Gender Differences in Enterprise Performance During the COVID-19 Crisis: Do Public Policy Responses Matter?

Addis G. Birhanu1, Yamlaksira S. Getachew2, and Addisu A. Lashitew3,4

Abstract
The COVID-19 crisis has introduced unique tradeoffs between health and economic risk, leading to a “life vs. livelihoods conundrum.” This study contributes to research on adversity and entrepreneurship by examining the implications of the pandemic for gender differences in enterprise performance. We further consider how public policy responses in the domains of public health and economic support moderate the potential gendered effects of the pandemic. Data analysis of more than 20,000 enterprises across 38 countries shows that women-owned enterprises were more adversely affected by the pandemic, and that stronger public health policy responses helped reduce the observed gap in performance.

Keywords
women entrepreneurship, adversity, COVID-19, public health policy, economic support policy

As a business owner, you try to bob and weave through things. But there is no way to bob and weave this pandemic. You have to take its hits and hope that you don’t get knocked out. — Sherika Wynter, founder of a research and development company (October 2020).

1Emlyon Business School, Écully, France
2Loyola Marymount University, Los Angeles, CA, USA
3DeGroote School of Business, McMaster University, Hamilton, ON, Canada
4Brookings Institution, Washington, DC, USA

The authors contributed equally and are listed in alphabetical order.

Corresponding Author:
Addisu A. Lashitew, DeGroote School of Business, McMaster University, 1280 Main Street West, Hamilton, ON L8S 4M4, Canada.
Email: lashitea@mcmaster.ca
The notion of adversity and its implications for entrepreneurial outcomes have become topics of increasing interest in entrepreneurship research (e.g., Davidsson & Gordon, 2016; Holland & Shepherd, 2013; Shepherd & Williams, 2020). Research in the area has examined the effects of and responses to different forms of adversities, including macroeconomic crises (e.g., Davidsson & Gordon, 2016; Marino et al., 2008), natural disasters (e.g., Salvato et al., 2020), financial crises (e.g., Buratti et al., 2018; Cowling, Marlow, et al., 2020), war (e.g., Bullough et al., 2014), violent protests (e.g., Dimitriadis, 2021), state fragility (Amorós et al., 2019), and recently the COVID-19 pandemic (e.g., Belghitar et al., 2021; Manolova et al., 2020; Muzi et al., 2021). The extent to which adversities undermine entrepreneurial performance is contingent upon the form and magnitude of the adversity (e.g., Holland & Shepherd, 2013) and specific venture or entrepreneurial characteristics (Amorós et al., 2019; Bullough et al., 2014). As well, the effect of adversity relies on how entrepreneurs and other stakeholders respond to the adversity (e.g., Davidsson & Gordon, 2016). Consequently, understanding whether and how adversity affects entrepreneurial ventures requires a closer examination of the nature of the adversity, venture characteristics, and response mechanisms in place.

In this paper, we seek to extend the literature on adversity and entrepreneurship by examining the implications of the COVID-19 pandemic and attendant public policy responses for gender differences in enterprise performance. The pandemic has been characterized as “a massive negative shock that is continually unfolding” and one that requires entities to “respond to the immediate shock while simultaneously preparing to advance in whatever becomes the ‘new normal’” (Shepherd & Williams, 2020, p. 4). Uniquely, COVID-19 has introduced a tradeoff between the physical and economic health of key business actors (i.e., the owners, management, workers, customers, and their families) (Brammer et al., 2020; Shepherd, 2020). We argue that gender plays an important role in determining the extent to which entrepreneurs manage this tradeoff, which some have described as a “lives vs. livelihoods conundrum” (Dodd, 2020). Indeed, the pandemic is likely to have gender-heterogenous effects given important differences between men and women entrepreneurs in their risk perception (Bönte et al., 2016; Brush et al., 2009; Verheul et al., 2012) and work-life interface (Jennings & Brush, 2013; Klyver et al., 2013; Shahriar & Shepherd, 2019).

Integrating insights from behavioral research in economics and entrepreneurship (Apicella et al., 2015; Croson & Gneezy, 2009; Gimenez-Jimenez et al., 2020) and the work-life interface research in women entrepreneurship literature (Jennings & Brush, 2013; Klyver et al., 2013; Shahriar & Shepherd, 2019), we argue that the pandemic has a greater adverse effect on the performance of women-owned enterprises. We further hypothesize that public policy responses to the pandemic, namely, economic support and public health policies, can help mitigate the potential gender gap in business performance. We test these hypotheses using enterprise performance data during the pandemic that covers a sample of more than 20,000 enterprises across 38 countries. Our findings reveal the presence of significant gender differences in business performance during the pandemic (in terms of sales growth and duration of closure), while also indicating that public health measures helped narrow the observed performance difference.

This study makes theoretical and practical contributions in several respects. First, by studying business performance in the context of dual economic and health risks and looking into the attendant tradeoffs in time and resource allocation, we contribute to the stream of entrepreneurship research that examines risk and risk perception, and their implications for entrepreneurial outcomes (De Carolis & Saparito, 2006; Gimenez-Jimenez et al., 2020; Keh et al., 2002). Second, by examining gender disparity in the performance of business enterprises in a context of adversity, we contribute to the stream of entrepreneurship research that adopts a gendered view of entrepreneurial processes and outcomes (e.g., De Bruin et al., 2007; Jennings & Brush, 2013; Shahriar & Shepherd, 2019). Third, the study responds to calls for research on the implication of the pandemic
for inequality (Milliken et al., 2020) and contributes to the growing literature on adversity and enterprise performance (e.g., Shepherd & Williams, 2020; Williams et al., 2017). Fourth, by examining the implications of public policy responses to COVID-19, we advance a better understanding of whether and how government-level responses limit potential gender disparity in enterprise performance. Considering that much of the extant research on adversity focuses on responses at individual, firm, or community levels (e.g., Shepherd & Williams, 2020; Williams et al., 2017), our work extends the focus to government-level responses, contributing toward a more complete, multilevel framework (De Bruin et al., 2007).

The remainder of this paper is structured as follows. First, we present our theoretical arguments that underpin our hypotheses. We then describe our data sources and variables, and discuss the empirical design used for testing the hypotheses. Next, we present our findings. We conclude by discussing contributions to theory and practice, highlighting limitations, and specifying directions for future research.

Theoretical Background

Adversity and Enterprise Performance

Businesses across the globe have encountered a wide array of adversities including financial crises, wars, and natural disasters such as tsunamis and earthquakes. According to a UN report on disaster risks, the scale, intensity, and frequency of such adversities have increased substantially over recent years (United Nations, 2015). In response, management and entrepreneurship scholars have emphasized the need to understand the nature, implications, and management of adversities (George, 2016). We define adversity as a low-probability, unanticipated, high impact event that can potentially disrupt the functioning of entities, including organizations, and threaten their viability (Shepherd & Williams, 2020). The COVID-19 pandemic is well in line with this definition and is a major form of adversity facing businesses throughout the world. Given that its effects are likely to be long-lasting (Alon et al., 2020; Brammer et al., 2020; Shepherd, 2020) and that similar pandemics could reoccur in the future (Donthu & Gustafsson, 2020), it is important to understand its implications for enterprises.

Entrepreneurship research on adversity has examined how entrepreneurs and their ventures are affected by different forms of adversities. Researchers, for example, have studied the effects of adversity on the cognitive processes of risk/opportunity perception and entrepreneurial motivation (e.g., Amorós et al., 2019; Bullough et al., 2014; Amorós et al. 2019) demonstrated that adversity in the form of state fragility hinders opportunity-based entrepreneurship but promotes necessity-based entrepreneurship. Likewise, Keh and colleagues (2002) documented how adversity relates to the perception of risk and evaluation of entrepreneurial opportunity. Researchers have also examined how adversity affects venture performance. While adversity generally has a negative effect on venture performance, some venture characteristics (such as precautionary saving) (Cowling, Brown, et al., 2020; Brown & Cowling, 2021) and entrepreneurial characteristics (such as self-efficacy, commitment, and ambition) (Bullough et al., 2014; Davidsson & Gordon, 2016) have been shown to reduce the adverse effects.

