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## Trade disruptions in Europe: Evidence from the EIB Investment Survey 2022

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ECONOMICS – WORKING PAPERS 2023/02

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June 2023



European  
Investment Bank



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# Trade disruptions in Europe: Evidence from the EIB Investment Survey 2022

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European Investment Bank

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## **Abstract**

Using firm level survey data we draw a portrait of incidence of recent trade related shocks, such as disruptions in logistics or access to materials, and undertaken responses in the economies of the EU. The paper focuses on firm heterogeneity in explaining the willingness to respond to these shocks and in explaining the type of response taken: diversification across trade partners or focusing on domestic markets and suppliers. We find that younger, larger, more productive firms are more likely to respond actively to trade shocks and disruptions, especially with diversification. At the same time, less productive, less innovative firms and firms using imported inputs, but that do not trade themselves are discouraged from engaging directly in international trade.

Keywords: international trade, firm heterogeneity, disruptions

JEL: D21, F1, L23

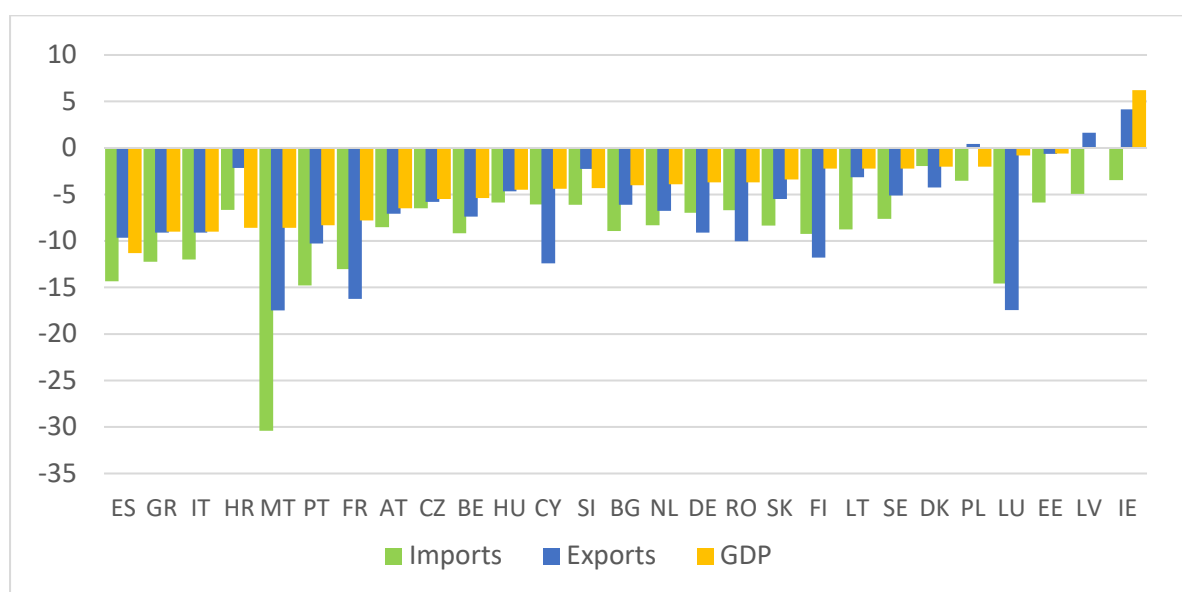
We would like to thank Christoph Weiss for his useful comments. The views expressed in this paper are those of the authors and do not necessarily reflect the views of the European Investment Bank.



## 1 Introduction

In most countries the economic consequences of the fight against the Covid-19 pandemic, i.e. measures of social distancing and lockdowns, caused severe drops in GDP and international trade. Among the EU countries, the most severely economically hit in 2020 were Spain, Greece and Italy, where tourism plays an important role in the economy (See Figure 1). At the same time, in almost all EU countries, the trade volumes have decreased even more than GDP. The decrease was not only witnessed in very small and open economies, such as Malta or Luxembourg, but also in larger countries such as France.

Figure 1. Changes in trade and GDP from 2019 to 2020 (%)



Source: COMEXT for trade data, EUROSTAT TEC00115 for GDP. Note: The figure shows the nominal change in products trade (export and import) and the change in real GDP from 2019 to 2020 to illustrate the changes in the first year of the pandemic. The countries are ordered from left to right according to GDP growth.

Next to the pandemic, the supply chains of the global economy were also heavily affected by Russia's war against Ukraine. It has brought forward Europe's reliance on energy source and exposed vulnerabilities related to the supply of raw materials that are critical for agriculture, industrial production, and the green transition (OECD, 2022).

In this period firms have been often reporting about supply chain problems (Javorcik et al., 2022) and the experiences have showed to many firms their supply management might not be strong enough to handle large shocks. Production was not only hindered by domestic social distancing regulations within the firm, but also disruptions in the supply chain via both domestic and foreign suppliers. These disruptions were manifold and included obstacles from shipping, such as congestions in the ports or availability of containers and maritime vessels, and shortages in materials, from masks, inhalators to bicycles, automobile parts, and semi-conductors. Bonadio et al (2020) argue that around a third of the GDP contraction globally could be attributed to the transmission of foreign lockdowns.

Experiences have also reignited questions about the slowing down and the merits of globalisation and the role of industrial policy. For example, both the EU and the US are



focusing their policies on supply chain resilience and safety of supply, particularly in relation with goods that can be considered as necessary (health related goods and materials) or strategic. See e.g. Biden's executive order 14017 on securing America's supply chains or the speech of Michel (2020) on strategic autonomy for Europe. Further, many countries are promoting policies for re-industrialisation or re-shoring, often combining with energy policy. See e. g. the Recovery Plan for France, the speech of von der Leyen at Davos in 2023 for the EU or the Inflation Reduction Plan for the US. On the other hand, many have questioned the end-of-globalisation view and pointed to the shift of trade and outsourcing towards services, see e.g. Baldwin (2022) on the benefits of improving supply chain resilience via diversification rather than turning inward. Also, Javorcik (2020), Baldwin and Evenett (2020), Arriola (2020) and Chepeliev (2022).

Our paper focuses on understanding better how heterogeneity at the firm level, including firm and sector characteristics and the type and severity of the disruptions might affect the firms' responses to trade and supply chain disruptions. Specifically, we are focusing on two firm responses: diversification across imported inputs and heavier reliance on domestic market alternatives. These firms' choices can provide insights into the ongoing and future directions of global trade, with respect to phenomena like re-shoring, import substitution or in broader terms the re-organisations of global value chains.

To analyse trade related disruptions in the post Covid-19 period, we use data of the EIB Investment Survey (EIBIS), a survey of more than ten thousand EU firms from 2022, which interviews firms about their investment and business choices.

Our findings are the following: 1) the majority of the firms across the EU report experiencing trade disruptions since 2021. At least a third of the firms perceived them as major obstacle to their business. 2) Trade disruptions affected a significant share of non-trading firms as well. Firms that are not engaged in international trade in fact were affected via their difficulties with local suppliers (in turn hit by disruptions) or their imported inputs acquired via wholesalers. 3) Trade disruptions are more likely to discourage non-traders from using imported inputs than trading companies. 4) More productive, innovative and digitalised firms were more likely to take action to mitigate the effects of trade related obstacles. 5) Low productivity firms are more likely to choose focusing on domestic markets over not taking action. More productive firms and globally competitive firms are more likely to choose diversification as a response strategy. 6) Firms that have already took action to diversify are expecting gains in terms of increased sales. Firms that focused on domestic markets do not share this positive outlook.

Our paper talks to several strands of the literature by joining the discussion on the topic of global value chains and more broadly on globalisation (e.g. Antràs and Chor 2013) and how imported inputs influence domestic production (Halpern et al 2015) and the choice to import from other countries (Antràs et al, 2017).

The first strand is the one focusing on how shocks to the supply chain propagate and affect firms. Several papers identify the negative effects of natural disasters and analyse how shocks propagate through local and international linkages. Barrot and Sauvagnat

(2016) investigate the effect of major natural disasters in the United States via supplier-consumer links and show that disasters impose significant output losses on customers of affected firms. Carvalho et al (2021) document how the disruption caused by the Great East Japan Earthquake of 2011 propagate through the value chain of the affected firms both up and downstream. Boehm et al (2019) also look at the 2011 earthquake and show how US firms that use Japanese inputs intensively have suffered losses from the earthquake. Freund et al (2021) looks at the aftermath of the 2011 earthquake Japan for the auto and electronics sector. While they document share drop in the imports of Japanese products by counterparts, their results did not highlight diversification of importers more exposed to Japan before, or re-shoring production.

