

Online Appendix OA. COVID-19 Timeline

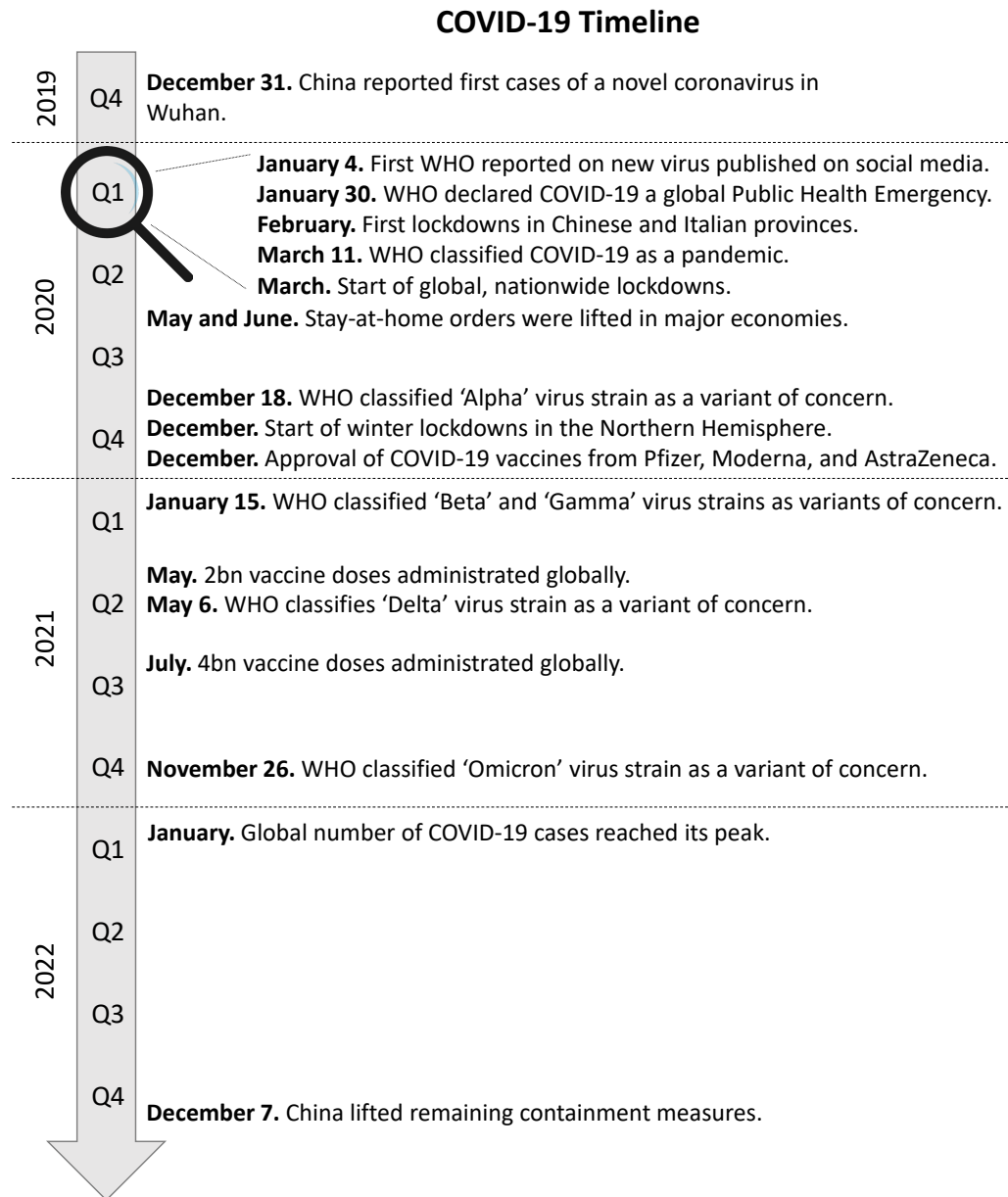


Figure OA1 COVID-19 timeline

Online Appendix OB. Economics Perspectives on Global Supply Chains

Economics Literature on GSCs

Economists study GSCs primarily to inform government policy making. They have provided rich insight into the formation and ongoing development of GSCs. Recent disruptions have increased attention on the macroeconomic response to disruptions and on quantifying how risks propagate through supply chains. Given their target audience, economists tend to emphasize welfare-related issues such as GDP, labor employment, and productivity.

GSC Configuration and Evolution. [Antràs and De Gortari \(2020\)](#) model global value chains and find that it is optimal to locate relatively downstream stages of production in more central locations. [Alfaro et al. \(2019\)](#) complement this conclusion by noting that a firm’s decision to integrate upstream or downstream suppliers largely depends on the elasticity of demand for its final product. Regarding supply chain evolution, [Alfaro and Chor \(2023\)](#) analyze *country-level* import/export shifts using UN Comtrade flow data from 2017 to 2022. They observed a decrease in direct US sourcing from China, with low-wage locations such as Vietnam and nearshoring/friendshoring alternatives like Mexico gaining import share. However, it is uncertain whether these shifts will reduce US dependence on supply chains linked to China, as import prices from Vietnam and Mexico are already rising. [Acemoglu and Tahbaz-Salehi \(2024\)](#) develop a model to study the macroeconomic implications of customized supplier–customer links and provide comparative statics that show how supply chains and aggregate output respond to shocks. [Liu et al. \(2024\)](#) further investigate the effects of supply disruptions on firms’ supply chain relationships and found significant heterogeneity in disruptions among US firms.

Risk Propagation in GSCs. [Elliott et al. \(2022\)](#) compare production networks with varying productivity levels and find that networks with intermediate productivity are very sensitive to small shocks and can amplify their impact. [Kinnan et al. \(2024\)](#) examine risk propagation through labor and supply chain links, discovering greater propagation via labor. [Bigio and La’o \(2020\)](#) depict distortions in production networks through analyses based on input-output networks, finding that the US input-output structure amplified financial distortions during the 2008 financial crisis. Similarly, [Carvalho et al. \(2021\)](#) reveal that supply chain linkages facilitate shock propagation and amplification both upstream and downstream, as seen during the Great East Japan Earthquake of 2011. These risk propagation mechanisms coincide with [Acemoglu and Tahbaz-Salehi \(2024\)](#)’s conclusion that production chains are

inefficient and inherently fragile, with small shocks having potential to disrupt output disproportionately.

GSCs as a Channel to Trigger Welfare Changes. Economists have examined the welfare impacts of supply chain changes. For example, Grossman et al. (2024) highlight a 12% welfare loss from increased US tariffs on Chinese products. New job creation in China dropped by 11.7% due to COVID-19 cases abroad and the resulting pandemic-control policies where those outbreaks occurred (Fang et al. 2020). Alfaro-Urena et al. (2022) focus on firm-to-firm linkages, finding that becoming a supplier to multinational corporations boosts employment and factor productivity. Carvalho et al. (2021) show that earthquake-induced supply chain disruptions depressed real GDP growth. Fang et al. (2020) study the labor impacts, finding that the pandemic abroad reduced local job creation through GSCs. Grossman et al. (2023) argue that policies altering incentives to invest at home versus abroad (i.e., reshoring vs. offshoring) may impact welfare more than those that merely encourage or discourage diversification.