Responses to Adversity

Entrepreneurship scholars have widely studied responses to adversities at individual, venture, and community levels. At the individual level, scholars have examined the relevance of cognitive and behavioral processes of resilience, dis/engagement, and adaptation (e.g., Bullough et al., 2014; Holland & Shepherd, 2013). At the venture level, research has identified differentiated response
mechanisms based on venture-level attributes such as size (e.g., Lai et al., 2016; Shepherd, 2003) and location (Marino et al., 2008). At the community level, scholars have documented the role of communities in helping ventures/entrepreneurs navigate through adversity (e.g., Peredo & Chrisman, 2006).

Despite the large body of work examining the role of government policies in encouraging startup formation and supporting established firms (Estrin et al., 2019; Murtinu, 2021; Parker, 2018; Aidis et al., 2008; Parker, 2018, 2018), we have limited understanding of public policy responses to crises and their potential heterogeneous effects across firms (Kuckertz et al., 2020; Williams & Vorley, 2015). A few researchers have started to address this issue, including Josephson and Marshall (2016), who looked into the effects of small business loans on firm survival in the wake of Hurricane Katrina, and Belghitar et al., (2021), who documented the positive effects of economic support policies on SME survival during the pandemic. The study aims to further contribute to the literature by examining the implications of public policy responses for the relationship between gender and enterprise performance during the COVID-19 pandemic.

**Gender Differences in Enterprise Performance**

The gendered perspective of entrepreneurship research has examined differences between women- and men-owned enterprises in several respects (Alsos et al., 2006; Jennings & Mcdougald, 2007; Kalnins & Williams, 2014). This stream of work has documented that women face major resource constraints (Alsos et al., 2006) and tend to own smaller businesses (Alsos et al., 2006) that are over-represented in retail and personal services industries (Jennings & Mcdougald, 2007). Research has also pointed to gender differences in risk perception (De Carolis & Saparito, 2006; Gimenez-Jimenez et al., 2020), socialization experiences (Gupta et al., 2009, 2014; Manolova et al., 2007), and the underlying motivation for entrepreneurial pursuit (Jennings & Brush, 2013; McGowan et al., 2012).

As well, research in the area has found evidence in support of the so-called “female underperformance hypothesis,” which suggests that women-owned enterprises on average exhibit lower performance than those owned by men (e.g., Collins-Dodd et al., 2004; Jennings & Mcdougald, 2007). However, some research has produced contrasting evidence, casting doubt on the female underperformance thesis. For example, Robb and Watson (2012) noted that gender differences in performance decline or even disappear once “…appropriate performance measures are adopted and key controls are incorporated into the analysis” (p. 557). More recently, scholars have advanced a contingency perspective, suggesting that sound understanding of performance differences requires a consideration of contextual factors, such as industry, location, and culture (Bullough et al., 2014, 2022; Kalnins & Williams, 2014).

In explaining gender differences in the performance of women- and men-owned enterprises, prior research has leveraged insights from two alternative perspectives: the *constraints perspective* and the *preferences perspective* (Bardasi et al., 2011; Watson, 2002). The constraints perspective attributes gender differences in enterprise performance to structural factors/barriers that deprive women of important resources such as time (Parker, 2018) and financial capital (Bardasi et al., 2011). In contrast, the preferences perspective emphasizes motivational and behavioral differences between women and men entrepreneurs as key determinants of differences in venture performance (Watson, 2002). Taken together, these perspectives point to the joint roles of structure and entrepreneurial choices/preference in determining performance differentials. There is also evidence that, in some instances, structural and behavioral factors interact to influence entrepreneurial outcomes (Eddleston & Powell, 2012; Jayawarna et al., 2020; Shahriar, 2018).
**Hypotheses**

**The Gendered Effect of the COVID-19 Pandemic**

The unprecedented spread of the COVID-19 pandemic across countries and the subsequent passage of public health laws, such as social distancing and lockdown measures, have strained the world economy (Kuckertz et al., 2020). While the pandemic has caused a major disruption to most businesses throughout the world, emerging evidence suggests that it had a greater toll on some businesses than others (e.g., Belghitar et al., 2021; Cowling, Brown, et al., 2020; Donthu & Gustafsson, 2020; Fairlie & Fossen, 2021). Understanding the nature and causes of such performance differences requires, among other things, examining the structural and behavioral implications of the pandemic for business operation. We argue that these implications are vital for understanding performances differences between women- and men-owned enterprises during the pandemic.

A major consequence of the COVID-19 pandemic has been the blurring of the boundary between family (or life) and work (Milliken et al., 2020; Shockley et al., 2021). Indeed, the pandemic represents an example of what Kreiner and colleagues (2009) called “a boundary violation,” defined as “behaviors, events, or episodes that either breach or neglect the desired work-home boundary” (p. 704). Stay-at-home orders and the closure of schools and daycare facilities resulted in an increase in “unpaid” home production—with work, education, and childcare activities being performed at home (Alon et al., 2020; Hupkau & Petrongolo, 2020; Yue & Cowling, 2021). This has increased work-family conflict, which is “a form of inter-role conflict in which the role pressures from the work and family domains are mutually incompatible…[because]…participation in the work (family) role is made more difficult by virtue of participation in the family (work) role” (Greenhaus & Beutell, 1985, p. 77). The work-family conflicts occasioned by the pandemic can take one or more of the following forms: *time-based conflicts* and *strain-based conflicts*. Time-based conflicts arise from the potential tradeoff in work and life demands and the finite amount of time available to meet these demands (Hupkau & Petrongolo, 2020; Jennings & Mcdougald, 2007; McGowan et al., 2012). Strain-based conflicts arise due to spillover of stress from work to life, and vice versa (Ashforth et al., 2000; Jennings & Mcdougald, 2007).

Whereas increased intensity of work-family conflict can adversely affect enterprise performance in general, we argue that women entrepreneurs are more likely to experience greater adverse effects. Women entrepreneurs are likely to witness greater demands from family responsibilities due to pre-existing patterns in division of labor that, in many parts of the world, assign disproportionately greater domestic responsibilities to women (Eddleston & Powell, 2012; Milliken et al., 2020). These patterns could be cemented and reinforced during the pandemic as a result of cultural norms (Bullough et al., 2022; Correll et al., 2007) and relative efficiency differences in discharging these responsibilities. A quote from a female finance executive in India that was interviewed by Venkataraman and Venkataraman (2021, p. 294) provides a lucid illustration of this point:

*I have to take calls when my kid wants my attention at the same time. ... She comes to my chair when I am busy and when I cannot get up. I am thinking about her health, the pandemic, and whether I am doing enough for her worries me to no end.*

Indeed, during the COVID-19 pandemic, women have continued to devote significantly longer hours per week to housework and childcare than men (Alon et al., 2020; Hupkau & Petrongolo, 2020; Milliken et al., 2020). For women entrepreneurs, increased family responsibility can result
in devoting less time and energy to running their businesses. Such conflicts between work and life roles are salient in contexts “…where one works at home” (Ashforth et al., 2000, p. 479), which can especially affect women who tend to “…experience more work-family conflict when family interference with work is high” (Milliken et al. 2020, p. 1768).

In addition to its effects on the boundaries of the work-family interface, the pandemic potentially influenced the behavioral dimensions of entrepreneurial goal pursuit. Research on women entrepreneurship suggests that women entrepreneurs tend to pursue “hybrid” (i.e., economic and non-economic) goals and seek to balance the economic goal of earning profit with the social goals of helping others and contributing to society (Bird & Brush, 2002; Jennings & Brush, 2013). Relatedly, scholars have documented that, in running their businesses, women entrepreneurs tend to be more communal (e.g., nurturance, affiliation, and dedication to others), but less agentic (e.g., independence, challenging the status quo, and free will) than men entrepreneurs (Hmieleski & Sheppard, 2019; Schaumberg & Flynn, 2017). For instance, Bird and Brush (2002) quoted a women founder of a venture who remarked: “I want to make people feel that they are important, that their health is important. I truly feel that I want them to know that their health is important to me, that their future is important to me” (emphasis added) …” (p. 51). This tendency to feel concern for the wellbeing of others is likely to be amplified during the COVID-19 pandemic, potentially introducing tradeoffs that limited the ability of women entrepreneurs to pursue economic goals.

