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RESILIENCE IN THE TIME OF COVID-19: LESSONS LEARNED FROM MIDDLE EAST AND NORTH AFRICA SMALL- AND MEDIUM-SIZED ENTERPRISES

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We investigated the effects of the COVID-19 pandemic on small- and medium-sized enterprises in Jordan, Egypt, Tunisia, and Morocco. Using firm-level panel data from an enterprise survey, we highlight several new findings. The surveyed firms resorted to wage and work hour reductions more readily than layoffs in the wake of the pandemic. Within these firms, larger firms are more resilient, recover faster, and adapt more often. On the sector level, the accommodation and food services sector is the worst affected by most outcomes. Furthermore, we find that switching to remote work is associated with better outcomes, while participating in government assistance programs is not. On the other hand, firms that participate in international trade are more resilient and adaptable during the pandemic. The results of the study carry policy implications relevant to the resilience of small- and medium-sized enterprises in developing countries in times of extreme crisis.

Keywords: COVID-19; Small- and medium-sized enterprises; Middle East and North Africa; Resilience; Developing countries
JEL classification: D22, F23, H12, J01

1. INTRODUCTION

THE world economy was hit hard by the outbreak of the COVID-19 pandemic (henceforth the pandemic) in early 2020. The pandemic led to sudden changes in the business environment, resulting in critical challenges for firms in most sectors and parts of the world. The impact of the pandemic on

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the wider economy was large, and no region was spared from the dire consequences of arguably the worst health crisis in over a century. The economic contagion of the pandemic was broad, and its spillovers were large. Therefore, the pandemic presented firms and businesses with insurmountable challenges (Duarte Alonso et al. 2020).

It is expected that developing countries will be disproportionately affected by the crisis that followed the pandemic outbreak. This is due to the fragile economic structures and institutions in many developing countries, which make it more difficult to deal with crises. In addition, governments may not possess the resources to manage the crisis and mitigate its worst economic consequences. The countries of the Middle East and North Africa (MENA) region, especially the non-oil-exporting ones among them, similarly observed deteriorating economic conditions. Businesses in the MENA region observed negative effects from the pandemic, but it is not clear what these effects are. This paper aims to explore how firms—particularly the small- and medium-sized enterprises (SMEs)—in the MENA region were affected by the pandemic and how they adapted to its challenges. Namely, we are interested in how SME outcomes, which include labor, wages, status, capacity to adapt, and revenues, are affected by the onset of the pandemic. Such an investigation allows us to draw conclusions about the resilience of these firms in times of crisis.

The paper is concerned with SMEs because they represent a very important socioeconomic pillar contributing to economic activity (Eggers 2020). For this purpose, we employed a recent enterprise survey of representative samples of SMEs from Jordan, Tunisia, Morocco, and Egypt, all non-oil-exporting and middle-income countries. The survey takes a snapshot of the SMEs just before the pandemic and follows them after the event. The data obtained from the survey allow us to compare firm outcomes after the pandemic first started to pre-pandemic levels (in February 2020). We also estimate difference-in-difference equations to compare the effects of the pandemic on firms that could operate remotely, receive government assistance, or participate in international trade to their counterparts that do not partake in these things.

We find that firms largely resorted to reducing wages and hours of work instead of outright layoffs to deal with the negative consequences of the pandemic. As expected, we find that some MENA SMEs were forced to close their business (temporarily) at some point during the pandemic. Nonetheless, the majority of firms adapt their business models to deal with closures and lockdowns by using the internet and social media to reach their clients and suppliers. In addition, the SMEs expected significantly lower sales and investment levels in 2021 compared to 2019 levels, but there is evidence of recovery in Q2 2021. Even within SMEs, larger firms are more resilient and adaptable. The firms that could switch to a remote mode of work were less likely to close their business

(temporarily) and more likely to adapt their business model. We also find that participation in government assistance programs is not associated with better firm outcomes and that international trade is associated with improving the firm's resilience in the face of the crisis.

This paper contributes to the emerging literature on the effects of the COVID-19 pandemic. While several studies have looked at the effects of the current pandemic on firms, this paper distinguishes itself in its thematic focus on SMEs, its geographic focus on the MENA region, and the unique variety of outcome variables explored. This study benefits from the use of recent firm-level data from four MENA countries, which allows us to study the direct effects of the pandemic at the firm level. The same data are used in two policy briefs authored by Krafft, Assaad, and Marouani (2021b, 2022). However, while the two briefs focus on descriptive statistics, our study attempts to look at the effects of the pandemic on SMEs in the four MENA countries while controlling for firm-specific effects. In addition, Krafft, Assaad, and Marouani (2021b), who similarly focus on SME adjustment in the MENA region, only look at the first wave of the data, whereas we also look at the second data wave. We also explore different aspects of the pandemic that were not covered in the aforementioned studies, such as remote work and international trade. Another study that is similar to this paper is a recent contribution by Guerrero-Amezaga et al. (2022), who explore the effect of the pandemic on small firms in Latin America. We distinguish ourselves from this paper in several ways. Besides the different geographic focus, we explore more firm outcomes, such as wages, hours of work, adaptability, sales, and investment, as well as the differential effects of remote work, participation in government assistance, and international trade. Furthermore, three recent reports are worth mentioning. A recent report by the World Bank (Hoogeveen and Lopez-Acevedo 2021) explores the effects of COVID-19 on poverty and inequality in the MENA region and bases its findings on household data. Another report by the OECD (2020) focuses on crisis response in several MENA countries and looks at the macroeconomic picture that emerges in these countries in the period following the outbreak. Similarly, a book edited by Hobaika, Möller, and Völkel (2022) explores the social, political, and economic impact of the pandemic on the MENA region. However, these reports differ substantially from the current study in their scope and focus.

It is well known that the pandemic was detrimental to the firm's performance and that it threatened its resilience. Business resilience is defined as a firm's capacity to persist (survive), recover (adapt), and converge to equilibrium after a shock interrupts its operations (Torres, Marshall, and Sydnor 2019; Simmie and Martin 2010). De Vries and Shields (2006) argue that resilience consists of various desired attributes, which include flexibility, incentive, persistence, and optimism. Disruptions can be an opportunity for firms to adapt, which could invigorate them

post-crises. This is especially relevant to SMEs due to their limited resources (Eggers 2020). Supardi (2020) points out that the COVID-19 pandemic has changed the firm's goal from being "profit seeking" to "resilience searching." Firms reacted in different ways to the pandemic. Some firms adjusted their practices, implemented remote working, adapted their distribution channels, switched to new products, and/or cut their spending (Huang and Jahromi 2021). We contribute to the discussion surrounding firm adaptability, diversification, and resilience in the face of uncertainties that are inherent to the global economy. We show, for example, that larger firms (even within SMEs) are more resilient, adaptable, and recover faster in the wake of the current pandemic. We also show that switching to remote mode is associated with better outcomes. Similarly, firms involved in international trade are more resilient and are more likely to adapt their business models. These are new findings in the literature, as far as we are aware.

The paper proceeds as follows. In Section 2, we review the relevant literature. In Section 3, we present a summary of the public policy response in the four countries as well as the broad macroeconomic consequences of the pandemic. In Section 4, we describe the data, present summary statistics, and briefly discuss how firms adapt to the pandemic and the difficulties that they face. Subsequently, we turn to investigate the effects of the pandemic on the firms in Section 5. Section 6 explores the differential effects of the pandemic on firms that operate remotely, participate in government assistance programs, or conduct international trade. Finally, we conclude in Section 7.

2. LITERATURE REVIEW

While this paper is related to several strands in the literature, we will mainly focus on the effects of crises on firms in general, and SMEs in particular, including the recent COVID-19 pandemic.[1] Cowling, Liu, and Zhang (2017) investigate the impact of the 2008 financial crisis on SMEs. They reveal that the financial crisis had a negative impact on well-established firms. However, there is no substantial impact on SMEs and young firms. The reasons for this surprising result could be that their small size and limited liabilities shielded them from the financial downturn and allowed them to adapt more quickly to the changing environment. Similarly, Branicki, Sullivan–Taylor, and Livschitz (2017) argue that the resilience of SMEs is mainly created and affected by entrepreneurial behavior. They find that entrepreneurial behavior, capacity building, and innovation support the resilience of

[1] Another relevant strand in the literature has looked at firm valuations (stock prices) in the context of the pandemic. Notable contributions include Ramelli and Wagner (2020), Ding et al. (2021), Song, Yeon, and Lee (2021), Narayan, Devpura, and Wang (2020), and Albuquerque et al. (2020), among others.

SMEs in a sample of 19 firms in the United Kingdom. Eggers (2020) reviews 69 papers that explore the effects on SMEs of preceding events and crises. The author suggests that SMEs can play an important role in overcoming the worst effects of extreme crises with high uncertainty through innovation.

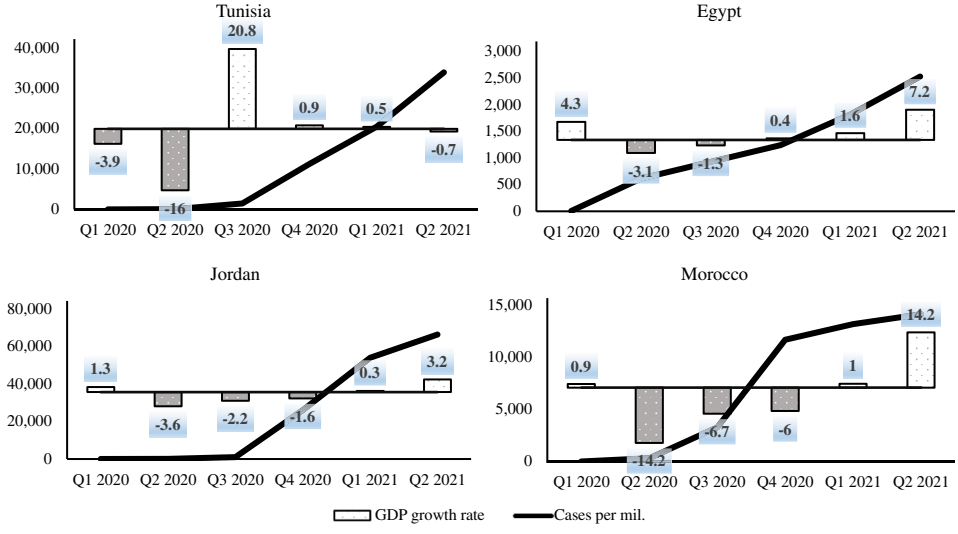
A growing number of papers are looking at the effects of the COVID-19 pandemic on firms, and these largely find that the effects are asymmetric across firms and sectors. They also generally find that smaller firms are more affected than larger ones. Gu et al. (2020) employ data on electricity usage in China to detect the impact of COVID-19 on firms and sectors. They find that industrial firms experienced negative effects, whereas firms in construction, IT, health, and services benefited from the pandemic. In addition, public and large firms were more resilient compared to private and smaller firms. Shen et al. (2020) similarly find that small firms are more affected by the pandemic than large firms are in the case of China, and some sectors are more exposed than others are. Borino et al. (2021) use a global survey of firms to show that international firms choose more resilient actions in the face of the pandemic. These include, for example, working remotely, sourcing from new suppliers, developing new products, or temporarily loaning employees to other businesses, such as manufacturers of personal protective equipment, that need workers. Espitia et al. (2021) investigate the effects of the pandemic on trade in the early stages of the pandemic. They show that sectors more amenable to remote work were less affected, but that participation in global value chains increased vulnerability to the shocks suffered by trading partners while reducing vulnerability to domestic shocks.

