and wages derived from respondents’ main occupations.

Table 1 presents the overall, as well as sex-disaggregated, unweighted demographic characteristics and employment outcomes of respondents in our sample. The sample contains a relatively equal gender proportion (roughly a 50:50 split). Overall, Table 1 suggests that the male and female respondents in the sample have a similar distribution in terms of age, urban/rural proportion, household size, education level, and the number of children below the age of five. On

¹⁷ If the amount of time being used is equal across jobs, then the main job is defined as the job that gives the highest contribution to the respondent’s total income.

average, nearly half of the respondents live in urban areas, and almost seven out of 10 respondents are married. Most of the respondents report the total number of household members and the number of children under the age of five as being more than four and one (or none), respectively.

Table 1. Summary statistics, overall and by gender groups

	Overall Sample		Female Sample		Male Sample		Normalized Gender Diff.
	Mean	SD	Mean	SD	Mean	SD	
Panel A: Demographic characteristics							
Female	0.5	0.5					
Age	37.42	13.78	37.51	13.64	37.32	13.91	0.01
Urban	0.45	0.50	0.46	0.50	0.45	0.50	0.01
Married	0.68	0.47	0.69	0.46	0.66	0.47	0.08
Number of children under 5 years old	0.33	0.57	0.34	0.58	0.32	0.57	0.03
Household size	4.29	1.74	4.26	1.74	4.32	1.73	-0.04
Highest educational attainment							
Primary	0.24	0.43	0.25	0.43	0.24	0.42	0.03
Lower secondary	0.23	0.42	0.22	0.42	0.23	0.42	-0.01
Upper secondary	0.29	0.45	0.26	0.44	0.31	0.46	-0.12
Tertiary	0.10	0.30	0.11	0.31	0.09	0.29	0.06
Percentage doing housekeeping activities	0.79	0.41	0.95	0.21	0.62	0.49	0.90*
Panel B: Employment outcomes							
Employed	0.67	0.47	0.54	0.50	0.81	0.40	-0.59*
Labor force participation	0.70	0.46	0.56	0.50	0.84	0.37	-0.63*
Unemployment rate	0.04	0.19	0.04	0.19	0.04	0.20	-0.02
Percentage employed as employee	0.36	0.48	0.32	0.47	0.38	0.48	-0.12
Percentage employed as unpaid family worker	0.16	0.36	0.29	0.45	0.07	0.25	0.59*
Employment by sector:							
agriculture	0.36	0.48	0.33	0.47	0.37	0.48	-0.09
industry	0.19	0.39	0.13	0.34	0.23	0.42	-0.25*
services	0.45	0.50	0.54	0.50	0.40	0.49	0.28*
Percentage formally employed	0.39	0.49	0.34	0.47	0.42	0.49	-0.17
Real hourly wages (IDR '000)	11.02	20.50	9.74	17.75	11.46	20.23	-0.09
Real hourly employee wages (IDR '000)	12.98	25.16	13.02	35.32	15.31	46.19	-0.05
Weekly work hours	36.96	17.94	34.14	18.64	38.88	17.18	-0.27*

Notes: The sample is restricted to 3,254,366 15–64-year-old (working age) individuals who were included in the 2016–2020 Sakernas rounds (both February and August rounds). All tabulations are unweighted. Panel A describes the demographic characteristics of individuals included in our dataset. Panel B displays the summary statistics of labor market outcomes used in our analysis. Unemployment and temporary unemployment rates exclude 975,996 individuals who are not in the labor force. Employment status, sectors, and weekly work hour are non-missing for 2,188,434 employed individuals. We report only the work hours of the respondent’s main job. Percentage of not in employment, education or training (NEET) is calculated of the 15–24-year-old population. Wages are only recorded for own account, employee, and casual workers. Real wages are constructed using 2007 fixed prices (IDR) and are winsorized at the 99th percentile value. In tabulating the wages, we exclude the unpaid family workers. Housekeeping activities are defined as unpaid domestic care activities. As the Sakernas data does not contain information on time use data, involvement in care activities does not account for the time spent on such activities. The normalized gender difference column reports the normalized difference (Imbens and Rubin, 2015) of each characteristic between the female and male groups. *indicates that the absolute normalized difference is above 0.25, indicating a relatively weak balance between the two gender groups.

However, one can also observe systematic differences between females and males based on the unpaid domestic responsibilities undertaken in the week prior to the survey interviews. Consistent with the gender norms on household caretaking that are prevalent in Indonesia (Setyonaluri et al., 2021), we find that the burden of domestic work responsibilities falls disproportionately on women; nearly *all* of the females in the sample (96 percent) are engaged in household caretaking during the past week prior to the survey, while only six out of 10 male respondents engage in household caretaking.

One can also observe significant gender differences in terms of employment outcomes and/or employment characteristics. Females are far less likely to be employed in Indonesia; only 54 percent of female respondents are employed compared with 81 percent of male respondents. Similarly, throughout the analysis period, females are also 26 percent less likely than their male counterparts to participate in the labor force. Among females who do participate in the labor force, they face the same probability of getting a job as their male peers, which is observed by the relatively similar unemployment and/or temporary unemployment¹⁸ rates. More than half (54 percent) of the female workers in the sample work in the services sector. However, nearly 30 percent of female workers work as unpaid family workers, compared with only 7 percent among male workers. They are also somewhat less likely to be formally employed¹⁹ (by 8 percentage points relative to men), and they tend to be paid less (both on a monthly and an hourly basis) than their male peers. This evidence points to a significantly lower quality of employment among females in the Indonesian labor market.

¹⁸ We define temporary unemployment as respondents who are usually working but have not been working in the past week.

¹⁹ We follow Statistics Indonesia's simplified formality definition in defining formal employment; a worker is designated as formal worker if he/she works as an employee or if he/she is an employer that is assisted by permanent workers.

5. Empirical Strategy

5.1 Seasonal Difference-in-Differences (SDID)

The COVID-19 pandemic and the ensuing economic crisis have upended the global economy in many ways: from the global health crisis to school closures, mobility restrictions, abrupt disruptions to global supply chains and certain industries (such as retail and tourism), voluntary changes to lifestyle and preferences, and reduced aggregated demand. Each of these channels can have economically meaningful impacts on the labor market, with potentially opposing forces at work. For example, the sudden illness of a household's income earners may exacerbate care responsibilities, exerting a negative pressure on the caregiver's participation in paid employment activities. Meanwhile, the greater financial need to cope with the economic crisis, for instance to cover health costs and to replace income earners, may push people into first-time employment. School closures, similarly, can exacerbate care responsibilities, especially on household caregivers (who are predominantly women and girls), while also increasing the likelihood of school dropouts.

To assess the net effects of the COVID-19 pandemic on Indonesia's labor market, we rely on the exogeneity of the timing of the pandemic (Albanesi and Kim, 2021; Alon et al., 2021; Deshpande, 2020; Couch, Fairlie and Xu, 2020; Lee, Park and Shin, 2021). While epidemiologists have long predicted the threat of an airborne virus as the potential trigger for a global pandemic (Richard and Fouchier, 2016), the specific timing of the COVID-19 pandemic itself was arguably unanticipated. The first official news of the Coronavirus discovery in Wuhan, China, surfaced on December 31, 2019. However, the Government of Indonesia only subsequently declared a national emergency on April 13, 2020,²⁰ three and a half months later. The duration of the pandemic is also

²⁰ On April 13, 2020, Indonesia's President Joko Widodo issued Presidential Decree No.12/2020, which essentially acknowledged the spread of the COVID-19 virus as a national disaster and mandated the pandemic management task to the COVID-19 Response Acceleration Task Force.

clouded in uncertainty, with scientists disagreeing on their predictions of just how long the pandemic could last (Kissler et al., 2020).

We estimate a seasonal difference-in-differences (SDID) specification where we compare differences within-year (across seasons) and across years. This approach allows us to identify COVID-19 impacts from normal seasonal fluctuations in labor market demand and supply, where employment rates in Indonesia tend to be lower in August (post-harvest) than in February (pre-harvest). We leverage multiple survey years prior to the COVID-19 pandemic to establish a historical trend of a pre-pandemic normal and to ensure that our estimates are based on this pre-pandemic normal, instead of potentially year-specific anomalies. Therefore, we are able to attribute any remaining difference to the causal effect of the COVID-19 pandemic on Indonesia's labor market outcomes.