Research on the risk perception of entrepreneurs also suggests that women entrepreneurs tend to be more risk averse (Bardasi et al., 2011; Gimenez-Jimenez et al., 2020; Jennings & Mcdougald, 2007; Langowitz & Minniti, 2007) and more cautious (Cowling, Marlow, et al., 2020) than men entrepreneurs. Relatedly, studies pointed to physiological differences (e.g., testosterone concentrations) between men and women in their reaction to and interpretation of risky situations (Apicella et al., 2015; Croson & Gneezy, 2009). These studies suggest that while, on average, men tend to perceive risky situations as challenges that call for participation, women are more likely to see risky situations as threats that encourage avoidance (Croson & Gneezy, 2009). Such behavioral differences are likely to be pronounced during the COVID-19 pandemic (Bergenholtz et al., 2021; Buratti et al., 2018; Cowling, Marlow, et al., 2020) as business activities may entail the risk of infection and transmission to related others. All these arguments suggest that, during the COVID-19 pandemic, women entrepreneurs are likely to face stronger work-life conflicts and adopt a more conservative stance in conducting their businesses (to reduce exposure to health and safety risks), which likely undermined the performance of their businesses. Hence, we put forward the following hypothesis:

Hypothesis 1: Women-run enterprises perform worse than their counterparts during the COVID-19 crisis.

The Moderating Effects of Public Policy Responses to the COVID-19 Crisis

To address the consequences of the COVID-19 crisis on lives and livelihoods, governments throughout the globe have introduced public health and economic support policies. These include public health policy measures such as public information campaigns, testing, and contact tracing, and economic support policy measures such as income support and debt relief for businesses and households (Cai & Luo, 2020; Hale et al. 2021).

These interventions were quite diverse in scope and robustness across countries, even within emerging economies. In Croatia, for example, the government activated a crisis management unit in the ministry of health to work on preventive measures before COVID-19 was reported in the country (Koprić, 2020). The unit had a strong political and institutional backing, and it was later
given even greater power when it was restructured under the auspices of the deputy prime minister (Koprič, 2020). In contrast, the responses of the Nicaraguan government were erratic and, at times, dismissive of the threat of the pandemic (Jarquin et al., 2020; Mather et al., 2020; Pearson et al., 2020). Deploring mitigation strategies recommended by the World Health Organization, President Daniel Ortega refused to put in place social distancing measures and openly downplayed the dangers of the pandemic (Mather et al., 2020).

Similarly, the quality and depth of economic support policy responses were also heterogeneous even within emerging economies. For example, Romania’s economic support response was by far more robust than the economic support provided by Nicaragua (IMF, 2021). The Rumanian government provided targeted support for large and small enterprises that were exposed to the crisis following explicitly articulated terms and conditions. This helped shield Rumania’s economy from the worst effects of the pandemic, making it the least affected member of the European Union (IMF, 2021). By contrast, the Nicaraguan government did not provide any tangible economic support to mitigate the economic losses brought about by the COVID-19 crisis (Jarquin et al., 2020; Mather et al., 2020).

These variations in government responses represent what Estrin and colleagues (2019, p. 19) called “…important [policy] variation among emerging economies,” whose implications have remained underexplored, especially in relation to their effects on potential gender differences in entrepreneurial performance (Ahl, 2006; Brush et al., 2010; Estrin et al., 2019).

The Moderating Effect of Public Health Policies

Prior research has shown that women perceive health risks more seriously than men (Lundborg & Andersson, 2008; YoungHo et al., 2018). Not surprisingly, women also perceived COVID-19 as a serious health crisis and accordingly took stricter measures to protect themselves and their loved ones relative to men. Galasso and colleagues (2020) reported that, in March 2020, women had a ten-percentage point lead over men in perceiving COVID-19 as a very serious health problem. This may appear counterintuitive considering that greater morbidity and mortality rates due to COVID-19 were recorded among men than women (Purdie et al., 2021). A similar survey by mid-April revealed a significant decline in the perceived risk of COVID-19 across the whole public, as well as the narrowing of the perception gap between men and women (Dryhurst et al., 2020). This suggests that differences in risk perception between men and women narrowed in countries like Croatia, which adopted stronger public health policy responses, including aggressive public information campaigns to reduce misinformation. In contrast, in countries like Nicaragua that failed to make a systematic effort to equip the public with timely, accurate and reliable public health information, women entrepreneurs could face greater challenges to properly gauge the health risks of the pandemic.

We argue that the adverse effects of the pandemic on women enterprises are likely to be greater in countries with weak public health policy responses for at least two main reasons. First, consistent with gender differences in risk taking and perception (De Carolis & Saparito, 2006; Gimenez-Jimenez et al., 2020; Lundborg & Andersson, 2008; YoungHo et al., 2018), sound public health policies will reduce the gender gap in risk perception by providing reliable and timely information and extending access to essential health and safety services. This, consequently, would enable women to be more actively involved in running their businesses, allowing them to (re)open their businesses and operate longer hours. In countries where public health policy responses are limited, women entrepreneurs are likely to remain apprehensive about the potential health hazards of their business operations. Further, given the general tendency of women entrepreneurs to display communal (Hmieleski & Sheppard, 2019; Schaumberg & Flynn, 2017) and caring behaviors (Bardasi et al., 2011; Bird & Brush, 2002), they are likely to restrict their business
activities for fear of exposing their workers and colleagues to potential health hazards, especially when robust public health responses are lacking.

Second, consistent with the work-life balance perspective, sound public health policies will help restore the work-life balance of women that became skewed because of increased family obligations during the crisis (Purdie et al., 2021). A quote from a founder of a small social enterprise illustrates the challenges of women entrepreneurs in the face of school closures:

*I’m very exhausted … Before COVID-19, I was applying and pitching for investments and working on my social enterprise during the day when my son was at school. It’s been a struggle to try and get the business to the next level with everything closing down.*

Strong health policies that contain viral contagion speed up the opening of schools and childcare services, which would in turn enable women entrepreneurs to devote more time to their businesses. Public health policies thus level up the playing field between men and women by correcting aspects of the work-life interface that became tilted in a manner that was unfavorable to working women. This would enable women entrepreneurs to navigate the altered business environment safely and to redirect their attention to their businesses by incorporating appropriate precautionary measures to themselves and their employees. By contrast, the unique work-life interface challenges facing women entrepreneurs are likely to remain unresolved in countries with weak public health policy responses. In the absence of strong public health policies, therefore, women entrepreneurs are likely to face greater constraints that adversely affect the performance of their businesses.

Therefore, we hypothesize:

**Hypothesis 2:** The adverse effect of the COVID-19 crisis on the relative performance of women-owned enterprises is smaller in countries with stronger public health policy responses.

**The Moderating Effect of Economic Support Policies**

Governments around the world have sought to reduce the adverse effects of the pandemic on businesses and employees through a range of economic support packages (Cai & Luo, 2020), although the scope and intensity of these measures varied considerably even within emerging economies. We argue that the adverse effect of the pandemic on women-owned businesses is likely to be weaker in countries with stronger economic support for at least three reasons.

First, due to their risk preferences, women entrepreneurs tend to invest less in innovative solutions in times of adversity, focusing instead on cost reduction and efficiency improvement measures such as downsizing (Buratti et al., 2018). Robust economic support responses can counteract this by providing women with the financial means to restructure their production and/or distribution processes (e.g., remote working and flexible shifts) (Belghitar et al., 2021; Shockley et al., 2021), to apply digital technologies (Belitski et al., 2021), and to modify their business models (Lim et al., 2020; Yue & Cowling, 2021). Chawla et al. (2020), for example, found that limited financial resources constrained the ability of women entrepreneurs in India to respond to the pandemic by adapting their business models. Strong economic support could limit these constraints, enabling women entrepreneurs to introduce innovative solutions and enhance their performance, while this would be unlikely in countries with meager or no economic support.

Second, in line with the constraints perspective, women entrepreneurs typically face greater resource shortages (Alsos et al., 2006; Becker-Blease & Sohl, 2007) that become particularly severe in times of crises. The performance impact of the same amount of economic support will thus be greater for resource-constrained (women-owned) enterprises. Related to this, women
entrepreneurs could make more effective use of economic support provided to them by allocating it to less risky activities through prudent investment decisions (Buratti et al., 2018; Cowling, Marlow, et al., 2020).

