



ECONOMICS - MENA ENTERPRISE SURVEY REPORT WORKING PAPERS: **Volume 6**

TRADE AND INNOVATION IN THE MIDDLE EAST AND NORTH AFRICA



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Trade and innovation in the Middle East and North Africa¹

Matteo Ficarra (Graduate Institute), Meryem Gökten (CEPS), Péter Harasztosi, Roberta Lesma, Rozália Pál, Christoph Weiss (EIB) and Zsóka Koczán (EBRD)

Abstract

This paper examines trade participation and innovation activities and how they are intertwined in the Middle East and North Africa region. While the level of trade participation of firms in the region is similar to other peer economies, innovation rates are particularly low. Many productive firms, especially smaller firms, might not be able to reap the scale and efficiency benefits from trade and innovation activity because of the weak business environment in the region. The paper shows that innovative firms tend to be more productive when they trade, while exporters tend to grow faster (in terms of sales) when they also invest in innovation. In addition, the use of foreign-licensed technology appears to have a key role in innovation, even after controlling for the effects of trade participation and foreign ownership. The paper also finds that traders and innovative firms were more likely to adapt to the COVID-19 crisis and the associated sharp sales shock. Overall, the results confirm the importance of international technology diffusion in the innovation process through access to foreign markets.

JEL code: D22, F14, O14, O31

Keywords: Trade, innovation, firm performance, business environment, COVID-19

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I. Introduction

Over the past three decades, globalization has been rapidly intensifying, generating opportunities for firms in many countries to enter new markets. The growth of international trade and the expansion of global value chains (GVCs) have proved to be a powerful means of economic development. Incomes and productivity have increased, while poverty has fallen in many developing countries (World Bank, 2020). Opening up the global economy and the fragmentation of production have been instrumental in enabling them to develop comparative advantages in the manufacture of certain products. This has been facilitated by trade liberalization and declining trade costs, especially after the 1980s.

More recently, the COVID-19 crisis has disrupted economic activity across the globe. In particular, global merchandise trade fell by 7% in 2020. The pandemic forced governments to impose strict containment measures, generating international supply and demand shocks across many countries (Baldwin, 2020). While GVCs have remained quite resilient to date, it is an open question whether COVID-19 will have a long-term impact on international trade and the organization of GVCs.

International trade is a key determinant of firms' competitiveness and innovation. Trade participation, profitability and survival are driven by different aspects of the business environment in which firms operate. These include the export capacity of domestic firms in an industry, foreign direct investment (FDI), trade costs and barriers, the quality of infrastructure and the availability (or migration) of skilled workers. Trade integration also plays a critical role in shaping the incentives for firms to innovate through various channels, including larger market size, increased competition, induced specialization and international knowledge spillovers (Melitz and Redding, 2021; Buera and Oberfield, 2020; De Loecker, 2013; Gorodnichenko et al, 2010).

In this paper, we examine trade participation and innovation activities and how they are intertwined in MENA. Using cross-sectional and panel data on more than 6,000 private firms in six MENA economies (the Arab Republic of Egypt, Jordan, Lebanon, Morocco, Tunisia and the West Bank and Gaza), we explore i) structural determinants of trade participation and innovation activities before the COVID-19 outbreak; and ii) the responses of traders and innovators and their performance during the COVID-19 crisis. While the level of trade participation of firms in the MENA region is similar to other lower-middle income (LMI) and upper-middle income (UMI) economies, we show that innovation rates are particularly low. This lack of innovation, which has been deteriorating in recent years, is also reflected in the low level of investment in intangible assets. This paper does not solve the difficult puzzle of why innovation is low in MENA. Instead, it attempts to identify the characteristics of firms that participate in trade and invest in innovation and how they benefit from these activities.

On the one hand, firms that trade in international markets tend to innovate more. Moreover, we find that traders tend to grow faster when they also invest in innovation, confirming the self-selection hypothesis of more productive, larger and innovative firms into trade activities. On the other hand, trade participation impacts positively the innovation process, even after controlling for the potential sample selection bias, confirming the learning by exporting effect. In addition, the use of a foreign-licensed technology company appears to have a key role for innovation, even after controlling for the effect of trade participation.

We also find significant differences in the average size and productivity levels between traders and non-traders. In particular, compared to non-traders, we find evidence of large productivity and firm

size premia associated with the “superstar” and large exporters but not for firms that trade less intensively.² On average, superstar exporters also tend to pay higher wages to their workers. Nevertheless, the higher export intensity, in line with higher capital intensity, is associated with a lower labor share per firm. The large premia for “superstar” exporters may be explained by policies favoring large exporters and privileging capital-intensive firms. These include, for example, lines of credit by the banking sector, but also direct public support, such as land and energy subsidies, protection and privileges that make it difficult for smaller domestic firms to access export markets and reap the benefits from international trade.

Our analysis puts a special emphasis on firms that participate in global value chains. As firms’ products mature and become more standardized, production processes can be moved from developed countries at the frontier of innovation to countries at lower levels of development. The lag in technological diffusion gives rise to international trade through GVCs (Vernon, 1966; Krugman, 1979) and, at the same time, facilitates the adaptation of new technologies. This, in turn, can raise firm productivity and an economy’s aggregate rate of growth (Perla et al, 2021; Melitz, 2003).

Many productive firms might not be able to reap the scale and efficiency benefits from trade and innovation activity because of the weak business environment and state dominance in the economy – either in the form of state ownership or political connections (Gatti and Islam, 2021; Francis and Kubinec, 2021). The significant presence of state-owned enterprises (SOEs) in MENA discourages the entry of private companies and hinders innovation. Furthermore, SOEs frequently provide goods and services to downstream markets and purchase inputs from upstream markets, affecting the whole value chain of the sectors in which they operate (Arezki et al., 2019). Similarly, privileges to politically connected firms in the MENA region can result in policy distortions – which can come in the form of subsidies or trade protection (Schiffbauer et al., 2014). Our paper shows that this can also reduce the incentives to invest in innovation. Under this challenging environment, the traditional channels of private sector development might be blocked or narrowed considerably.

We also find that traders and innovative firms were more likely to adapt to the COVID-19 crisis and to the associated sharp sales shock. They are much more likely to have started or have increased business sales online and remote working arrangements. Our results confirm the importance of international technology diffusion in the innovation process through access to foreign markets. GVC participation can foster innovation at the firm level, as highlighted also in our estimates of a gravity model of trade for MENA. There are several reasons why international trade – and in particular being part of GVCs – may be important sources of information on innovation. First, by importing intermediate goods for GVC participants, firms may also import state-of-the-art technology that was not previously available in the domestic market. Second, managers may need to adapt their production methods to improve process efficiency and increase the quality of the products they export. Third, improved logistics and upgrades in delivery processes may be required to be able to work with foreign clients or partners. This may also require further training of workers to enhance technical skills, which, in turn, may enable firms to introduce new or improved products and processes (Collier, 2019).

² Firms can be classified in different categories based on their exports sales: “superstar” exporters, big player exporters and small players (EBRD, EIB and World Bank, 2016). “Superstar” exporters are defined as firms above the 95th percentile of the distribution of export sales, big player exporters are firms between the 50th and 94th percentile, and small player exporters are firms below the median.

Trade integration with developed economies, in particular the EU, access to information and know-how (including the acquisition of foreign-licensed technologies) through participation in GVCs could help firms in MENA catch-up with other regions and close the innovation gap of the region.³ Digital capacity and connectivity to international markets are critical to cope and adapt better to the economic shocks such as the COVID-19 crisis. Policies should prioritize investment in digital infrastructure and pay special attention to improving workers' digital skills. Moreover, improving customs and trade regulations, which will lower entry costs for firms to engage in trade, will increase access to international markets to a larger share of firms. But these measures should not give preference to certain groups of firms. Instead, the focus should be on creating better incentives to invest in innovation for all firms. Ultimately, this may also help increase the integration of domestic firms, especially smaller ones, into GVCs.

The remainder of this paper is organized as follows. Section II provides an overview of trade integration, economic development and barriers to trade and innovation for firms in MENA. Section III explores the interrelationships of trade participation and innovation. Section IV discusses the responses of traders and innovators and their performance during the COVID-19 crisis. The last section concludes with policy implications for fostering private sector development in MENA.

II. Trade, innovation and business environment barriers

As a share of GDP, economies in the MENA region tend to import more goods than they export. As the trade balance is the major driver of the current account balance, large deficits might be a source of a macro risk.⁴ However, the current account deficit also implies an excess of investment over domestic savings, which could reflect the catching-up process of less developed economies (Ghosh and Ramakrishnan, 2020; Carranza, 2002). In 2019, all six MENA countries had a negative trade balance (Figure 1). Imports represented more than 30% of GDP of these countries (with the exception of Egypt), which is above the average of UMI (upper middle income) and LMI (lower middle income) benchmark economies, which are around 20% of GDP. Exports accounted for about 18% of GDP, in line with the average of LMI and UMI countries.

According to Enterprise Surveys, most firms in these regions engage in trade. But the breakdown of firms' trading profiles outlines the import dependence of most of the countries, in particular in Jordan, Lebanon and the West Bank and Gaza (Figure 1).⁵ This may reflect the relatively small size of the economy in these countries. This may also indicate that firms are unable to find inputs in the domestic market or reflect policies overvaluing currencies for example, due to pegged exchange rate to hard currencies in Lebanon and Morocco (Jaud and Freund, 2015). The share of non-traders is particularly large in Egypt and Morocco. In these two economies, this needs to be interpreted in light of the size of the economy, as they are significantly larger than the other countries in the MENA region.

Most firms that export their goods or services also import at the same time, indicating that they participate in GVC by importing, transforming and adding value before re-exporting. The share of

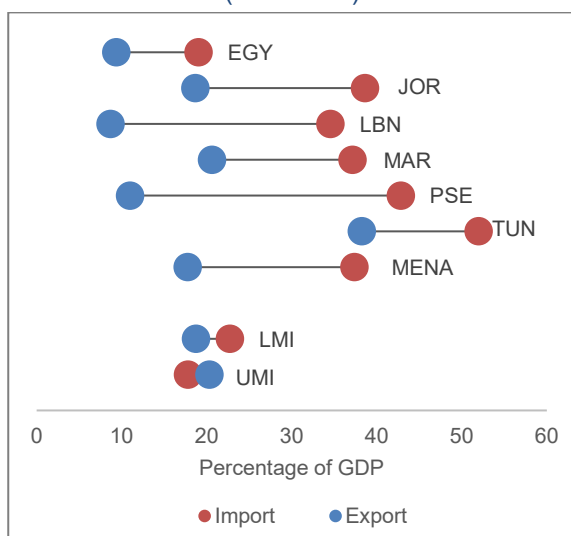
³ Figure A1 in the Appendix highlights that real GDP growth and GVC integration are correlated. For the positive association between real GDP and both service and goods trade in MENA, see Karam and Zaki (2015).

