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Impact of The Stringency and Volatility of Covid Containmen Measures on **Firms' Performances** in The MENA Region?

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An ILO/ERF working paper by

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Abstract

In this paper we study the impact of the variation of the stringency of COVID containment measures and their volatility on firms' performances. The analysis is based on regressions relying on three waves of firms' surveys, conducted in four countries of the MENA region in 2021. Our main results are that restrictions tightening but also a higher volatility of the stringency index are negatively associated with the variation in firms' sales. Access to finance does not seem to lessen the negative effect of the stringency of restrictions and volatility on sales. However, while firms' adaptation through changes in the business model or digitalization dampens the effects of higher stringency, only a change in the business model can dampen the effects of higher volatility. We also find evidence of a stronger negative effect of restrictions tightening for foreign-owned and exporting firms.

Keywords: firms, COVID-19, lockdown, stringency, volatility, MENA

Key Messages:

- Restrictions tightening and higher volatility of the stringency index are negatively associated with firms' sales
- Larger firms and those with higher access to finance performed better all else being equal
- Firms which adapted by changing their business model or digitalizing dampened the effects of higher stringency
- Only a change in the business model can dampen the effects of higher volatility
- There is evidence of a stronger negative effect of restrictions tightening for foreign-owned and exporting firms.

1. Introduction

Gourinchas et al. (2020) show that without government support, the rate of business failure for SMEs can be very high, even in rich countries. Pre-pandemic structural constraints, poor access to credit and weak government support are behind the disproportionate negative impact of the pandemic in Sub-Saharan Africa (Aga and Maemir, 2021) and in the MENA region (Krafft et al., 2021).

In this study, we assess how Covid containment policies affected firms' performances in four MENA countries. Our hypothesis is that, not only the level of restrictions imposed on firms activities matter, but also their predictability. The more volatile restrictions imposed on firms are, the harder it is for them to develop stable coping strategies.

Macroeconomic volatility, captured either by the volatility of income or by the volatility of exports, has been shown to have a strong adverse impact on economic performance of developing countries (Ramey and Ramey, 1995; Guillaumont et al., 1999; Norrbin and Pinar Yigit, 2005). Evidence at the firm level also suggest that firms suffer from high levels of macroeconomic volatility (Chong and Gradstein, 2009).

In this paper, we investigate a new source of macroeconomic volatility: one that stems from variations in the restrictions imposed during the pandemics, either because of erratic government choices or of random evolution in COVID-19 prevalence.

Our estimations of the impact of the stringency and volatility of Government imposed measures are based on three waves of high frequency phone surveys, implemented by the Economic Research Forum in four countries from the MENA region. The first objective is to understand the global picture, namely if the level of restrictions (measured by the stringency index) and their volatility have a significant effect on firms' sales and other performance variables. It would be interesting to uncover any threshold above which stringency becomes really binding. The second objective is to tackle heterogeneity through interaction effects of stringency/volatility with the main firm characteristics. In other words, we investigate some of the following questions: are small firms more or less sensitive to stringency/volatility than medium firms? Which sectors are impacted the most by stringency/volatility? Are foreign firms relatively advantaged or disadvantaged when stringency or volatility increase? Do the results differ in the various MENA countries?

Our paper is related to different strands of the literature. The first strand studies early-stage short impact of the Covid crisis on firms (Apedo-Amah et al., 2020; Bartik et al., 2020; Fairlie, 2020).

Our paper is also related to investigations on the impact of the stringency of restrictions on firms or the labor market (Bundervoet et al., 2022; Delaporte et al., 2021). Finally we are also related to the literature on the impact of entrepreneurs' expectations and sentiment (Bartik et al., 2020; Buchheim et al., 2022a,b).

Our main results are that restrictions tightening but also a higher volatility of the stringency index are negatively associated with the variation in firms' sales. Moreover, all else equal larger firms and those with access to finance performed better than other firms. Firms that adapted to the new situation through a change in their business model or by digitalizing their activites had significantly higher sales. Moreover, we find that while firms with access to finance have on average better performances, access to finance does not seem to dampen the negative effect of the stringency of restrictions and volatility on sales. We also find suggestive evidence of a stronger negative effect of restrictions tightening for foreign-owned and exporting firms. Finally, while change in the business model allows dampening the effects of higher stringency and volatility, digitalization dampens only the effects of higher stringency of COVID containment measures.

The rest of the paper is as organized as follows. Section 2 presents the literature review summa- rized above. In section 3 the database and methodology are discussed and some descriptive statistics are provided. In section 4 we discuss the results and section 5 concludes.

2. Literature review

Early stage studies and short-term impact

Apedo-Amah et al. (2020) conduct a comprehensive phone and online survey covering 51 countries (World Bank Business Pulse Survey), to assess the early-stage effects of the pandemic on firms. They find evidence of severe effects on sales, financial situation, exacerbated by the difficulty of accessing finance and uncertainty. The most salient result is that firms reduced their labor costs by lowering hours (the intensive margin) rather than by laying off. The authors also show that the traditional variables such as size and sector are poor predictors of sales drops, which poses a problem for program targeting.

