COVID-19's impacts on business activities and female workers: Empirical evidence from global developing economies

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Abstract
This paper empirically examines the economic impacts of COVID-19 on firms' business activities and female workers in 10 developing economies around the world. Based on a survey conducted by the World Bank, we constructed a firm-level panel dataset and investigated how firms' production and finances have developed during COVID-19. We also investigated female workers' employment situations and how they were affected by firm performance. COVID-19 indeed casted seriously adverse impacts in the developing world. As time passes, firms' production has been recovering, but their finances are worsening, and the female workers are facing worse situations in forms of higher probabilities of losing jobs and getting furloughed. Other variables such as workforce, capacity utilisation, and exports also play important roles in this process.

Keywords
business activities, COVID-19, developing economies, female workers, firms

JEL Classification
D22, O12, O47

1 INTRODUCTION

Between its outbreak in December 2019 and the time of writing in June 2022, COVID-19 caused over 532 million confirmed cases and almost 6.31 million deaths. Currently, a critical task for the economists is to properly evaluate COVID-19's economic impact—namely, how much it has affected the global community and how we can restore the
economy. To date, the pandemic has brought massive uncertainties and risks to the global economy, especially for developing economies, where the market system lacks resources and where regulations and insufficient financial and technological support linger.

Amid this ongoing economic turmoil, businesses in developing economies have suffered a great deal due to the sharp decrease in demand for goods and services and have been badly affected by devastated supply chains. To explore the economic impacts that firms have borne, we acquired data from a COVID-19 Enterprise Survey conducted by the World Bank. Starting in the second quarter of 2020, the World Bank conducted a two-round survey of enterprises globally, including in multiple developing countries. The same firms were questioned in each round. They were asked to provide information on their production, finances, and support received from their governments. We first estimated the economic shocks experienced by these firms and study whether these impacts have subsided or worsened under COVID-19. We then examined the determinants of the degrees to which the surveyed firms, as well as their female workers, have been negatively affected through a two-step investigation. First, we assessed five economic setbacks experienced by firms: decreasing sales, decreasing operating hours, decreasing financial liquidity, delayed payments, and holding overdue obligations to financial institutions. Next, we predicted the probabilities of the occurrence of these five consequences to explain four employment difficulties experienced by female workers: decreasing female workforce, more female workers leaving or quitting, rising numbers of female workers being laid off, and greater numbers of female workers being furloughed.

Several interesting findings have emerged from our empirical investigations. First, statistics show that COVID-19’s economic influence on firms’ production and employment has been subsiding; however, it exposes female workers to continuously increasing job risks. Comparatively speaking, overall, service firms are smaller sized and have been more severely affected than manufacturing firms. Second, as time passes, the likelihood of downsizing sales and the operating hours is significantly reduced, yet the likelihood of constrained finances significantly rises. Third, as the overall workforce recovers, the likelihood of female workers being negatively affected due to COVID-19 heightens. Finally, government support has a varying influence on the manufacturing and service industries. On the one hand, government support encourages manufacturing firms to downsize their production and, therefore, negatively affects female workers. On the other hand, government support helps service industry firms to continue with their businesses and, therefore, does not affect their female workers significantly.

Other variables, such as the percentage of remote workers, percentage of female workers, capacity utilisation, and exports, all exert important influences on business activities and the female workforce in developing economies. Specifically, firms with fewer remote workers or more female workers are likely to encounter lower probabilities of worsening production conditions, and their female workers are less adversely impacted. In a manufacturing firm, the more its production capacity has been utilised, the more risks it should expect under COVID-19. Interestingly, exports significantly deteriorate females' working conditions in manufacturing industries but help to alleviate pressures encountered by firms and female employees in service industries.

We contribute to the literature in several unique aspects. First, we complement the extant literature by focusing on micro-level evidence gathered from developing economies worldwide since the outbreak of the pandemic. The performance of real firms is the object of our empirical investigation. Using firm-level data from the World Bank, this paper joins the front lines of scholarly works investigating the pandemic’s concrete economic effects. The results can shed meaningful light on both the economic fragility of developing economies and the significant impact COVID-19 had on small businesses in the weeks and months after the pandemic-related disruptions started. The results also provide interesting yet contingent findings on the relief programs offered by the government.

By studying female workers’ employment challenges in developing countries, we intend to fill another vital gap in the extant literature regarding how to better enhance gender equality and the economy. It has long been recognised that the unfair treatment between men and women in workplaces has imposed chronic constraints to female empowerment, social welfare, and overall economic development in the long term. In this regard, an in-depth investigation of female employment should contribute important insights to our understanding of what to expect under the current crisis and how to prepare for further economic turmoil.
Our study also highlights the important role that time plays in determining the crisis's ultimate impact, which policymakers should carefully consider as they deliberate the extent of the required interventions. We find that although firms' production and employment are slowly recovering, their financial conditions are worsening, and female workers face increasing difficulties and risks in the workplace. Thus, governments—especially in developing economies—must cautiously consider how to reallocate their limited resources between sectors and people with different needs to restore their economies with better efficacy.

The remainder of this paper is organised as follows. Section 2 reviews the relevant literature. Section 3 presents the methods and variables. Section 4 describes the data statistics. Section 5 reports benchmark tests and results, while Section 6 extends onto different industries. Section 7 discusses our findings, and Section 8 concludes the paper.

2 | LITERATURE REVIEW

Recently, researchers have been studying the social impacts of COVID-19 in developing economies. For example, Picchioni et al. (2021) found that the previous Nigerian food system had been under a great deal of tension, demanding a social reproduction approach to enhance its sustainability. Gianella et al. (2021) and Ossome (2021) investigated how COVID-19 impacted the health systems in Peru and Africa, respectively. Both Kesar et al. (2021) and Miyamura (2021) focused on Indian society; the former studied the impacts of COVID-19 on employment and food security, whereas the latter examined how government policies have further suppressed the workforce and widened income inequality. Asante-Poku and van Huellen (2021) evaluated how the Ghanaian supply chain has been affected by conducting comparative studies with past commodity prices and economic disturbances. The resilience of the Ghanaian economy was also studied, and a long-term negative impact on its finances is expected.

There have been increasing discussions and studies on the economic consequences of the pandemic. In situations of extreme uncertainty, scenario planning—in which various sets of uncertainties are identified and potential future scenarios are projected—is a common response. For example, at the early stage of the pandemic (March 2020), Abiad et al. (2020) estimated a global impact of $77 billion to $347 billion, or 0.1% to 0.4% of the global GDP. Two-thirds of the economic impact was expected to fall on China, where the pandemic was still concentrated at that time. McKibbon and Fernando (2020) suggested global GDP losses for 24 industrial nations under seven potential scenarios with varying levels of severity. They predicted a total cost for COVID-19 ranging from $283 billion to as much as $9.2 trillion. Hevia and Neumeyer (2020) used a conceptual framework to analyse the economic impacts of COVID-19 and predicted an output decline that exceeded even that of the Great Depression.

Other studies on COVID-19's economic impacts have been conducted from different perspectives as well. Kaye et al. (2020) studied the economic impact of COVID-19 on international hospitals and health care facilities and concluded that low- and middle-income countries and individuals have been disproportionately affected. Using global data from 77 countries, Ashraf (2020) found that government actions such as social distancing orders, public awareness programs, testing, and quarantining policies have had a negative influence on stock market returns but also helped slow the spread of the virus. Cifuentes-Faura (2021) studied the virus containment measures carried out by European Union countries such as Italy, Spain, France, the United Kingdom, and Germany. He concluded that those nations that responded early to the pandemic have been less affected. Wu (2022) investigated European firms' experience during COVID-19 and concluded that smaller firms are less optimistic about restoring their production and employment than larger firms are. Firms from low-income countries have been more severely affected and are less optimistic than those from high-income countries.

More and more attention is being paid to the pandemic's impact on worldwide businesses. Several studies have already explored the COVID-19 Enterprise Survey and delivered interesting findings. For example, both Rocha et al. (2021) and Mohammed and Bunyaminu (2021) studied the heterogeneous impacts of characteristics such as workforce, government subsidies, and financial access. Khan (2022) further examined how financial constraints have
affected firms’ responses to COVID-19; financially constrained firms were more likely to go through liquidity problems and to rely on bank rather than government funding to address liquidity problems. Furthermore, using data from China, Gu et al. (2020) found that manufacturing industries suffered the most while other industries such as IT and healthcare were positively affected by COVID-19; private firms suffered more than state-owned and foreign-owned firms; small firms suffered more than large firms. Dörr et al. (2022) found that the pandemic had triggered surging insolvencies in Germany, especially among financially weak and small firms. Meyer et al. (2022) and Krammer (2022) respectively discussed how firms adjusted their expectation and adapted to the COVID-19 disruption.

In addition, it is particularly interesting to study what female workers have experienced during this difficult time. Inequality issues between female and male workers have been proven to be ubiquitous in developing economies, negatively affecting economic development (Bui et al., 2018; Ud Din et al., 2018). As Sabarwal et al. (2010) explained, aggregate economic shocks do not exert equal effects on men and women in developing countries; the direct impact is significantly more salient on women. Both Gezici and Ozay (2020) and Montenovo et al. (2020) explored the early labour market responses to COVID-19 in the United States between March and May 2020; job loss was found to be more frequent for women than for men. Using data from the United States, United Kingdom, Italy, Japan, South Korea, and China, Dang and Nguyen (2021) found that women were 24% more likely than men to permanently lose their jobs, and women should expect their labour income to fall by 50% more than that of men. Using data from Norway, Bennett et al. (2021) also proved that as a result of a long-term positive economic shock—a discovery of oil and gas in 1969—male workers’ income has increased by 7%, whereas female income has decreased by up to 14%. Kikuchi et al. (2021) found that COVID-19’s effects on the Japanese labour market vary between women and men, with an amplified severe effect on the former. Additionally, female-led businesses have experienced disproportionally negative impacts during COVID-19, especially in developing economies (Liu et al., 2021; Nieves et al., 2021). However, whether females’ working conditions have recovered or worsened due to COVID-19 disruptions is still unknown.

This paper is also one of the pioneering works to examine the detailed impacts of different government supports received by firms. Previously, Razumovskaia et al. (2020) developed a cognitive model to assess the effectiveness of government policies to support enterprises; they concluded that policies such as insurance premium deductions, deferred tax payments, and interest rate reductions did not effectively mitigate the negative impacts experienced by small and medium enterprises in Russia. Varshney et al. (2021) investigated the impact of India’s government assistance on agriculture sectors and found that cash transfers effectively alleviated financial constraints and increased agricultural investments. Following these earlier studies, we considered receiving government support to be an important factor that affects firms’ business activities and female employment, and we expected to find contingent influences of government support.

