# The Impact of the COVID-19 Pandemic on Women-Led Businesses*

Jesica Torres†, Franklin Maduko, Isis Gaddis, Leonardo Iacovone, and Kathleen Beegle‡

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**Abstract**

The COVID-19 pandemic has struck businesses across the globe with unprecedented impacts. The world economy has been hit hard and firms have experienced a myriad of challenges, but these challenges have been heterogeneous across firms. This paper examines one important dimension of this heterogeneity: the differential effect of the pandemic on women-led and men-led businesses. The paper exploits a unique sample of close to 40,000 mainly formal businesses from 49 countries covering the months between April and September 2020. The findings show that women-led micro-businesses, women-led businesses in the hospitality industry, and women-led businesses in countries more severely affected by the COVID-19 shock were disproportionately hit compared with businesses led by men. At the same time, women-led micro-firms were markedly more likely to report increasing the use of digital platforms, but less likely to invest in software, equipment, or digital solutions. Finally, the findings also show that women-led businesses were less likely to have received some form of public support although they have been hit harder in some domains. In a crisis of the magnitude of the COVID-19 pandemic, evidence tracing the impact of the shock in a timely fashion is desperately needed to help inform the design of policy interventions. This real-time glimpse into women-led businesses fills this need for robust and policy-relevant evidence, and due to the large country coverage of the data, it is possible to identify patterns that extend beyond any one country, region, or sector, but at the cost of some granularity for testing more complex economic theories.

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†Corresponding author. E-mail address: jtorrescoronado@worldbank.org.

‡Torres: The World Bank; Maduko: University of Exeter Business School and The World Bank; Beegle and Gaddis: The World Bank and Institute of Labor Economics (IZA); Iacovone: The World Bank and Hertie School.

## 1. Introduction

The COVID-19 pandemic has taken a profound toll on businesses across the globe. The dual shock of the coronavirus pandemic and government mandated economic shutdowns to contain the spread of the virus plunged the world economy into a deep recession in 2020 (Long and Ascent, 2020). All around the world, firms had to cope with a broad range of concurrent challenges, including suspensions of their in-person operations, mobility restrictions, a remote workforce, supply chain disruptions, and falling consumer demand.

While the impacts of the COVID-19 crisis are felt across the world, there is also evidence of considerable heterogeneity in the severity of firm-level impacts, both across and within countries (Apedo-Amah et al., 2020). This paper focuses on one possible source of heterogeneity in the impact of COVID-19 on businesses– differences between firms led by men and firms led by women.

A focus on gender differences seems warranted given the extensive (pre-COVID-19) literature establishing gender as an important determinant of business performance, with female-owned or -managed firms typically registering lower levels of labor and total factor productivity than male-owned or managed firms (Aterido et al., 2011; Bardasi et al., 2011; Rijkers and Costa, 2012; Hallward-Driemeier, 2013; Bruhn and McKenzie, 2014; Alibhai et al., 2015; Campos et al., 2018; Gui-Diby et al., 2017; Munyegera and Precious, 2018; Islam et al., 2020). Moreover, a few recent studies suggest that the COVID-19 crisis has had a disproportionate impact on female entrepreneurs (ANDE, 2020b; Facebook et al., 2020; ANDE, 2020a; Chawla et al., 2020; Jaim, 2021). Most of these studies, however, are either based on relatively small samples or a sampling approach that is not explicitly designed to be representative of a target population (Schneider, 2020). Therefore, caution must be exercised in generalizing the results from these case studies.

This paper provides novel insights into gender differences in the impacts of the COVID-19 crisis on firms, drawing on a unique data set of around 40,000 mainly formal businesses (only five countries included informal firms in the sample). Our analysis exploits firm surveys conducted between April and September 2020 under the World Bank's Business Pulse Survey (BPS) and Enterprise Survey (WBES) programs. These data cover businesses across 49 mostly low- and middle-income countries. This database has been analyzed by Apedo-Amah et al. (2020) to document global firm-level impacts of COVID-19, but without any disaggregation by gender. We extend their analysis to shine a spotlight on the early impacts of the COVID-19 crisis on women- and men-led businesses. We capture three broad areas of interest. First, impacts of COVID-19 on business performance measures (i.e. temporary business closures, disruptions in supply channels, changes in sales revenues, financial risks and the owners' expectations about the future); second, responses to the crisis (i.e. adjustments in labor inputs, technology adoption and product innovation); and third, access to public support.

Our paper offers descriptive evidence of a differentiated effect of the pandemic on women-led businesses using robust and timely data that are comparable across countries and that cover critical dimensions of the operations of a firm. In a crisis of the magnitude of the COVID-19 pandemic, evidence tracing the impact of the shock in a timely fashion is desperately needed to help inform the design of policy interventions. Our real-time glimpse into women-led businesses fills this need for timely and policy-relevant evidence, even if the data are not well suited to examine the underlying channels potentially explaining the patterns we document (channels which likely vary across countries).

Our analysis shows statistically significant gender gaps in different measures of performance, which suggests that women-led firms were disproportionately hit compared to businesses led by men. Specifically, we find that women-led micro-businesses, women-led businesses in the hospitality industry (hotels and

restaurants), and women-led businesses in countries more severely affected by the COVID-19 shock resumed operations at a slower pace and reported larger declines in sales revenues. Moreover, while in general there were no differences between men- and women-led firms in the likelihood of experiencing supply disruptions, women-led firms in the hospitality industry and in countries more severely affected by the crisis were more likely to report reductions in operating hours and/or the availability of inputs or raw materials. In addition, women-led businesses in hospitality reported a higher probability of falling in arrears.

Our analysis also suggests gender gaps in the potential responses to the shock. We do not find overall differences in the firms' responses to lay off workers, but women-led micro-firms and women-led businesses in the hospitality industry were comparatively more likely to grant leave to their employees or reduce their wages or hours. We also find statistically significant gender gaps in the increase in the use of digital platforms (to the advantage of women), and this gap is especially large among micro-firms. In contrast, we find lower rates of investment in software, equipment, and digital solutions among women-led firms. Finally, our results also reveal that women-led businesses in countries more affected by the pandemic exhibited higher rates of product innovation compared to their male peers.

Finally, we document gender gaps in access to public support (to the disadvantage of women), and this gap is significant among micro-firms, among businesses in services other than retail, and among businesses in countries more severely affected by the shock.

This paper is organized as follows. Section 2 summarizes our contributions to the literature. Section 3 describes the survey and characteristics of the sample. Section 4 outlines the methodology used to assess gender differences in the firm-level impacts of COVID-19. Sections 5, 6, and 7 describe the empirical results, discussing gender differences in the impact of the pandemic on business performance, responses to the crisis and access to public support, respectively. We conclude by summarizing our key findings and highlighting some lessons for policy makers and future research in section 8.

## 2. Related literature

Prior to the COVID-19 pandemic, there was a growing literature on the differences in enterprise performance between male and female owned/operated firms in developing countries. This literature reveals several interesting patterns connected to our work. Most of these studies have focused on gender gaps in productivity (labor productivity or total factor productivity) between women-led and men-led businesses as the primary indicator of differential enterprise performance. Other indicators such as sales or value added and enterprise growth have also sometimes been used.[1] These studies document notable differences in the profile of firms in terms of size and sector and the sex of the owner or operator. We draw attention to findings in terms of conditioning on these two key attributes because that is the approach we follow in our empirical strategy.

In most developing countries, unconditional gender differences in productivity, sales revenues, and profits favor firms led or owned by men: Amin (2011), for Argentina and Peru; Bardasi et al. (2011), for Europe and Central Asia (ECA), Latin America and the Caribbean (LAC), and Sub-Saharan Africa (SSA); Rijkers and Costa (2012), for Bangladesh, Ethiopia, Indonesia, and Sri Lanka; Hallward-Driemeier (2013), for SSA; Gui-Diby et al. (2017), for Asia; Nagler and Naudé (2017), for SSA; Munyegera and Precious (2018), for

[1] Since labor productivity is defined as sales or value added per worker, and given that women-led firms tend to have fewer employees than firms led by men, gender gaps in labor productivity typically imply gender gaps in sales and/or value added, although the reverse is not necessarily true.

Rwanda; Hardy and Kagy (2018), for Ghana; Islam et al. (2020) and Allison et al. (2021), for global analyses. Gaps in monthly profits, not all of them statistically significant, are summarized in Campos et al. (2019) for 14 SSA studies. Similar patterns are documented for high-income countries (e.g. Fairlie and Robb (2009); Rosa and Sylla (2016)).

These unconditional gaps typically narrow when controlling for sector and firm size (for example, Rijkers and Costa (2012); Hallward-Driemeier (2013); Gui-Diby et al. (2017); Chaudhuri et al. (2020)) because women business owners often operate in sectors where profit margins are comparatively low, and have fewer employees than their male counterparts (Amin (2011); Campos et al. (2018)). At the same time, several cross-country studies have documented that women-led businesses are more profitable and larger when they are in male-dominated sectors (Campos et al., 2019). However, firm characteristics do not explain the entirety of the gap in productivity, sales revenues, and profits. Islam et al. (2020) find that the labor productivity gap remains unchanged even with a wide range of controls. Similarly, in a study on the garment-making industry in Ghana, Hardy and Kagy (2018, 2020) find that the men-owned micro-enterprises generate significantly higher profits than women-owned micro-firms even after accounting for a wide range of firm, firm owner, and product characteristics.[2] Finally, Bruhn (2009), using data from Latin America and controlling for enterprise characteristics, finds gender differences in productivity for micro and small enterprises, but not for medium-sized and large firms.[3]

Several explanations for these gaps in performance have been suggested, ranging from lower levels of business capital for women compared to male peers, less labor used by female-owned firms, and differences in the adoption of advanced business practices and innovation (Campos et al., 2019). Evidence that gender gaps in enterprise performance are related to gender norms around domestic time use and responsibilities, which greatly constrain women's time and mobility, has also been documented (especially, but not exclusively, in the informal sector). Nordman and Vaillant (2014) show that among informal entrepreneurs in Madagascar, women are more likely than men to work from home, where unpaid domestic tasks may interfere with their productivity. Grimm et al. (2012) document similar patterns among informal entrepreneurs in seven West African countries. Kevane and Wydick (2001) argue that differences between male and female micro-entrepreneurs in Guatemala in the ability to respond to credit arise from the fact that women of reproductive or child-rearing age are more time-constrained than men. Finally, qualitative interviews with young women entrepreneurs in Ethiopia showed that married women are often unable to work full-time due to socially assigned responsibilities at home, which they regard as a major disadvantage for growing their business (Phororo and Verick, 2008).

In the context of the COVID-19 pandemic, the potential role of gender norms rose to the fore since it has been widely documented that women's work (whether it be running a firm or being a wage or salaried worked) was disproportionately affected by the increased need for childcare in the home associated with lockdowns and day care and school closures. For example, female business leaders covered by the first wave

[2]The authors ascribe this pattern to the within-sector differences in firm product and different demand facing firms, more precisely, that women are making garments for women, while men produce male garments, and women garment makers operate in more 'crowded' markets and have more competition for a set demand.

[3]Some papers in the literature have documented a smaller gender gap in the formal sector as well. Hallward-Driemeier (2013), for example, estimates that women-owned enterprises are 6% less productive than men-owned enterprises in the formal sector, compared with a gender gap of 50% in the informal sector. Such comparisons between formal and informal sector enterprises, however, tend to draw on different data sources (comparing for example, businesses in the World Bank Enterprise Surveys to enterprises captured in multi-topic household surveys) and differences in questionnaire content, question phrasing, and survey implementation might contribute to these findings.

of Facebook's 2020 Future of Business Survey were more than twice as likely as male business leaders (23% vs 11%) to spend six hours or more on unpaid work per day, i.e. caring for family members and other domestic work. In addition, they were 10 percentage points more likely to report that these unpaid activities interfered with their paid work (Facebook et al., 2020). There are well-documented pre-existing constraints which are not necessarily in the direct domain of the firm but matter for firm performance and which the pandemic has exacerbated. These include, for example, women's disproportionate share of unpaid care workload as well as mobility limitations and lack of access to digital technology (De Paz Nieves et al., 2021).

Arguably, while gender gaps in enterprise performance are well documented, there is far less conclusive evidence on how these gaps evolve during times of economic crisis. A few studies argue that gender gaps in enterprise performance and access to finance worsened in the aftermath of the 2008 global financial crisis, mostly in the context of developed and transition economies. Ahmed et al. (2020) show that women-led firms in Europe and Central Asia were more likely than men-led firms to exit the market between 2008 and 2009, even controlling for firm characteristics. Among businesses that managed to stay in business, the short-term impacts did not differ systematically for women- vs men-led firms, but women-led businesses experienced a larger decrease in net sales in the long term, i.e. approximately two years into the crisis. Cesaroni et al. (2013) use data from a Credit Registry at the Bank of Italy to show that women-owned firms faced a more pronounced credit contraction than firms owned by men between 2007 and 2009, when liquidity was tight. Similarly, Thébaud and Sharkey (2016) show that women-led firms in the United States were more likely than men-led firms to experience difficulties in acquiring funding when lending tightened in 2009 and 2010. In other contexts, however, women-led firms appear to have weathered the global financial crisis better than firms led by men, possibly due to lower levels of risk taking and more prudent management strategies. Palvia et al. (2015) show that among U.S. commercial banks, smaller banks with female CEOs and/or board chairs were less likely to fail during the global financial crisis, which may be explained by the fact that these banks were holding higher levels of equity capital. Cowling et al. (2020) show that among medium sized enterprises in the United Kingdom in the aftermath of the 2008 global financial crisis, women-led businesses were less likely to apply for loans but more often successful in their loan applications, a pattern which may suggest greater risk aversion among women entrepreneurs.

On the COVID-19 pandemic and more directly aligned with the focus of our paper, several recent studies and reports in the popular media suggest that the pandemic has had a disproportionate impact on female entrepreneurs. Evidence from cross-country data sets has been documented by ANDE (2020b) and Facebook et al. (2020). Additional evidence from country-level studies has been documented for Bangladesh (Jaim, 2021); India (ANDE, 2020a; Chawla et al., 2020); the United Kingdom (Reuschke et al., 2021); and the United States (Fairlie, 2020; Manolova et al., 2020; Bloom et al., 2021), among other settings. Many of these studies, however, especially those referring to developing countries, are either based on relatively small samples (typically covering a few hundred firms or even fewer), or use a sampling approach that is not well suited to draw inferences on a target population (Schneider, 2020). Therefore, caution must be exercised in generalizing the results from these case studies. Liu et al. (2021) offer more robust evidence drawing on World Bank Enterprise Surveys data for 24 countries to explore gender gaps in business performance. They find that women-led businesses were more likely to be closed, and closed for longer periods of time, than men-led businesses and that women entrepreneurs expressed more pessimistic views about the future. While related, our paper expands this analysis in several directions. First, by leveraging two different data sources, i.e. World

Bank Enterprise Surveys and Business Pulse Surveys, we are able to investigate gender gaps in enterprise performance over the course of the pandemic for a larger and more diverse set of 49 countries. Second, we not only consider a broader set of indicators of business performance (i.e. in addition to closures and future expectations, we also investigate changes in sales revenues and financial risks), but also analyze differences in how women- and men-led businesses responded to the pandemic shock (e.g. in terms of labor adjustments, technology adoptions, and/or product innovations) and in their access to public support programs. Third, our analysis is careful to distinguish between conditional and unconditional gender gaps and also examines the heterogeneity of gender gaps across specific groups of businesses (e.g. in enterprises in a specific sector or of a certain size).