OM and Economics Literature on GSCs: How Do They Differ?

While the fields of economics and operations management both research GSCs, they have different primary audiences (makers of macro-level policy vs. managers of individual firms), leading to divergence in *theory focus*, *data usage*, and *research contribution*.

For *theory focus*, economics papers on GSCs typically leverage theoretical frameworks centered around market equilibrium, price formation, and macroeconomic impacts. These studies typically explore how supply chains interact with broader economic variables, including trade policies, economic growth, and international trade dynamics. They focus on understanding how supply chain activities influence and are influenced by market conditions and economic policies at a macro level. OM papers, on the other hand, are grounded in theories related to inventory management and production planning for various supply chain configurations. These studies delve into the intricacies of managing supply chain processes, optimizing resource allocation, and improving operational efficiency within firms. They emphasize the practical aspects of supply chain design, coordination, and performance at a micro level.

For *data usage*, economics research on GSCs predominantly relies on macro-level data, such as country-level and industry-level trade statistics. This includes data on imports, exports, tariffs, and trade balances, which are used to analyze the broader economic impacts

of GSC activities. The focus is on aggregate trends and patterns that can inform policy decisions and economic modeling. In contrast, empirical work in OM utilizes detailed field data at the firm level or firm-by-product level. This includes data on production schedules, inventory levels, supply chain disruptions, and logistics performance. Such granular data allows for a deep dive into the executional nuances of supply chains, enabling the development of models and strategies that directly address firm-specific challenges and opportunities.

The primary *research contribution* of economics research on GSCs is in the realms of welfare implications, regulatory policy guidance, and theoretical advancements. These studies often aim to inform policymakers about the potential economic consequences of trade policies, supply chain disruptions, and globalization trends. The findings are geared towards shaping economic policy and enhancing theoretical understanding of global trade dynamics. Research contributions in OM are more focused on providing actionable insights for managers regarding firms' sourcing decisions and strategies. This includes optimizing the balance between cost efficiency and risk management, improving supply chain resilience, optimizing the sourcing locations and frequencies, and enhancing overall supply chain performance. The findings are directly applicable to practitioners looking to refine their supply chain operations and develop robust strategies to navigate the complexities of global markets.

The differences between the two fields are nicely illustrated by a direct comparison between our paper and [Liu et al. \(2024\)](#), which started with a shipment dataset similar to ours. [Liu et al. \(2024\)](#) document significant heterogeneity in disruption among US firms and investigate the effects of supply disruptions on firms' supply chain relationships, including termination and recovery. They aimed for policy recommendations, for instance by assessing various initiatives proposed by the US government in response to mounting supply chain challenges and how the COVID disruption impacted supply investment decisions. In contrast, our paper analyzes how the pattern of sourcing and supply flows into the US responded to the COVID disruption. We show how the supply chain reconfigurations and associated operational decisions (such as sourcing frequency and batch sizes) vary by products and industries, a level of granularity that [Liu et al. \(2024\)](#) did not pursue.

Online Appendix OC. Guideline for Using the Shipping (Bill of Lading) Data

U.S. GOVERNMENT BILL OF LADING INTERNATIONAL AND DOMESTIC OVERSEAS SHIPMENTS						B/L NUMBER	
TRANSPORTATION COMPANY TENDERED TO				SCAC		DATE B/L PREPARED	
DESTINATION NAME AND ADDRESS CONSIGNEE (Name and full address of installation)			SPLC (Dest.)		ORIGIN NAME AND ADDRESS SHIPPER NAME AND ADDRESS Exporting company : Name and Address		
			SPLC (Orig.)				
GBLOC (Cons.)							
APPROPRIATION CHARGEABLE				BILL CHARGES TO (Dept./agency, bureau/office mailing address and ZIP code)			AGENCY LOC CODE
VIA (Route shipment when advantageous to the Government)							
MARKS AND ANNOTATIONS							
PACKAGES		HM	DESCRIPTION OF ARTICLES (Use carrier's classification or tariff description if possible; otherwise use a clear nontechnical description.)	19. WEIGHTS* (Pounds only)		FOR USE OF BILLING CARRIER ONLY	
NO.	KIND					Services	Rate
			Product information: articles, weights, and volumes				
			CLASSIFICATION ITEM NO.			TOTAL CHARGES	
TARIFF/SPECIAL RATE AUTHORITY				CARRIER WAY/FREIGHT BILL NO. AND DATE			
STOP THIS SHIPMENT AT		FURNISH INFORMATION ON CAR/TRUCKLOAD/CONTAINER SHIPMENTS					
FOR		SEAL NUMBERS		LENGTH/CUBE		MARKED CAPACITY	
				ORDERED	FURNISHED	ORDERED	FURNISHED
		APPLIED BY:		DATE FURNISHED			
CARRIER'S PICKUP DATE (Year, month, and day) Arrival date							
MODE		ESTIMATE	NO. OF CLS/TLS	TYPE RATE	PSC	REASON	
This U.S. Government shipment is subject to terms and conditions of 41 CFR 102-117 and CFR 102-118.				CERTIFICATE OF CARRIER BILLING – CONSIGNEE MUST NOT PAY ANY CHARGES DELIVERED ON (Year, month, and day)			
FOR USE OF ISSUING OFFICE							
ISSUING OFFICE (Name and complete address)			GBLOC		ISSUING OFFICER		
			CONTRACT/PURCHASE ORDER NO. OR OTHER AUTHORITY			DATED	
FOB POINT NAMED IN CONTRACT							
*Show also cubic measurements for shipments via air, truck or water carrier in cases where required.			AUTHORIZED FOR LOCAL REPRODUCTION			STANDARD FORM 1103 (REV. 9/2003) Prescribed by GSA/FMR 102-118	

Figure OC1 US bill of lading: government standard form 1103

In this Appendix, we provide the guidelines for using the bill of lading datasets, which provide information into transaction-level shipping activities, parties involved, and ports of origin and destination. US Bill of Lading Form is shown in Figure OC1. We use S&P Panjiva global shipping datasets, from which the bill of lading is sourced from a variety of reliable and comprehensive sources, including government customs agencies, commercial databases, and direct submissions from companies. These datasets are the result of advanced data collection techniques and algorithms focused on accuracy and integrity. A researcher can subscribe to gain access to the S&P Panjiva data.

While the global shipment datasets offer near-universal records of shipping transactions across the US border, certain sensitive or confidential information related to individual shipments or companies must be restricted to adhere to confidentiality regulations. For example, global shipment data cannot disclose transaction information on US arms exports. Nonetheless, the datasets provide a wealth of information that can be leveraged for a wide range of research and analysis purposes on cross-border business transactions, i.e., to analyze global supply chains.

