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Gender, entrepreneurship and coping with the COVID-19 pandemic: The case of GoFood Merchants in Indonesia

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GENDER, ENTREPRENEURSHIP AND COPING WITH THE COVID-19 PANDEMIC: THE CASE OF GOFOOD MERCHANTS IN INDONESIA

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Abstract

This paper examines business performance and crisis mitigation strategies among micro-, small-, and medium-sized enterprises (MSMEs) in Indonesia during the COVID-19 pandemic. We utilize a new primary data set based on administrative records, survey data, and follow-up interviews with merchants using the digital application GoFood, an on-demand cooked food delivery service. Three empirical findings emerge: First, the overall employment size of women-owned businesses shrank more than men-owned businesses after the pandemic outbreak; second, women were more likely than men to cut personal expenditures and use government assistance as crisis mitigation strategies; and third, competition increased sharply as new merchants entered the platform, with service areas of both incumbents and entrants shrinking over time. These results have implications for policies on women's entrepreneurship, the uptake of business development services, and financing programs for MSMEs.

Keywords: women, e-commerce, COVID-19, digitalization, MSMEs

JEL Classification: J16, J21, O12, L11

Contents

1.	INTRODUCTION.....	1
2.	BACKGROUND.....	2
2.1	Impact of COVID-19 on Indonesia's Labor Market	3
2.2	Women and MSMEs in Indonesia	4
3.	CONCEPTUAL FRAMEWORK	5
4.	DATA AND METHODOLOGY	6
5.	DESCRIPTIVE STATISTICS	8
6.	REGRESSION ANALYSIS	16
7.	QUALITATIVE EVIDENCE	19
8.	SUMMARY AND POLICY IMPLICATIONS	20
	REFERENCES	22
	APPENDIX.....	24

1. INTRODUCTION

The COVID-19 pandemic generated devastating health impacts and major economic crises around the globe. It disrupted the livelihoods of countless individuals and households as well as existing businesses that thrive on physical supply and logistics chains. Yet the pandemic is not the only disruptor to global economies; accelerated digitalization has also contributed to enormous changes in the jobs people hold and their terms of employment. While online platforms can offer an alternative means to generate jobs and support business continuity for micro, small, and medium-sized enterprises (MSMEs), evidence is almost nonexistent, particularly in developing countries, due to the lack of high-frequency, granular data. To fill this critical lacuna of existing studies, our paper employs a new *sui generis* data set based on administrative records and survey data to examine business performance and crisis mitigation strategies among a sample of MSMEs on the GoFood platform (an online cooked food delivery platform) in Indonesia during the COVID-19 pandemic.

The pandemic changed the way people work, source what they need, and interact with each other. Certain sectors (especially retail, food, entertainment, and services) as well as MSMEs were hit particularly hard with business closures (ILO 2020), and a growing evidence base indicates disproportionate job and income losses for women and low-income individuals (Kabeer, Razavi, and Rodgers 2021). For instance, women were 44% more likely to lose their jobs in the crisis than men, and permanent job losses affected one in five women (ADB 2021; ILO 2020). The crisis amplified existing inequalities in opportunities to access economic resources, markets, and decent jobs, and it deepened societal fault lines.

Yet when exogenous shocks (such as a pandemic) disrupt business models that thrive on physical supply and logistics chains, online platforms can offer an alternative means for gainful employment, generating jobs and supporting business continuity for MSMEs. With the pandemic, important push and pull factors in business operation and performance emerged. In particular, subscription of MSMEs to online platforms increased to generate and sustain their revenues, and demand for e-commerce and online services expanded as a result of mobility restrictions imposed to contain the pandemic. Further, low to no entry barriers, low operations costs, autonomy, and flexible location and work hours built into some online business lines created fertile ground for new entrepreneurs to onboard during the pandemic.

Two important questions are how online MSMEs performed during the COVID-19 pandemic and whether men and women entrepreneurs differed in their business performance and crisis mitigation strategies. We explore this question using unique data from GoFood merchants of GoJek in Indonesia, one of the top three online platforms in Indonesia and in the Southeast Asia region as a whole by gross merchandise value.¹ GoFood allows merchants to prepare and deliver home-cooked foods; and like other platforms in the gig economy, it can provide new employment opportunities for individuals who otherwise might not have entered the labor market.

¹ GoJek was established in Indonesia as a call center offering instant courier and motorcycle ride hailing services in 2010. It proliferated its services, launching an easy-to-use mobile application in 2015, and a dedicated dashboard within the application for GoFood merchants where they were provided with online marketing, sales, and payment support. At present it operates in Indonesia, Singapore, Thailand, and Viet Nam, offering various services and products. In 2021, GoJek joined Grab (which generated US\$7.6 billion) and FoodPanda (which generated US\$3.4 billion) with US\$2 billion in annual gross merchandise value, as the top three performers in Southeast Asia. In Indonesia, GoJek accounted for 43% of the \$4.6 billion (or 3.9% of Indonesia's GDP of \$1.19 trillion in current prices in 2021) food delivery market, where Grab accounted for 49% of the market (Momentum Works 2022).

Work for the gig economy has served as a major buffer for Indonesian entrepreneurs during the pandemic as demand for online products and services grew, and online food delivery was among the most-often used platform services. Further, according to a 2021 survey, 78% of respondents in Indonesia stated that GoFood was the food delivery app they used most often (Rakuten Insight 2021).

In this paper, we focus on gender differences in business performance and crisis mitigation strategies among GoFood app merchants during the pandemic. We test three hypotheses stemming from the push and pull factors associated with the expansion of e-commerce and the contraction of Indonesia's economy with containment measures during the pandemic: (1) these push and pull factors contributed to an influx of micro- and small-sized businesses, especially those owned by women, resulting in a decline in the average number of employees per enterprise; (2) women business owners were more likely to adopt self-sufficiency strategies to mitigate crisis impacts, such as cutting personal consumption and using own savings, given that women's access to formal financial sources is lower than that of men (Esquivias et al. 2021); and (3) increased competition from new entrants contributed to declining revenues and transactions, especially for women. The analysis uses a mixed-methods approach based on new, primary data generated through administrative records, online surveys, and phone interviews with a sample of GoFood merchants.

To preview our findings, we find empirical support for all three of our hypotheses. These results have critical insights for policies on women's entrepreneurship, the uptake of business development services, and financing programs for MSMEs. This work builds on descriptive observations in a report by UN Women (2020) showing that women-owned businesses were more likely than those owned by men to diversify their operations and adjust the scope of their business using online platforms, which helped to mitigate some of the adverse effects of the pandemic. We expand on this descriptive study by using multivariable regression analysis to pinpoint the association between the gender of business owners and a set of business performance indicators. Our study also builds on Tambunan (2019), who found that during the 2007–08 global financial crisis, the total number of MSMEs in Indonesia actually rose, but the effects on MSME revenues and output varied depending on the sector. MSMEs in tourism and in export industries were especially hard hit as global demand shrank, and many of these enterprises resorted to laying off workers and cutting work hours (Tambunan 2019). We believe that our case study of GoFood merchants makes a novel contribution to the literature and policy discussion in this line of research, not only by focusing on a more recent and larger global crisis arising from the COVID-19 pandemic, but also by examining gender differences in online sales and coping strategies.

2. BACKGROUND

Indonesia constitutes an important case study for examining the gendered impacts of COVID-19 on MSMEs because among developing countries, it was one of the hardest hit countries (Suryahadi, Al Izzati, and Suryadarma 2020; Gibson and Olivia 2020). As in many other countries, women in Indonesia experienced a disproportionate burden imposed by lockdown policies, especially in terms of relatively greater unpaid care work burdens, which acted as a constraint on women's participation and productivity in the labor market (UN Women and Women Count 2020).

2.1 Impact of COVID-19 on Indonesia's Labor Market

A growing body of evidence indicates that Indonesia faced enormous disruptions due to the pandemic, with adverse effects on life expectancy, poverty, and the macroeconomy (Suryahadi et al. 2020; Gibson and Olivia 2020). Global data on COVID-19 infections indicate that Indonesia experienced more COVID-19 laboratory-confirmed cases and deaths per capita than most other Asian countries, especially in February 2021 and again in July 2021 when both new cases and deaths per capita rose sharply. Only the Philippines and India saw comparable mortality and morbidity rates during the pandemic in Asia (Roser et al. 2021). Even though Indonesia's government responded early in the global pandemic by closing its borders, containment responses were less strict compared to other Asian countries (Olivia, Gibson, and Nasrudin 2020).

Indonesia's government did respond with a set of stimulus packages worth about 6% of GDP that included tax relief, increased social assistance for low-income families, and incentives for MSMEs (Olivia, Gibson, and Nasrudin 2020). This social protection was much needed given that among its regional neighbors, Indonesia experienced one of the most widespread declines in household income: 81% of households reported declining incomes, exceeded only by 84% of households in the Philippines (Morgan and Trinh 2021). Critics, however, argued that the government's response was inadequate and focused too much on cushioning the short-term economic impact of the pandemic and not enough on addressing longer-term problems with poverty, unemployment, the investment climate, and structural transformation (Sparrow, Dartanto, and Hartwig 2020; Temenggung et al. 2021). The particularly severe impacts of COVID-19 contributed to Indonesia's downward shift in the World Bank's classification of countries by income groups, from upper-middle income to lower-middle income.

Employment losses led to household income losses. Published aggregate data for Indonesia indicate that the official unemployment for women rose from 3.4% in 2019 to 3.8% in 2020, when business closures surged, and for men it rose even more, from 3.8% to 4.6% (World Bank 2022). As unemployment rose, the employment to population ratio fell from 52.2% to 51.2% for women, and 79.3% to 77.8% for men between 2019 and 2020 (World Bank 2022). Thus, unlike the relatively larger employment losses for women in many other countries, in Indonesia, men's employment losses were more severe than those for women. Moreover, when the containment policies first started, 55% of women in the formal sector reported a decline in working hours compared to 42% of men, while in the informal sector relatively more men (32%) than women (24%) reported a decline in working hours (UN Women and Women Count 2020). The growth of self-employment in e-commerce may have helped to mitigate some of these losses, especially as consumer demand for door-to-door delivery surged. In the first six months of the pandemic, online shopping rose by an average of 30% in Indonesia and other Southeast Asian countries (IFC 2021). Among online services, growth in food delivery services was particularly noteworthy during the pandemic. In 2020, Indonesia led Southeast Asian markets in food delivery gross merchandise value. The Indonesian market continued to grow in 2021; platform to consumer online food delivery commanded \$366 million by the end of the year, more than tripling in value compared to the \$95 million revenue generated in 2019. However, the average annual revenue per user remained fairly stable at around \$52 during the same period, signaling a commensurate increase in the number of consumers and merchants on food delivery platforms (Statista 2022).