## 3. Description of the survey and characteristics of the sample

This paper draws on the harmonized firm-level data in Apedo-Amah et al. (2020), which combines the first wave of the World Bank Business Pulse Surveys (BPS) and the COVID-19 follow-up of the World Bank Enterprise Surveys (WBES). This novel data set tracks the potential impact of the pandemic on the private sector with regards to critical dimensions of business performance, such as operations of the business, sales revenue, liquidity and insolvency, labor adjustments, adoption of technology, expectations and uncertainty about the future, and access to public support.

The BPS and WBES subsamples contain different pieces of information that we leverage to classify businesses as male or female-led. The WBES data explicitly capture whether the firm's top manager is female and whether there are any women among the firm's owners. We define a firm as woman-led if at least one of these conditions is met - i.e. the business is managed by a woman and/or has a female owner.[4] The BPS have been implemented in collaboration with private sector associations, statistical agencies, and other government agencies (mainly Ministries of Finance and Economy), with implementation guidelines offered by the World Bank. The questionnaire did not ask about the sex of the owner or top manager, but the guidelines strongly suggest interviewing preferably the owner or top manager of the business, and we use the information on the respondent's sex and position within the firm (e.g. owner, top manager or other) to proxy for whether the business is led by a man or a woman.[5] Notice that in cases where the survey respondent is neither the owner nor the manager, the gender indicator will be missing. To avoid any bias resulting from missing values for our main variable of interest, we drop country-level data sets where the gender and position of the respondent are not generally available or where typically someone other than the firm's owner or manager provided answers to the questionnaire. More precisely, we drop country-level data sets where the fraction of missing values for the gender indicator is 30% or more, which excludes eight countries from the data set harmonized by Apedo-Amah et al. (2020)–Colombia, Ghana, Indonesia, India, Liberia, Madagascar, Mali and the Philippines. We also drop countries where one or more regressors are not available (Afghanistan, Armenia, and the Comoros). In the remaining 49 countries, the share of observations without information on whether the firm is led by a woman or man is relatively small (around 9% on average; see Table B1). Moreover, when we drop observations that contain no information on whether the firm is led by a woman or man, the distribution of observations in our final sample across geographical regions, size categories, sectors,

[4]Having a female owner does not rule out additional male owners.

[5]Unfortunately, we cannot distinguish in our BPS data between women as top managers and women as owners - though other studies suggest that gender gaps may be somewhat more pronounced if the comparison is based on management (e.g. Aterido and Hallward-Driemeier, 2011; Islam et al., 2020; Martínez-Zarzoso, 2017).

income classes, and severity levels of the shock is very similar to the distribution of observations in the full sample (see Table B2), which suggests that the country-level data sets included in the analysis are not strongly biased due to missing values.

The data sets we analyze combined cover around 45,000 interviews from 49 low-, middle-, and high-income countries in the six regions where the World Bank Group (WBG) is present (see Table B1 in the appendix).[6] We follow Apedo-Amah et al. (2020) and exclude businesses in the sample that were permanently closed at the time of the interview and businesses operating in the education and health sectors, which results in a data set with almost 39,000 firms where the gender indicator is available.[7] These data include micro, small, medium, and large businesses across five broad sectors–i.e. hospitality, manufacturing, retail and wholesale, other services, and others.[8] Businesses in the sample are largely formal, though informal firms are included in Cambodia, Senegal, South Africa, Sudan, and Tunisia. We focus on the short-term impact of the pandemic on women- vs men-led businesses and constrain our sample to interviews conducted between April and September 2020.

Even though the sampling frames for the BPS or the WBES follow-up are not nationally representative for men-led and women-led businesses, the harmonized data offer a comprehensive window into the differentiated impact of the pandemic on women entrepreneurs.[9] Consistent with many other studies, the fraction of women-led businesses in our data is the highest in East Asia and Pacific and Latin America and the Caribbean (approximates 40%) and the lowest in the Middle East and North Africa and South Asia (only around 10%; see Table 1). In terms of firm traits, we find that the fraction of women-led businesses in our data is the highest in the hospitality industry (34%) and retail and wholesale (30%), and the lowest in agriculture, mining, construction, and utilities (17% on average)–thus confirming the stylized fact that women entrepreneurs are over-represented in the services sectors (e.g. Amin and Islam, 2014). Perhaps less intuitive is that our data show that the share of women-led businesses increases with firm size, from 25% among micro-firms to 29% among large firms, which is at odds with the often documented pattern that businesses led by women are smaller than those led by men (e.g. Islam et al., 2020). These shares, however, are unconditional means, which are likely strongly influenced by the unequal distribution of male and female-led firms across countries and regions. To correct for the composition of the sample, our main empirical analysis (in sections 5 to 7) always includes a basic set of country-level control variables.

[6]The survey covers East Asia and Pacific (EAP), Europe and Central Asia (ECA), Latin America and the Caribbean (LAC), Middle East and North-Africa (MNA), South Asia (SAR), and Sub-Saharan Africa (SSA). Among high-income countries, our data set includes Cyprus, Greece, Italy, Poland, Romania, and Slovenia. Table B1 in the appendix details the full list of economies.

[7]In general, businesses in the sampling frame that were not reached during data collection were replaced with businesses in the same strata. Permanently closed businesses in the data are businesses that were indeed contacted but during the interview reported that they had permanently shut down at the time of the interview. These businesses were not asked the questions on the variables that are the focus of our analysis, and we therefore drop them from our analysis. The fraction of these permanently closed firms that were contacted but not applied the full questionnaire does not differ between men- and women-led firms (the average for both is 2.5%). Hyland et al. (2020) also find similar rates of permanent closure for female and male-owned firms.

[8]The hospitality sector includes accommodation and food preparation services. Other services includes services other than the hospitality industry and retail and wholesale, such as transportation and storage services, information and communication services, and financial services. Others consists of agriculture and mining, and construction and utilities.

[9]Details on the sampling frames and the representativity of the BPS data are summarized in Table B3 in the appendix.

Table 1: Characteristics of the sample. Fraction of businesses and women-led businesses in each category.

| | Fraction of total sample | Women-led (pp) | Men-led (pp) | Fraction of women-led |
|---|---|---|---|---|
| SAR | 7.2 | 0.5 | 6.7 | 7.2 |
| ECA | 41.4 | 13.4 | 28.0 | 32.4 |
| MNA | 15.5 | 1.7 | 13.8 | 11.0 |
| LAC | 8.0 | 3.2 | 4.8 | 39.9 |
| EAP | 3.1 | 1.2 | 1.9 | 40.0 |
| SSA | 24.6 | 6.7 | 17.9 | 27.1 |
| Low and lower-middle | 55.5 | 12.2 | 43.4 | 21.9 |
| Upper-middle and high | 44.3 | 14.6 | 29.7 | 33 |
| Micro (0-4) | 30.9 | 7.6 | 23.3 | 24.5 |
| Small (5-19) | 37.4 | 10.0 | 27.4 | 26.7 |
| Med and large (20+) | 31.6 | 9.2 | 22.3 | 29.3 |
| Manufacturing | 31.4 | 9.0 | 22.4 | 28.5 |
| Retail and wholesale | 26.7 | 8.0 | 18.6 | 30.1 |
| Hospitality | 7.2 | 2.5 | 4.7 | 34.3 |
| Other services | 19.3 | 4.6 | 14.6 | 24.1 |
| Others | 13.5 | 2.3 | 11.2 | 17.3 |
| Total | 100 | 26.8 | 73.2 | 26.8 |

## 4. Methodology

We report both unconditional and conditional estimates of gender differences in the impact of the COVID-19 pandemic on firm-level outcomes and responses. The unconditional gender gaps control for the timing of the survey and three country-level characteristics–the income level of the country (low and lower-middle, and upper-middle and high); the geographic region (EAP, ECA, LAC, MENA, SAR, and SSA); and the severity of the shock:

$$Y_i = \alpha + \beta W_i + \delta_m + \delta_r + \delta_s + \gamma t + \varepsilon_i. \quad (1)$$

$Y_i$ denotes the outcome variable of interest for firm $i$ (for example, the self-reported percentage change in sales revenue the 30 days before the interview relative to the same period of 2019); $W_i$ is an indicator that equals one if the owner or manager of the business is a woman and 0 otherwise; $\delta_m$, $\delta_r$, and $\delta_s$ denote fixed effects for income, region, and severity of the shock; and $t$ is a control for timing of the interview relative to

the beginning of the crisis.[10] These controls net out any effects that may arise from the unequal distribution of men- and women-led firms across regions and income-groups, or from differences across countries in the timing of the survey and severity of the COVID-19 shock. We still denote these estimates unconditional because–unlike the conditional estimates further below–they do not control for any firm-level traits that may drive gender gaps.

We estimate (1) using ordinary least squares (OLS) when the dependent variable is continuous, and using a Probit model when the dependent variable is binary. All our computations use the inverse of the number of observations in each country as weights (to give each country the same weight regardless of the sample size).

We use Google mobility trends around transit stations to proxy for both the peak and the severity of the first wave of the COVID-19 shock (Google, 2020; Apedo-Amah et al., 2020). The peak of the crisis corresponds to the peak in the mobility drop in each country during the first phase of the pandemic, which occurred at varying dates in the spring of 2020. The fixed effects for the timing of the interview measure the number of months before or after this peak.[11] To proxy for the severity of the shock we use the magnitude of the drop in mobility at the peak. More precisely, we sort countries into quartiles of the cross-country distribution of mobility drops at the peak. In our sample countries in the top 25% (for example Greece, Italy, South Africa) faced more severe shocks with drops of 73 to 88% relative to the February baseline than countries in the first quartile (such as Kenya, Mongolia, and Tanzania), which exhibited drops at the peak of 24 to 45%.

Our conditional estimates test whether the gender gap is larger among specific groups of businesses, for example, in particular sectors (e.g. hospitality) or among businesses of a particular size (e.g. micro or small). We also test whether gender differences vary with the severity of the shock (because countries more severely affected could exhibit, for example, larger increases in demand for caregivers which in turn could disproportionately affect women). The conditional specification introduces into (1) controls for the size and the sector of the business and in addition, interacts size, sector, income, and the severity of the shock with the indicator for whether the business is led by a woman:

$$Y_i = \alpha + \beta W_i + \delta_n + \delta_g + \delta_m + \delta_r + \delta_s + \beta_n(W_i \times \delta_n) + \beta_g(W_i \times \delta_g) + \beta_m(W_i \times \delta_m) + \beta_s(W_i \times \delta_s) + \gamma t + \varepsilon_i, \quad (2)$$

where $\delta_n$ and $\delta_g$ denote size and sector fixed effects.

The estimated *unconditional* gender gaps $\beta$ in (1) combine composition effects–which arise from the composition of the sample collected or from men- and women-led businesses operating in different sectors or having different sizes–and gender gaps that exist after controlling for these compositional characteristics (for example, due to some forms of discrimination or because women entrepreneurs were disproportionately affected by the increase in care demands due to school closures). In contrast, the *conditional* model in (2) estimates gender differences controlling for firm characteristics, hence net of the above composition effect. In addition, (2) allows us to test whether gender gaps are larger in some sectors relative to others and for some firm sizes. To estimate the gender gap in businesses of a specific size, for example, we use the fitted model to

[10] The control for the timing of the survey is the number of weeks between the date of the interview and March 11, 2020 (the date when the World Health Organization declared COVID-19 a pandemic).

[11] For countries without coverage in the Google mobility data, mobility is predicted using data on the stringency of the lockdown restrictions in Hale et al. (2020). See Apedo-Amah et al. (2020) for details.

predict the average value of outcome $Y_i$ over the full sample but conditioning on both size and whether the business is led by a man or a woman.[12] We show these estimates in the following sections and report whether the gender difference is statistically significant at the 95% confidence level, but the full set of results from ordinary least squares and the Probit estimations is available in the appendix.[13]

## 5. The shock

This section chronicles the impact of COVID-19 across five important dimensions of firm-level outcomes: business closures, disruptions in supply channels, sales revenues, financial risks, and the owners' expectations about the future. For each outcome, we first report unconditional gender gaps, followed by a more detailed discussion of conditional gender gaps, including industry- and firm-size specific results.

### 5.1 Temporary business closures

At the onset of the COVID-19 shock (spring of 2020) an estimated 70% of businesses were temporarily closed but 6 weeks after the peak (proxied using Google mobility trends around transit stations) this fraction averaged 25%; it then declined to 10% around week 15 (Apedo-Amah et al., 2020). The data suggests that women-led businesses resumed operations at a slower pace relative to men-led businesses (Table 2). The unconditional average predicted likelihood of operating regularly 6 weeks or more after the peak was 85.9% for men-led businesses and 84.5% for businesses led by a woman, a statistically significant difference of 1.4 percentage points (pp). This gender gap declines but remains statistically significant if we control for firm size and sector (for a conditional difference of -1.1 pp), which shows that some of the difference between men- and women-led businesses in the probability to remain closed six weeks after the peak crisis reflects gender differences in firm size and the fact that male and female entrepreneurs tend to operate in different industries. This finding is qualitatively in line with the evidence from other works in the literature. Based on data for 488 small and growing businesses in emerging markets, ANDE (2020b), for example, reports that women-led businesses were significantly more likely to shut down due to COVID-19 than men-led businesses. The Future of Business Survey (FBS), a data source for small- and medium sized enterprises with a Facebook Business page, reports that businesses led by women were seven pp more likely to be closed at the time of the survey compared to businesses led by men (Facebook et al., 2020).

Further disaggregation of our results by firm size using the conditional estimates shows that the gender gap in temporary business closure is significant among micro-enterprises (-2.6 pp) and medium and large firms (-1.6 pp). In terms of sectors, we see that the gender gap is largest, and to the disadvantage of women, in the hospitality sector (-5.3 pp) followed by other services (-4.7 pp)–two sectors in which female entrepreneurs are disproportionately engaged. Conversely, there is a gender gap to the disadvantage of men among manufacturing enterprises (2.6 pp). Moreover, female entrepreneurs' disadvantage in the likelihood that their businesses remain closed is driven by countries that experienced severe shocks and large declines in mobility (third or fourth quartile, as per Google data). Among countries with less severe shocks, gender differences in the probability of businesses to remain closed are either not significant (first quartile) or to the

[12] We run our computations using STATA. We use the command `margins` to compute the gender gaps.

[13] Our preferred specification to disentangle price from composition effects is interacting our controls with gender dummies instead of using Oaxaca-Blinder decompositions because most of our controls are fixed effects, and in these instances the results from Oaxaca-Blinder decomopsitions are difficult to interpret and highly sensitive to the choice of omitted categories (Fortin et al., 2011).

disadvantage of male entrepreneurs (second quartile).