Others look at how economic shocks in other countries affect firm's economic performance through the production networks. Dyne et al (2021, 2022) use export-import and VAT data to form connections with firms in Belgium and show that firms pass on a large share of the foreign shocks to their suppliers. Their research points at the differential response of material and labour inputs to foreign demand shocks.

In addition, we also connect to the literature looking at how firms react to mitigate negative effects of supply chain shocks. Lafrogne-Joussier et al (2022) look at the effect of early 2020 lockdown in French firms sourcing from China. Their results suggest that ex-ante geographic diversification of imported inputs did not mitigate the impact of the shock, while firms that have had built up relatively large inventories were able to deal with the supply shock better. Di Stefano et al (2021) look at the effects of Covid-19 surveying Italian multinationals. Their results suggest that firms are not planning to re-shore, but plan keeping existing suppliers as firms perceive the shocks as temporary.

Closest to our paper are Aksoy et al (2022) and EBRD (2022). Aksoy et al (2022) survey more than 400 firms in the German manufacturing, wholesale and retail trade sectors about their sourcing strategies in 2022. More than 87 percent of manufacturing firms report having made concrete changes in response to supply chain disruptions. Increased stockpiling and diversification are most frequently cited actions, with above 65 percent of the respondents. Their results highlight the more limited possibilities of smaller firms to diversify and switch among existing suppliers.

EBRD (2022) interviews participants of the Enterprise Survey in May- July of 2022 – exactly the same timing of the EIBIS survey used in this paper. They report that large majority of the firm experienced trade disruptions and or shipping issues, while for half of the firms, disruptions are not related to suppliers in China. As a response to the disruptions the surveyed firms are most likely to increase inventory, diversify and source the same inputs from more suppliers. Less than a fifth only reported to have replaced their supplier with a domestic one, and even less changed its main supplier.

Our paper differs from the ones above in several aspects. On the one hand, our country scope is different as our sample contains firms from all EU countries. Second, our analysis does not only contain two-way traders or multinationals but also service sector and non-trading firms that are affected indirectly via their network of supplies. More importantly, we apply regression analysis to shed light on the heterogeneity underlying the firm's responses.

The rest of the paper is organised as follows. Section 2 describes the data, section 3 describes the nature and types of trade disruptions learned from the survey. Section 4 provides descriptive statistics about the firm responses. Section 5 lays out our empirical methodology and the results of the investigations into the role of firm heterogeneity in response to trade shocks. Finally, section 6 concludes.

## 2 EIBIS data description

For our firm level analysis, we rely on the European Investment Bank Investment Survey (EIBIS). The EIBIS is conducted annually since 2016 and comprises a representative sample of firms in each of the 27 EU Member States (and the US for comparison in the last 4 waves). The interviewees are senior managers or financial directors with responsibility for investment decisions and investments finance. EIBIS covers non-financial firms with at least five employees from the sectors C to J in NACE rev2. Classification. The sample is stratified disproportionately by country, industry group and firm size class, and proportionally by region within each country. Brutscher et al (2020) showcase the representativeness of the EU sample with respect to the business population as described by Eurostat Structural Business Statistics.

The sampling frame of the EIBIS survey is the ORBIS dataset from Moody's on firm financials. This allows for linking (preserving anonymity) to each respondent its history of financial records available in the ORBIS dataset, facilitating the inclusion of additional firm characteristics into our analysis.

While EIBIS has seven waves, conducted annually from 2016 to 2022 this analysis uses the 12,021 firm observations from the last wave excluding 800 respondents from the US. The latest wave of EIBIS (wave 7) includes a specific set of questions related to trade disruptions and firms' actions in response.

- *In 2021, did your company export or import goods and/or services?*
  - *Yes, exported goods and/or services*
  - *Yes, imported good and/or services*
  - *Yes exported and imported goods and/or services*
  - *No did not import or export good and/or services*
  
- *Since 2021, did any of the following present an obstacle to your business's activities?*
  - *Disruptions to global logistics*
  - *Disrupted or reduced access to raw materials, services or other inputs*
  - *New trade restrictions, customs and tariffs*

*(answer options for each: Major obstacle, minor obstacle, not an obstacle at all, not applicable)*
  
- *You have just said that you experienced obstacle(s) to your business activities since 2021. Did Covid-19 and/or the Russia-Ukraine conflict, including the sanctions imposed by the international community, contribute to this in anyway?*
  - *Yes – Covid-19*
  - *Yes – Russia-Ukraine conflict*
  - *Both Covid-19 and Russia-Ukraine conflict*
  - *Neither of these*
  
- *Is your company taking any actions to mitigate the impact of these disruptions?*
  - *Yes – increasing the number of trade partners to diversify*
  - *Yes - focusing more on domestic suppliers/markets*
  - *No – not taking any actions*

The summary statistics of the key variables are reported in Table 1. We use the following sector classification for our graphical analysis and group firms in 12 sectors as follows: Food (Nace 10-12), Textiles and Apparel (13-15), Chemicals, Pharmaceuticals (Nace 20-21 ), Basic Manufacturing (Nace 16-19, 22-25) , Computer, Electronic equipment (Nace 26-27), Machinery (Nace 28-30), Utilities (Nace 35-39), Construction (Nace 41-43), Trade (Nace 45-47), Transportation (Nace 49-54), Tourism (Nace 55-60), IT and Telecom (Nace 61-63)

Table 1. Description of key variables in the EIBIS 2022

	N	Share
<b>Panel A: All firms</b>		
Exporter	1,070	9%
Importer	2,006	12%
Two-way trader	4,362	42%
Non trader	5,335	37%
<i>Disruptions to global logistics</i>		
- None	3234	22%
- Minor	3767	33%
- Major	4275	45%
<i>Disrupted or reduced access to raw materials, services</i>		
- None	3337	24%
- Minor	3706	33%
- Major	4333	43%
<i>New trade restrictions, customs and tariffs</i>		
- None	6870	55%
- Minor	2600	30%
- Major	1457	15%
<b>Panel B: Firms having experienced disruption</b>		
Covid-19 contributed to obstacles	2026	19%
Russia-Ukraine conflict contributed to obstacles	1192	13%
Covid and Russia-Ukraine conflict contributed to obstacles	5105	58%
Actions to mitigate the impact of disruptions?		
Yes - increasing the number of trade partners to diversify	3422	37%
Yes - focusing more on domestic suppliers/markets	3140	35%

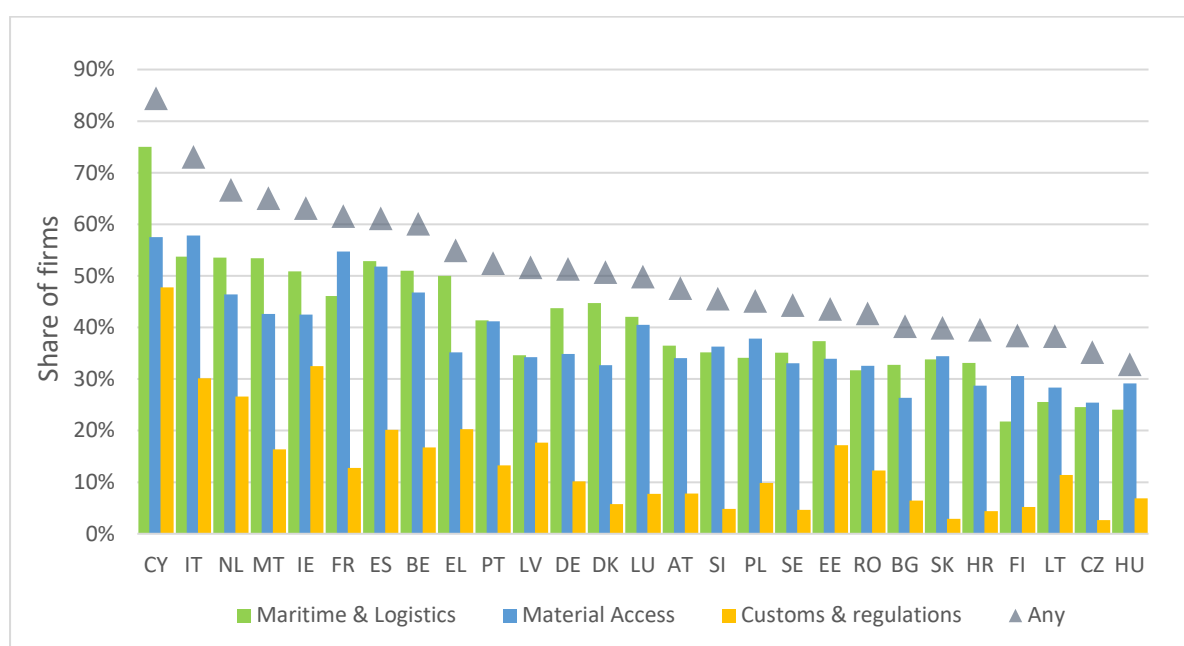
Note: In Panel A, percentages express the share of response in all firms excluding refused and do not know answers. For Panel B, firms that did not experience any disruptions are excluded.