Concerning the role of governments in managing the crisis, Alstadsæter et al. (2021) show that government programs targeting employees and fixed costs have a comparable impact on firms in Norway and the United States by reducing financial and economic distress. They find such supportive policies effective in alleviating the negative effects of COVID-19 on firms' liquidity and profitability. However, a recent contribution by Guerrero-Amezaga et al. (2022), based on a large survey of small firms in Latin America, finds that government aid has a limited impact on small firms. The authors stress that awareness of and participation in government assistance programs is generally very low, especially among small as well as informal firms. Didier et al. (2021) argue that government assistance programs are beneficial and can help firms survive the crisis, but the legal and regulatory infrastructure in place may be ill-equipped to deal with the pandemic. Moser and Yared (2021) argue that government restrictions improve the health situation but harm economic growth. On the sector level, several studies find that the sector most affected by the pandemic is the tourism and hospitality sector, which mirrors the findings from this study (Baum and Hai 2020; Gössling, Scott, and Hall 2020; Dube, Nhamo, and Chikodzi 2020).

3. MACROECONOMIC IMPACT OF COVID-19 AND PUBLIC POLICY RESPONSE

In this section, we provide an overview of the macroeconomic impact of COVID-19 and the public health response in the four countries. The pandemic started spreading internationally beyond China from February 2020. In the MENA counties, case numbers started taking off in early to late March 2020. Public health response was swift and escalated quickly. Figure 1 plots the quarterly cumulative number of COVID-19 cases versus the quarterly GDP growth rates between Q1 2020 and Q2 2021. The figure shows a generally growing number of COVID-19 cases over the period. On the other hand, economic activity, measured by GDP growth rate, shows that the sharpest contraction occurs in Tunisia (16%) and Morocco (14.2%) in Q2 2020. Tunisia observes a sharp recovery in economic activity early on in Q3 2020 (20.8%). Economic recovery, however, does not materialize until Q2 2021 in the three other countries. Economic performance during the pandemic is likely connected to public policy measures. Appendix Table 1 summarizes the public health measures taken in the four countries over the same period. Initially, all four countries resorted to a

Figure 1. Quarterly Cumulative COVID-19 Infection Cases and GDP Growth Rates in Egypt, Jordan, Morocco, and Tunisia between Q1 2020 and Q2 2021



Note: The cumulative cases per million people are for the end of each period. Quarterly GDP data are obtained from the corresponding central banks. Cumulative cases of COVID-19 are calculated by the authors based on raw data from the Our World in Data database.
[Colour figure can be viewed at wileyonlinelibrary.com]

shutdown of public life, including school closures, stay-at-home orders, restrictions on gatherings, and total border closures. These measures were somewhat loosened in May–June 2020, when their impact on public life and people's livelihoods became clear. Tunisia removes most of the restrictions in June 2020, and that reflects favorably on its GDP, which recovers by 20.8%. Later on, some of these measures would be reinstated when case numbers started climbing again. For example, a sharp rise in infection cases in Jordan saw a reinstatement of most restrictions in October 2020. Generally, the countries moved to bring back some sort of normalcy starting in Q1 2021, despite recurring waves of infection. In early 2021, vaccines were also being rolled out across the region, spearheaded by Morocco. This helped the countries return to some sort of normalcy in the remainder of 2021 as vulnerable groups and the elderly were immunized.

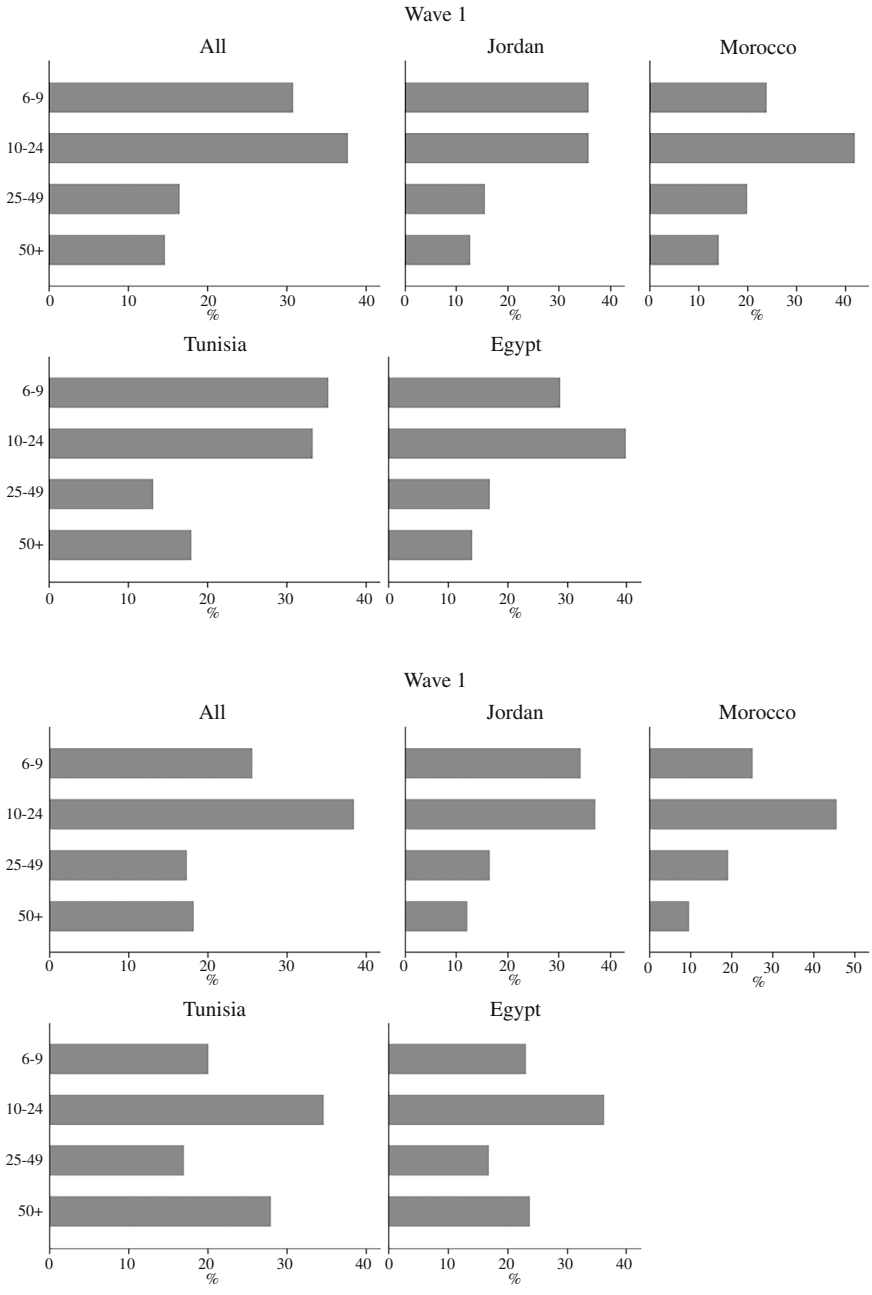
4. DATA AND DESCRIPTIVE STATISTICS

Data used in this study were obtained from the COVID-19 MENA Monitor Enterprise Survey (CCMMENT) of the Economic Research Forum (ERF).[2] The survey includes representative samples of SMEs with up to 200 employees from four countries in the MENA region: Egypt, Jordan, Morocco, and Tunisia. The purpose of the survey is to take a snapshot of the sampled firms just before the pandemic started spreading in the four countries (February 2020) and thereafter. The firms were surveyed one year after the outbreak of COVID-19 (March 2021) in the first wave of the survey, and around 16 months later (June 2021) in the second wave. Since not all firms sampled completed the survey, the survey introduces weights that are used in the analysis to correct for non-response and account for the sampling strategy.

The survey collects basic characteristics about the participating firms, such as industry, initial workforce size (February 2020), foreign ownership, and export and import status. Subsequently, the firms were asked a series of questions about their operations after the pandemic hit. Some of this information will be used in this paper to investigate how the firms' operations were affected by the pandemic. Figure 2 shows the distribution of firms in the survey by workforce size and country, as captured in waves 1 and 2 of the survey. Appendix Figure 1 shows the distribution of firms across the main activities (industries), of which there are 11. The figure shows that the highest number of firms is in retail (or wholesale), followed by accommodation (and food services).

[2] *Combined COVID-19 MENA Monitor Enterprise Survey, CCMMENT—Wave 1–2, 2021*. OAMDI, 2021. COVID-19 MENA Monitor Enterprise Survey (CCMMENT), http://www.erfdataportal.com/index.php/catalog. Version 2.0 of the licensed data files; CCMMENT Wave 1–2. Egypt: Economic Research Forum (ERF).

Figure 2. The Distribution of Firms by Firm Size in Terms of the Number of Employees in Wave 1 (March 2021) and Wave 2 (June 2021)



Source: Authors' own compilation based on raw data from the COVID-19 MENA Monitor Enterprise Survey.

Furthermore, we present summary statistics of firm characteristics and the dependent variables used in subsequent sections in Appendix Table 2, with means, standard deviations, minima, and maxima reported in the table. To deal with attrition, the survey introduces a refresher sample of 1,259 firms in wave 2, for which information is collected for the pre-pandemic period (wave 0) as well. This is because the attrition rate is quite high following wave 1. Out of the 1,960 firms sampled in wave 1, only 701 firms reappear in wave 2. This suggests an attrition rate of around 64%. In other words, the number of firms that appear in waves 0 and 1 only is 1,960; the number of firms that appear in waves 0 and 2 only is 1,259; and the number of firms that appear in waves 0, 1, and 2 are 701 firms. While the survey follows the same sampling strategy in wave 2 and introduces weights to reduce bias coming from attrition, these attempts, while reducing bias, may not be enough to eliminate it. The problem occurs when attrition is correlated with time-varying unobservable factors in the error term. Hence, care should be taken when comparing the wave 1 and wave 2 results.

COVID-19 and MENA SMEs: Difficulties and Adaptation

It is inevitable that the pandemic has presented MENA firms with unprecedented challenges and difficulties. The survey allows us to highlight some of the most common challenges faced by the firms during the first year of the pandemic. Appendix Figure 2 lists the most common difficulties reported by the surveyed firms. Problems with (availability and/or price of) intermediate inputs are the most common difficulty in wave 1, and difficulties tending to business are the most commonly reported challenge in wave 2.[3] A breakdown of the reported difficulties by country shows some variation in the ranking of the difficulties. Hence, this suggests that policies geared to assist managers and owners in tending to their businesses and reducing worker absenteeism would be appropriate to alleviate some of the difficulties faced by the SMEs.