Studying the impact of the pandemic on US SMEs, Bartik et al. (2020) find that more than 40 percent of SMEs were temporarily closed while employment was reduced by 40 percent. The absence of cash before the pandemic is one of the main impediments to resist to the crisis. Shen et al. (2020) show that the effect of Covid-19 in China is higher when a firms' investment scale is lower. Focusing on small businesses, Fairlie (2020) show that due to industry composition, African American and female-owned businesses are more affected than the average. Guerrero-Amezaga et al. (2022) study the effects of the pandemic on 35,000 small businesses in eight Latin American countries between March and December 2020, based on high-frequency phone surveys. The authors focus on small firms because these seem the most vulnerable according to previous established scholarly work and find a large impact on job losses. Small and informal firms are less likely to apply for and obtain government support, which may contribute to explain the disproportionate negative impact they witness. Finally, Aga and Maemir (2021) show that Sub-Saharan African firms have been disproportionately affected by the Covid crisis. However, despite low work from home and digital capacities, Sub-Saharan firms have a higher propensity to adjust their products and services to adapt to the shock.

Stringency of anti-Covid measures

Based on a 34 countries database, Bundervoet et al. (2022) show that the country-level stringency of social distancing is positively and significantly correlated with job losses. Using a database on 77 countries, Ashraf (2020) find that Covid containment measures have a negatively significant impact on stock market returns. Bachas et al. (2021) highlight a negative impact on formal firms' revenues in Honduras, particularly small ones. Webster et al. (2022) find mixed results on the impact of government restrictions. While stay-at-home restrictions and public transport bans have the expected negative impact on firms' sales, workplace closure has an unexpected positive impact. At the sectoral level, Chen et al. (2020) highlight the negative effect of the stringency on US firms' stock returns on the tourism and leisure sector, while Alfonso C et al. (2021) show a positive effect of Covid containment measures on the e-commercesector.

Delaporte et al. (2021) tackle the de jure stringency versus de facto by using simultaneously the Oxford Stringency Index and the Google mobility data. The difference between the two informs on the level of compliance. The authors show that the level of non-compliance increased in many countries and highlight the role of non-compliance as a coping strategy in countries where the share of informality is high and the level of government support weak.

Expectations and Sentiment

Fernandez-Perez et al. (2021) show that the increase of the stringency of anti-Covid measures has a negative impact on stock market returns. The interpretation provided by the authors is that containment measures have a negative impact on investors mood or sentiment and thus on their investment decisions.

Firms' expectations are also tackled by Bartik et al. (2020) who also highlight a negative impact of the expected length of the crisis on the likelihood of remaining open. Guerrero-Amezaga et al. (2022) show that firms' performances are significantly correlated to their expectations realized several months earlier. They also highlight the positive role of government support on firms' expectations. Relying on surveys on 60 countries, Cirera et al. (2021) find no significant difference in terms of uncertainty between firms receiving government support or not, once all relevant characteristics are corrected for.

Using a large panel of German firms, Buchheim et al. (2022a) show that sentiment is the only variable that can explain cross-sectional variation in firms closure length, once corrected for all rel- evant firms' characteristics. The authors show also that the response of firms in terms of strong measures (layoffs, investment) depended on the degree of optimism of their managers. Buchheim et al. (2022b) study the factors that may influence firms' expectations and show that the announce- ment of school closure in Germany was the triggering factor of the plunge in firms' expectations. Media coverage or the increase in the number of infections did not seem to impact significantly business expectations.

3. Data and Empirical Strategy

3.1 Data

In our study, we use data from the ERF COVID-19 MENA Monitor. Data was collected through high frequency phone surveys targeting private sector firms during the COVID-19 crisis (starting February 2021). Phone surveys were very practical during the pandemic and widely used. However, their data quality may not be the same as in-person surveys. An experiment by Heath et al. (2021) showed that we obtain lower estimates of employment and hours worked on the phone than in-person interviews from self-employed respondents.

We use data from the three waves of the COVID-19 MENA monitor firm surveys, spanning February 2021, May 2021, and August 2021. We focus on Egypt, Jordan[5], Morocco and Tunisia and outcomes between February 2021 and August 2021. Retrospective data on February 2020 outcomes allows us to compare pre-pandemic conditions to the results of the multiple waves and to study the evolution of challenges facing firms. [4] The analyses relies on contemporaneous data about current or recent outcomes, as well as on retrospective data about firms' characteristics in February 2020 or 2019. Table 1 shows the exact dates of the COVID-19 MENA Monitor fielding for Jordan, Tunisia, Morocco and Egypt.

3.2 Stringency of Government measures and economic outcomes

For the stringency index, we are using The Oxford Covid-19 Government Response Tracker (Ox- CGRT) which collects systematic information on policy measures that governments have taken to tackle COVID-19 (Hale et al., 2021).

In the initial stages of the pandemic, the four countries were characterized by very low infection and death rates. They all adopted restrictive regimes with regard to closures (see figure 1). Jordan had the most stringent regime with the initial stay-at-home orders, which initially lacked exceptions. Egypt was the least stringent. In the May-June 2020 period, Egypt and Morocco maintained high levels of restrictions, but Jordan and Tunisia reduced their restrictions considerably. The four countries relaxed their restrictions in the July to September period, particularly Tunisia which stringency index fell to an average of 25, one of the least restrictive regimes in the world (Krafft et al., 2021).