### 3 Which firms experience trade disruptions?

This section takes a closer look at the survey evidence on supply chain disruption by looking at sector and country level aggregates describing the incidence, perceived causes and responses.

The survey reveals that more than 8 in 10 firms in the EU report that they have experienced trade disruptions. While most firms (56%) report having experienced a major disruption, almost a third of the firms (30%) report about experiencing minor problems. The most cited disruptions are related to global logistics (45%) and to raw materials, services (42%). A smaller share of firms (15%) report disruptions caused by new trade regulations, customs, or tariffs.

Figure 2. Share of firms reporting about major trade related disruptions



Source: EIB Investment Survey (EIBIS wave 2022). Note: The Figure shows the average share of firms that reported experiencing major disruptions in their activities related to international trade. The averages are calculated by value added weight from EIBIS.

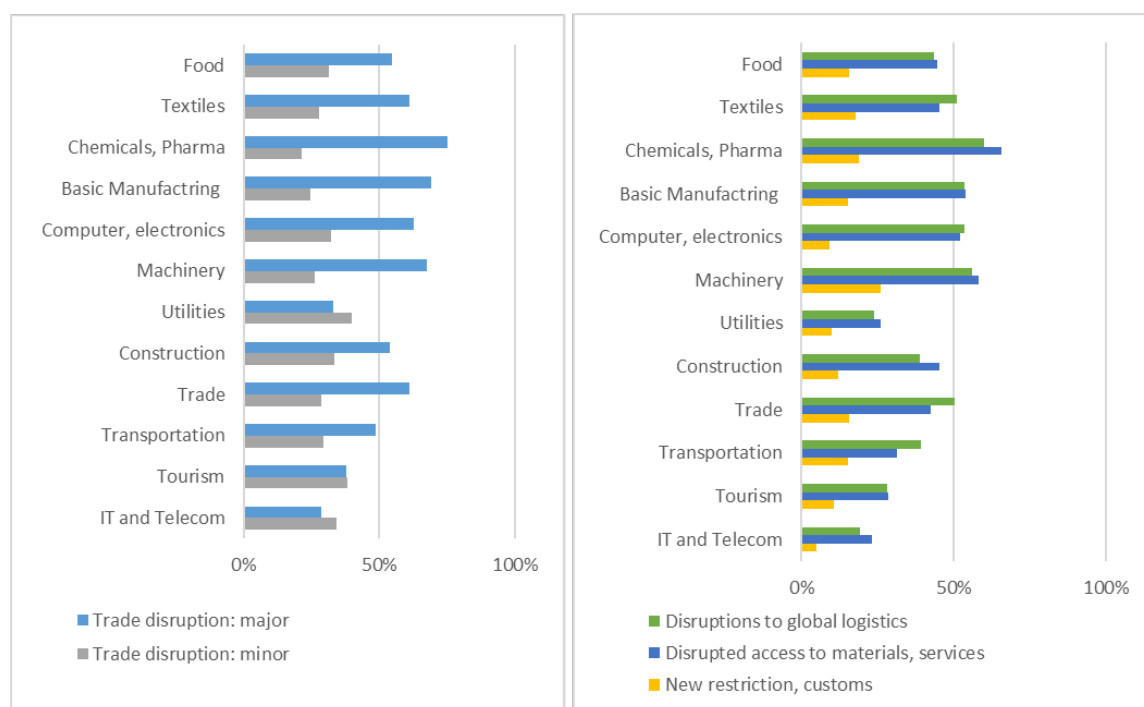
Among the EU countries, the highest share of firms complaining about major trade disruption are in Cyprus, Italy, and the Netherlands, while the lowest share of firms reporting about major disruptions are in Hungary and Czechia (See Figure 2). Firms across countries also report about the different types of disruptions to different extent. A relative high share of firms experiences disruptions due to maritime and logistical problems in Greece, Denmark, and Spain. Severe problems with material access were relatively more likely to be reported in Hungary, France, and Slovakia, while disruptions due to regulation and customs were relatively more frequent in Cyprus, Ireland, Italy and the Netherlands.

Not only firms directly involved in international trade experience trade disruption. More than 40% of the firms that do not export or import directly report about major disruptions. So do the majority of firms that export or import. Two-way traders that both export and import are the most likely to report about major disruptions (68%).

When it comes to type of issues, exporting and importing firms have similar challenges. Importers, including two-way traders are more likely to reports about major problems on global logistics than about access to materials. In the case of exporters and non-traders, the two types of disruptions are cited at a similar frequency. Trade disruptions affect all firms in a similar way, regardless of size or age – once the type of trading status is accounted for.

Disruptions in the global trade affected firms across industries to a different extent. Firms in the manufacturing sectors, especially in computer and electronics, chemicals and pharmaceuticals and the automotive industries are the most likely to have experienced major trade disruptions. See Figure 3.

Figure 3. Share of firms reporting trade disruptions by sectors



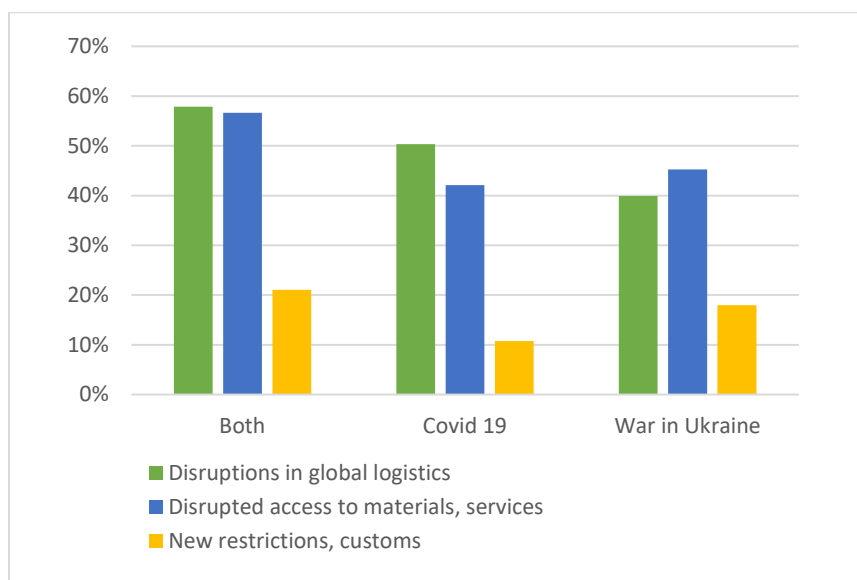
Source: EIB Investment Survey (EIBIS wave 2022). Note: The left panel shows the share of firms that reported experiencing minor or major trade disruptions. The right panel looks at the type of trade disruptions and shows major disruptions only. Questions: Since 2021, did any of the following present an obstacle to your business's activities? Major, minor, no obstacle at all?

When asked what contributed to the trade disruption, the majority of the firms (58%) cite both the Covid-19 pandemic and the war in Ukraine as the cause for trade disruption. A fifth of the firms (19%) report Covid-19 as the only single cause for trade disruption, while and even smaller share (13%) name the war in Ukraine as the cause. The ratios are similar regardless the severity of the disruption cited.

Covid-19 related disruptions are more associated with global logistics and transport than material access or regulation. Half of firms that name Covid-19 only as the cause for trade disruption report major issues in global logistics, while only 42% of them report having experienced major disruptions related to material or services access. The corresponding share for those naming the war as a cause is significantly lower for the first (40%) and slightly higher for the latter (45%). The trade disruptions that are more related to the war in Ukraine is more likely to be of administrative type, due to new

restrictions and customs (see Figure 4). Firms who name both the causes asked about in the survey are more likely to report major trade disruptions in all areas: logistics, material access and due to new regulations and customs.