2.2 Women and MSMEs in Indonesia

In Indonesia and around the globe, MSMEs provide an important vehicle for income generation for women and men (UN Women 2020). Some people start MSMEs because they need or want more flexibility in their terms of employment, or they have innovative ideas that warrant starting a new business. Other people, often those at the lower end of the income scale, have little choice but to engage in self-employment when paid employment opportunities are scarce, becoming “entrepreneurs by necessity.” Moreover, self-employment allows parents, and especially mothers, to combine labor market participation with childcare responsibilities. This feature of self-employment is particularly important in Indonesia where childcare and domestic work are still considered by most (79% of respondents in a recent ILO survey) to be women’s work, and where the government invests less in care infrastructure than most other countries with comparable incomes (ILO 2018). Even though household businesses tend to be small, MSMEs employ the lion’s share of Indonesia’s labor force. Approximately 98% of all Indonesian businesses are micro- and small-sized enterprises, with women owning 42% of micro-sized enterprises and 30% of small-sized enterprises (UN Women 2020).

E-commerce has contributed to the growth of women-led businesses in Indonesia. According to Sihotang et al. (2020), 55% of all online sellers in the five biggest retail e-commerce providers in Indonesia are women. Indonesia is the biggest and fastest expanding internet economy in Southeast Asia, which has contributed to the success of women-owned MSMEs (IFC 2021). Although MSMEs tend to lag behind large firms in terms of digitalization in other countries, in Indonesia a relatively high share of MSMEs use information and communications technology. Approximately one third of small Indonesian companies take internet-based orders, one of the highest shares globally (UNCTAD 2019). The growth of women-led businesses in turn has contributed to Indonesia’s steady increase in the female labor force participation rate, from 46% in 2005 to 53.7% in 2021 (World Bank 2022). That said, Indonesia still has a sizeable gender gap in labor force participation rates compared to its regional neighbors (Indonesian men had a participation rate of 81.7% in 2021).

In terms of women’s growing labor force participation and business ownership, the COVID-19 pandemic has proven to be a major disruptor for small business owners, especially women because they were in relatively more vulnerable financial positions, with limited access to credit markets before it started. Before the pandemic, women-owned businesses in emerging markets were already disproportionately represented in a \$1.5 trillion financing gap, and they had smaller networks than men and less access to information (IFC 2021). This lack of support meant that during the pandemic, women-owned businesses were relatively more likely to have difficulty servicing their bank loans and meeting payroll (IFC 2021).

Indonesia does have a well-developed market for business development services, some geared specifically for women, and they mostly take the form of government-provided training courses. However, women’s uptake of these services is fairly low, at about 12% of women entrepreneurs (World Bank 2016). The main explanation for this is women’s lack of information and knowledge of these services, followed by binding time constraints to participating in the training courses. Entrepreneurs-by-necessity may be better served by training and skills development programs that help them shift from low-value and highly competitive sectors (such as food production and beauty salons) to higher-growth sectors (such as manufacturing and technology), while growth-oriented entrepreneurs may respond more to management consulting services (World Bank 2016).

3. CONCEPTUAL FRAMEWORK

In examining business performance and crisis mitigation strategies among MSMEs in Indonesia, we consider a hybrid model of MSMEs and households, which integrates production and employment decisions, household finance, and portfolio management (Samphantharak and Townsend 2009). On the side of business investment and production decisions, we can postulate a canonical model of producers in which labor demand and output are functions of output and factor prices. A critical question related to merchants on online platforms is whether the entry of new merchants driven by rapid digitalization enhances the overall efficiency of market transactions. In platform markets, there is an effect of attracting new consumers to the platform (also known as the platform expansion or market creation effect). This effect can help merchants thrive even during a lockdown. Yet new entrants compete with incumbent merchants, which makes the platform more competitive (also known as the business stealing or cannibalization effect). Although the business stealing effect is a common economic force that exists across industries, the balance between these two effects determines the optimality of the platform size. Kawaguchi, Shum, and Uetake (2021) employ the empirical framework proposed by Berry and Waldfogel (1999) to examine merchant-level administrative data from Indonesia, finding strong cannibalization effects on the platform economy. In particular, the optimal number of firms is less than the actual number of firms.

On the household decision side of self-employed businesses, we adopt a model of consumption smoothing across time or space to formalize the framework of market and nonmarket insurance mechanisms. First, we consider a consumption Euler equation in an intertemporal consumption smoothing model, which is a necessary first-order condition of the life cycle permanent income hypothesis or LC-PIH (Jappelli and Pisterferri 2017). In contrast, the model of consumption smoothing across space is known as the complete consumption insurance or consumption risk-sharing framework (Townsend 1994). Using either model, we can derive a common empirical framework of consumption growth under a set of standard assumptions, such as a concave utility function, constant relative risk-aversion, and rational expectations (Sawada 2022). This would yield the following empirical model:

$$\Delta \log(c_{it}) = a_0 + a_1 S_{it} + u_{it}, \quad (1)$$

where c is an individual i 's consumption in period t , S is a disaster shock that individual i faces in each period, and u is a well-behaved error term. The LC-PIH or the complete consumption insurance hypothesis can be tested by checking whether $a_1 = 0$, which means that the agent fully offsets the (idiosyncratic) shocks and achieves consumption smoothing either through self-insurance mechanisms (such as dissaving or borrowing) in the LC-PIH or the mutual insurance mechanisms in the complete consumption insurance hypothesis.

Based on this approach, we can evaluate the relative effectiveness levels of different disaster mitigation channels such as the self-insurance and mutual insurance mechanisms. To this end, we follow Fafchamps and Lund (2003) and consider Equation (1), together with an individual's intertemporal budget constraint in each period as $c = y + d$, where y and d are income and net borrowing, respectively. Consumption is financed by overall income or negative saving. This budget constraint is approximated by an identity in which $\Delta \log(c) = \Delta \log(y) + \Delta(b/y)$. This expression indicates that a consumption increase can be financed by increased income (from sources such as earnings, private transfers, and public transfers), borrowing, dissaving,

or business profits. We can combine this budget constraint with Equation (1) to obtain the financing side of the consumption or crisis mitigation decisions: $k_{it} = a_0 + a_1 S_{it} + u_{it}$, where $k \equiv \Delta \log(y) + \Delta(b/y)$. This equation indicates that to smooth consumption, at least partly, disaster shocks must be absorbed by dissaving, borrowing, additional income from extended labor force participation, and/or transfers provided by private or public sources. Business earnings adjustments by changing employment and business inputs can also be regarded as coping or crisis mitigation strategies. In addition, cutting (unnecessary) consumption would be a way to respond to disaster shocks. Considering the COVID-19 pandemic as an aggregate shock, rather than an idiosyncratic shock, we can postulate the following regression framework with a particular focus on heterogeneities across gender in crisis mitigation strategies:

$$k_{it} = a_0 + (a_1 + a_G G_i) S_t + u_{it}, \quad (2)$$

where we are interested in the gender-specific parameter, a_G , for an indicator variable of gender-specific ownership, G_i , which takes one for a woman's ownership and zero otherwise.

Accordingly, taking three sets of outcome variables in Equation (2) —that is, changes in the number of employees, crisis mitigation strategies, and business performance measures—we test the following three hypotheses stemming from the push and pull factors associated with the expansion of e-commerce and the contraction of Indonesia's economy during the pandemic: First, these push and pull factors contributed to an influx of micro- and small-sized businesses, especially those owned by women, resulting in a decline in the average number of employees; second, women business owners were more likely to adopt self-insurance strategies to mitigate crisis impacts, such as cutting personal consumption or using own savings; and third, increased competition from new entrants contributed to declining revenues and transactions, especially for women. We employ a hybrid approach based on unique data generated through administrative records, online surveys, and phone interviews with a sample of GoFood merchants. We use both descriptive statistics and a multivariable regression analysis to pinpoint the association between the gender of business owners and a set of business performance indicators.

4. DATA AND METHODOLOGY

Our analysis is based on two data sources: (1) weekly administrative and transactions data on all (288,296) GoFood merchants in Indonesia, active on the platform as of February 2021; and (2) new primary data generated through an online survey followed by a telephone survey conducted among GoFood merchants in two of the seven regions served by GoJek in Indonesia. The first data set tracks new entrants and dropouts for a period spanning pre-COVID to post-onset of COVID. The administrative data from the GoJek platform are provided from 7 January 2019 to 28 February 2021, aggregated on a weekly basis per merchant. The data include detailed individual-level information on merchant revenues (as measured by gross merchandise value generated from online GoFood transactions), transactions, and consumer expenditures as well as geospatial identifiers, but they are not gender-disaggregated and enterprise size is not included.

The second data set includes primary data from surveys conducted among a random sample of 50,000 GoFood merchants in Jabodetabek (a label referring to the larger Jakarta area comprising the capital city Jakarta, Bogor, Depok, Tangerang, and Bekasi), and merchants in EJBN (a label referring to a group of administrative regions and cities in East Java, Bali, and East and West Nusa Tenggara). This sampling covers the regions that generated the highest (Jabodetabek) and lowest (EJBN) revenue as tracked through gross merchandise value in GoFood transactions during the study period. This data set introduces gender disaggregated data on enterprise owners and enterprise size as measured by number of employees. Following the precedent set by Indonesia's Central Bureau of Statistics, enterprises with 0–4 employees are micro-sized, 5–19 employees are small-sized, and 20–99 employees are medium-sized. Samples are drawn through a random selection from the two regions, reflecting the relative levels of all GoFood merchants operating in these two regions, so 65% of the surveyed merchants are from Jabodetabek and 35% are from EJBN.²

Online and phone survey questionnaires were developed in collaboration with GoJek and tested in small-scale pilots in 2021. The questionnaires were then updated for further clarity and the surveys were conducted in two phases. An online, written survey was conducted between 8 November and 5 December 2021, followed by phone interviews between 4 February, and 25 March 2022, conducted with a subset of online-survey participants that consented to share additional information. The phone interviews were instrumental in third-party verification of online survey responses and in providing qualitative data on GoFood merchants. The online survey yielded 869 responses, and phone interviews were conducted with 275 respondents. We acknowledge that this is a low response rate, with an associated risk of sample selection bias. It could be that relatively more successful businesses on the GoFood platform were more willing to participate in the survey, so we might be underestimating the true impacts of the pandemic on business performance. To check for such a bias, we perform t-tests for differences in means of the commonly available variables of gross merchandise value (GMV), number of items sold, and number of transactions across the full administrative records (total population) as well as subsamples of the online-survey and phone-survey respondents. As shown in Table 1, while the number of items sold is not different across the samples, we reject the null hypotheses of the same means for GMV and number of transactions. The number of online survey respondents is greater than the total population in GMV and number of transactions, but the magnitudes are rather small.

