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The Supply Chain Disruption Survey: A new survey on knowledge flows in global supply chains

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Abstract

Recent events have posed considerable challenges to supply chain, as demonstrated by trade data. Yet, firm-level information on the recent challenges remains scarce. The Supply Chain Disruption Survey addresses this gap by generating insights into firms' experiences and expectations regarding their supplier relationships, with a special focus on the role of intangibles and changes over time. Conducted as part of the RETHINK-GSC Horizon research project, the survey was carried out in Austria, Denmark, Germany, and Hungary between mid-2023 and spring 2024. The survey focused on medium-sized and large firms operating in various manufacturing industries. This paper has two main objectives: first, it provides information about the survey's background, design, questionnaire, and implementation; and second, it presents the key patterns visible in the survey. The results indicate that sourcing remains anchored in Europe but is diversified. Experiencing disruption was nearly universal between 2020 and 2023, mostly due to COVID-19, but also due to the war in Ukraine and trade policy changes. Despite the perception of the disruptions being of temporary nature, the anticipation of risk increased. Firms adopted different risk mitigation strategies, including diversifying their supplier portfolio and information sharing with suppliers.

Keywords: survey, questionnaire, supply chain, empirical research.
JEL-codes: F14, D22.

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1 Introduction

Global supply chains (GSCs) are a prominent feature of the world economy, with trade in intermediate inputs accounting for the majority of world trade. Yet, recent shocks - including the COVID-19 pandemic, geopolitical tensions, trade policy disruptions, and climate-related hold-ups - have exposed their vulnerability. Disruptions in one part of the supply chain can trigger cascading effects across firms, industries, and countries. The COVID-19 pandemic, in particular, highlighted these vulnerabilities and underscored the importance of robust responses to input shortages. Several studies focus on the impact of supply chain disruptions on firms' export and domestic activities during the COVID-19 pandemic. For instance, Lafrogne-Joussier et al. (2023) find that French firms relying on Chinese inputs saw a 5% drop in exports and a 5.5% decline in domestic sales, mainly due to firms ceasing to serve occasional foreign partners. Furthermore, beyond the adjustments in terms of suppliers' relationships, the pandemic also triggered deeper restructuring of the internal operational activities, forcing rapid adaptation in joint activities and task communication. However, administrative data typically do not capture the information on relationships between buyers and suppliers, which may be crucial for understanding firms' resilience to shocks.

Against this backdrop, the Supply Chain Disruption Survey was designed to explore input-output linkages and cooperation patterns between firms and their suppliers, shedding light on the relevance of intangibles alongside traditional tangible connections and on firms' reactions to shocks along GSCs. The survey captures firms' recent experiences and expectations regarding supplier relationships, enabling comparisons before and after COVID-19 across multiple EU countries and different types of firms occupying various positions in global supply chains.

Based on the Supply Chain Disruption Survey, this paper offers evidence on how supply-chain governance has adjusted since 2020. We show that sourcing of German, Austrian and Hungarian firms remains anchored in Europe but is meaningfully diversified, with many partners also in Asia and other industrial countries. Experiencing disruption between 2020 and 2023 was nearly universal as 93% of respondents reported disruptions, independent of the sourcing origin. These disruption experiences, though mainly temporary, have led to a shift in risk perception: firms anticipate more frequent disruptions compared to the pre-crises period. Facing higher risk exposure, firms adopted different risk mitigation strategies by diversifying their supplier portfolio and information sharing with suppliers.

The Supply Chain Disruption Survey is part of a Horizon Europe research project, "Rethinking Global Supply Chains: measurement, impact and policy" (RETHINK-GSC, No. 101061123), which aims to improve understanding of ongoing changes and challenges in global supply chains and provide new insights for poli-

cymakers. Conducted between mid-2023 and spring 2024 in Austria, Denmark, Germany, and Hungary, the survey covers medium-sized and large manufacturing firms. The choice of countries reflects three different environments in which European firms operate: a large country and smaller countries from Central-Western and Eastern parts of the EU, with different positions in value chains. We asked medium-sized and large firms operating in various manufacturing industries about different aspects of their relationship with their suppliers.

The main purpose of the Supply Chain Disruption Survey is to increase the knowledge of the changes and challenges currently affecting procurement processes and to understand how firms react to supply chain disruptions. The survey included questions like "What would be your firm's likely reaction to a sudden stop in delivery of a strategic input?", "How frequently do you meet personally with a representative of a strategic supplier?" and "How did it change since 2019?". Survey respondents provide valuable insights into their buyer-supplier relationships, including adjustments to and restructuring of internal operational processes and adaptation of joint innovation activities and task communication. This enables us to compare current trends across countries and industries, which cannot be identified using administrative data sets. Unlike administrative firm-level datasets, the Supply Chain Disruption Survey provides near real-time insights into firm-level economic activities, GSC processes and production networks and the dynamics thereof.

In addition, the survey allows for a comparison of expected changes and challenges faced by firms with different characteristics. More than two-thirds of responses can be linked to administrative datasets, allowing for richer firm-level characterization. These linked data can then be used directly in statistical analyses of the survey data and indirectly in the calibration of economic models. Literature on supplier-buyer linkages suggests that both firms' financial fundamentals - such as productivity, size, financial leverage, sector, and input requirements, available in administrative datasets - and strategic purchasing decisions influence firms' resilience (e.g. Elliott et al., 2022; Grossman et al., 2023). Therefore, the qualitative data from the survey complements balance sheet information from administrative records and helps us better understand the operation of firm networks and their impact on firm performance. The survey data, aggregated to country-industry bins, is publicly available online (DOI: 10.22000/MXMCoyURFeCSdIbn).

This paper describes the Supply Chain Disruption Survey and presents its main results. First, the following section discusses the background of the survey. Section 3 describes the survey design and process, the questionnaire and the sample in detail. Results to key questions on sourcing and collaboration patterns with strategic suppliers are provided in section 4. The following section 5 discusses the exposure and reaction of firms to shocks, focusing particularly on changes in collaboration patterns typically hidden in administrative data. The last section concludes.

2 Background

The Supply Chain Disruption Survey is motivated by the recent wave of crises affecting EU firms since 2019. These events have revealed weaknesses in supply chains, with repeated shortages hampering economic performance. Disruptions in one part of the supply chain can trigger cascading effects across firms, industries and countries (see Carvalho and Tahbaz-Salehi (2019) for a recent review of the theoretical and empirical literature on production networks)[1]. The COVID-19 pandemic and the Russian war - while providing unique empirical settings - gave new impulses to investigate supply chain vulnerabilities and firm responses to input shortages.

Several studies using global models rather than firm-level data provide insights into the broader transmission of shocks along global value chains (GVCs). Bonadio et al. (2020) quantify the economic impact of COVID-19 on global supply chains using a world production and trade model calibrated with OECD input-output data, while Eppinger et al. (2021) simulate the effects of China's COVID-19 shock on other countries. They find that decoupling strategies intended to reduce exposure to foreign shocks could lead to greater economic losses than potential benefits, limiting their effectiveness for building resilience. At the country level, Gerschel et al. (2020) estimate France's exposure to China's COVID-19 productivity slowdown by analyzing the share of Chinese value added in French production and the impact of travel restrictions on French GDP. Similarly, Heise (2020) show that U.S. sectors more dependent on Chinese imports experienced larger declines in production, employment, exports, and imports during the early phase of the pandemic, though these effects largely faded by mid-2020.[2]. Recent work also emphasizes conceptual and modeling perspectives on supply chain resilience. Ivanov and Das (2020) highlight the importance of intertwined supply networks encompassing interconnected supply chains, while Currie et al. (2020) point to the utility of simulation models for decision-making during the pandemic. Ivanov (2022) introduce the concept of a viable supply chain, emphasizing agility, resilience, and sustainability.

While the global transmission of supply chain shocks during the pandemic has been widely studied, the strategies firms adopted to mitigate increased risks and the subsequent internal reorganizations are not yet fully understood. From a policy perspective, this has raised questions about the overall resilience of the

[1]Previous empirical studies have used exogenous variation from natural disasters and weather-related events. For example, Boehm et al. (2014), Carvalho et al. (2021), and Todo et al. (2015) analyse the disruptions caused by the 2011 tsunami in Japan, while Martincus and Blyde (2013) investigate the consequences of the 2010 earthquake in Chile for supply chains. In addition, Kashiwagi et al. (2021) examine the propagation of supply shocks within and across countries following Hurricane Sandy in 2012 in the United States, while repeated weather-related shocks - including blizzards, floods, earthquakes, and hurricanes - were instead used by Barrot and Sauvagnat (2016) , London et al. (2023) and Balboni et al. (2024).

[2]This literature is part of a broader body of work on the microeconomic origins of macroeconomic fluctuations, including Gabaix (2011) and Carvalho and Gabaix (2013), which emphasize the role of firm size distribution in propagating shocks. Other studies document shock transmission across production networks at both industry (Acemoglu et al. (2016)) and firm levels (Barrot and Sauvagnat (2016), Carvalho et al. (2021), Boehm et al. (2019)).

economy. It is unclear whether, how and to what extent firms in different environments have responded to the emerging challenges. Firms are also challenged by an increasingly multipolar world, with new and sometimes competing production networks and political dynamics that may increase the need for nearshoring and friend-shoring.

The Supply Chain Disruption Survey seeks to address these gaps by directly asking firms about their recent experiences and future expectations regarding supplier relationships. It examines changes in supplier relationships and reactions to shocks along global supply chains, focusing on the role of intangible factors in procurement. Unlike administrative data, this survey captures real-time information from firms across various industries, regions, and supplier positions, enabling a comparison of trends before and after the disruptions. While statistical information such as registry data sheds light on elements such as performance and trading patterns, it does not capture firms' strategic considerations or granular decisions about sourcing and risk management. A survey instrument is able to empirically fill these knowledge gaps, which are important for a deeper understanding of the micro-dynamics and challenges that both managers and policymakers are trying to address.

This survey is not unique in its approach. Several surveys were launched in the immediate aftermath of the pandemic to capture firms' reactions to the shock. For instance, Borino et al. (2024) used the COVID-19 Business Impact Survey to find that international firms were more resilient than domestic ones, with their trade networks facilitating quicker adaptation to remote work and reducing lay-offs. de Lucio et al. (2023) show that Spanish manufacturers in global value chains mainly increased inventories, avoiding more complex adjustments, while Aksoy et al. (2022) report that German firms focused on stockpiling and supplier diversification, particularly among larger firms.

Nevertheless, the Supply Chain Disruption Survey offers two major contributions. First, it is our main interest to investigate changes in firms' perceptions and their supplier relationships *over time*. By asking about strategies before major disruptions - including COVID-19, the Russian-Ukrainian war, and trade policy shocks - and in 2023/2024, the survey provides a detailed, longitudinal view of how firms adapted Second, it goes beyond tangible aspects of production networks, incorporating *intangible factors* such as trust, knowledge flows, and informal communication in supplier relationships. These elements, not captured in administrative datasets and overlooked by earlier surveys, are crucial for firms' ability to respond to disruptions. Finally, the survey adopts a *multi-country approach*, allowing comparative analysis of firms operating in diverse economic environments and facing different levels of disruption.

3 The Supply Chain Disruption Survey

The Supply Chain Disruption Survey, part of the EU Horizon project "Rethinking Global Supply Chains: measurement, impact and policy" (RETHINK-GSC, No. 101061123), was designed as a multi-country survey to strengthen the (external) validity of the analysis. The setting allowed the research team to collect data reflecting a before and after impact scenario across countries, firm types, and positions in global supply chains. Conducted between mid-2023 and spring 2024, it covers four EU countries: Austria, Denmark, Germany, and Hungary. These countries were selected due to their different roles in value chains and their varying responses to recent shocks. Germany is a large economy at the technological frontier, with many multinational firms controlling parts of the value chain. Austria and Denmark are small, open economies at the technological frontier, with firms often occupying niche positions. Hungary is a small, open economy still catching up. Moreover, these countries have implemented different measures to address COVID-19 and support businesses, providing a rich setting to explore variation in supply chain management.

The Supply Chain Disruption Survey builds on insights gained from preceding surveys, the Business Relations Survey, and the WIFO Industry Survey. The Business Relations Survey (Békés et al., 2021)[3] aimed to explore the nature of supplier-buyer relationships by examining their number, share, and strength. It was conducted through computer-assisted personal interviews by GfK Hungary, a multinational market research company, who interviewed managers of 1,501 firms over several months in 2016 and 2017 in Hungary, Slovakia and Romania. The WIFO Industry Survey (Hölzl et al., 2025) is a paper-based survey of Austrian industrial firms focusing on competitive strategies, including product, procurement, and market strategies, and is conducted every three years.

3.1 Survey design and process

The sampling of the survey was based on firm size and industry. To capture the relationship with the most important suppliers, the survey focuses on *strategic inputs* and *strategic suppliers*. The former is defined as "purchased items with a high impact on profits and a high supply risk, or that are difficult to substitute", and the latter is defined as the ones "that have a high impact on profit and a high supply risk, or those that are difficult to replace". Identifying these elements is less straightforward in the services sector, so to ensure comparability across industries, the survey focuses exclusively on manufacturing firms. Small firms are also excluded, as they are less likely to have complex purchasing strategies or extensive supplier networks.

[3]The Business Relations Survey was funded by the European Research Council (ERC Starting Grant agreement number 313164) and the Hungarian Academy of Sciences Momentum Grant. The survey was initially called Central European Supplier Survey. For more information see here.