3 METHODS AND VARIABLES

In this section, we explain how to examine the determinants of the impacts of COVID-19 on business activities and female workers’ job security. The major purpose of this study is to analyse the impacts of COVID-19, whether they strengthened or weakened as time passed, and how they can be determined by various factors. Specifically, we intend to study the factors that can significantly raise or reduce the probability of firms being affected by COVID-19, as well as the factors that can influence the probability of female workers being impacted.

Further, we consider firms’ business activities as determinants of female workers’ employment. An endogeneity problem is likely because a change in the female workforce can affect a firm’s structure of employment, skill level, and productivity and, therefore, affect its experience during the pandemic (Liu et al., 2021; Nieves et al., 2021; Verick, 2014). To address this endogeneity issue, we implement a modified Heckman two-step estimation which corrects the endogeneity caused by sample selection bias. In the first step, we examine the factors that could negatively affect firms’ production and finances. Subsequently, we predict the probability of firms experiencing deteriorating
production and finances during COVID-19 and use these probabilities as determinants of female workers’ employment in the second step.

3.1 Business activities

We use Business Activities Impact\(^j\)\(^i\) to indicate the economic impact \(j\) experienced by firm \(i\) from the first to the second round of the COVID-19 survey. We refer to these impacts as a decrease in production or finances: \(j \in \{\text{sales decrease, hours decrease, liquidity decrease, payment delay, overdue financial obligation}\}\). Business Activities Impact\(^j\)\(^i\) = 1 if a firm \(i\) experienced \(j\) only in the second but not in the first survey; Business Activities Impact\(^j\)\(^i\) = 0 otherwise. Specifically, we consider a firm to have been affected by COVID-19 (Business Activities Impact\(^j\)\(^i\) = 1) if it met each of the following conditions only when it took the second survey: decreasing sales; decreasing operating hours; decreasing liquidity (or cash flow); delayed payments (to suppliers, landlords, or tax authorities); and holding overdue obligations (to any financial institution).\(^2\) In other words, if a firm made it through the beginning of 2020 but then saw its production and finances reduced by the end of the year, the firm is considered to have been impacted by COVID-19.

We then examine the determinants of COVID-19’s effects on firms’ business activities using a probit model explained in Equation (1):

\[
\text{Business Activities Impact}^j_i = \begin{cases} 
1 & \text{if } \beta X^i + \theta^i + \epsilon^i \geq 0 \\
0 & \text{otherwise} 
\end{cases} 
\]  

(1)

where \(\theta\) captures the fixed effects of regions in which the firms are located, \(\epsilon\) is the error term, and \(X^i\) includes the following explanatory variables of firm \(i\) in the initial round of the survey:

- **Time gap**: the number of months between the first and the second rounds of the survey. In this dyadic survey, the amount of time between the two rounds can reveal important findings on the whether the impact of COVID-19 is strengthening or weakening as time passes.
- **Percentage of remote workers**: percentage of the total workers working remotely. After the outbreak of COVID-19, many industries were forced to transition into remote working mode on short notice, with their employees being neither well trained nor fully prepared (Espitia et al., 2022). Despite its convenience and safety, remote working mode’s efficiency is questionable. Allen et al. (2015) already reviewed research on the effectiveness of telecommunication and addressed the controversial conclusions. As Van Zoonen et al. (2021) explained, occupations that offer enough work independence and clarity of job responsibilities can facilitate the possibility of working remotely. However, work alienation, lack of trust, and ineffective use of telecommunications can all significantly deter workers’ adjustment to remote mode. This finding reaffirmed the findings in Gómez et al. (2020), Molino et al. (2020), and Toscano and Zappalà (2020), who all proved that remote working during COVID-19 has entailed negative consequences such as technostress and social isolation, which affect workers’ productivity and well-being. Furthermore, work–family conflicts and uncertainties have also become key challenges to remote working (Wang et al., 2021).
- **Percentage of female workers**: the number of female workers as a percentage of all permanent, full-time workers. Female labour force has proved to be a key driver for economic growth, especially in developing countries. As Verick (2014) showed, there is a U-shaped relationship between economic growth and female labour force participation rate; when a society’s income and education levels increase, more and more women can join the labour force, taking advantage of the rising wages and newly emerging jobs. A similar conclusion can be drawn from firm-level studies. In the literature, the percentage of female workers has been found to positively affect a firm’s productivity or profitability via education (Kampelmann et al., 2018; Tsou & Yang, 2019). Weber and Zulehner (2010) also confirmed that start-up firms with female managers from the very beginning are more successful and survive longer in the market.
Export percentage: the percentage of a firm’s total sales that was exported. A positive relationship between firms’ export and production has received abundant support in the literature, and we take a major interest in examining whether exporting helps to alleviate the stress during COVID-19. On the one hand, self-selection theory (Bernard et al., 2003, 2006; Melitz, 2003) argues that exporting is a consequence of a firm’s advanced productivity. To access the export market, a firm incurs unrecoverable entry costs, and only firms with higher productivity can afford them and become exporters. On the other hand, learning-by-exporting theory (De Loecker, 2013; Fernandes & Isgut, 2015; Manjón et al., 2013) argues that production growth is a consequence of firm exporting. Firms can become more productive when participating on the export market, gaining access to a larger variety of global customers and techniques.

Received government support: a binary dummy variable that equals one if a firm received any government support, or zero otherwise. We are also interested in investigating the effectiveness of different relief policies issued by the government in response to the pandemic crisis, and whether they helped firms and workers to better survive the pandemic.

3.2 Female workers’ employment

We then estimate the probability of each business activities impact $j$ and use these as determinants of female employment. We investigate four negative impacts on female workers during COVID-19. We define $\text{Female Employment Impact}_k^i$ that equals one if $k$ points to one of the following four conditions for firm $i$, and equals zero otherwise: (1) fewer female workers, if the percentage of female workers in the second round is lower than in the first round of the COVID-19 survey; (2) more female workers taking leave or quitting, if the percentage of females who took leave or quit is higher in the second than in the first round of the survey; (3) more female workers laid off, if the percentage of laid-off female workers is higher in the second than in the first survey; and (4) more female workers furloughed, if the percentage of furloughed female workers is higher in the second survey. We then examine the determinants of COVID-19’s effects on female employment using the probit model explained in Equation (2):

$$
\text{Female Employment Impact}_k^i = \begin{cases} 
1 & \text{if } \sum_j \alpha_j \text{prob} (\text{BAI}_j^i) + \beta X_i + d_i + \varepsilon_i^k \geq 0 \\
0 & \text{otherwise}
\end{cases}
$$

where $\text{prob}(\text{BAI}_j^i)$ includes each of the four probabilities of COVID-19’s business activities impact (BAI)—sales decrease, workers’ decrease, liquidity decrease, delayed payments, and overdue financial obligations—retrieved from the estimation of Equation (1).

4 DATA DESCRIPTION

We acquired firm-level information from a COVID Enterprise Survey by the World Bank. Starting in 2020, the World Bank conducted a two-round survey in selected countries worldwide. The first round was conducted between May and August 2020, and the second round between October 2020 and May 2021. In this study, we focus on 10 developing economies located in Asia (Georgia, Jordan, and Mongolia), Eastern Europe (Moldova), Africa (Morocco and Zimbabwe), and South America (El Salvador, Guatemala, Honduras, and Nicaragua). In each round, the same firms in these economies were asked to provide concurrent information on the production, workforce, expectations, and support received from the government. In the first round, firms also provided information on business changes since
the outbreak of COVID-19. In the second round, firms provided newly updated information since the first round. Overall, we observed 5807 firms that provided continuous, valid information in both rounds of surveys.

4.1 | Firms affected during COVID-19

Table 1 reports how many firms have been affected during COVID-19. In each survey, the firms were asked to compare their current performance with the same month in 2019, before the pandemic occurred. Of all the observed firms, in the first survey, 61% claimed they had decreasing sales when compared with 1 year previously; approximately half of the firms had their total weekly working hours decreased. In the second survey, 52% and 38% of the firms still had decreasing sales and decreasing working hours, respectively. Additionally, 58% of all firms said there was a decreasing cash flow in the first round, and 48% said the same thing in the second round.

In the first survey, the firms were also asked to provide information about their businesses since the outbreak of COVID-19. In the second survey, the firms had to update that information. Of all the firms, 41% reported that they had closed their businesses temporarily since the outbreak of COVID-19 in the first round of the survey, and 21% closed between the first and the second surveys. Additionally, over 3% of the firms filed for bankruptcy before the first survey, and another 1% went bankrupt between the two surveys. Over 38% of firms delayed their payments to suppliers, property owners, or tax authorities before the first survey, and 33% did so between the two surveys. In the first round of the survey, 14% of firms reported that they had overdue financial obligations, and almost 30% expected that they would fall into arrears in the following 6 months. In the second round, 11% of firms had overdue financial obligations.

| TABLE 1 Number (percent) of firms affected by COVID-19 |
|-------------------------------------------------------|
| **All industries** | **Manufacturing industries** | **Service industries** |
| | Round 1 | Round 2 | Round 1 | Round 2 | Round 1 | Round 2 |
| Decreasing sales | 3549 (61.12%) | 3050 (52.52%) | 1470 (77.45%) | 1125 (59.27%) | 2079 (77.57%) | 1625 (60.63%) |
| Decreasing working hours | 2887 (49.72%) | 2252 (38.78%) | 1182 (62.28%) | 870 (45.84%) | 1705 (63.62%) | 1197 (44.66%) |
| Decreasing liquidity | 3394 (58.45%) | 2816 (48.49%) | 1400 (73.76%) | 1037 (54.64%) | 1994 (74.40%) | 1488 (55.52%) |
| Closed due to COVID | 2381 (41.00%) | 1238 (21.32%) | 1017 (53.58%) | 455 (23.97%) | 1364 (50.90%) | 621 (23.17%) |
| Bankruptcy filing | 201 (3.46%) | 65 (1.12%) | 88 (4.64%) | 24 (1.26%) | 113 (4.22%) | 36 (1.34%) |
| Delay payments | 2232 (38.44%) | 1889 (32.53%) | 912 (48.05%) | 691 (36.41%) | 1320 (49.25%) | 972 (36.27%) |
| Overdue obligations | 820 (14.12%) | 640 (11.02%) | 352 (18.55%) | 231 (12.17%) | 468 (17.46%) | 328 (12.24%) |
| Expect to fall in arrears | 1728 (29.76%) | 1047 (18.03%) | 671 (35.35%) | 370 (19.49%) | 1057 (39.44%) | 573 (21.38%) |
| No. of observations | 5807 (100%) | 5807 (100%) | 1898 (100%) | 1898 (100%) | 2680 (100%) | 2680 (100%) |

Note: The percentages of firms are reported in parentheses.
obligations, and 18% expected to fall into arrears. Thus, the impacts of COVID-19 lingered but subsided as time passed, and this finding applies to both manufacturing and service industries.