We were able to match the online survey data with the larger administrative database through geo-coded data, thus allowing us to have detailed gender-disaggregated information on merchant revenues, transaction details, and merchant and delivery locations for the sample of 869 merchants. The analysis compares women-owned, men-owned, and jointly owned businesses. The methodology is based on analysis of descriptive statistics as well as regression analysis. In the descriptive analysis, the data are examined in seven subperiods based on changes in the business environment that may have affected GoFood merchant onboarding, departures, and behaviors (Table 2). In particular, Indonesia adopted national and local containment measures during the pandemic, which included closure of physical restaurants, eateries, stalls, and other street vendors where cooked food was sold. Also of relevance, in 2019 GoJek introduced a support platform named GoBiz that allows merchants to update their menus and prices, order inputs, promote their business, and handle payments more

² The relative distribution of GoFood merchants operating in Jabodetabek and EJBN is 65% and 35%, respectively. This ratio was maintained for the online survey results. The distribution of phone survey respondents was almost the same, at 64% for Jabodetabek and 36% for EJBN.

easily. GoBiz also improved data capture for transactions facilitated by the GoFood platform.³ To support our choice of analyses around these seven subperiods, our Online Appendix provides additional data from surface urban heat island (SUHI) and nightlight luminosity mappings across these seven groupings. These mappings show that overall economic activity declined during lockdown periods and increased when the restrictions were released.

**Table 1: Means of Performance Variables
(Total population, online survey sample, and phone survey sample)**

Variable	(1)	(2)	(3)	t-test for Difference (1)–(2)	t-test for Difference (1)–(3)	t-test for Difference (2)–(3)
	Total Population Mean/SE	Online Survey Mean/SE	Phone Survey Mean/SE	Difference	Difference	Difference
GoFood GMV (million IDRs)	1.23 [0.0123]	1.45 [0.0441]	1.11 [0.015]	–0.22***	0.12***	0.34***
GoFood # of items	65.429 [0.057]	66.198 [0.815]	67.940 [0.854]	–0.769	–2.511	–1.742
GoFood # of transactions	25.416 [0.019]	26.125 [0.315]	27.864 [0.364]	–0.709*	–2.448***	–1.738***
Number of unique merchants	288,296	869	275			
Number of observations	11,409,707	27,290	12,581			

Note: The number of unique merchants is computed where one merchant is counted once across periods whereas number of observations refers to the total observations (such that one merchant is counted multiple times across periods). The values displayed for t-tests are the differences in the means across the groups. ***, **, and * indicate significance at the 1%, 5%, and 10% critical level. “IDR” is Indonesian rupiah.

Table 2: Timing Structure of Analysis

Period	Number of Weeks	Begin	End
Before COVID, before GoBiz	25	7 Jan 2019	30 Jun 2019
Before COVID, after GoBiz	35	1 Jul 2019	1 Mar 2020
Early COVID	5	2 Mar 2020	5 Apr 2020
First lockdown	13	6 Apr 2020	5 Jul 2020
COVID without lockdown	13	6 Jul 2020	4 Oct 2020
Second lockdown	9	5 Oct 2020	6 Dec 2020
After second lockdown	12	7 Dec 2020	28 Feb 2021
Total	112	7 Jan 2019	28 Feb 2021

5. DESCRIPTIVE STATISTICS

Administrative records for the full population of 288,296 GoFood merchants include data per merchant per week on transactions conducted through the GoFood application in the GoJek platform from 7 January 2019 to 28 February 2021. The data set has information on merchants deemed to be active on the platform—that is,

³ As clarified by GoJek, before GoBiz was introduced, all data capture was manual, i.e., data were submitted on a voluntary basis by merchants on the platform. Further, during the initial transition period to GoBiz, uptake among merchants was modest. Once the majority of merchants joined the GoBiz platform, the transactions data were captured through the platform and the dataset became more robust.

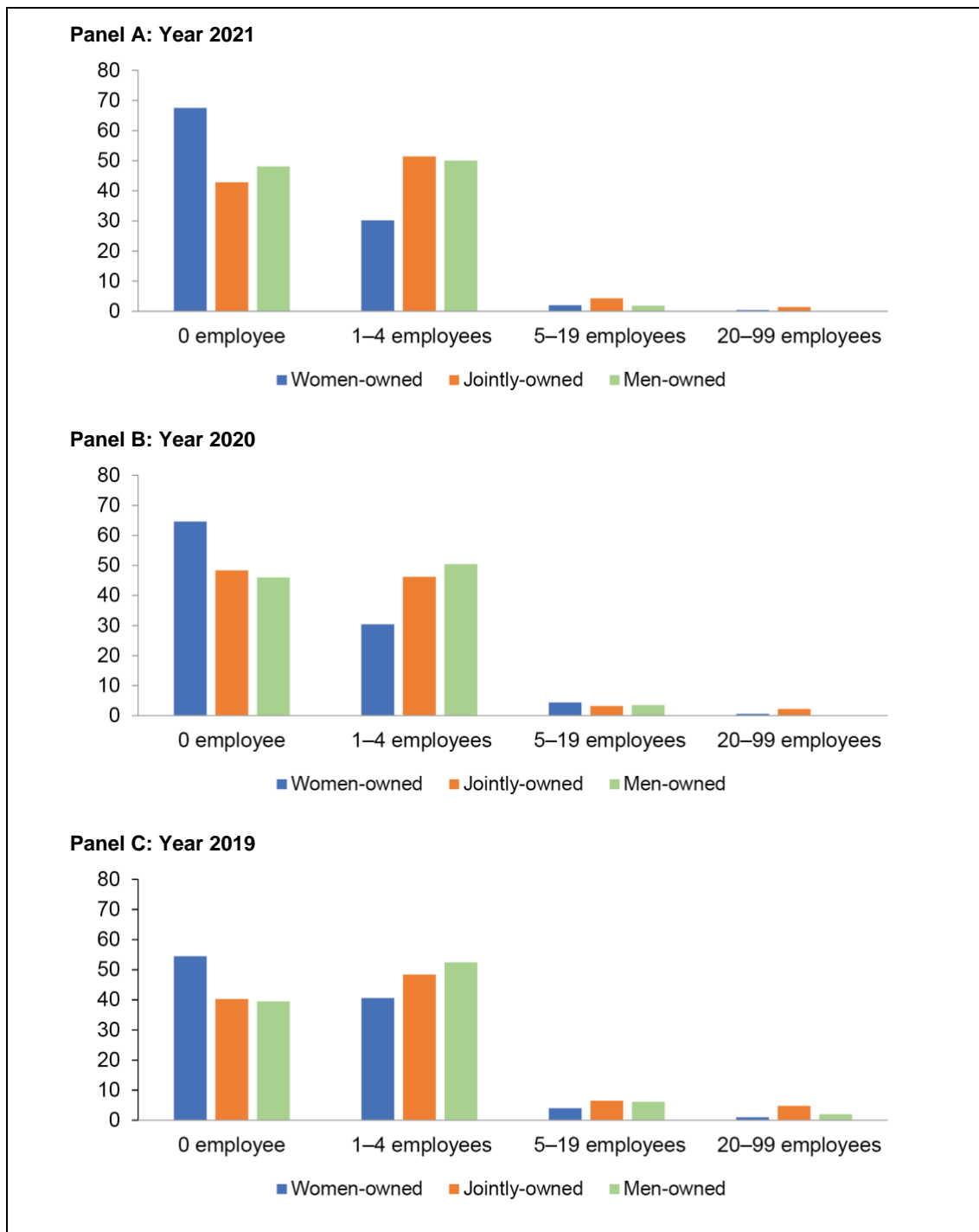
merchants who have undertaken at least one transaction through the platform within 3 months prior to the commencement of this study. A sample of 50,000 merchants has been randomly selected from the highest (Jabodetabek) and the lowest (EJBN) revenue centers of GoFood merchants to take part in an online survey, followed by phone interviews. Descriptive statistics on the full population of GoFood merchants as well as those merchants who participated in the online and phone surveys are provided in Table 1 and in the Online Appendix.

The overwhelming majority of 869 merchants surveyed are owners of micro-sized enterprises, either an owner-operated enterprise with 0 employees (446), or a micro-sized enterprise with 1–4 employees (339). Note that businesses with “0” employees are those in which an individual owns and operates the business, and businesses with “1–4 employees” are those in which there are workers that help the owner operate the business. In the case of GoFood, the owners of micro-enterprises with no employees are doing the cooking themselves, possibly with the help of an unpaid family member, and having it delivered through GoFood delivery service or with GoSend, a package delivery service within the GoJek ecosystem. As shown in Figure 1, in the 2019–2021 period, women were more likely than men to have an owner-operated enterprise with no employees, while men were more likely to have micro-enterprises with 1–4 employees. Moreover, the concentration of women in owner-operated enterprises with no employees grew during the period: in 2019, 54.5% of women-owned business were owner-operated enterprises with no employees, and this rose to 67.5% by 2021. The concentration of men in owner-operated enterprises with no employees also increased, but not as much as women. Also of note, the percentage of GoFood merchants with more than five employees dropped substantially during this short period, from 16% in 2019 to 8% in 2021.

Consistent with the responses to previous economic crises in Indonesia as discussed in Tambunan (2019), merchants adopted a range of crisis mitigation strategies. As shown in Figure 2, most of the merchants engaged in some sort of a crisis mitigation strategy during the pandemic, but men and women did differ in the strategies they chose to pursue. Overall, the most common strategy among GoFood respondents during the pandemic was to spend less on food and leisure, followed by pawning assets and reducing communication expenses (Panel A). Women were more likely than men to adopt some sort of a crisis mitigation strategy, especially to reduce spending on basic necessities, while men were more likely to report that they were not doing anything to adjust their spending. Patterns for jointly owned enterprises resemble those of women-owned enterprises, with the implication that women had decision-making power in jointly owned enterprises on business and household crisis mitigation mechanisms during the crisis.