Accordingly, the survey focuses on medium and large manufacturing firms, i.e. firms classified as operating in the manufacturing sector (C) according to the classification of economic activities in the European Community (NACE, rev. 2), including divisions 10 to 33 at the two-digit level. To account for cross-country differences in the firm size distribution, we used different size thresholds across countries. We sampled firms with at least 50 employees in Germany, 25 employees in Austria, and 10 employees in Hungary and Denmark.

In Austria, Germany and Hungary, the survey samples and contact information were derived from register-based firm information. We constructed a sampling frame for these countries using the ORBIS database to ensure that surveyed firms could be linked to administrative datasets.[4] In Denmark, the Danish Export Association included the Supply Chain Disruption Survey as a separate section in their standard quarterly exporter survey in May and September 2023[5]. Consequently, the members of the Danish Export Association formed the base for the Danish sample. Country-specific implementation details are provided in AppendixA.1.

The survey was implemented using the online platform Qualtrics. To increase transparency and trust, an accompanying multi-language website - https://suppliersurvey.eu/ - provided additional information for the participants, and also presented the GDPR-compatible privacy policy. To further enhance trust and interest in the survey, survey distribution in specific countries was supported by well-known institutions, such as the German Chamber of Commerce and Industry (DIHK) in Germany and the Hungarian Association for Logistics, Purchasing and Stockpiling (MLBKT) in Hungary, and the Danish Export Association in Denmark. In Austria, the survey was carried out by WIFO, which is widely known among Austrian firms for its regular business surveys.

The survey was explicitly designed to be completed by purchasing managers. In all countries, contact persons within the sampled firms - preferably purchasing managers - were approached directly. To maximize response rates, the survey process was adapted to the respective survey culture in each country. The questionnaire was translated into the local language, with the option to switch to English - , facilitating completion and ensuring a harmonized understanding of the survey across countries.

Participation in the survey was voluntary.[6] To encourage participation, we employed several techniques. In addition to support from well-known local institutions and country-specific contact strategies, respondents

[4] In Austria, ORBIS information was cross-checked with Herold Business Data.

[5] To increase the number of responses from Denmark, selected questions from the Supply Chain Disruption Survey were integrated directly into the Danish quarterly survey in September 2023.

[6] This inevitably leads to a relatively high non-response rate, which is common in business surveys. Non-response can be problematic if the answers of non-respondents systematically differ from those who participate, potentially introducing bias. Higher response rates increase the reliability and representativeness of results. Response rates in this survey are comparable to those of similar business surveys. Section 3.3 shows that respondents resemble the underlying firm population along several observable characteristics.

were offered the option to receive a benchmark report for their firm.[7] Notably, 71% of respondents requested such a report.

To reduce the number of dropouts, respondents were allowed to skip questions, and linking survey responses to administrative data was optional. Anonymity and GDPR compliance were strictly enforced throughout the survey process and explicitly communicated to participants.

3.2 Questionnaire

We designed the questionnaire based on previous experiences from the Business Relations Survey and the WIFO Industry Survey. The questionnaire is based on numerous pilot interviews and discussions with experts, who emphasized the need for a more broad analysis of supply chain disruptions at the firm level. The online survey was designed to take about 20 minutes; the actual median completion time was 24 minutes, which respondents generally considered long.

The questionnaire covers multiple dimensions of supplier relations. It asks about both current relationships and recent experiences with strategic suppliers, with a particular focus on supply chain disruptions and firms' reactions. More specifically, the survey includes questions on sourcing patterns (part 1), experienced disruptions (part 2), changes in suppliers (part 3), reasons for and reactions to disruptions (part 4), joint activities with suppliers such as knowledge flows and innovation (part 5), cooperation patterns including communication modes and frequency (part 6), and the integration of new suppliers (part 7).

We learn about the overall supplier portfolio with questions like "Do you expect a change in the importance of the following geographical markets for the sourcing of your strategic inputs in the next 5 years?" Questions like "Compared to 2019, how has the risk of not supplying for a specific reason changed?" and "Does your firm audit either formally or informally any of its indirect suppliers?" inform us about risk perception and management. Finally, we ask about knowledge sharing and collaboration with questions like "Does your firm perform specific activities that involve a close cooperation with strategic suppliers?" and "What would be the impact of having no possibility for any in-person meeting during the integration process of a new supplier?". The full questionnaire is provided in Appendix B.

While most sections refer to strategic inputs and suppliers in general, part 6 differs: it asks about the most important strategic suppliers from different regions. Respondents were randomized into two groups-one asked first and in more detail about an EU supplier and then a non-EU supplier, and the other group vice versa. This design helps identify differences between EU and non-EU suppliers.[8]

[7] Patterns derived from anonymized responses not only inform policy but can also be valuable to participating firms.

[8] Although optional, firms could also provide the names of the two suppliers and the inputs they supply, which in some cases

3.3 Response rate and data quality

The sample size varies across countries according to the heterogeneity of the four surveyed economies. Based on an anticipated response rate of 10%, the sampling frame includes between 6 to 7 times more firms than the final sample. [9] Table 1 provides a comparative overview of participation and engagement levels across the four survey economies, Austria, Denmark, Germany, and Hungary. Table 1 includes information on the initial sample size, response rates, completion rates, and subsequent engagement metrics. Our response rate aligns with broader trends showing survey fatigue after COVID-19, particularly for online surveys. In the Supply Chain Disruption survey, the engagement rate, i.e. the proportion of firms providing any response relative to the sample size (AnyResponse/ Sample), ranges from 4% in Hungary to 12% in Austria, yielding an overall engagement rate of 6% across countries.

Table 1: Response rates

	Austria	Denmark	Germany	Hungary	TOTAL
Initial sample (Number of firms)	2900	386	20187	7820	31293
Any response/ Sample	10%	11%	6%	4%	6%
Completed response/ Sample	6%	1%	4%	2%	3%
Completed response/ Any Response	62%	10%	57%	57%	57%
Partial response/ Any Response	11%	56%	17%	11%	15%
Early dropouts/ Any Response	28%	34%	26%	33%	28%
Responses on specific supplier (part 6)/ Completed	26%	50%	20%	34%	22%
Firms linkable to administrative data/ Completed	100%	100%	59%	70%	68%
Firms ask for Benchmarking Report/ Completed	77%	100%	71%	58%	70%

Note: A completed response is defined as one in which a response is given to any question within the last two part (part 7-8). A partial response is defined as one in which a response is given to any question beyond part 1 (background information) but no question is answered in the last two blocks. An early dropout is defined as one starting the questionnaire but not answering any question beyond part 1 (background information).
Source: Supply Chain Disruption Survey. Own calculations.

The completion rate was with 7% highest in Austria and with 2% lowest in Hungary. Among firms that provided any response, the proportion that fully completed the survey was with around 55% relatively uniform in all countries, regardless of country specific factors influencing initial contact success. Additional 10-19% gave partial responses to the questionnaire. Country-specific differences and perceptions however determine the share of firms in each country that allowed us to be linked to external administrative data sources like financial data from ORBIS. In total, 68% of all the respondents can be linked to administrative data, ranging from 17% in Denmark to 100% in Austria[10]. Disregarding Denmark, 21% to 33% of the

allows us to identify exact supplier–buyer links.

[9] An exception was Denmark, where we only targeted the members of the Danish Export Association, resulting in a disproportionally smaller initial sample.

[10] Note, that in the Austrian survey we ask respondents to allow for linking their responses to administrative data before proceeding to the survey, while in all the other countries it was an option to be chosen at the end of the survey. As in Austria,

Table 2: Respondent statistics

Function of respondent	Austria	Denmark	Germany	Hungary	Total
Purchase	34%	0%	51%	26%	44%
General management	46%	100%	36%	43%	39%
Production	3%	0%	3%	4%	3%
Finance	8%	0%	3%	10%	5%
Other	9%	0%	7%	16%	9%
Worked at the firm in 2019	90%	100%	84%	79%	84%

Note: Shares in completed responses of Question 36 "In which function do you work in this firm?" and Question 37 "Have you already worked at the firm in 2019?" Number of respondents: 717 for Germany, 164 for Austria, 179 for Hungary. As the question is at the end of the survey, the response rate is relatively low.
Source: Supply Chain Disruption Survey. Own calculations.

respondents reported the identity of a specific supplier we asked about.

Our survey distribution strategy of targeting informed respondents - purchasing managers or general managers - ensures data quality. This targeting is reassured by the self-reported composition of respondents presented in table Table 2. 83% of the respondents are from purchase of general management, and 84% worked at the firm already in 2019, being able to answer retrospective questions.

3.4 Sample characteristics and representativeness

Table 3 presents the share of completed responses by industry group, compared to the share of the same groups in a country within all the manufacturing firms above the country-specific employment cut-off. This comparison provides insight into the representativeness of the survey sample relative to the underlying industrial structure. The survey tends to over-represent firms from the NACE 26-30 sectors - which include manufacture of computer, electronic and optical products; electrical equipment; machinery; motor vehicles; and other transport equipment - particularly in Germany and Austria. Smaller and lighter industries, such as food or textiles, are somewhat under-represented. In Hungary, the distribution is more balanced, with the sectoral shares of respondents generally mirroring those in the underlying economy. Overall, although the survey captures relatively more large firms in capital- and technology-intensive manufacturing sectors, industries which typically are more integrated into global supply chains, there are no substantial distortions in terms of industry coverage.

Table 4 compares the country-specific size distribution of manufacturing firms in the survey with those in the economy. Similarly to Table 3, the calculation of the comparison of the economy includes only firms above the specific size cut-off we apply in the survey for the respective country. The size distribution in the

WIFO regularly contacts these firms with surveys, we expected a lower dropout rate due to the linking requirement.

Table 3: Distribution of survey respondents by industry across countries

		Share of firms within manufacturing	
Country	NACE	survey respondents	economy
Germany (>50 emp)	10-12	7%	15%
	13-15	1%	3%
	16-18, 31-32	11%	13%
	19-23	22%	18%
	24-25	21%	20%
	26-30	38%	32%
Austria (>20 emp)	10-12	8%	19%
	13-15	3%	3%
	16-18, 31-32	15%	21%
	19-23	21%	14%
	24-25	18%	19%
	26-30	34%	23%
Hungary (>10 emp)	10-12	17%	20%
	13-15	5%	6%
	16-18, 31-32	20%	17%
	19-23	17%	15%
	24-25	22%	24%
	26-30	19%	18%

Note: The respondents sample for Germany covers 1100 firms, the sample for Austria 194 firms, and the sample for Hungary 258 firms. Responses include firms that at least covered the section on sourcing patterns. Due to the low number of completed responses, industry shares for Denmark are not reported.
Source: Supply Chain Disruption Survey. Economy wide specific industry shares are based on Eurostat data from 2023. Own calculations.

German sample is close to the economy-wide one, while small firms are somewhat under-represented in the Austrian and Hungarian survey samples. In addition, we also consider ownership characteristics to assess the representativeness of the sample. Looking at ownership characteristics, Table 5 compares the share of firms in European and non-European firm groups. The survey sample is close to the economy-wide shares of EU multinational enterprises (MNE) and firm groups outside the EU for Germany, Austria and Hungary.

Table 4: Distribution of survey respondents by size across countries

Country	Number of employees	Share of firms within manufacturing survey respondents	economy
Germany (>50 emp)	below 50	2%	0%
	50-250	71%	76%
	250 or more	26%	24%
Austria (>20 emp)	below 50	20%	52%
	50-250	57%	35%
	250 or more	22%	13%
Hungary (>10 emp)	below 50	51%	73%
	50-250	33%	21%
	250 or more	15%	6%

Note: The respondents sample for Germany covers 1100 firms that filled in the survey, either fully or partially, at least starting the section on sourcing patterns, the sample for Austria 194 firms, and the sample for Hungary 258 firms. Due to the low number of completed responses, size category shares for Denmark are not reported.
Source: Supply Chain Disruption Survey. Economy wide specific size group shares within manufacturing are based on Eurostat data from 2023. Own calculations.

Table 5: Distribution of survey respondents by ownership links across countries

Country	Foreign group	Share of firms within manufacturing survey respondents	economy
Germany (>50 emp)	From the EU	14%	13%
	Outside the EU	9%	15%
Austria (>20 emp)	From the EU	24%	20%
	Outside the EU	8%	9%
Hungary (>10 emp)	From the EU	16%	18%
	Outside the EU	7%	8%

Note: Share of respondents answering to question Question 2: "The company is part of a non-European multinational firm" or "The company is part of a European multinational firm". As the question was not asked for Austrian firms, classification is done based on the country of global ultimate owners in ORBIS. The respondents sample for Germany covers 1100 firms that filled in the survey, either fully or partially, at least starting the section on sourcing patterns, the sample for Austria 164 firms for which ownership information is available, and the sample for Hungary 258 firms. Due to the low number of completed responses, ownership category shares for Denmark are not reported.
Source: Supply Chain Disruption Survey. Economy wide specific MNE shares are based on Eurostat foreign controlled enterprise data in manufacturing from 2021, compared to the total number of manufacturing firms above the country-specific size cut-off. Own calculations.