Specifically, we estimate the following regression:

$$y_{ipst} = \alpha + \beta COVID_{st} + \gamma_p + \theta_s + \delta_t + \phi X_{ipst} + \varepsilon_{ipst} \quad (1)$$

for the pooled male and female samples, and separately for each gender sample. y_{ipst} is the labor market outcome of individual i in province p in month s in year t . Sakernas is a biannual survey conducted in February and August of each year, hence, the month s can only take two values: February or August. $COVID_{st}$ is a binary indicator varying at the season-year level, which takes the value of 1 for periods after March 2020, and 0 if otherwise (from February 2016 to February 2020). Our study is limited to one disseminated survey round after the initial onset of the pandemic: August 2020. The coefficient, β , is the SDID estimate. γ_p , θ_s , and δ_t are province, season, and year fixed effects, respectively, which control for common characteristics within province, season, and year. X_{ipst} is a vector of control variables, including age, squared age terms, marital status dummies, household size, education level dummies, training experience dummy, and rural/urban

dummy. For regressions among the employed population, we also include sector and occupation fixed effects. We cluster our standard errors at the provincial level to account for intra-provincial correlations.²¹

This time-series approach is akin to studies estimating the mortality impacts of the pandemic using an “excess mortality” approach (Karlinsky & Dmitry, 2021). In these studies, COVID-19-related mortalities are not only attributed to individuals contracting the virus but, more broadly, to the net effects that the pandemic has on people’s physical and mental health, for example, with overcrowding of the health-care sector or mobility restrictions that limit people’s ability to access health-care facilities. By comparing *actual* mortality rates during the COVID-19 pandemic period to the *expected* mortality rates in the absence of the COVID-19 virus, the estimated death toll can provide a more objective measure that does not hinge on testing and reporting. Similarly, our approach has the advantage of identifying net employment effects irrespective of people’s subjective reporting of whether their exit from (or entry into) employment is attributable to the COVID-19 pandemic. For instance, a laid-off worker may claim that his/her termination is caused by the pandemic when in fact the firm or sector has been struggling for the past few years and was already on a downward trajectory. Moreover, we can identify the effect of the pandemic net of all causes, which provides more of a bird’s-eye view of labor market conditions.

Our approach is perhaps closest to Deshpande (2020), Couch, Fairlie and Xu (2020), Lemieux et al. (2020), and Lee, Park and Shin (2021), in that they also employ the seasonality difference-in-differences approach to investigate gender differences in the impact of the pandemic

²¹ Previous studies looking at local labor markets in Indonesia typically cluster standard errors at the district level (e.g., Akresh et al. 2021; Halim et al., 2021; Newhouse and Suryadarma, 2021), one administrative level lower than provinces. However, district identifiers are not disseminated in February rounds of Sakernas, due to smaller survey samples.

on employment. However, our paper improves on the previous works by extending the baseline period to 2016 to capture more years of seasonal pre-pandemic trends, while also providing a larger sample size and hence more precise effect estimates. Multiple baseline periods are useful in estimating the appropriate counterfactuals, and these are often missing from LMIC studies that leveraged the use of HFPS (for example, the work of Khamis et al., 2021; Kugler et al., 2021; Delaporte and Pena, 2020; Jain et al., 2020; Seck et al., 2021; Bundervoet, Davalos and Garcia, 2021; Genoni et al., 2020; James et al., 2021).

To account for the potential issue of simultaneous inference and multiple hypothesis testing, we follow Benjamini and Hochberg's (1995) concept of a false discovery rate (FDR). Whereas a typical unadjusted p-value of 0.05 suggests that 5 percent of all tests are incorrectly discovered as statistically significant, an FDR-adjusted q-value of 0.05 suggests that 5 percent of all statistically significant tests are false positives. The FDR adjustment for multiple hypothesis testing imposes a higher bar for a coefficient to be considered as having a statistically significant effect than without the adjustment. However, this approach is less stringent than the extremely conservative Bonferroni (1935) correction, where the p-values would simply be inflated by the number of tests performed. We calculate FDR-adjusted q-values within each table.

Figure 1 illustrates our identification strategy and the visual plausibility of the parallel trends assumption required for this strategy, and also indicates the presence of seasonal variations in employment-to-population ratios, both for the male and female populations. Generally, the employment-to-population ratio is lower in August than in February, which is attributable to the cyclicity of harvest seasons in Indonesia. However, the graph points to the strong presence of an anomaly in 2020 (indicated by the red line), where the downward slope of the employment-to-population ratio is much steeper than in preceding years. This indicates that there are components

of the February to August 2020 change that are unexplainable by seasonal variation, and we attribute such components to the impact of the COVID-19 pandemic.

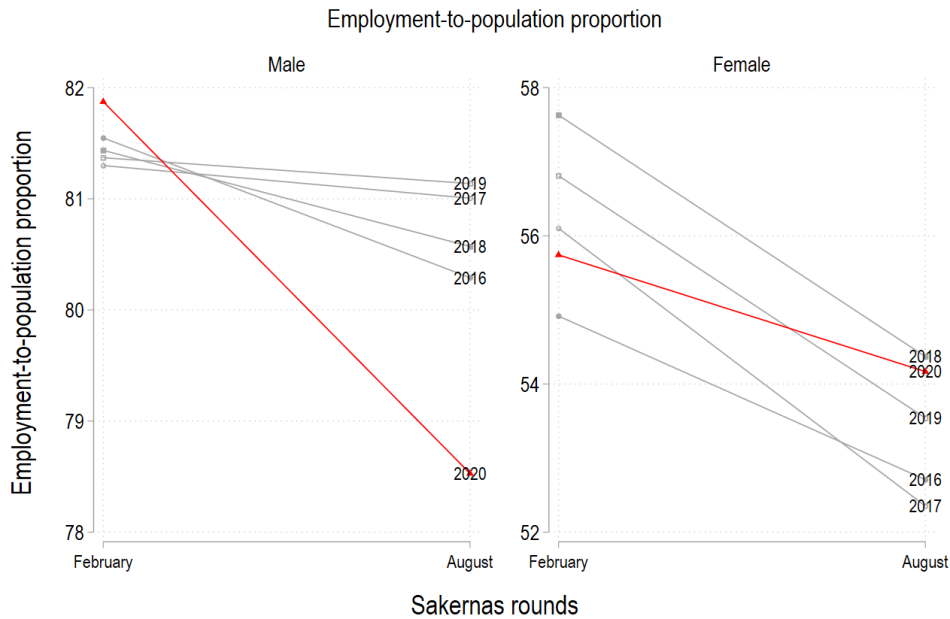


Figure 1. Employment-to-population trends, 2016–2020

Source: Sakernas 2016–2020 (February and August rounds). Trends are unweighted tabulations of the 15–64-year-old population.

We formally confirm the plausibility of the parallel trends assumption by performing placebo regressions with alternative cutoff periods using pre-pandemic data to check for potential trend breaks prior to the pandemic. Seven alternative cutoff periods are tested separately for male and female samples (Table 2), with only one sample appearing to be statistically significant at the 10 percent level, namely the August 2019 cutoff for the male sample. However, the statistical significance does not survive the FDR q-values adjustment. This yields confidence in the validity of our empirical strategy and confirms that there was no trend break in employment before the pandemic.

We study the net effects of the COVID-19 pandemic on a broad range of labor market indicators, y_{ipst} , including both extensive margins of participation and intensive margins (e.g., working hours and earnings). At the extensive margin, we focus on employment instead of labor

force participation or unemployment, because the pandemic might have affected the validity of the traditional definitions of such measures, thus rendering the pre-pandemic and ongoing-COVID-19 comparison results somewhat unclear (Lemieux et al., 2020). We disaggregate our analysis by sex, age group, highest education level, sector, and region (more on this in Section 5.3).