*Figure 4. Type of disruptions experienced by the causes cited*



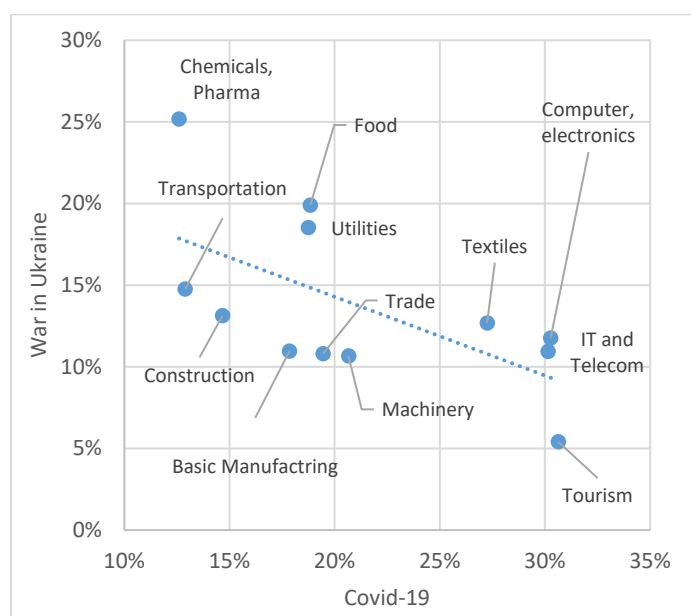
Source: EIB Investment Survey (EIBIS wave 2022). Note: The figure shows the share of firms that reported experiencing various major trade disruptions by the cause they attribute these disruptions to. Questions: You have just said that you experienced {an obstacle/obstacles} to your business activities since 2021. Did Covid-19 and/or the Russia-Ukraine conflict, including the sanctions imposed by the International community, contribute to this in anyway?

There is a heterogeneity across sectors in the extent to which the trade shocks attributed to Covid-19 or to the war in Ukraine affected them. Sectors that primarily suffered from trade disruptions from Covid-19 are less likely to cite the war in Ukraine as a single cause for disruptions. As the type of trade disruptions experienced during the pandemic and in 2022 due to the war in Ukraine are different in nature, the firms in different sectors are affected differently. Trade disruptions during the pandemic are more related to industries that source intensively from China and the far-East (See Figure A2 in the Appendix) and those that are more strictly hit by social distancing measures. While the war in Ukraine affected industries that are either reliant on imports from Russia or Ukraine or on import materials where these countries are key players on the global markets. Also, the sharp increase in energy prices and uncertainty in 2022 are often associated with the war.

As Figure 5 shows there is an inverse relationship between trade disruption causes cited in isolation across sectors. In the sector, where the share of firms reporting trade disruptions caused by the war in Ukraine only, such as Chemicals and Pharmaceutical manufacturing or Food manufacturing and utilities the share of firms reporting trade disruptions only during the pandemic was relatively low. At the same time the opposite is true for Computer and Electronics sector and Textiles or Tourism.



Figure 5. Share of firms reporting causes of disruption by industry groups



Source: EIB Investment Survey (EIBIS wave 2022). Note: The Figure shows only the share of firms that state either war in Ukraine or Covid-19 as a cause for recent trade disruption. Questions: You have just said that you experienced {an obstacle/obstacles} to your business activities since 2021. Did Covid-19 and/or the Russia-Ukraine conflict, including the sanctions imposed by the international community, contribute to this in anyway?

#### 4 Which firms respond to trade disruptions and how?

Firms are more likely to respond to larger trade shocks. Firms in the EIBIS survey are asked whether they are taking actions to mitigate the impacts of disruptions by either diversifying via increasing the number of trade partners or via focusing more on domestic markets or both. About half of the firms reporting minor trade disruptions are taking actions to mitigate the caused impact by either diversification or focusing more on domestic suppliers or markets. When firms report on any major disruption the share of firms taking action increases to over sixty percent.

In addition, the severity of the disruption shifts firms' response relatively more towards diversification compared to looking for solutions closer to home (Table 2).

Table 2. The responses of firms to mitigate the effects of trade shocks.

	No action taken	Diversify	Diversify-only	Domestic market	Domestic-only	Domestic-Diversify
<i>Panel A: Response to any disruptions</i>						
Non-trader	0.515	0.251	0.137	0.348	0.234	0.114
Export	0.520	0.265	0.157	0.323	0.215	0.108
Import	0.454	0.342	0.182	0.364	0.204	0.160
Two-way trade	0.352	0.486	0.294	0.353	0.162	0.192
<i>Panel B: Response to major disruption</i>						
Non-trader	0.509	0.267	0.149	0.341	0.224	0.118
Export	0.472	0.312	0.194	0.334	0.217	0.118
Import	0.430	0.395	0.209	0.362	0.176	0.186
Two-way trade	0.295	0.536	0.304	0.400	0.169	0.231

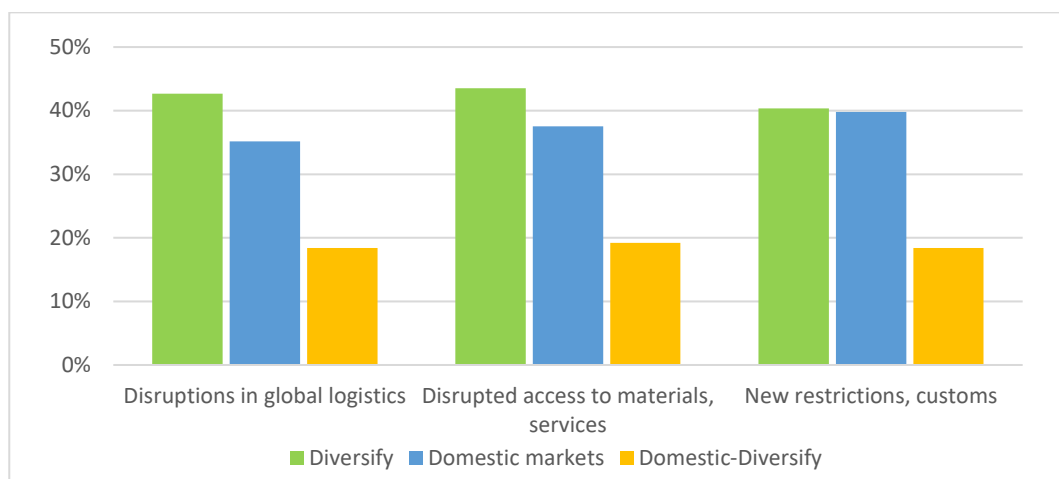
Source: EIB Investment Survey (EIBIS wave 2022). Note: The Table shows the share of firms that respond to reported trade disruptions with any of the strategies asked about. Panel B contains only firms that reported about major disruptions.

Once the firm's experience trade disruptions, either major or minor, trading firms are more likely to take action. A bit more than half of the exporter firms (52%) are not taking any action in response to trade disruption. A similar share to non-traders, while the share of firms not taking any action is lower for importers (45%) and even lower for two-way traders (35%). This difference across trading firms in responses is mainly driven by the responses to diversify. Looking for markets or suppliers closer to home is a more likely response to a major trade disruption for importers and two-way traders, and when combined with a diversification response.

While trading firms, especially importers, are more likely to take action, non-traders are more likely to react by focusing on domestic markets. This heterogeneity behind the results of Table 2 is revealed more clearly when looking at cross country variation. Table A1 (in the Appendix) suggests, firms that trade directly are more likely to respond by diversification, on average, in all countries. However, in many countries, for firms that do not trade, but use indirectly imported inputs are more likely to be discouraged to continue do so.<sup>1</sup>

<sup>1</sup> This result is partially driven by the difference in the distribution of sectors across countries. In sectors such as Tourism, Retail and raw materials and basic manuf. Products non-traders are more likely to focus on domestic markets than traders. The small sample size of non-traders in certain sectors does not facilitate a detailed analysis.