We know that firms adapt to the changing business environment. The survey posits the question—"Has your business adjusted its business model to reduce being directly in physical proximity with customers?"—to the firms to explore how businesses adapt to the challenges brought about by the pandemic. Around 52% and 57% of all firms in waves 1 and 2, respectively, reported using mainly the internet or social media to make orders and stay in touch with their clientele (refer to Appendix Figure 3). This is higher in Morocco (70% and 66%, respectively) and Egypt (74% and 65%, respectively), but lower in Tunisia (13% and 49%, respectively). Hence, wide internet availability in the four countries seems

[3] Difficulties tending to business refers to difficulties due to caregiving, such as children who had to stay home because schools shut down during the pandemic.

to have helped firms adjust to the negative shock. In the next section, we will estimate the effects of the pandemic on defined firm outcomes.

5. THE EFFECTS OF COVID-19 ON FIRMS IN THE MENA REGION

The main purpose of this paper is to study the effects of the pandemic on firms in the MENA region. The survey design allows us to identify the effects of COVID-19 by comparing firm outcomes during the pandemic (waves 1 and 2) to the pre-pandemic period (February 2020). Since we have four countries in this study and we know the industries in which the firms operate, we use interactions to explore how the firm outcomes differ by country and industry, as well as firm size categories. To generate how the different firm outcomes behave in the pandemic versus the pre-pandemic period, we estimate the following equation:

$$outcome_{ft} = \beta_0 + \sum_{v=1}^{2} (\beta_v\, wave_{vt}) + \sum_{v=1}^{2} \gamma_v \left(wave_{vt} * X_{(c|i|s)} \right) + \alpha_f + \epsilon_{ft}, \qquad (1)$$

$$t \in \{\text{Feb 2020, March 2021, June 2021}\},$$

where $wave_{1t} = 1$ when $t = \text{March 2021}$, otherwise zero; $wave_{2t} = 1$ when $t = \text{June 2021}$, otherwise zero. In equation (1), the dependent variable $outcome_{ft}$ is the firm outcome of firm f at time t. On the right-hand side, *wave* is an independent dummy variable that takes the value of one for the respective data wave (we have two waves). The same variable will also be interacted with firm size, country, or industry indicators (the variable X) to capture the average differential effects of the pandemic in each wave on the different size categories (subscript s), the four countries (subscript c), and the separate industries (subscript i). We include a set of firm fixed effects because this allows us to control for non-observable and time-non-varying firm characteristics. Conveniently, this also allows us to remove the level coefficients of the indicators of the firm size categories, countries, and/or industries (since these are perfectly collinear with the firm fixed effects) and focus on the coefficients of the interacted terms. We cluster standard errors by the firm.

The nature of this estimation will capture the average change to the outcome variable in the pandemic period (either waves 1 or 2) compared to the pre-pandemic period. The coefficients of the interacted terms allow us to explore heterogeneity in the results. Namely, the estimated coefficients γ_v of the interacted terms capture the differential average change in the outcome variable in the firm size category, country, or industry relative to a reference group to be defined later. The outcome variables that we obtain from the survey are the size of the

workforce, the proportion of the workforce that experiences wage or work hour reductions, expected layoffs, business closures, firm capacity to adapt, and expected changes in sales and investment.

5.1. Labor Effects

We start our estimations with the effects of COVID-19 on the firm's workforce. In Table 1, we present the results of estimating equation (1), where the dependent variable is the log of firm workforce size. The (natural) log of the firm workforce is taken to estimate the percentage change of the workforce (elasticity) relative to the baseline, which is pre-pandemic (February 2020). Note that the coefficients of the two waves are juxtaposed for ease of exposition, but these are born out of the same regression. The interacted terms are introduced in different columns. As mentioned earlier, the coefficients of the variables *wave 1* and *wave 2* will pick up the effect in the reference groups in the regressions with interaction terms. The reference groups are Jordan for countries; the smallest firms (<10 workers) for the firm size; and agriculture, fishing, and mining for the industry.

The results suggest the following: The firm workforce shrinks by 2.7% on average in wave 1 compared to pre-pandemic levels (baseline) with the coefficient being significant at the 10% significance level, but there is no statistically significant difference between the workforce in wave 2 and the baseline (columns 1). There are no statistically significant differences between the different firm size categories in either wave (columns 2). There is, however, some heterogeneity when it comes to countries. In the first wave, the firm workforce drops on average by 5.2% in Jordan (the reference country picked up by the *wave* coefficient) but increases by 4.2% in Tunisia (0.094 – 0.052), but the workforce is not statistically different in Morocco and Egypt from that in Jordan. In the second wave, the average Jordanian workforce is back to where it was pre-pandemic, but it increases by 10% in Morocco and remains 6.8% lower in Egypt, whereas the coefficient is statistically insignificant for Tunisia, all being relative to Jordan. Hence, the Tunisian workforce is on average not affected in terms of employment—it actually increases initially, and the Moroccan workforce seems to have rebounded the fastest in wave 2, whereas the Egyptian workforce is still negatively impacted in wave 2. These results partially reflect what was happening on the ground in terms of the restrictions imposed and the epidemiologic situation in the countries (refer to Appendix Table 1). For example, Jordan, Tunisia, and Morocco observed a steep increase in case and death counts in late 2020 and early 2021, which led to the reinstatement of many of the restrictions. However, the growth of the workforce in Tunisian SMEs initially may reflect that the Tunisian economy recovered the most in Q3 2020 (GDP growth rate of 20.8%, refer to Figure 1), unlike the other countries. These results can also be partially explained by the composition of industries in the different

Table 1. Effects of COVID-19 on the Log of Firm Workforce Size

	Wave 1				Wave 2			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Wave	−0.027*	0.010	−0.052*	−0.231	0.018	0.044	−0.000	−0.241
	(0.016)	(0.024)	(0.028)	(0.176)	(0.013)	(0.028)	(0.020)	(0.244)
Wave × country								
Morocco			0.020				0.099***	
			(0.048)				(0.028)	
Tunisia			0.094**				0.045	
			(0.046)				(0.044)	
Egypt			−0.013				−0.068**	
			(0.033)				(0.034)	
Wave × firm size category								
10–24		−0.049				−0.024		
		(0.032)				(0.033)		
25–49		−0.102				−0.041		
		(0.064)				(0.036)		
50+		−0.005				−0.059		
		(0.035)				(0.055)		
Wave × industry								
Manuf				0.260				0.297
				(0.180)				(0.245)
Constr				0.188				0.237
				(0.181)				(0.246)
Retail				0.203				0.259
				(0.178)				(0.244)
Transp				−0.037				0.213
				(0.278)				(0.254)
Accom. and food				0.194				0.288
				(0.178)				(0.245)
ICT				0.199				0.289
				(0.194)				(0.247)

Financial				0.241	0.191
				(0.180)	(0.263)
Educ				0.256	0.316
				(0.177)	(0.245)
Health				0.359**	0.315
				(0.183)	(0.248)
Other serv				0.220	0.178
				(0.184)	(0.264)
No. of obs.	7,057	7,057	7,057	7,057	
N firms	3,219	3,219	3,219	3,219	
R^2	0.00	0.00	0.01	0.01	

Note: The results are produced by estimating equation (1) where the dependent variable is the log of workforce size. All regressions include firm fixed effects. The coefficients of the two waves are juxtaposed for ease of exposition, but these are born out of the same regression. The reference groups are Jordan for countries; the smallest firms (<10 workers) for the firm size; and agriculture, fishing, and mining for the industry. Standard errors in parentheses are clustered by firm ID.
***$p < 0.01$; **$p < 0.05$; *$p < 0.10$.

countries. In Tunisia, the largest industry in the sample is manufacturing, which may not have been affected by the pandemic to the same degree as other industries. In Egypt, the two largest industries are retail and tourism (accommodation and food services), and these industries were the most affected by the pandemic given the importance of human contact in them. The recovery of the Moroccan workforce in Q2 2021 coincides exactly with the sharp recovery observed in overall economic activity in the country in the same period (Moroccan GDP grows by 14.2% in Q2 2021, refer to Figure 1). This recovery, in turn, coincided with the relaxation of most health policy measures (refer to Appendix Table 1). Finally, when it comes to industry, the only statistically significant coefficient estimated is that of the health sector in wave 1, suggesting the sector expanded initially, which makes sense given the health nature of the crisis.

While the size of the workforce is informative about the effects of the pandemic on the firm workforce, we may be missing other workforce outcomes, such as wages. To explore this further, we use information from the survey on the number of workers who experienced reductions in wages or work hours during the pandemic. Subsequently, we estimate equation (1), where the dependent variable is the percentage of workers who experience wage or hour reductions. The results of the estimations for wage reductions are presented in Table 2, while the estimations for work hour reductions are presented in Appendix Table 3. We find that up to 8.3% and 1.9% of the firm's workforce, on average, face wage reductions in waves 1 and 2, respectively (columns 1). The share of the workforce that faces wage reductions is significantly lower in the largest firms (at the 10% significance level) in wave 2 only (column 2). In addition, Tunisian workers experience significantly less wage reductions in wave 1 relative to the reference country (Jordan). This result for Tunisia is similar to what we observed in the case of the size of the workforce above. Furthermore, the wage reductions are significantly larger in all industries than the reference industry, with the highest coefficients being estimated for *education* and *accommodation and food services*. Recall that these two industries depend on human interaction, and therefore may be affected by the restrictions on movement and work to a larger degree. We observe a significant improvement in wave 2 of the survey, where the proportion of workers that experience wage reductions drops significantly and becomes even lower for the largest firms. In addition, countries converge, and most industries work away their wage reductions with the exception of *accommodation and food services*, *other services*, and *manufacturing*.

Similar patterns are largely found when the dependent variable is the share of workers who experience a reduction in work hours. In summary, while there is little evidence that firms reduced their workforce in the wake of the pandemic, firms resorted to wage and work hour reductions to deal with the negative consequences of the crisis. In addition, there is a clear improvement in the second

Table 2. Effects of COVID-19 on the Percentage of Firm Workers with Reduced Wages

	Wave 1				Wave 2			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Wave	0.083***	0.093***	0.112***	0.002	0.019***	0.023***	0.027***	0.000
	(0.006)	(0.012)	(0.013)	(0.002)	(0.003)	(0.007)	(0.008)	(0.000)
Wave × country								
Morocco			−0.009				−0.011	
			(0.019)				(0.010)	
Tunisia			−0.091***				−0.011	
			(0.015)				(0.010)	
Egypt			−0.020				−0.004	
			(0.017)				(0.010)	
Wave × firm size								
10–24		−0.012				0.000		
		(0.015)				(0.009)		
25–49		−0.005				−0.000		
		(0.018)				(0.010)		
50+		−0.022				−0.017*		
		(0.018)				(0.009)		
Wave × industry								
Manuf				0.060***				0.012**
				(0.014)				(0.005)
Constr				0.066***				0.015
				(0.016)				(0.012)
Retail				0.077***				0.004
				(0.011)				(0.006)
Transp				0.087***				0.017
				(0.031)				(0.019)
Accom. and food				0.136***				0.051***
				(0.019)				(0.010)
ICT				0.048**				0.013*
				(0.019)				(0.008)

Table 2 (continued)

	Wave 1				Wave 2			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Financial				0.052**				0.011
				(0.021)				(0.015)
Educ				0.151***				0.005
				(0.034)				(0.015)
Health				0.092*				−0.003
				(0.047)				(0.032)
Other serv				0.046***				0.034**
				(0.015)				(0.014)
No. of obs.	7,057	7,057	7,057	7,057				
N firms	3,219	3,219	3,219	3,219				
R^2	0.08	0.08	0.10	0.10				

Note: All regressions include firm fixed effects. The coefficients of the two waves are juxtaposed for ease of exposition, but these are born out of the same regression. The reference groups are Jordan for countries; the smallest firms (<10 workers) for the firm size; and agriculture, fishing, and mining for the industry. Standard errors in parentheses are clustered by firm ID.
***$p < 0.01$; **$p < 0.05$; *$p < 0.10$.

quarter of 2021 (wave 2) compared to the first quarter (wave 1), which mirrors the economic recovery phase that is observed in Jordan, Morocco, and Egypt in Q2 2021.