Table 2. Placebo cutoff impacts on employment

	Employment						
	February 2017 (1)	August 2017 (2)	February 2018 (3)	August 2018 (4)	February 2019 (5)	August 2019 (6)	February 2020 (7)
Panel A:							
Female							
COVID	-0.003 (0.007) [0.983]	-0.007 (0.007) [0.983]	-0.003 (0.007) [0.983]	0.002 (0.006) [0.983]	-0.003 (0.007) [0.983]	-0.002 (0.004) [0.983]	-0.003 (0.007) [0.983]
Panel B:							
Male							
COVID	0.004 (0.004) [0.983]	0.004 (0.004) [0.983]	0.004 (0.004) [0.983]	-0.004 (0.003) [0.983]	0.004 (0.004) [0.983]	0.004* (0.003) [0.983]	0.004 (0.004) [0.983]
Test: $\beta_m = \beta_f$ (p-value)	0.055	0.099	0.055	0.415	0.055	0.059	0.55

Notes: ***, ** and * denote significance at 1%, 5% and 10%, respectively. Parentheses indicate standard errors of coefficient estimates, while square brackets indicate the False Discovery Rates (FDR). The dependent variable in the regression is the unconditional dummy variable of employment status (i.e., no missing values over the population). The main variable of interest in the above results is the COVID dummy, which takes on the value of 1 if the time period is August 2020. Different placebo treatment cutoffs are used across the table columns. Control variables in the regressions include age, squared age term, marital status, household sizes, education level dummies, training experience dummy, and urban/rural dummy. All specifications include year, month and province fixed effects.

5.2 Transition in and out of Employment

The Sakernas data is pooled cross-sections that does not allow us to look at transitions in and out of employment. To understand the movement of individuals in and out of the labor force, we define mutually exclusive categories that sum to 100 percent of the working age population: (i)

employed²²; (ii) unemployed; (iii) discouraged workers²³; (iv) those preparing for business/future job; (v) full-time students; and (vi) those outside the labor force for reasons other than school, such as disability and retirement. Then, we run equation (1) with dummies for being in each category as the dependent variable. The $Post_{st}$ coefficients tell us the likelihood of individuals being in each category since the onset of the pandemic. Taken together, the coefficients can tell us where movements in and out of the labor force occur, whereby an increase in one means a decrease in the others.

5.3 Sectoral Analysis

In an almost similar manner, we can also look at sectors that are impacted by the pandemic and how are they impacted. We first define dummy indicators for employment in each sector. Then, we run equation (1) with employment in each sector as the dependent variable. Compared across sectors, this analysis reveals in which sectors there is job creation and job destruction. The shares of individuals across sectors should sum to the total share of employed individuals. When these sets of sectoral regressions are limited to employed individuals, the coefficients in all sectors should sum to zero, indicating movement of workers across sectors. We can perform the same analysis for occupations and employment types.

6. Results

6.1 Net Employment Effects

²² A person is considered to be employed if she is either working in the last week for at least one hour, or usually working but has not been working in the last week.

²³ Discouraged workers are defined as those who have neither been searching for jobs nor preparing for business, because they have given up hope of finding a job.

We first begin by examining the effects of the COVID-19 pandemic on net employment. Figure 2 illustrates the effect of the pandemic (SDID estimate in equation 1) six months after the onset on net employment by gender and age groups. For the entire working age population (ages 15–64), women are 1.3 percentage points more likely to be employed six months into the pandemic than in the pre-pandemic period, while men are 2.4 percentage points less likely to be employed than in the pre-pandemic period.²⁴ These changes represent a 2.4 percent increase and a 3.0 percent decrease from pre-pandemic average employment participation rates for women (54.1 percent) and men (81.0 percent), respectively. The COVID-19 pandemic seems to have closed the gender gap in employment participation by 14 percent. The effect is consistently negative and statistically significant for men in all age groups: 19–29, 30–44, 45–54, and 55–64. For women, the effect is positive and statistically significant for all groups, except for women aged 19–29, whose employment is negatively affected by the pandemic. Women aged 19–29 are 1.3 percentage points less likely to be employed after the onset of the pandemic than in the pre-pandemic period.

²⁴ Appendix Figure 2 plots net employment effects of the COVID-19 pandemic across Indonesian provinces, by gender.

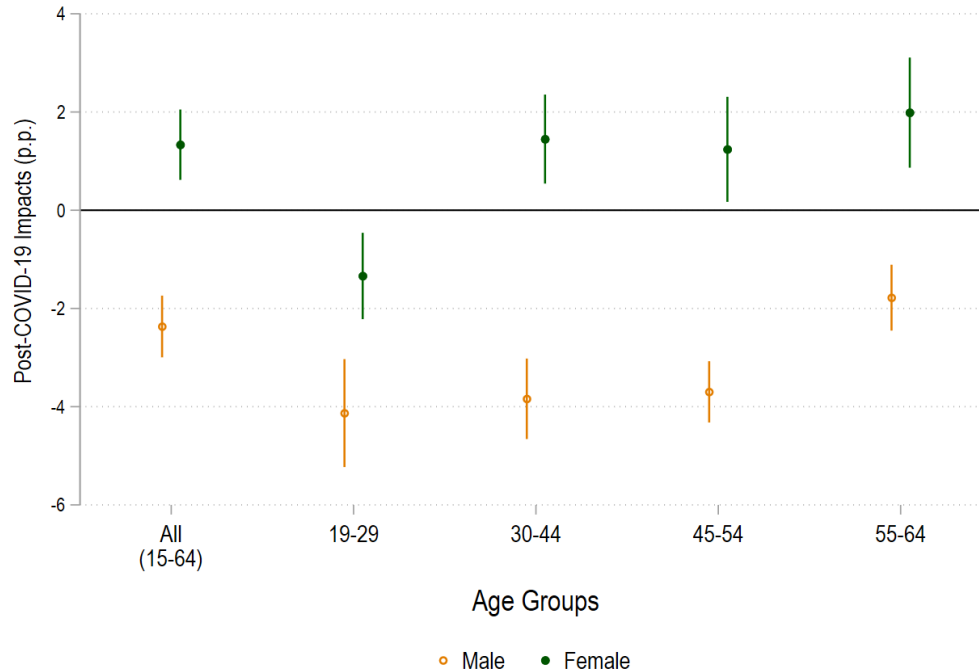


Figure 2. COVID-19 impacts on the likelihood of being employed

Note: Data are taken from Sakernas 2016–2020 (February and August rounds). Samples are restricted to the 15–64-year-old (working age) population. Each dot represents the coefficient of the COVID-19 dummy variable, which takes on the value of 1 if the Sakernas period is August 2020, and zero if otherwise. Vertical lines indicate 90% confidence intervals. Regressions are conducted separately for each combination of sex and age groups. Control variables in the all-sample regression includes age, squared age term, marital status, household size, education dummies, training experience dummy, and rural/urban status. Meanwhile, controls in each age group regression include all the previous controls except for age and squared age term. All specifications include year, province, and month fixed effects.

Table 3 illustrates where the movement in and out of employment comes from, by gender, in separate panels. The six columns reflect six mutually exclusive categories defining an individual’s status in the labor force. The shares of individuals across the six columns should sum to 1, while the coefficients should sum to 0. Taken together, we can interpret the coefficients relative to one another—an increase in one category comes at the expense of a decrease in another category. For women, we find positive increases in the likelihood of being employed (1.3 percentage points [p.p.]) and discouraged (0.3 p.p.), and preparing for a business or a future job (0.1 p.p.). These are all economically meaningful, considering that the female employment rate in Indonesia has been largely stagnant: between 2000 and 2019, female employment only increased

by 3.9 percentage points. Meanwhile, only 0.3 percent and 0.2 percent of women of the working age population were discouraged, and preparing for a business or a future job, respectively, before the pandemic. The pandemic doubled the rate of discouraged workers among women, and increased the likelihood of preparing for a business or a future job by 50 percent. These entries into the labor force come from reductions in being in full-time school and being outside of the labor force for all other non-school reasons. Women are substantially represented in the latter group, with 34.1 percent of the population outside the labor force for non-school reasons before the pandemic, compared with only 5.8 percent of men.

Meanwhile, we see declines in the likelihood of men being employed (2.4 p.p.) and in full-time school (1.2 p.p.). We find an increased likelihood of being unemployed (0.9 p.p.), being a discouraged worker (0.3 p.p.), preparing for a business or a future job (0.1 p.p.), and exiting the labor force altogether (2.3 p.p.). Unemployment for men increases by 29 percent, while being discouraged, preparing for a business or a future job, and exiting the labor force increases by about half relative to the pre-pandemic period. All the results discussed—for both women and men—are statistically significant (at least) at the 5 percent level, with regular p-values and FDR adjusted q-values. The COVID-19 pandemic impacts for women and men are statistically significantly different, based on the likelihood of them being employed, unemployed, or outside the labor force. We can reject equality of the coefficients for women and men at a 1 percent statistical significance level.