Figure 6. Responses to major trade shocks: by the type of trade shock

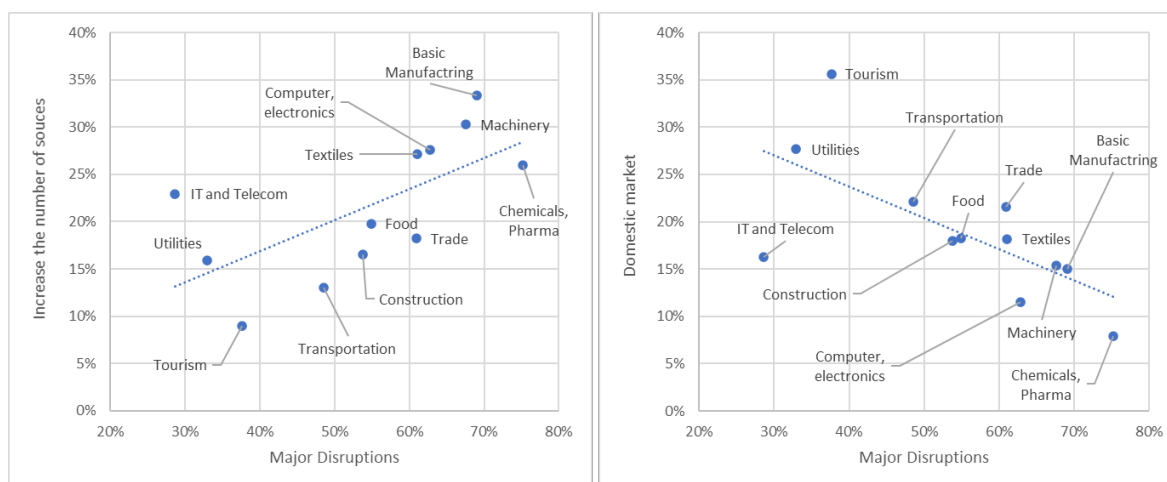


Source: EIB Investment Survey (EIBIS wave 2022).

In general, diversification is a more often cited strategy for major trade shocks across the board compared to looking for domestic market solutions. This is regardless of the type of shock, logistics or material access type (See Figure 6).

Increasing the number of import sources or export markets is the most likely response to a major trade shock. This is the case for both a single strategy or a joint one together with looking for more local markets. At the same time, the strategy to look for local markets is negatively related to the share of firms experiencing major trade shocks across sectors as a single strategy.

Figure 7. Responses to major trade shocks across sectors



Source: EIB Investment Survey (EIBIS wave 2022) Note: We are looking at single strategies only.

## 5 Role of firm heterogeneity in response to shocks

In this section, we look at the role of firm characteristics in influencing the choice of responses to the experienced trade shocks.

### 5.1 Empirical strategy

We run regressions with country and sector fixed effects that compare firms' specific reaction with respect to taking no action. The main linear specification is as follows:

$$y_i = \beta_0 + \beta_1 \mathbf{TD}_i + \beta_2 \mathbf{X}_i + \mu_s + \delta_c + \varepsilon_i \quad (1)$$

Where  $y$  is an indicator variable for the for firm  $i$  in country  $c$  and sector  $s$  based on its reply to trade disruptions. The indicator takes the value of zero when firm experienced minor or major trade disruptions but is not taking any action to mitigate the adverse effects. The variable takes the value one if firms respond either by diversification or focusing more on domestic markets. We also use alternate definitions of the dependent variable where the definition of value one depends on various logical combinations of the responses such as diversification only, focusing on domestic market only or taking joint action (six combinations altogether)

The right-hand side variables in Eq. (1) include  $\mathbf{TD}_i$ , a vector of indicator variables characterising the type, source and severity of the experienced disruption and  $\mathbf{X}_i$ , a set of variables characterising the firm. These include indicators for firm age, firm size, trading status of the firm (exporter, importer and two-way trader), indicators for firm innovativeness, digitalisation and productivity. Eq (1) also includes a set of indicator variables for the firm's sector classification (see Section 2) and country of location.

The timing of the variables in Eq. (1) is as follows. The trade disruptions cover the period of 2021 to the first quarter of 2023, similarly to the actions taken to mitigate their effects. All firm level characteristics from the EIBIS survey describe the firm in the year 2022. Firm level variables from Orbis, such as firm productivity describe the firm in the latest available year, between 2017 to 2019.

Our key parameters of interest in Eq. (1) are the  $\beta_2$  that can provide insight into the heterogenous firm's characteristics influencing responses to trade disruptions.

In addition to the linear probability model, we also implement multinomial regression models to investigate choice models with more than one outcome. We model changes in firms sales outcome  $s_i$ , which can take on three values  $j=\{\text{decrease, unchanged, increase}\}$  with the trade shock, the actions taken and firm characteristics. Our specification is:

$$PR(s_i = j) = \frac{\exp(\beta_0^j + \gamma^j Y_i + \beta_1^j \mathbf{TD}_i + \beta_2^j \mathbf{X}_i + \mu_s + \delta_c)}{\sum \exp(\beta_0^j + \gamma^j Y_i + \beta_1^j \mathbf{TD}_i + \beta_2^j \mathbf{X}_i + \mu_s + \delta_c)} \quad (2)$$

In Equation (2) our main coefficients of interests are the ones corresponding to  $Y$  and  $TD$ . These might provide a better understanding of the potential effect of trade disruption on firm outcome and whether actions were already helpful to mitigate adverse effects.

## 5.2 Results

Table 3 reports the results for Eq. 1, where firm characteristics only include age, size and trading status and TD only includes an indicator for disruption severity. The results show that firms in general are more likely to mitigate the consequences of a larger than a minor trade shock. Taking an action is 10 percentage points more likely if the firm reports experiencing major obstacles. The results also confirm the aggregate statistics already presented highlighting the more active role of traders and two-way traders in adopting mitigation strategies. Column (5) of Table 3 also echoes the finding in the previous section, namely, that non-trading companies are more likely to turn towards domestic market in response to obstacle. This suggests that shocks experienced in the last years had deterrent effect on non-trading firms' internationalisation progress.

Larger firms and to some extent younger firms, are more likely to take action against trade shocks. As Table 3 demonstrates, as firm size increases, firms are more likely to diversify their trade activity. The largest firms are 12-14 percentage points more likely to do so. Larger firms are also more likely to focus on domestic markets; however, they are not more likely to pursue this strategy alone. The results also suggest that firms established 5 years ago or less are more likely to diversify than older firms.

Different type of trade disruptions brings forth different type of reactions by the firms. Firms are less likely to take mitigative action when encountering issues with logistics and more when they experience disruptions related to regulations or material access. See Table (in the Appendix). The results also suggest that the strategy to focus more on domestic market is not related to logistical issues alone, rather to other obstacles. Unsurprisingly, we find that firms that have experienced disruptions due both to the pandemic and the war in Ukraine are more likely to have implemented strategies to deal with them.

Table 3. Responses to trade shocks - the role of size and age

VARIABLES	(1) No action	(2) Diversify	(3) Diversify- only	(4) Domestic focus	(5) Domestic focus only	(6) Domestic- Diversify
Major disruption	-0.107*** [0.011]	0.124*** [0.012]	0.094*** [0.012]	0.106*** [0.012]	0.053*** [0.012]	0.118*** [0.012]
Export	-0.032 [0.020]	0.088*** [0.022]	0.092*** [0.023]	-0.012 [0.023]	-0.041* [0.023]	0.037* [0.022]
Import	-0.027* [0.016]	0.079*** [0.017]	0.063*** [0.018]	0.003 [0.017]	-0.039** [0.018]	0.058*** [0.017]
Two-way trade	-0.102*** [0.014]	0.179*** [0.015]	0.179*** [0.016]	0.046*** [0.016]	-0.030* [0.016]	0.115*** [0.016]
Size: small	-0.034** [0.014]	0.057*** [0.016]	0.040** [0.016]	0.021 [0.016]	-0.002 [0.016]	0.043*** [0.016]
Size: medium	-0.072*** [0.015]	0.111*** [0.017]	0.088*** [0.017]	0.048*** [0.017]	-0.009 [0.018]	0.085*** [0.017]
Size: Large	-0.099*** [0.018]	0.140*** [0.020]	0.125*** [0.021]	0.067*** [0.021]	0.007 [0.022]	0.100*** [0.021]
age: 5 - 9 years	0.032 [0.032]	-0.053 [0.035]	-0.076** [0.037]	-0.013 [0.036]	-0.009 [0.037]	-0.020 [0.036]
age: 10-19 years	0.048 [0.029]	-0.059* [0.032]	-0.067** [0.034]	-0.038 [0.033]	-0.029 [0.034]	-0.038 [0.033]
age: 20 years or more	0.039 [0.028]	-0.057* [0.031]	-0.067** [0.033]	-0.022 [0.032]	-0.010 [0.033]	-0.030 [0.032]
Observations	9,157	7,467	6,049	7,184	5,766	5,494
R-squared	0.079	0.124	0.118	0.076	0.050	0.129
Sector 12 FE	yes	yes	yes	yes	yes	yes
Country FE	yes	yes	yes	yes	yes	yes

Source: EIB Investment Survey (EIBIS wave 2022). Note: Each column presents regression results for a separate regression. Standard errors in brackets. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Innovative and digital firms are more likely to take action. The higher performance, higher productivity and better resilience of innovative and digital firms is well-documented, see e.g., Cathles et al (2020). Consequently, it is not surprising that they are more responsive in the effort to mitigate the negative outcomes from trade disruptions. As Table 4 shows, innovative firms, virtually regardless of the intensity of level of innovativeness, are about 7-10 percentage points more likely to report on taking action to counter effects of trade disruptions. At the same time, digitalised firms also seem to exhibit similar adaptability. Digital firms are also more likely to report on both diversification response or focusing on domestic markets compared to not taking any

action. Unlike innovative firms, where focusing on domestic markets is not a preferred option across the board.