One aspect to consider when working with the shipping datasets is the company name-matching process. While the datasets provide information about shippers and consignees, they might not identify the ultimate parent firms of these entities. This presents a challenge for researchers who aim to incorporate publicly available financial indicators for the parent firms. In this work, as we focus on public firms, we do need to match their subsidiaries' shipping to the public firm name, and control for the public firm's financial variables.

To address this challenge, previous researchers have utilized fuzzy matching techniques (Charoenwong et al. 2022, Jain and Wu 2023). Python packages like FuzzyWuzzy contain multiple fuzzy string matching algorithms. These algorithms utilize the edit distance to quantify the level of similarity between two strings and classify similar firm names as belonging to the same companies. For instance, "Apple Inc" and "Apple" would be identified as the same company. Previous studies have predominantly utilized these fuzzy matching algorithms to group subsidiaries under their respective parent firms. Similarly, we have utilized a name-matching technique to establish these connections. Through a meticulous process involving manual checks and the use of business registration datasets, we have greatly enhanced the coverage of the data by linking shippers and consignees to their respective parent firms. One coauthor of this paper has led this effort with 3 PhD

students and over 20 undergraduates over the course of 6 months. Using business registration datasets of Orbis, EX21, and Nexis-Lexis, they meticulously cleaned their registered corporate names, checked their associations, and linked them to the associated listed entities.

Online Appendix OD. Empirical Evidence Supporting the Main Arguments

This Appendix includes all details of the empirical analyses (sample generations, variable metrics, specification models, and empirical results) that support the main findings in Section 2.

Sample Generation

The empirical findings are based on two data sources. The first conveys information extracted from the bills of lading for all sea-based imports into the US during 2019-2021. For each import transaction, the bill of lading includes the name and address of the importer, the name and address of the overseas supplier, information about the goods shipped (6-digit Harmonized System (HS) Code), country of origin, written description, number of containers, weight, quantity, units, volume in terms of TEUs (Twenty-foot Equivalent Units), estimated value (in USD), and transportation carrier and vessel information (name and International Maritime Organization (IMO) number). The government form capturing this information for individual transactions is shown in Online Appendix OC. The original dataset is organized at the enterprise level, with the enterprise name serving as the identifier. We refined the names and matched them to their respective listed parent firms, allowing us to merge the shipment data with a second dataset (from Compustat) that provides firm-quarter-level financial fundamentals. Limiting the analysis to publicly listed firms allows for the analysis to control for firm attributes. Merging the two datasets and retaining firms with overlapping observations produced a final dataset categorized at the firm-product (six-digit HS code)-quarter level. This encompasses 284,017 observations from 1,533 listed US importing companies, representing 4,444 product codes, and spans from the first quarter of 2019 to the last quarter of 2021. Of the 1,533 listed US importing companies in the final dataset, 1,139 appear in both the pre-pandemic and during-pandemic epochs. A robustness check considering only the firms present both before and during the pandemic has validated all empirical conclusions in the following section.

We exploit an exogenous and unanticipated natural disaster, the COVID-19 pandemic, which affected all firms in the US and its sourcing countries. The outbreak of COVID-19 can be likened to “dice rolled by God,” akin to events studied in several classic econometric papers, such as the minimum wage policy in the Nobel Prize-winning paper by [Card and Krueger \(2000\)](#), the Vietnam Draft Lottery in [Angrist et al. \(2011\)](#), a television show in [Cutler et al. \(2008\)](#), and the cholera outbreak in [Ambrus et al. \(2020\)](#). We focus on the

2019-2021 period because it encompasses the most severe phases of the pandemic while excluding other significant events that could affect global supply chains (GSCs), such as the Sino-US trade war starting in 2018 and the Russo-Ukraine war that began in 2022.

We focus on US firms for two reasons. First, US companies are known for offshore outsourcing of manufacturing, so provide a suitable context to study GSC restructuring. According to the World Bank, the US has the second-largest import volumes, following China (See statistics of import share by country from 2019-2021 here: <https://wits.worldbank.org/CountryProfile/en/Country/WLD/Year/2020/TradeFlow/Import/Partner/by-country>). Second, US companies intensively utilized GSCs, with significant sourcing volumes abroad, that were severely impacted by COVID-19. Thus, the supply chain decisions of US companies would be heavily affected by COVID-19, making them ideal research subjects. In contrast, although China has large trade volumes, it also has substantial local production and demand markets. Other countries might not have supply chains that are sufficiently in scope. Second, the financial variables and matching tables from shipment datasets to financial variables are the most complete for US companies. Although supply chain allocations in emerging markets or other economies are worth researching, the lack of clean data and matching tables will constrain effective identifications. Similarly, data from lower levels of supply chains is limited. Although other supply chain datasets like Factset Revere and Bloomberg can be used to investigate lower levels of supply chains, they show only the supply chain linkages with limited information on product-level transaction volumes or sales, making it difficult to depict changes in the sourcing frequencies, batch sizes, and geographic and industrial volume reallocations.

Variable Metrics

We collected a set of metrics from 2019 to 2021 to observe US importers' decisions before and during the COVID-19 pandemic. Firm-level metrics include the weight and volume of imports, the number of suppliers and their countries of origin, and the number and size of received shipments. Firm attributes contain a set of financial performance metrics derived from public firms' quarterly financial statements, corresponding to the control variables employed in previous literature (Rumyantsev and Netessine 2007, Kesavan et al. 2016). Table OD1 defines the variables. Table OD2 presents the variables' mean values before and during COVID-19.