Table 2: Average predicted probability that the business is open or partially open 6 weeks or more after the peak of the crisis.

| | Men-led businesses | Women-led businesses | Gender difference | Statistically significant |
|---|---|---|---|---|
| Aggregate unconditional | 85.9 | 84.5 | -1.4 | * |
| Aggregate conditional | 85.7 | 84.6 | -1.1 | * |
| Micro (0-4) | 83.5 | 81.0 | -2.6 | * |
| Small (5-19) | 84.0 | 84.5 | 0.4 | |
| Med and large (20+) | 89.1 | 87.5 | -1.6 | * |
| Manufacturing | 84.4 | 87.1 | 2.6 | * |
| Retail and wholesale | 90.0 | 88.6 | -1.4 | |
| Hospitality | 71.2 | 65.9 | -5.3 | * |
| Other services | 86.4 | 81.7 | -4.7 | * |
| Others | 87.9 | 87.4 | -0.5 | |
| Low and lower middle | 84.5 | 83.2 | -1.3 | * |
| Upper middle and high | 88.0 | 87.2 | -0.8 | |
| Q1 in mobility drop | 84.0 | 84.2 | 0.2 | |
| Q2 in mobility drop | 84.7 | 86.7 | 2.0 | * |
| Q3 in mobility drop | 91.4 | 87.8 | -3.6 | * |
| Q4 in mobility drop | 83.3 | 80.6 | -2.7 | * |

* indicates statistical significance of the gender difference at the 5% level. Averages over the full sample. Full set of results available in the appendix. The aggregate unconditional average is the estimate for $\beta$ in Equation 1. The other predictions exploit the estimates for Equation 2. The aggregate conditional average is the predicted value of the outcome if every business in the sample were led by a man/woman. The predicted averages in the following rows condition on other characteristics of the business in addition to the gender of the owner or manager.

### 5.2 Supply shocks

Supply shocks in the survey are reductions in operating hours and/or reductions in the availability of inputs or raw materials. Overall, women-led businesses do not exhibit a higher likelihood of experiencing these supply disruptions as a result of the COVID-19 shock. The average predicted probability of reporting supply shocks is around 72% for both men- and women-led businesses, regardless of whether or not we control for size and sector and include interactions in the conditional model (Table 3).

Examining particular sectors using the conditional estimates shows that the gender gap in supply shocks is only statistically significant in the hospitality industry (9 pp), where the fraction of women entrepreneurs is disproportionately high. Across income groups, the gender gap is statistically significant and to the disadvantage of women in low-income and lower-middle-income countries (4.8 pp) whereas businesses in

upper-middle-income and high-income countries exhibit a gender gap to the disadvantage of men (-4.2 pp). Finally, the gender difference in the likelihood of reporting supply shocks among businesses in countries with more severe shocks (in the top quartile of the mobility drop) is statistically significant and to the disadvantage of women (3.7 pp).

Table 3: Average predicted probability of reporting supply shocks.

| | Men-led businesses | Women-led businesses | Gender difference | Statistically significant |
|---|---|---|---|---|
| Aggregate unconditional | 71.6 | 72.6 | 1.1 | |
| Aggregate conditional | 71.9 | 72.7 | 0.8 | |
| Micro (0-4) | 71.0 | 68.6 | -2.4 | |
| Small (5-19) | 73.4 | 75.0 | 1.6 | |
| Med and large (20+) | 70.9 | 72.7 | 1.8 | |
| Manufacturing | 72.1 | 73.4 | 1.3 | |
| Retail and wholesale | 73.0 | 72.4 | -0.6 | |
| Hospitality | 73.5 | 82.5 | 9.0 | * |
| Other services | 71.6 | 72.2 | 0.6 | |
| Others | 68.6 | 67.5 | -1.1 | |
| Low and lower middle | 68.6 | 73.5 | 4.8 | * |
| Upper middle and high | 75.9 | 71.8 | -4.2 | * |
| Q1 in mobility drop | 71.8 | 70.7 | -1.1 | |
| Q2 in mobility drop | 69.9 | 69.7 | -0.2 | |
| Q3 in mobility drop | 72.1 | 73.1 | 1.0 | |
| Q4 in mobility drop | 74.3 | 78.0 | 3.7 | * |

* indicates statistical significance of the gender difference at the 5% level. Averages over the full sample. Full set of results available in the appendix. The aggregate unconditional average is the estimate for $\beta$ in Equation 1. The other predictions exploit the estimates for Equation 2. The aggregate conditional average is the predicted value of the outcome if every business in the sample were led by a man/woman. The predicted averages in the following rows condition on other characteristics of the business in addition to the gender of the owner or manager.

In our sample, in line with many other studies, women-led businesses tend to employ more women compared to their male peers–the (statistically significant) difference in the share of women employees between women- and men-led firms is 18 pp.[14] This disproportionate share of women employees, which we have not included as a covariate in our empirical specifications, could explain the increased likelihood of experiencing (labor) supply disruptions for some women-led firms, especially in countries more severely affected by the crisis. Mobility restrictions and closures in schools and nurseries associated with lockdowns have disproportionately increased the need for women to allocate time to housework and childcare relative to

[14]Coefficient on the dummy for whether the business is led by a woman in a linear regression that controls also for fixed effects for sector, size, income group, and region.

men. As as result of this and potentially other factors, women were more likely than men to stop working during the initial stages of the pandemic (Kugler et al., 2021). For the women-led firms in our sample, this increased demand for caregivers in the home during the pandemic could have resulted in fewer employees available to operate regularly, which would translate in our estimates into a disproportionate supply shock. Another potential explanation is that women-led firms within a country-sector could employ a different technology mix compared to their male peers (another omitted variable in our specifications) which would result in a different impact from the crisis. And lastly, women-led firms even in the same sector may face a different sub-market, which could respond differently in terms of supply. Hardy and Kagy (2018, 2020), for example, find that in the garment industry in Ghana, women mainly produce garments for women while men produce male garments. This could drive differentiated supply disruptions if producing female garments requires different inputs. Testing these alternative explanations, however, is outside the scope of this paper due to data limitations.

### 5.3 Change in sales revenues

The negative impact of the pandemic on sales revenues has been large and widespread (Apedo-Amah et al., 2020) and women-led businesses report on average larger declines in sales revenue relative to men-led businesses (Table 4), which suggests a widening of the gender gap in enterprise performance during the crisis. The unconditional aggregate fitted difference is -2 pp, which declines to -1.8 pp when we control for size and sector in the conditional estimation. This indicates that a fraction of the unconditional difference reflects differences between men and women in the size and industry of their businesses.

These results seem to be driven specifically by female-led micro- and small businesses, businesses in hospitality and other services, businesses in low and lower middle income countries, and in countries more severely affected by the shock (above the median in mobility drop).

Among micro-businesses the gender gap averages -2.0 pp (to the disadvantage of women), and -2.3 pp among small firms. Across industries, the gap is -7.4 pp in the hospitality industry (mainly hotels and restaurants) and -2.7 pp in other services (such as ITC, financial services, professional services, personal care). In low and lower middle income countries, the decline in sales revenue is 3.5 pp larger among businesses led by women. Finally, among businesses in countries more affected by the COVID-19 shock (above the median in the mobility drop) the gender gap averages -4 pp in the third quartile and -3.2 pp in the fourth (to the disadvantage of women). These results are even more concerning given the widely documented evidence of women entrepreneurs' lower levels of labor productivity and sales revenues even before the onset of the pandemic, which seem to have widened in the early phase of the crisis.

Table 4: Average predicted percentage change in sales relative to the same period of 2019.

| | Men-led businesses | Women-led businesses | Gender difference | Statistically significant |
|---|---|---|---|---|
| Aggregate unconditional | -43.2 | -45.2 | -2.0 | * |
| Aggregate conditional | -43.4 | -45.2 | -1.8 | * |
| Micro (0-4) | -47.9 | -49.9 | -2.0 | * |
| Small (5-19) | -45.1 | -47.4 | -2.3 | * |
| Med and large (20+) | -38.7 | -40.0 | -1.3 | |
| Manufacturing | -42.0 | -43.5 | -1.5 | * |
| Retail and wholesale | -39.2 | -39.8 | -0.6 | |
| Hospitality | -60.4 | -67.8 | -7.4 | * |
| Other services | -46.8 | -49.6 | -2.7 | * |
| Others | -41.2 | -42.1 | -1.0 | |
| Low and lower middle | -43.2 | -46.8 | -3.5 | * |
| Upper middle and high | -43.6 | -42.8 | 0.8 | |
| Q1 in mobility drop | -40.5 | -41.9 | -1.4 | |
| Q2 in mobility drop | -45.7 | -44.3 | 1.4 | |
| Q3 in mobility drop | -40.7 | -44.6 | -4.0 | * |
| Q4 in mobility drop | -46.7 | -50.0 | -3.2 | * |

* indicates statistical significance of the gender difference at the 5% level. Averages over the full sample. Full set of results available in the appendix. The aggregate unconditional average is the estimate for $\beta$ in Equation 1. The other predictions exploit the estimates for Equation 2. The aggregate conditional average is the predicted value of the outcome if every business in the sample were led by a man/woman. The predicted averages in the following rows condition on other characteristics of the business in addition to the gender of the owner or manager.

### 5.4 Financial risks

The COVID-19 shock was associated with a sharp decline in firm liquidity as many firms reported severe difficulties in meeting their financial obligations (Apedo-Amah et al., 2020). The BPS and WBES surveys measure liquidity constraints and financial risks among firms using two questions that seek to capture the ability to meet their current financial obligations (e.g. rents, wages, interest payments, etc.) and the likelihood to be in or soon fall into arrears.[15]

At the time of the interview, women-led businesses reported on average less cash available to cover their costs (Table 5). Men-led businesses report on average the predicted equivalent of 70 days of cash available to cover costs, whereas women-led businesses report only 61 days, a statistically significant gap. When controlling for size and sector using the conditional model, the difference remains statistically significant, indicating that most of the difference in available liquidity between men-led and women-led businesses does

[15]The two questions read *(i)*As of today, for how many days could this establishment continue paying all costs and payments with the cash available? *(ii)* Is it expected that this establishment will fall in arrears in any of its outstanding liabilities in the next 6 months?

not reflect the selection of men and women into enterprises or different sizes and/or enterprises operating in different sectors. These cash shortages are consistent with barriers to financing that women-led businesses faced before the pandemic and a drying up of alternative sources (personal savings, borrowing from friends and family), which were affected by the pandemic. Compared to male peers, women entrepreneurs tend to have less access to formal financing and financial services, and face larger credit shortages (Bruhn et al., 2017). Moreover, in low and middle income countries, women are less likely to borrow to start, operate, or expand a farm or a business compared to men (28% lower likelihood); they are less likely to finance their business with personal savings (33% gap); and are also less likely to borrow (for business or other purposes) from financial institutions (24% gap).[16]

The predicted gender difference in available liquidity is not statistically significant among micro-businesses but increases with the size of the firm to the disadvantage of women for larger firms–almost 9.5 fewer days among small firms; 12 fewer days among medium and large firms. Across sectors, we find that the predicted gender gap averages -10.4 days in hospitality and -7.9 days in other services, industries with a relatively high fraction of women entrepreneurs. In retail and wholesale the gap is statistically significant as well (-11.9). We do not find a clear pattern across severity of the shock.

Despite these important differences in the liquidity available to cover costs, women-led businesses are not on average more likely to report falling into arrears or expecting to fall into arrears. The average predicted gender gap is not statistically different from zero in either the unconditional or the conditional specification. However, this average effect is hiding important heterogeneity across sectors. Women-led businesses in hospitality are comparatively more likely to report falling in arrears (a statistically significant gap of 6.4 pp). We also find that the gap is large and significant and to the disadvantage of women among businesses in the third quartile of the mobility drop (3.7 pp), but not among countries in the top quartile.

[16]The World Bank Gender Data Portal.

Table 5: Average predicted number of days that the business can cover costs with the cash available.

| | Men-led businesses | Women-led businesses | Gender difference | Statistically significant |
|---|---|---|---|---|
| Aggregate unconditional | 69.9 | 61.4 | -8.4 | * |
| Aggregate conditional | 69.1 | 60.8 | -8.3 | * |
| Micro (0-4) | 66.8 | 67.8 | 0.9 | |
| Small (5-19) | 67.9 | 58.5 | -9.4 | * |
| Med and large (20+) | 71.7 | 59.4 | -12.3 | * |
| Manufacturing | 63.6 | 60.6 | -3.0 | |
| Retail and wholesale | 72.4 | 60.4 | -11.9 | * |
| Hospitality | 64.5 | 54.1 | -10.4 | * |
| Other services | 68.0 | 60.1 | -7.9 | * |
| Others | 80.5 | 67.1 | -13.3 | * |
| Low and lower middle | 95.0 | 81.7 | -13.3 | * |
| Upper middle and high | 27.9 | 27.6 | -0.3 | |
| Q1 in mobility drop | 53.0 | 48.8 | -4.2 | |
| Q2 in mobility drop | 76.9 | 58.8 | -18.1 | * |
| Q3 in mobility drop | 79.0 | 75.0 | -4.0 | |
| Q4 in mobility drop | 67.8 | 57.7 | -10.1 | * |

* indicates statistical significance of the gender difference at the 5% level. Averages over the full sample. Full set of results available in the appendix. The aggregate unconditional average is the estimate for $\beta$ in Equation 1. The other predictions exploit the estimates for Equation 2. The aggregate conditional average is the predicted value of the outcome if every business in the sample were led by a man/woman. The predicted averages in the following rows condition on other characteristics of the business in addition to the gender of the owner or manager.

One reason that different businesses may report different levels of liquidity problems could be driven by the fact that they have faced different demand shocks and experienced different levels of sales drop. We address this issue in Figure 1 where we show the correlation between change in sales revenue and the measures of financial fragility, after controlling for a number of confounding factors (i.e. size, sector, income group, and region, timing of the interview, and severity of the shock). The left panel shows that while on average businesses that experienced larger sales drop tend to have more liquidity problems, businesses led by women report significantly less cash available when experiencing a similar shock to sales revenue. The right panel shows that experiencing larger drops in sales revenue is associated with a disproportionately higher likelihood of falling in arrears if the business is led by a woman, that is, the estimated elasticity between the likelihood of falling in arrears and the percentage change in sales is larger among women-led businesses. The difference between men-led and women-led businesses in both panels is statistically significant. These results could reflect that women-led enterprises, due to a variety of constraints, often achieve lower levels of productivity and profitability than men-led enterprises, which may have reduced their ability to accumulate savings and

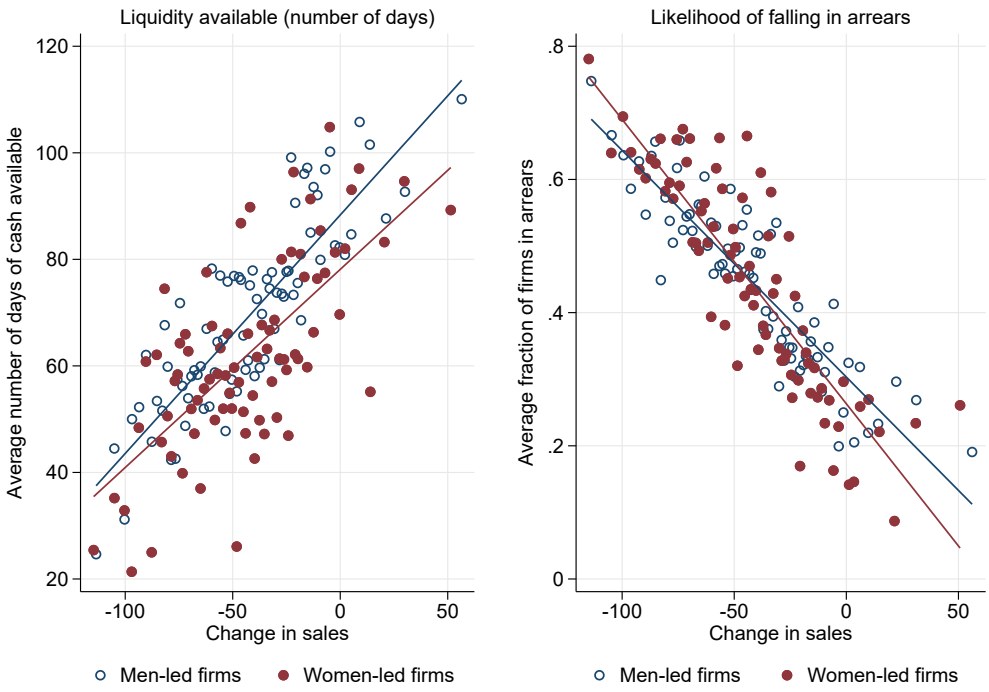
reserves prior to the onset of COVID-19 (e.g. Islam et al., 2020). They could also reflect the disproportionate deterioration in business performance (in terms of sales revenues, temporary business closures) that was experienced by women-led firms during COVID-19 and/or gender gaps in access to financial products, such as savings accounts (Demirgüç-Kunt et al., 2020).