Firms that are more productive are less likely to respond to trade disruption than not act. Specifically, companies that are more productive are less likely to report that they are taking actions to focus more on domestic markets as response to trade disruptions.

*Table 4. Responses to trade shocks - the role of productivity and finance*

	(1)	(2)	(3)	(4)	(5)	(6)
	No action	Diversify	Diversify-only	Domestic focus	Domestic focus only	Domestic-Diversify
<b>PANEL A</b>						
Labour productivity (in logs, EIBIS)	0.010 [0.008]	0.011 [0.009]	0.019** [0.009]	-0.030*** [0.009]	-0.039*** [0.010]	-0.004 [0.009]
Innovation: New to the company	-0.076*** [0.015]	0.072*** [0.016]	0.058*** [0.017]	0.092*** [0.017]	0.077*** [0.018]	0.074*** [0.017]
Innovation: New to the country	-0.103*** [0.027]	0.128*** [0.029]	0.088*** [0.033]	0.125*** [0.032]	0.042 [0.037]	0.166*** [0.031]
Innovation: new to global market	-0.084*** [0.025]	0.096*** [0.027]	0.077** [0.030]	0.092*** [0.030]	0.045 [0.035]	0.106*** [0.030]
Implemented adv. digital technologies	-0.091*** [0.013]	0.090*** [0.014]	0.072*** [0.015]	0.089*** [0.015]	0.064*** [0.015]	0.075*** [0.014]
Observations	6,329	5,226	4,212	4,888	3,874	3,785
R-squared	0.126	0.174	0.156	0.123	0.074	0.184
<b>PANEL B: Pre-covid characteristics</b>						
Labour Productivity (in logs, ORBIS)	0.027*** [0.009]	-0.001 [0.010]	0.009 [0.011]	-0.048*** [0.010]	-0.064*** [0.011]	-0.016 [0.010]
Observations	6,266	5,176	4,146	4,832	3,802	3,742
R-squared	0.080	0.125	0.121	0.085	0.063	0.144

Source: EIB Investment Survey (EIBIS wave 2022). Note: Table presents results from 12 separate linear regression, six in each panel. Each regression controls for firm size and age categories, trading status, severity, and type of trade shocks. Sector and country fixed effects are also included. Standard errors in brackets. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

As productivity is highly correlated with trading, innovation and digitalisations or the trade shock itself additional investigations may be necessary. On the one hand, results do not change significantly when these control variables are not included in the regression. On the other hand, exploiting variation in the pre-pandemic productivity of the firm do not change the sign of the estimated coefficients on productivity (see Panel B of Table 4).

Trade disruptions have significantly negative effects on firm's success on the marketplace. When economic consequences of the Covid-19 pandemic hit the firms in 2020, the distribution of sales growth became heavier on both tails of the distribution.

That is, besides the high share of firms that had significant losses, the share of firms that increased sales significantly, was also higher than in other years. See Coad et al. 2022. This is reflected in the first set of columns of Table 5, which display how firm level experiences and characteristics affect probabilities of sales loss and increase. The results indicate that firms reporting problems with global logistics and maritime transport were more likely to suffer losses or enjoy sales growth compared to other firms. However, firms that reported on obstacles related to trade regulations were more likely to suffer losses. The results also confirm previous findings of Harasztosi et al (2021), namely, that policy support in the times of Covid-19 was targeted at firms with significant loss. The sales dynamics for 2021 follows a similar pattern to the previous year concerning trade disruptions; though firms that received government support are also more likely recover in sales.

*Table 5. Responses to trade shocks - sales increase or decline*

VARIABLES	(1)		(2)		(3)	
	sales from 2019 to 2020		sales from 2020 to 2021		sales from 2019 to 2022	
	decline	increase	decline	increase	decline	increase
Major disruptions:						
Logistics/Maritime	0.196*** [0.070]	0.171** [0.072]	0.202** [0.084]	0.123* [0.067]	0.027 [0.082]	0.064 [0.062]
Material	0.085 [0.070]	-0.008 [0.072]	0.112 [0.084]	0.020 [0.067]	0.229*** [0.082]	-0.015 [0.062]
Customs/Regulation	0.157* [0.086]	0.046 [0.090]	0.203** [0.100]	-0.066 [0.082]	0.169* [0.098]	-0.042 [0.076]
Any financial support during COVID	0.972*** [0.056]	0.016 [0.056]	0.324*** [0.066]	0.296*** [0.052]	0.335*** [0.067]	0.114** [0.049]
Constant	-0.603*** [0.213]	0.060 [0.214]	-0.594** [0.254]	-0.050 [0.202]	-0.992*** [0.250]	-0.015 [0.187]
Observations	10,260	10,260	10,276	10,276	10,173	10,173
Sector FE	yes	yes	yes	yes	yes	yes
Country FE	yes	yes	yes	yes	yes	yes

Source: EIB Investment Survey (EIBIS wave 2022). Note: The table presents results from 3 multinomial logit regressions. The baseline for each regression is "stay the same". Each regression controls for firm size and age categories, trading status, severity and type of trade shocks. Sector and country fixed effects are also included. Standard errors in brackets. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

On the other hand, response to trade disruption may depend also on the overall success on the marketplace. Better, more agile firms could have recovered from the shock without significantly changing their supply chain and global sales strategies. To investigate this narrative, Table A2. looks at the correlation between response to shocks



and the evolution of sales, the flip side of Table 5.<sup>2</sup> If for more agile firms, it is not necessary to respond to trade shocks or are less likely to do so, Table A2 in the appendix should show a positive coefficient for no action for firms experiencing no sales losses, or sales losses in 2019 but an increase in 2021. The results do not show highly significant correlation between sales dynamics and response. There is only weak evidence that firms that suffered sales losses in the Covid-19 pandemic and has not recovered since are more likely to look for domestic market solutions than not action at all. The result remains unchanged when pre-covid firm characteristics, such as labour productivity are controlled for.

On the sales growth expectations for 2022, disruptions in material access and new customs and trade regulation exert negative effects. Firms that reported experiencing major disruptions in global logistics or maritime trade do not expect to have lower or higher sales in 2022 than in 2019 compared to other firms.

