



# DEMAND AND SUPPLY EXPOSURE THROUGH GLOBAL VALUE CHAINS: EURO-MEDITERRANEAN COUNTRIES DURING COVID

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### ABSTRACT

This paper tries to examine how the COVID-19 shock affects different countries through their regional integration and their exposure to Global Value Chains (GVCs). Using input-output tables (EORA 2016), our contribution is threefold. First, building on Pahl et al. (2021), we conceptually revise the approaches to analyse input-output relationships. In particular, we underline the difference between the bilateral flow of value-added and trade and distinguish between the producers and consumers of value-added. Second, we distinguish between the supply and demand channels through which these countries can be affected by the disruptions in GVCs. Third, we apply this empirical exercise on an understudied region, namely the Mediterranean region that is characterised by its involvement in several trade agreements that might boost their integration into GVCs. Our main findings show that, first, most of the countries have relatively larger backward GVC linkages than forward ones. Second, on the northern shore of the Mediterranean, Italy and France are net suppliers of value added since they produce more value-added absorbed abroad than the foreign value-added they consume. Third, on the Southern shore, Tunisia is the most integrated in GVCs but is also a net consumer of foreign value added. Morocco participates in GVCs but mainly in upstream segments. In contrast, Jordan followed by Egypt, are less involved in GVCs. Fourth, our results also highlight the limited integration between Southern shore partners, whose integration is almost completely driven by linkages with Southern European developed countries. This is why Jordan is much less affected by the shock than Tunisia and Morocco.

**Keywords:** Regional Integration, Global Value Chains, COVID-19.

**JEL codes:** F14.

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## 1 INTRODUCTION

The world has been hit by the unprecedented shock of the COVID-19 pandemic that led to significant changes at economic and social levels. In particular, it created a series of disruptions to Global Value Chains (GVCs) in both the short run (such as lockdowns) and the longer run (such as quarantines, travel bans and restrictions). Consequently, countries that are heavily involved in such GVCs were strongly hit by the shock (Baldwin and Freeman, 2020). Thus, this paper, by highlighting multi-regional input-output tables, attempts to examine how the pandemic affects emerging markets through GVCs. We focus on some Euro-Mediterranean countries that are fairly-well integrated and, to a certain extent, have developed a number of GVCs between the two shores of the Mediterranean.

Obviously, the disruptions implied by the pandemic brought a halt to the significance of production fragmentation and the “second unbundling” (Baldwin, 2016) that had started in the 1980s leading to the emergence of complex international production networks, thanks to the Information and Communication Technology (ITC) revolution and trade liberalisation. These trends were sustained until the financial crisis of 2008-2009 but, since then, with the great collapse in trade and with increasing protection at world level, a sort of “slow-balisation” has been observed. This is why the pandemic arrived at a peculiar time where trade wars were intense, Brexit took place, and the multilateral system is on hold with the World Trade Organisation Appellate Body crisis and the *de facto* failure of the Doha Development round. All these developments, along with the pandemic, led to greater uncertainty. Consequently, this will give firms time to rethink their internationalisation strategies, whilst several emerging markets can benefit or lose from their integration into GVCs.

This paper tries to examine how the COVID-19 shock can affect different countries through their regional integration and their exposure to GVCs. Our contribution is threefold. First, building on Pahl et al. (2021), we conceptually revise the approaches to analyse input-output relationships. In particular, we underline the difference between the bilateral flow of value-added and trade and distinguish between the producers and consumers of value-added. This clarification is particularly useful to analyse the impact of shocks, as well as to address whether there is any chance of increasing regional integration within the South, within the North and between South and North. Second, we distinguish between the supply and demand channels through which these countries can be affected by disruptions in GVCs. Third, we apply this empirical exercise on an understudied region, namely, the Mediterranean region - for two reasons. First, the area includes a set of heterogeneous countries with different levels of industrialisation that, in theory, can be part of GVCs. Indeed, it includes advanced European countries on the northern shore and middle-income

countries on the southern shore. Our analysis singles out eight countries: France, Greece, Italy and Spain for the northern shore (North); Egypt, Jordan, Morocco and Tunisia for the southern shore (South). Second, country selection reflects particular involvement in trade agreements or regional integration plans for the area, namely the Agadir Agreement (between Egypt, Jordan, Morocco and Tunisia) and the bilateral European Association Agreements. With these considerations in mind, we measure the extent of Mediterranean regional integration and discuss what could be done (if something could be done) to enhance these linkages.

Standard trade statistics based on gross trade flows, whilst accurately tracking goods that enter or leave the country, are hardly informative about the international input-output linkages. To accurately measure GVCs, economists have developed, refined and increasingly exploited multi-regional input-output tables. Thus, our analysis is conducted at the country level using input-output tables (EORA 2016). Our main findings show that, first, most of the countries have relatively larger backward GVC linkages than forward ones. Second, on the northern shore of the Mediterranean, Italy and France are net suppliers of value-added since they produce more value-added absorbed abroad than the foreign value-added that they consume. Third, on the southern shore, Tunisia is the most integrated in GVCs but is also a net consumer of foreign value-added. Morocco participates in GVCs but mainly in upstream segments. In contrast, Jordan followed by Egypt, are less involved in GVCs. Fourth, our results also highlight the limited integration between southern shore partners, whose integration is almost completely driven by linkages with Southern European developed countries. From a policy perspective, this result suggests the importance of deepening the Agadir Agreement, in order to increase regional value chains between countries on the Mediterranean southern shore on the one hand and with those of the northern shore on the other.

The paper is structured as follows. Section 2 presents the main channels through which COVID-19 affects GVCs from supply and demand perspectives. Section 3 explains our measures of GVCs. Section 4 assesses the structure, composition and exposure of GVCs in our countries of interest. Section 5 provides a conclusion and some policy recommendations.

## 2 HOW DID COVID-19 AFFECT GVCS?

Let us briefly summarise the channels through which the COVID 19 pandemic has affected the functioning of Global and Regional Value chains. More precisely, we single out the supply and the demand factors; we see what role they have played/could play and why we think that the COVID shock is intrinsically different from any other pandemic shock.

### 2.1 Supply side

#### 2.1.1 Factors of production

Selective lockdowns, quarantines and confinement, as well as reduced air travel, have disrupted the smooth working of Global Value Chains all over the world and made it difficult for buyers to keep track of their suppliers. Consumers, too, had to face unexpected difficulties. Most variables have been affected: labour supply because workers have been sick, or in partial or full lockdowns and subject to social distancing rules. As for capital, capital owners have become illiquid, uncertain and possibly insolvent. This exerted a negative impact on production through delays, less investment projects or reduced output (Mirodout, 2020). Indeed, Zeshan (2020), using a Computable General Equilibrium Model (GTAP-VA), introduces the impact of the pandemic by reducing the supply of factors of production (such as labour force, capital stock and land rents). These shocks led to global welfare losses of around 4.6 trillion (5.2% of global GDP). In the same vein, Eppinger et al. (2020), allowing for imperfect intersectoral mobility of labour, show that welfare losses are heterogeneous since they range from -30% for China to -0.75% for Russia and +0.12% for Turkey.