4.2 Comparison between the two survey rounds

Table 2 reports the averages of firms from different industries and compares them between the two rounds of the survey. The $t$ test significance between the two rounds is reported within all industries, the manufacturing industry, and the service industry. All the firms were also asked to horizontally compare their current sales with their sales in the same month in 2019 and to report the percentage of change. On average, compared with 1 year previously, all firms’ sales decreased by 33% in the first round and by 22% in the second round. Therefore, horizontally compared with their own sales 1 year previously, firms were severely impacted by COVID-19, but this negative impact has become less severe. This finding applies to both manufacturing and service industries, and it is consistent with Table 1. We define the export percentage as the percentage of the firm’s total sales that has been directly or indirectly exported to foreign countries. Firms in the manufacturing industry saw their export percentage significantly increase from 23% to 32% between the two survey rounds, whereas firms in the service industry saw their export percentage significantly increase from 15% to 23%.

Next, let us turn to the labour statistics. From the first to the second survey, firms’ average number of permanent, full-time workers grew from 69 to 79, and manufacturing firms’ average number of workers significantly rose from 99 to 111. However, there was a slight decrease in service firms’ employment size. The percentage of remote workers is the share of the firm’s workforce working remotely. Fewer workers worked remotely in both industries as the economies reopened and reinitiated normal business hours. The percentage of female workers is defined as the number of full-time female workers as a percentage of all workers. From the first to the second round of the survey, on average, the percentage of female workers decreased in all industries. Therefore, female workers encountered increasing job insecurity under COVID-19 conditions.

**TABLE 2** Comparison statistics between two surveys

| Average: | All industries | Manufacturing industries | Service industries |
|----------|----------------|--------------------------|--------------------|
|          | Round 1 | Round 2 | Round 1 | Round 2 | Round 1 | Round 2 |
| Sales change % | –33.32% | –21.66% |–40.88% | –23.42% | –43.25% | –26.16% |
| Export % | 35.35% | 36.62% | 23.43% | 32.24% | 14.80% | 23.19% |
| Workers | 68.53 | 78.64* | 99.05 | 110.91* | 46.41 | 45.95 |
| Remote workers % | 4.95% | 3.20% | 6.15% | 2.80% | 6.36% | 4.03% |
| Female workers % | 57.81% | 54.61% | 51.02% | 41.28% | 52.74% | 42.79% |
| Workers who took leave or quit % | 5.98% | 5.03% | 6.81% | 5.06% | 6.84% | 5.97% |
| Female workers who took leave or quit % | 4.84% | 5.30% | 6.34% | 5.21% | 4.24% | 6.33% |
| Workers laid off % | 2.78% | 3.43% | 3.10% | 3.12% | 3.83% | 4.00% |
| Female workers laid off % | 2.29% | 2.48% | 1.86% | 2.54% | 3.03% | 3.37% |
| Workers furloughed % | 9.64% | 4.50% | 11.82% | 4.13% | 12.73% | 5.02% |
| Female workers furloughed % | 8.88% | 4.84% | 11.02% | 4.57% | 12.18% | 5.56% |
| Expected weeks to stay open | 7.68 | 10.09*** | 7.77 | 10.44*** | 7.62 | 9.64*** |

*Significance at 10%.
**Significance at 5%.
***Significance at 1%.
We then further investigated full-time workers’ statistics. The percentage of (female) workers who took leave or quit is defined as (female) workers who took leave for over 5 days or who voluntarily quit due to illness, family responsibilities, or mobility restrictions related to COVID-19, as a percentage of all (female) workers. The percentage of (female) workers laid off is the percentage of (female) workers who were laid off due to COVID-19 among all (female) workers. Similarly, the percentage of (female) workers furloughed is the percentage of (female) workers who were furloughed among all (female) workers. The firms were asked to provide these statistics since the outbreak of COVID-19 in the first survey, and in the second survey, they provided new information since they took the first survey. From the first to the second survey, more workers had taken leave and quit, been laid off, and been furloughed. However, the percentage of workers who left and were furloughed significantly decreased, whereas the percentage of workers who were laid off increased.

Next, let us turn to the statistics of female workers. From the first to the second round of surveys, a diminishingly increasing percentage of female workers took leave or quit their jobs in the manufacturing industry, but significantly more and more female workers left their jobs in the service industry. In addition, the percentage of laid-off female workers significantly increased, whereas the percentage of furloughed female workers significantly decreased in both industries.

In each survey, the firms were also asked how many weeks they expected to be able to stay open if sales stopped immediately. From the first to the second survey, firms expected to stay open and keep their business running for significantly more weeks, even without sales. This suggests that the firms were regaining their confidence as pressure caused by the pandemic began to diminish. For more details regarding data description, please refer to Tables A2-A5.

4.3 | Received government support

Table 3 illustrates how many firms received different types of government support in both rounds of the survey. In the first survey, over 14% of all surveyed firms had received any type of government support since the outbreak of COVID-19. Between the first and second surveys, almost 14% of the firms received support. In addition, 18% of the manufacturing firms and 17% of the service firms received support in the first survey, whereas 16% of manufacturing firms and 15% of service firms received support between the two surveys. Notably, not always the same firms have been supported. A closer look at the data shows that only 4.2% of all firms received support in both rounds. Furthermore, approximately 5% of firms in the manufacturing industry and 5.6% of firms in the service industry were supported by the government in both rounds.

Among the different types of government support, generally, wage subsidies were the most used support from the government in the observed developing countries. Almost 10% and 9% of all the firms received wage subsidies in the first and second rounds, respectively. More specifically, around 11% of manufacturing firms and 10% of service firms received wage subsidies in both rounds. The next most popular government support was fiscal exemptions, which have been increasingly used over time. Approximately 7% of manufacturing and service firms were allowed to defer payments such as taxes, rent, mortgage, and interest payments or to roll over debts in the first survey. Additionally, 3.5% of manufacturing firms and 5% of service firms received the same benefits in the second survey. Cash transfers and access to new credit were also typical but less commonly seen forms of support from the government.

5 | BASELINE RESULTS

This section reports the baseline empirical findings. First, the determinants of business activities impact, which has been defined in Section 3.1, are presented in Section 5.1. The determinants of female employment impact, as defined in Section 3.2, are presented in Section 5.2.
5.1 Determinants of business activities

The results of Equation (1) are reported in Table 4. Interestingly, the length of time between the two surveys has significantly negative effects on the likelihood of a decreasing sales and operating hours. COVID-19’s negative impacts on production significantly subsided. However, the time gap significantly increases the likelihood of decreasing liquidity and debts; the likelihood of constrained finances considerably rose throughout the year 2020.

Interestingly, the remote workforce percentage significantly increases the likelihood of all types of business activities being affected. If the observed firms have many workers who do not need to show up physically to the workplace, they will probably experience business reductions during COVID-19. We interpret this finding as follows: although working-from-home can be convenient and safe, it has also brought up problems that hinder workers’ wellness and business performance. This finding aligns with previous empirical studies and reveals the potential inefficiency of the remote mode. Due to the unexpected factors and uncertainties, remote workers’ lower productivity leads to a higher likelihood of firms being negatively impacted in developing countries where telecommunication techniques still lack development.

Meanwhile, a higher percentage of female workers significantly lowers the likelihood of firms experiencing negative impacts. According to the extant literature, a higher proportion of educated female employees significantly enhances a firm’s performance. In this study, we only consider permanent, full-time workers instead of part-time workers; we therefore conjecture that these workers must be professionally educated to be qualified for permanent job positions. Thus, hiring more full-time, highly skilled female employees indicates that a firm has better capability to endure economic shocks and faces significantly fewer risks of reduced business during COVID-19.

Arguably, a higher export percentage protects a firm from being affected by COVID-19 via significantly negative coefficients on reduced hours and finances. Those firms that export more experience fewer shocks to their production and financial conditions. According to both self-selection and learning-by-exporting theories, exporters are expected to become more productive than non-exporters as a result of intense global competition; exporters have

### Table 4: Number (percent) of firms receiving government support

|                          | All industries | Manufacturing industries | Service industries |
|--------------------------|----------------|--------------------------|-------------------|
|                          | Round 1 | Round 2 | Round 1 | Round 2 | Round 1 | Round 2 |
| Any supports             | 829     | 796     | 341     | 304     | 455     | 404     |
|                          | (14.28%) | (13.71%) | (17.97%) | (16.02%) | (16.98%) | (15.07%) |
| Government support:      |          |          |          |          |          |          |
| Cash transfers           | 214     | 263     | 100     | 92      | 114     | 130     |
|                          | (3.69%) | (4.53%) | (5.27%) | (4.85%) | (4.25%) | (4.85%) |
| Deferral of payments     | 310     | 228     | 128     | 66      | 182     | 130     |
|                          | (5.34%) | (3.93%) | (6.74%) | (3.48%) | (6.79%) | (4.85%) |
| New credits              | 176     | 165     | 84      | 69      | 92      | 78      |
|                          | (3.03%) | (2.84%) | (4.43%) | (3.64%) | (3.43%) | (2.91%) |
| Fiscal exemptions        | 309     | 392     | 121     | 147     | 188     | 198     |
|                          | (5.32%) | (6.75%) | (6.38%) | (7.74%) | (7.01%) | (7.39%) |
| Wage subsidies           | 564     | 486     | 216     | 201     | 270     | 264     |
|                          | (9.71%) | (8.37%) | (11.38%)| (10.59%)| (10.07%)| (9.85%)  |
| No. of observations      | 5807    | 5807    | 1898    | 1898    | 2680    | 2680    |
|                          | (100%)  | (100%)  | (100%)  | (100%)  | (100%)  | (100%)  |