The improving picture in wave 2 of the survey is also evident from exploring the firm's prospects for layoffs and wage reductions. In the survey, the firms were asked to report on the number of workers they expect to lay off or reduce their wages in the next six months. We convert these numbers to shares of the workforce and estimate the same regressions as before. If the prospects of layoffs and wage reductions are taken as proxy for the firms' sentiment and uncertainty perception, the picture that emerges supports the hypothesis that these have improved remarkably in wave 2 compared to wave 1. Interestingly, Tunisian firms (wave 1), as well as the largest firms (50+ workers in wave 2), seem to expect the least negative outcomes for their workforce, something we observe in the previous results as well. We chose not to report these results here for the sake of brevity, but they can be obtained from the authors.

5.2. Firm Closures

The firms are asked to report on the status of their business at the time of the survey. From the answers, we generate a dummy variable that takes the value of one if the firm is temporarily or permanently closed at the time of the interview and estimate equation (1) with this dummy variable as the outcome variable. The results of these estimations are presented in Table 3. The interpretation of the estimated coefficients becomes in terms of the share of firms that are closed or the likelihood that a firm closes. It is important to note that, while there are a few firms that report being permanently closed, firms that exited the market are naturally less likely to respond to the survey. We estimate that around 9% and 7% of all firms close shop in waves 1 and 2, respectively. This share is highest for the smallest firms (12% and 10% in waves 1 and 2, respectively). It is 5 percentage points lower (relative to the smallest firms) for firms between 25 and 49 workers in wave 1, and 8.4 and 6.6 percentage points lower for the largest firms (50+ workers) in waves 1 and 2, respectively. This suggests that the larger firms were less likely to close shop in the wake of the pandemic. The lower negative outcome for the larger firms may reflect the fact that larger firms are more productive and have more resources to deal with shocks. In terms of countries, the share of firms that closed is highest in Jordan and Egypt (10.5% and 10% in the two waves, respectively), and lower in Morocco (by 3.5 and 7 percentage points in waves 1 and 2, respectively, relative to Jordan) and Tunisia (by 4 and 6.6 percentage points in waves 1 and 2, respectively). These numbers may reflect the higher share of firms in retail and tourism in Egypt and Jordan and the steep economic recovery in Morocco in Q2 2021. Concerning the sectors, the highest share of closures is estimated for the reference industry (agriculture, fishing, and

Table 3. Effects of COVID-19 on Permanent or Temporary Business Closure

	Wave 1				Wave 2			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Wave	0.088***	0.119***	0.105***	0.247***	0.072***	0.099***	0.100***	0.074*
	(0.007)	(0.015)	(0.014)	(0.070)	(0.006)	(0.015)	(0.014)	(0.041)
Wave × country								
Morocco			−0.035*				−0.071***	
			(0.019)				(0.016)	
Tunisia			−0.039**				−0.066***	
			(0.020)				(0.016)	
Egypt			0.010				0.027	
			(0.020)				(0.022)	
Wave × firm size								
10–24		−0.025				−0.029		
		(0.019)				(0.018)		
25–49		−0.051**				−0.026		
		(0.021)				(0.021)		
50+		−0.084***				−0.066***		
		(0.019)				(0.018)		
Wave × industry								
Manuf				−0.171**				−0.011
				(0.072)				(0.043)
Constr				−0.191***				−0.028
				(0.072)				(0.045)
Retail				−0.183**				0.001
				(0.071)				(0.043)
Transp				−0.204***				0.071
				(0.075)				(0.060)
Accom. and food				−0.048				0.027
				(0.074)				(0.046)
ICT				−0.169**				−0.004
				(0.077)				(0.047)
Financial				−0.194***				−0.007

				(0.074)	(0.048)
Educ				−0.232***	−0.035
				(0.071)	(0.047)
Health				−0.172**	−0.036
				(0.079)	(0.047)
Other serv				−0.169**	−0.025
				(0.074)	(0.047)
No. of obs.	7,266	7,124	7,266	7,266	
N firms	3,288	3,219	3,288	3,288	
R^2	0.07	0.08	0.08	0.09	

Note: All regressions include firm fixed effects. The coefficients of the two waves are juxtaposed for ease of exposition, but these are born out of the same regression. The reference groups are Jordan for countries; the smallest firms (<10 workers) for the firm size; and agriculture, fishing, and mining for the industry. Standard errors in parentheses are clustered by firm ID.
***$p < 0.01$; **$p < 0.05$; *$p < 0.10$.

mining) and *accommodation and food services* in wave 1, whereas other industries have significantly lower shares of closures relative to the reference industry, with the lowest being recorded in the *education sector*. In wave 2, the shares of closures are not statistically different across the industries from the reference industry. Therefore, once again, we learn that larger firms are less likely to close (temporarily), whereas *accommodation and food services*, along with agriculture, mining, and fishing, are most likely to close down, reflecting the importance of human interaction in these sectors.

5.3. Adjustment and Adaptation

We are also interested in firm adaptation as an outcome variable because it indicates the capacity of firms to adapt to external stresses and, therefore, improves their resilience. Recall that the firms were asked in the survey whether they adjusted their business models to deal with the aftermath of the pandemic (refer to Section 4). From the answer to this question, we create a dummy variable, which takes the value of one if the firm reports that it adjusts its business model to adapt to the new situation dictated by the pandemic (physical distancing, lockdowns, etc.). The results for this outcome are presented in Appendix Table 4. We calculate that 65% and 78% of all firms adapt their business models in waves 1 and 2, respectively. This share is higher for larger firms relative to the smallest ones, especially in wave 1. Tunisian firms adapt the least in wave 1 relative to the reference country, Jordan; this share is 42 percentage points lower in Tunisia relative to Jordan, where the share is around 64%. The share of Tunisian firms that adapt converges, however, to that of the other countries in wave 2. This finding reflects the less negative outcomes observed for the Tunisian SME workforce earlier, which may signal that Tunisian firms, on average, did not see the need to adjust their business processes. Recall that the Tunisian economy recovers the fastest among the four countries, and this result may reflect that. Egyptian firms are the most likely to adapt their business models in both waves—more than 90% of Egyptian firms choose to adapt their businesses. Finally, the sectors that are most likely to adapt are *education* (89%), *financial services* (77%), and *ICT* (76%) in wave 1. There is convergence in wave 2 across the sectors, but *education* remains the sector with the highest share of firms adapting (94%). Therefore, we learn that the majority of SMEs choose to adapt their business models to adjust to the shock.

5.4. Sales and Investments

The last two firm outcome variables that we consider are sales and investments. These two variables are derived from the expected changes in sales or investment (in percentages) in 2021 compared to sales or investment in 2019. Note that we implicitly assume that the expected change pre-pandemic (February

2020) is zero. We present the results for these outcomes in Appendix Tables 5 and 6. Lessons learned from these estimations can be summarized as follows: On average, the firms expect a drop of one-third in their revenues in 2021 compared to 2019 in wave 1, but this shrinks to 17% in wave 2. This is clear evidence that firms will experience a recovery in their businesses in Q2 2021. The largest firms (50+) expect the least sales losses in both waves. Jordanian and Moroccan firms report on average the worst expected sales losses in wave 1, but Moroccan firms experience the best recovery in wave 2. Again, this finding matches well with the overall economic recovery in Moroccan GDP that we discussed earlier in Section 3. Tunisian firms report on average the least expected losses in Q1, but this worsens slightly in Q2 2021, possibly reflecting a deadly wave of COVID-19 infections that was sweeping across the country at the end of Q2.[4] Finally, the sectors that expect the highest revenue losses in wave 1 are the *accommodation and food* (55% expected drop in sales) and *transport* (44% expected drop in sales) sectors. In wave 2, the differences across the sectors disappear. Largely identical patterns can be seen in investments.

6. REMOTE WORK, GOVERNMENT ASSISTANCE, AND THE ROLE OF INTERNATIONAL TRADE

6.1. Remote Work

One of the hallmarks of the COVID-19 crisis is the move to work remotely. This is made possible by the strides made in technical advances in communication. MENA countries do not enjoy similar levels of communication infrastructure, but most countries in the region have some capacity to allow some workers to work remotely given the wide availability of the internet in these countries. The survey asks the firms whether any of their workers worked remotely at any time during the 60 days preceding the interview. We use this information to create a dummy variable *remote* that takes the value of one when the firm was able to operate (partially) remotely in waves 1 and 2. We summarize the share of SMEs that choose some remote work across the firm size categories, countries, and sectors in Appendix Figure 4. Overall, we observe that around 39% of all firms moved some of their workers to work remotely in wave 1, and this share drops to around 34% in wave 2. The highest share belongs to Morocco (58%) in wave 1 and Egypt (40%) in wave 2. In terms of firm size, the second largest size group (25–49 workers) has the highest shares of firms working remotely in wave 1, while the largest firms are most likely to switch to remote work mode in wave 2. On the industry level, the highest shares of firms operating remotely are in

[4] Source: https://www.dw.com/en/tunisia-covid-19-doctors-warn-of-health-system-collapse/a-57425281.

education, ICT, and financial services, while the lowest shares belong to health, manufacturing, and agriculture. Finally, and on this topic, the survey asks the firms that were able to transition to some form of remote work about the most significant difficulties attributed to remote work. This question was asked to firms that could (partially) operate only remotely, regardless of their remote work status. Appendix Figure 5 shows the options that were given to the firms and the frequency of the recorded answers. Difficulty to monitor work is the most frequently mentioned difficulty, followed by poor internet quality, and this applies to all four countries consistently with a few exceptions.

One expects that firms that (partially) operate remotely will have different outcomes than firms that do not. This is because these firms may have been able to circumvent some of the negative effects of lockdowns and physical distancing. We explore this by adding to the RHS of equation (1) interactions of the *wave* dummy variable and the *remote* variable, which indicate whether a firm operated remotely during the pandemic. Our estimation equation becomes

$$\begin{aligned} outcome_{ft} = & \beta_0 + \sum_{v=1}^{2} (\beta_v\, wave_{vt}) + \sum_{v=1}^{2} \theta_v (wave_{vt} * remote) \\ & + \sum_{v=1}^{2} \gamma_v \left(wave_{vt} * X_{(c|i|s)} \right) + \alpha_f + \epsilon_{ft}, \\ & t \in \{\text{Feb 2020, March 2021, June 2021}\}, \end{aligned} \tag{2}$$

where $wave_{1t} = 1$ when $t = \text{March 2021}$, otherwise zero, and $wave_{2t} = 1$ when $t = \text{June 2021}$, otherwise zero.