4 Sourcing Patterns and Supplier Relationships

4.1 Sourcing patterns

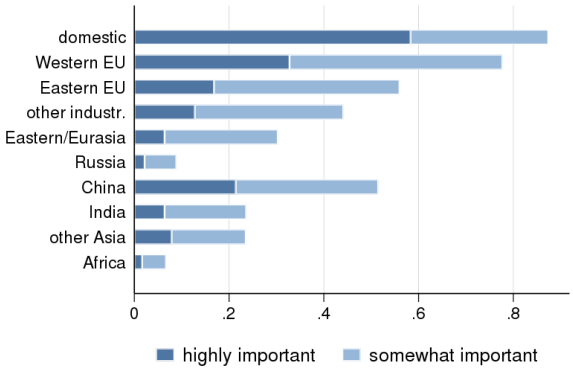
The Supply Chain Disruption Survey allows us to describe the sourcing and collaboration patterns of firms with their strategic suppliers in detail. The median firm sources from 10 different strategic suppliers. Larger firms in general tend to source from more strategic suppliers - with a median of 20 strategic supplier - than smaller firms - with a median of 5 strategic supplier. The median number of strategic suppliers is similar across industries, though slightly higher (median of 12 strategic supplier) in the computing, electric equipment and motor vehicle industry group.

While the domestic market is a highly important sourcing region for the majority of respondents, Figure 1 shows that firms in our sample import from various regions around the world. Beyond the domestic market, most of the strategic inputs come from other European markets, but Asian economies - especially China - are also important for many firms. Despite regional diversification, the most important supplier markets are nevertheless focused on a few countries. 54% of the respondents sourcing from the EU stated that their most important strategic supplier is from Germany, followed by Austria (9%) and Italy (7%). Taking out the four surveyed countries, the top three EU sourcing countries were Italy (24%), Poland (12%) and France (11%). Outside the EU, the three most important countries are China (42%), the US (13%) and Switzerland (8%), followed by India and Turkey (each 5%).

70% of the firms can independently choose their suppliers of strategic inputs, and 23% can choose at least some of them, while others are decided e.g. at the group level or by the buyer. The most important strategic suppliers tend to be large firms, irrespective of their region. 48% of the most important strategic suppliers from the EU are large firms with more than 250 employees and 38% are medium-sized (50-249 employees), and the same numbers for the most-important non-EU suppliers are 53% and 36%. Only 7% of the most important strategic suppliers are part of the same multinational and only 4% are part of the same business group.

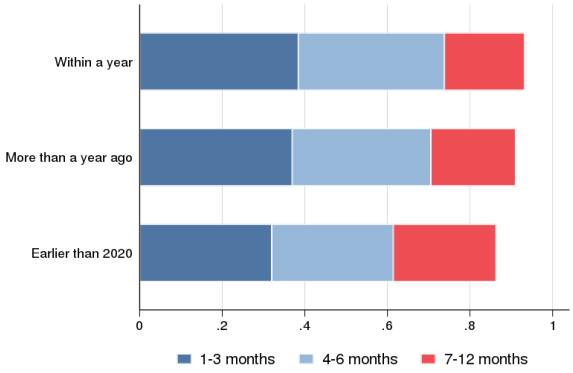
Integrating a new supplier of strategic inputs happens within 3 months for 37% of the respondents and within half a year for 70%, and the process lasts for more than a year for only 9%. As Figure 2 shows, patterns are similar for firms adding a new supplier more or less recently, though this process was typically somewhat longer for those firms which had a new supplier a long time ago, i.e. earlier than 2020. Friesenbichler et al. (2025b) show that longer integration times raise sunk and coordination costs, creating frictions such that firms alter their supplier pool less often when onboarding new suppliers takes long.

Figure 1: Sourcing patterns: Share of firms for whom a sourcing market is important



Note: The figure shows the share of respondents for whom a specific geographical market is highly or somewhat important as a location of production for strategic inputs, based on the multiple choice Question 6 "Think about the location of production of your firm's strategic inputs. How important are the following geographical markets for the sourcing of your strategic inputs?", with response options "Not important", "Somewhat important" and "Highly important", and with markets "Domestic market", "Western, Northern and Southern EU", "Eastern EU", "Other industrialized economies like UK, Switzerland, Norway, USA, Canada, Japan", "Other Eastern Europe and Eurasian countries (Balkans, Turkey, Ukraine etc.) ", "Russia", "China", "India", "Other South, South-eastern and Eastern Asia (Vietnam, Malaysia, Indonesia, South-Korea, etc.)", "Africa", "Other". Number of observation: 1,331 responses.
Source: Supply Chain Disruption Survey. Own calculations.

Figure 2: The length of a new supplier's integration process



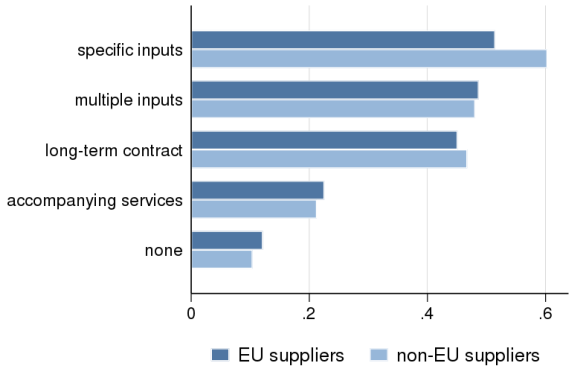
Note: The figure shows the share of respondents with a specific duration of the integration process for the last new supplier of strategic inputs, separately by the time of the last integration. This is based on Question 33 "How long did the integration process take from the initial intent to the first purchase order?" with answer options "1-3 months", "4-6 months", "7-12 months" and "More than a year"; and Question 32 "Think about the last time you added a new supplier of a strategic input to your value chain. When did that happen?", with answer options "Within the last year", "More than a year ago, but no earlier than 2020", "In 2019 or earlier" and "Cannot remember of such event". Number of observations: 923 responses, 458 adding a new supplier within a year, 268 more than a year ago but after 2019 and 197 before 2019.
Source: Supply Chain Disruption Survey. Own calculations.

4.2 Relationship with the most important strategic suppliers

Part 6 of the survey reveals hidden relationship characteristics of the firms with their most important strategic suppliers. Figure 3 shows the share of respondents with specific relationship characteristics with their most important supplier. Among the firms' most important strategic suppliers, 54% produce specific inputs made or adjusted for the firm, 49% provides multiple inputs, but only 22% provides accompanying services. As many important aspects of trade – e.g., reliability, demand assurance, flexibility, quality, and payment terms – are non–contractible and potentially subject to opportunistic behaviour, firms tend to stick with partners they trust. We observe that around 46% of the respondents have a long-term contract with their most important strategic supplier. Note that the survey question allowed multiple selection, these relationship features can - and likely do - coincide (e.g., a supplier of a customized input may also have a long-term relationship with the firm). Nevertheless, the high prevalence of customization alongside widespread multi-input sourcing points to concentrated, strategically important relationships, while the comparatively low incidence of service bundling suggests untapped scope for co-development or integrated support. Figure 3 shows that there are no considerable differences in terms of these characteristics between EU and non-EU suppliers; the only notable difference is a somewhat higher share of non-EU suppliers producing firm-specific inputs, mainly driven by firms in the computer, electrical equipment, machinery, motor vehicle and transport equipment industries, and suppliers in China and Turkey.

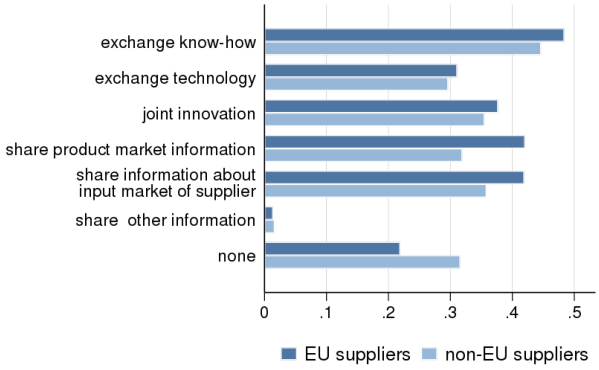
Further, 76% of the firms collaborate closely with their most important strategic supplier. A considerable share of firms exchanges know how, own product market or suppliers' input market information with their most important strategic suppliers or jointly innovates with them. Firms often share knowledge and information with their suppliers when seeking to procure high-quality products (Dyer and Nobeoka, 2000). Sharing technology is with around 30% somewhat less frequent. As Figure 4 suggests, these activities are more prevalent with suppliers within the EU than with those outside. Baldwin and Freeman (2022) stress that a proper risk management requires high degrees of collaboration and cooperation in GSCs. Although these have many facets, trust and information sharing are the most common ingredients. Friesenbichler et al. (2025a) argue that information sharing between buyers and suppliers can be portrayed as a mechanism for mitigating uncertainty and improving supply chain performance by reducing information asymmetries. They show that joint innovation with suppliers, which represents a deeper, more structural form of collaboration than information sharing, can improve the resilience of the configuration of the supply chain. Security of supply and quality assurance are the most important factors driving the collaboration with strategic suppliers in general. Also, cost savings, regulatory compliance, strategic technological development and protection of intellectual property rights all play a highly important role for about half of the firms (panel (a) of Figure 5).

Figure 3: Share of firms with specific relationship characteristics with their most important supplier, by supplier origin



Note: The figure shows the share of respondents reporting that their most important strategic supplier has a specific characteristic, separately for EU and non-EU suppliers. This is based on the multiple choice Question 18 and multiple choice Question 27: "Which statement is true for your supplier?", with answer options "The supplier produces specific inputs made/adjusted for your firm.", "The supplier provides multiple inputs for you.", "You have long-term contractual agreements with the supplier.", "The supplier also provides accompanying services related to the input." and "None of the above.". Firms were first asked about their most important EU or non-EU supplier randomly, then about the most important supplier from the other region. They could choose the two most important suppliers from one region if they had no suppliers from the other one. Number of observations: responses from 1118 firms, with 1477 stating having a most important strategic supplier from the EU and 597 from a non-EU country.
Source: Supply Chain Disruption Survey. Own calculations.

Figure 4: Share of firms with collaborative activities with their most important strategic suppliers, by supplier origin

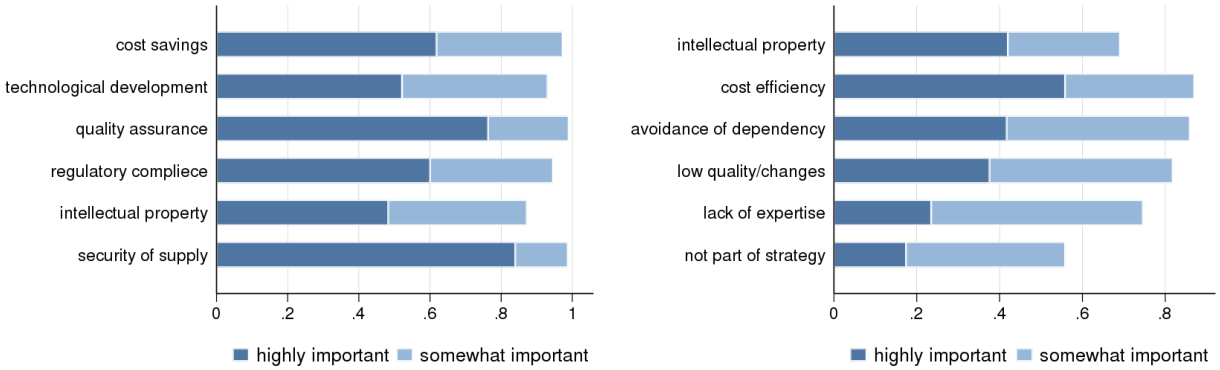


Note: The figure shows the share of respondents reporting a specific type of collaboration with their most important strategic supplier, separately for for EU and non-EU suppliers. This is based on the multiple-choice Question 20: "Which activities do you undertake with your strategic supplier?", with answer options "Exchange important know-how about your product", "Exchange production technologies", "Joint innovation", "Sharing market information about your product", "Sharing information about your supplier's input market", "Sharing information about something else", and "None of the above.". Firms were asked about their most important EU or non-EU supplier randomly. Number of observations: 1111 responses, 804 with suppliers from EU countries and 307 with suppliers from Non-EU countries.
Source: Supply Chain Disruption Survey. Own calculations

The most important factor hampering collaboration with suppliers is cost efficiency, followed by concerns related to the protection of intellectual property rights, avoidance of supplier dependency and low quality. The lack of knowledge and expertise at the strategic supplier or the own firm strategy are less decisive factors that impact the decision not to collaborate with strategic suppliers in general (panel (b) of Figure 5).

Figure 5: Reasons to collaborate or not with strategic suppliers

(a) Share of firms that report a specific reason to collaborate (b) Share of firms that report a specific reason to not collaborate

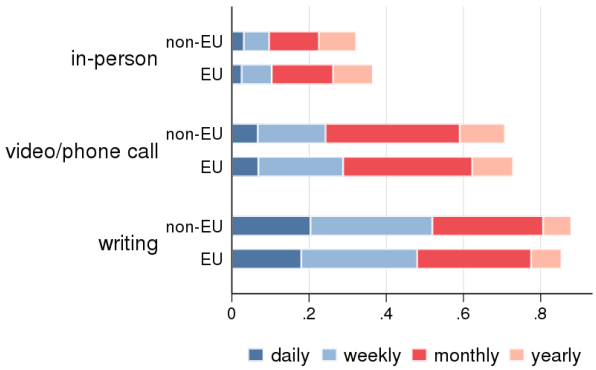


Note: The figure shows the share of respondents stating a factor as highly or somewhat important for choosing to collaborate (panel (a)) or not collaborate (panel (b)) with strategic suppliers. Panel (a) is based on the multiple-choice Question 13a "How important are the following factors to your firm's collaborative activities with strategic suppliers?", with answer options "Cost savings", "Strategic technological development", "Quality assurance", "Regulatory compliance", "Protection of intellectual property rights" and "Security of supply", and response alternatives "Not important", "Somewhat important" and "Highly important". Panel (b) is based on multiple-choice Question 13b: "How important were these factors in deciding not to collaborate with your strategic suppliers?", with options "Protection of intellectual property rights", "Cost efficiency", "Avoidance of supplier dependency", "Low quality/changes in technical details/changes in material", "Lack of necessary knowledge/expertise/potential partners" and "Not part of the firm's strategy", and response alternatives "Not important", "Somewhat important" and "Highly important". Number of observations: 773 responses in panel (a) and 362 in panel (b).
Source: Supply Chain Disruption Survey. Own calculations.