Note: The percentages of firms are reported in parentheses.
|                                     | Sales decrease | Hours decrease | Liquidity decrease |
|-------------------------------------|----------------|----------------|-------------------|
| Time gap between two rounds         | −0.128*** (0.005) | −0.127*** (0.005) | −0.933*** (0.049) |
| Remote workers %                    | 0.588*** (0.132) | 0.566*** (0.133) | 0.310** (0.129)   |
| Female workers %                    | −0.256*** (0.098) | −0.260*** (0.098) | −0.295*** (0.087) |
| Export %                            | −0.211*** (0.080) | −0.204*** (0.080) | −0.918*** (0.053) |
| Received government support         | −0.157* (0.082)  | 0.162** (0.066)  | −0.083 (0.076)    |
| Cash transfers                      | -              | 0.182 (0.160)    | 0.122 (0.107)     |
| Deferral of payments                | -              | −0.049 (0.151)   | 0.119 (0.092)     |
| New credits                         | -              | 0.063 (0.186)    | 0.044 (0.117)     |
| Fiscal exemptions                   | -              | −0.120 (0.150)   | 0.292*** (0.110)  |
| Wage subsidies                      | -              | −0.417*** (0.127) | 0.051 (0.73)      |
| Dummy (micro-size)                  | 0.449*** (0.102) | 0.443*** (0.103) | 0.448*** (0.087) |
| Dummy (small-size)                  | 0.430*** (0.097) | 0.432*** (0.098) | 0.358*** (0.092) |
| Dummy (medium-size)                 | 0.421*** (0.105) | 0.423*** (0.106) | 0.277*** (0.096) |
| Dummy (Latin America)               | 0.253*** (0.094) | 0.258*** (0.094) | 0.068 (0.083)     |
| Dummy (Mediterranean)               | 0.703*** (0.083) | 0.722*** (0.083) | 0.501*** (0.072) |
| Dummy (Mongolia)                    | 0.964*** (0.118) | 0.975*** (0.118) | 0.899*** (0.102) |
| No. of observations                 | 5807           |                |                   |

Note: Standard errors are reported in parentheses. *Significance at 10%. **Significance at 5%. ***Significance at 1%.
Table 4 (Continued)

| Variable                                      | Payment delay | Financial obligation overdue |
|-----------------------------------------------|---------------|-------------------------------|
| Time gap between two rounds                   | 0.102*** (0.005) | 0.101*** (0.005)              |
| Remote workers %                             | 0.320** (0.125)  | 0.308** (0.125)               |
| Female workers %                              | -0.238*** (0.085) | -0.238*** (0.085)            |
| Export %                                      | -0.317*** (0.076) | -0.322*** (0.076)            |
| Received government support                   | -0.119* (0.072)  | -0.238* (0.136)              |
| Cash transfers                                | -0.169 (0.145)   | -0.238* (0.136)              |
| Deferral of payments                          | -0.216 (0.140)   | -0.216 (0.140)               |
| New credits                                   | -0.205 (0.181)   | -0.205 (0.181)               |
| Fiscal exemptions                             | -0.230* (0.136)  | -0.230* (0.136)              |
| Wage subsidies                                | -0.180* (0.101)  | -0.180* (0.101)              |
| Dummy (micro-size)                            | 0.427*** (0.094)  | 0.434*** (0.094)             |
| Dummy (small-size)                            | 0.387*** (0.087)  | 0.391*** (0.088)             |
| Dummy (medium-size)                           | 0.348*** (0.091)  | 0.348*** (0.092)             |
| Dummy (Latin America)                         | 0.124* (0.074)    | 0.129* (0.074)               |
| Dummy (Mediterranean)                         | 0.225*** (0.066)  | 0.237*** (0.066)             |
| Dummy (Mongolia)                              | 0.236** (0.108)   | 0.264** (0.108)              |

Note: Standard errors are reported in parentheses.
*Significance at 10%.
**Significance at 5%.
***Significance at 1%.

No. of observations
12
easier access to state-of-the-art technologies; and resources tend to be reallocated towards exporters who possess production advantages. Because of these well-documented positive influences of exporting, firms that export more are expected to survive longer and sustain better under COVID-19.

Receiving support from the government exerts significant impacts, no surprisingly. We find that once a firm receives any type of public assistance, such as wage subsidies, deferred payments, or fiscal exemptions, it has a significantly lower likelihood of decreasing sales. Firms that receive support from the government also exhibit a lower likelihood of delaying payments to property owners, suppliers, or tax authorities, and they are less likely to owe debts to any financial institutions. Furthermore, among all types of government support, wage subsidies that directly influence labour input are the most effective because they exert significantly negative influences on the likelihood of sales decreases, payment delays, and overdue financial obligations.

Firms are also grouped into different sizes. According to OECD (Organization for Economic Co-operation and Development)'s definition, enterprises are categorised into micro-size (fewer than 10 workers), small-size (10 to 49 workers), and medium-size (50 to 249 workers). We find that the smaller firms are, the more likely it runs into decreasing sales, operating hours, and finances. This finding proves the difficulties that small businesses had to endure after the onset of the pandemic, and it echoes Wu (2022) that larger firms were less affected during the crisis. Besides, comparing different developing regions (Latin America, the Mediterranean, Mongolia, and Zimbabwe), we find that Mongolia features the highest probabilities of deteriorating sales, hours, and finances. Mediterranean countries (Georgia, Jordan, Moldova, and Morocco) have the second highest probabilities of deteriorating sales and finances.

5.2 Determinants of female workers' employment

Following the tests of business activities, we further examine determinants of females' employment using Equation (2). The results are reported in Table 5. Interestingly, a lower probability of decreasing sales is found to significantly reduce the likelihood of female workers being negatively affected. When a firm has increasing sales under COVID-19, it is more likely to have a lower probability of losing female workers, and its female workers should face fewer risks of being laid off or furloughed. During 2020, when firms saw smaller probabilities of decreasing workers—in other words, when firms experienced employment recoveries—the pressure on female workers significantly grew. They faced greater probabilities of leaving, being laid off, or being furloughed from workplaces.

Furthermore, higher probabilities of a firm experiencing financial difficulties such as decreasing liquidity, delayed payments, or holding overdue obligations to financial institutions significantly increase the likelihood of female workers being negatively affected. Deteriorating financial conditions also significantly worsen the employment of female workers in the developing world.

The time gap between the two surveys significantly raises the likelihood of decreasing female workers and more female workers leaving, being laid off, or being furloughed. We therefore find that female workers have encountered heightening risks at workplaces in multiple forms: voluntarily leaving, being forced to go, or being furloughed, as time passes. Therefore, as COVID-19 developed, it has brought escalating pressure on female workers.

A higher female worker percentage can significantly lower the probability of female workers being affected. When female workers are less represented in a firm, they encounter greater risks of losing their jobs during COVID-19. More exports and less remote workforce also help to enhance the performance of a firm and to secure jobs for females. These findings all echo Table 4, which shows that firms with more female permanent workers, fewer remote workers, and more exports have exhibited better resilience under the impact of the pandemic. When a firm is less impacted, its female workers can expect more job securities.

Receiving government support, however, significantly increases the job risks faced by female workers in the observed developing countries even though it helps to enhance firms’ business activities. We consider this is an interesting phenomenon that requires further deliberation. Meanwhile, interestingly, the smaller the firms are, the less likely it will see a decline of female workers. We interpret this finding as such. Micro or small firms hire fewer
|                                   | Decreasing female workers | Increasing female workers who took leave or quit |
|-----------------------------------|---------------------------|-----------------------------------------------|
| Sales decrease (p)                | 1.871*** (0.154)          | 1.445** (0.145)                                |
| Hours decrease (p)                | -4.960*** (0.635)         | -4.256*** (0.421)                              |
| Liquidity decrease (p)            | 1.224*** (0.456)          | 0.903** (0.367)                                |
| Delay payment (p)                 | 3.105*** (0.705)          | 6.358*** (0.497)                               |
| Financial obligation overdue (p)  | 2.598*** (0.852)          | 2.051*** (0.301)                               |
| Time gap between two rounds       | 0.157*** (0.066)          | 0.164*** (0.005)                               |
| Remote workers %                  | 0.440*** (0.108)          | 0.550*** (0.106)                               |
| Female workers %                  | -0.385*** (0.075)         | -0.172*** (0.061)                              |
| Export %                          | -0.278*** (0.060)         | -0.483*** (0.054)                              |
| Received government support       | 0.172* (0.104)            | -0.157** (0.065)                               |
| Cash transfers                    | -                         | -0.063 (0.115)                                 |
| Deferral of payments              | -                         | -0.013 (0.101)                                 |
| New credits                       | -                         | 0.097 (0.125)                                  |
| Fiscal exemptions                  | -                         | 0.179* (0.097)                                 |
| Wage subsidies                    | -                         | 0.141* (0.081)                                 |
| Dummy (micro-size)                | 0.821*** (0.070)          | 0.437*** (0.079)                               |
| Dummy (small-size)                | 1.106*** (0.066)          | 0.742*** (0.076)                               |
| Dummy (medium-size)               | 1.177*** (0.073)          | 0.835*** (0.082)                               |
| Dummy (Latin America)             | -0.162*** (0.062)         | 0.348*** (0.066)                               |
| Dummy (Mediterranean)             | -0.538*** (0.057)         | 0.259*** (0.059)                               |
| Dummy (Mongolia)                  | 1.055*** (0.112)          | 1.044*** (0.094)                               |
| No. of observations               | 5807                      |                                               |

Note: Standard errors are reported in parentheses. *Significance at 10%. **Significance at 5%. ***Significance at 1%.
TABLE 5 (Continued)

|                               | Increasing female workers laid off       | Increasing female workers furloughed     |
|-------------------------------|------------------------------------------|------------------------------------------|
| Sales decrease (p)            | 1.269*** (0.239)                         | 1.599*** (0.474)                         |
| Hours decrease (p)            | −1.741* (0.889)                          | −2.399*** (0.613)                        |
| Liquidity decrease (p)        | 1.225** (0.619)                          | 1.486*** (0.495)                         |
| Delay payment (p)             | 1.735* (0.993)                           | 1.759** (0.690)                         |
| Financial obligation overdue (p) | 2.540** (0.969)                          | 1.663** (0.347)                         |
| Time gap between two rounds   | 0.053*** (0.006)                         | 0.065*** (0.005)                         |
| Remote workers %              | 0.477*** (0.142)                         | 0.563*** (0.141)                         |
| Female workers %              | −0.408*** (0.115)                        | −0.907*** (0.102)                        |
| Export %                      | −0.329*** (0.089)                        | −0.324*** (0.080)                        |
| Received government support   | 0.680* (0.371)                           | 0.192** (0.084)                          |
| Cash transfers                | -                                        | −0.076 (0.171)                           |
| Deferral of payments          | -                                        | −0.114 (0.149)                           |
| New credits                   | -                                        | −0.076 (0.191)                           |
| Fiscal exemptions             | -                                        | 0.098 (0.136)                            |
| Wage subsidies                | -                                        | 0.194* (0.112)                           |
| Dummy (micro-size)            | 0.831*** (0.105)                         | 0.670*** (0.117)                         |
| Dummy (small-size)            | 0.852*** (0.099)                         | 0.703*** (0.113)                         |
| Dummy (medium-size)           | 1.025*** (0.105)                         | 0.871*** (0.118)                         |
| Dummy (Latin America)         | 0.363*** (0.098)                         | 0.525*** (0.098)                         |
| Dummy (Mediterranean)         | 0.029 (0.094)                            | 0.284*** (0.095)                         |
| Dummy (Mongolia)              | 0.514** (0.144)                          | 0.769*** (0.122)                         |

No. of observations

Note: Standard errors are reported in parentheses.
*Significance at 10%.
**Significance at 5%.
***Significance at 1%.
workers, including female workers; given a smaller employment size, there are fewer options for the managers to let any more females go. Therefore, the likelihood of female workers being affected will be lower in smaller firms compared to the larger ones with more workers and more flexibility to adjust employment. Among all the developing regions, Mongolia has the highest probability of female employment being affected and Latin America the second highest.