Table 3. COVID-19 impacts on participations in the labor force among the population

	Employed	Unemployed	Discouraged	Preparing for business or have future jobs arranged	Full-time school	Outside of LF (Otherwise)
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Female						
COVID	0.013*** (0.004) [0.005]	0.002 (0.001) [0.123]	0.003*** (0.000) [0.000]	0.001*** (0.000) [0.000]	-0.011*** (0.001) [0.000]	-0.009** (0.003) [0.015]
Pre-pandemic average	0.541	0.020	0.003	0.002	0.093	0.341
Panel B: Male						
COVID	-0.024*** (0.004) [0.000]	0.009*** (0.001) [0.000]	0.003*** (0.000) [0.000]	0.001*** (0.000) [0.000]	-0.012*** (0.002) [0.000]	0.023*** (0.003) [0.000]
Pre-pandemic average	0.810	0.031	0.005	0.002	0.093	0.058
Test: $\beta_m = \beta_f$ (p-value)	0.000	0.000	0.799	0.825	0.238	0.000

Notes: ***, ** and * denote significance at 1%, 5% and 10%, respectively. Parentheses indicate standard errors, while square brackets indicate the False Discovery Rates (FDR). Data are taken from Sakernas 2016–2020 (both February and August rounds). The main variable of interest in the above results is the COVID dummy, which takes on the value of 1 if the time period is August 2020. Pre-pandemic averages are population averages of the employment outcomes throughout 2016–2019 (both February and August rounds). Regressions are of the 15–64-year-old population, consisting of 1,614,217 male and 1,640,149 female individuals. Control variables include age, squared age term, marital status, household size, education level dummies, training experience dummy, and urban/rural dummy. All specifications include year, province and month fixed effects.

Table 4 shows the effects on recent entries into employment and unemployment—two margins of entry into the labor force. We find that women are 0.3 p.p. more likely to have recently entered employment for the first time since the onset of the pandemic. This seems consistent with the “added workers effect” (AWE), where secondary earners (who are often women) enter employment to help households cope with economic shocks. We also find that women are 0.3 p.p. less likely to have recently entered unemployment. Taken together, these findings suggest that, while women are more likely to be employed since the onset of the pandemic, their entry into the labor force is necessitated by the economic shock. Women may be taking any available job to help their households cope with an income shock during the onset of the pandemic and spending less time looking for an ideal job, which could be reflected by the type and quality of jobs that women engage in and by their educational attainment. Meanwhile, men are adversely affected by the pandemic in both of these dimensions.

Table 4. COVID-19 impacts on the likelihood of being employed across different employment types

	Recent entry into labor markets	
	Recent entry into employment (1)	Recent entry into unemployment (2)
Panel A: Female		
COVID	0.003*** (0.001) [0.019]	-0.003*** (0.001) [0.000]
Pre-pandemic average	0.025	0.010
Panel B: Male		
COVID	-0.002* (0.001) [0.151]	-0.002** (0.001) [0.053]
Pre-pandemic average	0.029	0.012
Test: $\beta_m = \beta_f$ (p-value)	0.000	0.249

Notes: ***, ** and * denote significance at 1%, 5% and 10%, respectively. Parentheses indicate standard errors, while square brackets indicate the False Discovery Rates (FDR). Data are taken from Sakernas 2016–2020 (both February and August rounds). The main variable of interest in the above results is the COVID dummy, which takes on the value of 1 if the time period is August 2020. Pre-pandemic averages are population averages of the employment outcomes throughout 2016–2019 (both February and August rounds). Regressions are of the 15–64-year-old population, consisting of 1,614,217 male and 1,640,149 female individuals. Control variables include age, squared age term, marital status, household size, education level dummies, training experience dummy, and urban/rural dummy. All specifications include year, province and month fixed effects.

6.2 Effects on Job Quality

First, we look at how the COVID-19 pandemic affects the likelihood of being in formal and informal employment by sector. Table 5 distinguishes formal and informal employment in the primary (agriculture), secondary (industry), and tertiary (services) sectors. The six columns sum to the total share of employed individuals. Generally, the results suggest that both women and men are more likely to shift towards informal employment, as seen by the significantly positive net effects on informal employment across all sectors. However, the sectoral shifts are somewhat different between men and women. Women have a higher likelihood of turning to informal agriculture and services, while men are more likely to turn to informal industries (the differences between women and men are statistically significant at the 10 percent level). This shift from formal

to informal employment dislocates the increasing shares of formal employment seen for both women and men across Indonesia in recent years²⁵ (Figure 3).

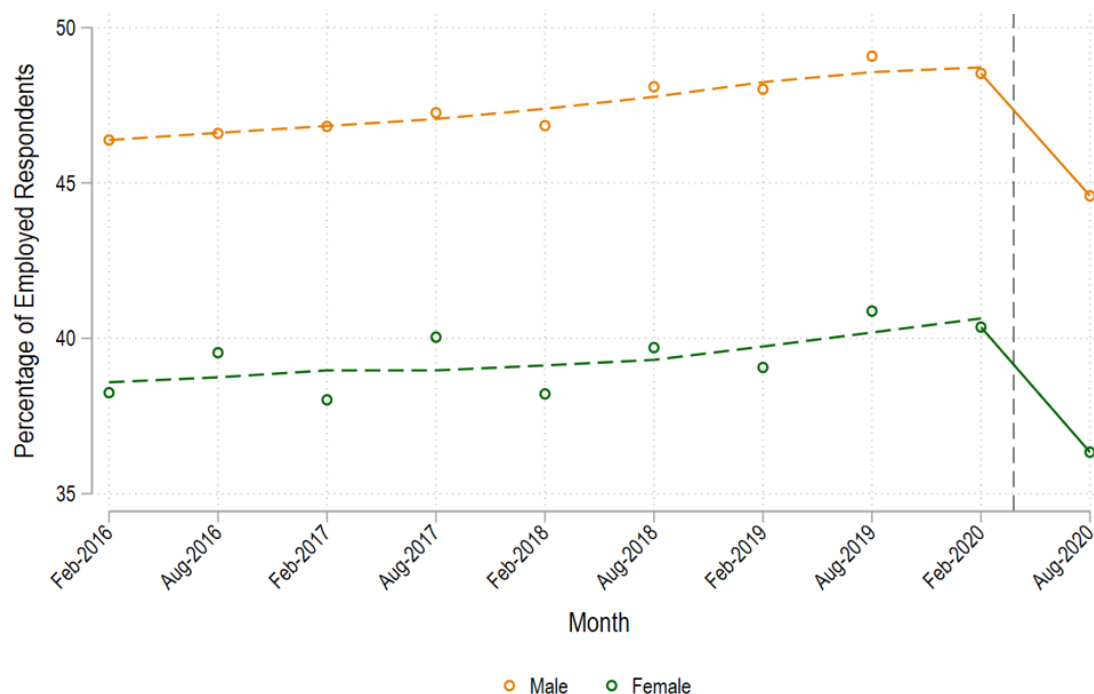


Figure 3. Share of formal employment across the years

Source: Sakernas 2016–2020 (February and August rounds). Formal employment includes employers that are assisted by permanent workers, as well as employees (wage workers). The green and yellow dots represent the female and male shares of formal employment within the pool of employed individuals of each sex group. The dash vertical line indicates the onset of the COVID-19 pandemic in Indonesia (March 2020). Green and yellow dash lines represent the lowess fit of the female and male formal employment shares between February 2016 and February 2020, while the green and yellow solid lines represent the linear fit of female and male employment shares from February 2020 to August 2020.

²⁵ Appendix Tables 1, 2 and 3 look at a more granular definition of employment types, occupations and sectors, respectively. Appendix Table 1 suggests a lower likelihood of women and men being employed in waged employment, and a higher likelihood of being employed as casual workers and unpaid family workers. Appendix Table 2 suggests that the pandemic lowers the likelihood of being employed in white-collared occupations, including professional/technical, administrative, and clerical positions.