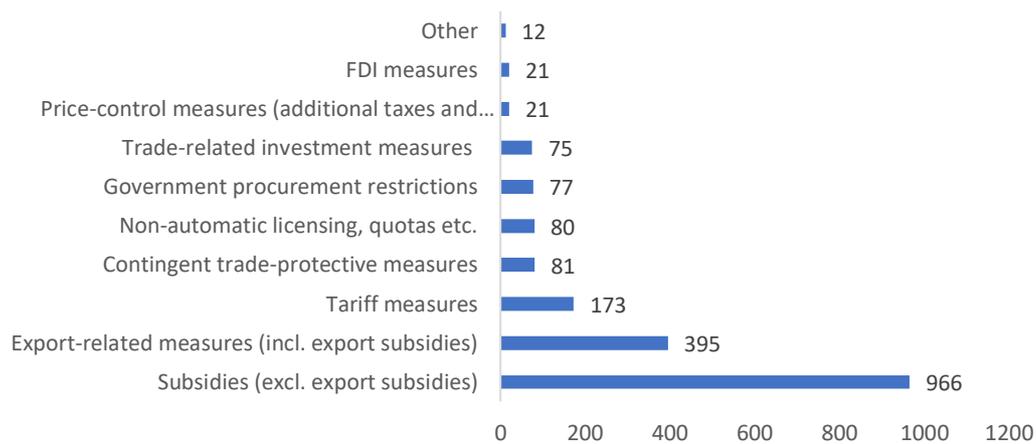
#### 2.1.2 Intermediate inputs

Obviously, intermediate inputs are the most important channel through which COVID-19 is likely to affect GVCs. When production in one location requires inputs from another location that is directly affected by the pandemic, supply chains could be severely interrupted. ILO (2020a) shows that this interruption has been aggravated through the ripple effects along supply chains and through shortages of parts and equipment to downstream industries (such as the automotive, chemicals, computer equipment, garments and textiles, machinery, metal and metal products industries, and those relating to precision instruments). This is why COVID-19 has called into question the excessive reliance on China for supplies (Javorcik, 2020). Indeed, around 25% of intermediate inputs used in high-tech exports (that include pharmaceuticals and chemical products, machinery, motor vehicles, and other transport equipment) in the US, Japan, Korea and Mexico come from China. Clearly, this negative effect is particularly pronounced for the lower tiers of supply chains where small and medium enterprises (SMEs) are present, notably in emerging economies. Baldwin and Freeman (2020) define 'supply chain contagion' according to which the supply-side disruption in China is being transmitted to other nations, notably for South Korea which is deeply integrated with China.

### 2.1.3 Trade policy related

Global value chains have been also affected by the growing number of protectionist measures that have been imposed by various countries (such as price controls, exports bans, quotas, etc.), as shown in Figure 1. Most of the measures dealt with exports (72% are related to subsidies and other export related measures). Clearly, in addition to the disruption related to the flow of intermediate inputs, protectionist measures aggravate the negative impact of the pandemic on GVCs, through three main channels. First, some measures might increase costs of production (directly through tariffs or indirectly through subsidies and export-related measures) and reduce a country’s ability to compete in export markets (OECD, 2013). Second, other measures can limit the availability of inputs if they are prohibitive (such as export bans, quantitative restrictions, etc.). Third, such measures are also associated with severe uncertainty, which makes production and investment difficult to plan. Consequently, it is very difficult for firms to resume business as usual, leading them to rethink their internationalisation strategies. For instance, in the case of USA, Caldara et al. (2020) show that trade policy uncertainty reduced American investment by about 1.5% in 2018.

**Figure 1: Harmful Measures Enacted by Different Countries - 2020**



**Source:** Global Trade Alert online dataset.

### 2.1.4 Services provisions

Several services have been affected by the pandemic, namely transportation services reflected in more restrictions on the movement of people (especially those involved in the physical distribution of goods, such as truck drivers, seafarers, pilots etc.), quarantine measures for air or sea crews and additional sanitary controls and requirements at the border for customs clearance and circumscribing of international air travel. Consequently, trading across borders has become more complicated and more expensive. This disruption in international transport networks directly affected GVCs that are highly dependent on transporting intermediate inputs from one region/country to another. This means that such a shock can also affect both domestic outsourcing and domestic transport networks (OECD, 2020).

## 2.2 Demand side

The pandemic also exerted a negative impact on demand through two main channels:

### 2.2.1 Labour market channels

First, with fewer exports and less production, labour demand decreases. This increases the risks of the most vulnerable workers such as women, migrants and informal workers who often do not have either a contract or a social protection scheme. For instance, according to UNESCWA (2020), the Arab region was set to lose at least 1.7 million jobs in 2020 with social distancing, reductions in working hours and millions of people who are pushed into working poverty. Second, the decrease in labour demand led to a downward pressure on the level, or growth rate, of average wages in most countries (especially in Japan, the Republic of Korea and the United Kingdom). In some European countries, workers would have lost 6.5% of their total wage bill between the first and second quarters of 2020 (ILO, 2020b) and where there was also a difference between women and men (an average between 8.1% of losses for women and 5.4% for men). Yet, despite the fact that several countries introduced retention measures and increased unemployment pensions, several categories were adversely affected by the pandemic, due to their purchasing power declining, leading to lower demand.

### 2.2.2 Demand of final goods

As a consequence of lower labour demand, severe sanitary containment measures and lower income levels, the demand for final goods has been affected through several channels. First, the structure of demand has shifted from some goods to others. For instance, whilst the demand for food products slightly declined with the closure of restaurants and hotels, that of medical supplies has surged. Second, and because of the previous point, demand has become more volatile. Indeed, with income and production fluctuations, consumption of different products has been unpredictable (OECD, 2020). Third, with lower demand in different markets, firms are less likely to sell goods used as

intermediate inputs in other countries. Fourth, this led to excess inventory (this is certainly the case for the automobile industry, oil and dairy products) leading to storage capacity shortages and the destruction of perishable products (ILO, 2020). Thus, these different channels exert a negative effect on welfare, with a pronounced heterogeneity across countries (Eppinger et al., 2020). Following the model of Benguria and Taylor (2020), if we assume that the pandemic shock is similar to a financial crisis, history shows financial crises are predominantly a negative shock on demand, where imports decline, exports remain stable and exchange rates depreciate.

In the following section, we explain how the latter is measured in our paper and we investigate and disentangle the effect of COVID-19 through the supply and demand channels.

### 2.3 Future developments

After the Global Financial Crisis (GFC) of 2008 slowed the era of hyper-globalisation that started in the 1980s, the COVID-19 crisis has hit the world system at a peculiar point in time, characterised by a lot of uncertainty. Indeed, several forces, such as automation and three-dimension (3D) printing, or the surge of political views leaning towards protectionism, all contribute to increased uncertainty. Given the fundamental role of international production networks for countries' economies and consumption, as well as for their relevance to shock transmission, scholars and policy makers are now wondering about the future of globalisation and GVCs, leading to an important debate at academic and policy levels.

On one side, some scholars argue that the post-COVID-19 era will be characterised by a wave of de-globalisation or "slow-balisation" (Jarkovick, 2020 etc, UNCTAD 2020). In this scenario, a retreat of GVCs may even take place. Firms could reshore or nearshore some foreign activities, in order to reduce exposure to foreign shocks and to protect themselves from the risk of disruption. On the other side, others argue that a drastic change in international relationships will hardly occur, since the shock - despite its strength - is perceived as transitory and, thus, there is little incentive for firms to tear down their network of cross-border linkages that have been laboriously built up over time and at great cost.