*Table 6. Sales expectations in 2022 by the response to trade shocks*

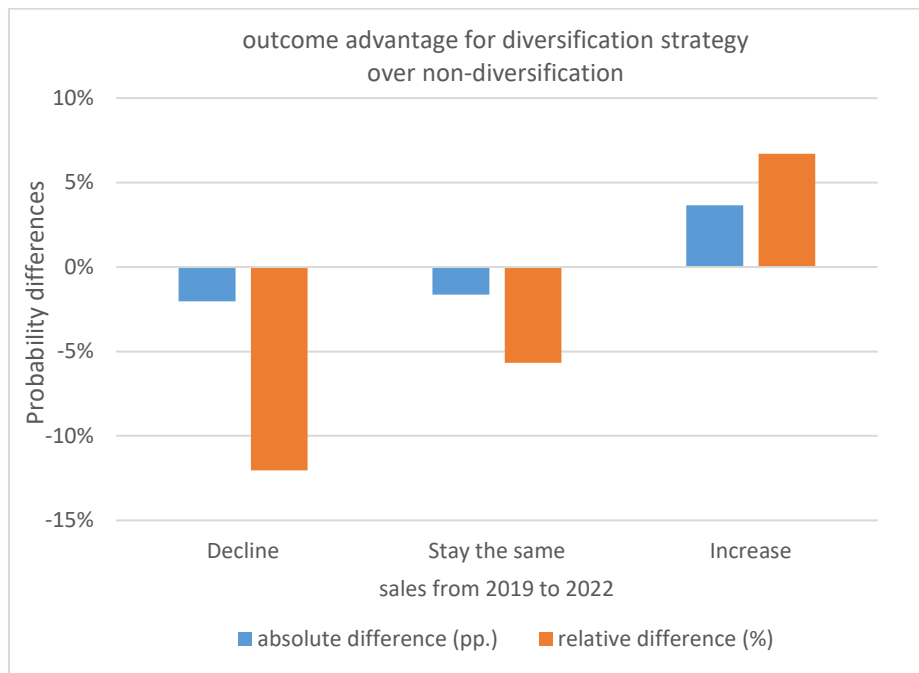
VARIABLES	(1)		(2)	
	sales from 2019 to 2022 decline	sales from 2019 to 2022 increase	sales from 2019 to 2022 decline	sales from 2019 to 2022 increase
Diversify-only	-0.022 [0.099]	0.150** [0.072]		
Domestic focus only	0.031 [0.094]	-0.016 [0.073]		
Domestic-Diversify	-0.126 [0.109]	0.074 [0.080]		
Diversification			-0.073 [0.078]	0.131** [0.057]
Domestic markets			-0.004 [0.075]	-0.040 [0.056]
Constant	-0.967*** [0.281]	-0.215 [0.212]	-0.973*** [0.280]	-0.179 [0.211]
Observations	8,193	8,193	8,267	8,267
Sector 12 FE	yes	yes	yes	yes
Country FE	yes	yes	yes	yes

Source: EIB Investment Survey (EIBIS wave 2022). Note: The table presents results from 2 multinomial logit regressions. The baseline for each regression is “stay the same”. Each regression controls for firm size and age categories, trading status, severity and type of trade shocks. Sector and country fixed effects are also included. Standard errors in brackets. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

<sup>2</sup> In addition, firms well prepared for trade shocks would have probably answered that they were unaffected by it, making it difficult to distinguish them from firms unaffected by trade shocks for other reasons. Also, unaffected firms did not answer the reply to trade shock questions in the questionnaire.

Firms that are taking actions to mitigate the effects of trade disruptions are more likely to expect higher sales in 2022 compared to 2019 than other firms are. Columns 1 and 2 of Table 6 display extensions of the last set of columns of Table 5 and contain indicator variable for firm responses. Column 1 adds variable on single and joint strategies, while column 2 includes indicators for diversification and for the strategy of focusing on domestic markets. For both specifications, the results suggest that firms that are taking actions to diversify across import or export partners are more likely to expect higher sales in 2022 compared to 2019.

Figure 8. Differences in sales outcome probabilities by response to trade-shocks



Source: EIB Investment Survey (EIBIS wave 2022).

To facilitate the interpretation of the results of the multinomial regression, Figure 8 displays estimated outcome differences for firms that engage in diversification compared to those that do not. Firms that diversify are 2 percentage points less likely to expect sales loss in 2022 compared to 2019 than other firms are. In relative terms, diversifiers are 12% less likely to expect sales decline. At the same time, the probability of expecting higher sales in 2022 also increases for diversifiers. The advantage is estimated to be 4 percentage points, or 7% in relative terms compared to other firms.

## 6 Conclusions

The two recent major episodes of trade disruptions, linked to Covid-19 and to the invasion of Ukraine, have renewed the debate on globalization and trade linkages and dependencies. Particularly, this debate is focusing on how global value chains have developed in the last decades and if, because of this evolution, their structure balance resilience to shocks with costs. The question is a topic of discussion in academia and policy. On the policy side, it relates to concepts, such as strategic autonomy, and independence that, as these two episodes clearly show, easily spill over from the economic realm to the political one (Yellen, 2022). This paper refers to the pure economic point of view, benefitting from the unique source of information constituted by the EIB Investment Survey (EIBIS) that investigated the corporates reactions to these two shocks. In this sense it provides the rationale of firms' behaviour, linking the shocks and the features of the firms, to their reactions.

The evidence from EIBIS survey suggests that firms' choices are related to the type of shock they experienced: if the shock is a major shock and has to do with logistic and transport the most likely reaction is to diversify. More digital, more innovative firms are more ready to implement strategies to tackle the shocks. Larger and more innovative firms seem to prefer diversification versus focusing on domestic markets. Taking into account expectations (particularly, sales expectations versus past levels of sales), the diversification strategy seems to be linked to positive sales expectations. Stretching a bit these results suggests that diversification can be considered a strategy promising good returns. Innovative firms or firms that experience good performances tend to implement diversification strategies.

One way to interpret these suggestions is to think that the management of the supply chains have become more difficult and, hence, riskier than what was thought before the shocks. This implies that there is a higher insurance cost that must be paid in order to keep things equal. The most obvious insurance cost for a firm is the level of inventories, but increasing the number of potential suppliers (and their locations) is another way of reducing the uncertainty. As for the decision regarding the internationalization of the firm, the choice to increase the diversification is a sort of binary choice, and it as to do with firm size and capabilities. Hence it is not obvious that this choice is available for every market participant. If this is the case, the consequence can be a larger gap between leader and laggard firms.

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## 8 Appendix

Table A.1. Responses to trade disruptions - by type, sources and causes

	(1)	(2)	(3)	(4)	(5)	(6)
	No action	Diversify	Diversify- only	Domestic focus	Domestic focus only	Domestic- Diversify
<b>PANEL A:</b>						
Logistics/Maritime	-0.028** [0.013]	0.049*** [0.014]	0.039*** [0.014]	0.022 [0.014]	-0.013 [0.015]	0.050*** [0.014]
Material	-0.094*** [0.013]	0.102*** [0.014]	0.077*** [0.014]	0.098*** [0.014]	0.058*** [0.015]	0.098*** [0.014]
Customs/Regulation	-0.058***	0.045***	0.040**	0.068***	0.075***	0.040**
Observations	8,430	6,891	5,551	6,571	5,231	5,032
R-squared	0.083	0.129	0.125	0.080	0.054	0.134
<b>PANEL B</b>						
Covid-19 - Trade disruption cause	-0.179*** [0.019]	0.174*** [0.020]	0.141*** [0.020]	0.141*** [0.020]	0.100*** [0.020]	0.097*** [0.019]
Russia-Ukraine war Trade disruption cause	-0.228*** [0.021]	0.206*** [0.022]	0.175*** [0.023]	0.195*** [0.023]	0.156*** [0.023]	0.120*** [0.022]
Both - Trade disruption cause	-0.301*** [0.017]	0.302*** [0.018]	0.228*** [0.018]	0.279*** [0.018]	0.184*** [0.018]	0.236*** [0.017]
Observations	9,082	7,401	5,993	7,124	5,716	5,443
R-squared	0.104	0.148	0.134	0.101	0.065	0.152

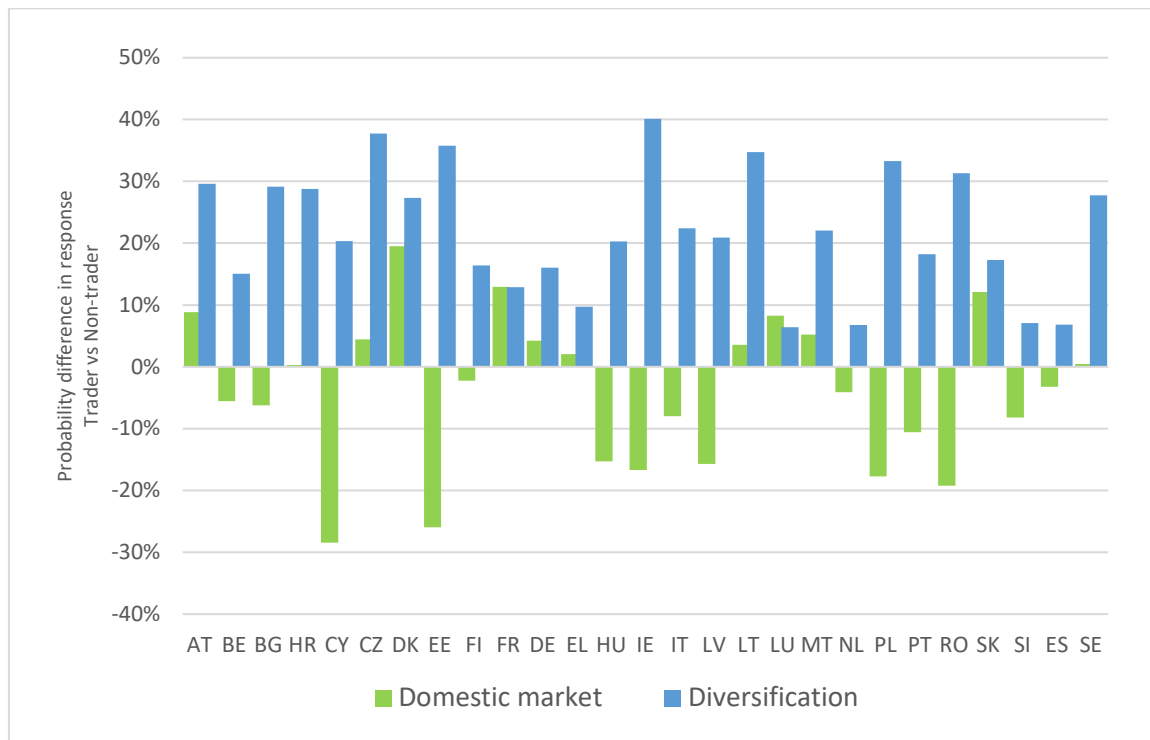
Source: EIB Investment Survey (EIBIS wave 2022). Note: The table presents results from 12 separate linear regressions, six for each panel. Each regression controls for firm size and age categories, trading status, severity and type of trade shocks. Sector and country fixed effects are also included. Standard errors in brackets. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table A.2. Responses to trade disruptions – by Covid-19 recovery