In terms of funding sources during the pandemic, Panel B of Figure 2 shows that the most common source of funding for GoFood merchants was own savings, especially for women: 56.9% of women reported that they used their own savings to fund their GoFood operating expenses, compared to 54.5% of men and 51.4% of jointly owned businesses. The next most common source of funding was retained earnings (labeled as “income from the business”), especially for jointly owned businesses. While women were more likely than men to avail themselves of the government’s funding programs (17.3% for women compared to 12.5% for men), men were more likely than women to have utilized formal loans (23.1% for men compared to 22% for women).

Figure 1: Employment: Distribution of Firm Size by Gender, 2019–2021
(%)



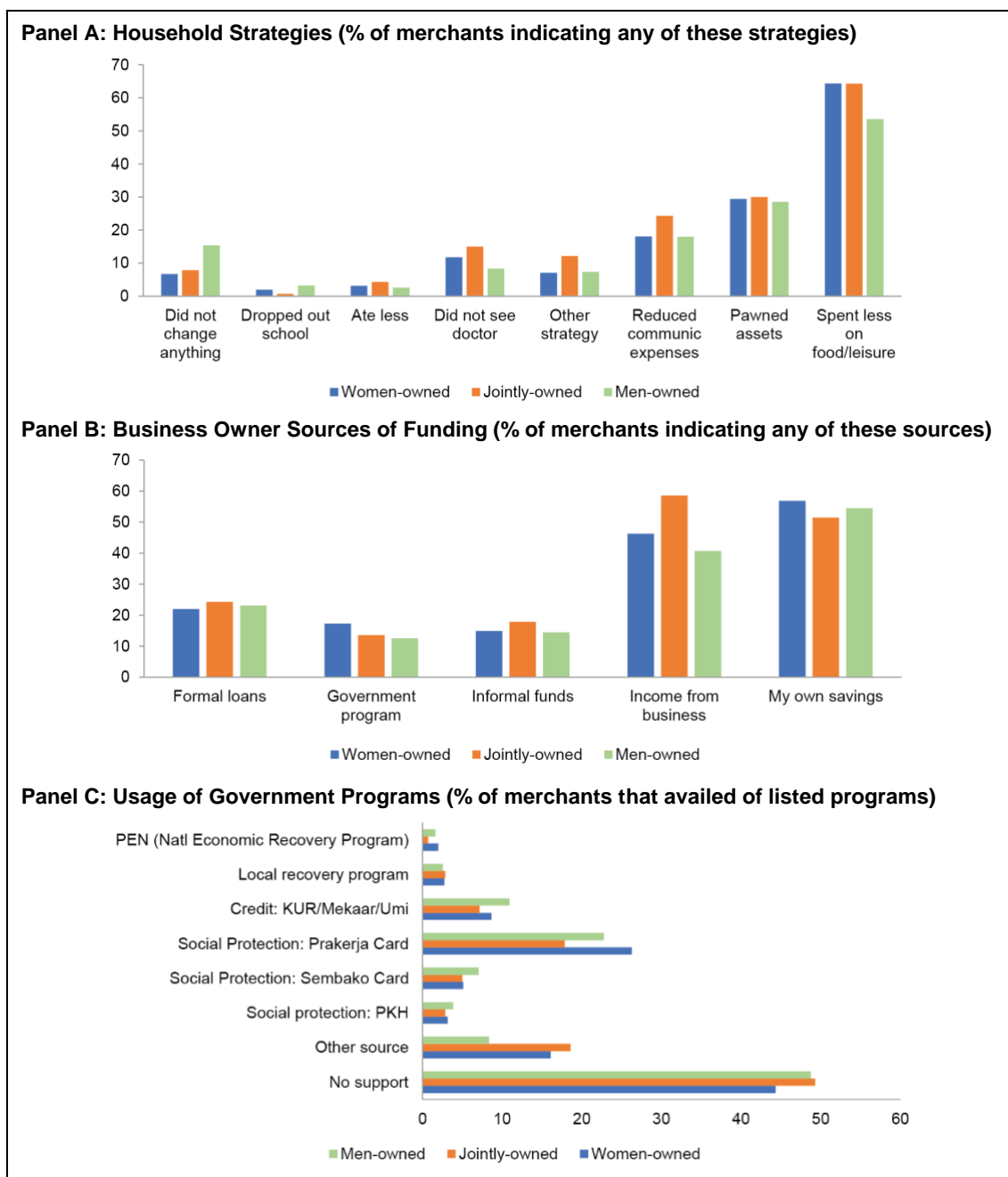
Source: Online survey of GoFood merchants.

Figure 2, Panel C reports the extent to which GoFood merchants utilized various public support programs for MSMEs and pandemic-related cash transfer programs. These programs include: (1) the Program Pemulihan Negara (PEN), or National Economic Recovery Program, a wide range of policy instruments provided to producers, consumers, and banks during the pandemic, including tax exemption and postponement of interest payments for micro- and small-scale businesses; (2) Kredit Usaha Rakyat (KUR), or People's Business Credit, a partial credit guarantee program that helps MSMEs meet collateral requirements and access credit; (3) Mekaar, a group-lending product for women who manage microbusinesses and earn less than \$2 a day; (4) Umi, a lending subsidy through nonbank financial institutions for micro businesses either in the form of a group of borrowers (without collateral) or individual borrowers (with collateral); (5) Prakerja, a pre-employment program that combines temporary social assistance with skills development to help laid-off workers and jobseekers; (6) Sembako, a noncash subsidy (voucher) for poor households to purchase food items of their choice. The program supported 15.6 million Indonesians in 2020; and (7) Program Keluarga Harapan (PKH), or Family Hope Program, a conditional cash transfer for poor households, based on health, education, disability, and senior age group. Of those merchants who did avail of government support programs, the main source of support was the Prakerja card. Relatively more women than men took advantage of this social protection program, while men were relatively more likely to seek credit in the KUR, Mekaar, and Umi programs that were part of the government's stimulus spending. Overall, men GoFood merchants were less likely to avail themselves of government support programs than women merchants.

Drawing on the matched administrative and survey data sets, we next explore competition among incumbent merchants and new entrants into the GoFood online marketplace over the seven subperiods. We also examine the association of this competition with the size of the service areas the merchants could access. In this analysis, geo-coded data are used to map the locations of the merchants in our survey sample, their competitors (defined as other GoFood merchants within a 100-meter radius from each of the merchants in our sample), and the consumers that buy cooked food from GoFood merchants through the GoFood application. In all, 720 of the 869 merchants in our sample had at least one other GoFood merchant (from the total population of GoFood merchants in Indonesia) within a 100-meter radius of their physical business location.

Competition in this case refers to within-platform competition among GoFood merchants in a given service area. It does not include potential competition from offline merchants and merchants on other food-delivery platforms selling substitutable products in the same service area. A merchant entering the GoFood platform is assigned a service area (that is, the geographic area within which a merchant can advertise and sell their products through the GoFood app) by GoJek, based solely on where the entrant is located. The number of potential competitors (other online and offline merchants) and potential consumers in that area are not considered during service area assignment.

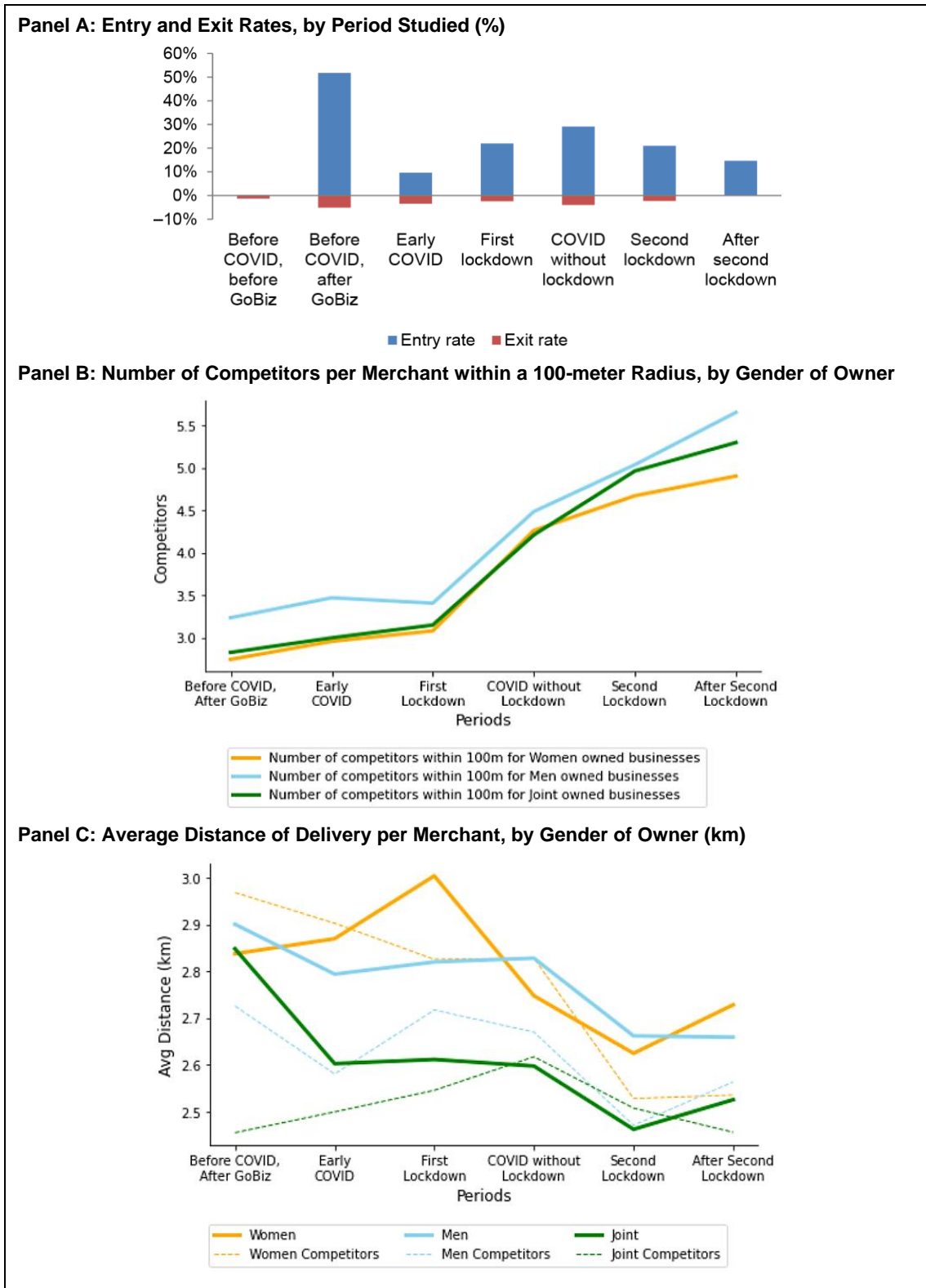
Figure 2: Crisis Mitigation Strategies Among GoFood Merchants, March 2020–March 2021 (%)



Note: The government support programs for MSMEs and pandemic-related cash transfer programs listed in the figure are: (1) Program Pemulihan Negara (PEN), or National Economic Recovery Program, a wide range of policy instruments provided to producers, consumers, and banks during the pandemic, including tax exemption and postponement of interest payments for micro and small-scale businesses; (2) Kredit Usaha Rakyat (KUR), or People's Business Credit, a partial credit guarantee program that helps MSMEs meet collateral requirements and access credit; (3) Mekaar, a group lending product for women who manage microbusinesses and earn less than \$2 a day; (4) Umi, a lending subsidy through non-bank financial institutions for micro businesses either in the form of a group of borrowers (without collateral) or individual borrowers (with collateral); (5) Prakerja, a pre-employment program that combines temporary social assistance with skills development to help laid-off workers and job seekers; (6) Sembako, a non-cash subsidy (voucher) for poor households to purchase food items of their choice; and (7) Program Keluarga Harapan (PKH), or Family Hope Program, conditional cash transfer for poor households, conditional on health, education, disability, and senior age group.