Both sides of the debate bring solid arguments and some preliminary, yet suggestive evidence, either from surveys, case studies or anecdotal. However, aggregate data and reliable statistics are still missing and no definite answers and visions have yet emerged. Indeed, there is no data yet that can enable us to describe the post COVID-19 world, since we still are in the middle of the pandemic. Yet, we can build on structural trends related to input-output linkages between countries and then "shock" these relations (for instance, using the difference between the rate of growth for 2020 estimated in 2019, before COVID-19 was contemplated and the rate of growth estimated in 2020, once the pandemic had started) to build possible scenarios.

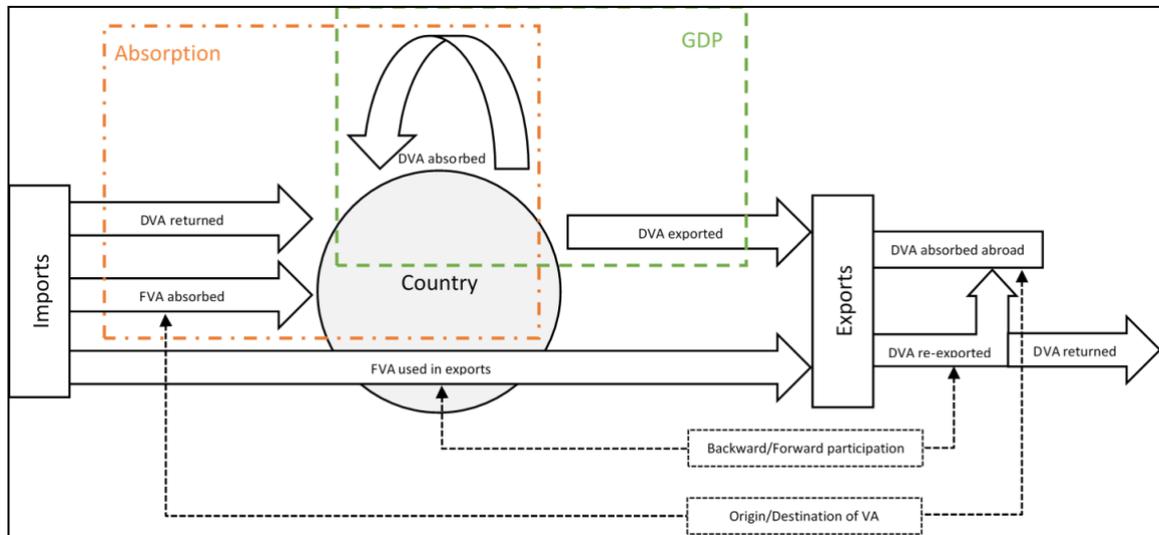
Considering the pros and cons of different trajectories are paramount for designing meaningful policies. Amongst the advantages, the existing literature has clearly shown that GVCs entail important long-term benefits in terms of growth and development (see Antras, 2020 and WDR 2020). Nevertheless, a major disadvantage is that GVCs have often been a channel for the transmission of shocks, as during the GFC. However, some recent evidence for the COVID-19 crisis suggests a reduced role of GVCs in the transmission of shocks with respect to the GFC and more towards beneficial effects, since international linkages seem to have actually “sheltered” firms (Giovannetti et al, 2020; Bonadio et al., 2020).

### 3 GVC MEASURES

Before moving to the data, it is important to clarify relevant concepts and definitions and to be explicit about what the different GVC indicators capture. In fact, several methodologies have been proposed (Johnson & Noguera, 2012; Koopman et al., 2014). In this paper, we follow the recent decomposition by Borin and Mancini (2019). In particular, we combine a more standard approach to GVC measurement, based on value-added content of exports, with a different approach looking at value-added absorption. The first approach, namely the value-added content of exports, helps capture the input-output linkages of international production hence, for simplicity, referred to as the supply side of GVC. Yet, the second approach, value added absorption, allows a characterisation of where the value-added flowing through several countries along the global value chain is ultimately absorbed into final consumption, hence what we claim is the demand side of GVC.

To clarify what we mean, we refer to Figure 2. The diagram shows the inward and outward flows of a representative country. In what follows, we describe how those flows enter the GVC indicators that we use in this paper.

Figure 2 – International flows and GVC measures.



Source: Authors' elaboration.

### 3.1 Supply side: foreign value-added for production

Our starting point is the decomposition of exports into their domestic and foreign contents. Exports today are seldom produced entirely with domestic inputs alone. The direct or indirect use of foreign inputs implies that part of a country's export is made up of foreign value-added. The *"foreign content of exports"* refers to the value-added that has been produced abroad and is, therefore, due to the use of imported inputs used in production and further incorporated into exports (see "FVA used in export" in Figure 2). The remaining part is the *"domestic content of exports"*, which refers to the value-added that is domestically produced (see "DVA exported" in Figure 2).

This export decomposition allows us to obtain a first measure of GVC participation. More specifically, the foreign content (or foreign value-added) represents a measure of *"backward participation"*, being due to the use of foreign inputs in the production of exports. As the country uses foreign value-added in the production of its exports, its exported value-added can be used by third party countries in the production of their exports (implying that the exported value-added is, in turn, re-exported after being incorporated into the export of others; this can happen several times). This perspective is obtained if we consider the exporting country as a supplier of intermediate products or value-added for other countries exports. This second measure captures *"forward participation"*.

Backward and forward participation are the two most standard measures of GVC interactions amongst countries. They capture foreign value-added flows used in the production of exports;

therefore, they refer to goods that cross at least two borders (once when they are first exported and at least one other time when they are re-exported) and are used as inputs in production.

### 3.2 Demand side: foreign value-added for consumption

Looking at value-added used in production is fundamental to capture the input-output linkages. Yet, this information must be complemented with an understanding of for whom goods are actually produced and who ultimately consumes them. Not all the foreign value-added imported is used for production of exports and, thus, part of it may never leave the country and will be absorbed into final demand. Similarly, domestic value-added exported may be consumed several steps down the direct trade partners and part of it may return home through imports. To capture this demand side of GVC, we need a different approach. In what follows, we propose a different GVC decomposition that looks at the origin and destination of value-added.

To appreciate this perspective, consider the following example. Country A exports to country B and B exports to country C; thus, trade follows the chain A-B-C. Considering the interconnections allows us to recognize that bilateral trade relations (A-B) may be affected by what happens to third countries (C). The GVC approach that we adopt in this paper helps us consider this kind of effect. Assume, for simplicity, that all A-to-B export is A's value-added that B uses in producing its own exports to country C, which then consumes the goods. Thus, country B plays the role of a processing export platform. In other words, all of A's exports to B are actually produced for C's consumers. It is clear that A is, in fact, exposed to demand shocks originating in C through GVC production relations that involve B; whilst a demand shock in B would instead be irrelevant, despite B being a trade partner. Note, how we would fail to capture this linkage by looking only at gross bilateral exports: A and C do not trade and they would appear unrelated, whilst the opposite is true. An economic shock in C, by reducing consumption in C, impacts A through a reduction of A's exports to B and B's exports to C. Similarly, an economic shock in A reduces the supply of value-added and thus consumption possibilities in C, through reduced exports from A to B and from B to C. Both these channels have been at work in the COVID-19 pandemic, as has been shown in section 2.