6 | EXTENSION: MANUFACTURING VERSUS SERVICE INDUSTRIES

We then compare between the manufacturing and service industries and report the results in Table 6. A major reason for this comparison study is to address the contingent impact of government support on female workers. In both rounds of the survey, the sales decrease was significantly higher in the service than in the manufacturing industry. The service industry also had much fewer exports and workers. More workers, including females, have left, been laid off, and been furloughed in the service industry. Overall, service firms are smaller and have been more severely affected than manufacturing firms during COVID-19. Therefore, service firms were more pessimistic about how long their businesses could stay open if their sales stopped right away.

6.1 | Manufacturing industry

We adopt the same probit model presented in Equation (1) to examine the determinants of business activities of firms operating in the manufacturing industry. The results are reported in Table 7. As time passes, manufacturing

| TABLE 6 Comparison statistics between manufacturing and service industry |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Average:                        | Round 1 Manufacturing industries | Service industries              | Round 2 Manufacturing industries | Service industries              |
| Sales change %                  | –40.88%                          | –43.25%                         | ** –23.42%                       | –26.16%                         | ***                             |
| Export %                        | 23.43%                           | 14.80%                          | *** 32.24%                       | 23.19%                          | ***                             |
| Workers                         | 99.05                            | 46.41                           | *** 110.91                       | 45.95                           | ***                             |
| Remote workers %                | 6.15%                            | 6.36%                           | 2.80%                            | 4.03%                           | ***                             |
| Female workers %                | 41.28%                           | 42.79%                          | 51.02%                           | 52.74%                          |                                 |
| Workers who took leave or quit %| 6.81%                            | 6.84%                           | 5.06%                            | 5.97%                           | **                              |
| Female who workers took leave or quit % | 6.34%                           | 4.24%                           | * 5.21%                          | 6.33%                           | *                               |
| Workers laid off %              | 3.10%                            | 3.83%                           | * 3.12%                          | 4.00%                           | **                              |
| Female workers laid off %       | 2.54%                            | 3.37%                           | * 1.86%                          | 3.03%                           | ***                             |
| Workers furloughed %            | 11.82%                           | 12.73%                          | 4.13%                            | 5.02%                           | *                               |
| Female workers furloughed %     | 11.02%                           | 12.18%                          | * 4.57%                          | 5.56%                           | *                               |
| Expected weeks to stay open     | 7.77                             | 7.62                             | 10.44                            | 9.64                             |

*Significance at 10%.
**Significance at 5%.
***Significance at 1%.
firms’ production recover, but there is an increasing likelihood for them to see their finances dwindle. Furthermore, we include a new variable—capacity utilisation percentage—that applies only to manufacturing firms. This percentage is defined as the firm’s total output as a percentage of its maximum output possible if all the available physical capital for production is used. The higher the utilisation percentage, the more likely the firm is to experience decreasing sales and liquidity. We interpret this finding as follows: abundant idle capital assets can cushion a firm from damages caused by unexpected economic shocks. When a firm uses up its potential production capability, it loses resiliency towards COVID-19 and is more likely to experience decreasing production and financial conditions.

Moreover, more remote workers and fewer female workers significantly increase the likelihood of business reduction during COVID-19. Notice that receiving government support raises the likelihood of decreasing production but reduces the likelihood of holding overdue financial obligations for manufacturing firms.

Table 8 reports the determinants of female workers being affected in various ways during COVID-19. The regressions are adopted from Equation (2), considering only firms from the manufacturing industry. Increasing production significantly reduces the probability of female workers leaving or being forced out of employment in the manufacturing industry. Meanwhile, financial difficulties such as decreasing liquidity, delayed payments, and holding overdue obligations all significantly raise the risks encountered by female workers in the manufacturing industry.

The time gap between the two rounds of the survey significantly increases the probabilities of females leaving, quitting, being laid off, and being furloughed, which leads to a smaller female workforce in developing countries. As time passes, female workers encounter escalating risks of being negatively influenced by COVID-19. Furthermore, a higher capacity utilisation percentage, more remote workers, less female unemployment, and receiving government support all significantly negatively affect female workers, echoing the findings in Table 5.

6.2 | Service industry

We then examine the determinants of business activities and female employment in the service industry and report the results in Tables 9 and 10. As in the manufacturing industry, as time passes, sales and employment size start to recover in the service industry, but firms’ finances significantly worsen. However, unlike in the manufacturing industry, in the service industry, receiving government support significantly lowers the probabilities of decreasing production and financial difficulties in the service industry. Among all observed developing regions, Mongolia’s service firms are most likely to be impacted during COVID-19.

Echoing the findings in Table 5 (all industries) and Table 8 (manufacturing industry), improving production significantly lowers the probability of female workers in the service industry being negatively affected during COVID-19. Meanwhile, constrained finances will harm female workers significantly. As time passes, the likelihood of female workers being severed from the workplace increases. A firm with more remote workers and fewer female workers is more likely to see female workers affected.

Interestingly, a higher export percentage significantly helps female workers to avoid being negatively impacted. Government support does not exert a significant impact on female workers in the service industry. Among all developing regions, Mongolia still features the highest probabilities of female workers leaving, quitting, being laid off, and being furloughed at their workplaces in the service industry.

7 | DISCUSSIONS AND IMPLICATIONS

In our investigation into business activities and female employment in developing economies, several interesting findings have been obtained, providing insightful thoughts on economic practices and policymaking.
### TABLE 7  Determinants of business activities impact in manufacturing industries

|                           | Sales decrease | Hours decrease | Liquidity decrease |
|---------------------------|---------------|---------------|-------------------|
| **Time gap between two rounds** | 0.204*** (0.048) | 0.188*** (0.046) | 0.317*** (0.023) |
| **Capacity utilisation %**  | 1.009*** (0.199) | 1.017*** (0.198) | 0.047 (0.114) |
| **Remote workers %**       | 0.810*** (0.219) | 0.836*** (0.218) | 0.001 (0.176) |
| **Female workers %**       | -0.337* (0.198) | -0.380* (0.197) | -0.015 (0.117) |
| **Export %**               | -0.074 (0.153)  | -0.070 (0.152)  | -0.033 (0.088) |
| **Received government support** | 0.598** (0.258) | 0.051 (0.167)  | 0.061 (0.249) |
| Cash transfers             | -             | 0.061 (0.263)  | 0.096 (0.166) |
| Deferral of payments       | -             | -0.116 (0.247) | 0.073 (0.151) |
| New credits                | -             | 0.289 (0.268)  | -0.179 (0.182) |
| Fiscal exemptions           | -             | -0.111 (0.231) | 0.193 (0.150) |
| Wage subsidies             | -             | 0.447** (0.189) | -0.059 (0.114) |
| Dummy (Latin America)      | 0.409 (0.268)  | 0.363 (0.264)  | -1.286*** (0.140) |
| Dummy (Mediterranean)      | 0.969*** (0.233) | 0.951*** (0.228) | -1.388*** (0.129) |
| Dummy (Mongolia)           | 1.067*** (0.272) | 1.074*** (0.269) | -1.118*** (0.180) |
| No. of observations        | 1898          |               |                   |

Note: Standard errors are reported in parentheses.
*Significance at 10%.
**Significance at 5%.
***Significance at 1%.
|                                | Payment delay       | Financial obligation overdue |
|--------------------------------|---------------------|-----------------------------|
| Time gap between two rounds    | 0.205*** (0.035)    | 0.204*** (0.035)            |
|                                |                     | 0.225*** (0.047)            |
|                                |                     | 0.226*** (0.047)            |
| Capacity utilisation %         | 0.202 (0.148)       | 0.204 (0.148)               |
|                                |                     | 0.037 (0.176)               |
|                                |                     | 0.039 (0.176)               |
| Remote workers %               | 0.395** (0.196)     | 0.397** (0.196)             |
|                                |                     | 0.032 (0.249)               |
|                                |                     | 0.035 (0.249)               |
| Female workers %               | -0.045 (0.153)      | -0.049 (0.153)              |
|                                |                     | 0.052 (0.180)               |
|                                |                     | 0.059 (0.179)               |
| Export %                       | -0.071 (0.118)      | -0.072 (0.118)              |
|                                |                     | -0.141 (0.142)              |
|                                |                     | -0.142 (0.142)              |
| Received government support    | 0.079 (0.255)       | -                           |
|                                |                     | -0.666** (0.328)            |
| Cash transfers                 | -                   | 0.098 (0.232)               |
|                                |                     | -                           |
| Deferral of payments           | -                   | -0.304 (0.238)              |
|                                |                     | -                           |
| New credits                    | -                   | -0.419 (0.312)              |
|                                |                     | -                           |
| Fiscal exemptions              | -                   | -0.358 (0.232)              |
|                                |                     | -                           |
| Wage subsidies                 | -                   | -0.041 (0.155)              |
|                                |                     | -                           |
| Dummy (Latin America)          | 0.337* (0.185)      | 0.334* (0.185)              |
|                                |                     | 0.573** (0.233)             |
|                                |                     | 0.575** (0.233)             |
| Dummy (Mediterranean)          | 0.514*** (0.167)    | 0.513*** (0.166)            |
|                                |                     | 0.565*** (0.212)            |
|                                |                     | 0.564*** (0.212)            |
| Dummy (Mongolia)               | 0.455** (0.227)     | 0.458** (0.227)             |
|                                |                     | 1.664*** (0.244)            |
|                                |                     | 1.659*** (0.244)            |

Note: Standard errors are reported in parentheses.