Table 6: Average predicted probability of reporting falling in arrears or expecting to fall in arrears.

| | Men-led businesses | Women-led businesses | Gender difference | Statistically significant |
|---|---|---|---|---|
| Aggregate unconditional | 44.7 | 44.7 | -0.0 | |
| Aggregate conditional | 44.8 | 45.2 | 0.4 | |
| Micro (0-4) | 45.2 | 45.3 | 0.1 | |
| Small (5-19) | 48.1 | 48.2 | 0.1 | |
| Med and large (20+) | 41.4 | 42.2 | 0.8 | |
| Manufacturing | 43.9 | 42.5 | -1.5 | |
| Retail and wholesale | 43.7 | 41.2 | -2.5 | |
| Hospitality | 51.6 | 58.0 | 6.4 | * |
| Other services | 43.9 | 47.7 | 3.9 | |
| Others | 46.4 | 50.4 | 4.0 | |
| Low and lower middle | 46.2 | 47.2 | 1.0 | |
| Upper middle and high | 42.6 | 42.1 | -0.5 | |
| Q1 in mobility drop | 40.4 | 41.6 | 1.3 | |
| Q2 in mobility drop | 41.0 | 37.8 | -3.2 | |
| Q3 in mobility drop | 47.0 | 50.6 | 3.7 | * |
| Q4 in mobility drop | 49.6 | 48.5 | -1.1 | |

* indicates statistical significance of the gender difference at the 5% level. Averages over the full sample. Full set of results available in the appendix. The aggregate unconditional average is the estimate for $\beta$ in Equation 1. The other predictions exploit the estimates for Equation 2. The aggregate conditional average is the predicted value of the outcome if every business in the sample were led by a man/woman. The predicted averages in the following rows condition on other characteristics of the business in addition to the gender of the owner or manager.

Figure 1: Correlation between financial risks and change in sales revenue.




Note: Binned scatterplots. Computation use weights equal to the inverse of the number of observations in each country. Variables in both axes are residuals from linear projections on fixed effects for size, sector, income group, geographical region, timing of the survey, and severity of the shock.

### 5.5 Prospects for the future

The shock from the COVID-19 pandemic was unexpected and generated high levels of uncertainty about the future (Altig et al., 2020). Economic agents are uncertain about several factors which are likely to shape future demand (including future travel patterns, type of public policy support, consumption and employment patterns, the levels of consumers and businesses confidence, as well as movement restrictions and health outcomes) and such high levels of uncertainty could significantly impact investment and slow down the recovery (Altig et al., 2020; Bernanke, 1983; Dixit et al., 1994).

In this section we explore gender gaps along two dimensions related to future prospects, i.e. sales growth expectations, and uncertainty about future sales growth. The survey asked respondents about their expectations about sales in the next 6 months under three scenarios - normal, optimistic and pessimistic scenarios. Respondents were then asked to assign subjective probabilities to the occurrence of each of these three scenarios. We construct a measure of sales growth expectations and uncertainty following the methods developed in Altig et al. (2020) and we estimate gender gaps for these measures.[17]

Our results suggest that on average, when we control for the characteristics of the firm, women-led businesses are slightly more optimistic about the future but not more uncertain (the difference is not statistically significant). We present the results for expected sales growth in Table 7. When we control for a series of firm characteristics such as the size category and sector, we find that on average women-led businesses have

[17] We apply a variant of this method developed in Apedo-Amah et al. (2020) in this paper.

higher expected sales growth of 2.2 pp relative to men-led ones. The results seem to be heterogeneous across different dimensions, and are driven by medium-sized and large businesses, businesses in manufacturing and the commerce sector, and businesses located in upper-middle and high income countries.

Table 7: Average predicted percentage growth in sales in the coming 6 months (relative to the same period of 2019).

| | Men-led businesses | Women-led businesses | Gender difference | Statistically significant |
|---|---|---|---|---|
| Aggregate unconditional | -6.0 | -4.0 | 2.0 | * |
| Aggregate conditional | -6.1 | -3.9 | 2.2 | * |
| Micro (0-4) | -4.3 | -1.2 | 3.1 | |
| Small (5-19) | -5.5 | -3.9 | 1.7 | |
| Med and large (20+) | -7.4 | -4.7 | 2.7 | * |
| Manufacturing | -5.8 | -1.3 | 4.4 | * |
| Retail and wholesale | -7.4 | -1.0 | 6.4 | * |
| Hospitality | -10.3 | -9.5 | 0.8 | |
| Other services | -5.0 | -5.8 | -0.8 | |
| Others | -4.9 | -7.0 | -2.1 | |
| Low and lower middle | -1.5 | 0.4 | 1.9 | |
| Upper middle and high | -20.9 | -17.7 | 3.2 | * |
| Q1 in mobility drop | 26.8 | 28.9 | 2.1 | |
| Q2 in mobility drop | 18.3 | 32.0 | 13.7 | * |
| Q3 in mobility drop | -20.3 | -17.9 | 2.5 | |
| Q4 in mobility drop | -9.1 | -11.6 | -2.5 | |

* indicates statistical significance of the gender difference at the 5% level. Averages over the full sample. Full set of results available in the appendix. The aggregate unconditional average is the estimate for $\beta$ in Equation 1. The other predictions exploit the estimates for Equation 2. The aggregate conditional average is the predicted value of the outcome if every business in the sample were led by a man/woman. The predicted averages in the following rows condition on other characteristics of the business in addition to the gender of the owner or manager.

We also examine gender gaps in our uncertainty measure about future sales growth and present the results in Table 8. On average, we do not find statistically significant differences in uncertainty between women-led and men-led businesses in either the unconditional or the conditional models. Digging further into the unconditional results, Table 8 suggests that in countries more severely affected by the shock (top quartile) women-led businesses are comparatively more uncertain (4.5 pp).

Table 8: Average predicted uncertainty about sales growth.

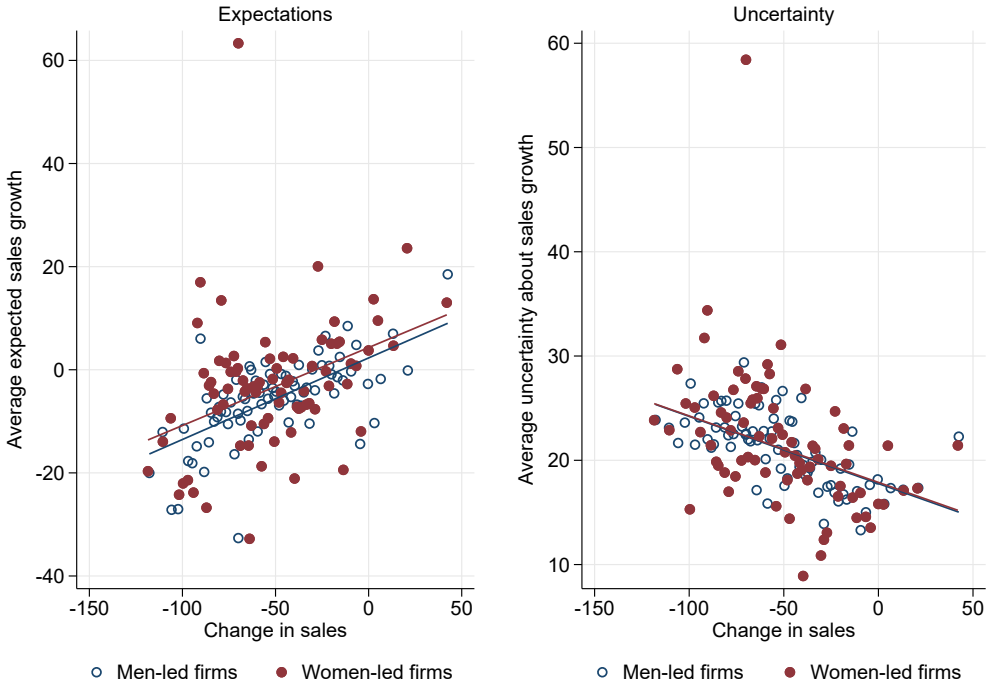
| | Men-led businesses | Women-led businesses | Gender difference | Statistically significant |
|---|---|---|---|---|
| Aggregate unconditional | 21.1 | 21.3 | 0.2 | |
| Aggregate conditional | 21.0 | 21.6 | 0.6 | |
| Micro (0-4) | 21.0 | 22.0 | 1.0 | |
| Small (5-19) | 21.6 | 21.9 | 0.4 | |
| Med and large (20+) | 20.4 | 21.1 | 0.8 | |
| Manufacturing | 21.3 | 22.3 | 1.0 | |
| Retail and wholesale | 18.6 | 20.3 | 1.7 | |
| Hospitality | 23.3 | 21.7 | -1.7 | |
| Other services | 20.7 | 22.1 | 1.4 | |
| Others | 22.2 | 21.5 | -0.8 | |
| Low and lower middle | 23.3 | 24.6 | 1.4 | * |
| Upper middle and high | 13.9 | 12.1 | -1.8 | * |
| Q1 in mobility drop | 13.6 | 13.8 | 0.2 | |
| Q2 in mobility drop | 17.6 | 15.3 | -2.3 | |
| Q3 in mobility drop | 22.9 | 22.9 | -0.0 | |
| Q4 in mobility drop | 26.2 | 30.7 | 4.5 | * |

* indicates statistical significance of the gender difference at the 5% level. Averages over the full sample. Full set of results available in the appendix. The aggregate unconditional average is the estimate for $\beta$ in Equation 1. The other predictions exploit the estimates for Equation 2. The aggregate conditional average is the predicted value of the outcome if every business in the sample were led by a man/woman. The predicted averages in the following rows condition on other characteristics of the business in addition to the gender of the owner or manager.

Prospects for future sales growth could be different because businesses faced different changes in sales. To assess if this is the key driver of our results, we show in the left hand panel of Figure 2 the conditional correlation between expected sales growth and the change in sales.[18] The graph shows that for any given level of percentage change in sales, women-led businesses have higher expectations of sales growth than men-led businesses (although the gender difference is not statistically significant). In contrast, the right hand panel shows that men-led and women-led businesses exhibit the same average uncertainty for any given drop in sales revenues. Combined, these results suggest that the gender gaps in uncertainty could be driven by the larger drops in sales revenue among women-led businesses (Table 4), whereas the gender gaps in expected sales growth could be driven by a higher optimism among women.

[18]The figure controls for firm size, sector, income group, geographical region, timing of the survey and severity of the shock fixed effects.

Figure 2: Correlation between prospects about the future and change in sales revenue.




Note: Binned scatterplots. Computation use weights equal to the inverse of the number of observations in each country. Variables in both axes are residuals from linear projections on fixed effects for size, sector, income group, geographical region, timing of the survey, and severity of the shock.

## 6. Responses

The previous section described how the COVID-19 shock impacted women- and men-led businesses, and showed that female entrepreneurs were disproportionately affected along a number of key dimensions. In this section, we analyze differences between women-led and men-led businesses in the ways they responded to the COVID-19 shock. We consider three types of responses to the crisis: labor adjustment (e.g. the probability to lay off workers or reduce working hours, wages or benefits), technology adoption (e.g. increased use of digital technology and investment in digital platforms) and product innovation (i.e. changes in the product and services mix of the firm).

### 6.1 Labor adjustments

The survey included a series of questions on the ways businesses have adjusted their labor costs on both the extensive–laying off workers–and intensive margins–reduction in wages and working hours, and granting paid and unpaid leave of absence.[19] Overall, businesses have adopted a combination of both approaches (Apedo-Amah et al., 2020) but the main adjustment across the world in the early months of the pandemic has been on the intensive margin. We examine gender differences in these adjustments in Table 9 and Table 10.

[19]Businesses are considered to have adjusted labor on the intensive margin if they reported having applied any of the three adjustments: grant leave of absence, reduce wages or benefits, or reduce hours worked.

Table 9: Average predicted probability of laying off workers.

| | Men-led businesses | Women-led businesses | Gender difference | Statistically significant |
|---|---|---|---|---|
| Aggregate unconditional | 14.1 | 14.3 | 0.2 | |
| Aggregate conditional | 14.0 | 14.7 | 0.6 | |
| Micro (0-4) | 10.0 | 10.3 | 0.3 | |
| Small (5-19) | 14.5 | 15.5 | 1.0 | |
| Med and large (20+) | 16.2 | 16.7 | 0.6 | |
| Manufacturing | 14.5 | 14.8 | 0.2 | |
| Retail and wholesale | 12.3 | 12.8 | 0.5 | |
| Hospitality | 19.2 | 18.9 | -0.3 | |
| Other services | 14.1 | 15.7 | 1.6 | |
| Others | 13.2 | 14.1 | 0.9 | |
| Low and lower middle | 10.8 | 12.8 | 2.0 | * |
| Upper middle and high | 21.9 | 19.4 | -2.4 | * |
| Q1 in mobility drop | 10.0 | 12.1 | 2.1 | * |
| Q2 in mobility drop | 15.5 | 13.1 | -2.4 | * |
| Q3 in mobility drop | 21.0 | 22.5 | 1.5 | |
| Q4 in mobility drop | 11.8 | 12.4 | 0.6 | |

* indicates statistical significance of the gender difference at the 5% level. Averages over the full sample. Full set of results available in the appendix. The aggregate unconditional average is the estimate for $\beta$ in Equation 1. The other predictions exploit the estimates for Equation 2. The aggregate conditional average is the predicted value of the outcome if every business in the sample were led by a man/woman. The predicted averages in the following rows condition on other characteristics of the business in addition to the gender of the owner or manager.

On average, we do not find a statistically significant difference between women-led and men-led businesses in either the unconditional or the conditional predicted likelihood of laying off workers (although in some more narrow groups of businesses women-led businesses seem more likely to lay off workers). Similarly, we do not find a significant overall gap between men- and women-led businesses in the likelihood of adjusting their employment on the intensive margins in either the unconditional or the conditional model (see Table 10). However, when we examine particular groups of businesses, we find that these averages hide a certain degree of heterogeneity across specific groups. Specifically, women-led micro-businesses are comparatively more likely to adjust their labor on the intensive margin (the statistically significant gap approximates 8.3 pp). Similarly, women-led businesses in the hospitality industry are 6 pp more likely to introduce leave of absence or reduce wages or hours of their employees.