⁴ A current account deficit is considered unsustainable when it may trigger a drastic policy shift or when it leads to a crisis, for example, an exchange rate collapse that prevents the country from servicing its external obligations.

⁵ Importers are defined as firms that purchase more than 10% of material inputs or supplies of foreign origin. Exporters are defined as firms exporting more than 10% of their sales directly.

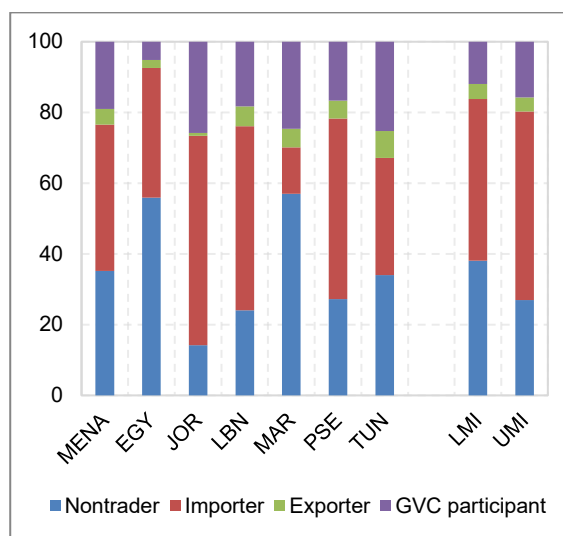
GVC participants – which is proxied throughout this paper by firms that both import and export – varies across countries. Around one in four manufacturers in Morocco, Tunisia and Jordan can be classified as GVC participants, a share that is significantly higher than the averages of lower-middle-income and upper-middle income economies (Figure 2). In Egypt, this share is particularly low, at 5% and remains below the average of lower-middle income countries. Tunisia and Morocco have opted for an economic model oriented toward exports and industrialization supported by a pro-active policy of attracting FDI (Saliola and Zanfei, 2009). This has enabled transfer of technology and know-how. For example, Morocco has become an important supplier of global value chains in the clothing, automobile parts and aerospace industries (AfDB, OECD and UNDP, 2014; Amraoui et al., 2019).

Fig.1 Imports and exports of goods in 2019 (% of GDP)



Source: the authors' calculations based on World Bank World Development Indicators. Note: regional share calculated as simple average of the countries.

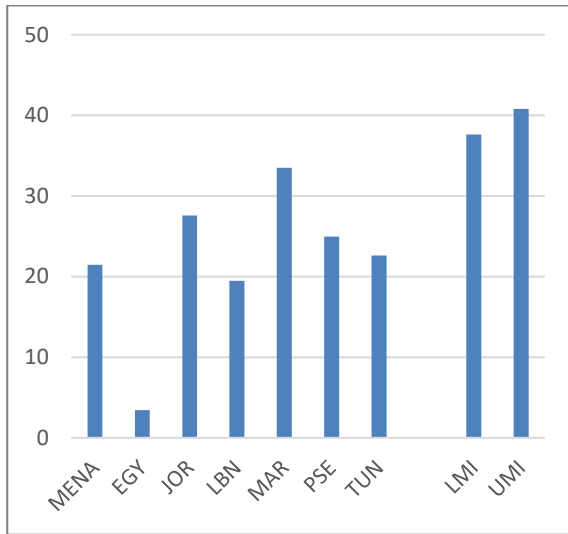
Fig. 2 Trading profiles in 2019 (% of firms)



Source: the authors' calculations based on EBRD-EIB-WB Enterprise Survey.

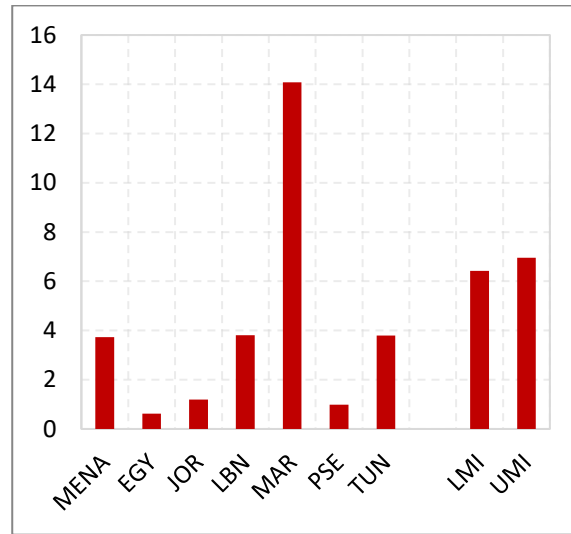
While the level of trade participation of firms in the MENA region is comparable to other lower-middle income (LMI) and upper-middle-income (UMI) economies, we find that innovation rates are particularly low (Figure 3). This lack of innovation, which has even been deteriorating in recent years, is also reflected in the low level of investment in intangible assets, except Morocco (Figure 4). According to the Global Innovation Index, an annual global ranking based on countries' characteristics and performance in innovation, innovative activity in MENA economies lag behind Southeast Asia and East Asia (Morrar, 2019). The low and deteriorating investment levels, both in fixed and intangible assets, may be explained by worsening external financing conditions of private firms and crowding out of private sector investment (Akbas et al., 2021). This is worrisome as this could have negative consequences for the medium- to long-term economic prospects in MENA. Our findings are in line with previous literature documenting that developing countries do not invest enough in innovation despite its central role in closing the gap between developed and developing countries (Cirera and Maloney, 2017). During the COVID-19 crisis, innovation proved to be key for firms to be more resilient and to adapt better to the economic shock.

Fig. 3 Innovation rates (% of firms)



Source: the authors' calculations based on EBRD-EIB-WB Enterprise Survey. Innovative firms are defined as those introducing new or improved products, services or processes, or spending on research and development activities.

Fig. 4 Investment in intangibles (% of firms)



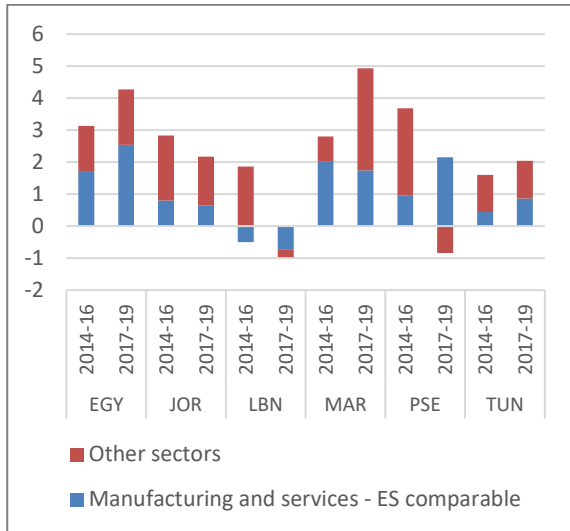
Source: the authors' calculations based on EBRD-EIB-WB Enterprise Survey. Intangible assets include trademarks, copyrights, patents, licenses, service contracts and franchise agreements.

Private sector development is lagging in MENA. On average, during the 2014-2019 period, the contribution to GDP growth of manufacturing and selected services sectors – which proxy the private sector in the Enterprise Surveys – was 44% in the region, ranging from 37% in Lebanon to 50% in the West Bank and Gaza (Figure 5).⁶ This is in line with the average of lower-middle income and upper-middle incomes economies (44% and 45%). For example, although Morocco registered the highest total growth in the region for the 2017-2019 period, more than half of it was driven by other sectors. The employment dynamics using Enterprise Surveys are in line with value added growth at the macroeconomic level, especially in Egypt, Morocco and Tunisia (Figure 6). In Lebanon, the private sector's contraction is reflected in the decrease in the employment at the firm level.

The significant presence of SOEs in MENA discourages the entry of private companies and hinders innovation. SOEs are typically subject to limited competition, weak oversight and soft budget constraints (Olugbade et al., 2021). As governments try to protect incumbents in strategic sectors, SOEs can become a drag on the economy by imposing fiscal burdens on the state, increasing the costs of doing business and depriving the private sector from resources that could have been used more productively. SOEs' lack of management skills is also the cause for their lower performance (Estrin et al., 2009). In addition, SOEs frequently provide goods and services to downstream markets and purchase inputs from upstream markets, affecting the whole value chain of the sectors they operate in (Arezki et al., 2019).

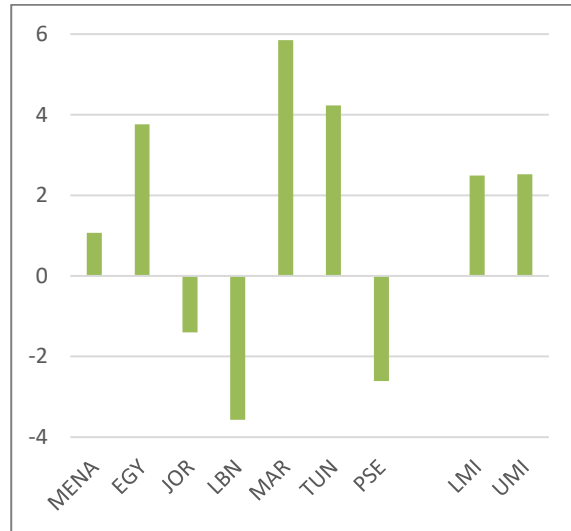
⁶ In Figure 5, manufacturing and selected services (construction, wholesale, trade, retail, restaurants, hotels, transport, storage and communication) correspond to the sectors covered by Enterprise Surveys. "Other sectors" include agriculture, hunting, forestry, fishing, mining, utilities, financial intermediation, real estate and renting, public administration and defense, education, health, social and personal service activities and activities of private households as employers and undifferentiated production activities of private households.

Fig. 5 Sectors' contribution to annual value added growth in 2014-16 and 2017-19 (in %)



Source: the authors' calculations based on UN National Accounts Main Aggregated Database (2015 USD).

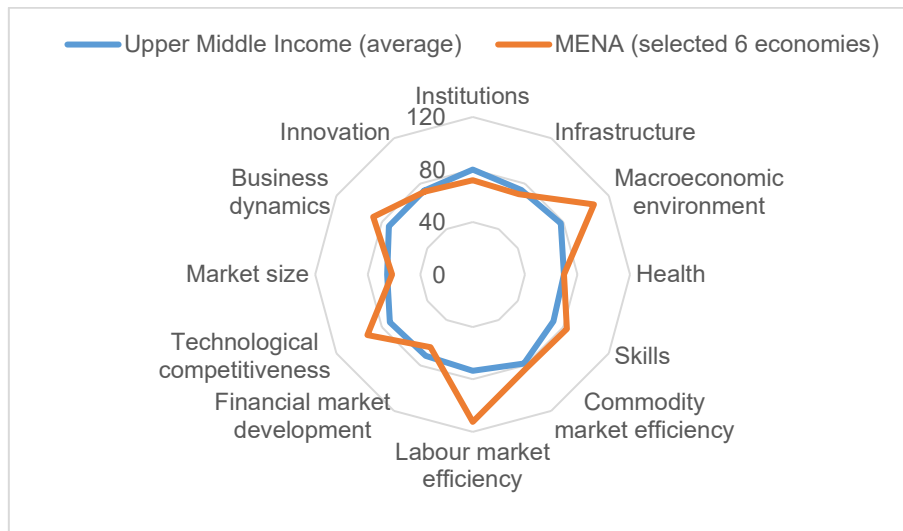
Fig. 6 Firms' annual employment growth (in %)



Source: the authors' calculations based on EBRD-EIB-WB Enterprise Survey.