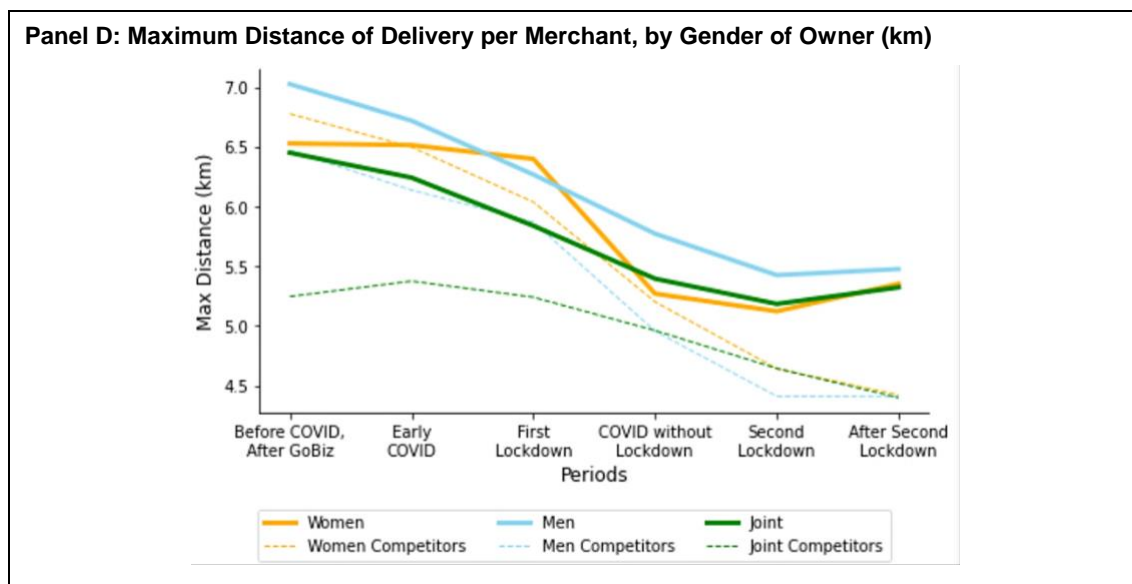
Source: Online survey of GoFood merchants.

Figure 3: Market Competition Among GoFood Merchants



continued on next page

Figure 3 continued



Note: “Competitor” denotes other GoFood merchants within a 100-meter radius from each of the GoFood merchants, by gender (i.e., of women-owned, men-owned and jointly-owned GoFood businesses) in the studied sample.

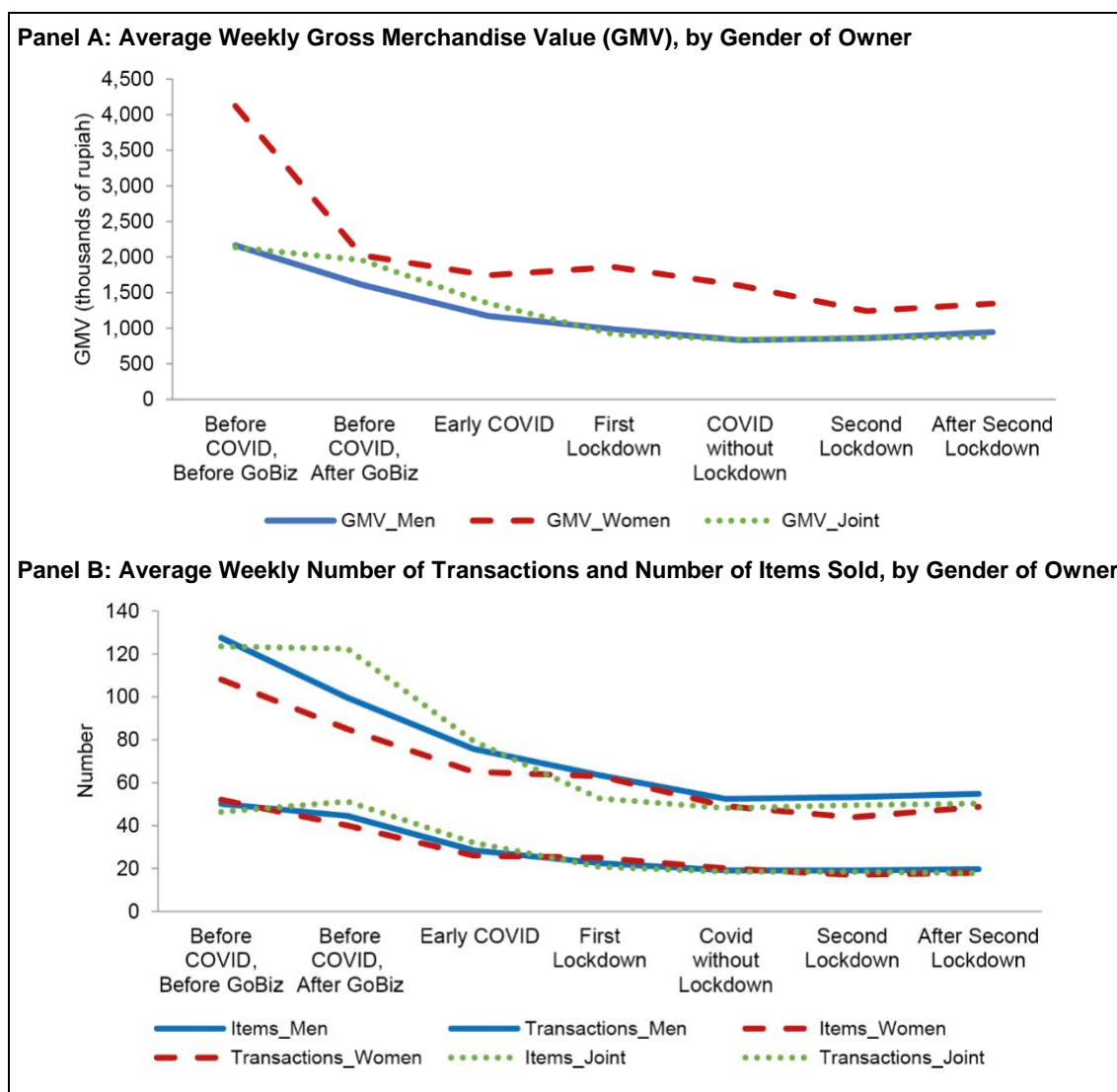
Source: GoJek administrative database and online survey of GoFood merchants.

Figure 3, Panel A reports entry and exit rates by period for the full population of merchants to help demonstrate increased competition and potential crowding out among merchants. This figure points to an extremely high entry rate of new merchants after GoJek introduced its GoBiz platform of business services. This surge was followed by a continued influx of new entrants throughout the pandemic period, especially after the first lockdown ended. While the difference is small, men-owned businesses had more competitors within a 100-meter threshold compared to women-owned and jointly owned businesses (Figure 3, Panel B). After the first and second lockdowns, the competition increased dramatically. For men, this indicator rose from 3.5 competitors per merchant to over 5.5 competitors within the same area, and for women it rose from approximately 2.5 to 4.5. Next, Panel C reports the average distance of delivery, in kilometers, per GoFood merchant during the seven subperiods. This figure shows that women-owned businesses had begun to expand their service area after the GoBiz platform was introduced and prior to the first COVID lockdown. However, women’s service areas shrank markedly between the first lockdown and the easing of mobility restrictions, while men-owned and jointly owned businesses hung on. The average delivery distance of women-owned businesses did not recover until after the second lockdown, when that of men-owned businesses continued to stagnate. Further, inverse trends were observed in the average delivery distance for women-owned and jointly owned businesses, and that of their competitors. As shown in Panel D, the maximum delivery distance tended to become shorter for women-owned, men-owned, jointly owned enterprises and for their competitors over time.

In the face of this increasingly competitive environment as well as fluctuating economic conditions during the pandemic period, how did businesses perform? In terms of average weekly revenue, as measured by GMV, Figure 4 (Panel A) shows that the average weekly GMV of women-owned businesses exceeded that of men-owned businesses and jointly owned businesses throughout the period, despite an overall declining trend over time across these three gender categories. The large advantage of women-owned businesses in GMV, however, declined noticeably after the introduction

of the GoBiz platform and the onset of the pandemic. In addition, for most of the period, the number of transactions and the number of items sold by women-owned businesses was either lower than or virtually the same as that of men-owned businesses (Figure 4, Panel B). However, the transactions of jointly owned businesses exceeded those of men-owned businesses prior to the pandemic—both in terms of average weekly transactions and average number of items sold per week—and the trends dovetailed after the onset of the pandemic. Hence women-owned businesses tended to fare better in terms of revenue generated than men-owned businesses during the pandemic period, but this does not hold for the number of transactions and items sold unless the women were part of a jointly owned business.

Figure 4: Weekly GoFood Administrative Data for Revenue and Transactions



Note: The upper cluster of lines depicts the average weekly number of items sold by gender of owner, and the lower cluster depicts the average weekly number of transactions by gender of owner.

Source: GoJek administrative database and online survey of GoFood merchants.