*Significance at 10%.

**Significance at 5%.

***Significance at 1%.
| Determinants of female employment impact in manufacturing industries | Decreasing female workers | Increasing female workers who took leave or quit |
|---------------------------------|---------------------------|-----------------------------------------------|
| Sales decrease (p)              | $1.519^{**}$ (0.742)     | $1.537^{**}$ (0.733)                          | $1.879^{**}$ (0.858) | $1.400^{*}$ (0.791) |
| Hours decrease (p)              | $-2.450^{***}$ (0.269)   | $-2.486^{***}$ (0.249)                        | $-2.572^{***}$ (0.344) | $-2.036^{***}$ (0.301) |
| Liquidity decrease (p)          | $-0.032$ (0.630)         | $-0.075$ (0.485)                              | $1.876^{**}$ (0.743) | $1.476^{**}$ (0.556) |
| Delay payment (p)               | $3.300^{***}$ (1.168)    | $4.646^{***}$ (0.728)                        | $4.042^{***}$ (1.357) | $3.184^{***}$ (0.809) |
| Financial obligation overdue (p)| $3.118^{**}$ (1.247)     | $3.551^{**}$ (1.463)                         | $2.406^{***}$ (1.259) | $3.790^{***}$ (0.473) |
| Time gap between two rounds     | $0.302^{***}$ (0.027)    | $0.304^{***}$ (0.028)                        | $0.287^{***}$ (0.036) | $0.289^{***}$ (0.036) |
| Capacity utilisation %          | $0.305^{**}$ (0.122)     | $0.274^{**}$ (0.123)                         | $0.273^{**}$ (0.141) | $0.298^{**}$ (0.142) |
| Remote workers %                | $0.260^{**}$ (0.126)     | $0.270^{**}$ (0.180)                         | $-0.108$ (0.202)     | $-0.125$ (0.203)     |
| Female workers %                | $-0.871^{***}$ (0.126)   | $-0.870^{***}$ (0.127)                       | $-0.480^{***}$ (0.156) | $-0.502^{***}$ (0.157) |
| Export %                        | $-0.078$ (0.092)         | $-0.077$ (0.095)                             | $0.204^{*}$ (0.106)  | $0.204^{*}$ (0.107)  |
| Received government support     | $0.283^{*}$ (0.168)      | -                                             | $0.344^{*}$ (0.205)  | -                    |
| Cash transfers                  | -                        | $-0.077$ (0.946)                             | -                    | $-0.210$ (0.208)     |
| Deferral of payments            | -                        | $-0.154$ (0.166)                             | -                    | $-0.227$ (0.198)     |
| New credits                     | -                        | $0.111$ (0.196)                              | -                    | $0.087$ (0.226)      |
| Fiscal exemptions               | -                        | $0.278^{*}$ (0.159)                         | -                    | $0.111$ (0.176)      |
| Wage subsidies                  | -                        | $0.251^{*}$ (0.128)                         | -                    | $0.329^{**}$ (0.147) |
| Dummy (Latin America)           | $0.972^{***}$ (0.152)    | $0.979^{***}$ (0.152)                        | $1.985^{***}$ (0.203) | $1.988^{***}$ (0.203) |
| Dummy (Mediterranean)           | $0.715^{***}$ (0.138)    | $0.733^{***}$ (0.139)                        | $1.320^{***}$ (0.188) | $1.321^{***}$ (0.188) |
| Dummy (Mongolia)                | $0.981^{***}$ (0.191)    | $0.960^{***}$ (0.192)                        | $2.376^{***}$ (0.224) | $2.371^{***}$ (0.223) |

No. of observations: 1898

Note: Standard errors are reported in parentheses. *Significance at 10%. **Significance at 5%. ***Significance at 1%. 
|                                | Increasing female workers laid off | Increasing female workers furloughed |
|--------------------------------|-----------------------------------|-------------------------------------|
| Sales decrease (p)            | 2.532** (1.282)                   | 1.959* (1.155)                      |
| Hours decrease (p)            | −2.800* (1.556)                   | −2.123* (1.108)                     |
| Liquidity decrease (p)        | 1.965* (1.160)                    | 1.382 (1.059)                       |
| Delay payment (p)             | 4.726*** (1.761)                  | 4.411*** (1.059)                    |
| Financial obligation overdue (p) | 1.632*** (0.533)              | 1.334** (0.586)                     |
| Time gap between two rounds   | 0.174*** (0.044)                  | 0.177*** (0.045)                    |
| Capacity utilisation %        | 0.339* (0.185)                    | 0.387** (0.186)                     |
| Remote workers %              | 0.478** (0.236)                   | 0.475** (0.237)                     |
| Female workers %              | −0.389* (0.201)                   | −0.360* (0.202)                     |
| Export %                      | 0.231* (0.133)                    | 0.244* (0.134)                      |
| Received government support   | 0.252* (0.148)                    | -                                   |
| Cash transfers                | -                                 | −0.220 (0.287)                      |
| Deferral of payments          | -                                 | −0.032 (0.273)                      |
| New credits                   | -                                 | −0.197 (0.343)                      |
| Fiscal exemptions             | -                                 | −0.359 (0.274)                      |
| Wage subsidies                | -                                 | 0.395* (0.191)                      |
| Dummy (Latin America)         | 0.903*** (0.238)                  | 0.901*** (0.240)                    |
| Dummy (Mediterranean)         | 0.508** (0.222)                   | 0.466** (0.226)                     |
| Dummy (Mongolia)              | 1.176*** (0.266)                  | 1.149*** (0.267)                    |
| No. of observations           |                                   |                                     |

Note: Standard errors are reported in parentheses.

*Significance at 10%.

**Significance at 5%.

***Significance at 1%.
|                                | Sales decrease | Hours decrease | Liquidity decrease |
|--------------------------------|----------------|----------------|-------------------|
| Time gap between two rounds    | −0.113*** (0.013) | −0.113*** (0.013) | −0.159*** (0.013) |
| Remote workers %               | 0.374** (0.180)  | 0.372** (0.180)  | 0.680*** (0.123)  |
| Female workers %               | −0.325** (0.130) | −0.324** (0.130) | −0.558*** (0.086) |
| Export %                       | −0.227** (0.105) | −0.228** (0.105) | −0.716*** (0.078) |
| Received government support    | −0.390* (0.226)  | −0.145 (0.132)   | −0.071 (0.144)    |
| Cash transfers                 | -              | −0.361* (0.210)  | -                 |
| Deferral of payments           | -              | 0.006 (0.198)    | −0.007 (0.118)    |
| New credits                    | -              | −0.204 (0.278)   | 0.079 (0.157)     |
| Fiscal exemptions              | -              | −0.190 (0.202)   | 0.088 (0.117)     |
| Wage subsidies                 | -              | −0.528*** (0.186) | 0.036 (0.098) |
| Dummy (Latin America)          | 0.245* (0.156)  | 0.242* (0.155)   | −0.431*** (0.093) |
| Dummy (Mediterranean)          | 0.565*** (0.127) | 0.562*** (0.127) | −0.613*** (0.080) |
| Dummy (Mongolia)               | 0.880*** (0.162) | 0.874*** (0.161) | 0.321*** (0.112) |
| No. of observations            | 2680           |                |                   |

Note: Standard errors are reported in parentheses. *Significance at 10%. **Significance at 5%. ***Significance at 1%.
Table 9 (Continued)

|                                | Liquidity decrease | Payment delay | Financial obligation overdue |
|--------------------------------|--------------------|---------------|-----------------------------|
| Time gap between two rounds    | 0.119*** (0.013)   | 0.107*** (0.012) | 0.106*** (0.012)         |
| Remote workers %               | 0.162 (0.186)      | 0.108 (0.174)  | 0.115 (0.173)              |
| Female workers %               | -0.558*** (0.128)  | -0.333*** (0.117) | -0.336*** (0.116) |
| Export %                       | -0.226** (0.103)   | -0.354*** (0.110) | -0.349*** (0.109)        |
| Received government support    | -                  | -0.502*** (0.184) | -                     |
| Cash transfers                 | 0.133 (0.190)      | 0.056 (0.196)  | -                          |
| Deferral of payments           | -0.060 (0.177)     | -              | -0.352* (0.188)          |
| New credits                    | -0.118 (0.234)     | -              | -0.201 (0.232)           |
| Fiscal exemptions               | 0.018 (0.168)      | -              | -0.399** (0.183)         |
| Wage subsidies                 | -0.010 (0.140)     | -              | -0.478*** (0.179)        |
| Dummy (Latin America)          | 0.178 (0.154)      | 0.180 (0.126)  | -0.325** (0.144)         |
| Dummy (Mediterranean)          | 0.561*** (0.123)   | 0.255** (0.107) | -0.349*** (0.123)       |
| Dummy (Mongolia)               | 0.741*** (0.160)   | 0.350** (0.148) | 0.377** (0.147)         |