The high resurgence of cases in fall 2020 led to a substantial increase in the stringency index, particularly in Jordan and Tunisia in the fourth quarter of 2020. Jordan's containment measures, the most severe among the four countries, were well above the world average. With the exception of a brief loosening from early February to early March, Jordan's restrictions remained high through April 2021. Tunisia maintained relatively tight restrictions through February 2021, loosened from February to April then had a higher stringency index from May to August 2021 as cases surged again. Morocco maintained a relatively high stringency index until the second quarter of 2021 (higher than Jordan or Tunisia until May 2021), loosened restrictions from May to July 2021 and tightened them again in August 2021 due to the resurgence of cases. Egypt maintained a relatively stable stringency index through October 2020, but then reduced gradually its restrictions until September

[4]Data are publicly available from the Economic Research Forum at www.erfdataportal.com
[5]Jordan Survey is funded by the Foreign, Commonwealth, and Development Office (FCDO)

3.3 Methodology

We estimate the effect of the change and volatility in the stringency index on firms' sales. Equation 1 presents our econometric model:

$$LnSales_{i,c,s,w} = \alpha + \beta DELTASI_{c,s,w-6} + \gamma VOLSI_{c,s,w-6} + \mu X_{i,c,s,w} + \zeta_c + \delta_s + \eta_w + \varepsilon_{i,c,s,w} \quad (1)$$

where $LnSales_{i,c,s,w}$ are sales of firm i in country c, sector s, interviewed in wave w. Equation 1 also controls for firm-level characteristics $X_{i,c,s,w}$ We include the size of the firm ($SIZE_{i,c,s,w}$) which indicates whether the firm is 0-5, or 6-49, or 50-199, or 200 or more employees. We also add a dummy capturing whether the firm is owned by foreign investors ($FOREIGN_{i,c,s,w}$), a dummy capturing whether the firm exports part of its products ($EXPORT_{i,c,s,w}$), and a dummy capturing whether the firm has access to finance ($FINANCE_{i,c,s,w}$).[6] We also include fixed effects for country (ζ_c), sector (δ_s) and wave (η_w). Following Moulton (1990), standard errors are clustered at the level of our explanatory variable of interest, i.e. country-sector-wave level.

Our main variables of interest are $DELTASI_{c,s,w-6}$ and $VOLSI_{c,s,w-6}$, the former being con- structed as the change in SI between the month of the wave and six month before ($DELTASI_{c,s,w-6} = SI_{c,s,w} - SI_{c,s,-6}$), while the latter is the volatility in SI between the time of the interview (w) and six months before. The volatility in SI is constructed as the standard error over six months of the cycle in SI. The cycle in SI is obtained by detrending SI, estimating the following regression for each of the four countries:

$$SI_m = \alpha + \beta SI_{m-1} + \gamma TIME_m + \varepsilon_m \quad (2)$$

In Equation 2, we account for a stochastic trend (SI_{m-1}) and a deterministic trend ($TIME_m$). The cycle of SI is the residual (εm). The volatility of SI is then constructed as the standard error of this residual, over a six-months period before the wave of the interview.

[6] The variable FOREIGNi,c,s,w refers to firms that are partly or fully owner by foreign entity. The variable FINANCEi,c,s,w refers to firms that managed to contract a bank credit or reschedule a loan since the start of the pandemic.

4. Results Baseline

In what follows we first estimate Equation 1 without (column 1) and with (column 2) the firm characteristics $X_{i,c,s,w}$. All regressions include sector, country and wave fixed effects. In both columns (1) and (2) of Table 2, $DELTASI_{c,s,w-6}$ is significantly negative, suggesting that when countries tightened the restrictions over the previous six months, firms experienced a decrease in their sales.

Columns (1) and (2) of Table 2 also display a significantly negative coefficient of the variable $V\ OLSI_{c,s,w-6}$ suggesting that not only the level of the restrictions but also the uncertainty asso- ciated to them matter for firms. Enterprises in countries that managed to implement less volatile restrictions have attained higher levels of sales.

Column (2) of Table 2 also suggests that foreign owned enterprises have performed similarly to other firms. Firms with access to finance have all else equal performed better than other firms and larger firms had better performances than smaller ones.

In columns (3) and (4) we sequentially add to the model two variables that are directly related with the ability and strategy of the firm to deal with the Covid crisis. First in column (3) we control for $CHANGEBM_{i,c,s,w}$, a dummy variable capturing whether the firm has changed its business model to deal with the crisis. This variable is significantly and positively associated with firm performance during the crisis. Second, in column (4) we include $DIGITAL_{i,c,s,w}$ which is a dummy variable capturing whether the firm resorted to digital technologies to adapt its activity during the crisis. Again, this variable is significantly positive. Both columns (3) and (4) of Table 2 suggest that the capacity of the firm to adapt its activity either by changing its business model or by resorting to digital technologies have favored firm activity during the crisis.

In Table 3 we re-estimate the same regressions as in Table 2 but replace the stringency index with one of its sub-components: the international travel restrictions (ITR). We thus recompute the change and volatility variables using this sub-component ($DELTAITR_{c,s,w-6}$ and $V\ OLITR_{c,s,w-6}$). The results are qualitatively similar to those of Table 2, with both the change and volatility in international travel restrictions impacting negatively firm performance.

Finally, in column (1) of Table 4, we re-estimate the baseline model and add the interaction term of the change and the volatility of the stringency index, $DELTASI_{c,s,w-i} \times V\ OLSI_{c,s,w-3}$. Again, all regressions include firm level controls as well as sector, country and wave fixed effects. While volatility keeps a significantly negative association with firm performance which is reinforced by large increases in SI (i.e. more constraints), the change in SI ($DELTASI_{c,s,w-i}$) has now a positive impact on firm performance for low values of volatility. For volatility greater than 7.75, the impact of $DELTASI_{c,s,w-i}$ becomes negatively associated with firm performance.