Referring to Figure 2, we look at the foreign value-added that is ultimately absorbed by the country ("origin of value-added") and at the domestic value-added that is ultimately absorbed abroad ("destination of value-added").

It is important to note how all the value-added produced by one country must equal its GDP. Similarly, all value-added absorbed into final demand, either of domestic or foreign origin, equals aggregate spending. GVC flows are, therefore, fully consistent with national accounting identities. In particular, GDP, absorption and trade are linked by the following identity:

$$GDP = Absorption + Export - Import$$

This stems from:

- i) the definition of GDP as value-added produced, as well as the sum of private consumption, private investments, government spending and net export:

$$GDP (VA produced) = DVA absorbed + DVA exported = C + I + G + X - M;$$

- ii) the definition of absorption as value-added consumed:

$$Absorption (VA used in final demand) = DVA absorbed + DVA returned + FVA absorbed = C + I + G; \text{ and}$$

- iii) the definition of export and import value-added decomposition as:

$$X = DVA exported + FVA exported, \text{ and}$$

$$M = DVA returned + FVA absorbed + FVA exported.$$

In all our calculations, we use the most recent 2016 release of the UNCTAD Eora26 multi-regional input-output table, which contains information for 189 countries and 26 industries. Indeed, taking into account all input-output relations, the calculation of GVC indicators requires the use of the entire matrix of country-sector-to-country-sector trade flows, even if one is interested in only one country or sector.

## 4 GVC INTEGRATION IN THE MEDITERRANEAN

The conceptual contribution previously given, constitutes the starting point for our analysis of the production and trade linkages between Southern and Northern Mediterranean countries.

### 4.1 GVC participation of Mediterranean countries

Table 1 reports exports decomposition of the Mediterranean countries under consideration. Italy and France are by far the largest exporters, followed by Spain and Greece. In 2019, the share of manufacturing exports to merchandising exports is 81% in France and 82% in Italy, whereas Spain and Greece's shares are much lower (66% and 34%, respectively). As far as the southern shore of the Mediterranean is concerned, Morocco and Egypt lead the group, followed by Tunisia and Jordan. Whilst these figures are heavily connected to the value of national GDP, their decomposition provides interesting insights into international performances. In light of the approach discussed above, we decompose exports with two different perspectives. First, we look at the origin of value-added exported, i.e., whether it is domestic or foreign. This allows us to understand how much a country's exports depend on the imports of foreign inputs. Higher foreign value-added in exports means that countries increasingly use foreign inputs for their exports and thus, *ceteris paribus*, that

they are more integrated into GVCs. The share of foreign value-added in exports measures backward GVCs participation. All southern Europe countries denote lower levels of domestic value-added in their exports than North African (NA) countries, since they rely more on imported inputs. Egypt is the country with the highest share of domestic value-added in exports (almost 90%). To deepen the measurement of GVCs participation, we also report the decomposition of trade between GVCs that are related and not related. GVC related trade accounts for the share of exports which crosses at least one other border with respect to the one being considered. As just said, a backward GVC (GVCB) is a part of this account, since, by being FVA in exports, it crosses a border before the one being considered. Complementary to this figure is the share of domestic value-added in exports that is further re-exported by the importer, forward GVCs (GVCF). In this case, the second border crossed is the outgoing one for the importer. Looking at the figures in Table 1, southern Europe countries show a higher level of GVC related trade. As far as countries on the southern shore are concerned, Morocco and Tunisia are much more integrated than Egypt and Jordan.

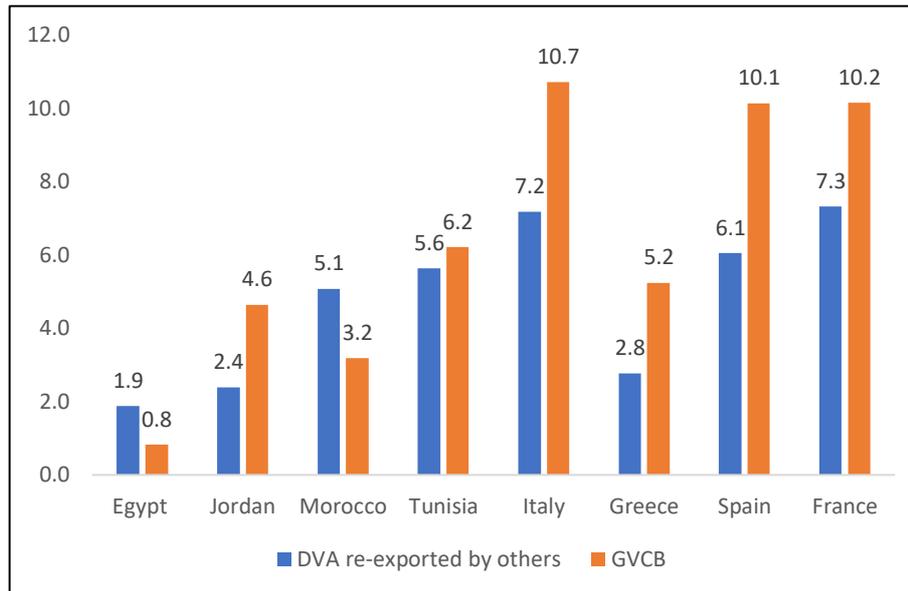
**Table 1: Mediterranean Countries exports decomposition**

	<b>Egypt</b>	<b>Jordan</b>	<b>Morocco</b>	<b>Tunisia</b>	<b>Italy</b>	<b>Greece</b>	<b>Spain</b>	<b>France</b>
<b>Gross exports (million \$; GEXP)</b>	<b>22120</b>	<b>7313</b>	<b>22717</b>	<b>12947</b>	<b>924361</b>	<b>38331</b>	<b>471226</b>	<b>967415</b>
of which								
<b>Domestic content (%; DC)</b>	<b>88.81</b>	<b>77.54</b>	<b>83.86</b>	<b>74.49</b>	<b>72.49</b>	<b>65.85</b>	<b>68.36</b>	<b>69.89</b>
<b>Foreign content (%; FC)</b>	<b>11.19</b>	<b>22.46</b>	<b>16.14</b>	<b>25.51</b>	<b>27.51</b>	<b>34.15</b>	<b>31.64</b>	<b>30.11</b>
Total (%)	100	100	100	100	100	100	100	100
of which								
<b>GVC-related trade (%; GVC)</b>	<b>36.82</b>	<b>34.03</b>	<b>41.84</b>	<b>48.67</b>	<b>46.47</b>	<b>52.21</b>	<b>50.91</b>	<b>52.62</b>
<i>GVC-backward (%; GVCB)</i>	<i>11.20</i>	<i>22.47</i>	<i>16.15</i>	<i>25.52</i>	<i>28.06</i>	<i>34.19</i>	<i>32.03</i>	<i>30.91</i>
<i>GVC-forward (%; GVCF)</i>	<i>25.62</i>	<i>11.56</i>	<i>25.68</i>	<i>23.15</i>	<i>18.42</i>	<i>18.02</i>	<i>18.88</i>	<i>21.72</i>
<b>Traditional trade</b>	<b>63.18</b>	<b>65.97</b>	<b>58.16</b>	<b>51.33</b>	<b>53.53</b>	<b>47.79</b>	<b>49.09</b>	<b>47.38</b>
Total (%)	100	100	100	100	100	100	100	100

**Source:** Authors' own elaboration using EORA dataset.

Interestingly, there are also differences concerning the relative importance of GVCB and GVCF (Figure 3) for Southern Europe countries. Indeed, GVCB is far larger than GVCF, meaning that these countries are relatively closer to final demand, or in other words, positioned downstream in the GVCs (Antras et al., 2012). The opposite is true for countries on the southern shore: only Jordan has GVCB that is larger than GVCF, whilst Egypt and Morocco have much higher GVCF. Tunisia's shares of GVCB and GVCF are almost equal. This means that these countries are positioned relatively upstream in GVCs and further from final absorption of value-added.