	(1)	(2)	(3)	(4)	(5)	(6)
	No Action	Diversify	Diversify- only	Closer- home	Closer- only	Closer- Diversify
<b>PANEL A</b>						
Sales 2019/2020 increased	-0.015 [0.017]	0.024 [0.018]	0.024 [0.018]	0.009 [0.019]	-0.010 [0.020]	0.021 [0.019]
Sales 2019/2020 declined, increase in 2021	0.010 [0.018]	-0.017 [0.020]	-0.017 [0.020]	-0.006 [0.020]	0.000 [0.021]	-0.010 [0.020]
Sales 2019/2020 declined, no increase in 2021	-0.023 [0.020]	0.017 [0.022]	0.017 [0.022]	0.039* [0.022]	0.027 [0.023]	0.034 [0.022]
<b>PANEL B: Pre-covid characteristics</b>						
Sales 2019/2020 increased	-0.015 [0.017]	0.024 [0.018]	0.024 [0.018]	0.010 [0.019]	-0.010 [0.020]	0.021 [0.019]
Sales 2019/2020 declined, increase in 2021	0.010 [0.018]	-0.017 [0.020]	-0.017 [0.020]	-0.005 [0.020]	0.002 [0.021]	-0.010 [0.020]
Sales 2019/2020 declined, no increase in 2021	-0.021 [0.020]	0.017 [0.022]	0.017 [0.022]	0.036 [0.022]	0.023 [0.023]	0.033 [0.022]
Labour productivity (in logs, Orbis)	0.026*** [0.009]	-0.001 [0.010]	-0.001 [0.010]	-0.047*** [0.010]	-0.062*** [0.011]	-0.015 [0.010]
Observations	6,235	5,155	5,155	4,807	3,783	3,727
R-squared	0.078	0.125	0.125	0.080	0.052	0.143
Sector 12 FE	yes	yes	yes	yes	yes	yes
Country FE	yes	yes	yes	yes	yes	yes

Source: EIB Investment Survey (EIBIS wave 2022). Note: The table presents results from 12 separate linear regressions, six for each panel. Each regression controls for firm size and age categories, trading status, severity and type of trade shocks. Sector and country fixed effects are also included. Standard errors in brackets. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

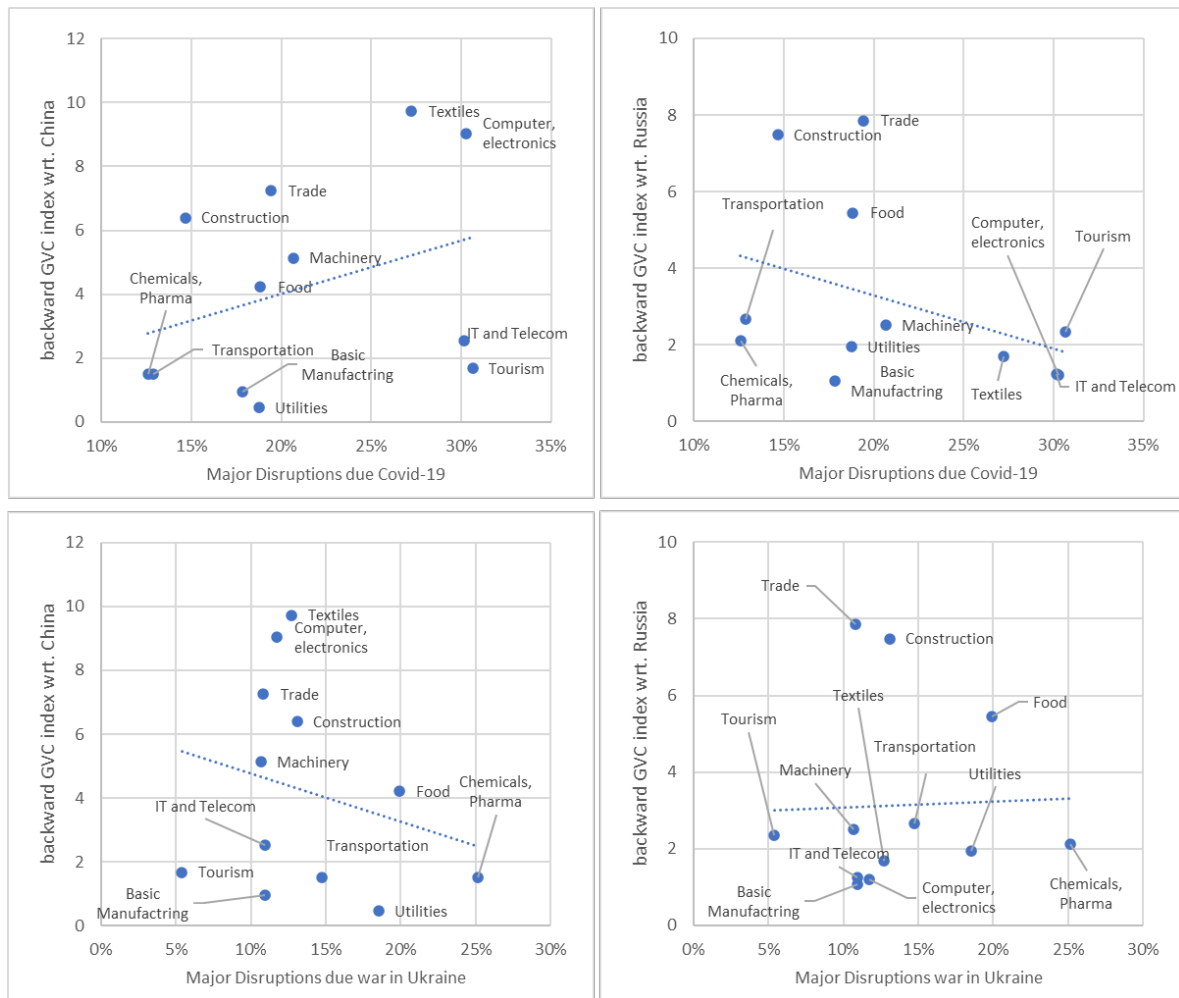
Figure A.1. Differences in response to trade shock: traders vs non-traders.



Source: EIB Investment Survey (EIBIS wave 2022). Note: The Figure shows percentage point differences in the average firms' response between trading and not trading firms. Green bars (Domestic market) show how much more non trading firms are likely to take action to mitigate the costs of disruptions by focusing on domestic markets compared to international traders (taken with negative sign). The blue bars show how much more international traders are likely to focus on diversification, with respect to non-traders. The statistics are calculated by taking a difference of value added weighted averages from EIBIS.



Figure A.2. Correlations between value chain participation and incidence type of disruption



Source: EIB Investment Survey (EIBIS wave 2022) and OECD. Note: The Figure shows the average sector level relationship between the sectors' backward global value chain (GVCB) participation index (share of value added exports that depend on value imported) with respect to China and Russia and the share of firms reporting major disruptions they attribute to the Covid-19 pandemic or the Russian invasion of Ukraine. The GVCB was calculated using the ICIO Stata package (Belotti et al., 2020) with 2021 edition of OECD global IO table.



# Trade disruptions in Europe:

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