Many productive firms might not be able to reap the scale and efficiency benefits from trade and innovation activity because of the weak business environment and state dominance in the economy. According to the latest WEF Global Competitiveness index, MENA countries perform worse than peer economies in terms of macroeconomic environment, labor market efficiency, technological competitiveness and business dynamics (Figure 7). Under this challenging business environment, the traditional channels of development and performance might be blocked or narrowed considerably.

Fig. 7 Global competitiveness Index



Source: WEF 2020 Global Competitiveness Report. Note: A lower value means a better rank.

Table 1 highlights business environment barriers that affect traders and innovators and also looks at firm performance indicators as dependent variable. We find that traders are more likely to mention customs and trade regulation and access to finance as a major obstacle to their operations. Non-innovative firms are more likely than innovators to report corruption as a major obstacle, indicating that corruption discourages considerably innovation. Finance constraints and political uncertainty

discourage employment growth, while competition from the informal sector is associated with lower labor productivity. These survey results are in line with previous evidence showing that financial constraints can restrain the ability of domestic firms to export and invest in innovation, especially for SMEs (Petrovito and Pozzolo, 2021; Gorodnichenko and Schnitzer, 2013).

Table 1. Business environment barriers and their association with trade, innovation and firm's performance.

	(1) Trader	(2) Innovator	(3) Annual employment growth (%)	(4) Labour productivity
Inadequately educated workforce	0.024 (0.040)	1.871 (4.501)	1.673 (1.101)	-0.041 (0.091)
Access to finance	0.056** (0.027)	-2.056 (2.808)	-1.524 (0.971)	-0.175 (0.126)
Competitors in the informal sector	0.043 (0.028)	-2.574 (2.990)	0.008 (0.979)	-0.263*** (0.092)
Customs and trade regulation	0.095*** (0.027)	-0.077 (3.500)	1.058 (1.054)	-0.140 (0.094)
Transport infrastructure	0.018 (0.030)	0.465 (3.500)	-0.254 (1.178)	-0.083 (0.107)
Tax rate	-0.000 (0.028)	-4.408 (2.750)	0.139 (0.926)	-0.132 (0.088)
Tax administration	0.012 (0.035)	-1.956 (3.482)	-0.975 (0.958)	-0.138 (0.110)
Business license	0.023 (0.035)	2.298 (3.939)	0.030 (1.246)	-0.170 (0.120)
Political instability	0.016 (0.028)	-0.045 (2.852)	-2.275** (0.913)	-0.058 (0.089)
Corruption	-0.026 (0.028)	-8.082*** (2.718)	-0.566 (0.889)	-0.094 (0.089)
Courts	-0.068 (0.043)	-5.353 (4.411)	-1.297 (1.326)	-0.153 (0.148)
Observations	5,532	5,297	5,363	5,362
R-squared	0.200	0.108	0.097	0.262

Note: Marginal effects from Probit regressions and OLS regressions using sampling weights. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The explanatory variables in the regression are business environment barriers, for example the share of firms that report an inadequately educated workforce to be a major or severe obstacle to operations. Other firm characteristics included in the regression but not reported in the table include: country, industry, a binary variable whether the firm is foreign-owned (defined as defined as those with foreign capital share of more than 10%), and firm size.

The presence of barriers and obstacles to trade, either through non-tariff or tariff measures, can reduce overall trading activity and volumes, both for importers and exporters.⁷ Customs and trade regulations appear to be more severe barriers for firms in MENA than in peer countries, in particular for GVC participants (Figure A2). Firms in MENA also report that it takes more days to clear customs to import or export goods than in other countries (Table A1). This is worrisome because the efficiency

⁷ Non-tariff barriers may include standards, licensing, packaging, and labeling requirements required by the countries to which MENA firms export.

of customs is an important trade facilitator via its effects on volume and shipping frequency (Dovis and Zaki, 2020; Hornok and Koren, 2015; Volpe et al., 2015). Barriers to trade may reduce market competition and erode the gains from international trade. This may decelerate the growth of efficient firms, and even result in lower value-added production (UNCTAD, 2005; Porter, 2000).

The profile of traders in developing and emerging economies is typically characterized by a large number of firms engaging in low-level trade, with a few “superstars” exporters facing few competitors. Firms can be classified in different categories based on their exports sales: “superstar” exporters, big player exporters and small players (Francis and Schweiger, 2017; EBRD, EIB and World Bank, 2016).⁸ We find significant differences (or premia) in the average size and productivity levels between traders and non-traders. In particular, compared to non-traders, we find evidence of large productivity and firm size premia associated with the “superstar” and large exporters but not for firms that trade less intensively: “small players” are not necessarily more productive than non-exporters (Table 2).

The large premia for “superstar” exporters may be explained by policies favoring large exporters and privileging capital-intensive firms – for example, through lines of credit by the banking sector, but also direct public support, such as land and energy subsidies. Successful exporters, large firms or multinationals may receive subsidies, protection, and privileges that make it difficult for smaller domestic firms to access export markets and reap the scale and efficiency benefits from trade. On average, “superstar” exporters also tend to employ more workers and they pay higher wages. While they represent just 6% of the number of firms in our sample, they account for a significant share of total employment (around 25% of the total sample) and about half of total value added measured. Nevertheless, the higher export intensity, in line with higher capital intensity, is associated with a lower labor share within firms. Overall, these firms may thus depress the labor share in MENA.

Table 2. Productivity, size and growth of sales premia of exporters (by exporters’ size categories)

	(1)	(2)	(3)	(4)	(5)
	Labour productivity	Firm size (log)	Cost of labour per unit of sales	Cost of labour per unit of value added	Average labour costs per employee
<i>Omitted category: firms that do not export</i>					
Superstar	2.484*** (0.382)	2.479*** (0.440)	-0.162*** (0.030)	-0.282*** (0.052)	1.082* (0.564)
Big exporter	0.772*** (0.162)	1.201*** (0.150)	-0.050** (0.021)	-0.056 (0.037)	0.415*** (0.095)
Small exporter	-0.318*** (0.116)	0.131 (0.086)	0.072*** (0.024)	0.033 (0.038)	0.061 (0.074)
Observations	5,138	5,537	5,032	2,659	5,249
R-squared	0.307	0.240	0.077	0.073	0.919

Note: OLS regressions using sampling weights. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. “Superstar” exporters are defined as firms above the 95th percentile of the distribution of export sales, big player exporters are firms between the 50th and 94th percentile, and small player exporters are firms below the median. Other firm characteristics included in the regression but not reported in the table include: country, industry, a binary variable whether the firm is foreign-owned, firm size (included as explanatory variable in column 1), and labour productivity (in column 2).

⁸ “Superstar” exporters are defined as firms above the 95th percentile of the distribution of export sales, big player exporters are firms between the 50th and 94th percentile, and small player exporters are firms below the median.

III. Innovation and trade are intertwined

To be able to compete in global markets, firms need to invest in innovation to deliver continuous improvement in their productivity. This can be achieved in different ways, such as decreasing production costs, introducing new products and services, adopting new technologies and improving the process of production and delivery. Throughout this process, the availability of a qualified labor force and the quality of management practices are indispensable for firm performance, notably for firms in developing economies that engage in trade (Bloom et al, 2021; Bastos et al, 2018; McKenzie and Woodruff, 2018).

Beyond the new technologies that advance the global production frontier, innovation is a broader concept, which includes the introduction of new or improved products and processes. It can be in the form of improvements in technical specifications, components and materials, software development, design, user-friendliness, and other functional characteristics of existing goods and services (OECD Frascati Manual, 2015). It can also entail new or significantly improved production and delivery methods, such as the automation of work or organizational improvements through software to manage inventories or improve delivery. This will be considered to be (catch-up) innovation, even when it is only new to the firm but not necessarily to its market.

On the one hand, innovation and managerial quality have a direct impact on the quality of output, allowing firms to compete and survive on global markets.⁹ On the other hand, access to international markets, and especially to a globalized system of production through GVCs, opens up new ways for firms to learn from trade partners and improve their productivity further. Two main mechanisms between trade and innovation can be distinguished in the literature: self-selection into trade; and learning-by-exporting. This will also depend on the direction of the causal relationship.

The idea of a self-selection process argues that only the most productive firms are able to cover the sunk costs of exporting and engage in trade (Bernard et al, 2012; Wagner, 2007; Melitz, 2003). Trade participation requires significant and continuous investment in innovation, which may also influence the degree of internationalization (Teruel et al, 2021). For example, the use of new technologies can enable new marketing and sales channels or reduce costs related to entry into foreign markets – factors that hamper smaller firms with limited resources. Lowering the cost of entry into trade can make the selection process work more efficiently. More firms will be able to compete with international counterparts, while the least productive firms, faced with expanded competition from home and abroad, will exit the market.

The idea behind the learning-by-exporting mechanism is that exporters gain knowledge from exposure to foreign markets and practices, allowing them to grow and increase their efficiency. The presence of factors that affect entry costs into trade or preferential access to foreign markets – for example, specific regulatory barriers, the time to clear customs, and direct informal or formal payments – will make it more difficult for firms to learn from global markets, adopt new technologies and become more innovative. This is particularly true for firms that are part of GVCs and may gain

⁹ On average, firms that invest in innovation and engage in trade are better managed. Enterprise Surveys include detailed questions on core management practices related to addressing problems arising in operations, monitoring of performance indicators, production targets and incentives rewarding staff performance. This information can be summarized in a normalized management index, where a higher score reflects better practices.

knowledge from foreign partners and competitors or through reacting to the demands of foreign markets (De Loecker, 2013; Bernard et al, 2007).

Firms that trade in international markets tend to innovate more. Among non-exporters, the share of innovative firms is about 11%, while it increases to close to 21% for importers. Innovation is particularly prevalent among exporters and participants in GVCs, where 33% of firms introduce new products and processes (Figure A3).¹⁰ Unsurprisingly, foreign ownership is also strongly associated with participation in GVCs (Figure A4). When the right conditions are in place, attracting FDI fosters investment in new or improved products and processes, and participation in GVCs tends to increase the quality of exports and stimulate product upgrading (Javorcik et al, 2017; Harding and Javorcik, 2012).