Introducing the interaction term renders equation (2) a difference-in-difference equation where the estimate of the coefficient θ measures the average differential effect of the pandemic on the firms operating remotely relative to those that do not in each of the waves. We also include a set of interactions between the wave indicators on the one hand and the indicators for firm size category, country, and industry on the other hand, along with firm fixed effects. This ensures that the results are not driven by the heterogeneity in the firms. The outcome variables in this estimation are similar to those captured in the previous estimations. The results of the estimation are presented in Table 4. The coefficients in the table capture the change in the outcome variable relative to the baseline scenario (February 2020) in the two waves, whereas the coefficients of the interacted terms capture the average differential change in "remote" firms relative to "non-remote" firms in the corresponding waves. Note that, by definition, none of the firms operated remotely before the pandemic, and therefore, remote only applies to the firms in the two waves of the data. This means that we cannot include the

Table 4. Effects of COVID-19 on Firms That Switch (Partially) to Remote Work during the Pandemic

	Total Workers	Wages Reduced	Hours Reduced	Layoffs	Closure	Adapt	Sales	Inv.
Wave 1	−0.247	0.048***	0.117***	0.180***	0.306***	0.472***	−34.377***	−11.574**
	(0.172)	(0.016)	(0.043)	(0.037)	(0.074)	(0.059)	(6.109)	(5.370)
Wave 2	−0.218	0.011	0.053***	0.148***	0.120***	0.635***	−27.351***	−21.986***
	(0.237)	(0.009)	(0.020)	(0.048)	(0.046)	(0.073)	(5.033)	(6.197)
Remote × wave 1	0.082**	0.028**	0.065***	−0.028*	−0.02	0.167***	0.708	−1.111
	(0.036)	(0.014)	(0.018)	(0.015)	(0.014)	(0.021)	(1.834)	(2.017)
Remote × wave 2	0.028	−0.001	0.004	0.005	−0.044***	0.131***	6.260***	5.054**
	(0.028)	(0.009)	(0.012)	(0.014)	(0.012)	(0.019)	(2.034)	(2.085)
No. of obs.	7,057	7,057	7,057	6,730	7,124	7,124	6,910	6,906
N firms	3,219	3,219	3,219	3,219	3,219	3,219	3,219	3,219
R^2	0.02	0.11	0.2	0.21	0.12	0.76	0.4	0.31

Note: The results are produced by estimating equation (2). All regressions include firm fixed effects and interaction terms between the wave indicators on the one hand and firm size, country, and industry dummies on the other hand. Standard errors in parentheses are clustered by firm ID. ***$p < 0.01$; **$p < 0.05$; *$p < 0.10$.

level of the variable *remote* since this is perfectly collinear with the interacted term *remote* × *wave*. It is also important to note that we cannot test for the presence of parallel trends, which is required to ensure that the difference-in-difference approach isolates the effects of the treatment. This is because we only have one observation before treatment. In addition, the decision to switch to remote mode may be endogenous. However, introducing the multidimensional interaction terms is expected to mitigate the problem of endogeneity to some extent, especially endogeneity from omitted variable bias. Nonetheless, one needs to be careful when interpreting the results, and we, therefore, choose to present the results in terms of pure comparisons or associations.

The results suggest that firms that operated partially remotely expanded by 8 percentage points relative to non-remote firms in wave 1, but they also had a higher share of their workforce that experienced reductions in wages and work hours by 2.8 and 6.5 percentage points, respectively. This suggests that workforce adjustment takes place through wage and work hour reductions rather than layoffs in the firms that switch to remote work compared to the firms that do not. At the same time, these firms expect 2.8 percentage points fewer layoffs than their non-remote counterparts in wave 1 do. On the other hand, firms operating remotely were 4.4 percentage points less likely to close shop in wave 2 relative to their non-remote counterparts. In addition, they are on average around 17 and 13 percentage points more likely to adapt their business models in the two waves, respectively. Finally, with respect to sales and investment, the picture that emerges is that firms that operate remotely anticipate on average around 6 and 5 percentage points drop in 2021 sales and investments compared to 2019 levels in wave 2 of the data, respectively. This suggests that remote firms recover faster than non-remote firms in wave 2 of the survey do. Hence, the firm's capacity to operate remotely is associated with a lower likelihood of closure, higher adaptation, and faster recovery, all of which indicate a higher degree of resilience. As far as we are aware, we are the first ones to present direct evidence from firm-level data on the likely role of remote work in the pandemic in the MENA region. In the online appendix, we estimate equation (2) using a matched sample of firms using propensity score matching, which may mitigate a part but not all of the endogeneity concerns.

6.2. The Role of Government

It is indisputable that the role of governments is crucial in times of crises such as the one at hand. Appendix Table 7 lists the types of government programs and the distribution of firms that choose the different programs, if any. When asked whether they participate in a government assistance program and the type of program, around 60% of all firms report they did not participate in any such programs in both waves 1 and 2. The most frequent types of government

assistance programs are business loans, partial or total salary subsidies, and delays in paying social security. For those who did not participate in any government assistance programs, when asked for the reasons for not participating (refer to Appendix Table 8), the most frequent answer is "no such programs" (44% of all firms chose this option), although one of the options given is "not aware of any such programs." This probably highlights the lack of trust in governments in these countries. The share of firms that chose this option is very high (67%) in Morocco in wave 1. Other popular reasons given are not being aware of any such programs, bureaucracy and avoidance of interaction, and the uncertainty in getting the assistance if applied for. By just looking at these statistics, governments need to communicate their assistance programs more effectively and reach out to SMEs to inform them of their options and assure them of their intentions.

Did the firms that applied and received government assistance fare any better than the ones that did not? Naturally, the choice of participating in a government assistance program may be endogenous (as remote work) because the firms with the worst outcomes are more likely to apply for such programs. It is also possible that the outcomes of such firms could have been worse had it not been for government assistance, something that is difficult to discern. We estimate an equation similar to equation (2), with the replacement of the *remote* indicator with a *government assistance* indicator. The results in Appendix Table 9 suggest that participation in government assistance is not associated with better outcomes. In some cases, it is actually associated with worse outcomes in layoffs, sales, and investments. This finding is similar to that of Guerrero-Amezaga et al. (2022), who found that small firms in Latin America did not benefit from government assistance programs.

6.3. The Role of International Trade

International trade may expose firms to international demand and supply shocks. On the other hand, international trade may mitigate the effects on the firm of negative local demand and supply shocks through diversification of the customer and supplier bases. For example, if local demand and supply are relatively more affected by the pandemic in a given MENA country, firms that participate in international trade may be more resilient because they are less exposed to the local market than their local counterparts are. To explore this further, we compare firms that participate in international trade to those that do not (similar to what we did in equation [2]). In the estimations, we replace the *remote* variable with indicator variables that take the value of one if the firm is an exporter or importer in February 2020. Recall that the variables that capture whether the firm participates in international trade are non-contemporaneous and capture the firm's export/import status pre- and post-pandemic. Therefore, the exporter and importer indicators will drop from the regressions because they are

perfectly collinear with the firm dummies that are included in the estimations. We conduct this analysis for exporters and importers separately.

The results are presented in Appendix Tables 10 and 11. We observe that international trade (exports and imports) mitigates the effects of the pandemic on the firms that partake in it. For instance, exporting firms reduce the wages and work hours of significantly lower percentages of their workforce in both waves 1 and 2 compared to their non-exporting counterparts. In addition, both exporting and importing firms are much less likely to face closures and face lower drops in sales and investments in one or both waves. Importing firms are also more likely to adapt their business models, but this does not apply to exporting firms in the first wave. We know that in international trade, the larger and more productive firms are more likely to be exporters and/or importers (Ghironi and Melits 2005). We also know that some firms are less likely to be exporters or importers due to the nature of their activities (think about the education or health sectors). However, recall that in our estimations, we control for firm size and sector with firm fixed effects and the wave interaction terms, which means that the results presented here apply while taking into account factors related to firm size and sector. Hence, participation in international trade is associated with higher resilience and adaptability of firms in the face of extreme global shocks such as the COVID-19 pandemic. This is a new finding because the literature has often cited that international trade exposes the firm to global risks to a higher degree than firms that do not participate in international trade (Vannoorenberghe 2012; Kurz and Senses 2016). We argue that while initially exporting and importing firms may be more exposed, these firms tend to do better once the external shock is internalized and leads to problems in local supply and demand. The rationale behind this is that importing and exporting firms have a more diverse set of suppliers and clients and can manage the crisis better as a result (Espitia et al. 2021).

7. CONCLUSION

Using a recent enterprise survey from the MENA region, we find evidence that SMEs were negatively affected by the COVID-19 pandemic. SMEs in four non-oil exporting MENA are found to resort to wage and work hour reductions more often than layoffs in the wake of the pandemic. Many of them had to close (temporarily) following restrictions dictated by the health authorities. The majority of SMEs were able to adapt their business models to circumvent the restrictions, mainly by using the internet and social media to reach customers and suppliers. These firms, however, expect significantly lower revenues and investments in 2021 compared to 2019 (pre-pandemic) levels. Furthermore, within SMEs, larger firms are more resilient and more adaptable than smaller ones. The sector that is consistently most negatively affected is the accommodation and food services

sector. There is also some evidence that Tunisian firms were less affected in the first wave of the survey (Q1 2021). This possibly reflects the fact that Tunisia experienced an economic recovery earlier than the other countries. In addition, the capacity to switch to a remote mode of work is associated with better outcomes for the firms and, hence, higher resilience. On the other hand, participation in government assistance programs is not associated with improving firm outcomes in the firms that partake in them. This is contrary to participation in international trade, which is associated with better firm outcomes.

The results highlighted in this paper have important policy implications, which we summarize as follows: SMEs require active government assistance and guidance, especially the smallest of them. The government assistance program that may be of help to the firms is a direct contribution to salaries (such as furlough schemes), given that a significant share of the workforce experienced wage and work hour reductions in the wake of the pandemic. Most SMEs, however, seem to be unaware of any government assistance programs despite their existence. This suggests that governments need to communicate their programs more effectively. The fact that most firms adapted their business models by pivoting them toward digital platforms and social media suggests that there may be a role for the government in this area. Policymakers may enhance this adaptation by providing better and cheaper internet to firms and employees. This is also supported by our finding that moving to a remote mode of work is associated with a lower likelihood of business closure and higher instances of business adaptation. Moreover, firms that were able to switch to remote mode indicated that the biggest difficulty they face is related to their ability to monitor workers and the poor quality of the internet. Hence, there is a role for policymakers in this regard. Finally, since international trade is associated with higher resilience in the face of extreme events such as the COVID-19 pandemic, promoting international trade (e.g., through export promotion programs) would be appropriate.