Effective communication with suppliers is essential for close collaboration and creates a common understanding of input requirements, schedules, and changes, thereby reducing uncertainty and information asymmetries. Regular, transparent exchanges also build trust and accountability, align incentives for quality and service, and increase flexibility and resilience - especially when inputs are customised or demand is volatile. Face-to-face interactions are widely recognised as a pivotal component of organisational capability because they facilitate the transfer of knowledge (e.g. Storper and Venables, 2004; Storper, 2004). By enabling the transformation of tacit knowledge into explicit knowledge, face-to-face contact lies at the heart of the process of knowledge creation and diffusion in organisational contexts (Nonaka, 1991). Despite the importance of face-to-face contact, in-person meetings with important strategic suppliers take place at least monthly for only about 27% of the respondents. Figure 6 reveals that around 65% of the firms do not even meet in-person with their most important strategic suppliers once a year. Communication with their most im-

portant strategic suppliers happens mostly in writing and via phone or video calls. Distance technologies might reduce costs by allowing codified knowledge to be disseminated at a significantly lower cost than tacit knowledge (Olson and Olson, 2003; Roberts, 2000). In recent years, the increasing popularity of remote communication technologies and the net acceleration of their use caused by the COVID-19 pandemic put the value of face-to-face interactions under question. 49% of the firms communicate with their most important strategic suppliers in writing at least once a week and 28% have at least one weekly video or phone call. As Figure 6 shows that there are no considerable differences in the communication patterns with strategic suppliers between suppliers within the EU and outside the EU.

Figure 6: Frequency of communication with the most important supplier



Note: The figure shows the share of respondents reporting a specific approximate frequency of communication with their most important supplier by the mode of communication and separately for EU and non-EU suppliers. This is based on Question 21 and Question 28: "How often do you or your colleagues communicate with this supplier, apart from sending orders and receiving invoices?", with answer options "In-person meeting", "Via video or phone call", and "In writing, including e-mails", each with a slider to choose the frequency with "Never" and "Almost every day" as the two extremes, and orientation points in between as "Once a year or more but not every month", "Once a month or more but not every week" and "Once a week or more but not every day". We assigned values chosen in the corresponding quintile to one of these categories. Firms were first asked about their most important EU or non-EU supplier randomly, then about the most important supplier from the other region. They could choose the two most important suppliers from one region if they had no suppliers from the other one. Number of observations: 1094 firms, with 1450 EU-suppliers and 589 non-EU suppliers.
Source: Supply Chain Disruption Survey. Own calculations.

5 Exposure and reactions to shocks

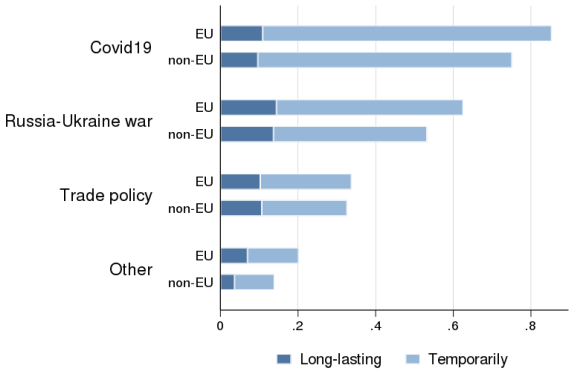
5.1 Experienced disruptions

The Supply Chain Disruption Survey (part 2) documents that firms experienced a turbulent period between 2020 and 2023. During this period, firms faced multiple shocks due to the COVID-19 pandemic, the war in Ukraine and trade policy changes also contributed to the unstable environment. Figure 7 presents the

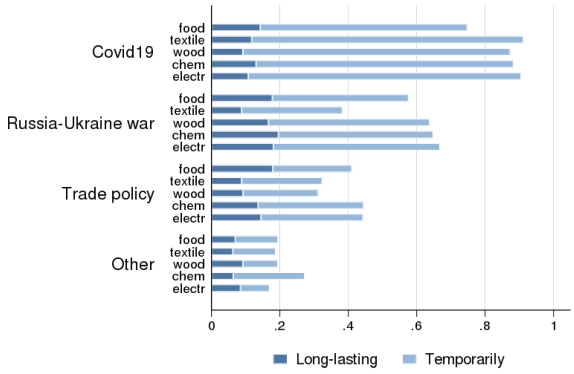
share of firms which reported temporary or long-lasting disruptions in the delivery of a strategic input due to specific reasons sourced from within the EU and outside the EU and by industry. Overall, 93% of the respondents report that they experienced at least one disruption between 2020 and 2023. On average, 89% of the firms reported disruptions in their supply chain related to COVID-19, with a slightly higher share of firms stating that the source of disruption was coming from within the EU compared to delays or interruption of strategic inputs sourced from suppliers outside the EU. On average, 66% of the firms reported disruptions due to the Russian-Ukraine war and 40% related to trade policy changes and 21% for other reasons. Most of these disruptions, however, were temporary. Only 31% reported any long-lasting disruptions, 14% related to the pandemic, 18% related to the war in Ukraine, 13% related to trade policy changes and 7.5% due to other reasons.

Figure 7: Share of firms that experienced disruptions in their supply chain

(a) by origin of the strategic input



(b) by industry



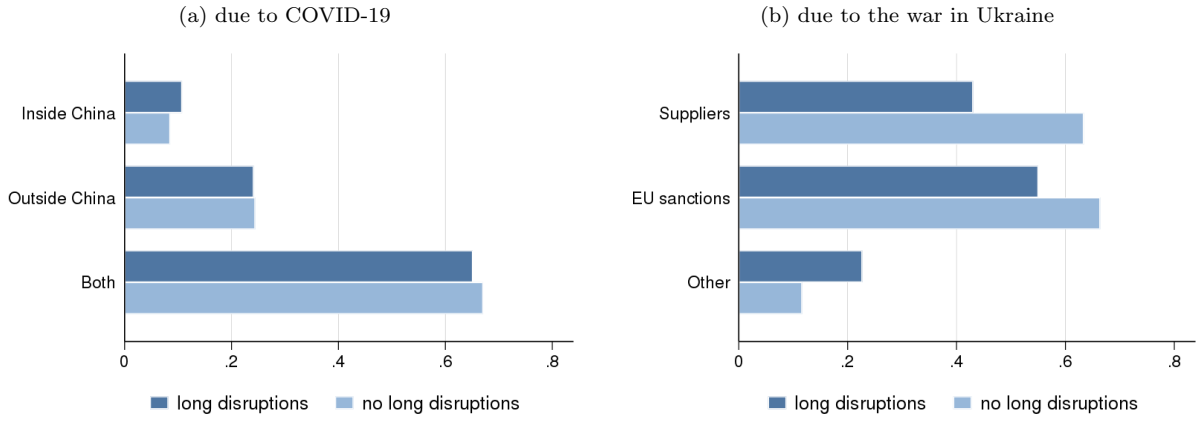
Note: The figure shows the share of respondents reporting temporary or long-lasting disruptions due to specific reasons. This is based on the multiple choice Question 7 "Since 2019, have you experienced any delays or interruptions in the delivery of your strategic inputs that come from suppliers within the EU?" and Question 7/1: "Since 2019, have you experienced any delays or interruptions in the delivery of your strategic inputs that come from suppliers outside the EU?", with response alternatives "Yes, temporarily", "Yes, long-lasting", "No", "Do not know". Number of observations: 1297 responses in panel (a), with 1296 for suppliers within the EU and 1279 for suppliers outside the EU, and 1297 responses in panel (b), with 119 firms from food, drink and tobacco industries (*'food'*), 34 from textile and leather (*'textile'*), 174 from wood, paper and printing (*'wood'*), 230 from petrol-chemical and chemical (*'chem'*), 232 from the metallurgical and 347 from computing, electric equipment and motor vehicle industries (*'electr'*)
Source: Supply Chain Disruption Survey. Own calculations.

Panel (a) of Figure 7 shows that disruption patterns are similar across sourcing origins, with disruptions in the delivery of strategic inputs reported slightly more often for suppliers within the EU than for non-EU suppliers. Panel (b) of Figure 7 indicates that patterns are also relatively consistent across industries. The food industry was least affected by COVID-19-related disruptions, while the war in Ukraine had the smallest impact on the textile sector. Textile and wood industries were likewise the least affected by disruptions linked

to trade policy changes. Disruptions were similarly distributed across firm size groups, with a marginally higher share of affected larger firms, reflecting their deeper integration into global supply chains. This is consistent with Bricongne et al. (2025), who show that exports of the largest French exporters fell more sharply during the pandemic, and with Di Giovanni et al. (2024), who document that foreign shocks generate more pronounced fluctuations for larger firms due to their greater involvement in international trade.

In general, the COVID-19 pandemic caused supply chains disruptions for more firms than the Russian-Ukrainian war or disruptions due to trade policy changes. However, the COVID-19 shock seems to have been more temporary than the Russian-Ukrainian war, which was more often perceived as a long-term disruption. Friesenbichler et al. (2024) observe that between 2020 and 2023, firms experienced multiple shocks simultaneously, with different causes and perceived durations.

Figure 8: Reasons for experienced disruptions



Note: The figure shows the share of respondents reporting specific reasons behind disruptions due to COVID-19 (panel (a)) or the Russian-Ukraine war (panel (b)), separately for firms with no or temporary disruptions and with long-lasting disruptions. This is based on Question 7/a "Was the disruption caused by the COVID-19 pandemic either directly or indirectly caused by suppliers inside or outside China?", and Question 7/b "What was the source of the disruption due to the Russia-Ukraine war? Please tick all that apply", with answer options "Suppliers in Russia, Belarus or Ukraine" (*'Suppliers'*), "EU sanctions on Russia" (*'EU sanctions'*) and "Other". Number of observations: 1125 responses for panel (a) and 792 responses for panel (b)). *Source:* Supply Chain Disruption Survey. Own calculations.

The COVID-19 pandemic prompted unprecedented surges in demand for essential products, driven by widespread fear of lockdowns and supply shortages. Global supply chains of critical items faced challenges in anticipating buyer' needs due to limited dynamic demand forecasting capabilities, technology, and infrastructure (e.g. Taghikhah et al., 2021b; Rahman et al., 2022; Taghikhah et al., 2021a). Figure 8 shows in panel (a) that COVID-related disruptions were mostly caused by suppliers inside and outside China, with no differences for firms experiencing long-term or only temporary disruptions. Panel (b) shows the

reasons for disruptions due to the war in Ukraine. Both suppliers in Russia, Belarus or Ukraine, and EU sanctions on Russia were frequently mentioned reasons, the first relatively more important for firms which only experienced temporary disruptions.

5.2 Change in expected risk exposure

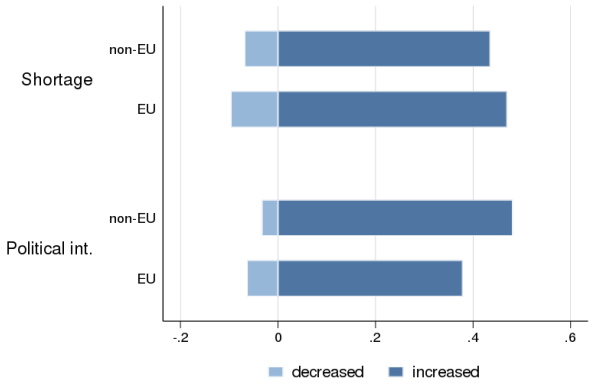
Experiencing a disruption - whether due to COVID-19, the war in Ukraine, or (trade) policy interventions - can shift firms' risk perceptions by revealing the systemic vulnerabilities inherent in global supply networks (e.g. Colon et al., 2020; Boehm et al., 2019; Carvalho et al., 2021; Barrot and Sauvagnat, 2016). Evidence from the Supply Chain Disruption Survey shows that recent major global shocks have indeed altered how firms perceive risks in their supply chains. Many respondents reported changes in their risk assessments during this sequence of crises.

Figure 9 presents the share of respondents who expect disruptions due to specific reasons to become more frequent (dark blue bars on the right) or less frequent (light blue bars on the left) compared to 2019, i.e. before COVID-19, the Russian-Ukrainian war, and rising geopolitical tensions and related trade policy shocks. As shocks propagate through production networks, disruptions at a strategic supplier can increase the perceived likelihood of future disruptions (Mishra et al., 2024; Manhart et al., 2020). Around 40% of Austrian, German, and Hungarian respondents expect more frequent disruptions due to shortages at the supplier level. This suggests that recent shocks have heightened firms' perception of exposure to supply chain risks.

Geoeconomic fragmentation driven by protectionist policy measures during the pandemic, trade wars, and especially sanctions related to the Russian-Ukrainian war has also increased perceived risks. About 47% of firms expect disruptions due to political interventions restricting the movement of goods or people (e.g. sanctions) originating in non-EU supplier countries to become more likely than before 2019. This share is 10 percentage points higher than for political interventions within the EU. Fewer than 9% of respondents expect such disruptions to become less likely. In addition to a higher perceived likelihood of experiencing a disruption, firms also anticipate an increase in their frequency.