Firms trading in international markets tend to invest more in R&D and to renew machinery and equipment. Compared with non-traders (firms that do not trade or are only importers), they tend more often to introduce new or improved products that are new to their main market, suggesting that they develop more innovation (Table 3). Similarly, they are more likely to invest in R&D and to upgrade machinery and equipment. The adoption and adaption of technologies developed elsewhere is the fastest way to catch up with more advanced economies (Hausmann and Rodrik, 2003) as it is often accompanied by investment in skills and further process innovation which may increase the firm's productivity (Halpern et al., 2015).¹¹

Table 3 Investment in new or improved products and processes, R&D, and machinery and equipment upgrades (% of firms)

	Innovation type		R&D and machinery and equipment upgrades	
	New to the company	New to the market	R&D investment	Machinery and equipment upgrades
Trader	10.9	18.5	22.6	44.5
Non-trader	6	11.4	10.6	36.5

Source: the authors' calculations based on EBRD-EIB-WB Enterprise Survey.

Confirming the idea of self-selection into trade, firms engaging in international trade tend to be more productive. Table 4 shows that there are significant productivity and firm size premia associated with trade participation. We also find that firms that trade and innovate at the same time tend to be much more productive than other firms. Traders are on average 25% more productive and 30% larger than non-traders. Innovators are around 40% more productive and larger. However, the premia are even higher for firms that trade and innovate at the same time. In addition, innovative traders tend to have higher sales growth.

¹⁰ Table A2 shows that this positive association between trade and innovation also holds in regression analysis in most MENA countries (with the exceptions of Lebanon and the West Bank and Gaza).

¹¹ In this analysis, controlling for firm size is important, as larger firms are also more likely to use foreign licensed technology, use a website, have recently upgraded their machinery or use international quality certification.

Table 4 Productivity, size and growth of sales premia of traders and innovators

	(1)	(2)	(3)
	Productivity	Firm size (log)	Sales growth (%)
Trader	0.253*** (0.090)	0.290*** (0.053)	1.730 (1.434)
Innovator	0.388* (0.224)	0.420*** (0.132)	2.656 (4.209)
Trader & innovator	0.520*** (0.132)	0.661*** (0.084)	3.802* (2.216)
Observations	5,017	5,539	4,779
R-squared	0.286	0.190	0.227

Note: OLS regressions using sampling weights. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. "Superstar" exporters are defined as firms above the 95th percentile of the distribution of export sales, big player exporters are firms between the 50th and 94th percentile, and small player exporters are firms below the median. Other firm characteristics included in the regression but not reported in the table include: country, industry, a binary variable whether the firm is foreign-owned, firm size (included as explanatory variable in columns 1 and 3), and labour productivity (in column 2).

Effects of trade on innovation activity

To analyze the learning by exporting effect, we need to assess whether trade participation has a causal effect on innovation, which is not obvious. We use two different estimation methods to control for endogeneity between international trade and innovation and mitigate the potential sample selection bias (based on observable characteristics, including labor productivity) between trading and non-trading firms. The effect of internationalization on the probability of being innovative is estimated using the following equation:

$$Prob(Innovator)_i = \beta_1 Trader_i + \beta_2 X_i + \varepsilon$$

The dependent variable is a binary taking value 1 if firm i is an innovator (defined as a firm that introduces new or improved products and processes or invests in R&D). Trader is a binary variable taking value 1 if the firm participates in trade (by importing, exporting or participating in GVCs). X is a set of explanatory variables, which includes various firm characteristics, country and sector fixed effects, and ε is a disturbance term. The firm characteristics include binary variables for whether the firm was formally registered when it began operations, whether the firm has a written business strategy with clear key performance indicators, whether the top manager is female, whether annual financial statements are checked and certified by an external auditor, whether the firm is a young firm (less than 5 years old), and the years of experience of the top manager (in log).

To address the endogeneity issues of omitted variable bias and reverse causality, which cannot be addressed directly, we use two indirect approaches: 1) coarsened exact matching (CEM) and 2) a placebo-treatment exercise. Coarsened exact matching (CEM) is a non-parametric estimation method that establishes a covariate balance between treated and control units (Lamperti et al., 2017; Blackwell et al., 2009; Iacus et al., 2012). It creates different strata based on the covariates X included in the analysis. CEM thus meets the congruence principle and restricts the matched data to areas of common support.

We also develop a placebo-treatment exercise to understand the relationship between trade and innovation. The idea behind the placebo treatment exercise is to target the potential self-selection of most productive (and innovative) firms into trade. We do this by predicting the firm's trader status using firm productivity as an ancillary statistic in a Probit model. We choose the cut-off point in the predicted trade status probability distribution so that the share of pseudo-traders in the sample matches that of the underlying data. Finally, we re-estimate the innovation and trade relationship using the firm's pseudo-trader status instead of the actual one. We keep the same control variables and our results confirm those obtained with the CEM model. If trade is an important determinant of innovation, not only due to productivity, we would expect the estimated coefficient to decline significantly.

The baseline estimation suggests a positive and significant relationship between innovation and trade, as traders are about 9 percentage points more likely to be also innovators (Column (1) in Table 5). However, this estimate could be biased either via a common force that drives both trade and innovation, such as a talented manager or other unobserved firm characteristics, or via the reciprocal effect on innovation on trade. The results that control for endogeneity through CEM estimation are reported in column (2) and confirm that trade participation has a positive effect on innovation, increasing innovativeness by 11%. Column (3) shows that the estimated marginal effect of pseudo-trader is low and not significant. This suggests that trade has an important impact on firms' innovation. It also suggests that the relationship is not entirely driven by reverse causality and the self-selection of the most productive firms into international trade.

Table 5 Trade as a driver of innovation: Logit, coarsened exact matching (CEM) and Placebo estimation

	(1) Logit	(2) CEM	(3) Placebo
Trader	0.079** (0.033)	0.106*** (0.024)	0.045 (0.048)
Foreign ownership	0.034 (0.040)	-0.069** (0.033)	0.067 (0.046)
Foreign licensed tech	0.173*** (0.033)	0.122*** (0.021)	0.159*** (0.041)
Firm size (log)	0.039** (0.011)	0.043** (0.008)	0.048** (0.012)
Observations	5,305	3,746	4,886

Note: The dependent variable is innovation. Marginal effects from logit estimation using sampling weights. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Labour productivity is used as an ancillary variable both for CEM (column 2). Firm size is defined as the log of the number of employees. Other firm characteristics included in the regression but not reported in the table include: country, industry, binary variables for whether the firm was formally registered when it began operations, whether the firm has a written business strategy with clear key performance indicators, whether the top manager is female, whether annual financial statements are checked and certified by an external auditor, whether the firm is a young firm (under five years old), and the years of experience of the top manager (in log).

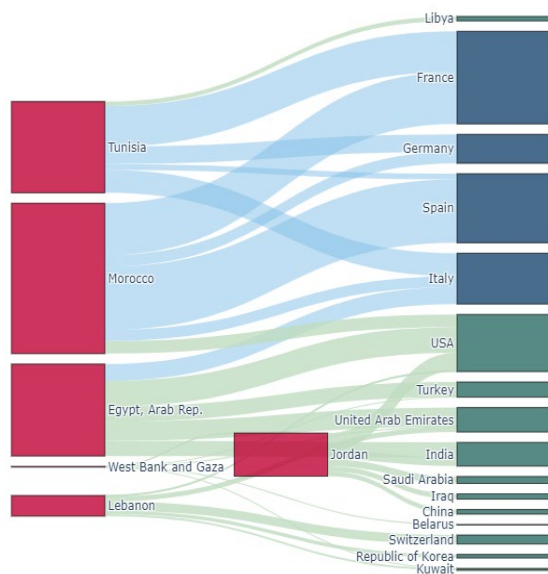
A gravity model of trade combining bilateral data on trade flows and the Enterprise Surveys

France, Spain, Italy and Germany are among the top five export destinations of Morocco and Tunisia, But Egypt, Jordan, Lebanon and the West Bank and Gaza are more exposed to countries that are

outside the EU, such as the US, Turkey, India and Arab countries – even though Italy is an important export destination for Egypt (Figure 8).¹²

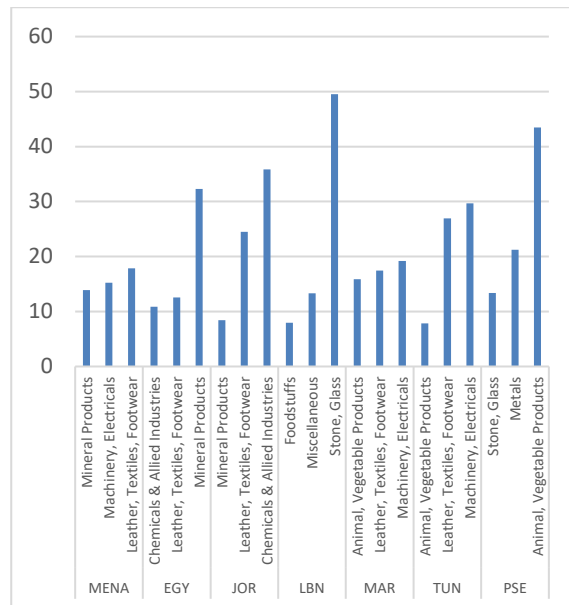
The industrial composition of economies more deeply integrated in GVCs comprises higher value-added products. Economies less integrated in GVCs are trading mainly manufacturing products with lower value added or raw materials, while those integrated in GVCs are able to diversify away from commodities towards higher-value-added manufactured goods and services. Even though developing countries are mainly involved in the production process of parts and assembly of high-tech products, they still contribute to a significant share of value added of the products and provide jobs for a large number of low-skilled workers – thereby also contributing to economic growth and reducing poverty (Dollar, 2019).

Fig. 8 Top 5 export markets in 2019



Source: the authors' calculations based on Comtrade. Note: The figure shows the relative trade flows of the top 5 export destination for each region. The flows from each exporting block (left side in red) add up to 100%. The EU trade partners are colored in blue, while trade with other partners are in green.

Fig. 9 Top 3 export commodities in 2019 (% of GDP)



Source: the authors' calculations based on Comtrade.

The EU is slowly increasing imports of higher-value added products, such as machinery, from Egypt, Morocco, Tunisia, Jordan and Lebanon, foreshadowing a stronger integration of the region with GVCs (Arezki et al., 2020). For example, the top exporting products of Morocco and Tunisia moved from lower value added products, such as clothing and textiles (still a top export commodity), towards higher value added products, such as machinery and electrical equipment (Figure 9). Morocco, in particular, has been able to increase the quality of their exports over time, also through FDI and as a regional logistics hub. On the other hand, countries such as Egypt still have to attract strong FDI flows that will allow them to connect to GVC-based trade (World Bank and IFC, 2020). In fact, Egypt and Jordan stand out compared to other countries, with a high share of mineral products, including petroleum oil and gas (around 30% and 10% of total exports, respectively). Lebanon and the West

¹² Jordan is among the top 5 exports for Lebanon and the West Bank and Gaza, which is why it is shown in the middle of Figure 8.