Third, COVID-19 has led to women entrepreneurs allocating more time and attention to unpaid work than to paid (business) work because (a) fundamental social support facilities such as schools and child care centers were closed (Alon et al., 2020; Hupkau & Petrongolo, 2020; Miliken et al., 2020) and (b) the financial return of time allocated to business has fallen due to an overall decline of business activity following the crisis (Cai & Luo, 2020; Manolova et al., 2020). Robust economic support that stimulates the economy will increase the financial return of operating a business, encouraging women entrepreneurs to spend more time at their businesses and less time at home. This opportunity also incentivizes them to renegotiate their home obligations with family members and reallocate more time and attention toward their businesses.

Overall, the above arguments indicate that the performance gap between men and women enterprises during the COVID-19 crisis will narrow in countries where economic support is greater relative to those where such a support is limited, leading to the following hypothesis:

**Hypothesis 3:** The adverse effect of the COVID-19 crisis on the performance of women-run enterprises is smaller in countries with stronger economic support policy responses.

**Methods**

**Sample**

We tested our hypotheses using a cross-sectional survey data of more than 20,000 enterprises across 38 countries from the World Bank’s ongoing COVID-19 tracking survey. This novel dataset provides measures of monthly performance over the period of March 2020–February 2021. The COVID-19 tracking survey targets a (sub)sample of the firms covered by the World Bank’s Enterprise Survey (WBES), which is a longitudinal dataset that has been collected since 2006. We matched the COVID-19 tracking survey with the WBES, which provided us with an extensive number of control variables for the pre-pandemic period. We collected additional data on public policy responses to COVID-19 from the University of Oxford’s Blavatnik School of Government COVID-19 Government Response Tracker database (Hale et al., 2021), which provided daily time series data on a number of policy responses to the pandemic.

**Measures**

**Dependent Variables.** We used two metrics of enterprise performance: (i) Sales growth, which shows month-on-month changes in sales revenue compared to 2019, and (ii) Business closure, which indicates the number of weeks the business was closed since the onset of the pandemic.

**Independent Variables.** Following past literature (cf. Parker, 2018), we measure women ownership using a dummy variable (Women) that gets a value of one when women’s ownership share is at least 50%. Since majority women ownership implies management control by women, this measure is suited to our goal of studying the gendered aspects of managerial decisions in relation to performance. We also conduct robustness tests using a continuous variable (Women share) that shows the ownership share of women.

**Moderating Variables.** Public Health Policy Index (PHPI) measures the strength of public health responses to COVID-19 over a range of 0 to 1. It is constructed from five indicators that measure
the strength of policy responses related to: (i) public information campaigns; (ii) testing policies to detect potential COVID-19 patients; (iii) contact tracing; (iv) use of facial coverings, and; (v) vaccination policies. Economic Support Index (ESI) measures the strength of economic policy responses over a range of 0 to 1. It is constructed from two indices that capture the magnitude of financial assistance for businesses and households in the form of (i) income support or direct cash transfers, and (ii) relief of debt or contract obligations. Both moderating variables were taken from the University of Oxford’s Government Response Tracker database (Hale et al., 2021), and we converted the daily time series data into monthly averages before combining them with the World Bank’s survey dataset.

Macro-Level Control Variables. To account for macro-level differences across countries that could correlate with gender differences in performance, we include interaction terms between the women ownership dummy and the following three variables: lockdown stringency, pandemic severity, and governance quality. Data for lockdown stringency and pandemic severity is obtained from the University Oxford’s Government Response Tracker database (Hale et al., 2021). Lockdown stringency measures the strength of lockdown policies imposed to contain the spread of COVID-19 based on eight indicators, which capture the strength of policies toward workplace closure, school closure, restrictions on public events and gatherings, limits on public transportation, stay-at-home requirements, and domestic and international travel restrictions. Pandemic severity is proxied by the cumulative number of positive COVID-19 cases per million of population. Governance quality, which is taken from the Worldwide Governance Indicators database, measures the quality of national bureaucracies to effectively implement government policies and their freedom from corruption.

Firm-Level Control Variables. We obtained a number of control variables from the matched WBES dataset, based on surveys over 2017–2019. The control variables include size dummies identifying small (<20 workers), medium (20–99 workers), and large (100 or more workers) enterprises, firm age, export status, foreign and public ownership, and industry dummies. We also calculated pre-pandemic sales growth rates using sales revenue data in the most recent WBES survey and 3 years prior to it.

Analysis

To test Hypothesis 1, we estimated the following cross-sectional model that relates women ownership (Women) with our two dependent variables (Y), while controlling for industry ($\mu_j$) and country-by-month ($\mu_{ct}$) fixed effects

$$Y_{ijct} = a(\text{Women}_{ijct}) + \beta(X_{ijct}) + \mu_j + \mu_{ct} + \epsilon_{ijct}$$

(1)

where the subscript $i$ denotes the firm, $j$ its industry at 2-digit ISIC level, $c$ its country of location, and $t$ the year and month of data collection. The vector of control variables $X$ include age, size dummies, foreign and public ownership dummies, and export status. In addition, we control for pre-pandemic sales growth to account for potential gender disparities in performance that existed prior to the pandemic. This also controls for pre-existing gender differences in human capital, financial resources and other endowments that could influence pandemic-period performance. The inclusion of country-by-month ($\mu_{ct}$) dummies accounts for national differences in economic or institutional environments, as well as changes in pandemic cycles.

To test Hypothesis 2 and Hypothesis 3, we include an interaction term between the two moderating policy variables (POL) and the women ownership dummy
\[ Y_{ijct} = \gamma (POL_{ct} \times Women_{ijct}) + \sigma (Z_{ct} \times Women_{ijct}) + \alpha (Women_{ijct}) + \beta (X_{ijct}) + \mu_j + \mu_{ct} + \epsilon_{ijct} \] (2)

The goal of the moderation analysis is to test if economic and public health policy responses to COVID-19 (POL) will narrow or widen gender differences in performance during the crisis. These policy responses are not entirely random; for example, countries that faced greater disease burden from the pandemic are likely to implement stronger policy responses to contain the pandemic and stimulate economic activity. Likewise, policy responses in economic support and public health domains are likely to correlate with the robustness of lockdown measures and the quality of regulatory institutions, which could also correlate with the gender gap in enterprise performance.\(^4\)

We thus include interaction terms between women ownership and additional controls (Z), namely: (i) pandemic severity, measured as the number of COVID-19 cases per capita (in log); (ii) a measure of lockdown stringency; and; (iii) governance quality. We also include an interaction term between the women ownership dummy and pre-pandemic sales growth rate to control for potential gender disparities in performance that existed prior to the pandemic.

For sales growth, we estimate equations (1) and (2) using Ordinary Least Squares (OLS) by clustering the standard errors within country-industry groups. Since business closure is a non-negative count variable, it may not satisfy the OLS assumption of normally distributed error terms. For this variable, we conduct the analysis using the non-linear negative binomial regression framework (Cameron & Trivedi, 2013). Detailed description of our specification for the negative binomial model is presented in Supplement A of the Online Appendix. To facilitate comparison of coefficients between the two outcome variables, we report both OLS and negative binomial regression results for business closure.

### Results

#### Descriptive Statistics

Table 1 provides descriptive statistics for key variables. Average monthly sales growth during the pandemic was \(-27.25\%\), while average closure was 2.97 weeks. Supplemental Figure C1 in the Online Appendix reports average statistics of the two outcome variables broken down by sector and ownership. It shows that women-owned enterprises perform relatively worse both in terms of sales growth and duration of closure regardless of sector (although performance differences appear slightly larger in construction).

Table 1 shows that women are majority owners in 21\% of the businesses in our sample, while the average ownership share of women is 19.4\%. The average values of public health and economic support policy responses were 0.61 and 0.56, respectively (see Supplemental Table C1 in Supplement C of the Online Appendix for country-level data). Sales growth and duration of closure are negatively correlated with a relatively large correlation coefficient of \(-0.46\). Women ownership is associated with significantly lower sales growth and higher duration of closure. We subsequently test these relationships using the regression framework introduced in the Methods section.