How are firms responding to these changes in their risk environment? If a supplier was suddenly unable to deliver, around two third of the respondents would be very likely switch to another established, incumbent supplier of the same input (Figure 10). The majority of the remaining respondents states that this reaction is somewhat likely. This preference for switching to an established alternative supplier for the same input within the supplier pool reflects a widespread adoption of supply chain diversification strategies, such as dual-sourcing or multiple-sourcing, which are recognized as effective shock absorbers against disruptions and

Figure 9: Change in the likelihood of a supply chain disruption due to delivery shortages or political interventions, by supplier origin



Note: The figure shows the share of respondents expecting a higher or lower likelihood of a supply shortage or a disruption due to political intervention compared to 2019, separately for suppliers in or outside the EU. This is based on Question 10/1 and Question 10/2: "Now consider strategic suppliers based in the EU (in Q10/1) / outside the EU (in Q10/2). Compared to 2019, how has the likelihood of such an event [a significant delay in delivery from any strategic supplier] occurring for each of the following reasons changed?" with selected options (2) "A key input used in the supplier's production process is not available (shortage)" (*"Shortage"*) (4) "Political interventions that restrict the movement of goods or people (e.g. sanctions)." (*"Political int."*). Number of observations: 1175 respondents, with 1170 responses about EU-suppliers and 1124 about non-EU suppliers. *Source:* Supply Chain Disruption Survey. Own calculations.

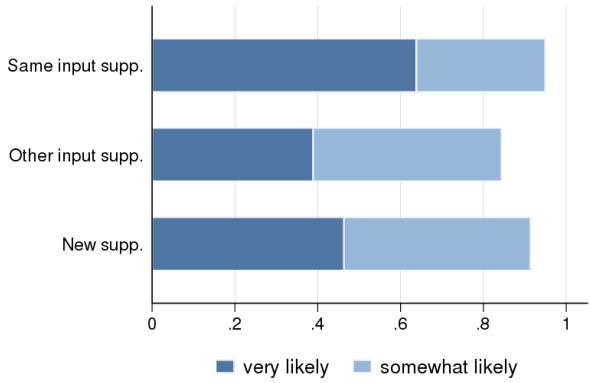
a means to enhance supply chain resilience (Manhart et al., 2020; Mishra et al., 2024; Friesenbichler et al., 2025b). This means, in most cases Austrian, German and Hungarian firms have alternative suppliers from which they source specific strategic input, often as part of a flexible sourcing strategy.

In-house production is quite rarely chosen as a potential solution, suggesting that while insourcing is a strategic alternative considered in risk management (Manhart et al., 2020), firms in Austria, Germany and Hungary generally prefer external sourcing flexibility as a reactive measure to sudden disruptions. These patterns are quite similar across firms, regardless of the severity of previously experienced shocks.

Other frequently chosen options are turning to suppliers of different inputs or looking for a new supplier. Recent evidence by Friesenbichler et al. (2024, 2025b) and Békés et al. (2025) shows that firms adjust their supplier portfolios in response to shocks. Following disruptions, a considerable share of firms actively reshapes their supplier pool, implementing diversification strategies that explicitly account for cost-resilience trade-offs (Friesenbichler et al., 2025b).

The COVID-19 pandemic as well as the Russian-Ukraine war catalysed a fundamental shift from global efficiency towards resilience, with firms increasingly prioritizing geographical diversification in their sourcing strategies (Friesenbichler et al., 2024, 2025a). Firms that are more geographically diversified tend to be less affected by disruption events affecting a specific region, mitigating uncertainty and decreasing the probability

Figure 10: Expected reactions after a sudden stop of delivery



Note: The figure shows the share of respondents reporting the likelihood of certain reactions after a sudden stop in strategic input delivery. This is based on Question 11: "Suppose one of your strategic suppliers suddenly stops delivering a strategic input and it becomes unavailable for the foreseeable future. How likely do you do the following?" with selected options "Source from another established supplier of the same input" (*'Same input supp.'*), "Source from another established supplier of different inputs" (*'Other input supp.'*) and "Find a new supplier to replace this one" (*'New supp.'*). Number of information: 1157 responses. *Source:* Supply Chain Disruption Survey. Own calculations.

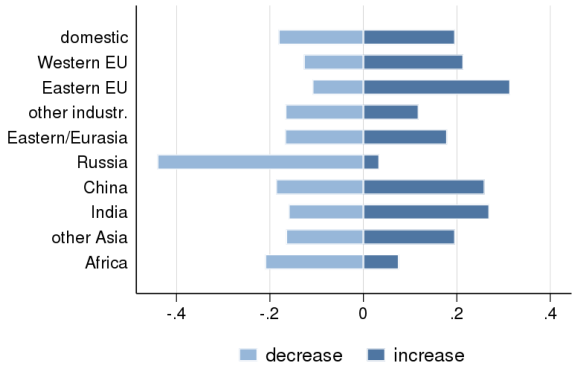
of simultaneous supplier failure (Javorcik, 2020; Bonadio et al., 2021). However, despite these effects of a geographic diversification strategy, Figure 11 shows, no strong overall shift in terms of expected changes in sourcing markets over the next five years. The only exception is Russia, which is expected to massively lose in importance (net decline of around 40%). To some extent, it is also true for Africa, however at a much lower degree. In contrast, we observe that for many respondents the EU and also China and India are expected to become in net more important over the next five years. Particularly eastern European markets seem to get more important for Austrian, German and Hungarian firms. More than 30 % of the respondent state that they expect the eastern EU markets to become more important for their sourcing strategy.

5.3 Changes in the relationships with the most important strategic suppliers

In addition to securing alternative sources of their strategic inputs, an alternative strategy for firms might be to invest in their relationships with existing suppliers. Closer collaboration and improved relationship management might help in solving unexpected problems and avoid or shorten disruptions (Namdar et al., 2025; Manhart et al., 2020). Evidence from the Supply Chain Disruption Survey suggests that some firms are indeed pursuing this strategy.

Figure 12 presents the share of firms increasing - darker bars on the right - or decreasing - lighter bars on the left - collaborative activities with their most important strategic suppliers since 2019. Overall, for about 70%

Figure 11: Expected changes in sourcing patterns by region over the next 5 years

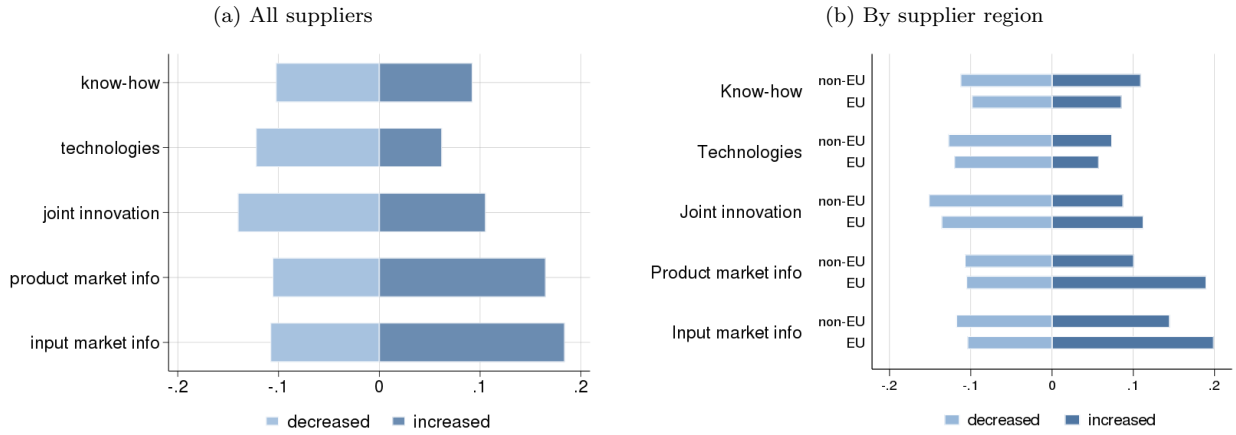


Note: The figure shows the share of respondents for whom the importance of a specific geographical market is expected to increase or decrease for the firm's sourcing in the next 5 years. This is based on Question 6/1 "Over the next 5 years, how do you expect the following geographic markets to change in importance for sourcing your strategic inputs?", with response options "Decrease", "Stay about the same" and "Increase", and with markets "Domestic market", "Western, Northern and Southern EU", "Eastern EU", "Other industrialized economies like UK, Switzerland, Norway, USA, Canada, Japan", "Other Eastern Europe and Eurasian countries (Balkans, Turkey, Ukraine etc.) ", "Russia", "China", "India", "Other South, South-eastern and Eastern Asia (Vietnam, Malaysia, Indonesia, South-Korea, etc.)", "Africa", "Other". Number of observation: 1,296 responses. *Source:* Supply Chain Disruption Survey. Own calculations.

of firms, the intensity of collaboration remained unchanged despite recent economic turmoil. The multiple shocks seem to not have impacted the general pattern of exchanging know-how and jointly innovating with the most important strategic suppliers. Nevertheless, in net firms tend to share technologies with their most important suppliers less often than prior to 2020. At the same time, there is a rising tendency to exchange information about both the firm's product markets and the suppliers' input markets. Namdar et al. (2025) stress that such a focus on information exchange is a critical component of building resilience, as enhanced visibility and a buyer's warning capability - both facilitated by information sharing - play a vital role in mitigating supply chain risks and enhancing resilience. Panel (b) of Figure 12 stresses that this information exchange seem to have particularly increased with suppliers outside the EU. Else, changes in collaboration patterns are similar for suppliers within and outside the EU. Increased collaboration establishes explicit and tacit understanding used in buyer–supplier absorptive capacity (Johnson et al., 2013), and also facilitate the cognitive efforts needed in supply risk identification (Fan and Stevenson, 2018) and mitigation (Chowdhury and Quaddus, 2016).

As knowledge sharing with suppliers became more intensive for almost 1/5 of the firms, it is important to note how the means of communication changed over time. Particularly the COVID-19 pandemic also triggered deeper restructuring of the internal operational activities, forcing rapid adaptation in joint activities

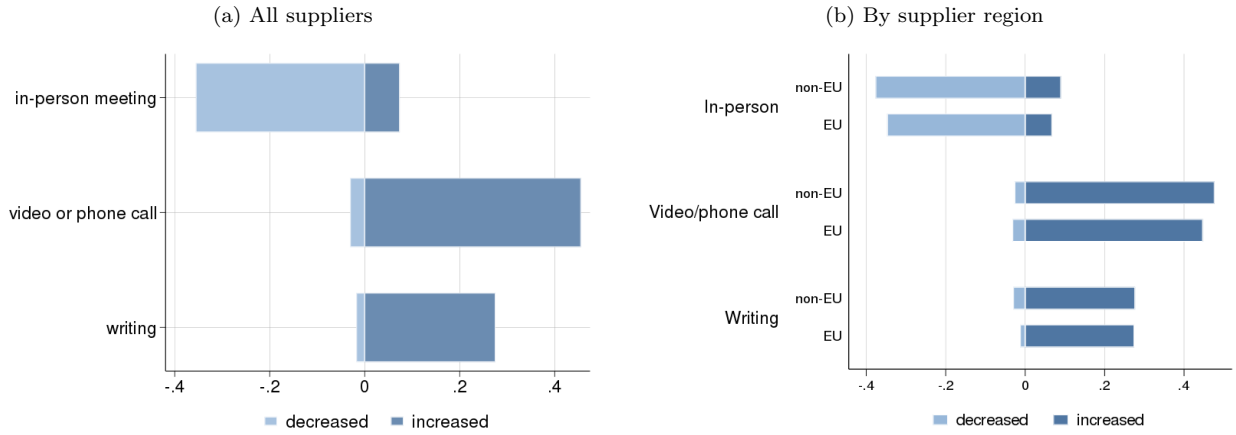
Figure 12: Change in joint innovation and information sharing with the most important strategic suppliers



Note: Share of respondents reporting increased or decreased joint innovation or information sharing with their most important supplier, separately for suppliers in and outside the EU in panel (b). This is based on Question 20/1: "Do you perform the following activities with your strategic supplier more or less intensively than in 2019? If your firm has not yet purchased from the supplier in 2019, use a similar strategic supplier from 2019 as a basis for comparison. (1) Exchange important know-how about your product, (2) Exchange production technologies, (3) Joint innovation, (4) Sharing market information about your product, (5) Sharing information about your supplier's input market." The region assignment of corresponding most important strategic suppliers was randomly. Number of observations: 1073 responses, with 771 responses with respect to EU-suppliers and 302 for non-EU suppliers.
Source: Supply Chain Disruption Survey. Own calculations.

and task communication (Castka et al., 2020; Guillot, 2020). Figure 13 shows that communication massively shifted towards remote communication. Only a small fraction of firms increased the frequency of face-to-face meetings, while it decreased for more than 1/3 of the firms. At the same time, more than 40% of the firms started to communicate via video or phone calls more frequently. There is a similar, but more modest increase for communicating in writing. As panel (b) of Figure 13 shows, the same patterns can be observed for suppliers in and outside the EU. This is in line with changes in technology use enabling remote communication during the COVID-19 pandemic (Baldwin, 2019). Prior to the COVID-19 pandemic, face-to-face meetings and geographical proximity interactions have been essential for knowledge sharing between buyers and suppliers, leading to productivity gains and innovation (Dyer and Nobeoka, 2000; Crescenzi et al., 2016; Hovhannisyan and Keller, 2015; Atkin et al., 2022). However, the rapid advancement of remote communication technologies has led to developments that could have helped mitigate substantially the negative impacts of reduced in-person interactions and - at the same time - provided viable, long-lasting alternatives for firms to communicate and collaborate with suppliers. In line with this, we observe in the Supply Chain Disruption Survey that a share of firms that increased the frequency of face-to-face communication with their strategic suppliers also increased/intensified their collaboration with strategic suppliers.