Bank and Gaza have strong export concentration in other raw materials, such as stone and glass (50% of total export of Lebanon) or vegetable or animal products (40% of total export of the West Bank and Gaza).

To better understand the determinants of exports for firms in the MENA region, we rely on the workhorse tool of gravity models. First introduced by Tinbergen (1962), gravity equations analyze the determinants of bilateral trade flows taking into account geographic distance between trading partners. The general form of a structural gravity model follows the one introduced by Anderson and van Wincoop (2003). After controlling for size (proxied by GDP), bilateral trade between exporter i and importer j depends on bilateral trade barriers between i and j , relative to the product of their multilateral resistance terms, i.e. the average trade barrier each country/region has with the rest of the world. Bilateral trade barriers may be determined by various factors, including trade agreements, institutions, geographic proximity, cultural similarities and historical bonds (Head and Mayer, 2014; Dhingra et al., 2017).

We develop a gravity model to study the determinants of exports, by the traditional bilateral trade barriers, but also taking into account the role of innovation and GVC participation, with the following equation:

$$\ln(exports_{ijk}) = \alpha_i + \alpha_j + \alpha_k + \beta_1 innovator_{ik} + \beta_2 GVC_{ik} + \gamma_1 distance_{ij} + \gamma_2 commonlang_{ij} + \gamma_3 contiguity_{ij} + \varepsilon_{ijk}$$

$\alpha_i, \alpha_j, \alpha_k$ are importer, exporter, and sector fixed effects respectively. $innovator_{ik}$ is a binary variable taking value 1 if a firm in sector k and country i is an innovator, and GVC_{ik} is a binary variable taking value 1 if the firm is a GVC participant. $distance_{ij}, commonlang_{ij}, contiguity_{ij}$ are proxies of bilateral trade barriers indicating the log-weighted distance between country i and country j , whether they share their official language and whether they have a common border.

Table 6. Gravity estimation: determinants of exports

Dependent variable: $\ln(exports)$	(1)	(2)	(3)
Innovative firm	0.455*** (0.173)		0.180 (0.172)
GVC participant		1.617*** (0.170)	1.615*** (0.181)
Distance (log)	-0.870** (0.341)	-0.799** (0.328)	-0.862** (0.343)
Common border for trading partners	-0.540 (0.442)	-0.525 (0.408)	-0.579 (0.426)
Common official/primary language	0.297 (0.361)	0.448 (0.350)	0.448 (0.357)
Observations	3,164	3,355	3,129
R-squared	0.401	0.451	0.459

Note: OLS regressions with sampling weights. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Only the top five export destinations are used for the estimation. The regression control for sector, exporting country, and importing country fixed effects. Distance, common border and common language between trading partners are based on BACI data.

In our analysis, firms in Enterprise Survey are matched to BACI data at the industry level, which provides disaggregated data on bilateral trade flows for more than 5,000 products (that were

reclassified in industry) and 200 countries (Gaulier and Zignago, 2010). The information on whether firms export and GVC participation is obtained from the Enterprise Survey, while the information on bilateral trade flows varies across industries. Our results confirm the key standard finding of gravity equations, namely the evidence on the negative association between trade flows and geographic distance (Table 6). This negative association is stronger for MENA than peer countries in Eastern Europe and Central Asia (Pal et al., 2022). Our estimates also show that innovative firms and GVC participants (as opposed to exporters that do not import) tend to trade more than other firms.

IV. Firm performance during the COVID-19 crisis

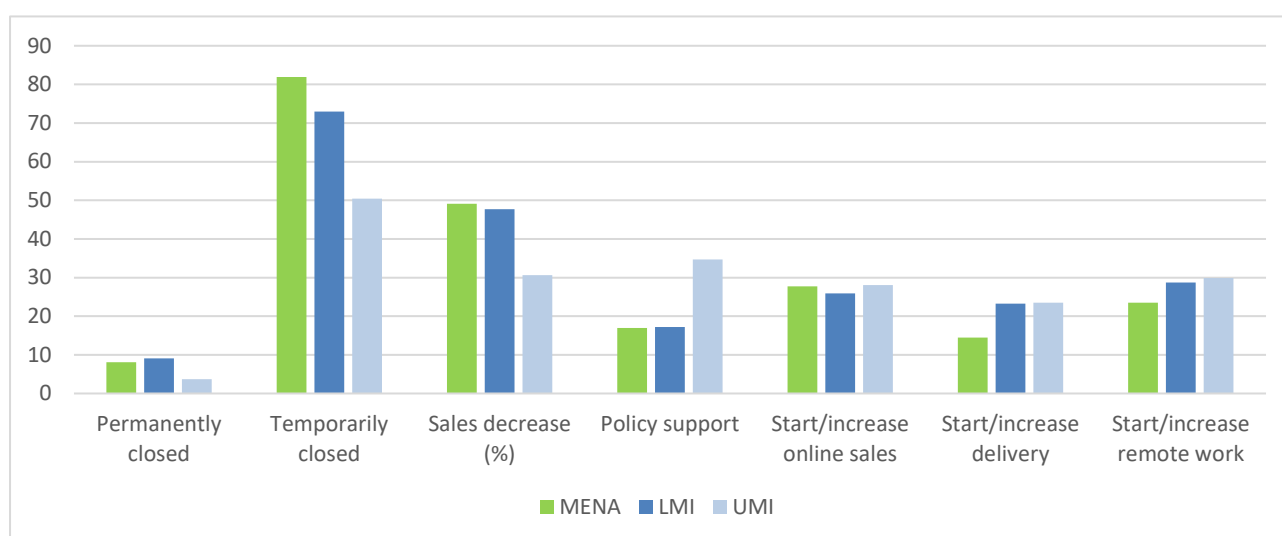
The COVID-19 crisis disrupted economic activity across the globe. The spread of the pandemic forced governments to impose strict containment measures, generating international supply and demand shocks across many countries. A growing literature has documented severe impacts of the COVID-19 crisis on firms as disruptions in production and depressed demand resulted in revenue losses, business closures, mass layoffs and liquidity shortages (Adams-Prassl et al., 2020; Bartik et al., 2020; Humphries et al., 2020; Revoltella et al., 2020). While global value chains remained so far quite resilient, it is an open question whether COVID-19 will have a long-term impact on international trade, global value chains and their organization.

Numerous studies have also pointed to differences across enterprises, with smaller firms being especially hard-hit (Apedo-Amah et al., 2020; Bartik et al., 2020). Building on the large literature emphasizing the importance of management practices for firm performance (including during crises), recent work has in turn also documented that better managed firms experienced smaller drops in sales and were more likely to implement changes in the organization of labor, and in particular to use remote work more intensely (Schivardi et al., 2021; Cette et al., 2020; Giorcelli, 2019; Bartz-Zuccala et al., 2018; Bloom et al., 2016).

Evidence from past crises suggests that temporary support to firms can be effective and early evidence appears to confirm that government support schemes helped mitigate employment declines and business closures in the current crisis as well (Bruhn, 2020; De Mel et al., 2012). At the same time, concerns have been raised about the effectiveness of government support programs in reaching the firms most in need – support may have, for instance, disproportionately benefited larger firms (Humphries et al., 2020).

The COVID-19 crisis has had a particularly strong impact on MENA economies. Compared to the average of upper-middle-income countries, firms in MENA were less likely to receive government support than the average of upper-middle-income economies (Figure 10). They were also more likely to close, permanently or temporarily, and saw larger drops in sales (and employment) than firms in richer economies where the policy support was more widespread. They were less likely to start or increase delivery of goods or services or to start and increase remote work. At the same time, however, firms in MENA were as likely to start or increase business activity online than firms in other regions.

Fig. 10. Firms' responses during the COVID-19 crisis (% of firms)



Source: the authors' calculations based on COVID-19 Follow-up Enterprise Surveys. Note: The MENA region is represented by Jordan, Lebanon and Morocco.

In the following, we aim to shed light on how firms' outcomes and responses during the COVID-19 crisis have varied by firms' management quality, past innovation and digitalization, as well as by ownership and trading status. We examine which firms closed temporarily or permanently, which saw larger drops in sales or employment relative to 2019, as well as which firms were more likely to receive government support. We then examine firms' responses and adaptations, such as whether they started or increased business activity online, delivery or carryout or remote work, as well as looking at the share of online sales in total sales and the share of the workforce working remotely. Figure 10 reports some stylized facts for economies in the MENA region. Given that only three MENA countries are covered by the COVID-19 Follow-up Enterprise Surveys, the econometric analysis is based on a larger sample of more than 18,000 firms in 32 economies in MENA, Europe and Central Asia.¹³

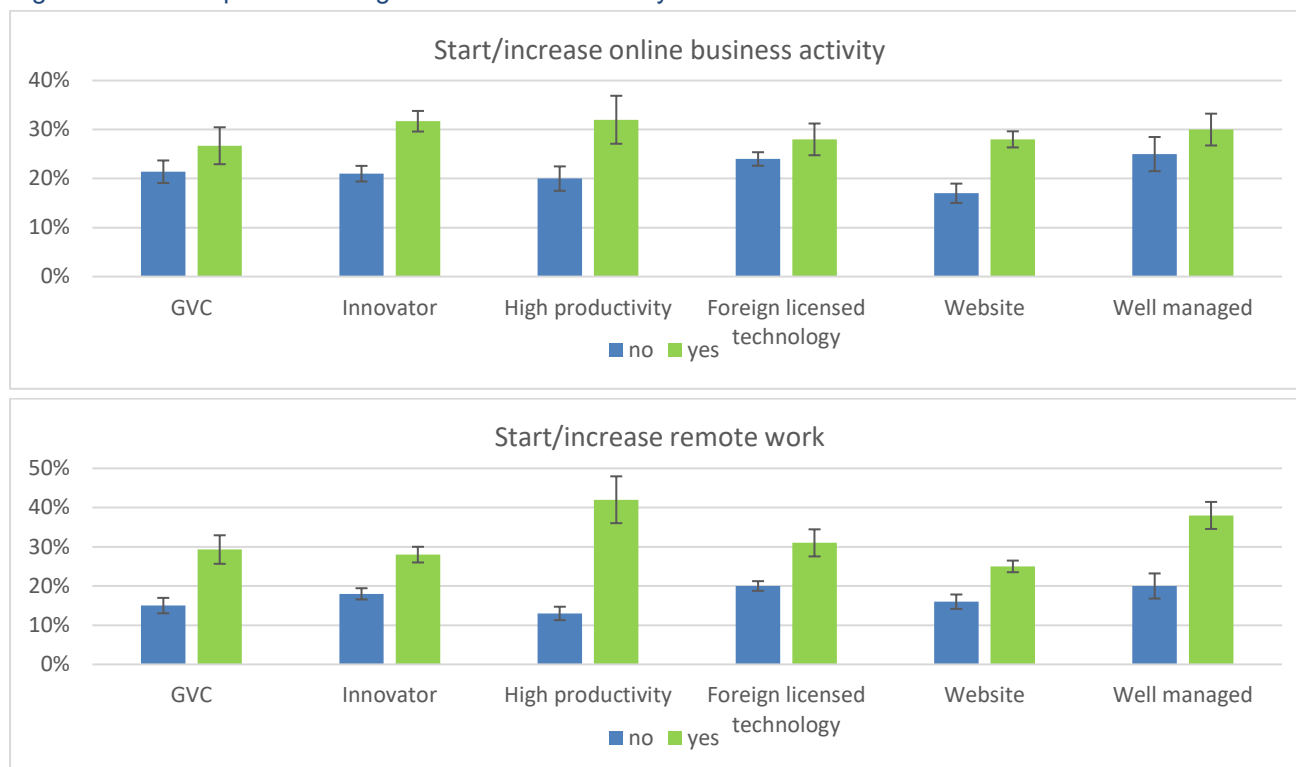
Figure 11 illustrates differences in predicted probability of starting (or increasing) online business activity and remote work according to different firm characteristics, while controlling for firm size and age. We find that firms' pre-COVID-19 characteristics and performance influence both firms' adaptability and the severity of the outcomes they experienced during the pandemic.¹⁴ Firms that were growing faster before the pandemic, had higher management quality, were more innovative and digital (having a website) before the crisis experienced smaller losses and adapted better during the pandemic. They were more likely to have started or increased business activity online, delivery or carryout or remote work; they also had higher shares of online sales and remote workers. These differences hold up when controlling for firms' other characteristics such as their age and firm size. They are both statistically and economically meaningful. For example, innovative firms – which introduced a new product, service or process in the three years before the COVID-19 crisis – were almost 50% more likely to start or increase remote work during the pandemic than firms that had not