Table OD1 Variable Descriptions

Variable	Measurement	Data source
Dependent Variable: Sourcing concentration		
<i>Number of Origins</i> _{<i>i,p,t</i>}	Number of countries from which company <i>i</i> sources product <i>p</i> (6-digit HS code) in quarter <i>t</i> .	Global Shipment Dataset
<i>Number of Regions</i> _{<i>i,p,t</i>}	Number of sourcing regions ¹ from company <i>i</i> sources product <i>p</i> in quarter <i>t</i> .	Global Shipment Dataset
<i>Number of Suppliers</i> _{<i>i,p,t</i>}	Number of suppliers company <i>i</i> sources product <i>p</i> in quarter <i>t</i> .	Global Shipment Dataset
<i>Number of New Suppliers</i> _{<i>i,p,t</i>}	Number of suppliers with whom company <i>i</i> has not partnered for product <i>p</i> up to quarter <i>t</i> .	Global Shipment Dataset
<i>Ratio of New Suppliers</i> _{<i>i,p,t</i>}	Number of new suppliers as a proportion of the total suppliers from which company <i>i</i> sources product <i>p</i> in quarter <i>t</i> .	Global Shipment Dataset
Dependent Variable: Geographic Distribution		
<i>Share of Imports from {Region}</i> _{<i>i,p,t</i>}	Import size from {Region} as a proportion of the total import size in terms of weight (tons), volumes (TEU), and number of shipments for company <i>i</i> sourcing product <i>p</i> in quarter <i>t</i> .	Global Shipment Dataset
Dependent Variable: Delivery Patterns		
<i>Shipment per Quarter</i> _{<i>i,p,t</i>}	Total number of shipment transactions for company <i>i</i> sourcing product <i>p</i> in quarter <i>t</i> .	Global Shipment Dataset
<i>Quantity per Shipment</i> _{<i>i,p,t</i>}	Total shipment quantity as a proportion of the number of transactions for company <i>i</i> sourcing product <i>p</i> in quarter <i>t</i> .	Global Shipment Dataset
<i>Volume per Shipment</i> _{<i>i,p,t</i>}	Total shipment volume measured in TEUs (Twenty-foot equivalent units) as a proportion of the total number of transactions for company <i>i</i> sourcing product <i>p</i> in quarter <i>t</i> .	Global Shipment Dataset
Core Independent Variable		
<i>During Pandemic</i> _{<i>t</i>}	A dummy variable that equals 1 if quarter <i>t</i> is equals to or later than the first quarter of 2020.	Global Shipment Dataset
Control variables: Uncertainty		
<i>US Economic Uncertainty</i> _{<i>t</i>} (EPU)	The average monthly US Policy-related Economic Policy Uncertainty Index in quarter <i>t</i> .	Baker et al. (2016)
<i>Sourcing Country Economic Uncertainty</i> _{<i>i,t</i>} (SEPU)	The weighted-average Quarterly World Uncertainty Index, using weights that are the country's share of the world imports of company <i>i</i> in quarter <i>t</i> .	Ahir et al. (2022)
<i>US Geopolitical Risks</i> _{<i>t</i>} (GRI)	The average monthly US Geopolitical Risk Index in quarter <i>t</i> .	Caldara and Iacoviello (2022)
Control Variables: Firm Attributes		
<i>Size</i> _{<i>i,t</i>}	The logarithm of the total asset of company <i>i</i> in quarter <i>t</i> plus one.	Compustat
<i>COGS</i> _{<i>i,t</i>}	Cost of goods sold of company <i>i</i> in quarter <i>t</i> .	Compustat
<i>Capital Intensity</i> _{<i>i,t</i>}	Total assets as a proportion of the total sales of company <i>i</i> in quarter <i>t</i> .	Compustat
<i>PPENT</i> _{<i>i,t</i>}	Net property plant and equipment of company <i>i</i> in quarter <i>t</i> .	Compustat
<i>Inventory</i> _{<i>i,t</i>}	Total inventory as a proportion of the total asset for company <i>i</i> in quarter <i>t</i> .	Compustat
<i>Inventory Turnover</i> _{<i>i,t</i>}	Cost of goods sold as a proportion of the total inventory for company <i>i</i> in quarter <i>t</i> .	Compustat
<i>Cash Efficiency</i> _{<i>i,t</i>}	Account payables as a proportion of the total inventory for company <i>i</i> in quarter <i>t</i> .	Compustat
<i>Net Income</i> _{<i>i,t</i>}	Net income of company <i>i</i> in quarter <i>t</i> .	Compustat
<i>ROA</i> _{<i>i,t</i>}	Net income as a proportion of the total assets for company <i>i</i> in quarter <i>t</i> .	Compustat
<i>Gross Margin</i> _{<i>i,t</i>}	Net income minus the cost of goods sold for company <i>i</i> in quarter <i>t</i> .	Compustat
<i>Sales Growth</i> _{<i>i,t</i>}	Percent change in sales for company <i>i</i> from quarter <i>t</i> – 1 to quarter <i>t</i> .	Compustat

Note. The data is organized at the firm (*i*)-product(*p*)-quarter(*t*) level. ¹Sourcing regions include China, Vietnam, India, North & Central America, South America, Japan & South Korea, Western Europe, Eastern Europe & Russia, and Taiwan.

Table OD2 Summary Statistics

Panel A: Summary Statistics

Variables	Observations	Mean	SD	p25	Median	p75
<i>Number of Origins</i>	251,475	1.410	1.080	1.000	1.000	1.000
<i>Number of Regions</i>	251,475	1.280	0.730	1.000	1.000	1.000
<i>Number of Suppliers</i>	251,475	1.930	3.970	1.000	1.000	2.000
<i>Number of New Suppliers</i>	251,475	0.700	1.910	0.000	0.000	1.000
<i>Ratio of New Suppliers</i>	251,475	0.380	0.450	0.000	0.000	1.000
<i>Share of Imports from China</i>	251,475	0.470	0.480	0.000	0.260	1.000
<i>Share of Imports from Vietnam</i>	251,475	0.030	0.150	0.000	0.000	0.000
<i>Share of Imports from India</i>	251,475	0.050	0.210	0.000	0.000	0.000
<i>Share of Imports from North & Central America</i>	251,475	0.050	0.210	0.000	0.000	0.000
<i>Share of Imports from West Europe</i>	251,475	0.180	0.370	0.000	0.000	0.000
<i>Share of Imports from Japan & South Korea</i>	251,475	0.040	0.180	0.000	0.000	0.000
<i>Share of Imports from South America</i>	251,475	0.020	0.140	0.000	0.000	0.000
<i>Share of Imports from East Europe & Russia</i>	251,475	0.010	0.100	0.000	0.000	0.000
<i>Share of Imports from Taiwan</i>	251,475	0.060	0.230	0.000	0.000	0.000
<i>Shipment per Quarter</i>	251,475	6.520	17.030	1.000	2.000	5.000
<i>Quantity per Shipment</i>	251,475	678.500	1635.260	19.000	147.000	786.500
<i>Volume per Shipment</i>	251,475	1.460	2.260	0.240	1.000	2.000
<i>EPU</i>	251,475	303.600	216.700	159.300	217.700	384.300
<i>SEPU</i>	251,475	0.030	0.050	0.010	0.020	0.030
<i>GRI</i>	251,475	1.960	0.340	1.750	1.980	2.190
<i>Size</i>	251,475	7.930	1.580	6.920	7.920	9.130
<i>COGS</i>	251,475	3356.730	4495.980	357.100	1100.350	4061.000
<i>Capital Intensity</i>	251,475	1.730	0.810	1.210	1.660	2.010
<i>PPENT</i>	251,475	7762.060	12383.350	483.000	1837.800	7032.000
<i>Inventory</i>	251,475	0.350	0.180	0.250	0.340	0.460
<i>Inventory Turnover</i>	251,475	2.730	6.210	0.830	1.250	1.570
<i>Cash Efficiency</i>	251,475	1.760	3.940	0.470	0.770	1.400
<i>Net Income</i>	251,475	362.500	643.500	11.070	83.200	385.000
<i>ROA</i>	251,475	0.040	0.060	0.010	0.040	0.060
<i>Gross Margin</i>	251,475	-2881.620	3815.670	-3625.900	-959.000	-321.100
<i>Sales Growth</i>	251,475	0.020	0.170	-0.040	0.000	0.080

Panel B: The mean of the dependent variables before and after the COVID-19 pandemic