Figure 13: Change in communication frequency by communication mode

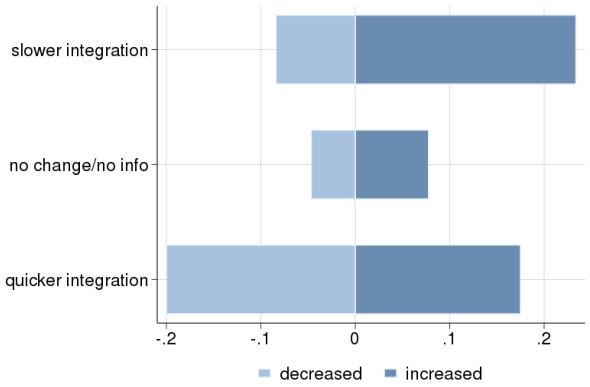


Note: This figure shows the share of respondents reporting increased or decreased communication frequency with their most important supplier by communication mode, separately for suppliers in or outside the EU in panel (b). This is based on Question 21/1: "Think about the same or a similar strategic supplier in 2019. How has the frequency of communication changed since then? If your firm has not yet purchased from the supplier in 2019, use a similar strategic supplier from 2019 as a basis for comparison. (1) In-person meeting, (2) Via video or phone call, (3) In writing, including e-mails." Firms were asked about their most important EU or non-EU supplier randomly. Number of observations: 1087 responses, 787 with suppliers from EU countries and 300 with suppliers from non-EU countries.
Source: Supply Chain Disruption Survey. Own calculations.

Many firms started sourcing from new suppliers during the 2020–2023 period. The start of a relationship with a new supplier is a special period that requires careful integration. There is some evidence of a slightly quicker integration process for firms that added a new supplier in or after 2020, as they more often report a typical integration period of 1 to 3 months (see Figure 2). For over 74% of firms, the length of the integration process did not change significantly compared to the pre-COVID-19 period. However, for the remaining firms, there is a tendency toward a longer integration process. This may partly reflect more careful selection of new suppliers. At the same time, firms experiencing disruptions may have been pressured to secure new input sources regardless of the integration time or associated costs (Friesenbichler et al., 2025b).

The fundamental economic decision in supplier onboarding involves balancing the competitive advantage of rapid integration against an increased expected cost of non-performance risk resulting from compromised due diligence. This is particularly important in a time characterised by disruptions. Rapid integration, while potentially offering speed-to-market, inherently reduces the time available to assess supplier "match quality," thereby elevating the probability of future disruptions. The expected match quality measured as the expected likelihood of the new supplier not performing stayed also rather stable compared to 2019, with no changes for 75% of the respondents. As Figure 14 shows, a slightly larger share of those with a slower integration process compared to the pre-COVID-19 period expect an increase likelihood of the new supplier

Figure 14: Change in the likelihood of the new supplier not performing



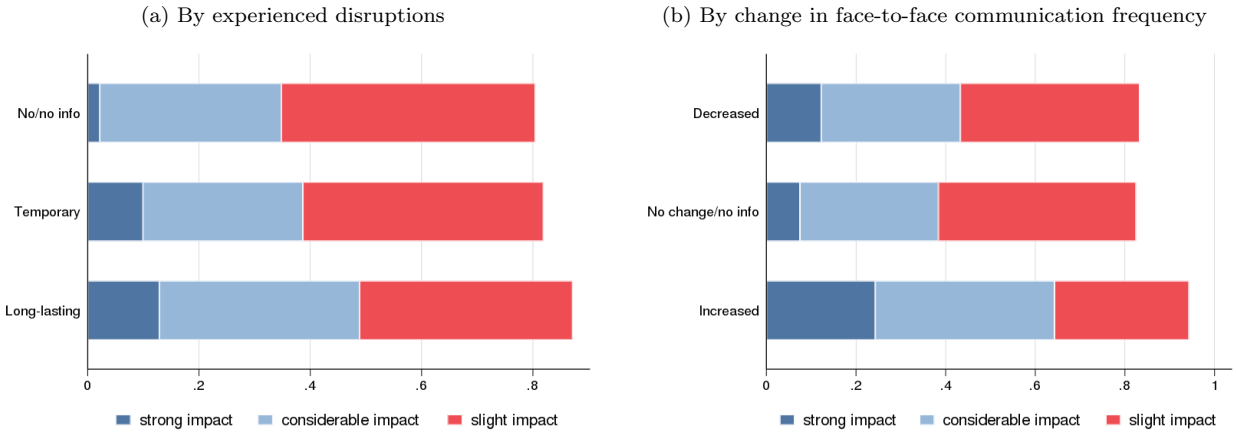
Note: The figure shows the share of respondents reporting increased or decreased probability of a newly integrated supplier not performing, by changes in the length of the integration process. This is based on Question 34: "How has the likelihood of the new supplier not performing changed compared to a similar new supplier of a strategic input in or before 2019?" and Question 33/1: "How has the length of the integration process changed compared to a typical integration process for a similar supplier of a strategic input in 2019 or earlier?". Number of observations: 726 responses of which 107 stated an increased and 40 a decreased length of the integration, and 579 no change or no information.
Source: Supply Chain Disruption Survey. Own calculations.

not performing. For firms that integrated new suppliers more quickly, the pattern is more mixed, likely reflecting the diverse reasons behind accelerating the onboarding process.

Even though in-person communication with suppliers became less frequent in the recent years as Figure 13 shows, it still stayed important in the process of integrating new suppliers. Face-to-face communication seems to be instrumental in building the trust and mutual understanding required for effective knowledge exchange and collaboration (Nonaka, 1991; Storper, 2004). 42% of the respondents stated that the impossibility of in-person meetings during the integration process of a new supplier would have considerable or strong impact on the firm's relationship with that supplier. As shown in panel (a) of Figure 15, firms that experienced long-lasting disruptions during 2020–2023 consider face-to-face communication with new suppliers even more important. Personal connections, reinforced by regular face-to-face meetings, might function as relational capital that may pay dividends when disruptions occur. Not surprisingly, the share of respondents expecting strong or considerable impact of no possibility for face-to-face meetings is higher among those few firms which increased the frequency of face-to-face meetings with suppliers relative to the pre-COVID period.

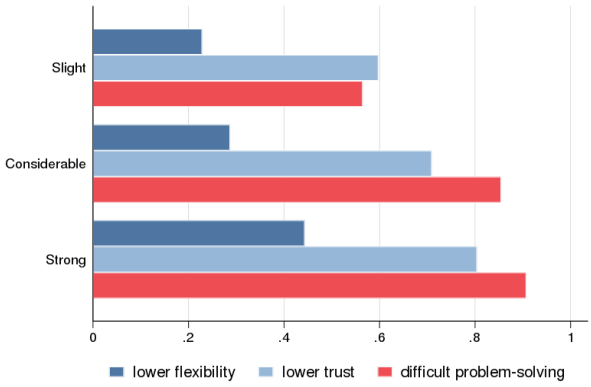
Personal meetings help build trust, flexibility, and mutual understanding in problem solving, and they allow firms to better anticipate supplier behaviour. When face-to-face communication with new suppliers is not possible, firms expect more difficult problem solving and lower trust to be the most significant challenges. About 72% of respondents anticipate that finding solutions would become harder, while 67% expect a decline

Figure 15: Intensity of the effect of no face-to-face meetings on the relationship with a new supplier



Note: The figure shows the share of respondents expecting more or less strong impact of no face-to-face communication opportunities on the relationship with a new supplier, by experienced disruptions (panel (a)) and by the change in face-to-face communication frequency since 2019. This is based on Question 35: "Consider a situation in which there is no opportunity at all for face-to-face meetings during the supplier integration process. How would this affect your firm's relationship with the new supplier?". Disruptions in panel (a) are defined based on Question 7 (see Figure 7 and pooled across causes. Changes in face-to-face communication frequency (panel (b)) are based Question 21/1 (see Figure 13). Number of responses: 923 responses, with panel (a) 303 firms with long-term disruptions, 574 with temporary (but no long-term) and 46 with no delays and interruptions (or no information) and panel (b) with 335 responses with decreased, 70 with increased and 508 with unchanged face-to-face communication frequency.
Source: Supply Chain Disruption Survey. Own calculations.

Figure 16: Type of the effect of no face-to-face meetings on the relationship with a new supplier



Note: The figure shows the share of respondents expecting a specific effect of no face-to-face communication opportunities, separately for firms with lower or higher expected effect on the relationship with new suppliers. This is based on the multiple choice Question 35/1: "What would be the effect of not being able to meet face to face? Please tick all that apply. (1) Lower flexibility, (2) Lower trust, (3) More difficult problem-solving, (4) Other." crossed with the intensity of the effect of no face-to-face meetings based on Question 35 (see Figure 15). Number of observations: 749 responses, with 363 respondents with slight, 289 with considerable and 97 with strong effect.
Source: Supply Chain Disruption Survey. Own calculations.

in trust in the supplier relationship, and 28% anticipate lower flexibility.

Figure 16 shows that firms expecting a strong impact from the absence of face-to-face meetings also anticipate a larger combined loss in trust, flexibility, and problem-solving capacity with the new supplier. In contrast, among firms expecting only a low impact from the lack of in-person meetings, 59% identify the strongest potential impact as a loss of trust in the supplier relationship.

6 Conclusion

The Supply Chain Disruption Survey is a novel multi-country survey targeting purchasing managers of manufacturing firms and asking them about their supplier relationships and knowledge flows in global supply chains. The survey provides first-hand evidence on how supplier–buyer relationships evolved through the COVID-19 shock and subsequent geopolitical turbulences (Russian-Ukrainian war, trade policy changes, etc.), which are typically hidden in administrative data. The survey allows us to get a complex picture about how firms' relationship with strategic suppliers and their expectations about risk were affected by experienced disruptions during the recent period of multiple global crises.

This paper provides information about the survey's background, design, questionnaire, and implementation; and presents the key patterns visible in the survey. The Supply Chain Disruption survey was conducted in four EU countries (Austria, Denmark, Germany and Hungary) between mid 2023 and spring 2024. The survey process was adopted to the survey culture in the respective countries and the questionnaire was translated into the local language, guaranteeing a harmonisation of the survey across the surveyed countries. With a sampling frame drawn from the ORBIS database provided by Moody's Analytics, the survey can be matched to administrative data.

Using the Supply Chain Disruption Survey, this paper offers evidence on how supply-chain governance has adjusted since 2020. Three key observations stand out. First, sourcing remains anchored in Europe but is meaningfully diversified: many firms rely on strategic suppliers in Asia and the United States alongside European partners. Most firms report complex relationships with their most important strategic suppliers: long-term contracts are common, and strategic suppliers frequently provide specific inputs or multiple inputs to the same buyer. Information sharing and collaboration with strategic suppliers is widespread though somewhat weaker with non-EU suppliers. Firms typically communicate with strategic suppliers at least weekly in writing and at least monthly via phone or video. The majority of firms though does not meet in-person with their strategic suppliers even once per year. Consistent with the complexity of these relationships, integrating a new supplier of strategic inputs takes more than three months for the majority

of firms in our sample.

Second, experiencing disruption was nearly universal - 93% of respondents reported disruptions between 2020 and 2023 - most of these disruptions were due to COVID-19, but also due to the war in Ukraine or - to a lesser extent - due to trade policy changes. Yet these disruptions were predominantly of temporary nature. These experiences nonetheless shifted expectations: about 40% of respondents now anticipate more frequent disruptions arising from supplier input shortages or from policy-driven mobility restrictions relative to the pre-COVID period. Further, respondents report a higher expected probability that a new supplier will not perform.

Third, firms adopted different risk mitigation strategies by diversifying their supplier portfolio and information sharing with suppliers. The majority of the firms have multiple suppliers of the same strategic input which they expect to be able to use as substitutes in case of a disruption. In the crises period between 2020 and 2023, many responding firms added new suppliers with an explicit diversification motive. Still, the importance of geographical markets for sourcing is expected to remain quite stable, only with a massive expected loss for Russia and for Africa to some extent, and a slight shift towards the Eastern European and Asian markets. Compared to 2019, the average length of the supplier integration process increased slightly. Additionally, some of the firms started to share more information with strategic suppliers, especially within the EU, mainly about their own product market and about the supplier's input market. It was coupled with a massive increase in remote forms of communication and a steady decrease in in-person communication. However, the small share of firms increasing face-to-face communication with suppliers tended to increase information sharing with suppliers the most. Many respondents explicitly emphasized the importance of face-to-face interaction during the integration of new suppliers, citing more difficult problem-solving and lower trust without it. Compared to 2019, the average length of the integration process increased somewhat, and respondents report a slightly higher expected probability that a new supplier will not perform.

The survey data, aggregated to country-industry bins, is publicly available online (DOI: 10.22000/MXM-CoyURFeCSdIbn). In subsequent research, the survey responses can be linked to available administrative sources to deepen the analysis. These linkages - where feasible - will allow us to examine the relationship between reported adaptations (e.g., multi-sourcing, added suppliers, increased information sharing, and communication modes), observable outcomes (such as delivery reliability, onboarding durations) and firm performance (from administrative data).