In columns (2) to (4) of Table 4 we test the validity of our baseline results to using alternative time windows to compute the change and the volatility of SI. In column (2), the change and volatility are computed over the 3 months before the survey wave, while in columns (3) and (4) the windows are extended to 9 and 12 months before the survey wave respectively. These regressions confirm the negative relationship between restrictions volatility and firm performance, whatever the time span over which the variable is measured. The effect of the change in SI does not seem as robust and seems to depend on other factors, notably the volatility in SI. In contexts of high volatility, more stringent policy have a negative impact, which does not seem to be the case when stringent policy are adopted somehow more permanently.

A final robustness check consists in re-estimating the baseline model when dropping one country- wave (i.e. one survey) at the time. The results are presented in Table 5. Most regressions confirm the negative association between both the change and the volatility in SI when country-waves are sequentially dropped.

5. Heterogeneity Analysis

In what follows we examine whether the negative association between the change and volatility of restrictions imposed on the economy applies to all kinds of firms, depending on their characteristics, focusing mostly on access to credit, ownership, export orientation, and ability to deal with the crisis (resorting to digital technologies and changing business model). We thus estimate the following econometric model:

$$LnSales_{i,c,s,w} = \alpha + \beta DELTASI_{c,s,w-6} + \gamma V\ OLSI_{c,s,w-6} + \mu 1X_{i,c,s,w} + \mu 2X_{i,c,s,w} x DELTASI_{c,s,w-6} + \mu 3X_{i,c,s,w} x V\ OLSIc,s,w\text{-}6 + \zeta c + \delta s + \eta w + \varepsilon_{i,c,s,w} \quad (3)$$

In Equation 3 we thus include DELTASIc,s,w–6 and V OLSIc,s,w–6 in interaction with the firm level characteristics (Xi,c,s,w).3 In Table 6, we show all the variables of interest (interaction terms and variables in level). All regressions include the full set of firm level characteristics and fixed effects. Standard errors are clustered as in the previous analysis at the country, sector and wave level.

Panel A of Table 6 explores the heterogeneity in the effect of DELTASIc,s,w–6 and V OLSIc,s,w–6 according to whether the firms have access to finance. We could expect that a higher access to credit allows firms to better absorb the shock of the pandemic, as has been suggested by Gourinchas et al. (2020). We find that while firms with access to finance have on average better performances as suggested by the significantly positive coefficient of FINANCEi,c,s,w–6, access to finance does not seem to dampen the negative effect of DELTASIc,s,w–6 and V OLSIc,s,w–6 on sales. We find similar results when the stringency index is replaced by its sub-component international travel restrictions as shown in Panel B.

In column (2) of Table 6 we present a similar analysis, but this time interacting our variables of interest with a dummy indicating whether the firm is foreign-owned. We find no suggestive evidence of a higher resilience of foreign-owned enterprises since the dummy variable FOREIGNi,c,s,w–6 is non significant in column (2) of Table 6. What Panel A of Table 6 also suggests is that the negative effect of restrictions tightening (captured by DELTASIc,s,w–6) is stronger for foreign-owned firms. Hence, these firms have similar sales on average than those that are not foreign-owned, but suffer more from restrictions imposed during the COVID crisis. This may be explained by the factthat foreign-owned companies are more outward looking and therefore more exposed to a tightening of the restrictions. Finally, Panel A of Table 6 suggests that the volatility of the stringency index affects all firms negatively, no matter the composition of their ownership. The results are slightly different in Panel B when looking more specifically at the impact of the change and volatility in international travel restrictions (ITR) on firm performance. Indeed, the volatility in ITR negatively affects the performance and more strongly so when the firm is foreign-owned.

Column (3) of Table 6 reports the results of the interaction of DELTASIc,s,w–6 and V OLSIc,s,w–6 with a dummy indicating whether the firm exports part of its production. Results are very close to those obtained in column (2) when both variables are interacted with FOREIGNc,s,w which is in line with the observation that foreign-owned firms are also those which activity is export-oriented. Finally columns (4) and (5) of Table 6 examine how the ability of the firm to deal with COVID crisis affects the effect of the change and volatility of the stringency index (Panel A) and international travel restrictions (Panel B). We consider two factors that may contribute to enable the firm to react and adapt to the crisis situation: resorting to digital technologies and changing the business model. In both cases, the negative impact of DELTASIc,s,w–6 (a tightening of the restrictions) on firm performance is dampened by the ability of the firm to either resort to digital technologies or

[7] We have also explored the heterogeneity of the effect of the change and volatility in SI (and ITR) according to the size of the firms and to their sector of activity but did not find any significant results.

change its business model. This dampening effect is also observed for the change in the business model - but not for digitalization - when we interact these variables with the volatility of the restrictions adopted by governments. We respectively find positive and non significant interaction terms. Moreover, when we use the international travel restrictions we obtain almost the same results, except that the interaction between volatility and the change in the business model becomes non significant.

6. Conclusion

In this paper we study the impact of the variation of the stringency of COVID-19 containment measures and their volatility on firms' performances. The analysis is based on regressions relying on three waves of firms' surveys conducted in four countries of the MENA region during the three quarters of 2021.

Our first result shows that not only restrictions tightening, but also higher volatility of the stringency index are negatively associated with the variation in firms' sales. The results are robust to the substitution of the stringency index by one of its sub-components, the international travel restrictions. When we use alternative time windows to compute the change and the volatility of the stringency index, we highlight a more robust relationship between volatility and sales than between stringency and sales.