#### Gender Difference in Enterprise Performance during COVID-19

Table 2 reports our estimates for equation (1). The results provide support for Hypothesis 1 and show that women-owned businesses registered significantly lower sales growth (by \(-3.0\%\)). This effect fell only marginally when we controlled for pre-pandemic sales growth rates in regression 2. The coefficient of pre-pandemic growth in regression 2 indicates a
Table 1. Descriptive statistics and correlation coefficients.

|                                | Observations | Mean  | SD   | Min   | Max   | Sales growth | Business closure | Women binary variable |
|--------------------------------|--------------|-------|------|-------|-------|--------------|---------------------|-----------------------|
| **Dependent variables**        |              |       |      |       |       |              |                     |                       |
| Sales growth (monthly)         | 20,365       | -27.25| 30.46| -100.00| 62.00 | .05 (0)      | .05 (0)            | 1                     |
| Business closure (weeks)       | 18,240       | 2.97  | 5.39 | 0.00  | 60.00 | -.46 (0)     | 1                   |                       |
| **Independent variables**      |              |       |      |       |       |              |                     |                       |
| Women own. binary              | 20,365       | 0.21  | 0.40 | 0.00  | 1.00  | -.05 (0)     | .05 (0)            | 1                     |
| Women share (%)                | 20,365       | 19.41 | 33.29| 0.00  | 100.00| -.05 (0)     | .06 (0)            | .91 (0)               |
| **Moderating variables**       |              |       |      |       |       |              |                     |                       |
| Public Health Policy Index (PHPI) | 20,365     | 0.61  | 0.12 | 0.17  | 0.86  | .09 (0)      | -.03 (0)           | -.05 (0)              |
| Economic Support Index (ESI)   | 20,365       | 0.56  | 0.25 | 0.00  | 1.00  | .11 (0)      | -.01 (0.28)        | -.01 (0.2)            |
| COVID-19 stimulus spending (% GDP) | 20,365     | 0.05  | 0.03 | 0.01  | 0.14  | .18 (0)      | -.12 (0)           | .01 (0.29)            |
| Lockdown stringency            | 20,365       | 0.57  | 0.19 | 0.04  | 1.00  | -.24 (0)     | .18 (0)            | -.02 (0)              |
| COVID-19 cases per million population | 20,365 | 8,375 | 13,377 | 4 | 59,725 | .14 (0) | -.11 (0) | (0.87) |
| Governance quality             | 20,365       | 0.36  | 0.66 | -1.46 | 1.59  | .24 (0)      | -.17 (0)           | (0.48)                |
| **Control variables**          |              |       |      |       |       |              |                     |                       |
| Small size (<20 workers)       | 20,365       | 0.46  | 0.50 | 0.00  | 1.00  | -.13 (0)     | .12 (0)            | .11 (0)               |
| Medium size (20–99 workers)    | 20,365       | 0.34  | 0.47 | 0.00  | 1.00  | .04 (0)      | -.05 (0)           | -.02 (0)              |
| Large size (≥100 workers)      | 20,365       | 0.20  | 0.40 | 0.00  | 1.00  | .11 (0)      | -.08 (0)           | -.12 (0)              |
| Age                            | 20,365       | 23.68 | 16.13| 2.00  | 207.00| .05 (0)      | -.07 (0)           | -.03 (0)              |
| Exporting dummy                | 20,365       | 0.21  | 0.41 | 0.00  | 1.00  | .06 (0)      | -.06 (0)           | -.08 (0)              |
| Foreign own. dummy             | 20,365       | 0.10  | 0.30 | 0.00  | 1.00  | .01 (0.25)   | 0 (0.55)           | -.1 (0)               |
| Public own. dummy              | 20,365       | 0.01  | 0.10 | 0.00  | 1.00  | .04 (0)      | -.01 (0.08)        | -.03 (0)              |

Notes. The values in parentheses indicate the p-value for the correlation coefficients in the same cell.

The original values of Public Health Policy Index and Economic Support Index ranged between 0 and 100 but we rescaled them to range between 0 and 1 to facilitate the reporting and interpretation of results.
positive, significant association between pre-pandemic and pandemic-period growth. Regression 3 likewise confirms that women-owned businesses were closed for a significantly longer period. Women-owned businesses were closed by half a week longer—about 17% longer than the duration of closure of the average firm \((17.2\% = (0.51/2.97)*100)\). This effect declines by about a quarter when pre-pandemic growth rates are included in regression 4.

Regressions 5 and 6, which are based on a negative binomial model, also indicate positive and significant coefficients for the women ownership dummy. These coefficients are interpreted as semi-elasticities in the same manner as coefficients from a log-linear model. Regression 5 reveals that women ownership is associated with a 16.8% increase in the duration of closure—a result very similar to the OLS estimates reported above.

**The Moderating Effect of Public Health Policies Index**

Table 3 reports the regression results for equation (2) to test Hypothesis 2. From regression 1, the interaction between Women and Public Health Policy Index (PHPI) is positive and significant, providing support for Hypothesis 2. It indicates that women-owned enterprises registered higher sales growth in countries with stronger public health policy responses. The coefficient remains large and significant in regression 2 when a potential gender gap in pre-pandemic sales growth is accounted for.

Regression 3 also provides support for Hypothesis 2 as the interaction term is negative and significant for business closure, indicating that women-owned enterprises in countries with stronger public health policies registered shorter duration of closure. This effect remains robust after controlling for the potential role of pre-pandemic growth gender gap. Regressions 5 and 6, which are based on a negative binomial model, further confirm these results.

Figure 1 plots the marginal effects of women ownership on sales growth and business closure, based on regressions 1, 3, and 5. All three plots reveal that a sufficiently high level of PHPI eliminates the gender gap in performance. At the average level of PHPI in our sample (around 0.60, see Table 1), the marginal effect of women ownership on sales growth is −3.05 percentage points, and the same on business closure is 0.50 week based on OLS and 0.46 week based on negative binomial regression, all of which are significant at 5% level. The marginal effect of women ownership on sales growth and business closure becomes statistically insignificant when a country’s PHPI level approaches 0.80. These results indicate that gender differences in enterprise performance during the pandemic are considerably attenuated by high-quality public health measures.

**The Moderating Effect of Economic Support Policies (ESP)**

Table 4 reports the results for equation (2), where an interaction term between women ownership and Economic Support Index (ESI) is included. The results fail to provide support for Hypothesis 3, both for sales growth and the duration of business closure. We thus find no evidence that economic support policies help narrow gender differences in performance during the pandemic. We explore the possible reasons for the lack of support for this hypothesis through additional robustness tests in the next subsection.

**Robustness Tests**

*Heckman Selection Model.* We conduct additional robustness tests to account for the potential selection of observations into the sample. It is likely that women entrepreneurs that suffered the most from the pandemic exited the market and were not covered by the survey. In this case, we only observe better-performing women-owned enterprises, and our analysis could understated
## Table 2. Gender (in)equity in enterprise performance during COVID-19.