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A Additional Information on the Supply Chain Disruption Survey

A.1 Country-specific implementation processes

The survey was conducted in four countries: Germany, Austria, Hungary and Denmark. To maximise the respondent rates in the different countries, the survey process was adopted to the respective survey culture. The questionnaire was translated into the local language, ensuring a harmonization of the survey and its interpretation across countries. The translation was reviewed by both survey experts and academics. Respondents also were given the option to switch the language to English.

A.1.1 Germany

In Germany, medium-sized and large manufacturing firms with at least 50 employees were targeted by the Supply Chain Disruption Survey. Firms were invited to participate in the Supply Chain Disruption Survey by the Kiel Institute for the World Economy (IfW) and the German Chamber of Commerce and Industry (Deutsche Industrie- und Handelskammer, DIHK). The German Chamber of Commerce and Industry is a well know local business association, which is trusted by German firms. Firms were individually invited to the survey by postal letters to comply with GDPR requirements. Postal survey invitation letters, including a personalized link and QR code to the online survey, were sent out in Germany between November 2023 and January 2024. To increase the survey participation rate, postal reminder letters including a personalized link and QR codes to the online questionnaire were sent out in March 2024. The personalized links allow to track whether a firm responded to the survey invitation. To guarantee anonymity to the participants, this information is only used to simplify the matching procedure of the survey with administrative data. The contact information of the firm, firm identifiers and survey responses are stored and handled separately to ensure the anonymity of the participating firms.

In total 20,187 firms were invited to participate in the survey in Germany. Note that this number is nominal in the sense that it includes non-respondents and returned invitation letters[11]. 0.4% of the invited firms returned their invitation or reminder letter, while 3.9% of the German firms participated in the survey (only including firms that responded after the initial invitation letter, not including additional responses coming in after the reminders) and 2.1% completed the survey. 54% of the respondents allow us to link their data to administrative datasets. 73% requested a benchmarking report, and 40% agreed to be contacted again for further information. Finally, 21% named a specific strategic supplier.

[11] Letters are returned due to various reasons, including among others wrong address information, mergers, bankruptcies, contact persons left the company or general survey rejection

A.1.2 Austria

In Austria, the process was similar to the survey process in Germany. Austrian Firms were individually invited to participate in the survey by postal letters to comply with GDPR requirements. In Austria, the survey process was conducted by WIFO's surveys division, which regularly carries out paper-based and online surveys in Austria like the WIFO-Business Cycle Survey (WIFO-Konjunkturtest), the WIFO Industry Survey and project-related surveys. In a first wave, between August and November 2023, postal invitation and reminder letters were sent out to Austrian manufacturing firms with at least 50 employees. Since Austria's business structure is characterized by many small and medium sized firms, in a second wave, firms with at least 25 employees were included as well in the survey. These firms were invited to participate in the survey in November 2023 and reminded in January 2024.

In Austria, in total 2,547 manufacturing firms with at least 20 employees were invited to participate in the survey. Out of these invitations, 1.9% invitation or reminder letters were returned[12]. In Austria, the participation rate in the survey is with 12.3% relatively high for an online survey, though only around 60% of the participating firms completed the survey. All respondents allow us to link their data to administrative datasets. 14% of the respondents also named a specific strategic supplier, which also can be (name-) matched to administrative datasets. Out of those Austrian firms that completed the survey, more than three quarters requested a benchmarking report and more than half of the respondents agree to be contacted again for further information.

A.1.3 Hungary

In Hungary, we followed more closely the process of the previous Business Relations Survey. We had Impetus Research Kft, a specialist survey company as a subcontractor initiating direct contact with potential respondents from targeted firms through phone calls. Then the online survey was sent directly to those contacted purchasing managers who were interested in that. In addition to that the survey was also advertised on the Purchasing Managers' Conference and in the newsletter of the Hungarian Association for Logistics, Purchasing and Stockpiling (MLBKT). At the same time, all completed responses were the result of a direct contact.

Out of the 7820 firms in the target population, 13% of the potential respondents claimed to be interested in the survey after having been contacted by Impetus. From those who showed interest and received the online survey, 68% ended up not even opening the survey. Compared to the target population, 4% responded

[12]Letters are returned due to various reasons, including among others wrong or outdated address information, mergers, bankruptcies, contact persons left the company or general survey rejection

and 2% finished the survey. In 70% of the completed responses, the respondent gave permission to link its responses with administrative firm-level data. 57% asked for a benchmarking report and 29% agreed to be contacted later. In one-third of the complete responses, respondents also named a strategic supplier about which we requested detailed information.

A.1.4 Denmark

In Denmark, we got the support of the Danish Export Association to reach our target audience, which led to a somewhat different procedure. The Danish Export Association has a standard quarterly survey for its members, which was extended in 2023 May to include the Supply Chain Disruption Survey as a separate section, and in 2023 September again, to include only specific questions from our survey but more deeply integrated to the Danish quarterly survey. Consequently, the members of the Danish Export Association formed the base for the Danish sample. While this is a non-random sample of firms, it includes most of the firms with international connections. Additionally, we expected to increase trust and willingness to participate in the survey if we contact firms through a well-known association with a regular survey practice.

As opposed to the expectations we formed after we have consulted with the Danish Export Association, the response rate turned out to be low: 11%, and only 6% finished the shortened version of the survey. Only 17% of the respondents who finished the survey allowed to link their responses with administrative firm-level data, and only 13% gave permission to contact them again for additional information. At the same time, 78% asked for a benchmarking report.

B Questionaire

The quality and resilience of supply chains has an increasing attention. In this survey, we ask about different aspects of your firm's relationship with its suppliers. We are interested in getting a glimpse of sourcing and collaboration patterns, as well as understanding key disruptions. The Supply Chain Disruption Survey is part of a Horizon Europe research project, RETHINK-GSC (N. 101061123), which has the aim of getting a better understanding of current changes and ongoing challenges in global supply chains, providing new insights for policymakers. For more information about the project: https://suppliersurvey.eu/.

It will take approximately 20 minutes to complete the survey.

Confidentiality is crucial for us, and ensured by our **strict data protection procedures** and GDPR compliance. We do not identify the respondent. Contact details provided voluntarily are only used for survey-related follow-up communication. We only use the identity of the firm to connect administrative information like size or industry, otherwise ensure anonymity in the entire process. We will not publish or share any data where companies can be identified.

Upon request, we will send a **benchmarking report** to the respondents, including information on industry-specific trends.

*To proceed with the survey, please accept our privacy policy, which is available at https://suppliersurvey.eu/privacy-policy/.

◯ Hereby I accept the Privacy Policy.

BACKGROUND INFORMATION ABOUT THE FIRM

1. The size of the firm is

- ○ below 100 employees (1)
- ○ between 100-250 employees (2)
- ○ between 251-1000 employees (3)
- ○ above 1000 employees (4)

2. The company is

- ○ part of a non-European multinational firm (1)
- ○ part of a European multinational firm (2)
- ○ part of a domestic firm group, but not part of a multinational firm (3)
- ○ a standalone firm (4)

3. The company is active in

- ○ mostly manufacturing (1)
- ○ both manufacturing and services (2)

3/1. Main activity of your company:

_____

4 4. City of your company unit:

_____

PART 1: SOURCING PATTERNS

Think about your firm's most important **strategic inputs**, defined as purchased items with a high impact on profits and a high supply risk, or that are difficult to substitute. This can either be a product or business service, but excludes real estate or energy.

5. Before we ask you about the full portfolio of your firm's **strategic inputs**, please give **one example** of these, providing the product or service category.

6. Think about the **location of production** of your firm's **strategic inputs**. How important are the following geographical markets for the sourcing of your strategic inputs?

	Not important (a)	Somewhat important (b)	Highly important (c)
Domestic market (1)	○	○	○
Western, Northern and Southern EU (2)	○	○	○
Eastern EU (3)	○	○	○
Other industrialized economies like UK, Switzerland, Norway, USA, Canada, Japan (4)	○	○	○
Other Eastern Europe and Eurasian countries (Balkans, Turkey, Ukraine etc.) (5)	○	○	○
Russia (6)	○	○	○
China (7)	○	○	○
India (8)	○	○	○
Other South, South-eastern and Eastern Asia (Vietnam, Malaysia, Indonesia, South-Korea, etc.) (9)	○	○	○
Africa (10)	○	○	○

6/1. Over the next 5 years, how do you expect the following geographic markets to change in importance for sourcing your strategic inputs?

	Decrease (a)	Stay about the same (b)	Increase (c)
Domestic market (1)	○	○	○
Western, Northern and Southern EU (2)	○	○	○
Eastern EU (3)	○	○	○
Other industrialized economies like UK, Switzerland, Norway, USA, Canada, Japan (4)	○	○	○
Other Eastern Europe and Eurasian countries (Balkans, Turkey, Ukraine etc.) (5)	○	○	○
Russia (6)	○	○	○
China (7)	○	○	○
India (8)	○	○	○
Other South, South-eastern and Eastern Asia (Vietnam, Malaysia, Indonesia, South-Korea, etc.) (9)	○	○	○
Africa (10)	○	○	○

PART 2: EXPERIENCED DISRUPTIONS

7. Since 2019, have you experienced any delays or interruptions in the delivery of your strategic inputs that come **from suppliers within the EU**?

	Yes, temporarily (a)	Yes, long-lasting (b)	No (c)	Do not know (d)
Due to COVID-19 (1)	○	○	○	○
Due to the Russia-Ukraine war (2)	○	○	○	○
Due to trade policy changes (3)	○	○	○	○
Due to other reasons, please specify: (4)	○	○	○	○

7/1. Since 2019, have you experienced any delays or interruptions in the delivery of your strategic inputs that come **from suppliers outside of the EU**?

	Yes, temporarily (a)	Yes, long-lasting (b)	No (c)	Do not know (d)
Due to COVID-19 (1)	○	○	○	○
Due to the Russia-Ukraine war (2)	○	○	○	○
Due to trade policy changes (3)	○	○	○	○
Due to other reasons, please specify: (4)	○	○	○	○

7/a. Was the disruption caused by the COVID-19 pandemic either directly or indirectly caused by suppliers inside or outside China?

- ○ Inside China (a)
- ○ Outside China (b)
- ○ Both inside and outside of China (c)

7/b. What was the source of the disruption due to the Russia-Ukraine war? Please tick all that apply.

- ☐ Suppliers in Russia, Belarus or Ukraine (1)
- ☐ EU sanctions on Russia (2)
- ☐ Other, please specify: (3) _____

PART 3: CHANGES IN SUPPLIERS

8. Has your establishment changed suppliers of any of its strategic inputs since 2019? Please tick all that apply.

- ☐ Switching from one supplier to another (1)
- ☐ Adding new suppliers while retaining existing ones (2)
- ☐ Dropped incumbent suppliers without replacing them with new ones (3)
- ☐ No, there was no change in suppliers (4)

8/a. What were the main reasons for introducing new suppliers for your strategic inputs? Please tick all that apply.

The new supplier offered

- [ ] better price or financial conditions (1)
- [ ] better quality (2)
- [ ] better product range (3)
- [ ] better availability (4)
- [ ] better conditions in any other aspect (5)

8/a1 The old supplier

- [ ] had unreliable delivery (1)
- [ ] had due diligence issues (including social and environmental problems) (2)
- [ ] has left the market or has had its contract terminated (3)

8/a2 Change in

- [ ] technology (1)
- [ ] political environment (e.g., sanctions, disruptions due to trade policy) (2)
- [ ] natural circumstances, caused by an external and unanticipated disruption (e.g., COVID-19, natural disaster) (3)
- [ ] purchasing strategy aiming at a more diversified supplier base (4)
- [ ] purchasing strategy to reduce the dependence on specific regions (5)

8/b. How important were these reasons in keeping your suppliers?

	Not important (a)	Somewhat important (b)	Highly important (c)
The supplier has specific knowledge of the firm's needs. (1)	○	○	○
Trust in the supplier (e.g., reliable quality, fair prices, flexibility). (2)	○	○	○
There is no alternative supplier of similar quality. (3)	○	○	○
There is no alternative supplier with similar availability. (5)	○	○	○
Other, please specify: (4)	○	○	○

PART 4: REASONS FOR AND REACTIONS TO DISRUPTIONS

Now we are going to ask about the **suppliers of strategic inputs** to your firm. Think about those suppliers that you consider to be strategic, i.e., those that have a high impact on profit and a high supply risk, or those that are difficult to replace. Please answer the questions for the **producers** and not for the distributors.

9. Approximately how many **strategic suppliers** does your firm have?

_____

10. On average, how often do you expect your firm to face the following event? There is a significant delay in delivery from **any** strategic supplier for the following reasons:

	Never (1)	Once a decade (2)	Once every few years (3)	Once a year (4)	More than once a year (5)
Quality problem caused by the supplier (1)					
A key input used in the supplier's production process is not available (shortage) (3)					
Natural disaster, extreme weather (5)					
Political interventions that restrict the movement of goods or people (e.g. sanctions) (6)					
Any event affecting more than one of your strategic suppliers at the same time (9)					

10/1. Now consider strategic suppliers based **in the EU.** Compared to 2019, how has the likelihood of such an event occurring for each of the following reasons changed?

	Decreased (a)	Stayed about the same (b)	Increased (c)
Quality problem caused by the supplier (1)	○	○	○
A key input used in the supplier's production process is not available (shortage) (2)	○	○	○
Natural disaster, extreme weather (3)	○	○	○
Political interventions that restrict the movement of goods or people (e.g. sanctions) (4)	○	○	○
Any event affecting more than one of your strategic suppliers at the same time (5)	○	○	○

10/2. Now consider strategic suppliers based in a **non-EU country**. Compared to 2019, how has the likelihood of such an event occurring for each of the following reasons changed?