No. of observations

Note: Standard errors are reported in parentheses.
*Significance at 10%.
**Significance at 5%.
***Significance at 1%.
| Determinants of female employment impact in service industries | Decreasing female workers | Increasing female workers who took leave or quit |
|---------------------------------------------------------------|--------------------------|-----------------------------------------------|
| Sales decrease (p)                                            | 2.153** (0.857)          | 1.263* (0.718)                                |
|                                                              | 2.816*** (0.971)         | 1.528** (0.777)                               |
| Hours decrease (p)                                            | -1.869*** (0.209)        | -1.490*** (0.194)                             |
|                                                              | -0.545** (0.255)         | -0.511** (0.232)                              |
| Liquidity decrease (p)                                        | 1.157* (0.665)           | 1.993*** (0.605)                              |
|                                                              | 4.340*** (0.850)         | 3.903*** (0.745)                              |
| Delay payment (p)                                             | 3.681*** (0.881)         | 5.520*** (0.704)                              |
|                                                              | 5.922*** (1.142)         | 3.125*** (0.851)                              |
| Financial obligation overdue (p)                              | 1.946** (0.965)          | 1.214** (0.566)                               |
|                                                              | 2.556** (1.061)          | 3.960*** (1.376)                              |
| Time gap between two rounds                                   | 0.174*** (0.015)         | 0.175*** (0.015)                              |
|                                                              | 0.075*** (0.013)         | 0.075*** (0.013)                              |
| Remote workers %                                              | 0.371*** (0.139)         | 0.382*** (0.140)                              |
|                                                              | 0.440*** (0.160)         | 0.476*** (0.161)                              |
| Female workers %                                              | -0.479*** (0.093)        | -0.478*** (0.093)                             |
|                                                              | -0.398*** (0.124)        | -0.398*** (0.124)                             |
| Export %                                                      | -0.377*** (0.082)        | -0.375*** (0.082)                             |
|                                                              | -0.472*** (0.113)        | -0.476*** (0.113)                             |
| Received government support                                    | 0.022 (0.076)            | -0.101 (0.087)                                |
|                                                              | -0.003 (0.188)           | -0.514*** (0.171)                             |
| Cash transfers                                                | -                        | -0.201 (0.159)                                |
|                                                              | -                        | -0.001 (0.132)                                |
| Deferral of payments                                          | -                        | 0.099 (0.170)                                 |
|                                                              | -                        | 0.055 (0.128)                                 |
| New credits                                                   | -                        | 0.055 (0.128)                                 |
|                                                              | -                        | -0.118 (0.129)                                |
| Fiscal exemptions                                             | -                        | 0.563*** (0.105)                              |
|                                                              | -                        | 0.565*** (0.105)                              |
| Wage subsidies                                                | -                        | 0.565*** (0.105)                              |
|                                                              | -                        | 0.949*** (0.140)                              |
| Dummy (Latin America)                                         | -0.340*** (0.081)        | 0.344*** (0.092)                              |
|                                                              | -0.340*** (0.081)        | 0.553*** (0.131)                              |
| Dummy (Mediterranean)                                         | 0.380*** (0.123)         | 0.572*** (0.124)                              |
|                                                              | 0.380*** (0.123)         | 1.637*** (0.146)                              |
| Dummy (Mongolia)                                              | -0.340*** (0.081)        | 0.344*** (0.092)                              |
|                                                              | -0.340*** (0.081)        | 0.553*** (0.131)                              |
| No. of observations                                           | 2680                     |                                               |
**TABLE 10** (Continued)

|                                | Increasing female workers laid off | Increasing female workers furloughed |
|--------------------------------|-----------------------------------|--------------------------------------|
| Sales decrease (p)             | 2.827** (1.171)                   | 2.481** (0.972)                      | 0.181 (1.306)                  | 0.456 (1.869)                  |
| Hours decrease (p)             | −1.436*** (0.316)                 | −0.828*** (0.289)                    | −2.726*** (0.937)              | −2.789*** (0.902)              |
| Liquidity decrease (p)         | 1.730* (0.955)                    | 1.852* (0.966)                      | 4.609*** (1.760)              | 3.184*** (1.010)              |
| Delay payment (p)              | 3.667*** (1.283)                  | 3.554*** (1.452)                    | 5.127*** (1.429)              | 3.664*** (1.052)              |
| Financial obligation overdue (p)| 0.602 (1.251)                     | 0.454 (0.998)                       | 2.704** (1.187)               | 5.543*** (1.417)              |
| Time gap between two rounds    | 0.060*** (0.014)                  | 0.059*** (0.014)                    | 0.193*** (0.040)              | 0.197*** (0.040)              |
| Remote workers %               | 0.357* (0.187)                    | 0.392* (0.188)                      | 0.145 (0.223)                 | 0.117 (0.225)                 |
| Female workers %               | −0.300** (0.144)                  | −0.305** (0.144)                    | −0.417** (0.167)              | −0.415** (0.167)              |
| Export %                       | −1.111*** (0.116)                 | −1.104*** (0.116)                   | −1.008*** (0.210)             | −1.020*** (0.211)             |
| Received government support    | 0.105 (0.103)                     | −0.103 (0.222)                      | 0.070 (0.113)                 |                            |
| Cash transfers                 | -                                 | −0.179 (0.184)                      |                                  | 0.069 (0.190)                 |
| Deferral of payments           | -                                 | −0.016 (0.239)                      |                                  | 0.148 (0.1245)                |
| New credits                    | -                                 | 0.289* (0.163)                      |                                  | −0.188 (0.185)                |
| Fiscal exemptions              | -                                 | 0.085 (0.147)                       |                                  | −0.142 (0.162)                |
| Wage subsidies                 | -                                 | 0.703*** (0.160)                    | 7.018 (7.900)                  | 7.064 (7.854)                 |
| Dummy (Latin America)          | 0.449*** (0.149)                  | 0.448*** (0.149)                    | 6.733 (7.900)                  | 6.792 (7.854)                 |
| Dummy (Mediterranean)          | 0.819*** (0.172)                  | 0.799*** (0.173)                    | 7.961 (7.900)                  | 8.025 (7.854)                 |

|                                | No. of observations               |

Note: Standard errors are reported in parentheses.
*Significance at 10%.
**Significance at 5%.
***Significance at 1%.
7.1 COVID-19 and business activities

COVID-19 has brought escalating financial difficulties to firms in the developing world. This study shows that the larger the time gap between the two surveys, the more likely firms were to encounter decreasing liquidity and increasing debts. Therefore, even though many businesses have reopened and are rebuilding their confidence, the harm wrought by COVID-19 is not fading yet. Since the sudden shutdown of the global production chain in early 2020, transportation and logistics worldwide remain in deep chaos, exerting a profound impact, especially on developing economies that lack sufficiently mature market systems and resilience against shocks. Furthermore, due to the shortage of supplies, the prices of raw materials have quickly risen, causing further production problems in vulnerable developing economies.

7.2 COVID-19 and female workers

Our statistics show that although overall employment is slowly recovering under COVID-19, female workers’ situation continues to worsen. As time passes, we find that the likelihood of decreasing employment size is diminishing, indicating that the overall unemployment issue has been under control. However, the percentage of female workers has significantly dropped. Female workers face an increasing likelihood of being severed from their jobs or receiving pay cuts. Therefore, females have been under greater pressure than their male coworkers. This could be for a couple of important reasons. On the one hand, in today’s world, females still take on most family responsibilities. After the outbreak of COVID-19, due to the widespread shutdown of the education system and most public facilities, females were expected to return to their families and take care of other family members. On the other hand, female workers are still underrepresented in the workplace, especially in most developing countries; a legal system that secures their rights and benefits is lacking. During economic recessions, female workers are more likely to be let go than male workers. In this regard, our study complements that of Yu et al. (2021), who argued that gender inequality will be intensified in the labour market because COVID-19 has substantially affected the education, health, and social care industries, which are dominated by female employees. Yu et al. (2021) also showed that due to the pandemic, women now face higher risks of experiencing a reduction of working hours than men.

7.3 Manufacturing vs. service industries: Government support

One of our major findings is that receiving government support tends to induce dwindling production in manufacturing firms, but it helps service firms avoid declines in production. We attribute this interesting finding to how different firms keep their businesses running. Manufacturing firms have more flexibilities because they can adjust the utilisation of their production capacity and inventory storage. When manufacturing firms receive subsidies or other support from the government, they are provided with an additional safety net to guard them against permanently closing. Temporarily downsizing production can greatly help firms endure difficulties. However, firms in the service industry rely heavily on cash flow; without sufficient liquidity in hand, the service industry must shrink under economic pressure. Receiving government support, including direct cash transfers or wage subsidies, importantly eases difficulties encountered by service firms and helps them to get through the crisis. In one word, government support enables service firms to maintain their sales but prompt manufacturing firms to cut or even temporarily halt their production processes during the pandemic.

Meanwhile, although government support does not significantly result in a change in overall operating hours of a firm, it does significantly affect female workers, especially those in the manufacturing industry. Receiving government support causes more female workers to leave the manufacturing industry, yet it does not significantly affect females working in the service industry. As discussed above, with government support, manufacturing firms are more...
likely to face downsizing production; consequently, the manufacturing pressure is transferred to female workers, who will leave the workplace—either voluntarily or not—or be furloughed. In contrast, government support prevents service firms from decreasing production and, therefore, does not worsen their female workers’ situation.

7.4 | Manufacturing versus service industries: Exports

Exports, interestingly, also exert different impacts between manufacturing and service industries. On the one hand, in manufacturing industries, exports do not affect firms’ business activities but significantly increase the likelihood of female workers quitting, being laid off, and being furloughed. On the other hand, in service industries, exports prevent firms from declining and prevent their female workers from being negatively affected during COVID-19. Therefore, globalisation has brought more uncertainties to manufacturing firms than to the service firms during COVID-19. The more a manufacturing firm exports, the more its business relies on the global market and the more volatilities it will experience under the global pandemic. However, exporting can significantly benefit service firms and help them grow more resilient against the pandemic. A strong service industry, which is supported by advanced telecommunications and network techniques, should be encouraged to enter the global market to prosper and boost the domestic economy.

7.5 | Policy implications

Several useful policy implications can be derived from this study. For example, the government of a developing economy needs to properly support firms’ businesses to enable them to maintain their sales through the pandemic. According to our study, firms take different actions upon receiving government support; some choose to cut production, whereas others choose to expand. Consequently, female employment worsens among those firms that decide to cut production. Thus, the government should endeavour to maintain firms’ production processes and keep them open. Credits would provide firms with incentives to continue production and sales rather than to shut down temporarily. It is also important for governments to acquire sufficient financial resources and techniques to support firms’ business operations through COVID-19.

Developing economies should pay special attention to female workers’ benefits. We find that even though overall employment has been recovering, female workers face increasing probabilities of job insecurity. To address the worsening working conditions for females during COVID-19, several policies should be considered—for example, subsidies or benefits available for female workers to apply for, more income equality between female and male workers, improved day care services, and better regulations for family leave. The legal system should be redesigned to protect females’ rights and help female professionals balance work and family responsibilities. Modern techniques, in this regard, also play important roles in enhancing the living standards of people, especially females, who live in developing countries.

The efficacy of education and the social welfare system, in the meantime, should be greatly enhanced in developing economies. On the one hand, globally, governments need to further increase the literacy rate among girls and the accessibility of advanced education to female students. Public assistance that constructs a better nexus and a better matching process between female job searchers and the job market would be significantly helpful. On the other hand, the social status of females in developing economies must be ameliorated. The traditional stereotypes of females’ roles are difficult to change quickly, but they should be gradually corrected as society progresses. In addition, society needs to provide better care for children and the elderly instead of asking females to take on most or even all family responsibilities.

Policies promoting globalisation should also undergo careful deliberation. We find that a heavy reliance on exports would hurt female workers in manufacturing industries but benefit those in service industries. Thus, a
developing economy needs to prioritise promoting the global competitiveness of its service firms. Telecommunication techniques must be strengthened to provide international services such as consulting, financial and legal advice, customer service, managerial engineering, and product design, which can drive economic development. Meanwhile, manufacturing firms in developing economies should efficiently explore domestic markets to be better prepared for economic shocks such as COVID-19.