|                  | (1)                              | (2)                              | (3)                              | (4)                              | (5)                              | (6)                              |
|------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
|                  | Sales growth                     | Sales growth                     | Business closure                 | Business closure                 | Business closure                 | Business closure                 |
| Women own. dummy | $-3.007^{***} \ (0.519)$         | $-2.573^{***} \ (0.586)$         | $0.510^{***} \ (0.092)$          | $0.372^{***} \ (0.096)$          | $0.168^{***} \ (0.043)$          | $0.142^{***} \ (0.044)$          |
| Pre-pandemic growth | $0.033^{**} \ (0.015)$          | $-0.003 \ (0.003)$              | $0 \ (0.001)$                   | $-0.003 \ (0.003)$              | $0 \ (0.001)$                   | $-0.003 \ (0.003)$              |
| Small size       | $-8.635^{***} \ (0.791)$         | $-8.842^{***} \ (0.867)$         | $1.162^{***} \ (0.143)$          | $1.149^{***} \ (0.150)$          | $0.498^{***} \ (0.067)$          | $0.542^{***} \ (0.079)$          |
| Medium size      | $-4.378^{***} \ (0.683)$         | $-4.375^{***} \ (0.744)$         | $1.447^{***} \ (0.116)$          | $0.480^{***} \ (0.123)$          | $0.241^{***} \ (0.065)$          | $0.296^{***} \ (0.076)$          |
| Log (age)        | $-0.246 \ (0.352)$              | $-0.019 \ (0.392)$              | $-0.192^{***} \ (0.072)$         | $-0.094 \ (0.075)$              | $-0.079^{***} \ (0.030)$         | $-0.075^{***} \ (0.038)$         |
| Exporting firm   | $0.441 \ (0.637)$               | $0.103 \ (0.659)$               | $0.062 \ (0.118)$               | $-0.121 \ (0.125)$              | $-0.089^{*} \ (0.050)$           | $-0.099^{*} \ (0.057)$           |
| Foreign owned    | $0.337 \ (0.661)$               | $0.213 \ (0.727)$               | $0.192 \ (0.140)$               | $0.283^{**} \ (0.144)$           | $0.078 \ (0.056)$               | $0.154^{**} \ (0.062)$           |
| State owned      | $9.368^{***} \ (1.973)$         | $9.095^{***} \ (1.991)$         | $0.417 \ (0.474)$               | $0.324 \ (0.511)$               | $-0.127 \ (0.237)$              | $-0.168 \ (0.251)$              |
| Observations     | $20,365$                         | $16,548$                         | $18,240$                        | $14,875$                        | $17,770$                        | $14,722$                        |
| R-squared        | $0.315$                          | $0.313$                          | $0.277$                         | $0.269$                         | $29,170$                        | $23,386$                        |
| Log pseudo likelihood |                         | $-29,170$                        | $-23,386$                      | $0.045$                         | $0.046$                         | $0.904$                          |
| Pseudo R-squared | $0.045$                          | $0.046$                          | $0.904$                         | $0.904$                         | $0.904$                         | $0.904$                         |

**Notes:** The dependent variables are indicated by the row headings. Country-by-month and industry fixed effects are included but not reported. Standard errors in parentheses are corrected for clustering within country-industry groups. For business closure, the results in columns 3 and 4 are based on Ordinary Least Squares (OLS) regressions, while those in columns 5 and 6 are based on Negative Binomial (NB) regressions.
|                        | (1)          | (2)          | (3)          | (4)          | (5)          | (6)          |
|------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| **Women X Public Health Policy Index** | 10.435*** (4.557) | 12.859*** (5.027) | -2.089*** (0.873) | -2.297*** (0.802) | -0.731*** (0.346) | -0.811*** (0.316) |
| **Women own. dummy**   | -2.252 (3.277) | -2.509 (3.767) | .832 (0.563) | 1.253*** (0.555) | .530* (0.304) | .638*** (0.317) |
| **Women X Lockdown stringency** | -6.005*** (2.555) | -4.590 (2.838) | .444 (0.444) | -.186 (0.453) | -.235 (0.196) | -.381** (0.223) |
| **Women X COVID-19 cases pc** | -.488* (0.268) | -.736** (0.300) | .089 (0.054) | .077 (0.053) | .029 (0.022) | .030 (0.024) |
| **Women X Governance quality** | .203 (0.840) | .784 (0.961) | .013 (0.170) | .064 (0.155) | .117* (0.065) | .159** (0.073) |
| **Pre-COVID growth**   | -.032** (0.015) | .002 (0.003) | -.002 (0.003) | .001 (0.001) | .001 (0.001) | .001 (0.001) |
| **Women X Pre-COVID growth** | .099 (0.039) | .002 (0.007) | -.002 (0.007) | .001 (0.002) | .001 (0.002) | .001 (0.002) |
| **Small size**         | -8.621*** (0.793) | -8.831*** (0.870) | 1.162*** (0.142) | 1.151*** (0.150) | .505*** (0.066) | .551*** (0.078) |
| **Medium size**        | -4.377*** (0.685) | -4.370*** (0.747) | .447*** (0.115) | .480*** (0.123) | .245*** (0.064) | .301*** (0.076) |
| **Log (age)**          | -.254 (0.351) | -.023 (0.392) | -.193*** (0.072) | -.096 (0.075) | -.079*** (0.029) | -.077*** (0.038) |
| **Exporting firm**     | .461 (0.634) | .120 (0.658) | -.063 (0.117) | -.119 (0.125) | -.085* (0.050) | -.093* (0.056) |
| **Foreign owned**      | .365 (0.663) | .232 (0.730) | .189 (0.139) | .282* (0.143) | .077 (0.056) | .155** (0.062) |
| **State owned**        | 9.375*** (1.964) | 8.989*** (1.974) | .423 (0.475) | .338 (0.512) | -.137 (0.236) | -.175 (0.249) |
| **Observations**       | 20,365 | 16,548 | 18,240 | 14,875 | 17,770 | 14,722 |
| **R-squared**          | .031 | .031 | .027 | .027 | .045 | .047 |
| **Log pseudo likelihood** | -.29,162 | -.23,376 | -.045 | -.047 | -.045 | -.047 |
| **Pseudo R-squared**   | .045 | .047 | .044 | .044 | .044 | .044 |

**Notes.** The dependent variables are indicated by the row headings. Country-by-month and industry fixed effects are included but not reported. Standard errors in parentheses are corrected for clustering within country-industry groups. For business closure, the results in columns 3 and 4 are based on Ordinary Least Squares (OLS) regressions, while those in columns 5 and 6 are based on Negative Binomial (NB) regressions.
gender differences in performance in the crisis period. To address this kind of selection bias, we rely on a response to a question in the survey that asks: “Currently is this establishment open, temporarily closed, or permanently closed?” Five percent of the observations (1270 out of 25,090) were found to be permanently closed. There is also a large number of enterprises that were intended to be surveyed but could not be reached. For 7000 such enterprises, the response to the above question is missing. One can assume that a large percentage of these enterprises could not be reached because they had exited the market, implying a 26% exit rate (8270 out of 32,092).

We conduct additional analysis to account for potential selection bias using these two potential measures of exit. Since the World Bank’s COVID-19 survey follows enterprises that have been surveyed in prior years, we have historical data for surviving as well as (potentially) exiting firms. We use historical measures that indicate the level of debt burden of the firm and its sunk costs to explain the probability that a firm is selected into the sample. Supplement A in the Online Appendix discusses in greater detail the rationale for using these variables and how they are measured.

The regression results that explain the two selection probabilities indicated above are reported in Supplemental Table C2 in Supplement C of the Online Appendix. First, women-owned businesses were not more or less likely to be selected into the sample, indicating absence of gender-based selection differences. Second, indebtedness and sunk costs have the expected type of effect on enterprise performance. Indebtedness has an inverse-U shaped relationship with selection into the sample, indicating that firms with very high and low levels of debt are more likely to exit (the latter potentially because low debt levels reflect credit constraints). As expected, sunk costs positively moderate the effect of indebtedness on survival: at higher levels of debt, firms with greater sunk costs are more likely to survive. The selection model results are thus generally plausible.

Based on the results of Supplemental Table C2, we predicted the probability of selection, from which we generated inverse-mills ratios. Following the procedures for estimating the two-stage
Table 4. The effect of economic support policies on the gender gap in enterprise performance.