¹³ The results of the econometric analysis are broadly similar when we focus on the three MENA countries covered: Jordan, Lebanon and Morocco. The full list of countries in the sample includes Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Georgia, Greece, Hungary, Italy, Jordan, Kazakhstan, Latvia, Lebanon, Lithuania, Malta, Moldova, Mongolia, Montenegro, Morocco, North Macedonia, Poland, Portugal, Romania, the Russian Federation, Serbia, the Slovak Republic and Slovenia.

¹⁴ The definition of the variables are listed in Table A3. Regression results with a longer list of firm characteristics are reported in Tables A4 and A5.

introduced such innovations before. Firms that had a website in 2019 were 55% more likely to start or increase business activity online than firms that did not have a website.

Fig. 11. Firms' responses during the COVID-19 crisis by firm characteristics



Source: the authors' calculations based on COVID-19 Follow-up Enterprise Surveys.

More productive firms were also adapting better during the pandemic. They were less likely to close down both permanently and temporarily; they also suffered smaller sales and employment losses. Furthermore, more productive firms were more likely to start or increase business online and more likely to start or increase remote work. For example, high productivity firms (top 10 percentile of the productivity distribution) were 55% more likely to increase online business activity and were more than three times as likely to introduce remote work compared to low productivity firms in the bottom decile.

Firms with links abroad – through foreign ownership, trade or use of foreign technology – were on average more likely to adapt, in particular they were more likely to introduce remote working arrangements.¹⁵ Firms that were majority foreign owned were 11% more likely to start or increase remote work during the pandemic than domestic firms. Trading has a similar effect to foreign ownership: global value chain participants (firms who both import and export at least 10% of their sales) were about 9% more likely to start or increase remote work than firms who did not import or export.

In contrast, state-owned enterprises were significantly less likely to introduce changes in responses to the crisis – in line with earlier studies that documented that they are less likely to innovate.¹⁶ Nonetheless, state-owned firms were less likely to close and experienced smaller drops in sales than domestic private firms, reflecting more widespread government support (controlling for their other

¹⁵ See also EBRD (2021a) and Kodama et al. (2018).

¹⁶ See EBRD (2021b) and references therein.

characteristics) and likely softer budget constraints. More generally, government support appears to have helped avoid some permanent closures.

V. Conclusion

This paper shows that firms participating in international trade, in particular in GVC, are more innovative and more productive. Moreover, there is a strong positive correlation between firm size and trade participation, which highlights the role of scale economies and competitiveness in foreign markets. The productivity gains associated with trade participation are driven by large firms and superstar exporters – while small firms tend to be less productive, regardless of whether they participate in trade. Small traders may lack incentives to expand but still have incentives to continue to trade while being less efficient. Besides the superstar traders, the winners from trade in terms of productivity gains and innovation are firms that get access to foreign technology.

While the level of trade participation of firms in the MENA region is similar to other lower-middle income and upper-middle income economies, we show that innovation rates are particularly low. This lack of innovation, which has been deteriorating in recent years, is also reflected in the low level of investment in intangible assets. Innovation and trade are strongly intertwined. Innovative firms tend to be more productive when they trade, while exporters tend to grow faster (in terms of sales) when they also invest in innovation. Traders and innovative firms were also more likely to adapt to the COVID-19 crisis and to the associated sharp decline in sales. They are much more likely to have started or have increased business sales online and remote working arrangements.

Trade integration with developed economies, in particular the EU, access to information and know-how through participation in GVCs, foreign licensed technology and modern management practices are among the most important ingredients for boosting innovation. This could help close the innovation gap of the MENA region. At the same time, smaller companies that do not trade directly may also benefit from adapting foreign licensed technologies, as this will help them invest in innovation and digitalization and become more resilient.

Taken together, these findings suggest several measures that policy makers might implement to accelerate economic development, by improving productivity through deeper trade integration and increasing incentives to invest in innovation. First, improving customs and trade regulations, which will lower entry costs for firms to engage in trade, will increase access to international markets to a larger share of firms, especially smaller ones (Francis and Schweiger, 2017). But these measures should not only target small firms or give preferences to certain groups of firms. This may not improve competition and productivity in the economy: small traders are not more productive than firms that do not engage in trade. Instead, improving the incentives to invest in innovation, in particular for small firms, might be more effective, as small and innovative firms have higher growth prospects and better chances of surviving in international, competitive markets.

Second, a large share of firms in MENA is reliant on imports, resulting in trade deficits for several economies. Policies that aim to rebalance the deficit should not introduce restrictions on imports that serve as inputs of production and intermediary goods for domestic firms, especially those participating in GVCs. Imports also make it possible for local firms that do not engage in trade and sell their

products and services in the local economy to source components and parts of a better quality (or at a lower cost) than those available in the domestic market.

Third, to improve innovativeness and economic development, there should be incentives for the acquisition of foreign licensed technologies by both trading and domestic firms. To increase the participation of local firms in GVCs, reforms to the business environment, through reducing informality and political uncertainty, should be promoted: this will help to create a more stable and predictable operating environment for trading partners and foreign investors. Foreign-owned companies are more likely to be part of global trade and they are important players in the international knowledge diffusion network. Under the right conditions, they can contribute to creating local ecosystems that will connect domestic firms to indirect exports. In addition, foreign licensed technology can be accessed by non-trading, domestic firms, thereby improving their innovativeness.

Finally, policy makers should prioritize investment in digital infrastructure and facilitate improvements in management practices and workers' skills. The MENA region needs to develop a digital economy that takes advantage of its young workforces to accelerate growth and, at the same time, address informality and youth unemployment. Governments could encourage intensive training programs, in particular aimed at improving the management of SMEs and incentives to reskill the workforce, including in less well-connected areas to attract innovative firms. Combined with investment in digital infrastructure, this could help to rebalance discrepancies within the region in terms of development, and improve resilience and adaptability to shocks, such as the COVID-19 crisis.

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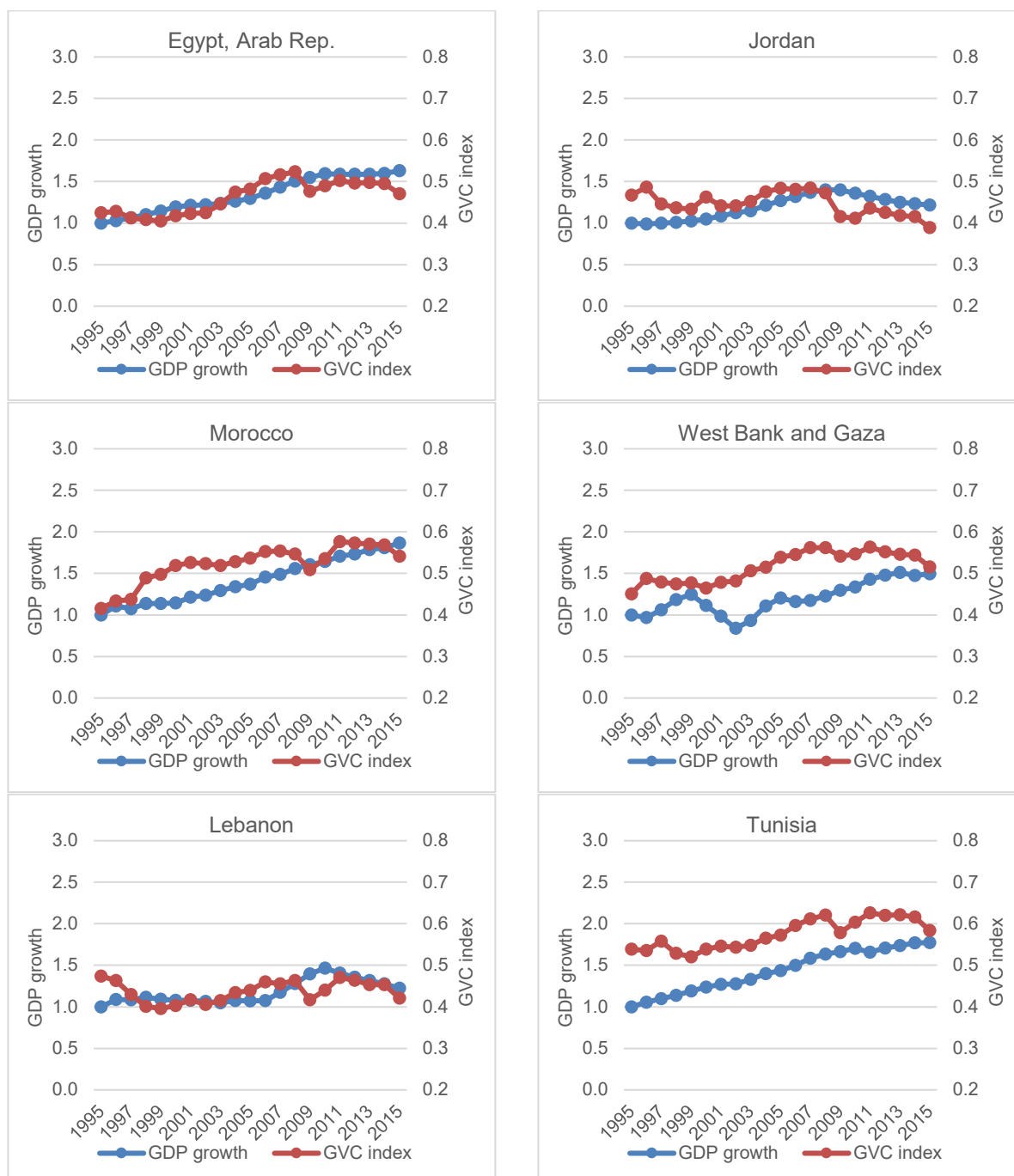
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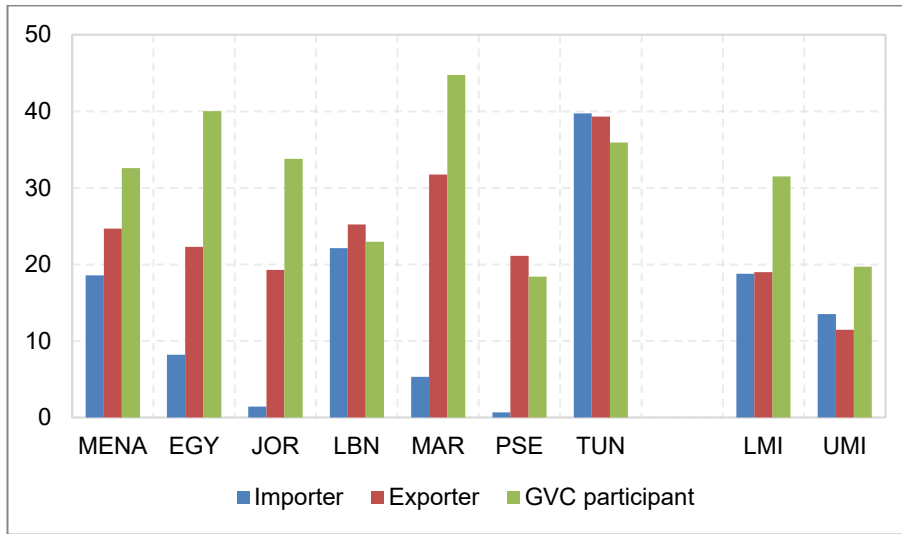
Appendix