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APPENDIX

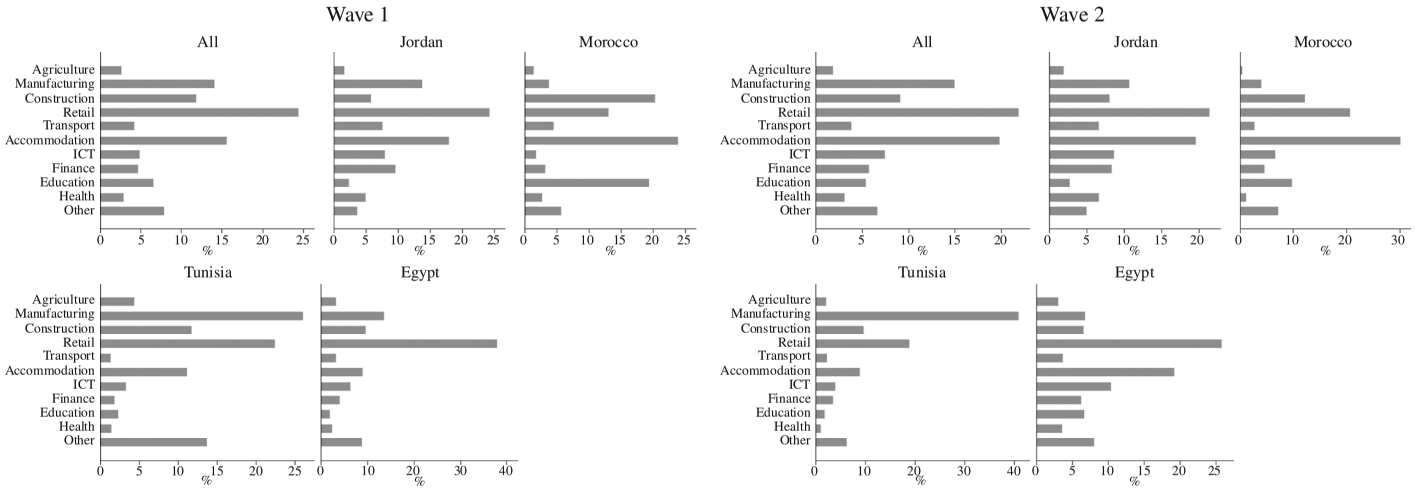
App. Table 1. A Summary of the Public Health Response to the COVID-19 Pandemic in Egypt, Jordan, Morocco, and Tunisia and the Public Health Response to the Crisis

	Egypt	Jordan	Morocco	Tunisia
			Schools	
Q1 2020	Totally closed	Totally closed	Totally closed	Totally closed
Q2 2020	Closing loosened	Closing loosened		Closing loosened
Q3 2020			Closings loosened	
Q4 2020				
Q1 2021	Closing reinstated	Closing reinstated	Closing reinstated	Closing reinstated
Q2 2021	Closing loosened	Closing loosened	Closing loosened	Closing loosened
			Workplace	
Q1 2020	Partially closed	Partially closed	Partially closed	Partially closed
Q2 2020	Restrictions loosened	Restrictions loosened	Restrictions loosened	Restrictions loosened
Q3 2020		Closing reinstated		
Q4 2020				
Q1 2021	Closing reinstated	Closing reinstated		
Q2 2021	Restrictions loosened	Restrictions loosened		
			Public Events and Gatherings	
Q1 2020	Partially canceled	Totally canceled	Partially canceled	Totally canceled
Q2 2020	Restrictions loosened	Restrictions loosened	Restrictions loosened	Restrictions loosened
Q3 2020				
Q4 2020	Gatherings banned		Gatherings banned	
Q1 2021		Restrictions reimposed		Restrictions reimposed
Q2 2021	Restrictions lifted	Restrictions lifted	Restrictions lifted	Restrictions lifted

	Public Transports Closing			
Q1 2020	Totally closed	Totally closed	Totally closed	Totally closed
Q2 2020	Closing relaxed	Closing relaxed	Closing relaxed	Closing relaxed
Q3 2020				
Q4 2020	Restrictions reimposed		Recommended to be closed	
Q1 2021	Restrictions lifted		Reinstated late January	Reinstated late January
Q2 2021			Restrictions lifted	Restrictions lifted
	Internal Movement / Borders			
Q1 2020	Internal movement restrictions with border closure	Internal movement restrictions with border closure	Internal movement restrictions with border closure	Internal movement restrictions with border closure
Q2 2020	Restrictions lifted		Restrictions lifted in early June	
Q3 2020	Restrictions added in August			
Q4 2020		Restrictions on internal movements reinstated		Restrictions reinstated
Q1 2021	Restrictions lifted mid-January	Restrictions lifted in early February and reinstated in March		Loosened in March
Q2 2021		Restrictions lifted		Restrictions lifted

Source: The main public health response measures are obtained from Krafft, Assaad, and Marouani (2021a).
Note: Unless a change in closure restrictions is noted, the restrictions are assumed to be the same as those of the previous period.

App. Figure 1. The Distribution of Firms by Industry in Wave 1 (March 2021) and Wave 2 (June 2021) of the Survey



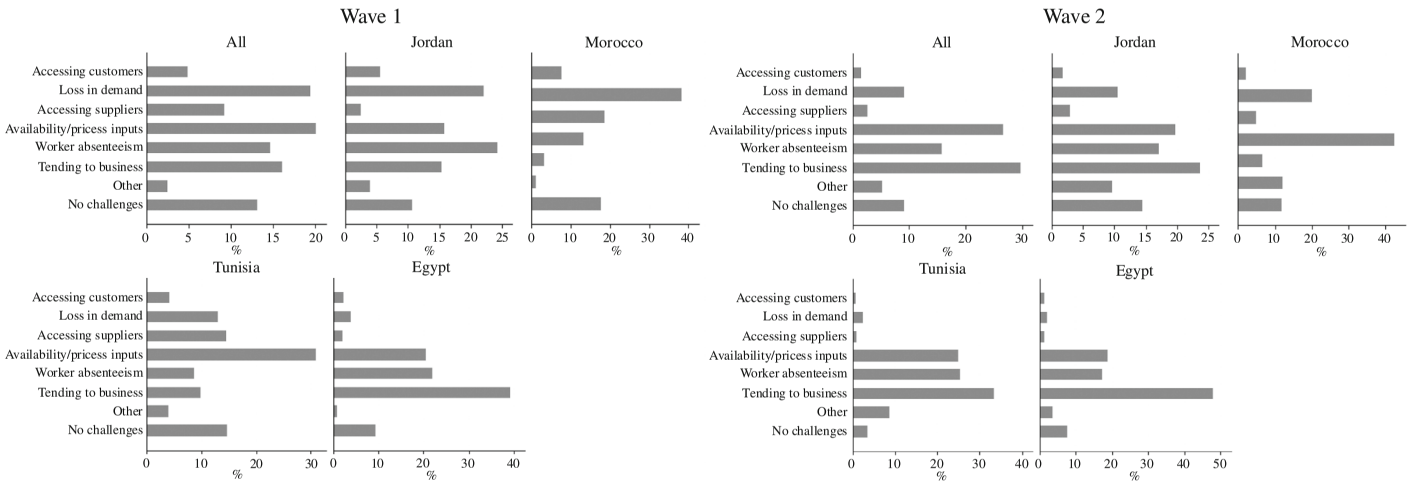
Source: Authors' own compilation based on raw data from the COVID-19 MENA Monitor Enterprise Survey.

App. Table 2. Summary Statistics of the Main Variables Used in This Study

	Wave 1					Wave 2				
	N Firms	Mean	SD	Min	Max	*N Firms*	Mean	SD	Min	Max
Workforce (pre-pandemic)	1,960	25.92	30.46	1	201	1,945	29.76	35.30	1	200
Workforce	1,960	27.58	36.93	0	600	1878	32.00	40.20	0	351
Wage reduction	1,960	0.09	0.25	0	1	1878	0.02	0.11	0	1
Work hours reduction	1,960	0.17	0.33	0	1	1878	0.05	0.17	0	1
Business closures	1,976	0.09	0.29	0	1	2,002	0.07	0.26	0	1
Adaptation	1,976	0.65	0.48	0	1	2002	0.78	0.41	0	1
Exp. % change in sales	1,873	−34.32	37.30	−100	100	1,875	−16.55	38.57	−100	400
Exp. % change in investments	1,886	−27.40	39.21	−100	200	1,856	−14.59	37.80	−100	400
Remote work	1,976	0.39	0.49	0	1	2002	0.34	0.47	0	1
Gov. ass. participation	1,976	0.39	0.49	0	1	2002	0.41	0.49	0	1
Export status	1,960	0.13	0.33	0	1	2002	0.16	0.36	0	1
Import status	1,976	0.24	0.43	0	1	2002	0.27	0.44	0	1
Foreign ownership	1,976	0.09	0.28	0	1	2002	0.09	0.29	0	1

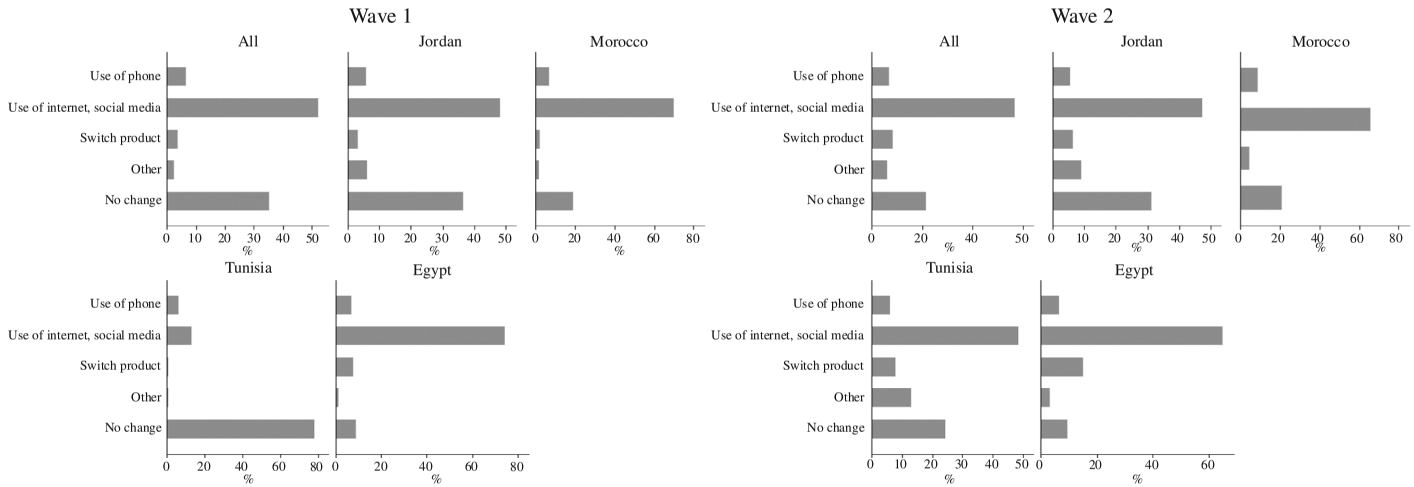
Note: All numbers are shares (proportion) of workforce except for the firms' workforce, the corresponding number of firms, and the percentage change in sales/investments.

App. Figure 2. The Type of Difficulties Faced by SMEs during the Pandemic in the MENA Region in Wave 1 (March 2021) and Wave 2 (June 2021) of the Survey



Source: Authors' own compilation based on raw data from the COVID-19 MENA Monitor Enterprise Survey.