	Decreased (a)	Stayed about the same (b)	Increased (c)
Quality problem caused by the supplier (1)	○	○	○
A key input used in the supplier's production process is not available (shortage) (2)	○	○	○
Natural disaster, extreme weather (3)	○	○	○
Political interventions that restrict the movement of goods or people (e.g. sanctions) (4)	○	○	○
Any event affecting more than one of your strategic suppliers at the same time (5)	○	○	○

11. Suppose one of your strategic suppliers suddenly stops delivering a strategic input and it becomes unavailable for the foreseeable future. How likely do you do the following?

	Unlikely (a)	Somewhat likely (b)	Very likely (c)
Source from another established supplier of the same input (1)	○	○	○
Source from another established supplier of different inputs (2)	○	○	○
Find a new supplier to replace this one (3)	○	○	○
Change production/business processes (4)	○	○	○
Produce the input in-house (5)	○	○	○
Redesign the product (6)	○	○	○
Focus on other products in the product portfolio (7)	○	○	○
Other, please specify: (8)	○	○	○

12. Does your firm audit any of its strategic suppliers, either formally or informally? Please tick all that apply.

- [ ] Yes, there is a regular and formal process (at least once a year) (1)
- [ ] Yes, it is part of normal business operations (2)
- [ ] Yes, occasionally (e.g., at the beginning of the relationship) (3)
- [ ] No (4)
- [ ] Do not know (5)

12/a. Does your firm audit **any** of its **indirect strategic supplier**s, i.e., suppliers of your strategic suppliers, either formally or informally? Please tick all that apply. (if audit direct)

- [ ] Yes, there is a regular and formal process (at least once a year) (1)
- [ ] Yes, it is part of normal business operations (2)
- [ ] Yes, occasionally (e.g., at the beginning of the relationship) (3)
- [ ] No, but we know the identity of some of them (4)
- [ ] No, we do not either know their identity (5)
- [ ] Do not know (6)

12/a. Do you know at least some of your firm's **indirect strategic suppliers**, i.e., suppliers of your strategic suppliers? (If no audit of direct)

- ○ Yes (1)
- ○ No (2)
- ○ Do not know (3)

12/b. Does your firm audit any of its **indirect suppliers** that are **more than two steps** in the supply chain away, either formally or informally? Please tick all that apply. (If audit indirect)

- [ ] Yes, there is a regular and formal process (at least once a year) (1)
- [ ] Yes, it is part of normal business operations (2)
- [ ] Yes, occasionally (e.g., at the beginning of the relationship) (3)
- [ ] No, but we know the identity of some of them (4)
- [ ] No, we do not either know their identity (5)
- [ ] Do not know (6)

12/b. Do you know at least some of your firm's indirect suppliers that are **more than two steps in the supply chain** away? (If no audit indirect)

- ○ Yes (1)
- ○ No (2)
- ○ Do not know (3)

PART 5: JOINT ACTIVITIES WITH SUPPLIERS

13. Does your firm engage in any of the following activities that require a close collaboration with strategic suppliers? Please tick all that apply.

- ☐ Exchange of important know-how about your product (1)
- ☐ Exchange of production technologies (2)
- ☐ Joint innovation (3)
- ☐ Other, please specify: (4) _____
- ☐ No (5)

13/a. How important are the following factors to your firm's collaborative activities with strategic suppliers?

	Not important (a)	Somewhat important (b)	Highly important (c)
Cost savings (1)	○	○	○
Strategic technological development (2)	○	○	○
Quality assurance (3)	○	○	○
Regulatory compliance (4)	○	○	○
Protection of intellectual property rights (5)	○	○	○
Security of supply (6)	○	○	○
Other, please specify: (7)	○	○	○

13/b. How important were these factors in deciding not to collaborate with your strategic suppliers?

	Not important (a)	Somewhat important (b)	Highly important (c)
Protection of intellectual property rights (1)	○	○	○
Cost efficiency (2)	○	○	○
Avoidance of supplier dependency (3)	○	○	○
Low quality/changes in technical details/changes in material (4)	○	○	○
Lack of necessary knowledge/expertise/potential partners (5)	○	○	○
Not part of the firm’s strategy (7)	○	○	○
Other, please specify: (6)	○	○	○

PART 6: COOPERATION PATTERNS

Randomized question

14A. Does your firm have a strategic supplier which is **based within the EU?**

14B. Does your firm have a strategic supplier which is **based in a non-EU country?**

- ○ Yes (1)
- ○ No (2)

If 14A is YES or 14B is NO:

14Aa Think about **the most important strategic supplier** of your firm which is located **within the EU.**

If 14A is NO or 14B is YES:

14Ba Think about **the most important strategic supplier** of your firm which is located in a **non-EU country**.

If no response to 14:

14Ca Think about **the most important strategic supplier** of your firm.

15. In which country is the strategic supplier located? Consider the location of the employees you communicate with.

16. Have you already purchased from this strategic supplier in or before 2019?

- ○ Yes (1)
- ○ No (2)
- ○ Do not know (3)

17. What is the approximate size of this strategic supplier firm?

- ○ Small (less than 50 employees) (1)
- ○ Medium-sized (50-250 employees) (2)
- ○ Large (more than 250 employees) (3)

18. Which statement is true for your supplier? Please tick all that apply.

- ☐ The supplier produces specific inputs made/adjusted for your firm. (1)
- ☐ The supplier provides multiple inputs for you. (2)
- ☐ You have long-term contractual agreements with the supplier. (3)
- ☐ The supplier also provides accompanying services related to the input. (4)
- ☐ None of the above. (5)

19. Which statement is true for your supplier? Please tick all that apply.

- ☐ You and your supplier are part of the same business group. (1)
- ☐ You and your supplier are part of the same multinational company. (2)
- ☐ None of the above. (3)

20. Which activities do you undertake with your strategic supplier? Please tick all that apply.

- [ ] Exchange important know-how about your product (1)
- [ ] Exchange production technologies (2)
- [ ] Joint innovation (3)
- [ ] Sharing market information about your product (4)
- [ ] Sharing information about your supplier's input market (5)
- [ ] Sharing information about something else, please specify: (6) _____
- [ ] None of the above (7)

20/1. Do you perform the following activities with your strategic supplier more or less intensively than in 2019? If your firm has not yet purchased from the supplier in 2019, use a similar strategic supplier from 2019 as a basis for comparison.

	Less (a)	Stayed about the same (b)	More (c)
Exchange important know-how about your product (1)	○	○	○
Exchange production technologies (2)	○	○	○
Joint innovation (3)	○	○	○
Sharing market information about your product (4)	○	○	○
Sharing information about your supplier's input market (5)	○	○	○

21. How often do you or your colleagues communicate with this supplier, apart from sending orders and receiving invoices?

	Never (1)	Once a year or more but not every month (2)	Once a month or more but not every week (3)	Once a week or more but not every day (4)	Almost every day (5)
In-person meeting (1)					
Via video or phone call (2)					
In writing, including e-mails (3)					

21/1. Think about the same or a similar strategic supplier in 2019. How has the frequency of communication changed since then? If your firm has not yet purchased from the supplier in 2019, use a similar strategic supplier from 2019 as a basis for comparison.

	Decreased (a)	Stayed about the same (b)	Increased (c)
In-person meeting (1)	○	○	○
Via video or phone call (2)	○	○	○
In writing, including e-mails (3)	○	○	○

22. What strategic input do you source from this strategic supplier? It is sufficient to provide a product or service category (e.g., LCD screens, plastic bottles).

_____

23. Please give the name of that supplier if you can:

_____

If 14A Yes:

24/A So far, you have answered questions about a strategic supplier located within the EU. Now we would like to ask you about another strategic supplier located in a non-EU country.

Does your firm have a strategic supplier which is **located in a non-EU country**?

If 14B Yes:

24/B So far, you have answered questions about a strategic supplier located in a non-EU country. Now we would like to ask you about another strategic supplier located within the EU.

Does your firm have a strategic supplier which is **located within the EU**?

- ○ Yes (1)
- ○ No (2)

If 14A No or 14B No or no response to 14:

24/C Now we would like to ask you about another strategic supplier of your firm, which is **located in another country** than the previously given**.**

If 24A Yes:

24/A1 Think about the **most important strategic supplier** of your firm which is located **in a non-EU country**.

If 24B Yes:

24/B1 Think about the **most important strategic supplier** of your firm which is located **within the EU**.

If 24A No or 24B No:

24/C1 Think about a **representative strategic supplier** of your firm which is located **in another country** than the previously given.

25. In which country is the strategic supplier located? Consider the location of the employees you communicate with.

26. What is the approximate size of this strategic supplier firm?

- ○ Small (less than 50 employees) (1)
- ○ Medium-sized (50-250 employees) (2)
- ○ Large (more than 250 employees) (3)

27. Which statement is true for your supplier? Please tick all that apply.

- ☐ The supplier produces specific inputs made/adjusted for your firm. (1)
- ☐ The supplier provides multiple inputs for you. (2)
- ☐ You have long-term contractual agreements with the supplier. (3)
- ☐ The supplier also provides accompanying services related to the input. (4)
- ☐ None of the above. (5)

28. How often do you or your colleagues communicate with this supplier, apart from sending orders and receiving invoices?

	Never (1)	Once a year or more but not every month (2)	Once a month or more but not every week (3)	Once a week or more but not every day (4)	Almost every day (5)
In-person meeting (1)					
Via video or phone call (2)					
In writing, including e-mails (3)					

28/1. Think about the same or a similar strategic supplier in 2019. How has the frequency of communication changed since then? If your firm has not yet purchased from the supplier in 2019, use a similar strategic supplier from 2019 as a basis for comparison.

	Decreased (a)	Stayed about the same (b)	Increased (c)
In-person meeting (1)	○	○	○
Via video or phone call (2)	○	○	○
In writing, including e-mails (3)	○	○	○

29. What strategic input do you source from this strategic supplier? It is sufficient to provide a product or service category (e.g., LCD screens, plastic bottles).

_____

30. Please give the name of that supplier if you can:

_____

PART 7: INTEGRATION OF NEW SUPPLIERS

31. Can your firm independently choose the suppliers of its strategic inputs?

- ○ Yes (1)
- ○ Yes for some, but others are decided, e.g., at the group level or by the buyer (2)
- ○ No, these are decided, e.g., at the group level or by the buyer (3)

32. Think about the last time you added a new supplier of a strategic input to your value chain. When did that happen?

- ○ Within the last year (1)
- ○ More than a year ago, but no earlier than 2020 (2)
- ○ In 2019 or earlier (3)
- ○ Cannot remember of such event (4)

33. How long did the integration process take from the initial intent to the first purchase order?

- ○ 1-3 months (1)
- ○ 4-6 months (2)
- ○ 7-12 months (3)
- ○ More than a year (4)

33/1. How has the length of the integration process changed compared to a typical integration process for a similar supplier of a strategic input in 2019 or earlier?

- ○ Decreased (1)
- ○ Stayed about the same (2)
- ○ Increased (3)
- ○ Do not know (4)

34. How has the likelihood of the new supplier not performing changed compared to a similar new supplier of a strategic input in or before 2019?

- ○ Decreased (1)
- ○ Stayed about the same (2)
- ○ Increased (3)
- ○ Do not know (4)

35. Consider a situation in which there is no opportunity at all for face-to-face meetings during the supplier integration process. How would this affect your firm's relationship with the new supplier?

- ○ No impact (1)
- ○ Slight impact (2)
- ○ Considerable impact (3)
- ○ Strong impact (4)

35/1. What would be the effect of not being able to meet face to face? Please tick all that apply.

- ☐ Lower flexibility (1)
- ☐ Lower trust (2)
- ☐ More difficult problem-solving (3)
- ☐ Other, please specify: (4)

PART 8: BACKGROUND INFORMATION

36. In which function do you work in this firm?

- ○ Purchase (1)
- ○ Production (2)
- ○ General management (4)
- ○ Finance (5)
- ○ Other, please specify: (7)

_____

37. Have you already worked at the firm in 2019?

- ○ Yes (1)
- ○ No (2)

38/1. Name of your company:

_____

38/2. Tax id/ registry number of your company:

_____

38/3. Please allow us to link your previous survey reposnses with administrative firm-level data, and according the privacy policy (https://suppliersurvey.eu/privacy-policy/), to use them in an anonymized way for research purposes.

- ○ Hereby, I allow to link my responses with administrative firm-level data. (1)

39/1. Can we send you a **benchmarking report** based on the results of the survey?

- ○ Yes (1)
- ○ No (2)

39/2. Can we contact you for further information?

- ○ Yes (1)
- ○ No (2)

If only 39/1 is Yes

E1 We need your contact details to be able to send you the benchmarking report. This information will only be used for that purpose.

If 39/2 Yes

E2 We need your contact details to be able to get in touch with you concerning further survey-related information. These data will only be used for that purpose.

If 39/1 or 39/2 Yes

40/1 Please give your e-mail address:

If 39/1 or 39/2 Yes

40/2. Please give your phone number:

rethink GSC

ABOUT RETHINK-GSC

The project ‚Rethinking Global Supply Chains: Measurement, Impact and Policy' (RETHINK-GSC) captures the impact of knowledge flows and service inputs in Global Supply Chains (GSCs). Researchers from 11 institutes are applying their broad expertise in a multidisciplinary approach, developing new methodologies and using innovative techniques to analyse, measure and quantify the increasing importance of intangibles in global supply chains and to provide new insights into current and expected changes in global production processes.

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