Dimensions	Variables	Before COVID-19	During COVID-19	Mean Diff. (During-Before)	Percentage Change
Sourcing	<i>Number of Origins</i>	1.418	1.410	-0.008*	-0.56%
	<i>Number of Regions</i>	1.283	1.281	-0.002	-0.15%
Concentration	<i>Number of Suppliers</i>	1.919	1.934	0.015***	0.77%
	<i>Number of New Suppliers</i>	0.651	0.728	0.077***	11.75%
	<i>Ratio of New Suppliers</i>	0.343	0.395	0.052***	15.28%
Geographic Distribution	<i>Share of Imports from China</i>	0.482	0.470	-0.012***	-2.41%
	<i>Share of Imports from Vietnam</i>	0.021	0.028	0.007***	32.35%
	<i>Share of Imports from India</i>	0.051	0.055	0.004***	7.50%
	<i>Share of Imports from North & Central America</i>	0.058	0.050	-0.009	-14.82%
	<i>Share of Imports from West Europe</i>	0.171	0.180	0.009***	4.96%
	<i>Share of Imports from Japan & South Korea</i>	0.040	0.038	-0.001***	-3.46%
	<i>Share of Imports from South America</i>	0.021	0.021	-0.000*	-0.14%
	<i>Share of Imports from East Europe & Russia</i>	0.009	0.010	0.001	7.70%
	<i>Share of Imports from Taiwan</i>	0.063	0.063	0.000	0.37%
Delivery Patterns	<i>Shipment per Quarter</i>	6.874	6.339	-0.535***	-7.78%
	<i>Quantity per Shipment</i>	628.166	704.660	76.495***	12.18%
	<i>Volume per Shipment</i>	1.395	1.498	0.104***	7.42%

Note. Share of imports from regions is measured by weight (in tons).

Empirical Specification

We investigate the change in sourcing patterns following the start of the COVID-19 pandemic, for public US importing firms aggregated at the firm (i), quarter (t), and product (6-digit HS code) (p) level. The specification for the tests is given by equation (1):

$$Y_{i,p,t} = \beta_0 + \beta_1 \cdot \text{DuringPandemic}_t + \beta_2 \cdot \text{EPU}_t + \beta_3 \cdot \text{SEPU}_{i,t} + \beta_4 \cdot \text{GRI}_t + \mathbf{X}_{i,t}\gamma + \delta_I \times \delta_q + \delta_i + \delta_p + \epsilon_{i,p,t} \quad (1)$$

We performed regressions for multiple measures of sourcing patterns. $Y_{i,p,t}$ denotes multiple supply chain patterns, including the number of sourcing origins, regions, or suppliers, the share of imports from particular regions, sourcing frequency, and batch sizes. The independent variable DuringPandemic_t is a binary indicator equal to 1 during the COVID-19 pandemic (after the first quarter of 2020) and zero otherwise.

Firm-specific attributes $\mathbf{X}_{i,t}$ include factors that may drive changes in supply chain decisions and the firm's exposure to the pandemic, such as firm size (*Size*), direct costs of producing goods (*COGS*), spending on assets (*Capital Intensity* and *PPENT*), inventory level and efficiency (*Inventory* and *Inventory Turnover*), efficiency of short-term assets (*Cash Efficiency*), profitability (*Net Income*, *ROA*, and *Gross Margin*), and growth (*Sales Growth*). We included several time-variant uncertainty indices and time-variant firm-level attributes as control variables to account for other time-variant, non-COVID GSC uncertainties. We controlled for economic and geopolitical uncertainty indices that simultaneously affect pandemic exposure and supply chain patterns. These include *US Economic Uncertainty* (EPU_t) controlling for time-variant US economic conditions (Baker et al. 2016), *Supply Countries' Average Economic Uncertainty* (SEPU_t) reflecting economic uncertainty in sourcing countries. US Economic Policy Uncertainty Index can be extracted from https://www.policyuncertainty.com/us_monthly.html. The index is derived from text-mining of articles containing economic uncertainty terms in 10 large newspapers (*USA Today*, *Miami Herald*, *Chicago Tribune*, *Washington Post*, *Los Angeles Times*, *Boston Globe*, *San Francisco Chronicle*, *Dallas Morning News*, *Houston Chronicle*, *Wall Street Journal*). World Uncertainty Index can be extracted from https://www.policyuncertainty.com/wui_quarterly.html.

The quarterly indices of economic uncertainty for 143 countries are constructed using frequency counts of “uncertainty” and its variants in the quarterly Economist Intelligence

Unit country reports. *US Geopolitical Risk* (GRI_t) reveals the impacts of geopolitical risks faced by US firms (Caldara and Iacoviello 2022). Monthly Geopolitical Risk Index was constructed from <https://www.matteoiacoviello.com/gpr.htm>. The index is based on a tally of newspaper articles covering geopolitical tensions. The variable descriptions can be found in Table OD1.

We included several fixed effects to control for time-invariant factors that concurrently influence the impact of the pandemic and supply chain patterns. The firm fixed effect δ_i encapsulates time-invariant firm-specific traits, such as industry affiliation. The product fixed effect δ_p controls for time-invariant product attributes such as production complexity. The interaction of industry and quarter fixed effects $\delta_I \times \delta_q$ controls for the impacts of industry-specific shocks or seasonality. A complete discussion of endogeneity issues that may impact the empirical specification can be found in Online Appendix OE.

Empirical Results

Changes in the Sourcing Concentration. Table OD3 shows no evidence of diversification of supplier locations during COVID-19. Column (1) indicates that the number of countries from which US firms sourced has not changed significantly. Similarly, column (2) reveals that companies have not been sourcing from fewer world regions. Column (3) shows that US importing firms increased their total number of suppliers. The increase was driven by adding new suppliers rather than continuing to work with suppliers from the preceding five years, as evidenced by the rise in the number and ratio of new suppliers (columns (4) and (5), respectively).

Changes in the Geographic Distribution. Table OD4 underscores significant shifts in the import proportions from diverse countries. The geographic reallocation of imports mainly happened in China, Vietnam, India, North & Central America, and South America. Regarding offshoring, imports from China decreased, while increasing from other Asian countries such as Vietnam and India. In terms of nearhoring, US importing firms were increasingly using North & Central America sources, although this increase was small in absolute numbers. It is important to point out that the regression controls for fixed effects on firms, products, the interaction of industry and time, and several time-variant firm attributes and uncertainty, and thus shows an actual shift in the geographic distribution of firms' sourcing. In contrast, economists' reports (see, e.g., Alfaro and Chor 2023) typically report aggregated import flow changes, which could partially mask offsetting changes in the