**Figure 3: GVCs Backward and Forward Participation**

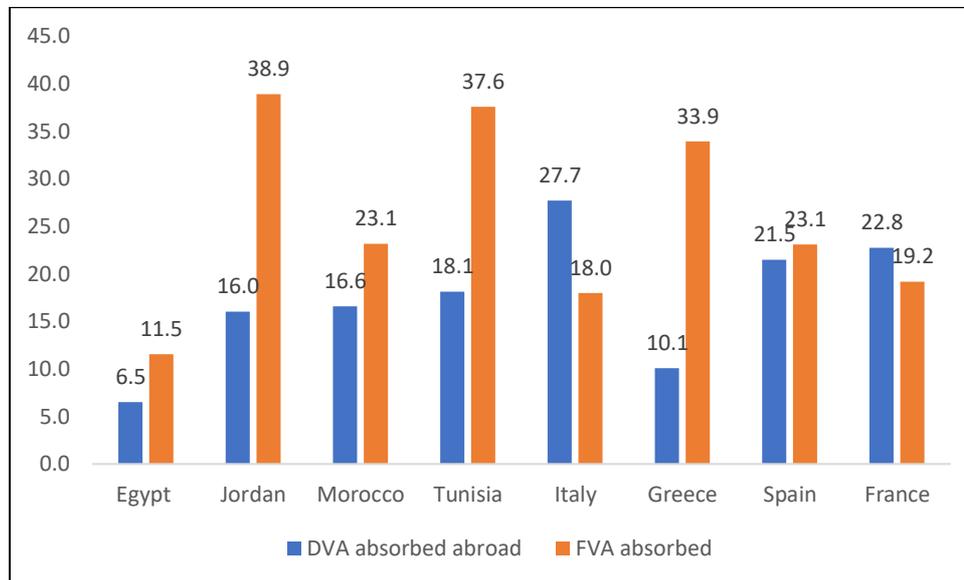


**Source:** Authors' own elaboration using EORA dataset.

**Notes:** Values are in % of GDP.

This data (and figures) show that some countries are “suppliers” (GVCF) whilst others are “users” (GVCB) of value added for production and exports. To complement this perspective, Figure 4 also brings the supply and use of VA for final demand into the picture. In this case, instead of considering the relative importance of forward vs backward GVC participation, we compare for each country its production of value-added absorbed abroad with its absorption of foreign value-added, linking our analysis to the “demand channels” described above.

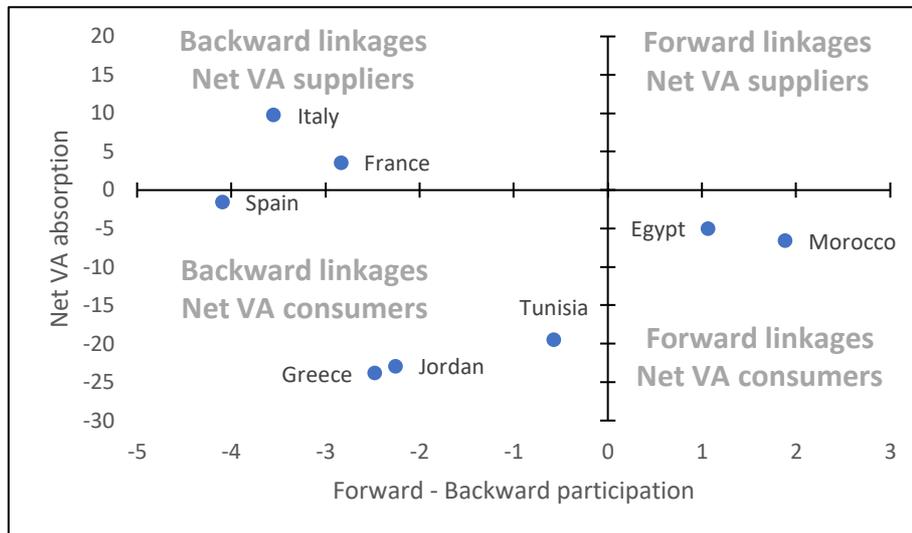
**Figure 4: Value added absorption**



**Source:** Authors' own elaboration using EORA dataset.

Combining the two measures just proposed, we obtain a more comprehensive perspective of countries' foreign exposure (see Figure 5). Almost all countries, as evidenced by Figure 3, have relatively larger GVCB than GVCF and, therefore, are positioned to the left of the y-axis. On the x-axis, we report net value-added absorption (i.e., the difference between DVA absorbed abroad and FVA absorbed domestically). Only Italy and France are net suppliers of VA: these two countries produce more value-added absorbed abroad than the foreign value-added they consume. All the other countries being considered are, instead, "value-added consumers". In particular, Jordan, Greece and Tunisia denote the lowest values.

Figure 5: GVC participation and value-added “balance”



Source: Authors’ own elaboration using EORA dataset.

These figures provide interesting insights characterising a country’s international performance, given the large differences in positioning. Southern Europe countries, especially Italy and France, have high GVC participation and are close to final demand. Furthermore, they also stand as “net value-added suppliers”. Spain follows closely behind, with Greece being the only exception, probably due to its relatively more distant geographical position and different productive specialisation (less advanced manufacturing and less services, apart from shipping). Results are much less clear-cut for countries on the southern shore of the Mediterranean. Tunisia is the most integrated in GVCs but is also a “net consumer” of foreign value-added; Morocco participates in GVCs, but mainly in upstream segments; Jordan is not so involved in GVCs, albeit relatively downstream, but it is a net consumer of foreign value-added; finally, Egypt is the least involved in GVCs.

It is crucial to note that, despite their relevance and ability to explain major patterns, these figures, being country aggregates, do not provide a complete characterisation of the international relationships for our sample of countries. Indeed, trade partners matter, because a bilateral perspective allows us to go deeply into the analysis of regional integration.

After presenting these backward and forward linkages, it is important to examine the exposure of various countries to the shock implied by the pandemic. Our approach is close to Pahl et al (2021) that analyse the transmission of supply and demand shocks for developing countries at a global level. In their paper, they use trade in value-added data for a sample of 12 developing countries in Sub-Saharan Africa, Asia and Latin America in order to quantify their dependence on demand and supply from the three main hubs, namely China, Europe and North America. In our paper, we depart from

their work, since we focus on a regional dimension and propose a matrix approach that allows disentangling the proposed measures for Mediterranean partners. This helps us assess the extent of regional linkages, as well as to discuss future policies for improving countries' resilience when facing international shocks, such as COVID-19. In particular, we first look at the supply side, i.e., we focus on the source of value-added used in exports – as a proxy for production – and, second, we analyse the demand side, i.e., we focus on the destination of value-added absorbed by foreign countries in final demand.