Table 5. COVID-19 impacts on formal and informal employment across sectors

	Formal			Informal		
	Agriculture (1)	Industry (2)	Services (3)	Agriculture (4)	Industry (5)	Services (6)
Panel A: Female						
COVID	0.002*** (0.000) [0.000]	-0.005*** (0.001) [0.000]	-0.017*** (0.002) [0.000]	0.019*** (0.003) [0.000]	0.002* (0.001) [0.165]	0.012*** (0.002) [0.000]
Pre-pandemic average	0.010	0.038	0.186	0.168	0.033	0.104
Panel B: Male						
COVID	0.001 (0.001) [0.661]	-0.023*** (0.003) [0.000]	-0.026*** (0.002) [0.000]	0.013*** (0.003) [0.000]	0.005*** (0.001) [0.001]	0.008*** (0.002) [0.000]
Pre-pandemic average	0.039	0.123	0.227	0.253	0.063	0.097
Test: $\beta_m = \beta_f$ (p-value)	0.299	0.000	0.000	0.074	0.099	0.06

Notes: ***, ** and * denote significance at 1%, 5% and 10%, respectively. Parentheses indicate standard errors, while square brackets indicate the False Discovery Rates (FDR). Data are taken from Sakernas 2016–2020 (both February and August rounds). Dependent variables are unconditional (of the whole 15–64-year-old population) dummy variables of being employed across different formality-sector combinations. The main variable of interest in the above results is the COVID dummy, which takes on the value of 1 if the time period is August 2020. Pre-pandemic averages are population averages of the employment outcomes throughout 2016–2019 (both February and August rounds). Regressions are of the 15–64-year-old population, consisting of 1,614,217 male and 1,640,149 female individuals. Control variables include age, squared age term, marital status, household size, education level dummies, training experience dummy, and urban/rural dummy. All specifications include year, province and month fixed effects.

Similar to previous crises, the COVID-19 crisis also leads to a lower likelihood of being employed full-time, with a 6.2 p.p. and 2.2 p.p. lower likelihood for men and women, respectively (Table 6). Men are more adversely affected and the difference is statistically significant. The results hold even when controlling for sector and occupation fixed effects. However, fewer women were employed full-time before the pandemic, with only 42 percent of women employed in full-time work compared with 72 percent of men. Women and men experienced reductions in their working hours by 2.3 and 2.6 fewer hours per week, respectively, since the onset of the pandemic. While we find that women and men earn less per month—16 percent and 15 percent reductions in monthly earnings for women and men, respectively—this is likely to be associated with reduced working hours, considering that hourly earnings nominally increase since the onset of the pandemic. This may indicate some rigidity in the wage structure and a limited ability to adjust compensation in proportion to the reduction in working hours.

Further, breaking down the analysis across the formal and informal spectrum suggests that female workers in formal sector jobs have been more negatively affected than their male counterparts (Table 7). Female workers in the formal sector work 4.7 hours less since the pandemic, compared with 3.2 fewer hours among male formal workers. This exacerbates the pre-existing gender gap in work hours, where female formal workers worked 4 fewer hours than males prior to the pandemic. By contrast, among informal workers, males see higher work hour reductions than females, with 1.8 and 0.6 fewer hours worked by males and females, respectively. Unsurprisingly, the COVID crisis has led to higher reductions in the earnings of informal workers (as compared to formal workers) across both gender groups. This is likely caused by the fact that formal jobs tend to have more rigid wage structure, thus causing less flexibility for adjustment during times of crisis.

Table 6. COVID-19 impacts on work hours and earnings

	Hours		Earnings	
	Full-time employment	Weekly work hours	Monthly earnings	Hourly earnings
	(1)	(2)	(3)	(4)
Panel A: Female				
COVID	-0.053*** (0.004) [0.000]	-2.326*** (0.186) [0.000]	-0.163*** (0.012) [0.000]	0.361*** (0.013) [0.000]
Observations	888,854	888,854	483,684	483,684
Pre-pandemic average	0.783	34.7	673,100	6,963
Panel B: Male				
COVID	-0.047*** (0.003) [0.000]	-2.580*** (0.197) [0.000]	-0.147*** (0.009) [0.000]	0.367*** (0.008) [0.000]
Observations	1,299,580	1,299,580	868,241	868,241
Pre-pandemic average	0.884	39.5	1,201,273	11,525
Test: $\beta_m = \beta_f$ (p-value)	0.071	0.065	0.121	0.534

Notes: ***, ** and * denote significance at 1%, 5% and 10%, respectively. Parentheses indicate standard errors, while square brackets indicate the False Discovery Rates (FDR). Full-time employment, work hours, monthly earnings, and hourly earnings are conditional on a respondent's employment status (i.e., missing for non-employed respondents), and regressions for these variables include only workers who have more than six months of experience in current job/occupation. Earnings regressions exclude the unpaid/family workers. The main variable of interest in the above results is the COVID dummy, which takes on the value of 1 if the time period is August 2020. Pre-pandemic averages are population averages of the employment outcomes throughout 2016–2019 (both February and August rounds). Regressions are of the 15–64-year-old population. All earnings averages are reported in real 2007 rupiah. Control variables include age, squared age term, marital status, number of children under age five, education level dummies, training experience dummy, and urban/rural dummy. All specifications include year, province, month, sector and occupational fixed effects. Results are also robust to excluding sector and occupation fixed effects.

Table 7. COVID-19 impacts on work hours and earnings, by formal/informal employment

	Formal		Informal	
	Work hours (1)	Monthly earnings (2)	Work hours (3)	Monthly earnings (4)
Panel A: Female				
COVID	-4.725*** (0.238) [0.000]	-0.119*** (0.010) [0.000]	-0.604*** (0.198) [0.002]	-0.187*** (0.016) [0.000]
Sector / Occupation FE	Yes	Yes	Yes	Yes
Observations	264,147	244,505	524,026	176,681
Pre-pandemic average				
Panel B: Male				
COVID	-3.145*** (0.187) [0.000]	-0.113*** (0.008) [0.000]	-1.809*** (0.245) [0.000]	-0.139*** (0.013) [0.000]
Sector / Occupation FE	Yes	Yes	Yes	Yes
Observations	484,598	419,273	661,746	336,960
Pre-pandemic average				
Test: $\beta_m = \beta_f$ (p-value)	0.000	0.500	0.000	0.005

Notes: ***, ** and * denote significance at 1%, 5% and 10%, respectively. Parentheses indicate standard errors, while square brackets indicate the False Discovery Rates (FDR). Work hours and monthly earnings are conditional on a respondent's employment status (i.e., missing for non-employed respondents), and regressions for these variables include only workers aged 15-64 who have more than six months of experience in current job/occupation. Earnings regressions exclude the unpaid/family workers. Formal workers include workers who are either employee, or employers that are assisted by permanent workers. The main variable of interest in the above results is the COVID dummy, which takes on the value of 1 if the time period is August 2020. Pre-pandemic averages are the averages of the employment outcomes among employed individuals throughout 2016–2019 (both February and August rounds), and pre-pandemic monthly income average excludes the unpaid family workers. All earnings averages are reported in real 2007 rupiah. Control variables include age, squared age term, marital status, number of children under age five, education level dummies, training experience dummy, and urban/rural dummy. All specifications include year, province, month, sector and occupational fixed effects. Results are robust to excluding sector and occupational fixed effects.

The pandemic has had varying effects on employment, depending on the education level. We find that college-educated women and men are 3.3 p.p. and 3.9 p.p.,²⁶ respectively, less likely to be employed during the onset of the pandemic (Table 8). Meanwhile, the increase in women's overall employment seems to be driven by lower-educated women with primary and lower secondary education entering informal employment. Meanwhile, primary educated and high-school educated men are more adversely affected by the pandemic. Similarly, we find that men in both urban and rural areas are 3.4 and 1.6 p.p. (respectively) less likely to be employed during the onset of the pandemic, while women in rural areas are 3.0 p.p. more likely to be employed. But women in urban areas are neither more nor less likely to be employed since the onset of the pandemic.²⁷

²⁶ The difference is not statistically significant.

²⁷ We also find that the COVID-19 pandemic increases labor market frictions by increasing the duration of the job search. Conditional on being unemployed, Appendix Figure 3 shows a lower likelihood of being unemployed for a period of one month or more for both women and men (i.e., the gender difference is not statistically significant), and a higher likelihood of being unemployed for four months or more, and for longer durations. This might suggest: (i) a slower recovery for individuals losing their employment during the onset of the pandemic; and (ii) difficulties in finding employment for fresh graduates entering the labor force for the first time.