Table 10: Average predicted probability of reporting adjustments on the intensive margin.

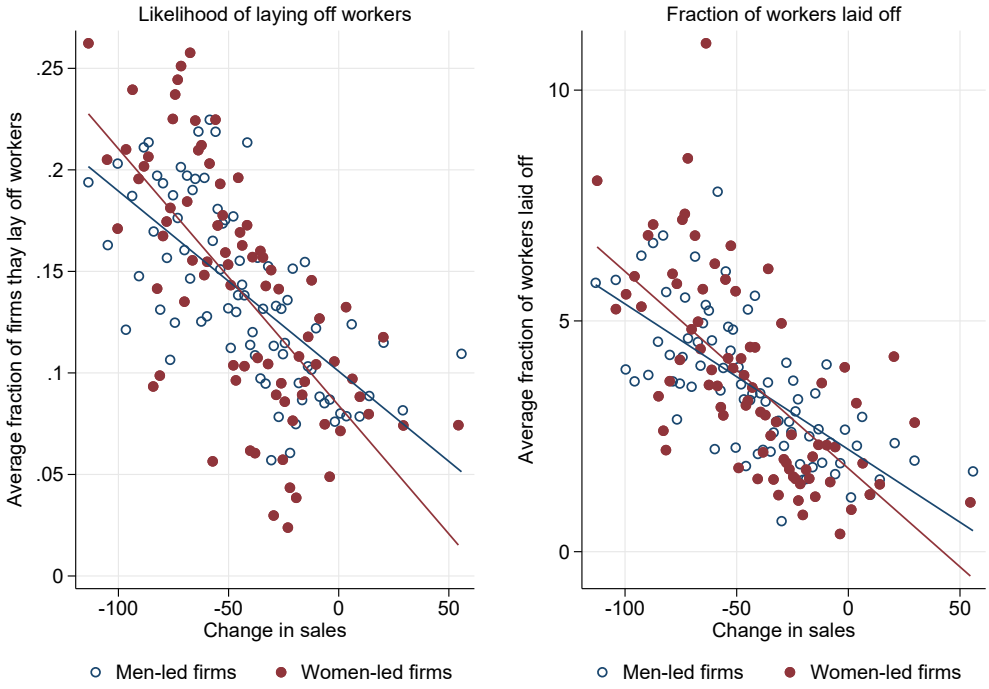
| | Men-led businesses | Women-led businesses | Gender difference | Statistically significant |
|---|---|---|---|---|
| Aggregate unconditional | 45.5 | 46.6 | 1.1 | |
| Aggregate conditional | 45.6 | 46.7 | 1.1 | |
| Micro (0-4) | 33.6 | 41.9 | 8.3 | * |
| Small (5-19) | 49.2 | 48.8 | -0.4 | |
| Med and large (20+) | 49.7 | 47.7 | -2.1 | |
| Manufacturing | 46.8 | 47.9 | 1.1 | |
| Retail and wholesale | 40.4 | 43.5 | 3.1 | * |
| Hospitality | 53.7 | 59.6 | 6.0 | * |
| Other services | 50.5 | 47.9 | -2.6 | |
| Others | 41.8 | 41.3 | -0.4 | |
| Low and lower middle | 43.0 | 43.5 | 0.5 | |
| Upper middle and high | 50.4 | 52.7 | 2.3 | * |
| Q1 in mobility drop | 33.7 | 34.7 | 1.0 | |
| Q2 in mobility drop | 49.4 | 50.1 | 0.7 | |
| Q3 in mobility drop | 52.4 | 54.3 | 2.0 | |
| Q4 in mobility drop | 48.7 | 49.4 | 0.6 | |

* indicates statistical significance of the gender difference at the 5% level. Averages over the full sample. Full set of results available in the appendix. The aggregate unconditional average is the estimate for $\beta$ in Equation 1. The other predictions exploit the estimates for Equation 2. The aggregate conditional average is the predicted value of the outcome if every business in the sample were led by a man/woman. The predicted averages in the following rows condition on other characteristics of the business in addition to the gender of the owner or manager.

In addition, women-led businesses adjust their labor force more decidedly relative to men-led businesses in response to drops in their sales revenue. In Figure 3 we explore the correlation between changes in sales revenue and the likelihood of laying off workers (left panel) and granting leave or reducing wages or hours (right panel) for men- and women-led businesses.[20] The results suggest that experiencing larger drops in sales revenue is associated with a larger likelihood of laying off workers or adjusting labor on the intensive margin (Apedo-Amah et al., 2020), but among those more severely affected by the crisis (with larger drops in sales) the increased propensity is even larger if the business is led by a woman (although the gender difference in the right panel is not statistically significant).

[20]The analysis corrects for variation in characteristics of the firm (size, sector, income group, and region), timing of the interview, and severity of the shock.

Figure 3: Correlation between likelihood of laying off workers and change in sales revenue.




Note: Binned scatterplots. Computation use weights equal to the inverse of the number of observations in each country. Variables in both axes are residuals from linear projections on fixed effects for size, sector, income group, geographical region, timing of the survey, and severity of the shock.

### 6.2 Digital technology adoption

In this section we examine gender gaps in technology adoption during the COVID-19 crisis. Studies prior to the crisis have tested whether women are more or less likely than men to use digital solutions. Fatehkia et al. (2018) estimate gender gaps in both internet penetration and mobile phone usage across countries using digital trace data from Facebook, and find that gaps in internet usage and mobile phone usage between men and women decrease with the stage of development of the country.[21] EIGE (2016) documents that women's usage of the internet to sell goods is 5 pp lower than men's usage, while women's usage of the internet to buy goods is 7 pp less than men's usage. Finally, (Ono and Zavodny, 2003) examine differences in men's and women's usage of the internet using data from several surveys during the period 1997 to 2001. They find that the frequency and intensity of internet usage by women is less than that of men, however, women's likelihood of having access to the internet is not significantly different from that of men since the year 2000. Other, more recent, studies document that women have lower digital literacy (Rowntree, 2018), and are on average, 14% less likely to own a mobile phone than men (De Paz Nieves et al., 2021). The literature, however, has remained relatively silent on whether such potential gender gaps exist during periods of large unanticipated economic shocks, which is the focus of this section.

[21] Women's internet usage is 24% lower than that of men in low-income countries, 14% lower in lower-middle-income countries, 8% lower in upper-middle-income countries and 5% lower in high-income countries. On mobile phone gender gaps, women's mobile phone usage is 21% lower than that of men in low-income countries, 10% lower in lower-middle-income countries, 4% lower in upper-middle-income countries and 2% lower in high-income countries.

In Table 11 we report both the unconditional and conditional estimates on the reported use of digital platforms (e.g. online social media, a web page) in response to the pandemic.[22] On average, women-led businesses are on average more likely than businesses led by men to report increasing the use of digital technology–a 2 pp gap favoring women in the unconditional estimates and 2.2 pp when we control for size and sector. This gender difference decreases with the size of the firm, from 10.4 pp among micro-firms–a markedly large gap–to -2.9 pp among businesses with 20+ employees. Similarly, the gaps are statistically significant in retail and wholesale and manufacturing, where women owners and managers are 5.7 and 3.8 pp more likely than their male peers to adopt the use of digital platforms. Women-led businesses are also more likely to increase the use of digital technology in low and lower middle income countries.

The survey also includes a question on new investments in equipment, software, or digital solutions.[23] We test differences between men and women owners and managers in this variable in Table 12. The results suggest a statistically significant overall difference in investment rates of -1.9 pp in the unconditional specification and -1.7 pp in the conditional one.

[22]Digital platforms are online businesses that facilitate commercial interactions between (at least) two different groups, typically suppliers and buyers for sales functions (e.g. Amazon, eBay, Alibaba), but also for other business functions such as payments or supply chain management. The question reads "Has this establishment started or increased the use of internet, online social media, specialized apps, or digital platforms in response to the COVID-19 outbreak?" The potential answers are: Yes, started; Yes, increased; No; Don't know (spontaneous).

[23]The question reads "Has this establishment invested in any new equipment, software, or digital solution in response to COVID-19?" The potential answers are: Yes; No.

Table 11: Average predicted probability of increasing the use of digital platforms.

| | Men-led businesses | Women-led businesses | Gender difference | Statistically significant |
|---|---|---|---|---|
| Aggregate unconditional | 27.6 | 29.6 | 2.0 | * |
| Aggregate conditional | 27.4 | 29.6 | 2.2 | * |
| Micro (0-4) | 17.2 | 27.6 | 10.4 | * |
| Small (5-19) | 26.1 | 28.7 | 2.6 | * |
| Med and large (20+) | 34.4 | 31.5 | -2.9 | * |
| Manufacturing | 22.8 | 26.6 | 3.8 | * |
| Retail and wholesale | 29.3 | 35.0 | 5.7 | * |
| Hospitality | 27.5 | 24.8 | -2.7 | |
| Other services | 35.7 | 34.2 | -1.5 | |
| Others | 25.5 | 22.6 | -2.8 | |
| Low and lower middle | 27.1 | 29.9 | 2.8 | * |
| Upper middle and high | 27.9 | 29.1 | 1.2 | |
| Q1 in mobility drop | 17.5 | 21.4 | 3.9 | * |
| Q2 in mobility drop | 32.1 | 30.4 | -1.7 | |
| Q3 in mobility drop | 34.1 | 38.5 | 4.4 | * |
| Q4 in mobility drop | 26.7 | 28.7 | 2.0 | |

* indicates statistical significance of the gender difference at the 5% level. Averages over the full sample. Full set of results available in the appendix. The aggregate unconditional average is the estimate for $\beta$ in Equation 1. The other predictions exploit the estimates for Equation 2. The aggregate conditional average is the predicted value of the outcome if every business in the sample were led by a man/woman. The predicted averages in the following rows condition on other characteristics of the business in addition to the gender of the owner or manager.

Table 12: Average predicted probability of investing in equipment, software, and digital solutions.

| | Men-led businesses | Women-led businesses | Gender difference | Statistically significant |
|---|---|---|---|---|
| Aggregate unconditional | 16.4 | 14.5 | -1.9 | * |
| Aggregate conditional | 16.2 | 14.4 | -1.7 | * |
| Micro (0-4) | 11.7 | 8.5 | -3.2 | |
| Small (5-19) | 12.8 | 11.9 | -0.8 | |
| Med and large (20+) | 21.3 | 18.8 | -2.5 | |
| Manufacturing | 13.8 | 12.1 | -1.7 | |
| Retail and wholesale | 17.2 | 14.0 | -3.2 | |
| Hospitality | 15.5 | 16.3 | 0.9 | |
| Other services | 22.2 | 18.3 | -3.9 | |
| Others | 13.3 | 14.1 | 0.9 | |
| Low and lower middle | 16.9 | 15.2 | -1.7 | |
| Upper middle and high | 14.3 | 12.7 | -1.7 | |
| Q1 in mobility drop | 10.5 | 7.9 | -2.6 | |
| Q2 in mobility drop | 22.1 | 19.5 | -2.6 | |
| Q3 in mobility drop | 14.2 | 11.7 | -2.4 | * |
| Q4 in mobility drop | 16.3 | 17.6 | 1.3 | |

* indicates statistical significance of the gender difference at the 5% level. Averages over the full sample. Full set of results available in the appendix. The aggregate unconditional average is the estimate for $\beta$ in Equation 1. The other predictions exploit the estimates for Equation 2. The aggregate conditional average is the predicted value of the outcome if every business in the sample were led by a man/woman. The predicted averages in the following rows condition on other characteristics of the business in addition to the gender of the owner or manager.

On the one hand, the crisis is arguably propelling women-run businesses towards digital platforms and closing the gender gap in internet usage that previous studies have documented (Fatehkia et al., 2018; EIGE, 2016; Ono and Zavodny, 2003; Rowntree, 2018). Our results suggest that moving to digital platforms (which can be as inexpensive as opening a profile on social media) is a compelling response to the crisis for female-led businesses, possibly because women have faced greater mobility restrictions due to lockdowns and increased childcare demands (De Paz Nieves et al., 2021). Such platforms can potentially help firms navigate mobility restrictions at a comparably low cost. However, these results could also be explained by a catch up effect, with women-led firms exhibiting greater potential to increase their use of digital technologies because they were using them less intensively before the crisis compared to their male peers. In other words, the gaps we document could reflect gaps in the pre-pandemic levels of digital adoption between men- and women-led businesses. On the other hand, our finding that investments in equipment, software, and digital solutions are greater for male-led businesses could suggest that these solutions may be more costly, which combined with the higher barriers to formal financing noted earlier, could potentially exacerbate the gender gaps in business

functions more complicated than sales and marketing (e.g. due to the higher costs of equipment or software for business administration, production planning, supply chain management).

### 6.3 Product innovation

Across the world, an estimated 26% of businesses reacted to the crisis repackaging their mix of products and services (Apedo-Amah et al., 2020). Table 13 shows that this fraction statistically significantly differs between men- and women-led businesses only in the unconditional model. Focusing more narrowly on specific groups of businesses, however, we find that women-led businesses in manufacturing and in countries more severely affected by the shock were more likely to repackage their products and services. In manufacturing, women-led businesses were 3.9 pp more likely than businesses led by men to innovate on products. In countries that were severely hit by the crisis (above the median in mobility drop) the gap averages between 3 and 4.8 pp, while the opposite pattern holds in countries that were less severely affected.

Table 13: Average predicted probability of repackaging the mix of products and services.

| | Men-led businesses | Women-led businesses | Gender difference | Statistically significant |
|---|---|---|---|---|
| Aggregate unconditional | 27.3 | 28.8 | 1.5 | * |
| Aggregate conditional | 27.5 | 28.3 | 0.9 | |
| Micro (0-4) | 27.6 | 25.0 | -2.6 | |
| Small (5-19) | 25.6 | 26.4 | 0.8 | |
| Med and large (20+) | 29.2 | 31.0 | 1.8 | |
| Manufacturing | 25.4 | 29.2 | 3.9 | * |
| Retail and wholesale | 30.0 | 29.7 | -0.3 | |
| Hospitality | 28.7 | 32.5 | 3.8 | |
| Other services | 31.7 | 28.9 | -2.8 | |
| Others | 21.6 | 18.3 | -3.2 | |
| Low and lower middle | 24.3 | 25.7 | 1.3 | |
| Upper middle and high | 31.2 | 31.4 | 0.2 | |
| Q1 in mobility drop | 38.4 | 34.6 | -3.8 | * |
| Q2 in mobility drop | 31.5 | 28.4 | -3.1 | * |
| Q3 in mobility drop | 19.5 | 22.4 | 3.0 | * |
| Q4 in mobility drop | 24.2 | 29.0 | 4.8 | * |

* indicates statistical significance of the gender difference at the 5% level. Averages over the full sample. Full set of results available in the appendix. The aggregate unconditional average is the estimate for $\beta$ in Equation 1. The other predictions exploit the estimates for Equation 2. The aggregate conditional average is the predicted value of the outcome if every business in the sample were led by a man/woman. The predicted averages in the following rows condition on other characteristics of the business in addition to the gender of the owner or manager.