## 4.2 Regional linkages

### 4.2.1 Supply side

Let us analyse how the countries in our sample are interconnected through supply linkages. With this aim, we construct Table 2 where, in rows, we have countries that are the “source of VA”, further exported by countries in columns. This table helps us single out the impact of a shock in country  $i$  (in row) on the exports of country  $j$  (in column). One could think of exports as a proxy for supply. Country  $j$  sources foreign VA for its production from countries  $i$ . It is important to note that shares are computed by column, since we are interested in weighting the importance of a shock of supply from  $i$  to  $j$ . To grasp the intuition behind the table, we rely on a simple example. Exports by Tunisia (Column 4) contain Foreign Value-Added (FVA). 42% of this FVA is produced in the Mediterranean Area (the 58% in the RoW). This 42% is the sum of all the countries in the area: France (19%) and Italy (16%) are by far the most important contributors. The role of value-added from partners on the southern shore of the Mediterranean is marginal (1% Egypt and 1% Morocco). This means that a shock that reduces supply in Italy by 10%, reduces the flow of VA to Tunisia and, therefore, the foreign content of Tunisian exports by 1.6%, whilst a shock that reduces supply in Egypt by 10% has a negligible impact on the flow of VA to Tunisia.

**Table 2: Foreign supply exposure**

Foreign supply exposure		Exporter (j)							
		Egypt	Jordan	Morocco	Tunisia	Italy	Greece	Spain	France
Source of VA (i)	Egypt	.	3%	0%	1%	1%	1%	0%	0%
	Jordan	1%	.	0%	0%	0%	0%	0%	0%
	Morocco	0%	0%	.	1%	0%	0%	0%	0%
	Tunisia	0%	0%	0%	.	0%	0%	0%	0%
	Italy	9%	7%	9%	16%	.	13%	8%	8%
	Greece	1%	1%	0%	0%	1%	.	0%	0%
	Spain	3%	2%	14%	5%	5%	3%	.	6%
	France	5%	4%	18%	19%	10%	6%	14%	.
<b>Exposure to MED</b>		19%	17%	42%	42%	17%	23%	23%	15%
<b>To SMED</b>		1%	3%	0%	2%	1%	1%	0%	0%
<b>To NMED</b>		18%	14%	42%	40%	16%	22%	23%	15%
<b>Exposure to RoW</b>		81%	83%	58%	58%	84%	77%	77%	85%

**Source: Authors' own elaboration using EORA dataset.**

**Notes: In rows, we have countries i that are the source of VA further exported by countries j in columns. It is important to note that shares are computed by column, since we are interested in weighting the importance of a shock of supply from i to j.**

Table 2 shows a limited integration in the Mediterranean region, in terms of what concerns the supply side. All countries' share of backward linkages in the area are, indeed, about 20%; a stark difference exists for Morocco and Tunisia, which source in the region of more than the 40% of their FVA in exports. However, this is sourced almost entirely from Southern Europe: France is the main source for both these countries, whilst Italy and Spain stand as a second source for Tunisia and Morocco respectively. The leading role of Southern Europe is found for all the countries: indeed, exposure to NMED accounts for almost 100% of total MED exposure. This especially highlights limited integration between southern shore partners, whose integration is almost completely driven by linkages with Southern European developed countries. As far as Southern Europe is concerned, Italy and France are the least integrated in the area of FVA users in exports: this suggests that their network is connected to other international partners, such as Germany, China and the US.

#### 4.2.2 Demand side

Table 3 analyses regional integration from the demand side. In rows, we have the origin country of VA, in columns those countries that are absorbers of VA (final demand). This table helps us single out the impact of a shock in country j (in column) demand on country i (in row). Country j absorbs VA produced in country i. In contrast with Table 2, shares are now computed by row, since we are interested in a shock of demand from j to i. Let us refer to the same example, as above, to show the

difference between the two perspectives. Tunisia (row 4) produces VA that is absorbed by foreign countries' demand. 43% of this VA is absorbed in the Mediterranean Area ( 57% in the RoW). Italy absorbs about 1/3 (15%) of Tunisian VA absorbed abroad, whilst France (21%) absorbs half of it. In addition, in this case, the demand from other countries on the southern shore is limited. As above, a 10% contraction of demand in, say, Italy, *ceteris paribus* reduces consumption of VA from Tunisia, and, therefore, Tunisian GDP absorbed abroad by the 1.5%. Again, a contraction of demand in Egypt has a negligible impact on Tunisian GDP absorbed abroad.

**Table 3: Foreign demand exposure**

<u>Foreign demand exposure</u>		Destination of VA (j)							Exposure to Med	To SMED	To NMED	Exposure to RoW	
		Egypt	Jordan	Morocco	Tunisia	Italy	Greece	Spain					France
<b>Origin of VA (i)</b>	<b>Egypt</b>	.	1%	0%	1%	9%	2%	3%	5%	21%	2%	19%	79%
	<b>Jordan</b>	3%	.	0%	0%	1%	0%	0%	1%	5%	3%	2%	95%
	<b>Morocco</b>	0%	0%	.	1%	5%	1%	11%	18%	36%	1%	35%	64%
	<b>Tunisia</b>	0%	0%	1%	.	15%	1%	6%	21%	44%	1%	43%	57%
	<b>Italy</b>	0%	0%	0%	0%	.	2%	5%	8%	16%	0%	16%	85%
	<b>Greece</b>	1%	0%	0%	0%	9%	.	3%	4%	18%	1%	17%	83%
	<b>Spain</b>	0%	0%	1%	0%	7%	1%	.	12%	22%	1%	21%	78%
	<b>France</b>	0%	0%	1%	1%	7%	1%	7%	.	16%	2%	14%	84%

**Source: Authors' own elaboration using EORA dataset.**

**Notes: Shares are now computed by row, since we are interested in a shock of demand from j to i**

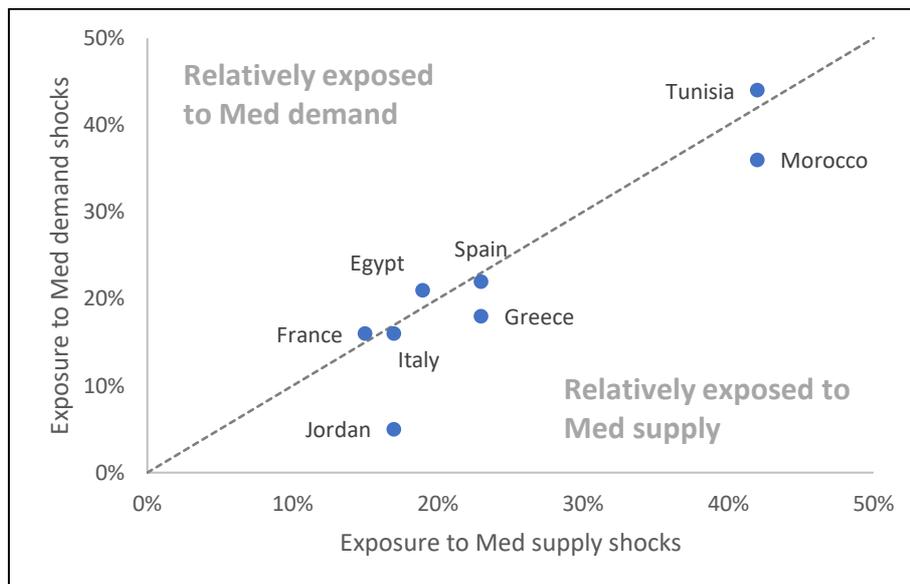
As in Table 2, Table 3 also shows the limited integration on the southern shore of the Mediterranean. Besides, as above, the driver of this integration is characterised by the importance of partners for Southern Europe countries from the southern shore. Indeed, France, Spain and Italy have an important role, especially for Morocco and Tunisia. A notable difference is represented in the much-reduced importance of demand linkages, with respect to supply linkages for Jordan.