|                      | (1)          | (2)          | (3)          | (4)          | (5)          | (6)          |
|----------------------|--------------|--------------|--------------|--------------|--------------|--------------|
|                      | Sales growth | Sales growth | Business closure | Business closure | Business closure | Business closure |
| Women X Economic Support Index | 2.034 (2.356) | 1.187 (2.751) | 0.135 (0.417) | 0.073 (0.448) | 0.070 (0.190) | -0.231 (0.213) |
| Women own. dummy     | 1.330 (2.581) | 2.309 (2.979) | -0.054 (0.504) | 0.282 (0.509) | 0.218 (0.245) | 0.333 (0.265) |
| Women X Lockdown stringency | -5.432*** (2.742) | -3.521 (3.020) | 0.167 (0.451) | -0.444 (0.482) | -0.314 (0.215) | -0.337 (0.224) |
| Women X COVID-19 cases pc | -0.324 (0.270) | -0.521* (0.311) | 0.055 (0.053) | 0.040 (0.054) | 0.015 (0.024) | 0.020 (0.026) |
| Women X Governance quality | 0.089 (0.956) | 0.843 (1.104) | -0.045 (0.203) | 0.006 (0.198) | 0.113 (0.074) | 0.194*** (0.080) |
| Pre-COVID growth     | 0.032*** (0.015) | -0.002 (0.003) | 0 (0.001) | 0.006 (0.039) | -0.002 (0.007) | -0.002 (0.002) |
| Women X Pre-COVID growth | 0.006 (0.039) | -0.002 (0.007) | -0.002 (0.002) | 0 (0.001) | 0 (0.001) | 0 (0.001) |
| Small size            | -8.610*** (0.792) | -8.819*** (0.868) | 1.160*** (0.142) | 1.149*** (0.150) | 0.503*** (0.066) | 0.548*** (0.078) |
| Medium size           | -4.368*** (0.685) | -4.358*** (0.746) | 0.445*** (0.116) | 0.478*** (0.123) | 0.243*** (0.065) | 0.299*** (0.076) |
| Log (age)             | -0.251 (0.351) | -0.022 (0.391) | -0.191*** (0.072) | -0.095 (0.075) | -0.079*** (0.029) | -0.078*** (0.038) |
| Exporting firm        | 0.462 (0.633) | 0.122 (0.657) | -0.062 (0.118) | -0.118 (0.125) | -0.084* (0.050) | -0.092 (0.056) |
| Foreign owned         | 0.351 (0.663) | 0.220 (0.730) | 0.190 (0.139) | 0.283*** (0.143) | 0.078 (0.056) | 0.155*** (0.062) |
| State owned           | 9.337*** (1.973) | 8.996*** (1.983) | 0.414 (0.476) | 0.328 (0.512) | -0.136 (0.238) | -0.172 (0.249) |
| Observations          | 20.365 | 16.548 | 18.240 | 14.875 | 17.770 | 14.722 |
| R-squared             | 0.316 | 0.313 | 0.277 | 0.269 | -29.165 | -23.378 |
| Log pseudo likelihood | 0.045 | 0.047 | 0.045 | 0.047 |

Notes: The dependent variables are indicated by the row headings. Country-by-month and industry fixed effects are included but not reported. Standard errors in parentheses are corrected for clustering within country-industry groups. For business closure, the results in columns 3 and 4 are based on Ordinary Least Squares (OLS) regressions, while those in columns 5 and 6 are based on Negative Binomial (NB) regressions.
Heckman model, we subsequently estimated the performance model [i.e., Equations (1) and (2)] by including the inverse-mills ratios (see, e.g., Parker, 2018). In these regressions, we also include the firm’s level of indebtedness, since this variable could affect creditworthiness during the pandemic. The results are reported in Supplemental Tables C3-I to C3-III in Supplement C of the Online Appendix, one table for each hypothesis. The inverse-mills ratios were significant in almost all of the regressions, indicating the presence of a general selection effect. In Supplemental Table C3-I, the coefficients of the women ownership dummy are significant and with the expected sign. In Supplemental Table C3-II, the interaction term of the women ownership dummy and PHPI has significant coefficients with the expected sign. The interaction term with Economic Support Index is insignificant in Supplemental Table C3-III. These tests indicate the robustness of the results after accounting for potential selection bias.

Joint Estimation of Outcome Variables. Since sales growth rate and the duration of closure are significantly correlated with each other (coeff. = $-0.46$; $p$-value = 0, see Table 1), jointly explaining them has certain efficiency advantages. However, this could also lead to cross-equation contamination of measurement error. Since sales growth is measured using accounting data while business closure is measured based on retrospective memory, there is likely a difference in the precision with which the two variables are measured.

With this limitation in mind, we ran a joint estimation analysis using seemingly unrelated regression (SUR) method. The SUR estimates are reported in Supplemental Tables C4-I to C4-III in the Online Appendix. Again, the dummy variable for women ownership enters with significant coefficients of the expected sign in Supplemental Table C4-I, and its interaction with PHPI is significant and with the expected sign in Supplemental Table C4-II. As in the baseline results, the interaction term between women ownership and Economic Support Index is insignificant in Supplemental Table C4-III. Joint estimation of the outcome variables thus confirms our baseline results.

Women Over-representation in Service Sectors. Another important concern is that women tend to be over-represented in consumer-facing services sectors (Parker, 2018), which were disproportionately affected by the pandemic. Although we have included 2-digit ISIC subindustry codes to partial out industry composition differences, this approach might be untenable if the effects of gender interact with industry effects. To assess this possibility, we extended equation (1) by including interaction terms between the women ownership dummy and sectoral dummies. The results, which we do not report to conserve space, revealed no significant coefficients for the interaction terms between women ownership and sectoral dummies, while the main effect of women ownership always remained significant and with the expected sign. This indicates that, while women-owned businesses on average suffered more during the pandemic, this performance gap was not significantly greater in the services sector.

Measurement Issues. We conducted a number of additional tests to check the robustness of the results to alternative approaches for measuring key variables in our model. Supplement C of the Online Appendix discusses these tests, which include using (i) a continuous variable for measuring the ownership share of women entrepreneurs, (ii) stimulus spending as a share of GDP to capture economic support for testing hypothesis 3, and (iii) excess mortality data to account for pandemic severity. The results of these tests, which are discussed in Supplement C of the Online Appendix, are strongly in line with the baseline results.
Discussion and Contributions

The COVID-19 pandemic has received widespread research attention, with several journals publishing commentaries and articles that shed light on the effects of the pandemic on business and society (e.g., Brammer et al., 2020; Brown et al., 2020; Hitt et al., 2021). This study advances research in this area by providing empirical evidence on the gendered effects of the pandemic on enterprise performance. We found that women-owned enterprises performed worse than their counterparts during the pandemic. Sound public health measures, such as the provision of credible public health information that corrected perceptual bias, helped reduce the adverse effects of the pandemic on women-owned businesses, whereas economic support policies did not have a similar effect. This could be because women entrepreneurs did not receive a fair share of economic support, or because their specific interests were not well-understood by male decision makers who dominate the landscape of politics and policy making (Josephson & Marshall, 2016). The design and execution of such economic support policies could thus be influenced by the same structural forces that placed women at a disadvantage, such as patriarchal norms that skew the work-life balance against women (Viswanath & Mullins, 2021).

We bridge behavioral research in economics and entrepreneurship (Bönte et al., 2016; Unger et al., 2015; Gimenez-Jimenez et al., 2020) and the work-life interface research (Jennings & Brush, 2013; Klyver et al., 2013), to unpack the mechanisms by which exogenous shocks shape entrepreneurs’ behavior and subsequently enterprise performance. We argue, and provide empirical support, that the crisis amplified the sensitivity of women to economic and health risks. This sensitivity could stem from their socialization (care for others) and biological factors related to testosterone levels (Apicella et al., 2015; Unger et al., 2015). Their greater sensitivity to health risk might have led women entrepreneurs to pursue business decisions that negatively impacted the performance of their enterprises. This effect was further reinforced by lockdown policies that exacerbated work-life imbalances and compelled women entrepreneurs to channel their time and energy to their households rather than business responsibilities.

Theoretical Contributions

The study makes several contributions to the related literature. By examining gender differences in enterprise performance, we contribute to entrepreneurship research that looks into the gendered dimensions of entrepreneurial performance (e.g., Jennings & Brush, 2013). The relationship between gender and enterprise performance is contentious: some studies provide support for the so-called “female underperformance hypothesis” (e.g., Jennings & McDougald, 2007) while others refute the presence of such an effect (Kalnins & Williams, 2014; Robb & Watson, 2012). By focusing on the unique context of the COVID-19 pandemic, our work contributes toward a more nuanced understanding of the underlying factors driving gender differences in enterprise performance. This has enabled us to go beyond examining the relationship between gender and enterprise performance to shed light on the conditions under which such a relationship could hold.