## 7. Access to public support

Countries around the globe responded to the COVID-19 shocks by enacting several policy measures directly aimed at supporting firms (Cirera et al., 2021). In this section we examine whether women managers and owners report access to public support at different rates relative to men. Table 14 summarizes our findings. On average, women-led businesses were approximately 2.0 pp less likely to report accessing public support relative to businesses led by men, and this gap does not vary between the unconditional and the conditional specification.

We unmask these average differences by focusing on specific groups of businesses. When we condition on the size of the firm, the gender gap remains statistically significant and to the disadvantage of women–micro-businesses led by women were on average 4.4 pp less likely to report access to public support, and this gap declines to -0.9 among larger firms (20+ employees). Across sectors, the gender gap averages -3.9 pp in hospitality and -3.6 in other services. Finally, the gender difference is also statistically significant and to the disadvantage of women when we condition on the severity of the shock (but only in the bottom and top quartiles).

These findings are consistent with a recent study on the impacts of COVID-19 on firms in South Asia, where women-led firms were also found to have lower access to public support (Brucal et al., 2021). One potential reason could be that women entrepreneurs are sometimes found to have fewer and weaker social network ties than male entrepreneurs (e.g. Kim (2019) for the U.S.). This may disadvantage them in terms of accessing information about government support programs.

Table 14: Average predicted probability of reporting access to public support.

| | Men-led businesses | Women-led businesses | Gender difference | Statistically significant |
|---|---|---|---|---|
| Aggregate unconditional | 26.0 | 23.9 | -2.2 | * |
| Aggregate conditional | 26.0 | 23.8 | -2.2 | * |
| Micro (0-4) | 22.6 | 18.2 | -4.4 | * |
| Small (5-19) | 25.5 | 23.0 | -2.5 | * |
| Med and large (20+) | 27.9 | 27.0 | -0.9 | |
| Manufacturing | 24.5 | 23.5 | -1.0 | |
| Retail and wholesale | 24.1 | 22.4 | -1.7 | |
| Hospitality | 37.0 | 33.1 | -3.9 | * |
| Other services | 27.3 | 23.6 | -3.6 | * |
| Others | 26.0 | 22.4 | -3.5 | * |
| Low and lower middle | 17.1 | 14.5 | -2.6 | * |
| Upper middle and high | 36.5 | 34.1 | -2.4 | * |
| Q1 in mobility drop | 24.6 | 17.0 | -7.6 | * |
| Q2 in mobility drop | 26.0 | 24.4 | -1.6 | |
| Q3 in mobility drop | 23.2 | 23.4 | 0.2 | |
| Q4 in mobility drop | 29.8 | 27.4 | -2.3 | * |

* indicates statistical significance of the gender difference at the 5% level. Averages over the full sample. Full set of results available in the appendix. The aggregate unconditional average is the estimate for $\beta$ in Equation 1. The other predictions exploit the estimates for Equation 2. The aggregate conditional average is the predicted value of the outcome if every business in the sample were led by a man/woman. The predicted averages in the following rows condition on other characteristics of the business in addition to the gender of the owner or manager.

## 8. Concluding remarks

The global impact of the COVID-19 pandemic on economic growth and livelihoods has been unprecedented. Firms have faced a range of concurrent challenges, including suspensions of in-person operations and mobility restrictions, supply chain disruptions, and falling consumer demand. This work contributes to the emerging evidence of the severity of firm-level impacts, both across and within countries. Drawing on a large data set covering almost 40,000 firms across 49 mostly low- and middle-income countries collected early in the pandemic, we examine the heterogeneous impact of this crisis on women- versus men-led businesses. This deep dive into the gender differentiated impacts is motivated by existing research from prior to the pandemic, which shows that women-led firms select into different sectors and run businesses of different sizes relative men-owned or managed firms, and in addition, women-led firms have been shown to exhibit lower levels of labor and total factor productivity.

We examine three domains of outcomes. First, we examine seven measures related to the pandemic's impacts on business performance: business closures, disruptions in supply channels, changes in sales revenues,

liquidity and insolvency, and expectations and uncertainty about the future. Second, we examine the firms' responses to the crisis: adjustments in labor inputs, technology adoption, and product innovation. And finally, we examine a measure of the firms' access to public support. In each case we present unconditional and conditional results, which control for the size and the sector of the business, since it is well established by the existing literature that there are significant differences by sex in these key traits. Conditional results sometimes, but certainly not always, differ from the raw (unconditional) results. For example, female-led firms were statistically significantly less likely to have been open 6 weeks more from the peak of the crisis in the raw data, but this difference is smaller (though still significant) when controls are added.

At the aggregate level, women-led businesses reported having significantly less cash available to cover their costs (with a raw gap of 61 days that their business can carry costs, compared to 70 for men), although only women-led firms in the hospitality industry reported being more likely to expect to fall into arrears. The estimated elasticity between the likelihood of falling in arrears and the percentage change in sales is larger among women-led businesses, consistent with them having lower savings and reserves prior to the onset of COVID-19 (as other studies have shown).

Despite differences in these outcomes, on average, women-led firms did not report making larger labor adjustments than their male counterparts. They were, however, more likely to have increased the use of digital platforms and to report product innovations (only in the unconditional specification), but they exhibited a lower probability of having made new investments in software, equipment, or digital solutions. And although they have been hit harder in some domains, women-led businesses were less likely to have received some form of public support – both in the raw unconditional data and conditional on the firm size and sector, with the exception of medium sized firms.

These global findings, however, mask considerable heterogeneity in impacts by country types (by region, income level, and severity of the shock) and by firm size and sector. This heterogeneity across contexts and types of firms suggest that efforts to support disadvantaged women entrepreneurs would require a more nuanced and careful approach across different contexts than just targeting female-led businesses across the board. In arguably simplistic terms, we find that women-led micro-businesses, women-led businesses in the hospitality industry, and women-led businesses in countries more severely affected by the COVID-19 shock were disproportionately hit compared to similar businesses led by men. Looking forward, these data offer an opportunity to drill down into specific sectors and country types to further understand how women and men-led firms have been impacted, where differences emerge, and how policies can target specific groups to facilitate a robust recovery.

The main contribution of this paper is to provide a real-time glimpse at the business impacts of the unfolding coronavirus pandemic at a global scale, with a focus on differences between women and men-led enterprises. Due to the large country coverage of our data, we are able to identify patterns that extend beyond any one country, region or sector – and that will be important to track during the recovery phase. On the flipside, however, this bird's eye view implies that some granularity is lost and that we cannot easily test complex economic theories. The differences in the impact of the pandemic between women-led and men-led firms that we document could reflect a variety of factors, from both the demand and the supply sides. On the demand side, women could be providing products or services that differ from those of their male counterparts, even within the same sector. Hardy and Kagy (2018, 2020), for example, document within-sector differences in firm products (each catering to their gender) and more crowded markets for women entrepreneurs among

garment makers in Ghana, a not implausible pattern for some industries in the relatively traditional countries in our sample. On the supply side, differences in labor supply responses (from both the owner/manager and the business employees) could also be driving some of the effects we document. During the pandemic, mobility restrictions and closures of schools and daycare facilities have disproportionately increased the need for women to allocate time to housework and childcare relative to men (De Paz Nieves et al., 2021), and this increased demand for caregivers in the home during the pandemic could have resulted in time-constraints for female business owners and fewer employees available to operate regularly. Our BPS-WBES data, however, are not well suited to examine these underlying supply and demand channels (whose importance likely varies across countries). Still, when we examine the differentiated impact of the pandemic on firms with a disproportionate share of women employees (above the regional average), we find a statistically significant effect for the likelihood of reporting supply disruptions, the negative shock to sales, the availability of cash, and the likelihood of falling into arrears, which suggests that supply factors and the high fraction of women employees among women-led firms could partly drive the patterns we document.[24] Deep diving into this channel, however, is outside the scope of this paper.

[24]Results from linear regressions of each outcome on a dummy for whether the firm employs a fraction of women above the regional dummy and fixed effects for size, sector, income level, region, severity of the shock, and timing of the survey.

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## Appendix A: Full set of results

Table A1: Unconditional estimates of gender gaps in the operational status; supply shocks, the probability of falling into arrears, and access to public support of businesses

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Business is open | Supply Shocks | Falling into Arrears | Access to Public Support |
| Women | -0.069*** | 0.034 | -0.001 | -0.078*** |
| | (0.026) | (0.022) | (0.024) | (0.023) |
| Upper Middle and High | 0.198*** | 0.133*** | -0.142*** | 0.673*** |
| | (0.034) | (0.026) | (0.032) | (0.026) |
| ECA | 0.881*** | -0.673*** | -0.837*** | 0.408*** |
| | (0.049) | (0.046) | (0.048) | (0.045) |
| MNA | 0.849*** | -0.121** | -0.498*** | 0.105** |
| | (0.051) | (0.049) | (0.056) | (0.050) |
| LAC | 0.556*** | 0.121** | -0.551*** | 0.004 |
| | (0.051) | (0.057) | (0.056) | (0.055) |
| EAP | 0.894*** | -0.498*** | -0.347*** | 0.661*** |
| | (0.058) | (0.053) | (0.049) | (0.053) |
| SSA | 0.485*** | 0.110** | -0.382*** | -0.188*** |
| | (0.037) | (0.045) | (0.039) | (0.049) |
| Q2 in mobility drop | 0.019 | -0.067** | 0.002 | 0.102*** |
| | (0.037) | (0.030) | (0.039) | (0.037) |
| Q3 in mobility drop | 0.325*** | 0.022 | 0.201*** | 0.014 |
| | (0.038) | (0.033) | (0.036) | (0.037) |
| Q4 in mobility drop | -0.086** | 0.154*** | 0.250*** | 0.236*** |
| | (0.036) | (0.035) | (0.036) | (0.038) |
| Constant | -0.567*** | 1.121*** | 0.430*** | -1.557*** |
| | (0.053) | (0.057) | (0.057) | (0.062) |
| Observations | 36088 | 32214 | 22359 | 31900 |

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table A2: Unconditional estimates of gender gaps in labor market adjustments, the use and investment in digital technology, and product innovation

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Laid off Workers | Grant Leave, Reduce wages or hours | Use Digital Platforms | Invest in Digital solutions | Innovate on Products |
| Women | 0.011 | 0.030 | 0.061*** | -0.083* | 0.046* |
| | (0.025) | (0.022) | (0.021) | (0.044) | (0.025) |
| Upper Middle and High | 0.413*** | 0.234*** | -0.028 | -0.036 | 0.190*** |
| | (0.031) | (0.028) | (0.027) | (0.056) | (0.030) |
| ECA | -0.375*** | -0.509*** | 0.271*** | 0.435*** | 0.271*** |
| | (0.049) | (0.041) | (0.044) | (0.089) | (0.053) |
| MNA | 0.151*** | 0.122*** | 0.507*** | -0.576*** | -0.213*** |
| | (0.051) | (0.042) | (0.044) | (0.124) | (0.059) |
| LAC | 0.450*** | -0.404*** | 0.855*** | 0.956*** | 0.192*** |
| | (0.056) | (0.048) | (0.048) | (0.091) | (0.056) |
| EAP | 0.252*** | -0.317*** | 0.636*** | 0.143* | -0.331*** |
| | (0.065) | (0.058) | (0.049) | (0.079) | (0.062) |
| SSA | 0.593*** | -0.024 | 0.400*** | 0.653*** | 0.342*** |
| | (0.044) | (0.036) | (0.040) | (0.067) | (0.047) |
| Q2 in mobility drop | 0.182*** | 0.355*** | 0.385*** | 0.490*** | -0.212*** |
| | (0.033) | (0.030) | (0.031) | (0.088) | (0.039) |
| Q3 in mobility drop | 0.466*** | 0.495*** | 0.513*** | 0.192** | -0.538*** |
| | (0.037) | (0.033) | (0.034) | (0.092) | (0.038) |
| Q4 in mobility drop | 0.091** | 0.407*** | 0.296*** | 0.258*** | -0.345*** |
| | (0.039) | (0.033) | (0.034) | (0.095) | (0.037) |
| Constant | -2.077*** | 0.522*** | -1.371*** | -1.752*** | -0.446*** |
| | (0.058) | (0.049) | (0.054) | (0.136) | (0.061) |
| Observations | 35331 | 33970 | 34477 | 10814 | 23480 |

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table A3: Unconditional Estimates of Gender gaps on impact of COVID-19 on Sales, Liquidity, expectations of sales growth and Uncertainty

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Change in Sales | Available Liquidity | Predicted Sales Growth | Uncertainty of Prediction |
| Women | -2.013*** | -8.417*** | 2.036* | 0.224 |
| | (0.538) | (1.449) | (1.090) | (0.507) |
| Upper Middle and High | 1.938*** | -64.739*** | -20.534*** | -8.203*** |
| | (0.708) | (2.371) | (2.814) | (1.621) |
| ECA | 24.752*** | 52.401*** | 52.533*** | -3.209 |
| | (1.212) | (3.272) | (3.729) | (2.088) |
| MNA | 5.411*** | 6.522** | 2.988 | 1.293 |
| | (1.133) | (2.956) | (4.173) | (2.064) |
| LAC | 10.342*** | 5.414* | 103.876*** | -6.194*** |
| | (1.375) | (2.785) | (3.981) | (2.113) |
| EAP | 19.502*** | 7.599** | 21.962*** | -11.164*** |
| | (1.468) | (3.647) | (1.864) | (0.860) |
| SSA | 8.378*** | 23.363*** | 17.534*** | 1.814* |
| | (1.009) | (2.683) | (1.898) | (1.018) |
| Q2 in mobility drop | -5.417*** | 21.227*** | -7.024*** | 4.313*** |
| | (0.712) | (1.961) | (2.016) | (0.914) |
| Q3 in mobility drop | -2.091*** | 25.828*** | -46.772*** | 8.934*** |
| | (0.786) | (2.306) | (1.624) | (0.803) |
| Q4 in mobility drop | -7.533*** | 13.631*** | -35.819*** | 11.990*** |
| | (0.777) | (1.876) | (2.615) | (1.525) |
| Constant | -79.202*** | -1.798 | 49.534*** | 15.164*** |
| | (1.209) | (3.259) | (2.278) | (1.114) |
| Observations | 34899 | 26134 | 5958 | 5958 |

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table A4: Conditional estimates of gender gaps in the operational status; supply, the probability of falling into arrears, and access to public support of businesses