6. REGRESSION ANALYSIS

To formalize the descriptive analysis, we performed a regression analysis of the factors associated with the following dependent variables: employment size; crisis mitigation strategies; and GMV during the pandemic. Control variables include age and age squared, education level, source of income, usage of GoJek apps, usage of other online platforms, and period and region fixed effects. The results tables report coefficient estimates of the gender-specific ownership indicator variable, G_i , in Equation (2). In actual estimation, we include two dummy variables, one for women-owned enterprises and the other for jointly owned enterprises in which the reference category is set for men-owned enterprises. For the employment regressions, we converted the employment range information into continuous values by using the midpoint of each range.

The employment regression results reported in Table 3 point to two main findings. First, the employment size of women-owned businesses is systematically smaller than that of men-owned businesses in 2019, 2020, and 2021, as can be seen in the first three columns. Second, the overall employment size of women-owned businesses shrank after the outbreak of the pandemic, as shown in the final three columns for 2019–2020, 2020–2021, and 2019–2021. While the magnitude of these estimated coefficients may be small, the original variables are recorded as employment size categorical variables and thus intra-category change cannot be captured. Hence, these estimated coefficients should be interpreted as lower-bound estimates.

Table 3: Regression Results for Employment Level and Change in Employment Size

	(1)	(2)	(3)	(4)	(5)	(6)
Year	2019	2020	2021	2019 to 2020	2020 to 2021	2019 to 2021
Level or Change	Level	Level	Level	Change	Change	Change
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Woman owner	-0.75*** (0.28)	-0.41** (0.21)	-0.49*** (0.19)	-0.04* (0.02)	-0.04** (0.02)	-0.05** (0.02)
Joint owner	0.28 (0.44)	0.43 (0.31)	0.58* (0.32)	0.04 (0.03)	0.02 (0.03)	0.06 (0.04)
Constant	4.83** (2.17)	1.29 (1.46)	2.51* (1.35)	-0.10 (0.13)	0.42** (0.18)	0.22 (0.19)
R-squared	0.14	0.12	0.10	0.08	0.10	0.10
Number of observations	649	750	750	649	750	649

Note: The dependent variables (employment levels and their changes) are based on the following categories: 1 = "I work by myself, no other employees," 2 = "1–4 employees," 3 = "5–19 employees," and 4 = "More than 19 employees." We converted these categories into a numeric value by taking the midpoint of each bracket (respectively: 0, 2.5, 12, and 25). Also note * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Numbers in parentheses show standard error. Control variables include age and age squared, education level, source of income, usage of GoJek apps, and usage of other online platforms.

Second, we investigate the factors associated with crisis mitigation strategies that merchants used to handle business shocks generated by the COVID-19 pandemic. There are seven crisis mitigation strategies, where "did not change anything" is the reference strategy. For each of these seven actions, we can employ a dichotomous decision model of whether or not to adopt a strategy. Specifically, we estimate Equation (2), taking each of seven strategies as a discrete dependent variable. For example, the dependent variable of the first model, k^1_{it} , takes one if a respondent

cut food and/or leisure expenditures, and zero otherwise. Considering potential interrelationships among these seven strategies, we estimate linear probability models jointly, using a Seemingly Unrelated Regression (SUR) model to allow for plausible cross-equation correlation of error terms.

Table 4 reports the results for the following seven strategies: (1) spending less on food and leisure; (2) liquidation of (personal) assets; (3) reduction of communication expenses; (4) dissaving from own savings; (5) using business income; (6) borrowing formal loans; and (7) using government programs. The SUR model shows that relative to men-owned businesses, women-owned businesses had a 9.2% greater probability of utilizing food and leisure expenditure cuts to manage the income shocks associated with the pandemic. In addition, government support programs were more intensively used by women-owned businesses than those businesses owned by men, where the estimated coefficient is positive and marginally significant (with a p-value of 10.4%). The estimated impact is sizable: women-owned enterprises were 47% more likely to utilize government programs.

Table 4: SUR Results for Crisis Mitigation Strategies

	Cut Food/ Leisure Expenditure	Sold Assets	Cut Communication Spending	Dissaved	Used Business Income	Borrowed Formal Loans	Used Government Programs
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Woman owner	0.092** (0.041)	-0.13 (0.037)	-0.011 (0.032)	-0.002 (0.041)	0.45 (0.041)	-0.028 (0.035)	0.47+ (0.029)
Joint owner	0.097** (0.049)	-0.025 (0.045)	0.051 (0.039)	-0.068 (0.050)	0.166*** (0.050)	0.018 (0.042)	0.002 (0.035)
Constant	0.757** (0.322)	0.061 (0.297)	0.816*** (0.256)	0.660** (0.327)	0.405 (0.325)	-0.073** (0.230)	0.219 (0.230)
R-squared	0.05	0.05	0.06	0.05	0.06	0.06	0.05
Number of observations	750	750	750	750	750	750	750

Note: * p<0.10, ** p<0.05, *** p<0.01. + p-value=0.104. Numbers in parentheses show standard error. Control variables include age and age squared, education level, source of income, usage of GoJek apps, and usage of other online platforms. "SUR" stands for "seemingly unrelated regression model."

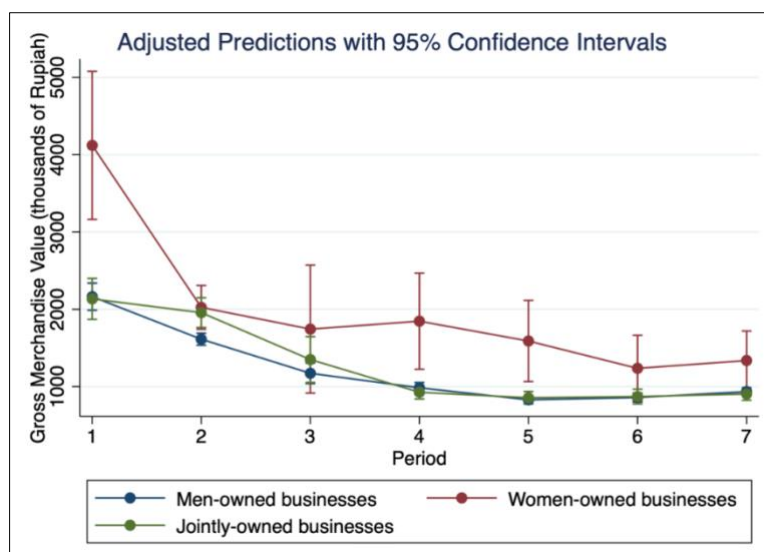
The final set of regressions for gross merchandise value yields three notable results (Table 5). First, on average from January 2019 to January 2021, average weekly GMV for a woman-owned business is consistently larger than a man-owned one by IDR626.54 thousand. Second, there is an overall trend of declining GMV, especially among women-owned businesses after the pandemic outbreak (Table 5, Column 5). To help illustrate this time pattern, we use the estimated regression coefficients to construct an event-study graph. This graph (Figure 5) clearly shows the declining trend of GMV, especially for women owners. Finally, the positive estimated coefficients of the subperiod 2 incumbents variable in Columns 3 and 4 (Table 5) indicate that incumbent businesses could maintain their business performance, whereas new entrants (and especially women merchants) after the outbreak reported systematically smaller revenues.

Table 5: Regression Results for Gross Merchandise Value
(in thousands of rupiah)

	(1)	(2)	(3)	(4)	(5)
Controls	No	Yes	No	Yes	Yes
Period fixed effects	No	No	No	No	Yes
Region fixed effects	No	No	No	No	Yes
Woman owner	626.54*** (96.77)	1,517.59*** (126.07)	618.23*** (96.73)	1,516.66*** (126.23)	3,499.98*** (421.20)
Joint owner		-165.69*** (56.28)		-165.50*** (56.22)	-165.70*** (56.11)
Incumbents in P2			951.90*** (76.24)	204.86** (85.53)	
(period==2)*Woman owner					-2,111.78*** (415.39)
(period==3)*Woman owner					-2,074.64*** (536.52)
(period==4)*Woman owner					-1,794.23*** (490.09)
(period==5)*Woman owner					-1,987.53*** (469.32)
(period==6)*Woman owner					-2,367.56*** (453.42)
(period==7)*Woman owner					2,335.81*** (445.99)
Constant	1,168.97*** (13.40)	1,147.24*** (290.29)	901.67*** (23.32)	1,095.25*** (296.63)	751.34*** (292.89)
R-squared	0.002	0.25	0.006	0.25	0.25
Number of observations	34,273	31,638	34,273	31,638	31,638

Note: * p<0.10, ** p<0.05, *** p<0.01. Numbers in parentheses show standard error. Control variables include age and age squared, education level, source of income, usage of GoJek apps, and usage of other online platforms.

Figure 5: Event Study of Changes in Gross Merchandise Value (GMV) by Ownership Status



Note: Each point represents a predicted value based on the estimated coefficients reported in column (5) of Table 5. Periods on the horizontal axis are defined as follows: 1 = Before COVID, before Go-Biz, 2 = Before COVID, after Go-Biz, 3 = Early COVID, 4 = First Lockdown, 5 = COVID without Lockdown, 6 = Second Lockdown, and 7 = After Second Lockdown.

Source: GoJek administrative database and online survey of GoFood merchants.

7. QUALITATIVE EVIDENCE

The focused phone interviews allowed us to examine these results in a more granular way, subject to the caveat of a sample selection bias in that owners of more successful enterprises were somewhat more likely to respond. Virtually all of the respondents reported that their business faced challenges during the pandemic, with the biggest challenge proving to be a decline in product demand followed by difficulties with marketing and covering production costs. Women favored changing marketing strategies, moving their business locations, closing their businesses temporarily, and relying on personal funds; while men favored decreasing the number of employees, pawning business assets, and taking loans from financing sources from formal and informal sectors. In addition, most business owners indicated they did not receive business support services or financing from the government.

Numerous respondents indicated during the phone survey that GoJek facilitated market participation during the pandemic, especially with helping businesses to go online, reach more consumers, and survive the pandemic. For example, 42% of respondents noted GoJek “has helped [their] business expand” and another 51% indicated GoJek has helped their businesses survive during the crisis. Several respondents even commented on the overall scale of e-commerce, with feedback such as “Digitalization in the economy contributes to economic growth,” and “Online sales is a revolutionary idea.” Another merchant said that using online platform for sales should be more common in Indonesia, just like in other countries, and that is why they joined GoFood. Numerous respondents signaled their commitment to continuing to have at least a portion of their business online after the pandemic, as illustrated by the response “Nowadays we must be willing to learn to use online technology, and marketing through social media for small businesses.”