Manufacturing firms should also make great efforts to expand their production capacity; we find that the limited availability of production capacity significantly increases the risks facing manufacturers’ production and employees. During normal business operations, acquiring idle capital assets will be accommodating in alleviating economic pressures caused by unexpected events. In this regard, investment activities should be greatly encouraged in developing economies. The government must provide sufficient physical and financial capital assets, lower investment constraints, and properly encourage business investment. A better regulated market system with fewer bureaucratic obstacles is necessary.

8 | CONCLUSIONS

Based on observations from 10 developing countries worldwide, this paper empirically studies firms’ experience during COVID-19. We acquired firm-level data from a two-round survey of the World Bank and investigated determinants of reduced business activities and employment difficulties experienced by female workers. We first statistically compared firms’ situations between the two rounds of the survey and then compared the manufacturing and service industries. We found that as the pandemic has continued, firms’ production has been recovering, but the size of the female workforce has decreased. More and more females have been quitting, getting laid off, and being furloughed from their workplaces.

We then econometrically examined the determinants that led to reduced business activities and difficulties encountered by female workers. Overall, firms with fewer remote workers and more female workers were found to encounter a lower likelihood of dwindling business. We also found that over time, the likelihood of shrinking production has significantly reduced, yet the likelihood of constrained finances has significantly increased. As time passes, whereas firms’ sales and operating hours are recovering, female workers face an increasing likelihood of losing their jobs or being furloughed. In addition, improving sales and finances can effectively reduce female workers’ employment risks. In a workplace where females are underrepresented, female employees must expect higher employment risks during COVID-19.

Furthermore, different findings were detected between the manufacturing and service industries. Government support encourages manufacturing firms to downsize their production during COVID-19, which negatively impacts their female workers. Meanwhile, in the service industry, government support helps firms to maintain their business and, thus, does not affect female workers. More exports significantly increase the difficulties experienced by female workers in the manufacturing industry but help to alleviate employment risks for females in the service industry.

There are multiple ways to extend our study on the economic impacts of COVID-19 in developing economies. Given the micro-level data available with a longer period of observation, the aftermath of COVID-19 can be studied in more depth. Investigations on workers’ income cuts, people’s working motivation, the transformation of the labour market, and the development of gender equality or inequality would all be highly valuable future works. Another interesting study would be a direct comparison between female and male workers, given information on both genders. It would also be interesting to explore the mechanisms and influences of government support in different industries or under different economic development levels.

ENDNOTES

1 Data source: World Health Organization, https://covid19.who.int/. Date of access: 14 June 2022.

2 In each round of the survey, firms were asked whether their sales, operating hours, or liquidity had decreased; they were asked to horizontally compare their current performance with the same month in 2019. If a firm reported decreasing sales
(or operating hours, liquidity) not in the first round but only in the second round, we consider its sales (or hours, liquidity) decrease $= 1$. If a firm reported it had delayed payments only in the second round of the survey, we consider its payment delay $= 1$. If a firm reported it had overdue obligations only in the second round, we consider its financial obligation overdue $= 1$.

3 The original survey questions on major variables are included in Appendix A (Table A1).

4 For more information, please refer to OECD's website https://data.oecd.org/entrepreneur/enterprises-by-business-size.htm.

**DATA AVAILABILITY STATEMENT**

The data that support the findings of this study are available in World Bank Enterprise Surveys at https://www.enterprisesurveys.org/en/data.

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APPENDIX A

| Variable                  | Question in Round 1                                                                 | Question in Round 2                                                                 |
|---------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Decreasing sales          | Comparing this establishment's sales with the same month in 2019, did sales increase, remain the same, or decrease? | Same as Round 1                                                                     |
| Decreasing working hours  | Comparing this establishment's total hours worked per week with the same month in 2019, did it (they) increase, remain the same, or decrease? | Same as Round 1                                                                     |
| Decreasing liquidity      | Since the outbreak of COVID-19, has this establishment's liquidity or cash flow increased, remained the same, or decreased? | Since [insert Round 1 month], has this establishment's liquidity or cash flow increased, remained the same, or decreased? |
| Closed due to COVID       | Did this establishment close temporarily (suspended services or production) due to the COVID-19 outbreak? | Since [insert Round 1 month], did this establishment close temporarily (suspended services or production) due to the COVID-19 outbreak? |
| Bankruptcy filing         | Since the outbreak of COVID-19, has this establishment filed for insolvency or bankruptcy? | Since [insert Round 1 month], has this establishment filed for insolvency or bankruptcy? |
| Delay payments            | Since the outbreak of COVID-19, has this establishment delayed payments due to the COVID-19 outbreak for more than 1 week (excluding payments postponed following current regulation) to suppliers, property owners, or tax authorities? | Since [insert Round 1 month], has this establishment delayed payments due to the COVID-19 outbreak for more than 1 week (excluding payments postponed following current regulation) to suppliers, property owners, or tax authorities? |
| Overdue obligations       | Since the outbreak of COVID-19, has this establishment been overdue on its obligations to any financial institution? | Since [insert Round 1 month], has this establishment been overdue on its obligations to any financial institution? |
| Expect to fall in arrears | Is it expected that this establishment will fall in arrears in any of its outstanding liabilities in the next 6 months? | Same as Round 1                                                                     |
### TABLE A2  Number and percent of firms from different regions and countries

| Regions       | Countries   | No. of observations | Percent of observations |
|---------------|-------------|---------------------|-------------------------|
| Latin America | El Salvador | 719                 | 12.38%                  |
|               | Guatemala   | 345                 | 5.94%                   |
|               | Honduras    | 332                 | 5.72%                   |
|               | Nicaragua   | 333                 | 5.73%                   |
| Mediterranean | Georgia     | 701                 | 12.07%                  |
|               | Jordan      | 601                 | 10.35%                  |
|               | Moldova     | 360                 | 6.20%                   |
|               | Morocco     | 1096                | 18.87%                  |
|               | Mongolia    | 360                 | 6.20%                   |
|               | Zimbabwe    | 960                 | 16.53%                  |
| Total         |             | 5807                | 100%                    |

Note: The percentages of firms are reported in parentheses.

### TABLE A3  Number (percent) of firms experiencing changes between two surveys, by industries

|                          | All industries | Manufacturing industries | Service industries |
|--------------------------|----------------|--------------------------|--------------------|
| Sales decrease           | 634 (10.92%)   | 136 (7.17%)              | 198 (7.39%)        |
| Hours decrease           | 1905 (32.81%)  | 818 (43.10%)             | 1087 (40.56%)      |
| Liquidity decrease       | 692 (11.92%)   | 177 (9.33%)              | 224 (8.36%)        |
| Payment delay            | 746 (12.85%)   | 230 (12.12%)             | 290 (10.82%)       |
| Financial overdue        | 457 (7.87%)    | 145 (7.64%)              | 231 (8.62%)        |
| Decreasing female workers| 1701 (29.29%)  | 566 (29.82%)             | 731 (27.28%)       |
| Increasing female workers took leave or quit | 779 (13.41%) | 282 (14.86%) | 339 (12.65%) |
| Increasing female workers laid off | 350 (6.03%) | 103 (5.43%) | 161 (6.01%) |
| Increasing female workers furloughed | 388 (6.68%) | 119 (6.27%) | 172 (6.42%) |
| No. of observations      | 5807 (100%)    | 1898 (100%)              | 2680 (100%)        |

Note: The percentages of firms are reported in parentheses.
|                     | Latin America | Mediterranean | Mongolia         | Zimbabwe         |
|---------------------|---------------|---------------|------------------|------------------|
|                     | Round 1       | Round 2       | Round 1          | Round 2          |
| Closed due to COVID | 413 (23.89%)  | 288 (16.66%)  | 1288 (46.70%)    | 325 (11.78%)     |
|                     | 102 (28.33%)  | 113 (31.39%)  | 578 (60.21%)     | 512 (53.33%)     |
| Bankruptcy filing  | 40 (2.31%)    | 19 (1.10%)    | 45 (1.63%)       | 23 (0.83%)       |
|                     | 88 (24.44%)   | 23 (6.39%)    | 28 (2.92%)       | 0 (0.00%)        |
| Delay payments      | 527 (30.48%)  | 496 (28.69%)  | 980 (35.53%)     | 150 (41.67%)     |
|                     | 214 (59.44%)  | 150 (41.67%)  | 511 (53.23%)     | 418 (43.54%)     |
| Overdue obligations | 240 (13.88%)  | 181 (10.47%)  | 406 (14.72%)     | 130 (36.11%)     |
|                     | 67 (18.61%)   | 130 (36.11%)  | 107 (11.15%)     | 114 (11.88%)     |
| Expect to fall in arrears | 420 (24.29%)  | 187 (10.82%)  | 785 (28.46%)     | 178 (49.44%)     |
|                     | 193 (53.61%)  | 178 (49.44%)  | 330 (34.38%)     | 147 (15.31%)     |
| No. of observations | 1729 (100%)   | 2758 (100%)   | 360 (100%)       | 960 (100%)       |

**Note:** The percentages of firms are reported in parentheses.
|                                | Latin America | Mediterranean | Mongolia | Zimbabwe |
|--------------------------------|---------------|---------------|----------|----------|
| Sales decrease                 | 162 (9.37%)   | 338 (12.26%)  | 53 (14.72%) | 81 (8.44%) |
| Hours decrease                 | 475 (27.47%)  | 906 (32.85%)  | 130 (36.11%) | 394 (41.04%) |
| Liquidity decrease             | 164 (9.49%)   | 382 (13.85%)  | 47 (13.06%) | 99 (10.31%) |
| Payment delay                  | 197 (11.39%)  | 354 (12.84%)  | 46 (12.78%) | 149 (15.52%) |
| Financial overdue              | 93 (5.38%)    | 161 (5.84%)   | 106 (29.44%) | 97 (10.10%) |
| Decreasing female workers      | 500 (28.92%)  | 763 (27.66%)  | 92 (25.56%) | 346 (36.04%) |
| Increasing female workers took leave or quit | 303 (17.52%) | 272 (9.86%)  | 151 (41.94%) | 53 (5.52%) |
| Increasing female workers laid off | 129 (7.46%) | 134 (4.86%)  | 50 (13.89%) | 37 (3.85%) |
| Increasing female workers furloughed | 129 (7.46%) | 126 (4.57%)  | 133 (36.94%) | 130 (13.54%) |
| No. of observations            | 1729 (100%)   | 2758 (100%)   | 60 (100%) | 960 (100%) |

Note: The percentages of firms are reported in parentheses.