Further, by examining the implication of the COVID-19 crisis, we contribute to the literature on adversity and enterprise performance (e.g., Shepherd & Williams, 2020; Williams et al., 2017). Previous studies on enterprise resilience have demonstrated the relevance of pre-existing capabilities—cognitive endowments, strategic networks, resource access, and behavioral attributes of entrepreneurs—as important determinants of survival in the face of adversity (Williams et al., 2017). Using COVID-19 as an example of adversity (Shepherd & Williams, 2020; Mithani, 2020), our study demonstrates the pandemic’s disproportionate effect on women-owned businesses, especially on those located in countries with weak public health policy responses. In doing so, we extend the adversity literature by highlighting the importance of analyzing the mechanism...
by which adversity perturbs normalcy. This, in turn, is key for understanding the heterogeneous effects of adversity on enterprises and for identifying potential coping mechanisms.

Given that the COVID-19 crisis is a recent phenomenon, most studies thus far heavily relied on anecdotal evidence, selected interviews, and conceptual analysis. Among these, some have reported the effects of the pandemic on firm performance and survival (Muzi et al., 2021), the strategic responses of entrepreneurs to the crisis (e.g., Kuckertz et al., 2020; Manolova et al., 2020), and the role of economic support policies on reducing firm exit (Belghitar et al., 2021). Our research extends this nascent literature by shedding light on the gendered aspects of the crisis on entrepreneurial outcomes. Our contribution also speaks to recent research that examined the role of the pandemic in worsening gender inequality in employment (Alon et al., 2020; Hupkau & Petrongolo, 2020), by documenting a similar effect in the business and entrepreneurship domains.

Our focus on government-level responses extends prior research that was mainly focused on responses to adversity at the individual, firm, or community levels (e.g., Shepherd & Williams, 2020; Williams et al., 2017). Interestingly, our findings suggest that gender-neutral policies, in particular sound public health policies, could have a gendered outcome. Moreover, by pointing to the potential role of public health policy measures in mitigating gender inequality in enterprise performance, our findings show that (a) the perception and tolerance of risk, which are enduring, individual-level attributes (Langowitz & Minniti, 2007) can be changed by policy interventions, and that (b) policies can alter individual behavior by not only adjusting incentive mechanisms but also reframing perceived risks.

This research also contributes to the literature that examines institutional and policy variations among emerging economies and their implications for entrepreneurial activities (Aidis et al., 2008; Estrin et al., 2019; Estrin & Prevezer, 2011). In particular, it highlights the presence of significant variations in the strength of public policy responses to the crisis among emerging countries and the important role that such variations play in driving gender differences in enterprise performance.

**Practical Implications**

Our research has some notable practical implications. First, given that pandemics such as the COVID-19 are both recurring (Donthu & Gustafsson, 2020) and with long-lasting repercussions (Alon et al., 2020; Brammer et al., 2020; Shepherd, 2020), it is important to understand their distributional implications by assessing their effects on businesses owned by vulnerable social groups. Our results on the adverse effects of COVID-19 on women entrepreneurs highlight the need for a systematic effort to understand how asymmetries in economic opportunities and preferences interact with institutional constraints to perpetuate gender-based inequalities. These results provide meaningful input for the preparation of sound interventions that avert or mitigate adverse effects on disadvantaged groups. For example, policy interventions that aim to improve economic recovery could pay special attention to the needs of women enterprises, just as other economic policies emphasize the needs of small and medium enterprises (Belghitar et al., 2021).

At the same time, the study suggests that redressing these inequalities may not necessarily require targeted interventions such as affirmative action, as they could be effectively mitigated through interventions that address the root causes of the disparity. Since COVID-19 started as a health crisis and gradually created spillover effects in other domains of life, public health measures that contained the spread of the virus significantly reduced its negative, differential effect on women business. These kinds of policies can complement targeted and selective remedial policies.

For entrepreneurs, our findings provide useful insights on the potential behavioral and structural explanations for gender disparity in performance. Such an understanding could be useful to draw lessons on building resilience in anticipation of similar adversities. Specifically, the pandemic has demonstrated the value of adapting to crises through bricolage, digitalization, and
business model innovation (Manolova et al., 2020; Muzi et al., 2021). Considering their vulnerability to public health adversities, women entrepreneurs would need contingent risk mitigation strategies, for example, by investing on technologies that build resilience. Further, our study points to the value of timely, accurate and reliable public health information for sound understanding of public health risks. For women entrepreneurs, this may suggest the need to actively seek out timely information on potential public health hazards to limit potential adverse effects on their businesses.

**Limitations and Future Research Directions**

Our study provides empirical evidence on the effects of the COVID-19 pandemic on the relative performance of women-owned businesses. However, due to the cross-sectional nature of our data, the results might not be necessarily interpreted as causal. Future research could exploit panel databases to identify causal evidence on the heterogeneous effects of the pandemic by gender and other attributes. Moreover, future research can improve our understanding by looking into the specific mechanisms through which public policy responses create heterogenous effects across enterprises. Other promising avenues of future research include examining whether and how (a) public health measures influence the decisions of entrepreneurs and (b) the allocation of economic stimulus varies across firms.

With respect to the “lives vs. livelihoods” conundrum, this study documented how women entrepreneurs suffered significantly from loss of livelihoods. However, we do not know the potential gains of women entrepreneurs, for example, in terms of reductions in mortality and morbidity among their family and workers, resulting from their greater sensitivity to health risks. Future research could examine other aspects of this tradeoff that had an uneven effect on women and men entrepreneurs. Furthermore, an interesting aspect of the pandemic has been that some emerging countries have performed better (or employed stronger policy responses) than some advanced countries (Hale et al. 2021). A potentially fruitful direction of research lies in studying the entrepreneurial implications of such asymmetry between economic development and the strength of public policy responses to adversity.

**Declaration of Conflicting Interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Funding**

The author(s) received no financial support for the research, authorship, and/or publication of this article.

**ORCID iD**

Addisu A. Lashitew © https://orcid.org/0000-0001-6405-5682

**Supplemental Material**

Supplemental material for this article is available online.

**Notes**

1. “Black women were among the fastest-growing entrepreneurs—Then COVID arrived” Available at: https://www.forbes.com/sites/ruthumoh/2020/10/26/black-women-were-among-the-fastest-growing-entrepreneurs-then-covid-arrived/?sh=7f684a806e01
2. In this study, we adopt the commonly used definition of entrepreneurs as residual claimants, or owners, who also run their businesses (Parker, 2018, p. 6).

3. “How COVID-19 is changing women’s lives.” Available at: www.bbc.com/worklife/article/20200630-how-covid-19-is-changing-womens-lives. June 2020.

4. Pandemic severity and lockdown stringency are likely to be positively correlated with public health and economic support policy responses (POL), while having the opposite effect of increasing the gender gap in enterprise performance. Failing to control for their effects will introduce an omitted variable bias that reduces the magnitude and significance of $\gamma$, leading to an understatement of the extent to which policy measures (POL) reduce the gender gap in enterprise performance.

5. This pattern is also apparent in our sample as women-majority firms are slightly over-represented in services, where they make up 23% of all firms (against 21% in the full sample). In manufacturing and construction, women-owned enterprises are under-represented, constituting only 19% and 14% of firms in the two sectors, respectively.

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**Author Biographies**

**Addis G. Birhanu** is an associate professor of Strategy and Organization at EMLYON Business School, France. She received her Ph.D. in Business Administration and Management from Bocconi University, Italy. Her research interests are in the nexus of non-market strategy and corporate governance, and their implications on firm performance. Her research has been published among others in *Strategic Management Journal, Strategic Organization, and Journal of International Financial Markets, Institutions, and Money*. Addis currently serves as a member of the Editorial Review Board of *Strategic Management Journal*.

**Yamlaksira S. Getachew** is an assistant professor of management at Loyola Marymount University, USA. He received his Ph.D. in business administration from Ivey Business School, Western University, Canada. His research focuses on the interplay between businesses and sustainable development, with particular emphasis on Africa, economic institutions, and inequality. His work has appeared in leading management journals including *Entrepreneurship Theory & Practice, Journal of World Business*, and *Global Strategy Journal*.

**Addisu A. Lashitew** is an assistant professor at DeGroote School of Business of McMaster University and a nonresident research fellow at Brookings Institution. He was previously a David M. Rubenstein Research Fellow at the Global Economy and Development Program of the Brookings Institution. His research covers diverse topics in development economics, innovation studies and corporate sustainability. His work has been published several journals including the *Journal of International Business Studies, Research Policy, World Development, Business & Society* and *Journal of Business Ethics*. 