Moreover, all else equal larger firms and those with access to finance performed better than other firms. Firms that adapted to the new situation through a change in their business model or by digitalizing their activities had significantly higher sales. In addition, we find that while firms with access to finance have on average better performances, access to finance does not seem to dampen the negative effect of the stringency of restrictions and volatility on sales. We also find suggestive evidence of a stronger negative effect of restrictions tightening for foreign-owned and exporting firms. These firms suffer more from restrictions imposed during the COVID crisis. This may be explained by the fact that these companies are more outward looking and therefore more exposed to a tightening of the restrictions.

We consider two factors that may contribute to enable the firm to react and adapt to the crisis situation: resorting to digital technologies and changing the business model. In both cases, the negative impact of tightening of the restrictions on firm performance is dampened by the ability of the firm to either resort to digital technologies or change its business model. This dampening effect is observed for the change in the business model but not for digitalization when we interact these variables with the volatility of the restrictions adopted by governments. This would suggest that the volatility of COVID containment measures may have a higher negative cost on firms than their level of stringency.

We view our paper as a first attempt to address the effect of the COVID-19 on firms' performance in the MENA region using the variation in the stringency index, as well as its volatility. Relying on this research, there are rooms for future research. First, our analysis can be taken one step further by establishing causality rather than correlations. This can be achieved by looking at potential solutions for the endogeneity of the stringency index. Second, it would be valuable to investigate the reason behind the surprising positive effect of the change in the stringency index in some of our regressions. Finally, although we explore multiple heterogeneous effects, more research is needed to understand the mechanism(s) driving the negative relationship between the stringency index and firms' levels of sales.

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Tables

Table 1: Waves of the Enterprise Survey

	Wave 1	Wave 2	Wave 3
Jordan	Feb-March. 2021	May-June. 2021	August-Sept. 2021
Morocco	Feb-March. 2021	June-July. 2021	August-Sept. 2021
Tunisia	Jan-April. 2021	June-July. 2021	August-Sept. 2021
Egypt	Feb-March. 2021	June-July. 2021	–

Table 2: Baseline estimations, OLS

	(1) log(sales)	(2) log(sales)	(3) log(sales)	(4) log(sales)
$DELTASI_{c,s,w-6}$	-0.023**	-0.022**	-0.020**	-0.020**
	(0.010)	(0.010)	(0.010)	(0.010)
$V\ OLSI_{c,s,w-6}$	-0.105***	-0.108***	-0.073*	-0.073*
	(0.038)	(0.039)	(0.038)	(0.038)
$FOREIGN_{i,c,s,w}$		0.245	0.232	0.206
		(0.160)	(0.160)	(0.160)
$FINANCE_{i,c,s,w}$		0.649***	0.636***	0.625***
		(0.124)	(0.127)	(0.126)
$EXPORT_{i,c,s,w}$		0.788***	0.750***	0.777***
		(0.111)	(0.110)	(0.109)
$SIZE_{i,c,s,w\ (ref=0-5)}$ 6-49		0.858***	0.872***	0.866***
		(0.167)	(0.165)	(0.167)
50-199		1.818***	1.815***	1.826***
		(0.203)	(0.202)	(0.203)
200+		2.729***	2.676***	2.630***
		(0.630)	(0.644)	(0.636)
$CHANGEBM_{i,c,s,w}$			0.758***	
			(0.186)	
$CHANGEBM_{i,c,s,w}$				0.682***
				(0.164)
Observation	2698	2595	2568	2595
Sector fixed effects	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes
Wave fixed effects	yes	yes	yes	yes

• *Standard errors in parentheses are clustered at the country-sector-wave level*

** p < 0.1, ** p < 0.05, *** p < 0.01*

Table 3: Baseline estimations, OLS, International travel restrictions

	(1) log(sales)	(2) log(sales)	(3) log(sales)	(4) log(sales)
$DELTASI_{c,s,w-6}$ (0.146)	-0.480*** (0.146)	-0.467*** (0.155)	-0.489*** (0.147)	-0.489*** (0.143)
$V\ OLSI_{c,s,w-6}$	-2.060*** (0.592)	-2.112*** (0.624)	-1.734*** (0.563)	-1.773*** (0.556)
$FOREIGN_{i,c,s,w}$		0.221 (0.154)	0.179 (0.155)	0.210 (0.154)
$FINANCE_{i,c,s,w}$		0.631*** (0.125)	0.605*** (0.127)	0.617*** (0.128)
$EXPORT_{i,c,s,w}$		0.788*** (0.113)	0.772*** (0.111)	0.737*** (0.112)
$SIZE_{i,c,s,w}$ (ref=0-5) 6-49		0.880*** (0.166)	0.888*** (0.166)	0.893*** (0.164)
50-199		1.829*** (0.198)	1.838*** (0.199)	1.828*** (0.197)
200+		2.892*** (0.681)	2.750*** (0.680)	2.810*** (0.688)
$CHANGEBM_{i,c,s,w}$			0.841*** (0.195)	
$CHANGEBM_{i,c,s,w}$				0.771*** (0.179)
Observation	2698	2595	2595	2568
Sector fixed effects	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes
Wave fixed effects	yes	yes	yes	yes

• Standard errors in parentheses are clustered at the country-sector-wave level

** p < 0.1, ** p < 0.05, *** p < 0.01*

Table 4: Baseline estimations, OLS, interaction between change and volatility in SI