App. Figure 3. How Do Firms Adapt to the Pandemic? Answers to the Question "Has Your Business Adjusted Its Business Model to Reduce Being Directly in Physical Proximity with Customers?"



Source: Authors' own compilation based on raw data from the COVID-19 MENA Monitor Enterprise Survey.

App. Table 3. Effects of COVID-19 on the Percentage of Firm Workers with Work Hours Reduced

	Wave 1				Wave 2			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Wave	0.156***	0.155***	0.140***	0.111***	0.054***	0.066***	0.088***	0.010
	(0.008)	(0.015)	(0.014)	(0.042)	(0.005)	(0.011)	(0.012)	(0.016)
Wave × country								
Morocco			0.052**				−0.057***	
			(0.023)				(0.015)	
Tunisia			−0.101***				−0.049***	
			(0.018)				(0.014)	
Egypt			0.112***				−0.033**	
			(0.022)				(0.015)	
Wave × firm size								
10–24		−0.007				−0.008		
		(0.019)				(0.013)		
25–49		0.027				−0.005		
		(0.025)				(0.017)		
50+		−0.004				−0.048***		
		(0.026)				(0.014)		
Wave × industry								
Manuf				0.033				0.038*
				(0.047)				(0.019)
Constr				0.038				0.030
				(0.049)				(0.023)
Retail				0.066				0.039**
				(0.045)				(0.020)
Transp				−0.001				0.043
				(0.055)				(0.034)

App. Table 3 (continued)

	Wave 1				Wave 2			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Accom. and food				0.090*				0.075***
				(0.048)				(0.021)
ICT				0.034				0.047**
				(0.053)				(0.024)
Financial				−0.008				0.047
				(0.052)				(0.032)
Educ				0.052				0.026
				(0.053)				(0.023)
Health				0.011				0.027
				(0.056)				(0.028)
Other serv				0.005				0.043*
				(0.050)				(0.026)
No. of obs.	7,057	7,057	7,057	7,057				
N firms	3,219	3,219	3,219	3,219				
R^2	0.15	0.15	0.19	0.16				

Note: The results are produced by estimating equation (1) where the dependent variable is the percentage of firm workers that experience reduced hours of work. All regressions include firm fixed effects. The coefficients of the two waves are juxtaposed for ease of exposition, but these are born out of the same regression. The reference groups are Jordan for countries; the smallest firms (<10 workers) for the firm size; and agriculture, fishing, and mining for the industry. Standard errors in parentheses are clustered by firm ID.
***$p < 0.01$; **$p < 0.05$; *$p < 0.10$.

App. Table 4. The Effects of COVID-19 on Firm Adaptation (adaptation of the business processes in the wake of the pandemic)

	Wave 1				Wave 2			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Wave	0.649***	0.566***	0.638***	0.476***	0.781***	0.753***	0.679***	0.749***
	(0.012)	(0.024)	(0.022)	(0.075)	(0.010)	(0.021)	(0.022)	(0.073)
Wave × country								
Morocco			0.161***				0.110***	
			(0.030)				(0.029)	
Tunisia			−0.424***				0.081***	
			(0.031)				(0.030)	
Egypt			0.269***				0.225***	
			(0.026)				(0.028)	
Wave × firm size								
10–24		0.115***				0.021		
		(0.030)				(0.027)		
25–49		0.170***				0.069**		
		(0.034)				(0.030)		
50+		0.078**				0.049		
		(0.038)				(0.031)		
Wave × industry								
Manuf				0.003				0.009
				(0.082)				(0.077)
Constr				0.141*				0.042
				(0.082)				(0.079)
Retail				0.169**				0.001
				(0.079)				(0.076)
Transp				0.199**				0.003
				(0.094)				(0.091)

App. Table 4 (continued)

	Wave 1				Wave 2			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Accom. and food				0.225***				0.020
				(0.079)				(0.078)
ICT				0.286***				0.115
				(0.091)				(0.080)
Financial				0.293***				0.028
				(0.091)				(0.085)
Educ				0.413***				0.186**
				(0.081)				(0.078)
Health				0.107				−0.003
				(0.107)				(0.094)
Other serv				0.172**				0.067
				(0.086)				(0.080)
No. of obs.	7,266	7,124	7,266	7,266				
N firms	3,288	3,219	3,288	3,288				
R^2	0.69	0.69	0.74	0.70				

Note: The results are produced by estimating equation (1) where the dependent variable is the percentage of firms that adapt their business processes in response to the pandemic. All regressions include firm fixed effects. The coefficients of the two waves are juxtaposed for ease of exposition, but these are born out of the same regression. The reference groups are Jordan for countries; the smallest firms (<10 workers) for the firm size; and agriculture, fishing, and mining for the industry. Standard errors in parentheses are clustered by firm ID.
***$p < 0.01$; **$p < 0.05$; * $p < 0.10$.

App. Table 5. The Effects of COVID-19 on the Expected Change in Firm Sales (%)

	Wave 1				Wave 2			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Wave	−33.277***	−35.201***	−36.091***	−23.204***	−17.165***	−19.944***	−26.278***	−18.724***
	(0.939)	(1.809)	(1.753)	(6.021)	(0.961)	(1.909)	(1.789)	(4.587)
Wave × country								
Morocco			−15.087***				24.537***	
			(2.477)				(2.620)	
Tunisia			17.575***				2.490	
			(2.409)				(2.345)	
Egypt			10.694***				10.393***	
			(2.508)				(2.795)	
Wave × firm size								
10–24		−1.932				1.557		
		(2.341)				(2.520)		
25–49		4.152				2.810		
		(2.728)				(2.821)		
50+		12.695***				9.565***		
		(3.138)				(2.972)		
Wave × industry								
Manuf				−3.382				−1.444
				(6.479)				(4.955)
Constr				−9.098				0.948
				(6.546)				(6.006)
Retail				−4.397				5.003
				(6.275)				(4.889)
Transp				−20.352***				−2.955
				(7.139)				(6.816)

App. Table 5 (continued)

	Wave 1				Wave 2			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Accom. and food				−31.774***				−4.978
				(6.501)				(5.436)
ICT				2.321				5.587
				(7.092)				(5.510)
Financial				5.627				4.849
				(7.456)				(5.667)
Educ				−18.744***				8.178
				(6.768)				(6.070)
Health				−12.962*				−0.334
				(7.314)				(6.178)
Other serv				−3.069				8.058
				(6.800)				(5.749)
No. of obs.	7,036	6,910	7,036	7,036				
N firms	3,288	3,219	3,288	3,288				
R^2	0.30	0.31	0.37	0.34				

Note: Firms were asked to report expected change in their sales in 2021 versus the pre-pandemic sales levels in 2019. The results are produced by estimating equation (1) where the dependent variable is the percentage expected change in sales in 2021 compared to sales in 2019. All regressions include firm fixed effects. The coefficients of the two waves are juxtaposed for ease of exposition, but these are born out of the same regression. The reference groups are Jordan for countries; the smallest firms (<10 workers) for the firm size; and agriculture, fishing, and mining for the industry. Standard errors in parentheses are clustered by firm ID.
***$p < 0.01$; *$p < 0.10$.

App. Table 6. The Effects of COVID-19 on the Expected Change in Firm Investment (%)

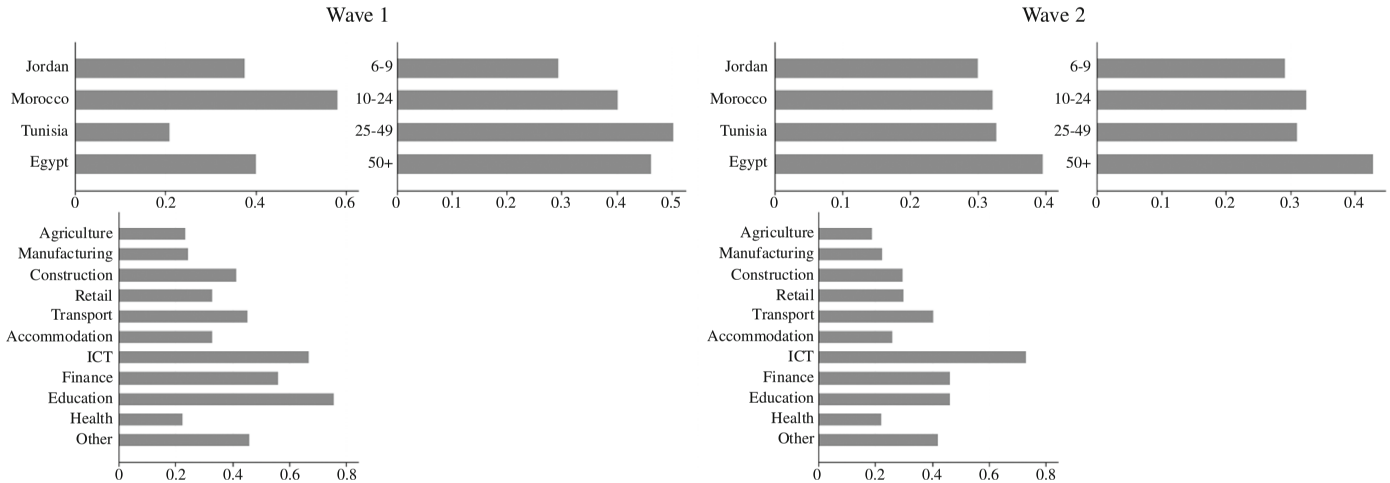
	Wave 1				Wave 2			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Wave	−16.134***	−19.546***	−15.386***	−6.907*	−8.348***	−10.313***	−10.066***	−7.373**
	(0.650)	(1.353)	(1.340)	(3.601)	(0.592)	(1.141)	(1.302)	(3.014)
Wave × country								
Morocco			−12.304***				3.525**	
			(1.951)				(1.706)	
Tunisia			7.535***				−1.717	
			(1.787)				(1.665)	
Egypt			3.092*				4.677**	
			(1.718)				(1.826)	
Wave × firm size								
10–24		1.360				1.692		
		(1.735)				(1.529)		
25–49		4.961**				2.398		
		(1.949)				(1.787)		
50+		10.753***				6.273***		
		(1.934)				(1.667)		
Wave × industry								
Manuf				−4.449				−1.700
				(3.880)				(3.286)
Constr				−9.800**				−1.126
				(4.096)				(3.495)
Retail				−8.088**				1.278
				(3.816)				(3.171)
Transp				−10.150**				−2.490
				(4.547)				(4.036)

App. Table 6 (continued)

	Wave 1				Wave 2			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Accom. and food				−17.312***				−5.404
				(4.092)				(3.593)
ICT				2.060				−1.877
				(4.229)				(3.780)
Financial				−0.257				0.621
				(4.163)				(3.783)
Educ				−21.781***				1.777
				(4.487)				(3.954)
Health				0.765				0.366
				(4.773)				(4.084)
Other serv				−14.525***				1.083
				(4.422)				(3.693)
No. of obs.	9,628	9,439	9,628	9,628				
N firms	3,288	3,219	3,288	3,288				
R^2	0.09	0.10	0.12	0.11				