Table 8. COVID-19 impacts on employment across population groups

	Education Level				Area	
	Primary (1)	Lower secondary (2)	Upper secondary (3)	Tertiary (4)	Urban (5)	Rural (6)
Panel A: Female						
COVID	0.019*** (0.006) [0.009]	0.038*** (0.005) [0.000]	0.002 (0.005) [0.899]	-0.033*** (0.005) [0.000]	-0.005 (0.003) [0.326]	0.030*** (0.006) [0.000]
Observations	664,197	368,681	424,096	183,175	750,197	889,952
Pre-pandemic average	0.580	0.394	0.504	0.778	0.515	0.563
Panel B: Male						
COVID	-0.025*** (0.004) [0.000]	0.001 (0.005) [0.899]	-0.036*** (0.005) [0.000]	-0.039*** (0.006) [0.000]	-0.034*** (0.005) [0.000]	-0.016*** (0.004) [0.000]
Observations	588,689	369,600	503,616	152,312	730,251	883,966
Pre-pandemic average	0.870	0.668	0.819	0.892	0.771	0.843
Test: $\beta_m = \beta_f$ (p-value)	0.000	0.000	0.000	0.209	0.000	0.000

Notes: ***, ** and * denote significance at 1%, 5% and 10%, respectively. Parentheses indicate standard errors of coefficient estimates, while square brackets indicate the False Discovery Rates (FDR). The dependent variable in the regression is the unconditional dummy of being employed. The main variable of interest in the above results is the COVID dummy, which takes on the value of 1 if the time period is August 2020. Control variables in the regression include age, squared age term, marital status, household sizes, education level dummies, training experience dummy, and urban/rural dummy. Fresh graduates are respondents who had graduated during the past year.

6.3 Robustness Checks

The greatest threat to our identification strategy is that August 2020 could be an anomalous season-year period, the COVID-19 pandemic notwithstanding. There could be a downward or an upward trend from previous years that is common at the national level, or that varies by province. This risk can be mitigated by including a year trend term or province-specific trend. Appendix Table 4 shows that the results are robust to the inclusion of either a national trend or provincial-specific trends.

Another concern is that our level of geographical analysis—provinces—may wash out useful variations at the smaller level of districts. Districts in Indonesia are similar to the size of commuting zones in the United States, which may be a better approximation of “local” labor markets than provinces. However, district-level identifiers are not disseminated in February rounds of the Sakernas survey. While it is feasible to estimate the COVID-19 impacts using only August rounds, this would weaken the identification strategy, removing useful seasonal variations in our estimation. In Appendix Table 5, we show that the results are robust to this switch. Nevertheless, as the seasonal variations are critical for the identification strategy, our main specification is much preferred to this alternative setup.

7. Conclusion

Given the pre-existing gender differences in economic activities and social norms, among others, the COVID-19 pandemic is likely to affect women and men quite differently. The majority of the empirical findings on the pandemic’s impact in other countries suggests that female workers are disproportionately affected by the pandemic due to sectoral/occupational segregation of female workers and increased unpaid domestic care work during the pandemic. However, an opposite

mechanism could also be at play, namely that households need to rely on female spousal labor supply as a form of insurance or a coping mechanism during periods of economic downturn. As such, measuring the net gendered effects of the pandemic on employment is ultimately an empirical task.

In contrast to empirical findings in the majority of other countries, we find that, during the onset of the pandemic in Indonesia, men of all ages are less likely to be employed, while women are more likely to be employed, except those aged 19–29. The COVID-19 crisis, therefore, has had the effect of narrowing the gender gap in labor market participation in Indonesia by 14 percent. The findings suggest that women are less likely to become unemployed. Meanwhile, the increase in female employment reflects the phenomenon of the ‘added workers effect’, meaning females tend to take up any jobs to help their households cope with the pandemic-induced economic shocks. This is reflected in the increase of female employment mainly among less-educated females in rural areas who mostly work as casual workers or unpaid family workers in the agriculture sector.

Moreover, this paper finds that the pandemic has also lowered the employment quality across the board. We documented the overall shift towards informal employment during the pandemic, with lower likelihood of being employed as wage workers. The decline in employment quality is also reflected by the decrease in hours worked and probability of full-time employment among the workers, particularly female formal workers.

There are several avenues through which future studies can build upon our work. First, future analysis in the Indonesian context could extend our work by studying the employment recovery process in subsequent periods beyond August 2020. Second, future studies could complement our findings by investigating the role of household dynamics in influencing women’s

decisions to enter the labor market as “added workers” during the pandemic—an aspect that could not be analyzed in this paper due to unavailability of household identifiers in the Sakernas datasets. Third, as more data points become available in the future, future studies could also look at the long-term effects of the pandemic on the employment outcomes of individuals. This is a policy-relevant question that is particularly important among the youth, who arguably stand to be the most negatively affected group in the long term via the “scarring” effect.

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Online Appendix for

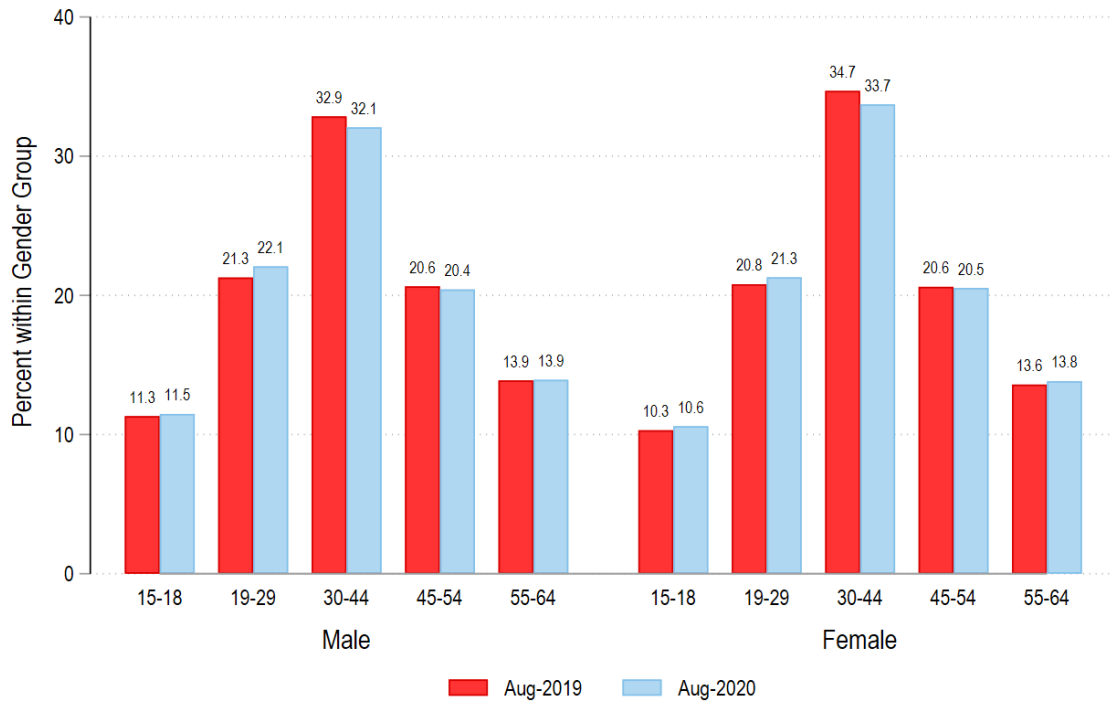
**Assessing the Gendered Impacts of the COVID-19 Pandemic on Indonesia's
Labor Market**