Fig. A1 Growth of real GDP per capita and level of GVC participation 1995-2015



Source: the authors' calculations based on UNCTAD-Eora and World Bank World Development Indicators. **Note:** The figure shows the average GVC participation index (in orange, right axis) and the growth in the average GDP per capita of the region compared to 1995 (in blue, left axis). The regional statistics are calculated as unweighted averages from country level figures. The GVC participation index is calculated as the sum of forward and backward participation rates. The backward participation rate is the share of exported value added that is imported for further processing from another country. The forward participation is the share of exported value added that will be used for further processing by another importing country. The calculations are based on the UNCTAD-EORA dataset (Casella et al., 2019).

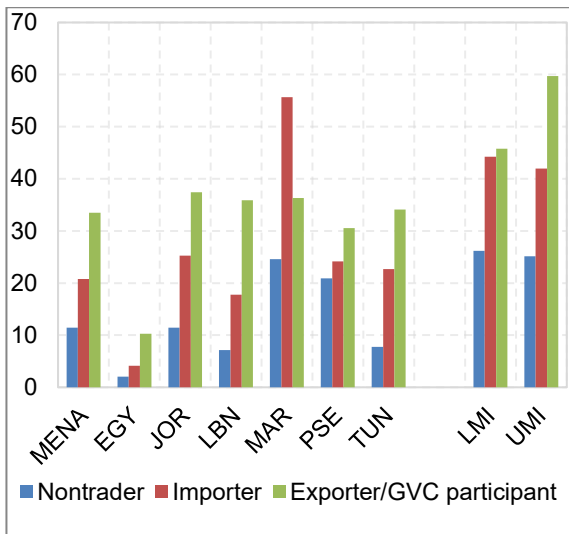
Fig. A2 Customs and trade regulation are a major obstacle to operations (% of firms)



Source: the authors' calculations based on EBRD-EIB-WB Enterprise Survey.

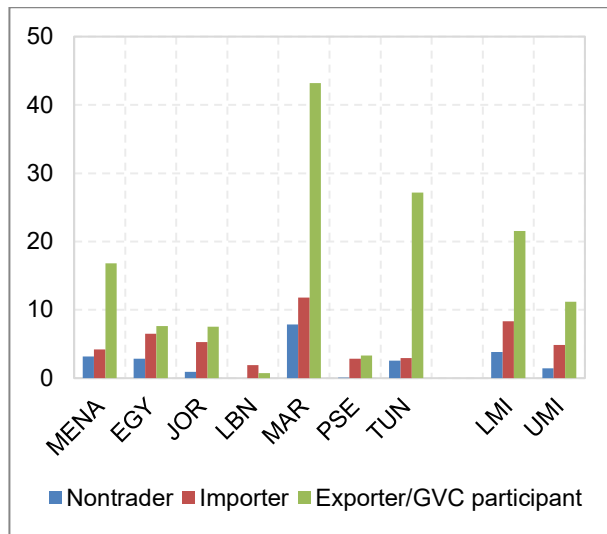
Note: Share of firms reporting customs and trade regulation as a major or very severe obstacle to operations.

Fig. A3 Innovative firms, by trading profile (% of firms)



Source: the authors' calculations based on EBRD-EIB-WB Enterprise Survey. Note: Innovative firms defined as those investing in R&D or introducing new products or processes.

Fig. A4 Foreign ownership, by trading profile (% of firms)



Source: the authors' calculations based on EBRD-EIB-WB Enterprise Survey. Note: Foreign own companies are defined as those with foreign capital share of more than 10%.

Table A1 Business environment for traders

	Customs and trade regulations as major obstacle (% of firms)	Days to clear exports through customs	Days to clear imports from customs	Informal payment to export (% of firms)	Informal payment to import (% of firms)	Export loss due to breakage and spoilage (% of sales)
MENA	23.3	7.3	12.8	3.6	7.9	1.1
EGY	15.3	6.7	8.4	4.2	6.6	0.2
JOR	25.7	4.7	4.6	0.3	0.1	0.2
LBN	22.3	12.3	14.2	10.6	13.4	0.5
MAR	27.7	6.7	13.1	10.0	32.6	3.2
PSE	16.2	5.3	19.4	0.0	3.3	3.6
TUN	32.9	6.7	15.8	0.5	3.8	0.3
LMI	17.7	4.6	10.5	8.7	14.1	1.1
UMI	12.3	4.0	5.4	5.8	8.1	0.3

Source: the authors' calculations based on EBRD-EIB-WB Enterprise Survey.

Table A2 Trade and innovation

Dependent variable : innovation	MENA	EGY	JOR	LBN	MAR	PSE	TUN
Trader	0.079** (0.033)	0.033** (0.014)	0.115 (0.134)	0.147* (0.076)	0.193** (0.082)	-0.066 (0.084)	0.138** (0.059)
Foreign ownership	0.034 (0.040)	0.014 (0.019)	-0.206 (0.178)	-0.156 (0.167)	-0.021 (0.089)	-0.174 (0.144)	0.068 (0.071)
Foreign licensed tech	0.173*** (0.033)	0.055*** (0.017)	-0.022 (0.083)	0.239*** (0.060)	0.248*** (0.089)	0.133 (0.152)	0.182** (0.079)
Firm size (log)	0.039*** (0.011)	0.005 (0.006)	0.065* (0.038)	0.029 (0.027)	0.036 (0.036)	0.091** (0.039)	0.032 (0.021)
Observations	5,305	2,965	497	523	436	336	548

Note: Marginal effects from logit estimation using sampling weights. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Other firm characteristics not reported in the table include: country, industry, binary variables for whether the firm was formally registered when it began operations, whether the firm has a written business strategy with clear key performance indicators, whether the top manager is female, whether annual financial statements are checked and certified by an external auditor, whether the firm is a young firm (less than 5 years old), and the years of experience of the top manager (in log)

Table A3. Variable definitions for the COVID-19 Follow-up sample

	Variable	Definition
COVID-19 Follow-up Surveys	Closed permanently	Establishment closed permanently (0/1)
	Closed temporarily	Establishment closed temporarily (0/1)
	Received government support	Establishment received national or local government support (0/1)
	Started/increased business online	Establishment started or increased business activity online (0/1)
	Started/increased delivery or carry-out	Establishment started or increased delivery or carry-out of goods or services (0/1)
	Started/increased remote work	Establishment started or increased remote work (0/1)
	Share of online sales	Online sales as a share of total sales (%)
	Share of remote workers	Share of workforce working remotely (%)
	Sales change	Change in sales in the last completed month relative to the same months in 2019 (%)
	Employment change	Change in employment in the last completed month relative to end 2019 (%)
EIB-EBRD-World Bank Enterprise Surveys	Age	Years since the establishment began operations
	Employment	Number of full-time employees at the end of last fiscal year
	State-owned	More than 50% state owned (Enterprise survey exclude 100% state owned firms)
	Foreign owned	More than 50% owned by private foreign individuals, companies or organisations
	Importer only	Establishment that imports some of its material inputs and supplies, but its (direct or indirect) exports are less than 10% of sales.
	Exporter only	Establishment with direct or indirect exports greater or equal to 10% of sales and no imports of any of its material inputs and supplies
	GVC participant	Establishment that imports some of its material inputs and supplies, and it exports (directly or indirectly) exports are more than 10% of sales.
	Productivity	Sales over employment
	Innovator	The establishment carried out process or product innovation or invests in R&D
	Management score	Overall Management Z-score (operations, monitoring, targets and incentives management weighted equally)
	Past sales growth	Average annual sales growth over the last two years (%)
	Website	Establishment has its own website
Foreign technology	Establishment uses technology licensed from a foreign-owned company	