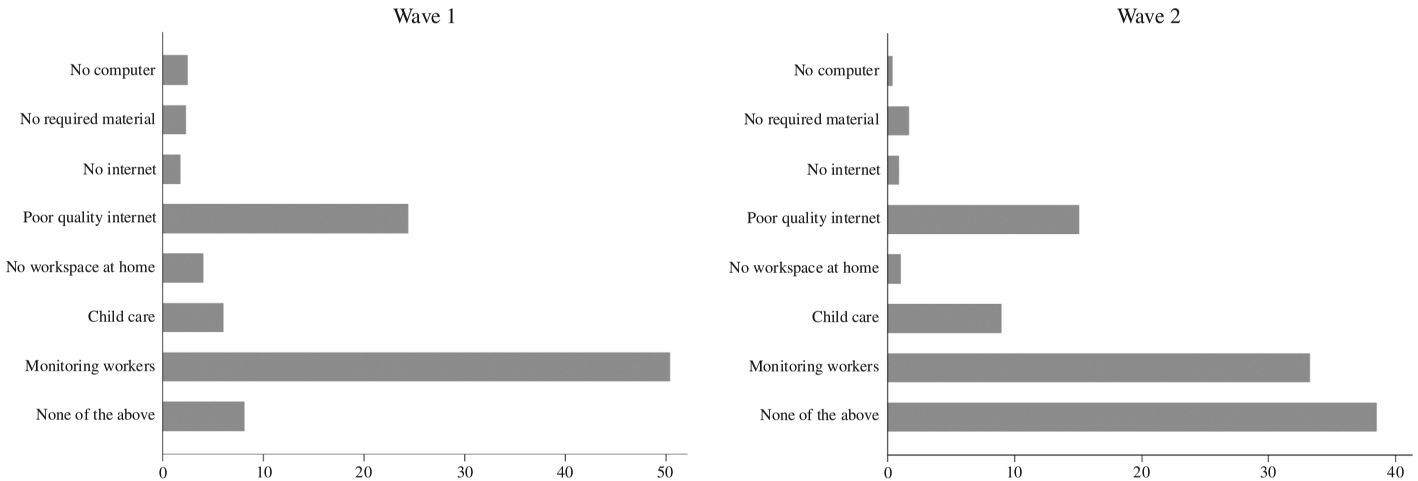
Note: Firms were asked to report expected change in their investments in 2021 versus pre-pandemic levels in 2019. All regressions include firm fixed effects. The coefficients of the two waves are juxtaposed for ease of exposition, but these are born out of the same regression. The reference groups are Jordan for countries; the smallest firms (<10 workers) for the firm size; and agriculture, fishing, and mining for the industry. Standard errors in parentheses are clustered by firm ID.
***$p < 0.01$; **$p < 0.05$; *$p < 0.10$.

App. Figure 4. The Rate of Firms with Some or All Workers Working Remotely in March 2021 (wave 1) or June 2021 (wave 2)



Source: Authors' own compilation based on raw data from the COVID-19 MENA Monitor Enterprise Survey.

App. Figure 5. Difficulties Faced by Firms That Choose (Partial) Remote Work (%)



Source: Authors' own compilation based on raw data from the COVID-19 MENA Monitor Enterprise Survey.
Note: This does not include firms that stated that remote work was not at all possible.

App. Table 7. Participation in Government Assistance Programs (%)

	Wave 1					Wave 2				
	All	Jordan	Morocco	Tunisia	Egypt	All	Jordan	Morocco	Tunisia	Egypt
Business loans	12.83	11.75	20.43	8.42	10.52	9.01	6.74	14.35	6.35	8.6
Loan payment deferrals	2.73	3.21	0.84	1.56	5.23	2.92	2.35	1.45	4.03	3.84
Partial or total salary subsidies	8.31	2.69	7.99	21.44	1.72	4.26	7.16	3.41	5.36	1.1
Cash transfers of unemployment benefits	0.94	0.33	0	2.36	1.12	2.93	0	0.66	9.87	1.21
Rental or utilities subsidies or deferrals	1.39	1.89	0.09	2.1	1.52	1.57	1.09	1.16	2.07	1.97
Subsidies (products/inputs/services)	1.28	2.02	0.85	0.9	1.35	1.33	0.61	1.06	1.31	2.34
Reduction or delay in taxes	3.21	1.82	1.32	3.99	5.75	4.59	2.15	5.72	5.97	4.52
Delays in paying social security	8.41	17.14	1.19	7.5	7.76	13.96	16.09	5.44	23.72	10.63
Not participated	60.89	59.14	67.28	51.71	65.02	59.43	63.81	66.76	41.32	65.79

App. Table 8. Reasons Given for Not Participating in Government Assistance Programs (%)

	Wave 1					Wave 2				
	All	Jordan	Morocco	Tunisia	Egypt	All	Jordan	Morocco	Tunisia	Egypt
Not aware of any such programs	22.8	14.09	18.94	1.74	50.7	21.33	16.85	25.45	15.02	25.42
It requires internet/smartphone	0.17	0	0	0.81	0	0.28	0	0	0	1.01
Even if I apply, I do not think I will get it	9.89	15.59	5.99	10.4	8.34	11.95	14.7	8.69	21.91	6.36
I will need to pay a bribe to apply	0.82	1.49	0	1.36	0.66	1.02	1.97	0.31	1.6	0.43
Bureaucracy/avoidance of interaction	6.96	5.77	0.43	18.83	5.79	8.31	7.94	1.47	12.44	13.01
Not eligible	9.04	18.03	3.26	10.83	5.49	8.48	10.43	2.92	10.11	11.2
Other	6.08	8.38	4.01	4.98	6.97	14.13	19.6	0.83	14.19	22.29
No such programs	44.23	36.65	67.37	51.05	22.06	34.51	28.49	60.32	24.73	20.28

Note: Only firms that did not participate in any government assistance programs.

App. Table 9. Effects of COVID-19 on Firms That Participate in Government Assistance Programs during the Pandemic

	Total Workers	Wages Reduced	Hours Reduced	Layoffs	Closure	Adapt	Sales	Inv.
Wave 1	−0.23	0.051***	0.128***	0.166***	0.302***	0.502***	−33.273***	−11.219**
	(0.173)	(0.016)	(0.044)	(0.036)	(0.074)	(0.061)	(6.110)	(5.340)
Wave 2	−0.217	0.009	0.047**	0.135***	0.122***	0.631***	−25.653***	−20.505***
	(0.237)	(0.009)	(0.020)	(0.047)	(0.046)	(0.075)	(5.035)	(6.161)
Gov × wave 1	−0.018	0.012	0.004	0.051***	0.004	0.016	−7.681***	−3.888**
	(0.029)	(0.013)	(0.016)	(0.014)	(0.014)	(0.020)	(1.750)	(1.928)
Gov × wave 2	0.009	0.006	0.022*	0.034**	−0.021	0.050**	−4.539**	−4.250**
	(0.025)	(0.009)	(0.012)	(0.014)	(0.013)	(0.021)	(1.951)	(2.022)
No. of obs.	7,057	7,057	7,057	6,730	7,124	7,124	6,910	6,906
N firms	3,219	3,219	3,219	3,219	3,219	3,219	3,219	3,219
R^2	0.02	0.11	0.2	0.21	0.12	0.76	0.4	0.31

Note: The results are produced by estimating equation (2), where treatment is participation in government assistance programs. All regressions include firm fixed effects and interaction terms between the wave indicators for waves 1 and 2 on the one hand and firm size, country, and industry dummies on the other hand. Standard errors in parentheses are clustered by firm ID.
***$p < 0.01$; **$p < 0.05$; *$p < 0.10$.

App. Table 10. Do Exporters Do Better than Non-exporters in the Wake of COVID-19? The Differential Effects of COVID-19 on Exporting Firms

	Total Workers	Wages Reduced	Hours Reduced	Layoffs	Closure	Adapt	Sales	Inv.
Wave 1	−0.231	0.055***	0.135***	0.177***	0.304***	0.501***	−34.306***	−11.694**
	(0.173)	(0.016)	(0.044)	(0.037)	(0.074)	(0.061)	(6.123)	(5.355)
Wave 2	−0.211	0.012	0.056***	0.145***	0.117**	0.639***	−26.873***	−21.651***
	(0.238)	(0.009)	(0.020)	(0.047)	(0.046)	(0.075)	(5.033)	(6.182)
Export × wave 1	−0.005	−0.031**	−0.069***	−0.036*	−0.030*	0.042	1.938	−0.028
	(0.048)	(0.014)	(0.021)	(0.020)	(0.017)	(0.035)	(3.053)	(3.277)
Export × wave 2	−0.052	−0.016**	−0.028**	0.034	−0.003	0.083***	−1.257	−0.415
	(0.060)	(0.007)	(0.013)	(0.023)	(0.017)	(0.029)	(2.501)	(2.836)
No. of obs.	7,057	7,057	7,057	6,730	7,124	7,124	6,910	6,906
N firms	3,219	3,219	3,219	3,219	3,219	3,219	3,219	3,219
R^2	0.02	0.11	0.2	0.21	0.12	0.75	0.4	0.31

Note: The results are produced by estimating equation (2), where treatment is export status. All regressions include firm fixed effects and interaction terms between the wave indicators for waves 1 and 2 on the one hand and firm size, country, and industry dummies on the other hand. Standard errors in parentheses are clustered by firm ID.
***$p < 0.01$; **$p < 0.05$; *$p < 0.10$.

App. Table 11. Do Importers Do Better than Non-exporters in the Wake of COVID-19? The Differential Effects of COVID-19 on Importing Firms

	Total Workers	Wages Reduced	Hours Reduced	Layoffs	Closure	Adapt	Sales	Inv.
Wave 1	−0.216	0.048***	0.135***	0.177***	0.311***	0.479***	−35.096***	−12.394**
	−0.175	−0.017	−0.044	−0.037	−0.074	−0.061	−6.153	−5.447
Wave 2	−0.208	0.014	0.057***	0.147***	0.133***	0.616***	−27.819***	−22.717***
	−0.24	−0.009	−0.02	−0.048	−0.046	−0.074	−5.033	−6.175
Import × wave 1	−0.06	0.016	−0.024	−0.011	−0.038***	0.100***	3.682*	2.811
	−0.056	−0.015	−0.02	−0.016	−0.015	−0.025	−2.131	−2.347
Import × wave 2	−0.03	−0.012**	−0.013	0.002	−0.060***	0.110***	3.579*	4.242**
	−0.04	−0.006	−0.012	−0.016	−0.012	−0.023	−2.064	−2.141
No. of obs.	7,057	7,057	7,057	6,730	7,124	7,124	6,910	6,906
N firms	3,219	3,219	3,219	3,219	3,219	3,219	3,219	3,219
R^2	0.02	0.11	0.2	0.21	0.12	0.75	0.4	0.31

Note: The results are produced by estimating equation (2), where treatment is import status. All regressions include firm fixed effects and interaction terms between the wave indicators for waves 1 and 2 on the one hand and firm size, country, and industry dummies on the other hand. Standard errors in parentheses are clustered by firm ID.
***$p < 0.01$; **$p < 0.05$; *$p < 0.10$.

SUPPORTING INFORMATION

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