Daniel Halim
The World Bank

Sean Hambali
The World Bank

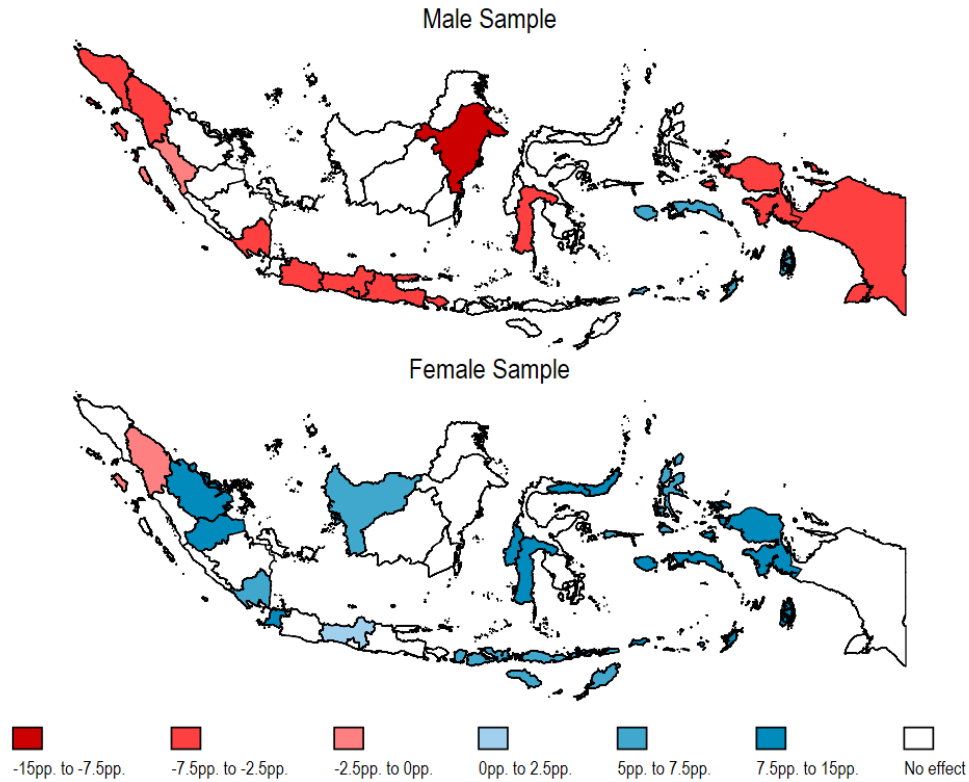
Ririn Salwa Purnamasari
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January 2023



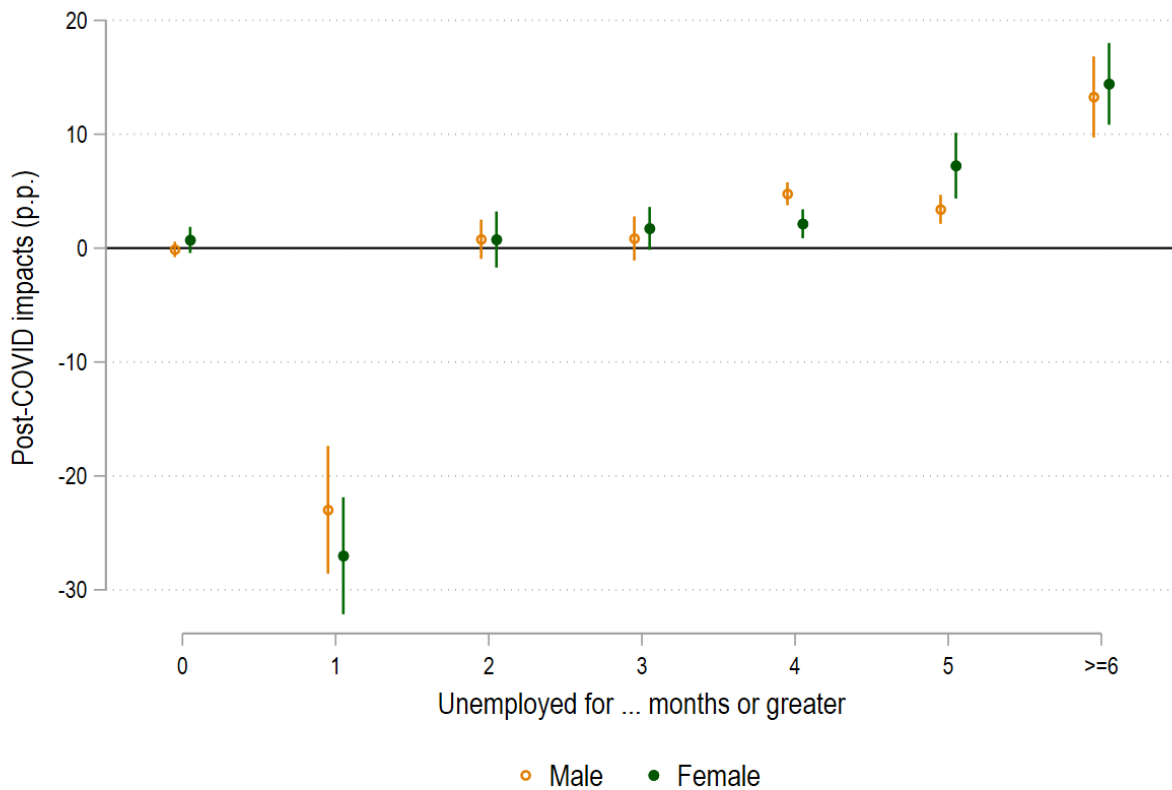
Appendix Figure 1. Within-gender age group distribution of the national labor force survey (Sakernas)

Note: The figure above presents the unweighted tabulation of age distribution for 1,443,533 respondents that are 15–64 years old, taken from the August rounds of the 2019–2020 Sakernas. The y-axis in the graph above denotes the percentage within each gender group of each Sakernas rounds.



Appendix Figure 2. COVID-19 impacts on employment at the province level

Source: Sakernas 2016–2020 (both February and August rounds). The graph above indicates the impacts of the COVID-19 pandemic on male and female employment at the province level. Colors indicate the employment effect magnitude that is statistically significant at 5% level—with the red and blue colors indicating the negative and positive effects, respectively—while lack of color indicates provinces with statistically insignificant employment effects. Control variables in the regression include age, squared age terms, marital status, household size, education level dummies, training experience dummy, and rural/urban dummy variable. All specifications include year and month fixed effects.



Appendix Figure 3. COVID Impacts on the Duration of Unemployment Spells

Source: Sakernas 2016 – 2020 (February and August rounds). Regressions are restricted to unemployed individuals. The dependent variable in the regression is the dummy variable indicating the time-length for which an unemployed respondent has been looking for jobs or preparing for business. The dummy dependent variables are defined unconditionally over the unemployed population. Each dot represents the coefficient of the COVID-19 dummy variable, which takes on the value of 1 if the Sakernas period is August 2020, and zero if otherwise. Vertical lines indicate 90% confidence intervals. Control variables in regression include age, squared age terms, marital status, household size, education level dummies, training experience dummy, rural / urban status dummy. All specifications include year, province, month fixed effects.

Appendix Table 1. COVID-19 impacts on the likelihood of being employed across different employment types

	Own account (1)	Employers assisted by temporary workers (2)	Employers assisted by permanent workers (3)	Employees (4)	Casual agriculture workers (5)	Casual non- agriculture workers (6)	Unpaid family workers (7)
Panel A: Male							
COVID	0.001 (0.003) [0.913]	0.000 (0.003) [0.913]	-0.003*** (0.001) [0.000]	-0.047*** (0.003) [0.000]	0.005*** (0.001) [0.000]	0.003** (0.001) [0.085]	0.017*** (0.001) [0.000]
Pre-pandemic average	0.160	0.162	0.037	0.311	0.034	0.054	0.053
Panel B: Female							
COVID	0.002 (0.002) [0.913]	0.009*** (0.002) [0.000]	-0.001** (0.001) [0.067]	-0.025*** (0.002) [0.000]	0.001 (0.001) [0.726]	0.001*** (0.000) [0.039]	0.027*** (0.003) [0.000]
Pre-pandemic average	0.103	0.073	0.009	0.178	0.017	0.009	0.152
Test: $\beta_m = \beta_f$ (p- value)	0.707	0.000	0.026	0.000	0.002	0.112	0.000

Notes: ***, ** and * denote significance at 1%, 5% and 10%, respectively. Parentheses indicate standard errors, while square brackets indicate the False Discovery Rates (FDR). Data are taken from Sakernas 2016–2020 (both February and August rounds). Pre-pandemic averages are population averages of the employment outcomes throughout 2016–2019 (both February and August rounds). Regressions are of the 15–64-year-old population, consisting of 1,614,217 male and 1,640,149 female individuals. The main variable of interest in the above results is the COVID dummy, which takes on the value of 1 if the time period is August 2020. Control variables include age, squared age term, marital status, household size, education level dummies, training experience dummy, and urban/rural dummy. All specifications include year, province and month fixed effects.