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Business is open | Supply Shocks | Falling into Arrears | Access to Public Support |
| Women | 0.127 | 0.00256 | -0.0118 | -0.406*** |
| | (0.096) | (0.086) | (0.099) | (0.103) |
| Small (5-19) | 0.0233 | 0.0760** | 0.0771* | 0.106*** |
| | (0.035) | (0.030) | (0.041) | (0.032) |
| Med and large (20+) | 0.292*** | -0.00575 | -0.103** | 0.189*** |
| | (0.038) | (0.032) | (0.043) | (0.034) |
| Small (5-19) × Women | 0.137** | 0.135** | 0.00220 | 0.0899 |
| | (0.064) | (0.060) | (0.087) | (0.063) |
| Med and large (20-99) × Women | 0.0291 | 0.137** | 0.0160 | 0.154** |
| | (0.070) | (0.062) | (0.088) | (0.064) |
| Retail and wholesale | 0.307*** | 0.0289 | -0.00545 | -0.0165 |
| | (0.043) | (0.032) | (0.036) | (0.033) |
| Hospitality | -0.512*** | 0.0460 | 0.206*** | 0.410*** |
| | (0.050) | (0.056) | (0.052) | (0.047) |
| Other services | 0.0969** | -0.0143 | -0.00262 | 0.0962** |
| | (0.042) | (0.036) | (0.040) | (0.037) |
| Others | 0.177*** | -0.107*** | 0.0671* | 0.0507 |
| | (0.044) | (0.036) | (0.039) | (0.038) |
| Retail and Wholesale × women | -0.217*** | -0.0620 | -0.0281 | -0.0288 |
| | (0.076) | (0.056) | (0.061) | (0.060) |
| Hospitality × women | -0.307*** | 0.295*** | 0.219** | -0.0736 |
| | (0.087) | (0.099) | (0.090) | (0.082) |
| Other services × Women | -0.353*** | -0.0250 | 0.147* | -0.0934 |
| | (0.080) | (0.068) | (0.076) | (0.069) |
| Others × women | -0.161* | -0.0796 | 0.149* | -0.0941 |
| | (0.095) | (0.078) | (0.083) | (0.081) |
| Upper Middle and High | 0.186*** | 0.239*** | -0.0983*** | 0.639*** |
| | (0.041) | (0.032) | (0.038) | (0.031) |
| Upper middle and high × women | 0.0210 | -0.297*** | -0.0407 | 0.0599 |
| | (0.054) | (0.047) | (0.050) | (0.048) |

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| | Business is open | Supply Shocks | Falling into Arrears | Access to Public Support |
|---|---|---|---|---|
| ECA | 0.853*** | -0.753*** | -0.840*** | 0.395*** |
| | (0.054) | (0.049) | (0.051) | (0.048) |
| MNA | 0.805*** | -0.143*** | -0.493*** | 0.0891* |
| | (0.055) | (0.052) | (0.060) | (0.052) |
| LAC | 0.491*** | 0.0511 | -0.518*** | -0.00279 |
| | (0.055) | (0.059) | (0.059) | (0.057) |
| EAP | 0.851*** | -0.580*** | -0.354*** | 0.625*** |
| | (0.063) | (0.056) | (0.052) | (0.056) |
| SSA | 0.519*** | 0.0519 | -0.403*** | -0.222*** |
| | (0.041) | (0.048) | (0.042) | (0.051) |
| Q2 in mobility drop | 0.0302 | -0.0595 | 0.0166 | 0.0513 |
| | (0.045) | (0.037) | (0.047) | (0.045) |
| Q3 in mobility drop | 0.423*** | 0.00971 | 0.178*** | -0.0502 |
| | (0.048) | (0.041) | (0.045) | (0.047) |
| Q4 in mobility drop | -0.0353 | 0.0799* | 0.248*** | 0.180*** |
| | (0.046) | (0.043) | (0.044) | (0.047) |
| Q2 in mobility drop × Women | 0.0952 | 0.0281 | -0.125 | 0.253*** |
| | (0.088) | (0.070) | (0.081) | (0.087) |
| Q3 in mobility drop × Women | -0.234*** | 0.0697 | 0.0671 | 0.317*** |
| | (0.084) | (0.070) | (0.072) | (0.084) |
| Q4 in mobility drop × Women | -0.130 | 0.169** | -0.0613 | 0.233*** |
| | (0.083) | (0.075) | (0.072) | (0.087) |
| Constant | -0.808*** | 1.131*** | 0.411*** | -1.662*** |
| | (0.068) | (0.068) | (0.069) | (0.074) |
| Observations | 35652 | 31497 | 22119 | 31492 |

Standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table A5: Conditional estimates of gender gaps in labor market adjustments, the use and investment in digital technology, and product innovation

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Laid off Workers | Grant Leave, Reduce wages or hours | Use Digital Platforms | Invest in Digital solutions | Innovate on Products |
| Women | 0.160* | 0.226*** | 0.536*** | -0.288 | -0.101 |
| | (0.087) | (0.076) | (0.078) | (0.302) | (0.110) |
| Small (5-19) | 0.238*** | 0.444*** | 0.321*** | 0.057 | -0.063 |
| | (0.032) | (0.027) | (0.031) | (0.094) | (0.052) |
| Med and large (20+) | 0.312*** | 0.458*** | 0.571*** | 0.423*** | 0.051 |
| | (0.035) | (0.030) | (0.032) | (0.096) | (0.052) |
| Small (5-19) × Women | 0.028 | -0.253*** | -0.285*** | 0.151 | 0.110 |
| | (0.060) | (0.054) | (0.055) | (0.216) | (0.087) |
| Med and large (20-99) × Women | 0.007 | -0.297*** | -0.452*** | 0.099 | 0.136 |
| | (0.065) | (0.058) | (0.057) | (0.219) | (0.087) |
| Retail and wholesale | -0.110*** | -0.177*** | 0.213*** | 0.152** | 0.145*** |
| | (0.039) | (0.031) | (0.031) | (0.061) | (0.038) |
| Hospitality | 0.197*** | 0.191*** | 0.157*** | 0.077 | 0.106* |
| | (0.051) | (0.047) | (0.046) | (0.076) | (0.056) |
| Other services | -0.018 | 0.104*** | 0.401*** | 0.346*** | 0.197*** |
| | (0.039) | (0.034) | (0.033) | (0.058) | (0.043) |
| Others | -0.064* | -0.139*** | 0.091** | -0.028 | -0.131*** |
| | (0.039) | (0.035) | (0.036) | (0.060) | (0.047) |
| Retail and Wholesale × women | 0.014 | 0.056 | 0.035 | -0.058 | -0.131** |
| | (0.066) | (0.056) | (0.054) | (0.125) | (0.061) |
| Hospitality × women | -0.020 | 0.132 | -0.215*** | 0.124 | -0.010 |
| | (0.091) | (0.081) | (0.080) | (0.150) | (0.091) |
| Other services × Women | 0.062 | -0.105 | -0.176*** | -0.061 | -0.208*** |
| | (0.075) | (0.065) | (0.063) | (0.126) | (0.077) |
| Others × women | 0.034 | -0.042 | -0.220*** | 0.129 | -0.238** |
| | (0.084) | (0.078) | (0.074) | (0.142) | (0.097) |
| Upper Middle and High | 0.495*** | 0.207*** | 0.027 | -0.116* | 0.216*** |
| | (0.037) | (0.033) | (0.033) | (0.063) | (0.036) |
| Upper middle and high × women | -0.197*** | 0.048 | -0.050 | -0.009 | -0.040 |
| | (0.051) | (0.045) | (0.044) | (0.102) | (0.050) |

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| | Laid off Workers | Grant Leave, Reduce wages or hours | Use Digital Platforms | Invest in Digital solutions | Innovate on Products |
|---|---|---|---|---|---|
| ECA | -0.501*** | -0.634*** | 0.112** | 0.522*** | 0.220*** |
| | (0.053) | (0.044) | (0.047) | (0.090) | (0.056) |
| MNA | 0.063 | 0.058 | 0.432*** | -0.556*** | -0.246*** |
| | (0.054) | (0.044) | (0.046) | (0.125) | (0.061) |
| LAC | 0.379*** | -0.487*** | 0.727*** | 0.855*** | 0.123** |
| | (0.059) | (0.050) | (0.050) | (0.095) | (0.058) |
| EAP | 0.118* | -0.425*** | 0.526*** | 0.151* | -0.353*** |
| | (0.069) | (0.061) | (0.051) | (0.080) | (0.065) |
| SSA | 0.571*** | -0.090** | 0.336*** | 0.651*** | 0.308*** |
| | (0.046) | (0.038) | (0.042) | (0.070) | (0.049) |
| Q2 in mobility drop | 0.289*** | 0.447*** | 0.495*** | 0.526*** | -0.194*** |
| | (0.040) | (0.035) | (0.038) | (0.096) | (0.049) |
| Q3 in mobility drop | 0.511*** | 0.529*** | 0.551*** | 0.196* | -0.586*** |
| | (0.044) | (0.040) | (0.043) | (0.102) | (0.048) |
| Q4 in mobility drop | 0.105** | 0.429*** | 0.328*** | 0.296*** | -0.421*** |
| | (0.048) | (0.040) | (0.043) | (0.108) | (0.048) |
| Q2 in mobility drop × Women | -0.235*** | -0.015 | -0.204*** | 0.068 | 0.013 |
| | (0.078) | (0.068) | (0.069) | (0.213) | (0.081) |
| Q3 in mobility drop × Women | -0.067 | 0.019 | -0.032 | 0.043 | 0.211*** |
| | (0.073) | (0.066) | (0.068) | (0.208) | (0.076) |
| Q4 in mobility drop × Women | -0.092 | -0.016 | -0.089 | 0.221 | 0.257*** |
| | (0.081) | (0.069) | (0.070) | (0.227) | (0.076) |
| Constant | -2.304*** | 0.268*** | -1.865*** | -2.041*** | -0.463*** |
| | (0.070) | (0.059) | (0.066) | (0.171) | (0.081) |
| Observations | 34572 | 33216 | 33694 | 10613 | 23130 |

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Table A6: Conditional Estimates of Gender gaps on impact of COVID-19 on Sales, Liquidity, expectations of sales growth and Uncertainty

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Change in Sales | Available Liquidity | Predicted Sales Growth | Uncertainty of Prediction |
| Women | -2.941 | 5.201 | 4.881 | 1.722 |
| | (1.804) | (4.752) | (5.146) | (2.342) |
| Small (5-19) | 2.822*** | 1.021 | -1.260 | 0.529 |
| | (0.685) | (2.090) | (2.190) | (1.059) |
| Med and large (20+) | 9.278*** | 4.843** | -3.091 | -0.669 |
| | (0.754) | (2.276) | (2.318) | (1.077) |
| Small (5-19) × Women | -0.259 | -10.324*** | -1.405 | -0.591 |
| | (1.350) | (3.888) | (4.860) | (2.173) |
| Med and large (20-99) × Women | 0.674 | -13.188*** | -0.397 | -0.208 |
| | (1.429) | (4.236) | (4.974) | (2.210) |
| Retail and wholesale | 2.816*** | 8.768*** | -1.609 | -2.722*** |
| | (0.735) | (2.132) | (1.554) | (0.809) |
| Hospitality | -18.423*** | 0.865 | -4.527** | 2.005* |
| | (1.245) | (2.855) | (2.072) | (1.064) |
| Other services | -4.816*** | 4.358* | 0.774 | -0.594 |
| | (0.812) | (2.266) | (1.557) | (0.740) |
| Others | 0.835 | 16.857*** | 0.896 | 0.912 |
| | (0.866) | (2.706) | (1.537) | (0.707) |
| Retail and Wholesale × women | 0.957 | -8.920** | 1.920 | 0.712 |
| | (1.310) | (3.553) | (2.859) | (1.452) |
| Hospitality × women | -5.864*** | -7.380 | -3.629 | -2.617 |
| | (2.005) | (5.544) | (4.705) | (2.042) |
| Other services × Women | -1.219 | -4.840 | -5.224* | 0.435 |
| | (1.532) | (4.010) | (2.825) | (1.343) |
| Others × women | 0.562 | -10.323* | -6.545** | -1.743 |
| | (1.794) | (5.478) | (3.115) | (1.421) |
| Upper Middle and High | -0.368 | -67.120*** | -19.376*** | -9.347*** |
| | (0.832) | (2.759) | (3.159) | (1.767) |
| Upper middle and high × women | 4.335*** | 12.975*** | 1.343 | -3.195*** |
| | (1.115) | (2.924) | (2.315) | (1.057) |

continued on next page

| | Change in Sales | Available Liquidity | Predicted Sales Growth | Uncertainty of Prediction |
|---|---|---|---|---|
| ECA | 22.763*** | 51.487*** | 51.126*** | -1.209 |
| | (1.265) | (3.500) | (4.224) | (2.324) |
| MNA | 2.968** | 6.670** | 3.978 | 2.931 |
| | (1.176) | (3.116) | (4.251) | (2.081) |
| LAC | 8.662*** | 6.500** | 102.182*** | -3.734 |
| | (1.394) | (2.990) | (4.450) | (2.338) |
| EAP | 15.998*** | 6.499* | 21.199*** | -11.181*** |
| | (1.514) | (3.886) | (2.116) | (0.977) |
| SSA | 9.410*** | 23.235*** | 17.366*** | 2.092* |
| | (1.051) | (2.909) | (2.054) | (1.082) |
| Q2 in mobility drop | -5.145*** | 23.908*** | -8.496*** | 3.971*** |
| | (0.827) | (2.455) | (2.118) | (0.953) |
| Q3 in mobility drop | -0.158 | 26.005*** | -47.129*** | 9.282*** |
| | (0.946) | (2.951) | (1.723) | (0.841) |
| Q4 in mobility drop | -6.198*** | 14.747*** | -35.871*** | 12.564*** |
| | (0.944) | (2.401) | (2.870) | (1.627) |
| Q2 in mobility drop $\times$ Women | 2.780* | -13.908*** | 11.590* | -2.467 |
| | (1.562) | (4.445) | (6.045) | (3.109) |
| Q3 in mobility drop $\times$ Women | -2.554 | 0.259 | 0.375 | -0.219 |
| | (1.556) | (4.512) | (3.086) | (1.321) |
| Q4 in mobility drop $\times$ Women | -1.823 | -5.852 | -4.640 | 4.265* |
| | (1.619) | (3.646) | (4.247) | (2.337) |
| Constant | -81.815*** | -8.737** | 51.681*** | 14.846*** |
| | (1.399) | (3.986) | (2.886) | (1.458) |
| Observations | 34126.000 | 25899.000 | 5952.000 | 5952.000 |

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

## Appendix B: Sampling frames in each economy

The analysis combines harmonized firm-level data from the first wave of the World Bank Business Pulse Surveys (BPS) and the COVID-19 follow-up of the World Bank Enterprise Surveys (WBES). We follow Apedo-Amah et al. (2020) and exclude permanently closed businesses (businesses that were contacted during data collection but reported that had permanently shut down the firm) and businesses in education and health. Table B1 lists the data source, the number of observations (total and where the gender indicator is available), and the fraction of women-led firms in each economy. Table B2 compares the distribution of observations in our final sample to the distribution of observations in the full sample.