Table OD3 Changes in the Sourcing Concentration

VARIABLES	(1) Number of Origins	(2) Number of Regions	(3) Number of Suppliers	(4) Number of New Suppliers	(5) Ratio of New Suppliers
<i>DuringPandemic</i>	-0.003 (-0.522)	0.003 (0.570)	0.043* (1.672)	0.031** (2.527)	0.012*** (4.244)
<i>Size</i>	0.002 (0.139)	-0.009 (-0.795)	-0.095 (-1.446)	-0.060* (-1.883)	-0.003 (-0.402)
<i>COGS</i>	0.000*** (5.757)	0.000*** (7.427)	0.000 (1.195)	0.000 (0.394)	-0.000** (-2.380)
<i>Capital Intensity</i>	-0.001 (-0.154)	-0.001 (-0.209)	0.027 (1.139)	0.018 (1.587)	0.001 (0.343)
<i>PPENT</i>	0.000 (0.559)	0.000 (0.958)	-0.000 (-0.205)	0.000 (0.246)	0.000 (0.369)
<i>Inventory</i>	0.042 (0.957)	-0.003 (-0.115)	0.392** (2.363)	0.483*** (6.019)	0.120*** (6.588)
<i>Inventory Turnover</i>	0.005*** (3.989)	0.004*** (5.331)	-0.006 (-1.456)	-0.006*** (-2.725)	-0.001*** (-2.614)
<i>Cash Efficiency</i>	-0.002 (-1.082)	-0.001 (-0.913)	0.014** (2.144)	0.013*** (3.981)	0.002*** (2.757)
<i>Net Income</i>	-0.000*** (-2.960)	-0.000*** (-4.972)	0.000 (0.866)	0.000* (1.946)	0.000** (2.535)
<i>ROA</i>	0.002 (0.029)	-0.021 (-0.475)	0.469* (1.898)	0.295** (2.468)	0.028 (1.036)
<i>Gross Margin</i>	0.000*** (4.798)	0.000*** (6.867)	0.000 (0.473)	-0.000 (-0.164)	-0.000 (-1.164)
<i>Sales Growth</i>	-0.020 (-1.422)	-0.013 (-1.379)	-0.056 (-1.064)	0.024 (0.951)	0.041*** (7.097)
<i>US Economic Uncertainty</i>	-0.000** (-2.414)	-0.000** (-1.962)	-0.000*** (-2.610)	-0.000*** (-3.850)	-0.000*** (-5.307)
<i>Sourcing Countries' Economic Uncertainty</i>	-0.377*** (-5.241)	-0.275*** (-5.687)	-0.772*** (-2.812)	-0.382*** (-2.874)	-0.121*** (-3.994)
<i>Geopolitical Risk</i>	0.012 (1.093)	0.012* (1.652)	0.031 (0.744)	-0.106*** (-5.181)	-0.080*** (-17.262)
Firm FE	Y	Y	Y	Y	Y
Industry × Quarter FE	Y	Y	Y	Y	Y
Product FE	Y	Y	Y	Y	Y
Observations	251,475	251,475	251,475	251,475	251,475
R-squared	0.185	0.184	0.125	0.118	0.172

Note. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ using two-tailed tests. OLS estimates with robust t statistics are in parentheses.

import volumes of industries and individual firms. A robustness check in Online Appendix OF utilizing the absolute changes in imports as the dependent variables produced empirical conclusions consistent with those in Table OD4.

Industry Variation for Geographic Reallocation. To understand the composition of the identified geographic reallocation, we drilled down to the level of specific industries. Table OD5 presents details of differences by industry. The findings reveal that the geographic distribution of imports evolves differently across industries.

Changes in the Delivery Patterns. Table OD6 shows a notable shift in the size and frequency of companies' shipments during the COVID-19 period. Specifically, batch sizes expanded in terms of both volume and weight, accompanied by a reduction in delivery frequency. By percentage, we observed a 4.96% rise in quantity per shipment, a 2.08% increase in volume per shipment, and a 6.67% decrease in sourcing frequency.

Allon (2023) proposes another factor contributing to larger shipments with reduced frequency: i.e., the increased costs of ordering (such as the shipping costs) during the COVID-19 pandemic. Seaborne imports, in particular, faced significant challenges due to soaring

Table OD4 Changes in the Geographic Distribution

VARIABLES	China			Share of Imports from Vietnam			India		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	By Weight (Tons)	By Volume (TEU)	By Shipments	By Weight (Tons)	By Volume (TEU)	By Shipments	By Weight (Tons)	By Volume (TEU)	By Shipments
<i>DuringPandemic</i>	-0.023*** (-8.886)	-0.023*** (-8.854)	-0.023*** (-9.086)	0.006*** (6.582)	0.006*** (6.607)	0.006*** (6.808)	0.008*** (6.442)	0.008*** (6.621)	0.008*** (6.773)
<i>EPU</i>	0.000 (0.160)	0.000 (0.135)	0.000 (0.499)	-0.000* (-1.754)	-0.000** (-2.216)	-0.000* (-1.959)	-0.000*** (-4.580)	-0.000*** (-4.660)	-0.000*** (-5.011)
<i>SEPU</i>	0.085*** (3.045)	0.093*** (3.334)	0.089*** (3.236)	-0.028*** (-2.895)	-0.028*** (-2.911)	-0.027*** (-2.928)	-0.031** (-2.273)	-0.032** (-2.419)	-0.030** (-2.265)
<i>GRI</i>	-0.017*** (-3.875)	-0.016*** (-3.698)	-0.017*** (-4.001)	-0.002 (-1.601)	-0.002* (-1.676)	-0.002* (-1.703)	0.003 (1.309)	0.003 (1.415)	0.003 (1.553)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry×Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Product FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475
R-squared	0.377	0.375	0.382	0.196	0.194	0.198	0.269	0.268	0.278
VARIABLES	North & Central America			West Europe			Japan & South Korea		
	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	By Weight (Tons)	By Volume (TEU)	By Shipments	By Weight (Tons)	By Volume (TEU)	By Shipments	By Weight (Tons)	By Volume (TEU)	By Shipments
<i>DuringPandemic</i>	0.005*** (3.889)	0.004*** (3.515)	0.005*** (4.204)	0.000 (0.092)	-0.001 (-0.548)	0.000 (0.005)	-0.000 (-0.056)	-0.000 (-0.176)	-0.000 (-0.077)
<i>EPU</i>	-0.000 (-0.159)	-0.000* (-1.837)	-0.000 (-0.173)	-0.000 (-0.281)	0.000 (0.094)	-0.000 (-0.548)	0.000*** (3.453)	0.000*** (3.167)	0.000*** (3.558)
<i>SEPU</i>	0.004 (0.308)	0.027** (2.243)	0.005 (0.356)	-0.016 (-0.743)	0.003 (0.155)	-0.018 (-0.818)	0.009 (0.777)	0.006 (0.496)	0.010 (0.802)
<i>GRI</i>	0.008*** (3.894)	0.003 (1.386)	0.009*** (4.348)	-0.000 (-0.070)	-0.001 (-0.363)	-0.002 (-0.516)	0.003 (1.602)	0.002 (1.346)	0.003* (1.825)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry×Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Product FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475
R-squared	0.338	0.221	0.347	0.380	0.368	0.386	0.187	0.187	0.192
VARIABLES	South America			East Europe & Russia			Taiwan		
	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)
	By Weight (Tons)	By Volume (TEU)	By Shipments	By Weight (Tons)	By Volume (TEU)	By Shipments	By Weight (Tons)	By Volume (TEU)	By Shipments
<i>DuringPandemic</i>	-0.002** (-2.198)	-0.002** (-2.186)	-0.002** (-2.036)	0.000 (0.371)	0.000 (0.126)	0.000 (0.032)	0.000 (0.060)	-0.000 (-0.306)	-0.000 (-0.176)
<i>EPU</i>	0.000* (2.215)	0.000* (1.882)	0.000** (2.453)	-0.000 (-0.778)	-0.000 (-0.798)	-0.000 (-0.605)	0.000 (0.559)	0.000 (0.568)	0.000 (0.564)
<i>SEPU</i>	0.006 (0.662)	0.011 (1.284)	0.005 (0.586)	-0.014** (-2.122)	-0.012* (-1.916)	-0.014** (-2.161)	0.009 (0.629)	0.009 (0.634)	0.008 (0.525)
<i>GRI</i>	0.001 (1.084)	0.001 (0.570)	0.002 (1.329)	-0.000 (-0.345)	-0.000 (-0.116)	-0.001 (-0.527)	-0.001 (-0.553)	-0.002 (-0.697)	-0.001 (-0.515)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry×Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Product FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475
R-squared	0.264	0.261	0.269	0.164	0.158	0.167	0.236	0.235	0.243