Table A4. Drivers of firm outcomes and responses

	(1) Closed permanently	(2) Closed temporarily	(3) Sales change	(4) Employment change	(5) Government support
Firm age	-0.016*** [0.005]	0.003 [0.009]	-0.520 [0.873]	-3.129 [1.933]	0.010 [0.009]
Firm size	-0.016*** [0.004]	-0.028*** [0.006]	2.691*** [0.559]	-9.304*** [1.130]	0.013** [0.005]
Observations	18,333	18,333	12,464	13,497	17,806
State owned	0.019 [0.036]	-0.117* [0.069]	8.381** [3.850]	26.973* [15.554]	0.010 [0.083]
Foreign owned	0.017 [0.017]	-0.031 [0.028]	1.089 [2.700]	-4.735 [5.421]	-0.047** [0.024]
Observations	18,097	18,097	12,306	13,331	17,572
Importer only	0.003 [0.009]	0.043*** [0.016]	1.484 [1.425]	0.322 [2.973]	0.049*** [0.016]
Exporter only	0.021 [0.017]	0.003 [0.030]	-1.367 [2.990]	1.196 [5.537]	-0.016 [0.030]
GVC participant	0.006 [0.013]	-0.002 [0.022]	-1.301 [1.745]	2.346 [4.014]	0.023 [0.020]
Observations	17,510	17,510	11,934	12,918	16,985
Productivity	-0.009*** [0.003]	-0.017*** [0.006]	1.955*** [0.537]	6.661*** [1.327]	-0.005 [0.006]
Observations	16,316	16,316	11,180	12,059	15,805
Innovator	-0.025*** [0.007]	0.011 [0.015]	1.396 [1.218]	1.172 [2.706]	0.025* [0.014]
Observations	18,170	18,170	12,356	13,382	17,643
Management score	-0.006 [0.006]	-0.002 [0.012]	0.352 [0.893]	2.995* [1.533]	0.015 [0.012]
Observations	9,440	9,637	6,598	7,136	9,392
Firm has website	-0.007 [0.008]	0.005 [0.015]	-0.000 [1.313]	2.330 [2.870]	0.037** [0.015]
Observations	18,298	18,298	12,440	13,472	17,771
Foreign technology	0.003 [0.011]	-0.025 [0.020]	0.969 [1.639]	9.059** [3.822]	-0.042** [0.018]
Observations	18,150	18,150	12,336	13,362	17,623
Past sales growth (log difference)	-0.048** [0.019]	-0.013 [0.038]	1.736 [3.696]	9.473 [7.471]	0.008 [0.040]
Observations	14,348	14,348	9,916	10,683	13,858
Politically connected	-0.011 [0.015]	0.037 [0.031]	1.053 [2.729]	5.218 [5.354]	-0.003 [0.028]
Observations	17,828	17,828	12,098	13,125	17,301

	(6) Started / increased business online	(7) Started / increased delivery	(8) Started / increased remote work	(9) Share of online sales	(10) Share of remote workers
Firm age	-0.012 [0.008]	-0.008 [0.007]	0.001 [0.009]	-0.721 [0.593]	-0.116 [0.532]
Firm size	0.023*** [0.004]	0.008* [0.004]	0.053*** [0.005]	-0.221 [0.320]	0.838*** [0.308]
Observations	17,806	18,333	18,333	12,372	13,157
State owned	-0.105*** [0.025]	-0.096*** [0.020]	-0.056 [0.068]	3.308 [5.418]	1.406 [4.669]
Foreign owned	0.007 [0.022]	-0.024 [0.021]	0.117*** [0.028]	2.224 [1.872]	1.739 [1.586]
Observations	17,572	18,097	18,097	12,231	13,004
Importer only	0.015 [0.015]	0.007 [0.012]	0.045*** [0.016]	0.150 [0.778]	0.257 [1.172]
Exporter only	0.030 [0.029]	-0.074*** [0.018]	0.043 [0.033]	4.630** [2.287]	2.607 [2.023]
GVC participant	0.010 [0.019]	-0.006 [0.018]	0.098*** [0.022]	3.615*** [1.350]	2.981*** [1.150]
Observations	16,985	17,510	17,510	11,886	12,621
Productivity	0.008* [0.005]	-0.001 [0.005]	0.036*** [0.005]	0.078 [0.338]	0.688* [0.352]
nobs	15,805	16,316	16,316	11,288	11,827
Innovator	0.074*** [0.013]	0.046*** [0.012]	0.082*** [0.014]	1.935** [0.814]	3.459*** [1.031]
Observations	17,643	18,170	18,170	12,275	13,044
Management score	0.019* [0.011]	0.011 [0.009]	0.057*** [0.011]	1.361** [0.610]	1.250*** [0.468]
Observations	9,392	9,637	9,637	6,556	6,949
Firm has website	0.072*** [0.012]	0.024** [0.011]	0.068*** [0.013]	2.344*** [0.811]	2.552*** [0.730]
nobs	17,771	18,298	18,298	12,347	13,132
Foreign technology	0.003 [0.015]	-0.006 [0.014]	0.080*** [0.019]	2.412** [1.228]	3.921*** [1.045]
Observations	17,623	18,150	18,150	12,257	13,030
Past sales growth (log difference)	0.055 [0.035]	0.004 [0.030]	0.045 [0.040]	2.977 [1.871]	5.419 [4.247]
Observations	13,858	14,348	14,348	10,149	10,522
Politically connected	0.037 [0.026]	0.021 [0.026]	0.009 [0.030]	-0.041 [1.789]	-0.843 [1.485]
Observations	17,301	17,828	17,828	12,012	12,792

Source: the authors' calculations based on COVID-19 Enterprise Survey and Enterprise Surveys 2016-2020. Note: Sample of 32 economies from MENA, Europe and Central Asia. The results are broadly similar when we focus on the three MENA countries covered: Jordan, Lebanon and Morocco. Fixed effects regressions for sales change, employment change, share of online sales and share of remote workers; logit regressions for all other dependent variables, odds ratios shown. All specifications include country and sector fixed effects. Country-clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A5. Drivers of firm outcomes and responses, controlling for government support

	(1) Closed permanently	(2) Closed temporarily	(3) Sales change	(4) Employment change
Firm age	-0.015*** [0.005]	0.001 [0.009]	-0.575 [0.870]	-3.120 [1.934]
Firm size	-0.015*** [0.004]	-0.031*** [0.006]	2.827*** [0.560]	-9.329*** [1.130]
Government support	-0.057*** [0.007]	0.267*** [0.015]	-5.692*** [1.410]	1.325 [2.711]
Observations	18,333	18,333	12,464	13,497
State owned	0.017 [0.034]	-0.112* [0.067]	8.506** [3.843]	26.943* [15.565]
Foreign owned	0.010 [0.015]	-0.021 [0.026]	0.776 [2.689]	-4.649 [5.417]
Observations	18,097	18,097	12,306	13,331
Importer only	0.003 [0.009]	0.030* [0.016]	1.770 [1.426]	0.242 [2.996]
Exporter only	0.020 [0.018]	0.006 [0.030]	-1.473 [3.006]	1.231 [5.532]
GVC participant	0.008 [0.012]	-0.009 [0.021]	-1.199 [1.736]	2.306 [4.018]
Observations	17,510	17,510	11,934	12,918
Productivity	-0.009*** [0.003]	-0.016*** [0.006]	1.887*** [0.535]	6.674*** [1.328]
Observations	16,316	16,316	11,180	12,059
Innovator	-0.022*** [0.008]	0.004 [0.015]	1.561 [1.223]	1.140 [2.702]
Observations	18,170	18,170	12,356	13,382
Management Score	-0.006 [0.006]	-0.007 [0.011]	0.442 [0.892]	2.987* [1.530]
Observations	9,440	9,637	6,598	7,136
Firm has website	-0.005 [0.008]	-0.003 [0.014]	0.217 [1.312]	2.284 [2.869]
Observations	18,298	18,298	12,440	13,472
Foreign technology	-0.000 [0.011]	-0.015 [0.019]	0.711 [1.648]	9.118** [3.817]
Observations	18,150	18,150	12,336	13,362
Past sales growth (log diff.)	-0.051*** [0.018]	-0.018 [0.036]	1.827 [3.733]	9.478 [7.468]
Observations	14,348	14,348	9,916	10,683
Politically connected	-0.011 [0.015]	0.039 [0.032]	0.860 [2.705]	5.271 [5.353]
Observations	17,828	17,828	12,098	13,125

	(5) Started / Increased business online	(6) Started / increased delivery	(7) Started / increased remote work	(8) Share of online sales	(9) Share of remote workers
Firm age	0.003 [0.009]	-0.008 [0.007]	0.000 [0.009]	-0.725 [0.593]	-0.129 [0.530]
Firm size	0.030*** [0.005]	0.007* [0.004]	0.052*** [0.004]	-0.208 [0.320]	0.884*** [0.304]
Government support	0.114*** [0.015]	0.112*** [0.013]	0.145*** [0.015]	-0.698 [0.751]	-2.328*** [0.712]
Observations	17,806	18,333	18,333	12,372	13,157
State owned	-0.118*** [0.035]	-0.097*** [0.019]	-0.058 [0.067]	3.322 [5.414]	1.453 [4.661]
Foreign owned	0.004 [0.027]	-0.020 [0.021]	0.127*** [0.028]	2.190 [1.871]	1.600 [1.575]
Observations	17,572	18,097	18,097	12,231	13,004
Importer only	0.022 [0.017]	0.002 [0.012]	0.038** [0.016]	0.173 [0.781]	0.358 [1.154]
Exporter only	0.066* [0.035]	-0.073*** [0.019]	0.044 [0.033]	4.625** [2.283]	2.569 [2.021]
GVC participant	0.022 [0.022]	-0.008 [0.017]	0.094*** [0.021]	3.625*** [1.350]	3.034*** [1.147]
Observations	16,985	17,510	17,510	11,886	12,621
Productivity	0.016*** [0.006]	-0.001 [0.005]	0.037*** [0.005]	0.069 [0.338]	0.658* [0.351]
Observations	15,805	16,316	16,316	11,288	11,827
Innovator	0.096*** [0.015]	0.042*** [0.012]	0.079*** [0.014]	1.954** [0.814]	3.515*** [1.034]
Observations	17,643	18,170	18,170	12,275	13,044
Management Score	0.017 [0.011]	0.010 [0.009]	0.054*** [0.011]	1.381** [0.608]	1.280*** [0.467]
Observations	9,392	9,637	9,637	6,556	6,949
Firm has website	0.096*** [0.014]	0.020* [0.011]	0.063*** [0.013]	2.370*** [0.812]	2.636*** [0.722]
Observations	17,771	18,298	18,298	12,347	13,132
Foreign technology	0.037** [0.018]	-0.000 [0.014]	0.086*** [0.019]	2.382* [1.228]	3.821*** [1.048]
Observations	17,623	18,150	18,150	12,257	13,030
Past sales growth (log diff.)	0.058 [0.042]	0.002 [0.029]	0.041 [0.040]	2.999 [1.867]	5.484 [4.225]
Observations	13,858	14,348	14,348	10,149	10,522
Politically connected	0.008 [0.029]	0.021 [0.026]	0.009 [0.030]	-0.070 [1.782]	-0.922 [1.478]
Observations	17,301	17,828	17,828	12,012	12,792

Source: the authors' calculations based on COVID-19 Enterprise Survey and Enterprise Surveys 2016-2020. Note: Sample of 32 economies from MENA, Europe and Central Asia. The results are broadly similar when we focus on the three MENA countries covered: Jordan, Lebanon and Morocco. Fixed effects regressions for sales change, employment change, share of online sales and share of remote workers; logit regressions for all other dependent variables, odds ratios shown. All specifications include country and sector fixed effects. Country-clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

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