Despite the low regional integration of countries on the southern shore of the Mediterranean, from a policy perspective, our results confirm to what extent the Agadir Agreement<sup>1</sup> (signed between Egypt, Jordan, Tunisia and Morocco) failed to deepen their integration. Our approach gives a different explanation for this shallow integration that is linked to Global Value Chains

<sup>1</sup> The Agadir Agreement is a free trade agreement between Egypt, Jordan, Morocco and Tunisia (and from 2016 also Palestine and Lebanon). The agreement was launched in 2001 but came into force in 2007. One important feature is that the Agreement uses the EU's rules of origin.

Figure 6 summarises the two approaches presented above (supply exposure and demand exposure). The similarity of the numerical values of the two matrices implies that the majority of the countries are close to the 45° line: the countries most exposed to shocks in the area are Morocco and Tunisia, whilst Jordan is the least exposed, because it is less integrated. Indeed, Jordan’s trade partners are mainly the USA and Middle Eastern countries, so that Jordan is almost unaffected by demand side Mediterranean shock (and much less than to a supply shock).

**Figure 6: Supply and Demand side in Mediterranean area**



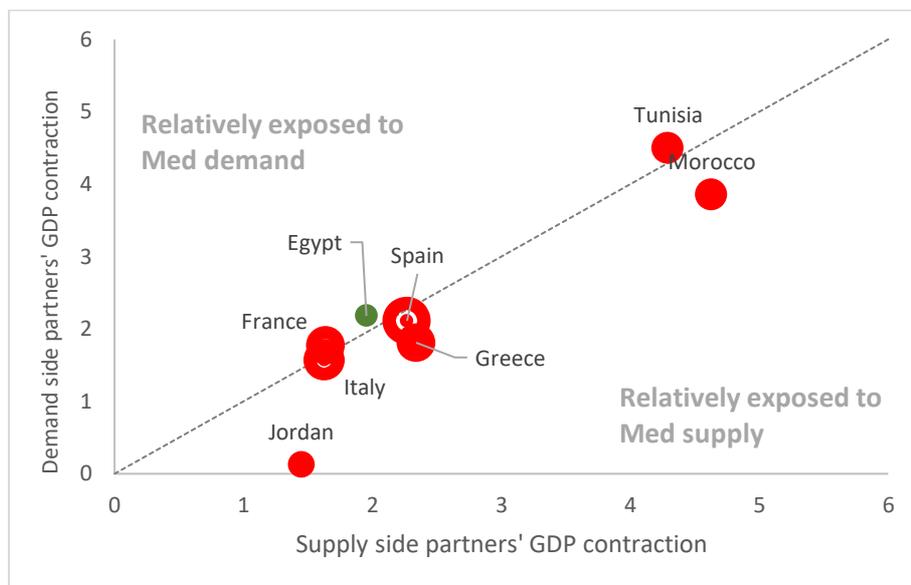
**Source:** Authors’ own elaboration using EORA dataset.

In light of the impact of the COVID-19 crisis on both demand and supply sides, in Figure 7, we provide evidence of the average shock propagating from regional integration. We weight partner countries’ estimates of GDP growth<sup>2</sup> with bilateral shares of supply and demand exposure. This gives us an estimate of the average foreign shock hitting each country in the area. Moreover, we complement this measure using individual GDP growth for country indicator size. Morocco and Tunisia, given their high shares of linkages with strongly hit Southern European countries, stand out as the most impacted countries, with an average partner contraction of about 4 percentage points for both supply and demand sides. The rest of the counties are more concentrated, with an average partner contraction of between 1.5 and 2.5 percentage points. Amongst them, Egypt exhibits much the best results: first, it is the only country in the sample with expected positive GDP growth; secondly, being the least integrated, it is going to be affected less by the shock. Indeed, Jordan is found to have the

<sup>2</sup> GDP estimates for 2020 are sourced from IMF, WEO October 2020

lowest partner contraction because it is characterised by lower integration and is connected to countries that are less affected.

**Figure 7: Supply and Demand side COVID-19 shock in Mediterranean area**



**Notes:** Authors' own elaboration using EORA dataset.

**Note:** GDP contraction sourced from IMF WEO October 2020 revision.

## 5 CONCLUSIONS

This paper tries to examine how the COVID-19 shock affects different countries through their regional integration and their exposure to Global Value Chains (GVCs). Using input-output tables (EORA 2016), we first distinguish between the producers and consumers of value-added and, second, between the supply and demand channels through which these countries can be affected by the disruptions in GVCs. Our main findings show that, first, most of the countries have relatively larger backward GVC linkages than forward ones. Second, on the northern shore of the Mediterranean, Italy and France are net suppliers of value-added since they produce more value-added absorbed abroad than the foreign value-added they consume. Third, on the southern shore, Tunisia is the most integrated in GVCs but is also a net consumer of foreign value-added. Morocco participates in GVCs but mainly in upstream segments. In contrast, Jordan followed by Egypt, are less involved in GVCs. Fourth, our results also highlight the limited integration between southern shore partners, whose integration is almost completely driven by linkages with Southern European developed countries.

From a policy perspective, our results highlight several issues. First, it is clear that the Agadir Agreement failed to deeply integrate the southern shore countries of the Mediterranean. Thus, if these countries are to develop regional or global value chains, a deeper approach is needed, in order to increase their intra-regional trade in general and as intermediaries in particular. This requires more coordination between industrial and trade policies at the regional level. Second, at the agreement level, if the interlinkages are strong, specific legal clauses and policies are needed *ex-ante* to prevent value-chain disruptions, in particular for the trade of essential goods. Third, these countries are in dire need of increasing foreign direct investment in the manufacturing sector, instead of oil as the primary sector, since the former is more prone to the development of regional value chains. Fourth, it is the case that EU countries consider near-shoring from Asia to South-Med countries, the latter must implement a number of structural reforms, in order to reduce non-tariff measures and improve their investment climate, which are indispensable for boosting GVCs (Dovis and Zaki, 2020). Clearly, Asian countries perform better when it comes to the ease of doing business.

However, it is important to note that, whilst massive waves of reshoring may not take place anytime soon (see Giovannetti et al (2020) for some evidence of firm level survey data for Italy), firms may still evaluate a less impulsive and more thoughtful reconfiguration of their international networks, perhaps by trading some production efficiency for resilience and robustness, in order to build more

sustainable GVCs. A feasible solution could imply the diversification of international partners and the introduction of new contractual clauses to avert value chain disruptions, as a way of improving risk management. This solution could help when facing supply disruptions and bottlenecks, whilst keeping alive the benefits of internationalisation. In this regard, the geographical dimension may be crucial. Whilst technology has increased the scope for collaboration with geographically distant partners, international transport networks and movement of people across borders are still needed to unfold many GVC operations (OECD, 2020). The COVID-19 crisis, which induced a sudden and complete stop to the circulation of people, has spurred the digitalisation of some activities, but it has also showed how close interactions are still a vital necessity. Strengthening regional ties and designing opportunities imbedded in legal frameworks for stable integration, may contribute to creating resilient and sustainable GVCs.