Note. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ using two-tailed tests. OLS estimates with robust t statistics are in parentheses. Control variables include *Net Income*, *PPENT*, *COGS*, *Cash Efficiency*, *Gross Margin*, *Capital Intensity*, *Sales Growth*, *Size*, *ROA*, *Inventory*, and *Inventory Turnover*.

ocean freight charges. Consequently, companies might have opted for order consolidation to mitigate costs by decreasing order frequency. A complete discussion of robustness checks applied to the three main findings reside in Online Appendix OF.

Table OD5 Industry Variation of Geographic Reallocation

Industry	Machinery & Electrical Goods	Semiconductor Goods	Hygiene Goods	Critical Materials
Share of Imports from:	β_1	β_1	β_1	β_1
China	-0.026***	0.005	-0.006	-0.097***
Vietnam	0.004***	-0.003	0.002	0.018**
India	0.008***	-0.001	-0.002	0.032**
North & Central America	0.006***	0.002	0.000	0.016
Western Europe	0.011***	0.048**	0.004	0.081**
Japan & South Korea	-0.002	-0.036**	-0.001	0.000
South America	-0.002	-0.000	0.001	-0.005
East Europe & Russia	0.000	-0.007	0.004*	0.000
Taiwan	0.003	-0.006	-0.005	-0.023
Industry	Mineral & Fuels	Transportation	Textiles & Apparel	Chemicals
Share of Imports from:	β_1	β_1	β_1	β_1
China	-0.006	-0.000	-0.055***	-0.014*
Vietnam	-0.002	0.001	0.012***	0.001
India	-0.004	0.007	0.015***	0.011**
North & Central America	0.039**	-0.005	0.002	0.005
Western Europe	0.025	0.005	0.011***	-0.007
Japan & South Korea	-0.010	0.010	-0.003	0.003
South America	-0.026**	-0.004	-0.000	0.001
East Europe & Russia	-0.001	-0.004	-0.002*	-0.001
Taiwan	0.001	-0.007	-0.003	-0.004

Note. β_1 refers to the coefficient identified for *DuringPandemic* in empirical specification (1), capturing the share of changes caused by the pandemic when other factors being equal. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ using two-tailed tests. The share of imports is measured by import weights (tons).

Table OD6 Changes in the Sourcing Frequency and Shipment Batch Size

VARIABLES	(1) Shipment per quarter	(2) Quantity per shipment	(3) Volume per shipment
<i>DuringPandemic</i>	-0.458*** (-4.275)	31.254*** (3.142)	0.029** (2.113)
EPU	-0.001*** (-3.564)	0.005 (0.238)	0.000 (1.003)
SEPU	-2.568** (-2.229)	-118.021 (-1.103)	0.263* (1.799)
GRI	0.166 (0.934)	-49.807*** (-3.022)	-0.029 (-1.276)
Controls	Y	Y	Y
Firm FE	Y	Y	Y
Industry×Quarter FE	Y	Y	Y
Product FE	Y	Y	Y
Observations	251,475	251,475	251,475
R-squared	0.162	0.216	0.234

Note. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ using two-tailed tests. OLS estimates with robust t statistics are in parentheses. Control variables include *Net Income*, *PPENT*, *COGS*, *Cash Efficiency*, *Gross Margin*, *Capital Intensity*, *Sales Growth*, *Size*, *ROA*, *Inventory*, and *Inventory Turnover*.

Online Appendix OE. Discussion of Endogeneity Issues in Empirical Analysis

In this Appendix, we discuss the endogeneity issues that may impact the empirical findings. Observational data, when utilized in a natural experiment setting and with control of confounding factors, can be used to generate causal relationships. We exploit a very exogenous and unanticipated natural disaster, the COVID-19 pandemic. This natural experiment setting makes *reverse causality* (i.e., the supply allocation decision affecting the occurrence of COVID-19) unlikely. Additionally, despite using observational data, the data source is US customs, who record every material transaction arriving into the US during the period studied. This comprehensive coverage makes *selection bias* less likely, thereby reducing causality concerns. Endogeneity concerns here involve other omitted uncertainties that may affect how firms are exposed to COVID-19 and how they change their supply chain material flow patterns. Although the time frame 2019-2021 was employed to exclude the impacts of events other than pandemics, some may argue that long-term impacts or proactive actions by US firms in response to other supply chain uncertainties (such as industry sanctions, changes in economic conditions in both the US and sourcing countries) might obscure the effects of COVID-19. Therefore, we included several time-variant uncertainty indices and time-variant firm-level attributes as control variables to account for other time-variant, non-COVID GSC uncertainties. We controlled for economic and geopolitical uncertainty indices that simultaneously affect pandemic exposure and supply chain patterns. These include *US Economic Uncertainty* (EPU_t) controlling for time-variant US economic conditions (Baker et al. 2016). *Supply Countries' Average Economic Uncertainty* ($SEPU_t$) reflecting economic uncertainty in sourcing countries, and *US Geopolitical Risk* (GRI_t) revealing the impacts of geopolitical risks faced by US firms (Caldara and Iacoviello 2022).

Some might suggest using instrumental variables to address endogeneity concerns, but this approach is not suitable here. Instrumental variables are typically employed when treatment is non-random or when independent variables are highly endogenous and omitted variable bias cannot be controlled directly. Suitable instruments must influence the endogenous variables while affecting the dependent variable only through them. In our case, the COVID-19 pandemic was an exogenous shock unrelated to our main variables, making it infeasible to identify valid instruments. Therefore, we conclude that instrumental variables are not appropriate for this study.

Online Appendix OF. Robustness Checks of Empirical Findings

This section provides four robustness checks applied to the three main tests discussed in the main content: sourcing concentration, geographic distribution, and sourcing frequency and batch sizes. First, we used alternative dependent variables to test geographic distribution. Next, we replaced the original independent variable “DuringPandemic” with several alternative COVID-19 intensity measurements. The data sources and measurements for these alternative dependent variables and COVID-19 metrics can be found in Table OF8. We also changed the independent variables and extended the sample period to 2016-2022. The main results still hold with statistical significance, despite some slight differences in significance level.