Appendix Table 2. COVID-19 impacts on the likelihood of being employed across different occupations

	Professional / technical work	Admin work	Clerical work	Sales work	Services work	Agriculture work	Production work
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Female							
COVID	-0.009*** (0.001) [0.000]	-0.002*** (0.000) [0.000]	-0.004*** (0.001) [0.000]	0.007*** (0.002) [0.000]	-0.000 (0.001) [0.998]	0.021*** (0.003) [0.000]	0.000 (0.002) [0.998]
Pre-pandemic average	0.061	0.004	0.035	0.128	0.043	0.177	0.092
Panel B: Male							
COVID	-0.009*** (0.001) [0.000]	-0.005*** (0.001) [0.000]	-0.004*** (0.001) [0.000]	-0.001 (0.002) [0.998]	0.003** (0.001) [0.079]	0.014*** (0.003) [0.000]	-0.018*** (0.003) [0.000]
Pre-pandemic average	0.044	0.016	0.046	0.099	0.028	0.292	0.264
Test: $\beta_m = \beta_f$ (p-value)	0.899	0.000	0.615	0.000	0.023	0.039	0.000

Notes: ***, ** and * denote significance at 1%, 5% and 10%, respectively. Parentheses indicate standard errors, while square brackets indicate the False Discovery Rates (FDR). Data are taken from Sakernas 2016–2020 (both February and August rounds). Pre-pandemic averages are population averages of the employment outcomes throughout 2016–2019 (both February and August rounds). Regressions are of the 15–64-year-old population, consisting of 1,614,217 male and 1,640,149 female individuals. The main variable of interest in the above results is the COVID dummy, which takes on the value of 1 if the time period is August 2020. Control variables include age, squared age term, marital status, household size, education level dummies, training experience dummy, and urban/rural dummy. All specifications include year, province and month fixed effects.

Appendix Table 3. COVID-19 impacts on the likelihood of being employed across 17 different sectors

	Agriculture, forestry, and fisheries	Mining and quarrying	Manufacturing	Electricity and gas	Water supply, sewerage, waste, and recycling management	Construction	Wholesale and retail trade	Accommodation and FnB activity	Transportation and storage
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Female									
COVID	0.022*** (0.003) [0.000]	0.000 (0.000) [0.910]	-0.003** (0.001) [0.373]	0.000 (0.000) [0.910]	-0.000 (0.000) [0.910]	-0.000 (0.000) [0.910]	0.010*** (0.001) [0.000]	-0.001 (0.001) [0.910]	-0.001*** (0.000) [0.015]
Pre-pandemic average	0.180	0.002	0.068	0.000	0.001	0.002	0.117	0.044	0.002
Panel B: Male									
COVID	0.013*** (0.002) [0.000]	-0.001 (0.001) [0.910]	-0.008*** (0.002) [0.002]	-0.001** (0.000) [0.524]	-0.001** (0.000) [0.296]	-0.009*** (0.001) [0.000]	0.000 (0.001) [0.910]	-0.002* (0.001) [0.815]	-0.002 (0.001) [0.910]
Pre-pandemic average	0.301	0.020	0.080	0.003	0.003	0.080	0.111	0.027	0.050
Test: $\beta_m = \beta_f$ (p-value)	0.005	0.448	0.052	0.030	0.043	0.000	0.000	0.611	0.325

Appendix Table 3 (continued)

	Information and communication (10)	Financial and insurance activity (11)	Real estate (12)	Business services (13)	Public administration, defense, and compulsory social security (14)	Education services (15)	Human health and social work activity (16)	Other services (17)
Panel A: Female								
COVID	0.000 (0.000) [0.910]	-0.001*** (0.000) [0.016]	-0.000 (0.000) [0.910]	-0.001*** (0.000) [0.063]	-0.003*** (0.001) [0.001]	-0.007*** (0.001) [0.000]	-0.002** (0.001) [0.127]	-0.001** (0.001) [0.296]
Pre-pandemic average	0.002	0.005	0.001	0.003	0.022	0.048	0.015	0.029
Panel B: Male								
COVID	-0.000 (0.000) [0.910]	-0.001*** (0.000) [0.000]	-0.000* (0.000) [0.910]	-0.002*** (0.001) [0.021]	-0.008*** (0.001) [0.000]	-0.005*** (0.001) [0.000]	-0.001*** (0.000) [0.003]	0.003*** (0.001) [0.020]
Pre-pandemic average	0.005	0.009	0.001	0.011	0.050	0.027	0.006	0.024
Test: $\beta_m = \beta_f$ (p-value)	0.140	0.590	0.107	0.033	0.000	0.007	0.382	0.000

Notes: ***, ** and * denote significance at 1%, 5% and 10%, respectively. Parentheses indicate standard errors, while square brackets indicate the False Discovery Rates (FDR). Data are taken from Sakernas 2016–2020 (both February and August rounds). Pre-pandemic averages are population averages of the employment outcomes throughout 2016–2019 (both February and August rounds). Regressions are of the 15–64-year-old population, consisting of 1,614,217 male and 1,640,149 female individuals. The main variable of interest in the above results is the COVID dummy, which takes on the value of 1 if the time period is August 2020. Control variables include age, squared age term, marital status, household size, education level dummies, training experience dummy, and urban/rural dummy. All specifications include year, province and month fixed effects.

Appendix Table 4. COVID-19 impacts on the likelihood of being employed and the inclusion of province and national trends

	Province-Level Trends (1)	National Trend (2)
Panel A: Female		
COVID	0.013*** (0.004) [0.002]	0.013*** (0.004) [0.002]
Province Trend	Yes	No
National Trend	No	Yes
Panel B: Male		
COVID	-0.024*** (0.004) [0.000]	-0.024*** (0.004) [0.000]
Province Trend	Yes	No
National Trend	No	Yes
Test: $\beta_m = \beta_f$ (p-value)	0.000	0.000

Notes: ***, ** and * denote significance at 1%, 5% and 10%, respectively. Parentheses indicate standard errors, while square brackets indicate the False Discovery Rates (FDR). Data are taken from Sakernas 2016–2020 (both February and August rounds). Column (1) indicates the regression results of employment dummy on COVID dummy period (August 2020), with province-specific trends included as controls in the regression. Column (2) indicates the regression results of employment dummy on COVID-19 period, with national time trends included as controls in the regressions. Regressions are of the 15–64-year-old population, consisting of 1,614,217 male and 1,640,149 female individuals. The main variable of interest in the above results is the COVID dummy, which takes on the value of 1 if the time period is August 2020. Control variables include age, squared age term, marital status, household size, education level dummies, training experience dummy, and urban/rural dummy. All specifications include year, province and month fixed effects.

Appendix Table 5. COVID-19 impacts on the likelihood of being employed and the inclusion of district fixed effects

	Province FE Model (1)	District FE Model (2)
Panel A: Female		
COVID	0.013*** (0.004) [0.005]	0.010** (0.004) [0.022]
Province FE	Yes	No
District FE	No	Yes
Observations	1,640,149	1,211,414
Panel B: Male		
COVID	-0.024*** (0.004) [0.000]	-0.025*** (0.003) [0.000]
Province FE	Yes	No
District FE	No	Yes
Observations	1,614,217	1,191,859
Test: $\beta_m = \beta_f$ (p-value)	0.000	0.000

Notes: ***, ** and * denote significance at 1%, 5% and 10%, respectively. Parentheses indicate standard errors, while square brackets indicate the False Discovery Rates (FDR). Column (1) indicates the regression results of employment dummy on COVID dummy period (August 2020), with the inclusion of province fixed effects in the regression model. Meanwhile, Column (2) indicates the regression results of employment dummy on COVID-19 period, which only use the August Sakernas rounds in the estimation as the February Sakernas rounds do not disseminate district-level identifier. Thus, in Column (2), semester fixed effects are omitted from the regressions.

Data for the regressions are taken from Sakernas 2016–2020. Regressions are of the 15–64-year-old population, consisting of 1,614,217 male and 1,640,149 female individuals. The main variable of interest in the above results is the COVID dummy, which takes on the value of 1 if the time period is August 2020. Control variables include age, squared age term, marital status, household size, education level dummies, training experience dummy, and urban/rural dummy. All specifications include year fixed effects.