	(1) i= 6	(2) i = 3	(3) i = 9	(4) i = 12
$DELTASI_{c,s,w-i}$	0.124*** (0.026)	0.072** (0.032)	0.061*** (0.018)	0.055*** (0.010)
$V\ OLSI_{c,s,w-i}$	-0.166*** (0.041)	0.011 (0.057)	-0.234*** (0.054)	-0.057* (0.031)
$DELTASI_{c,s,w-i}$ x $V\ OLSI_{c,s,w-3}$	-0.016*** (0.003)	-0.013** (0.005)	-0.003** (0.002)	-0.003*** (0.001)
Observation	2595	2595	2595	2595
Firm level controls	yes	yes	yes	yes
Sector fixed effects	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes
Wave fixed effects	yes	yes	yes	yes
Turning point in $DELTASI_{c,s,w-i}$	7.75	5.54	20.3	18.3

• Standard errors in parentheses are clustered at the country-sector-wave level

** p < 0.1, ** p < 0.05, *** p < 0.01*

Table 5: Dropping one country-wave at the time

	W1	W2	W3
W/O TUNISIA $DELTASI_{c,s,w-6}$	0.019*** (0.007)	-0.022** (0.010)	-0.022** (0.009)
$V\ OLSI_{c,s,w-6}$	0.015 (0.031)	-0.098** (0.039)	-0.128*** (0.039)
$DELTASI_{c,s,w-6}$	-0.108 (0.109)	-0.546*** (0.152)	-0.310 (0.194)
$V\ OLSI_{c,s,w-6}$	-0.665 (0.413)	-2.253*** (0.598)	-1.726** (0.719)
N	2468	2453	2442
W/O JORDAN $DELTASI_{c,s,w-6}$	-0.019** (0.009)	-0.043*** (0.016)	-0.019* (0.010)
$V\ OLSI_{c,s,w-6}$	-0.126*** (0.038)	0.020 (0.053)	-0.105** (0.041)
$DELTASI_{c,s,w-6}$	-0.446*** (0.153)	-1.022*** (0.290)	-0.749*** (0.286)
$V\ OLSI_{c,s,w-6}$	-2.017*** (0.624)	-0.620 (0.686)	-3.138*** (1.099)
N	2447	2457	2439

• Standard errors in parentheses are clustered at the country-sector-wave level

** p < 0.1, ** p < 0.05, *** p < 0.01*

	W1	W2	W3
W/O MOROCCO $DELTASI_{c,s,w-6}$	-0.021** (0.010)	-0.024** (0.011)	-0.027*** (0.010)
$V\ OLSI_{c,s,w-6}$	-0.115*** (0.040)	-0.093** (0.046)	-0.136*** (0.040)
$DELTASI_{c,s,w-6}$	-0.421*** (0.147)	-0.488*** (0.161)	-0.553*** (0.152)
$V\ OLSI_{c,s,w-6}$	-2.191*** (0.631)	-2.027*** (0.655)	-2.819*** (0.638)
N	2521	2517	2519
W/O EGYPT $DELTASI_{c,s,w-6}$	-0.027** (0.012)	-0.022** (0.011)	
$V\ OLSI_{c,s,w-6}$	-0.153*** (0.057)	-0.108*** (0.039)	
$DELTASI_{c,s,w-6}$	-0.487*** (0.157)	-0.371*** (0.142)	
$V\ OLSI_{c,s,w-6}$	-1.901*** (0.561)	-2.574*** (0.687)	
N	2388	2430	
Firm level controls	yes	yes	yes
Sector fixed effects	yes	yes	yes
Country fixed effects	yes	yes	yes
Wave fixed effects	yes	yes	yes

• Standard errors in parentheses are clustered at the country-sector-wave level

** p < 0.1, ** p < 0.05, *** p < 0.01*

Table 6: Heterogeneity analysis

	(1) FINANCE	(2) FOREIGN	(3) EXPORT	(4) DIGITAL	(5) CHANGEBM
Panel A - using stringency index (SI) $V\ ARIABLE_{c,s,w}$	0.710*** (0.188)	0.180 (0.225)	0.697*** (0.142)	0.182 (0.399)	-0.106 (0.399)
$DELTASI_{c,s,w-6}$	-0.021** (0.010)	-0.019* (0.010)	-0.017* (0.009)	-0.042*** (0.009)	-0.046*** (0.008)
$V\ ARIABLE_{c,s,w}\ x\ DELTAITR_{c,s,w-6}$	-0.004 (0.009)	-0.031*** (0.011)	-0.028** (0.011)	0.062*** (0.009)	0.061*** (0.008)
$V\ OLSI_{c,s,w-6}$	-0.104** (0.040)	-0.110*** (0.040)	-0.110*** (0.037)	-0.085* (0.049)	-0.115** (0.050)
$V\ ARIABLE_{c,s,w}\ x\ V\ OLSI_{c,s,w-6}$	-0.016 (0.028)	0.033 (0.043)	0.041 (0.028)	0.067 (0.050)	0.100** (0.047)
N	2595	2595	2595	2595	2568