However, not all responses were positive. Complaints included high commissions or high retention rate of commissions charged by GoJek for platform and delivery services, lack of consistency and continuity in delivery driver availability, insufficient assistance with marketing and promotions, and delays in receiving payment. For example, one merchant responded “Charging 20% per GoFood order can be very burdening for merchants. It should be decreased to 10%, particularly during hard times, like the pandemic.” Respondents also felt that GoJek favored larger businesses, with comments such as “GoFood was perceived to play less of a role during the pandemic because it felt like the orders received were unclear and [the app] prioritized large entrepreneurs.” Some merchants complained about having too much competition, as exemplified by this comment from one of the merchants: “Many people who lost their job during the pandemic choose to survive by selling online food, which causes even more fierce competition among online food sellers.” Merchants’ observations about intense competition are consistent with results from GoFood transactions data analyses, discussed below.

It was clear that respondents believed it was the government’s responsibility to provide assistance for small businesses, but quite a few respondents complained that the government was not providing enough assistance for MSMEs or promoting awareness of that assistance. One merchant said, “When the government provides assistance for MSMEs, the program should be promoted widely so merchants can apply immediately.” Another merchant complained about the complex process when registering a business for BPUM (the government assistantship program for micro-businesses). Another felt that the food sector did not get enough attention, with the comment that “Government should pay closer attention to culinary MSMEs during the pandemic as more people order food from home.” Several merchants spoke to the

debilitating effects of the government's social restrictions during the pandemic (with the *Pemberlakuan Pembatasan Kegiatan Masyarakat*, or Implementation of Restrictions on Social Activities Regulations), not only in terms of the decline in consumer demand but also the difficulty in finding reasonably priced supplies and drivers to deliver the cooked food. The sentiment to end the social restrictions was quite apparent from the phone interviews.

8. SUMMARY AND POLICY IMPLICATIONS

This study has examined differences between men- and women-owned businesses on GoJek's cooked food delivery platform, GoFood, vis-à-vis their business performance and crisis mitigation strategies during the pandemic period. Our study has three key findings. First, while GoJek platform helped onboard MSMEs, the overall size of women-owned businesses (by number of employees) shrank after the onset of the pandemic. Second, women and men opted for different crisis mitigation strategies. Women were more inward-looking, relying on government support services as well as self-sufficiency strategies, such as using own savings, liquidating personal assets, or cutting back on their expenditures for personal necessities; while men- and jointly owned enterprises opted for borrowing from formal and informal sector financing sources, and liquidating business assets to weather the economic shock triggered by the pandemic and associated containment measures. This finding presents a unique opportunity for the government and financial institutions to improve beneficiary targeting by addressing gaps in program awareness and beneficiary skepticism, which seemed to have deterred women from formal financing instruments and men from government programs, respectively.

Third, competition stiffened in the GoFood merchant market as new merchants continued to join the platform throughout the pandemic, with service areas of both incumbents and entrants shrinking over time. Using geo-coded delivery data for all transactions undertaken through the GoFood platform, we found that as new merchants joined the GoFood platform: (i) The number of each merchant's competitors within a 100-meter radius increased over the seven subperiods studied; (ii) the actual areas that GoFood merchants served became smaller compared to their assigned service areas, as maximum delivery distance per merchant declined during most of the pandemic period, with some recovery observed after the second lockdown; and (iii) at the same time, the average weekly gross merchandise value, number of transactions, and number of items sold per merchant declined. These concurrent developments do not prove causality, but they present a plausible case for further investigation. These developments have important implications for future business performance of MSMEs as more merchants continue to onboard and are allocated standard service areas by the platform. While it is beyond the scope of this paper, additional research on this topic would facilitate a better understanding of within-platform competition dynamics and their implications for the online marketplace, the platforms that facilitate e-commerce, and the merchants that earn their livelihoods with the help of these platforms.

This study also provides insights for opportunities to scale up good practices in generating employment for women in the online marketplace. Online platforms provide an opportunity for women- and men-owned businesses to sell their products beyond their immediate neighborhoods to a larger consumer base by using digital applications. Further, they receive business development support to market their products in a professional and accessible format to consumers they may never see but continue to transact with. They also have an opportunity to move from a fully informal setup

to a more formal one, starting with the use of e-wallets and other online payment systems. All of these may help to close the gender gap in the online marketplace. Greater use of online platforms among women entrepreneurs has the potential to generate value both for women business owners and for the economy overall. The IFC (2021) estimates that if the gap in sales between women and men vendors in Southeast Asia were closed by 2025, then the value of the e-commerce market would increase by \$280 billion between 2025 and 2030. More broadly, according to ADB (2021), digitalization will allow Indonesia to reap an economic dividend of more than \$0.13 trillion per year over the next five years and create 16 million new jobs annually from increased use of digital technologies. These estimates underscore the importance of the online marketplace for women-owned businesses and employment-led growth policies, and warrant further attention going forward.

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APPENDIX

1. Sample Characteristics

A sample of 50,000 micro-, small- and medium-sized enterprises (MSMEs) from the GoFood platform were randomly selected to take part in an online survey to better understand the enterprises and merchants on the platform. Surveys and subsequent comparative analyses were conducted among a randomly selected group of merchants in GoJek/GoFood's highest revenue center (the larger Jakarta area comprising Jakarta, Bogor, Depok, Tangerang, and Bekasi, labeled as Jabodetabek) and its lowest revenue center (a group of administrative regions and cities in East Java, Bali, and East and West Nusa Tenggara, labeled EJBN). These online and phone surveys allowed us to expand merchant and enterprise-level information to include the gender and education level of each GoFood merchant that participated in the surveys, and the size of their enterprises. The main merchant and enterprise characteristics examined in this paper are described in Appendix Table 1 below. Descriptive statistics with means and standard deviations for performance indicators are provided in Table 1 of the main text.

Appendix Table 1: Characteristics of MSMEs That Participated in the Online and Phone Surveys

Variable	Category	Online Survey Respondents (n = 869)		Phone Survey Respondents (n = 275)	
		n	%	n	%
Owner's gender	Female	270	31.1	63	22.9
	Male	336	38.7	122	44.4
	Joint	144	16.6	90	32.7
	No response	119	13.7	258	93.8
Respondent's role in business	Owner	841	96.8	13	4.7
	Manager	25	2.9	4	1.5
	Other staff	3	0.3	78	28.4
Business size as of end-February 2021	0 employee (owner operated)	446	51.3	177	64.4
	1–4 employees	339	39.0	14	5.1
	5–19 employees	18	2.1	1	0.4
	>19 employees	3	0.3	5	1.8
	No response	63	7.2	176	64.0
Business location	Jabodetabek	562	64.7	99	36.0
	EJBN	307	35.3	233	84.7
Respondents' education attainment	High school graduates or higher	629	72.4	36	13.1
	Lower than high school diploma	121	13.9	6	2.2
	No response	119	13.7	63	22.9
Number of employees variable (in categories)	Number of employees in 2021	594	1.6 (0.61)	275	1.6 (0.58)
	Number of employees in 2020	594	1.6 (0.62)	275	1.6 (0.58)
	Number of employees in 2019	594	1.9 (1.12)	275	1.9 (1.11)

Note: Numbers in parentheses show standard deviation. The categories for the number of employees are: 1 = "I work by myself, no other employees," 2 = "1–4 employees," 3 = "5–19 employees," and 4 = "More than 19 employees." "Jabodetabek" denotes the larger Jakarta area comprising Jakarta, Bogor, Depok, Tangerang, and Bekasi. "EJBN" denotes a group of administrative regions and cities in East Java, Bali, and East and West Nusa Tenggara.

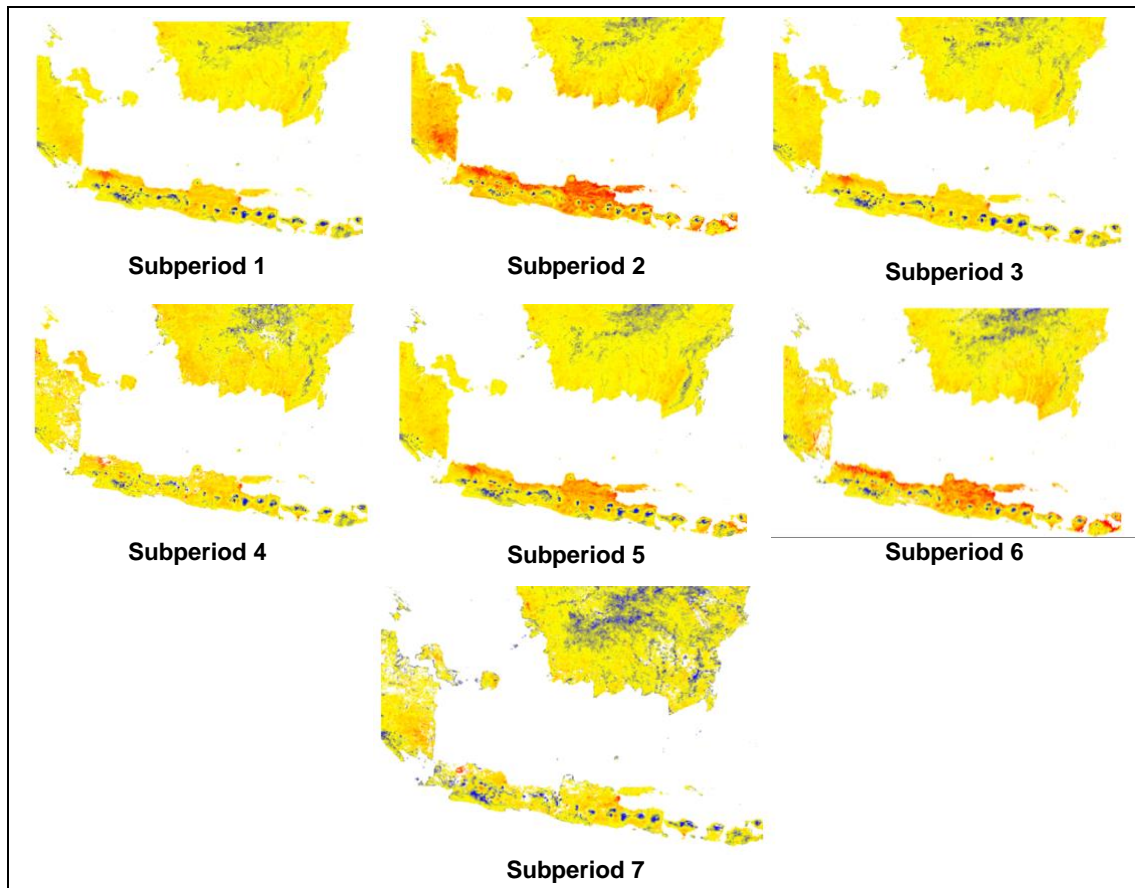
Source: Online survey of GoFood merchants and GoJek's administrative database.