Table B1: Sample sizes in the BPS and WBES surveys (businesses not permanently closed at the time of the interview).

| Region | Economy | Survey | Businesses interviewed* | Gender indicator available | Women-led firms | First interview | Last interview |
|---|---|---|---|---|---|---|---|
| EAP | Cambodia | BPS | 501 | 501 | 28 % | 18-Jun-20 | 3-Jul-20 |
| EAP | Mongolia | WBES | 284 | 284 | 51 % | 3-Aug-20 | 15-Aug-20 |
| EAP | Vietnam | BPS | 495 | 494 | 45 % | 12-Jun-20 | 7-Jul-20 |
| ECA | Albania | WBES | 344 | 344 | 23 % | 5-Jun-20 | 26-Jun-20 |
| ECA | Belarus | WBES | 530 | 530 | 55 % | 11-Aug-20 | 28-Aug-20 |
| ECA | Bulgaria | BPS | 940 | 667 | 38 % | 14-May-20 | 12-Jun-20 |
| ECA | Bulgaria | WBES | 521 | 521 | 41 % | 15-Jul-20 | 4-Sep-20 |
| ECA | Croatia | WBES | 342 | 342 | 38 % | 5-Sep-20 | 30-Sep-20 |
| ECA | Cyprus | WBES | 167 | 167 | 47 % | 3-Jun-20 | 29-Jun-20 |
| ECA | Georgia | WBES | 597 | 597 | 36 % | 2-Jun-20 | 10-Jun-20 |
| ECA | Greece | WBES | 530 | 530 | 55 % | 3-Jun-20 | 1-Jul-20 |
| ECA | Hungary | WBES | 619 | 619 | 50 % | 7-Sep-20 | 30-Sep-20 |
| ECA | Italy | WBES | 420 | 420 | 23 % | 27-May-20 | 26-Jun-20 |
| ECA | Kosovo | BPS | 2,083 | 1,875 | 11 % | 19-Jun-20 | 23-Jul-20 |
| ECA | Kyrgyzstan | BPS | 995 | 995 | 53 % | 16-Aug-20 | 12-Sep-20 |
| ECA | Moldova | WBES | 283 | 283 | 46 % | 19-May-20 | 29-May-20 |
| ECA | Poland | BPS | 1,335 | 1,002 | 26 % | 26-May-20 | 1-Jul-20 |
| ECA | Poland | WBES | 975 | 975 | 43 % | 27-Jul-20 | 28-Aug-20 |
| ECA | Romania | BPS | 937 | 689 | 36 % | 11-May-20 | 26-Jun-20 |
| ECA | Romania | WBES | 514 | 514 | 38 % | 13-Aug-20 | 30-Sep-20 |
| ECA | Russia | WBES | 1,145 | 1,145 | 33 % | 3-Jun-20 | 29-Jun-20 |
| ECA | Slovenia | WBES | 249 | 249 | 43 % | 6-Jul-20 | 5-Aug-20 |
| ECA | Tajikistan | BPS | 971 | 971 | 13 % | 16-Aug-20 | 8-Sep-20 |
| ECA | Turkey | BPS | 1,424 | 1,185 | 12 % | 8-Jun-20 | 22-Jul-20 |
| ECA | Uzbekistan | BPS | 937 | 937 | 22 % | 22-Aug-20 | 14-Sep-20 |
| LAC | Ceara** | BPS | 369 | 326 | 33 % | 26-May-20 | 27-Jul-20 |

Table B1: Sample sizes in the BPS and WBES surveys (businesses not permanently closed at the time of the interview).

| Region | Economy | Survey | Businesses interviewed* | Gender indicator available | Women-led firms | First interview | Last interview |
|---|---|---|---|---|---|---|---|
| LAC | Sao Paulo** | BPS | 1,612 | 1,401 | 40 % | 19-Jun-20 | 7-Jul-20 |
| LAC | El Salvador | WBES | 391 | 391 | 41 % | 10-Jun-20 | 7-Aug-20 |
| LAC | Guatemala | WBES | 199 | 199 | 29 % | 24-Jun-20 | 7-Aug-20 |
| LAC | Honduras | WBES | 163 | 163 | 58 % | 25-Jun-20 | 6-Aug-20 |
| LAC | Nicaragua | WBES | 184 | 184 | 38 % | 17-Jun-20 | 6-Aug-20 |
| MNA | Algeria | BPS | 427 | 427 | 5 % | 19-Jul-20 | 19-Aug-20 |
| MNA | Jordan | WBES | 498 | 498 | 21 % | 5-Jul-20 | 12-Aug-20 |
| MNA | Morocco | WBES | 781 | 781 | 20 % | 16-Jul-20 | 28-Aug-20 |
| MNA | West Bank and Gaza | BPS | 2,600 | 1,896 | 7 % | 23-Jun-20 | 12-Sep-20 |
| MNA | Tunisia | BPS | 3,680 | 2,763 | 10 % | 1-Jun-20 | 25-Jun-20 |
| SAR | Bangladesh (1) | BPS | 400 | 400 | 3 % | 22-Apr-20 | 13-May-20 |
| SAR | Bangladesh (2) | BPS | 500 | 494 | 18 % | 4-Jun-20 | 7-Jul-20 |
| SAR | Nepal | BPS | 504 | 495 | 9 % | 21-May-20 | 6-Jun-20 |
| SAR | Pakistan | BPS | 1,293 | 1,223 | 2 % | 9-Jun-20 | 21-Jul-20 |
| SAR | Sri Lanka | BPS | 500 | 454 | 11 % | 2-May-20 | 10-Jun-20 |
| SSA | Chad | WBES | 101 | 101 | 16 % | 18-Jun-20 | 28-Jun-20 |
| SSA | Côte d'Ivoire | BPS | 529 | 529 | 14 % | 14-Apr-20 | 30-Apr-20 |
| SSA | Guinea | WBES | 103 | 103 | 12 % | 16-Jun-20 | 27-Jun-20 |
| SSA | Kenya | BPS | 1,797 | 1,476 | 21 % | 10-Jun-20 | 31-Aug-20 |
| SSA | Niger | WBES | 71 | 70 | 16 % | 17-Jun-20 | 27-Jun-20 |
| SSA | Nigeria | BPS | 2,518 | 2,487 | 30 % | 24-Jul-20 | 10-Sep-20 |
| SSA | Senegal | BPS | 488 | 488 | 22 % | 28-Apr-20 | 8-May-20 |
| SSA | South Africa | BPS | 2,022 | 1,906 | 35 % | 13-May-20 | 3-Jun-20 |
| SSA | Sudan | BPS | 491 | 413 | 1 % | 5-Jul-20 | 29-Jul-20 |
| SSA | Tanzania | BPS | 978 | 932 | 15 % | 18-Jun-20 | 12-Jul-20 |
| SSA | Togo | BPS | 157 | 137 | 18 % | 5-Jun-20 | 18-Jun-20 |
| SSA | Togo | WBES | 54 | 54 | 19 % | 16-Jun-20 | 27-Jun-20 |
| SSA | Zambia | WBES | 533 | 533 | 44 % | 16-Jun-20 | 14-Jul-20 |
| SSA | Zimbabwe | WBES | 813 | 812 | 44 % | 12-Jun-20 | 13-Jul-20 |
| | | **Total** | 42,894 | 38,972 | 26 % | | |

* Excludes also businesses in health and education. ** Ceara and Sao Paulo in Brazil

Table B2: Distribution of observations in the full sample and our sample.

| Region | Percentage of observations in full sample | Distribution in sample used in analysis | Percentage of missing observations |
|---|---|---|---|
| EAP | 2.8 | 3.0 | 0.1 |
| ECA | 39.8 | 40.4 | 7.5 |
| LAC | 6.0 | 6.2 | 6.1 |
| MNA | 18.2 | 16.7 | 16.2 |
| SAR | 6.6 | 7.1 | 2.9 |
| SSA | 26.6 | 26.7 | 8.5 |
| Total | 100.0 | 100.0 | 8.7 |
| Large (100+) | 10.1 | 9.5 | 14.0 |
| Medium (20-99) | 20.9 | 20.4 | 10.6 |
| Micro (0-4) | 32.9 | 33.3 | 7.5 |
| Small (5-19) | 36.2 | 36.8 | 7.2 |
| Total | 100.0 | 100.0 | 8.7 |
| Hospitality | 7.2 | 7.3 | 6.9 |
| Manufacturing | 30.7 | 31.0 | 8.0 |
| Other services | 20.7 | 20.1 | 11.4 |
| Others | 14.5 | 14.6 | 8.7 |
| Retail and wholesale | 26.9 | 27.0 | 8.2 |
| Total | 100.0 | 100.0 | 8.8 |
| Low and lower middle | 55.7 | 56.4 | 7.6 |
| Upper middle and high | 44.3 | 43.6 | 10.1 |
| Total | 100.0 | 100.0 | 8.7 |
| Quartile 1 in mobility drop | 13.5 | 13.6 | 7.7 |
| Quartile 2 in mobility drop | 35.2 | 34.8 | 10.0 |
| Quartile 3 in mobility drop | 32.7 | 31.6 | 11.7 |
| Quartile 4 in mobility drop | 18.6 | 20.0 | 2.2 |
| Total | 100.0 | 100.0 | 8.8 |

The sampling design for the WBES follows the Enterprise Survey methodology and is thoroughly documented in the Enterprise Surveys COVID-19 dashboard. In each economy these surveys are nationally representative of the population of formal businesses with 5+ employees, and each sample is stratified for sector, size, and location.

The sampling frames for the BPS were based on the latest establishment census or listing of businesses from administrative records or survey companies available in each economy. Table B3 details the source of the sampling frame and the stratification in each economy. Additional details are documented in the COVID-19 Business Pulse Surveys dashboard.

Table B3: Sampling frames for the Business Pulse Surveys.

| Region | Economy | Sampling frame | Phone/face-to-face/online interview |
|---|---|---|---|
| EAP | Cambodia | Sample from a combination of listings from different sources (neither nationally representative). The sample targeted micro, small, medium, and large firms in manufacturing, wholesale/retail, and other services, but does not include weights, and is not representative for the targeted groups. Both formal and informal firms included in the sample. | Phone |
| EAP | Vietnam | Nationally representative sample from the 2018 Establishment census. The sample targeted small, medium, and large firms in agriculture, manufacturing, retail/wholesale, and other services, and includes sampling weights to obtain representativity for the targeted categories. | Phone/face-to-face |
| ECA | Bulgaria | Sample from the Business Registry. The sampling targeted small, medium, and large firms in agriculture, manufacturing, retail/wholesale, and other services but does not include weights, and is not representative for the targeted groups. | Phone |
| ECA | Kosovo | Nationally representative sample from the Business Tax Registry. The sampling targeted micro, small, medium, and large firms in manufacturing, retail/wholesale, and other services, and includes sampling weights to obtain representativity for the targeted categories. | Phone |

Table B3: Sampling frames for the Business Pulse Surveys.

| Region | Economy | Sampling frame | Phone/face-to-face/online interview |
|---|---|---|---|
| ECA | Poland | Nationally representative sample from the CEM Institute database. The sample targeted small, medium, and large firms in agriculture, manufacturing, retail/wholesale, and other services, and includes sampling weights to obtain representativity for the targeted categories. A second survey was implemented on a list provided by government counterpart. | Phone |
| ECA | Romania | Sample from Datefirme (which covers the universe of firms). The sample targeted small, medium, and large firms in manufacturing, retail/wholesale, and other services, but does not include weights, and is not representative for the targeted groups. | Phone |
| ECA | Turkey | Sample from a combination of listings from different sources (neither nationally representative). The sample targeted micro, small, medium, and large firms in agriculture, manufacturing, wholesale/retail, and other services, but does not include weights, and is not representative for the targeted groups. | Online |
| ECA | Uzbekistan | Sample from a combination of listings from different sources (neither nationally representative). The sample targeted micro, small, medium, and large firms in agriculture, manufacturing, wholesale/retail, and other services, but weights were not corrected for non-response, and the sample is not representative for the targeted groups. | Phone |
| LAC | Brazil-Ceara | Representative sample from the 2018 RAIS (an employer-employee census). The sample targeted small, medium, and large firms in agriculture, manufacturing, retail/wholesale, and other services, and includes sampling weights to obtain representativity for the targeted categories. | Phone |

Table B3: Sampling frames for the Business Pulse Surveys.

| Region | Economy | Sampling frame | Phone/face-to-face/online interview |
|---|---|---|---|
| LAC | Brazil-Sao Paulo | Representative sample from a listing from a business support service. The sample targeted micro and small firms in agriculture, manufacturing, wholesale/retail, and other services, and includes weights to obtain representativity for the targeted categories. | Phone |
| MNA | West Bank and Gaza | Nationally representative sample from the 2017 Establishment census. The sample targeted micro, small, medium, and large firms in agriculture, manufacturing, retail/wholesale, and other services, and includes sampling weights to obtain representativity for the targeted categories. | Phone/face-to-face |
| MNA | Tunisia | Nationally representative sample of formal businesses from the 2018 National Business Directory. This sample targeted micro, small, medium, and large firms, but sampling weights allow representativity only for exporters and for specific categories in manufacturing and services. The sample also includes a non-representative sample of informal firms. | Phone |
| SAR | Bangladesh (1) | Representative sample from the 2013 Establishment census and the Business Registry. The sample targeted small, medium, and large firms in manufacturing, and includes sampling weights to obtain representativity for the targeted categories. | Phone |
| SAR | Bangladesh (2) | Sample from a combination of listings from different sources (neither nationally representative). The sample targeted micro, small, and medium size firms in agriculture, manufacturing, wholesale/retail, and other services, but does not include weights, and is not representative for the targeted groups. | Phone |

Table B3: Sampling frames for the Business Pulse Surveys.

| Region | Economy | Sampling frame | Phone/face-to-face/online interview |
|---|---|---|---|
| SAR | Nepal | Sample from a combination of listings from different sources (neither nationally representative). The sample targeted micro, small, and medium size firms in agriculture, manufacturing, wholesale/retail, and other services, but does not include weights, and is not representative for the targeted groups. | |
| SAR | Pakistan | Sample from the Economic Census and listings from the survey company. The sample targeted firms in manufacturing, wholesale/retail, and other services, but does not include weights, and is not representative for the targeted groups. | Phone |
| SAR | Sri Lanka | Sample from a combination of listings from different sources (neither nationally representative). The sample does not include weights. | Phone |
| SSA | Côte d'Ivoire | Representative sample from administrative records for 2013. The sample targeted micro, small, and medium size firms in agriculture, manufacturing, wholesale/retail, and other services, and includes sampling weights to obtain representativity for the targeted categories. | Phone |
| SSA | Kenya | Nationally representative sample from the 2017 Establishment census. The sample targeted micro, small, medium, and large firms in agriculture, manufacturing, retail/wholesale, and other services, and includes sampling weights to obtain representativity for the targeted categories. | Phone |
| SSA | Nigeria | Sample from a combination of listings from different sources (neither nationally representative). The sample targeted small and medium size firms in manufacturing and services, but does not include weights, and is not representative for the targeted groups. | Phone |

Table B3: Sampling frames for the Business Pulse Surveys.

| Region | Economy | Sampling frame | Phone/face-to-face/online interview |
|---|---|---|---|
| SSA | Senegal | Nationally representative sample from the 2016 Establishment census. The sample targeted small, medium, and large firms in agriculture, manufacturing, retail/wholesale, and other services, and includes sampling weights to obtain representativity for the targeted categories. Both formal and informal firms included in the sample. | Phone |
| SSA | South Africa | Representative sample from a listing of MSMEs provided by government counterpart (frame not nationally representative). The sample targeted micro, small, and medium size firms in manufacturing, retail/wholesale, and other services, and includes sampling weights to obtain representativity for the targeted categories. Both formal and informal firms included in the sample. | Phone/Online |
| SSA | Sudan | Sample from a combination of listings from different sources (neither nationally representative). The sample does not include weights. Both formal and informal firms included in the sample. | Phone |
| SSA | Tanzania | Sample provided by Statistics office. The sample targeted businesses in two categories, 0-9 workers and 10+, and in manufacturing and services, but does not include weights, and is not representative for the targeted groups. | Phone |