	(1) FINANCE	(2) FOREIGN	(3) EXPORT	(4) DIGITAL	(5) CHANGEBM
Panel B - using international travel restrictions (ITR)					
$V\ ARIABLE_{c,s,w}$	0.630***	0.222	0.755***	1.045***	1.225***
	(0.169)	(0.200)	(0.127)	(0.302)	(0.327)
$DELTASI_{c,s,w-6}$	-0.475***	-0.409**	-0.391***	-0.967***	-1.171***
	(0.162)	(0.159)	(0.145)	(0.207)	(0.202)
$V\ ARIABLE_{c,s,w}\ x\ DELTAITR_{c,s,w-6}$	0.030	-0.708***	-0.425*	0.934***	1.127***
	(0.164)	(0.263)	(0.248)	(0.232)	(0.213)
$V\ OLSI_{c,s,w-6}$	-2.123***	-2.022***	-2.008***	-1.709**	-1.630**
	(0.632)	(0.619)	(0.582)	(0.665)	(0.683)
$V\ ARIABLE_{c,s,w}\ x\ V\ OLSI_{c,s,w-6}$	0.048	-1.016*	-0.306	0.564	0.513
	(0.360)	(0.613)	(0.414)	(0.688)	(0.680)
Observations	2595	2595	2595	2595	2568
Firm level controls	yes	yes	yes	yes	yes
Sector fixed effects	yes	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes	yes
Wave fixed effects	yes	yes	yes	yes	yes

• Standard errors in parentheses are clustered at the country-sector-wave level

** p < 0.1, ** p < 0.05, *** p < 0.01*

Figures

Figure 1: Monthly average of stringency index per country

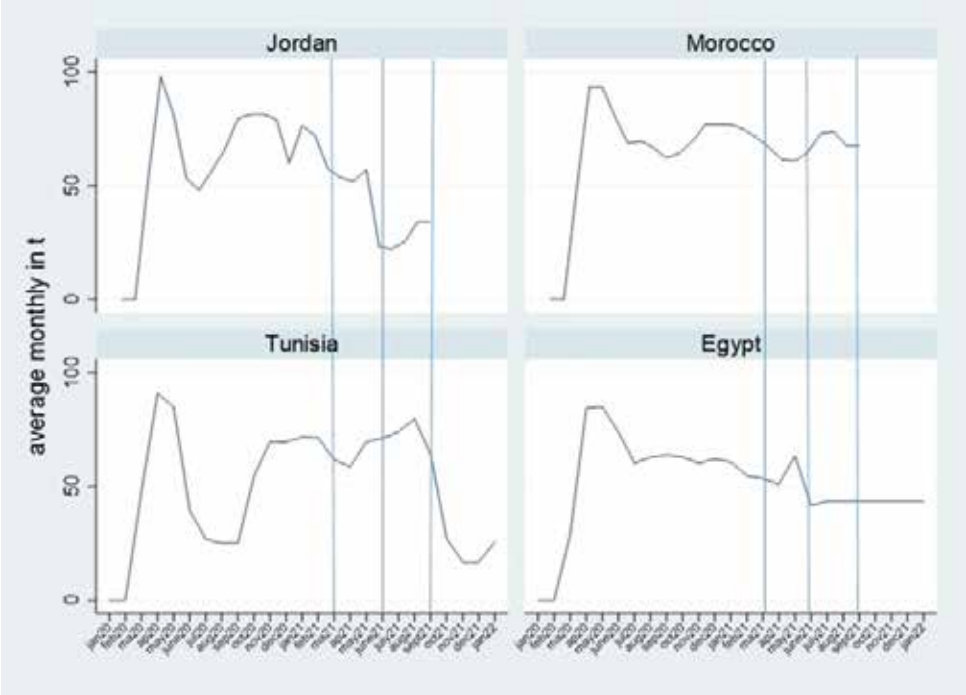
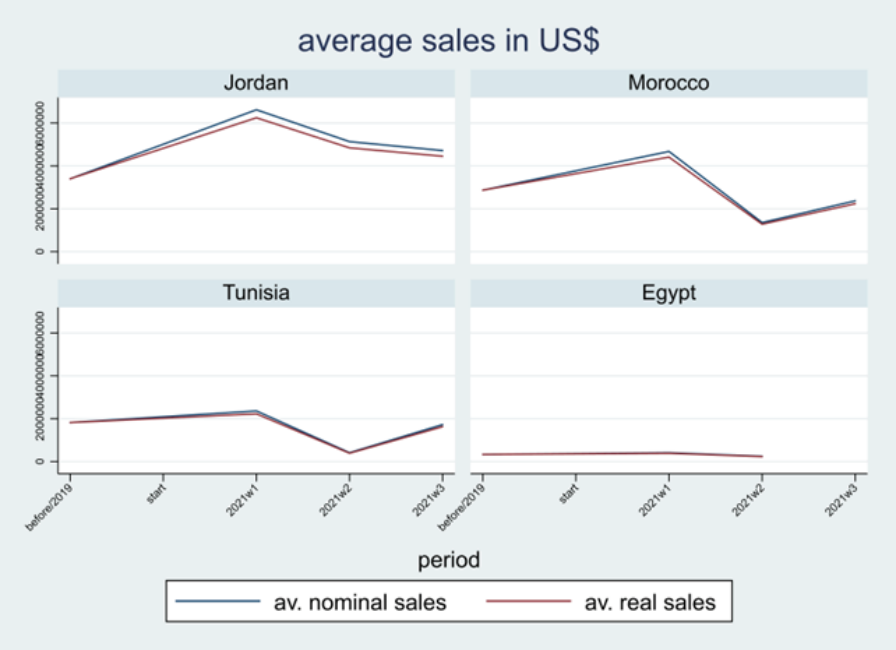