2. Surface Urban Heat Island and Nightlight Luminosity Mappings

To help illustrate changes in economic activity during the pandemic period in the two sample regions, we used surface urban heat island (SUHI) and nightlight luminosity mappings of GoFood merchant locations. SUHI data are used as proxy for the level of economic activity and human movement where merchants and their respective service areas are located. Nightlight data are used as proxy for the level of socioeconomic development where merchants and their respective service areas are located. In both SUHI and nightlight maps, darker colors, orange and red hues are interpreted to signal higher economic activity and socioeconomic development levels. The SUHI maps for Jabodetabek and EJBK were generated from daily satellite thermal data with 1-kilometer resolution, focusing on the location and service areas of the 869-merchant sample. With SUHI mapping, the surface of densely populated urban areas is significantly warmer than in surrounding areas due to density of, and materials used in, urban infrastructure and buildings, intensity of economic activities, and human movement in urban centers. Changes in SUHI were used as a proxy for changes in economic activity in the two regions, keeping mobility restrictions constant for the two regions. We also use monthly satellite data on nightlight luminosity for Jabodetabek and EJBK, which serve as a proxy for level of economic development. The SUHI and nightlight data help to assess level of economic activity and market conditions at a higher level of granularity over time. Areas that are warmer and have higher nightlight luminosity signal more economic activity, higher economic development levels, and a higher propensity among consumers to purchase cooked food. We examined SUHI and nightlight data for seven periods, chosen based on the exogenous changes GoFood merchants have faced: (1) before onset of COVID-19 and before the GoBiz platform is introduced: 7 January 2019 – 30 June 2019; (2) before COVID-19 and after GoBiz is introduced: 1 July 2019 – 1 March 2020; (3) onset of COVID-19: 2 March 2020 – 5 April 2020; (4) first lockdown: 6 April 2020 – 5 July 2020; (5) COVID-19 with no lockdown: 6 July 2020 – 4 October 2020; (6) second lockdown: 5 October 2020 – 6 December 2020; and (7) after second lockdown: 7 December 2020 – 28 February 2021.

As shown in Appendix Figures 1 and 2, SUHI and nightlight maps support our argument that GoFood merchants in Jabodetabek were located in areas that were more developed, with higher economic activity and more competitors and consumers, compared to the GoFood merchants in EJBK. Overall economic activity declined during lockdown periods and increased when mobility restrictions were removed. However, there were no significant differences compared to the respective baselines in the two regions. Of the seven time periods in the analysis, a slight anomaly was observed after the second lockdown, where surface temperatures declined (signaling a decline in overall economic activity) despite less stringent mobility restrictions compared to prior periods, while the upward trajectory of GoFood merchant revenues and sales continued. This subperiod, 7 December 2019 – 28 February 2021, coincides with cooler months and the emergence of the COVID-19 Delta variant. Thus, SUHI maps for subperiod 7 depict a decrease in surface heat levels and economic activity despite less stringent mobility restrictions compared to subperiods 4 and 6. These results hold when we control for seasonal fluctuations in temperature; and they are consistent with nightlight luminosity data and Google mobility data for the same period.

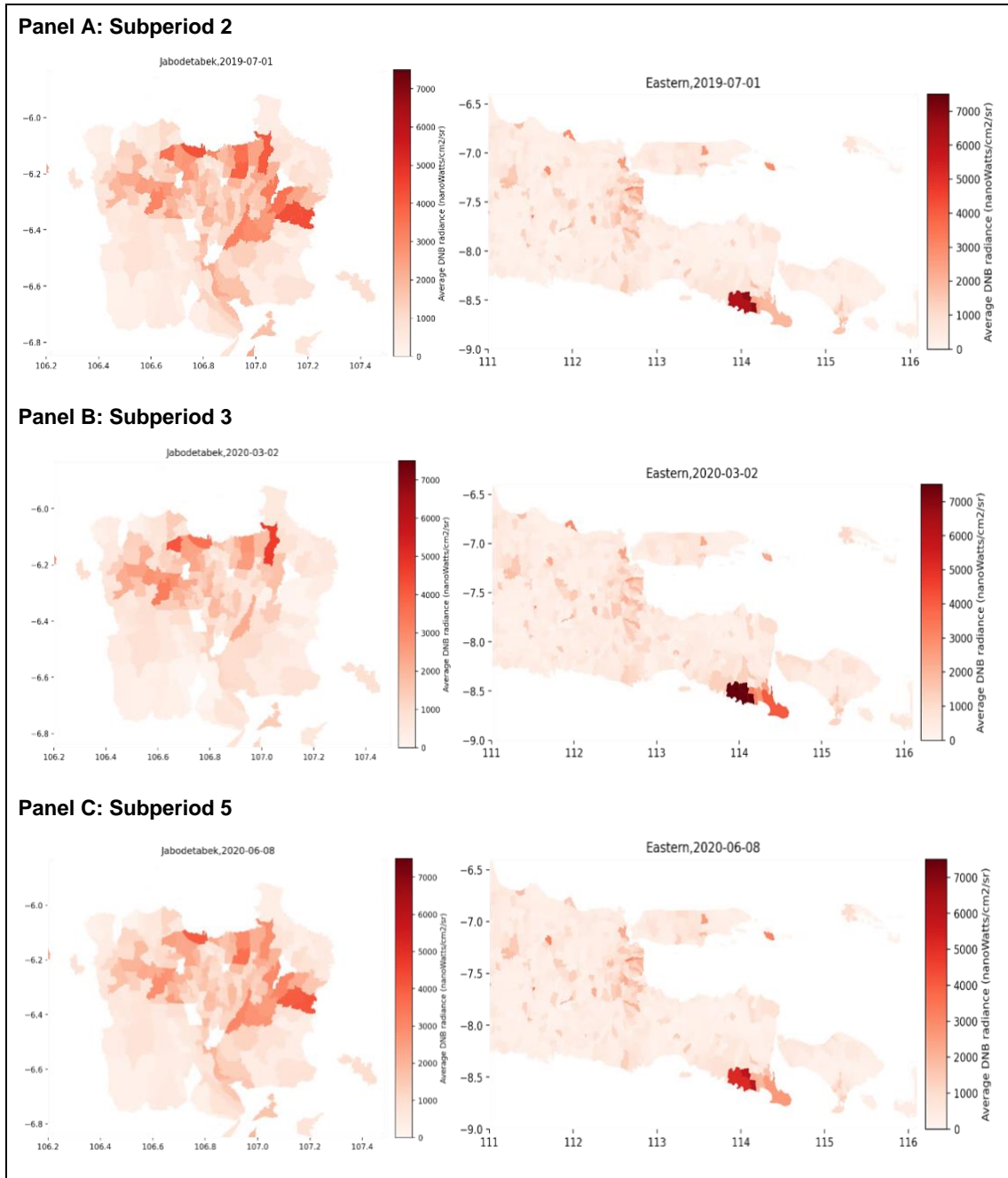
Appendix Figure 1: Surface Urban Heat Island (SUHI) Maps of Seven Subperiods Studied in Indonesia



Note: Subperiods studied are: (1) before onset of COVID-19 and before the GoBiz platform is introduced: 7 January 2019 – 30 June 2019; (2) before COVID-19 and after GoBiz is introduced: 1 July 2019–1 March 2020; (3) onset of COVID-19: 2 March 2020 – 5 April 2020; (4) first lockdown: 6 April 2020 – 5 July 2020; (5) COVID-19 with no lockdown: 6 July 2020 – 4 October 2020; (6) second lockdown: 5 October 2020 – 6 December 2020; and (7) after second lockdown: 7 December 2020 – 28 February 2021.

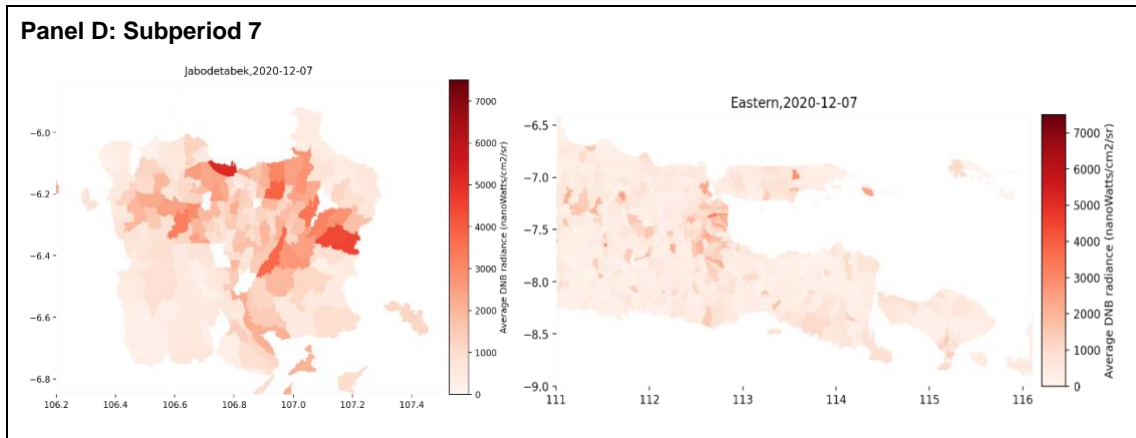
Source: https://developers.google.com/earth-engine/datasets/catalog/MODIS_061_MOD11A1 (MODIS).

Appendix Figure 2: Nightlight Data Maps of Jabodetabek and EJBK for Selected Subperiods



continued on next page

Appendix Figure 2 *continued*



Note: “Jabodetabek” refers to the larger Jakarta area, comprising the capital city Jakarta, Bogor, Depok, Tangerang and Bekasi. “EJBN” refers to a group of administrative regions and cities in East Java, Bali, and East and West Nusa Tenggara. Subperiod 2 is before COVID-19 and after GoBiz is introduced: 1 July 2019 – 1 March 2020; subperiod 3 is onset of COVID-19: 2 March 2020 – 5 April 2020; subperiod 5 is COVID-19 with no lockdown: 6 July 2020 – 4 October 2020; and subperiod 7 is after the second lockdown: 7 December 2020 – 28 February 2021.

Source: [https://developers.google.com/earth-engine/datasets/catalog/NOAA_VIIRS_DNB_MONTHLY_V1_VCMCFG#bands\(VIIRS\)](https://developers.google.com/earth-engine/datasets/catalog/NOAA_VIIRS_DNB_MONTHLY_V1_VCMCFG#bands(VIIRS)).