Our research agenda includes several points. First, with the data at our disposal, we are not able to forecast the different scenarios that may arise in terms of reconfiguration of GVCs. In other words, we cannot say with certainty if there will be some supplier diversification, nor how firms will be able to manage the increased uncertainty and react to mitigate its impact. Second, our paper adopted a macroeconomic approach. Clearly, the latter hides a lot of sectoral heterogeneity. An important question arises: if near-shoring takes place, shall South-Med countries consider traditional sectors (such as textiles, ready-made garments, chemicals) or non-traditional ones (electronics, electrical products) or products that are vital for the current context (pharmaceuticals, medical equipment, etc.)? This requires a thorough, detailed analysis that is beyond the scope of the current paper.

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### 7 APPENDIX

#### SUPPLY SIDE EXPOSURE - VA content of exports: Matrix 1

		Exporter								RoW	Forward GVC MED	Forward GVC total	% Forward MED
		Egypt	Jordan	Morocco	Tunisia	Italy	Greece	Spain	France				
Source of VA	<b>Egypt</b>	19644.49	42.30	2.57	30.07	1325.24	113.69	345.83	549.26	3258.41	2408.97	5667.38	0.43
	<b>Jordan</b>	21.77	5670.24	2.28	2.44	26.03	2.30	13.03	18.84	758.91	86.68	845.59	0.10
	<b>Morocco</b>	1.01	1.12	19050.09	25.29	562.69	14.93	517.82	1173.32	3538.53	2296.19	5834.71	0.39
	<b>Tunisia</b>	3.50	0.70	12.58	9644.88	820.28	8.80	371.37	737.17	1042.81	1954.39	2997.20	0.65
	<b>Italy</b>	223.67	120.96	315.40	529.06	670109.80	1714.48	12314.26	23686.45	131327.95	38904.27	170232.22	0.23
	<b>Greece</b>	26.01	8.59	15.04	13.79	1292.57	25242.68	307.30	460.28	4785.22	2123.57	6908.79	0.31
	<b>Spain</b>	72.28	39.36	530.59	179.58	11665.11	411.71	322143.72	16305.74	59758.28	29204.37	88962.65	0.33
	<b>France</b>	116.72	66.07	673.92	617.31	25299.09	748.46	20400.81	676110.53	162155.49	47922.38	210077.86	0.23
										= DVA			
	<b>RoW</b>	2010.56	1363.36	2114.11	1904.81	213259.81	10073.90	114811.73	248373.20				
	<b>Total Export</b>	<b>22119.99</b>	<b>7312.69</b>	<b>22716.57</b>	<b>12947.23</b>	<b>924360.62</b>	<b>38330.95</b>	<b>471225.86</b>	<b>967414.79</b>				
	<b>FVA MED</b>	464.94	279.10	1552.38	1397.53	40991.01	3014.37	34270.42	42931.06				
	<b>Total FVA</b>	2475.50	1642.45	3666.48	3302.35	254250.83	13088.27	149082.14	291304.26				
	<b>% Backward MED</b>	0.19	0.17	0.42	0.42	0.16	0.23	0.23	0.15				

### DEMAND SIDE EXPOSURE - VA content of demand: Matrix 2

j - Destination of VA

i -  
Source  
of VA

	Egypt	Jordan	Morocco	Tunisia	Italy	Greece	Spain	France		RoW	Total GDP	GDP MED	GDP abs abroad	% GDP MED
<b>Egypt</b>	280345.88	254.95	17.65	134.38	1690.85	464.15	677.43	958.31		15424.62	299968	4197.72	19622.34	0.213926
<b>Jordan</b>	153.77	29712.37	11.73	10.03	34.70	12.34	22.21	32.71		5387.64	35378	277.49	5665.13	0.048982
<b>Morocco</b>	14.97	10.61	95808.16	135.77	1000.59	111.14	2134.69	3414.34		12204.27	114835	6822.12	19026.39	0.358561
<b>Tunisia</b>	43.41	5.84	84.80	43497.45	1411.23	60.82	580.38	2033.82		5410.34	53128	4220.30	9630.65	0.438216
<b>Italy</b>	3193.08	955.44	2370.82	3231.15	1713426.09	12450.37	30394.72	49790.20		553845.35	2369657	102385.79	656231.14	0.156021
<b>Greece</b>	213.49	55.39	77.67	61.03	2362.80	224462.68	730.79	1072.92		20549.03	249586	4574.08	25123.11	0.182067
<b>Spain</b>	933.55	296.50	3475.54	1035.87	22234.00	3091.48	1153123.43	38144.27		246902.67	1469237	69211.20	316113.88	0.218944
<b>France</b>	1851.53	563.14	5547.59	4217.63	45133.54	5702.58	43191.79	2215872.95		546807.10	2868888	106207.81	653014.92	0.162642
<b>RoW</b>	28223.78	11633.04	14992.10	11147.53	351762.88	62783.07	261998.69	455371.50						
<b>Total Demand</b>	<b>314973.49</b>	<b>43487.27</b>	<b>122386.07</b>	<b>63470.84</b>	<b>2139056.68</b>	<b>309138.64</b>	<b>1492854.13</b>	<b>2766691.02</b>						
<b>Demand MED</b>	6403.82	2141.87	11585.80	8825.86	73867.71	21892.89	77732.01	95446.57						
<b>Total Foreign Demand</b>	34627.61	13774.91	26577.90	19973.39	425630.59	84675.96	339730.70	550818.07						
<b>% Foreign MED</b>	0.18	0.16	0.44	0.44	0.17	0.26	0.23	0.17						

DVA  
absorption



## ABOUT EMEA

**The Euro-Mediterranean Economists Association (EMEA)** is a Barcelona-based regional think-tank established in 2012 that serves as a leading independent and innovative policy research institution; a forum for debate on the political and socio-economic reforms in Mediterranean and Africa; and promoter of actions and initiatives that fulfill objectives of sustainability, inclusiveness, regional integration and prosperity. It strives to contribute to the rethinking of the Euro-Mediterranean and Africa partnerships in view of the new dynamics of an emerging multi-polar world.

EMEA has a large network of economists, high-level experts and institutional partners (research institutes, think tanks and universities) in the Euro-Mediterranean and Africa. EMEA builds on the collaborative research network MEDPRO (funded by the EU's Seventh Framework Programme (2009-13) and provides forward-looking thinking and political and socio-economic integrated analyses on the Euro-Mediterranean region. EMEA is also the promoter and co-funder of the Euro-Mediterranean Network for Economic Studies (EMNES), co-funded by the European Commission (DG NEAR) between 2015 and 2019. EMNES is a regional network composed of 30 institutions and more than 100 experts and researchers in the Mediterranean region.

From January 2020, EMEA coordinates The Euro-Mediterranean Network for Economic Studies (EMNES). EMNES, aims to provide a renewed vision for socio-economic development in the Mediterranean region, mainly focusing on employment creation, social inclusion, sustainable development and regional integration. It performs economic and policy research exploring the pillars of inclusive and sustainable economic models in the Euro-Mediterranean region.

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