Figure 2: Change in sales through the different waves per country



Appendix

Figure 1: Establishment main activity (Feb 2020) per country

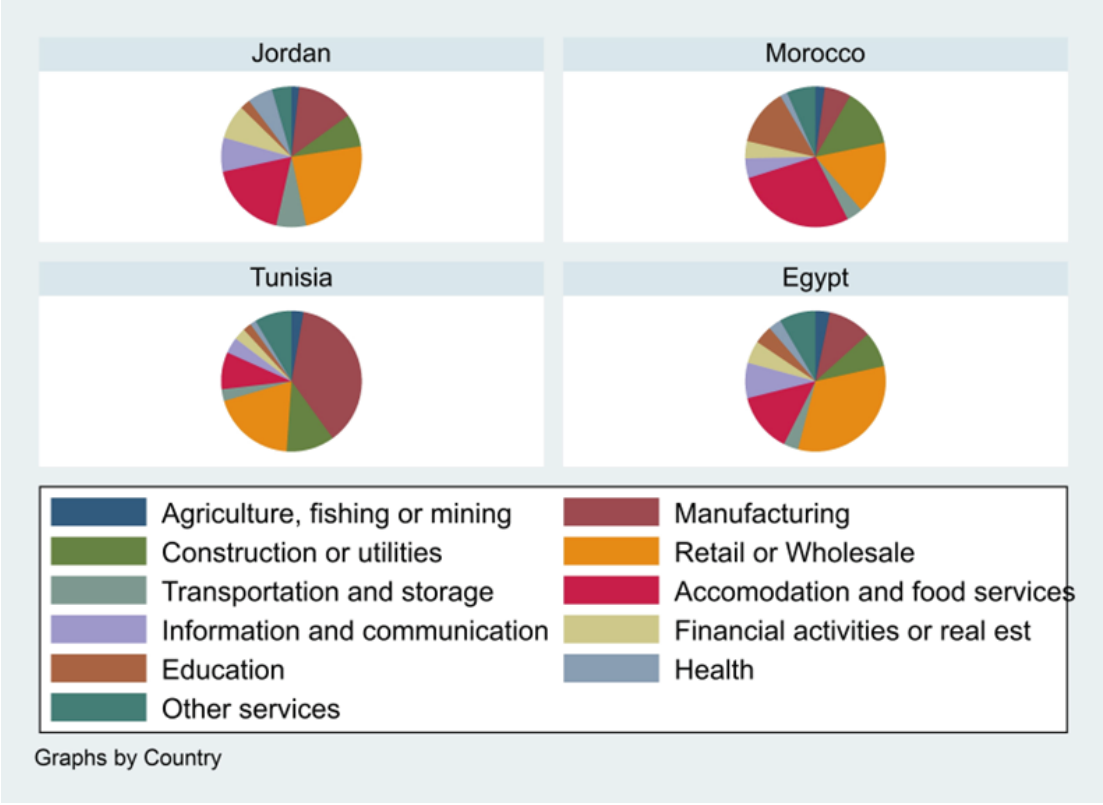


Table 1: Establishment main activity :

	Freq.	Percent
Agriculture, fishing or mining	132.6643	2.42
Manufacturing	940.7073	17.17
Construction or utilities	563.0745	10.28
Retail or Wholesale	1,225.19	22.36
Transportation and storage	233.8529	4.27
Accomodation and food services	949.8929	17.33
Information and communication	321.1728	5.86
Financial activities or real estate	271.2151	4.95
Education	301.7463	5.51
Health	163.1202	2.98
Other services	377.3686	6.89
Total	5,480	100

Table 2: Summary statistics on the estimated sample:

Variable	Obs	Mean	Std. Dev.
Sales	2,651	620370	1403827
Growth rate stringency index (6mo)	2,651	0.895	12.477
Stringency index volatility (6 mo)	2,651	3.751	3.852
Foreign ownership	2,651	0.084	0.277
Access to finance	2,651	0.281	0.449
size	2,651	1.294	1.013
labor	2,595	30.559	34.592

Table 3: Summary statistics on the estimated sample by country : Jordan

Variable	Obs	Mean	Std. Dev.
Sales	758	602299.9	1437520
Growth rate stringency index (6mo)	758	-4.69971	9.614118
Stringency index volatility (6 mo)	758	5.521506	4.420594
Foreign ownership	758	0.072559	0.259583
Access to finance	758	0.299472	0.458329
size	758	1.110818	0.963462
labor	732	25.31284	31.46634

Table 4: Summary statistics on the estimated sample by country : Morocco

Variable	Obs	Mean	Std. Dev.
Sales	417	1226148	2171558
Growth rate stringency index (6mo)	417	-0.37071	8.138047
Stringency index volatility (6 mo)	417	1.955437	1.92456
Foreign ownership	417	0.129496	0.336152
Access to finance	417	0.371703	0.48384
size	417	1.270983	0.985933
labor	412	28.66505	30.19449

Table 5: Summary statistics on the estimated sample by country : Tunisia

Variable	Obs	Mean	Std. Dev.
Sales	778	562927.7	1205907
Growth rate stringency index (6mo)	778	9.295283	16.73654
Stringency index volatility (6 mo)	778	4.442382	4.116804
Foreign ownership	778	0.107969	0.310541
Access to finance	778	0.27892	0.448757
size	778	1.440874	1.048244
labor	761	35.72799	37.55818

Table 6: Summary statistics on the estimated sample by country : Egypt

Variable	Obs	Mean	Std. Dev.
Sales	698	342115	715280.6
Growth rate stringency index (6mo)	698	-1.63383	4.420423
Stringency index volatility (6 mo)	698	2.131212	2.365365
Foreign ownership	698	0.04298	0.202957
Access to finance	698	0.212034	0.409042
size	698	1.346705	1.015022
labor	690	31.55652	35.95688

Sweden
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