(a) Absolute changes in imports by region.

We first changed the import shares in the geographic distribution tests to absolute import volumes, weights, and shipments, then rerun the regressions on the geographic distribution. Table OF1 shows that the reallocation of imports from China to Vietnam, India, and North & Central America continues to appear.

(b) Replacing the independent variables with the “World Pandemic Index”.

Next, we replaced the original independent variable “DuringPandemic” with several alternative COVID-19 intensity measurements. When replacing the independent variable “DuringPandemic” with the quarterly measure “World Pandemic Index,” a measurement based on keyword counts from global discussions on the pandemic, the main results still continue to hold as seen in Tables OF2-OF4.

(c) Replacing the independent variables with the reciprocal of one plus “government non-pharmaceutical interventions”.

We replaced “DuringPandemic” with an alternative measure of a firm’s COVID-19 exposure (specifically, the reciprocal of “one plus government non-pharmaceutical interventions”) and reran the three groups of tests. Government non-pharmaceutical interventions can be downloaded here: <https://github.com/Keystone-Strategy/covid19-intervention-data/>. COVID-19 exposure is negatively correlated with intervention intensity as the higher the government non-pharmaceutical intervention in a region, the less COVID-19 spreads in that region. The results in Table OF5-OF7 show that the trends of diversifying suppliers by adding new ones, reallocating from China to Vietnam, India, and North & Central America, and consolidating sourcing orders in the post-pandemic era still appear.

Table OF1 Geographic Distribution: Absolute Import Changes by Region

VARIABLES	China			Logarithm of Total Imports from Vietnam			India		
	(1) By Weight (Tons)	(2) By Volume (TEU)	(3) By Shipments	(4) By Weight (Tons)	(5) By Volume (TEU)	(6) By Shipments	(7) By Weight (Tons)	(8) By Volume (TEU)	(9) By Shipments
<i>DuringPandemic</i>	-0.060*** (-6.229)	-0.041*** (-6.571)	-0.065*** (-12.944)	0.031*** (7.442)	0.018*** (7.077)	0.015*** (7.198)	0.030*** (6.183)	0.015*** (5.490)	0.014*** (5.375)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry×Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Product FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475
R-squared	0.400	0.389	0.393	0.178	0.167	0.188	0.257	0.240	0.266
VARIABLES	North & Central America			West Europe			Japan & South Korea		
	(10) By Weight (Tons)	(11) By Volume (TEU)	(12) By Shipments	(13) By Weight (Tons)	(14) By Volume (TEU)	(15) By Shipments	(16) By Weight (Tons)	(17) By Volume (TEU)	(18) By Shipments
<i>DuringPandemic</i>	0.013*** (2.597)	0.005* (1.744)	0.010*** (4.439)	-0.015** (-2.121)	-0.011*** (-2.750)	-0.011*** (-3.318)	-0.005 (-0.944)	-0.004 (-1.343)	-0.004 (-1.633)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry×Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Product FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475
R-squared	0.218	0.184	0.225	0.364	0.294	0.320	0.156	0.137	0.153
VARIABLES	South America			East Europe & Russia			Taiwan		
	(19) By Weight (Tons)	(20) By Volume (TEU)	(21) By Shipments	(22) By Weight (Tons)	(23) By Volume (TEU)	(24) By Shipments	(25) By Weight (Tons)	(26) By Volume (TEU)	(27) By Shipments
<i>DuringPandemic</i>	-0.014*** (-3.812)	-0.008*** (-4.036)	-0.005*** (-3.011)	0.001 (0.369)	0.000 (0.177)	-0.001 (-0.883)	-0.008 (-1.609)	-0.005* (-1.839)	-0.008*** (-3.108)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry×Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Product FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475
R-squared	0.287	0.255	0.248	0.189	0.168	0.160	0.173	0.149	0.189

Note. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ using two-tailed tests. OLS estimates with robust t statistics are in parentheses. Control variables include *US Economic Uncertainty*, *Sourcing Country Economic Uncertainty*, *US Geopolitical Risk*, *Net Income*, *PPENT*, *COGS*, *Cash Efficiency*, *Gross Margin*, *Capital Intensity*, *Sales Growth*, *Size*, *ROA*, *Inventory*, and *Inventory Turnover*.

Table OF2 Sourcing Concentration: Replacing the Independent Variables with the “World Pandemic Index”

VARIABLES	(1) Number of Origins	(2) Number of Regions	(3) Number of Suppliers	(4) Number of New Suppliers	(5) Ratio of New Suppliers
<i>World Pandemic Index</i>	0.000 (1.018)	0.001 (1.407)	0.003* (1.650)	0.007*** (8.861)	0.004*** (19.464)
Firm FE	Y	Y	Y	Y	Y
Industry × Quarter FE	Y	Y	Y	Y	Y
Product FE	Y	Y	Y	Y	Y
Observations	251,475	251,475	251,475	251,475	251,475
R-squared	0.185	0.184	0.125	0.118	0.174

Note. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ using two-tailed tests. OLS estimates with robust t statistics are in parentheses. Control variables include *US Economic Uncertainty*, *Sourcing Country Economic Uncertainty*, *US Geopolitical Risk*, *Net Income*, *PPENT*, *COGS*, *Cash Efficiency*, *Gross Margin*, *Capital Intensity*, *Sales Growth*, *Size*, *ROA*, *Inventory*, and *Inventory Turnover*.

Table OF3 Geographic Distribution: Replacing the Independent Variables with the “World Pandemic Index”

VARIABLES	China			Share of Imports from Vietnam			India		
	(1) By Weight (Tons)	(2) By Volume (TEU)	(3) By Shipments	(4) By Weight (Tons)	(5) By Volume (TEU)	(6) By Shipments	(7) By Weight (Tons)	(8) By Volume (TEU)	(9) By Shipments
<i>World Pandemic Index</i>	-0.023*** (-8.886)	-0.023*** (-8.854)	-0.023*** (-9.086)	0.006*** (6.582)	0.006*** (6.607)	0.006*** (6.808)	0.008*** (6.442)	0.008*** (6.621)	0.008*** (6.773)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry×Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Product FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475
R-squared	0.377	0.375	0.382	0.196	0.194	0.198	0.269	0.268	0.278
VARIABLES	North & Central America			West Europe			Japan & South Korea		
	(10) By Weight (Tons)	(11) By Volume (TEU)	(12) By Shipments	(13) By Weight (Tons)	(14) By Volume (TEU)	(15) By Shipments	(16) By Weight (Tons)	(17) By Volume (TEU)	(18) By Shipments
<i>World Pandemic Index</i>	0.005*** (3.889)	0.004*** (3.515)	0.005*** (4.204)	0.000 (0.092)	-0.001 (-0.548)	0.000 (0.005)	-0.000 (-0.056)	-0.000 (-0.176)	-0.000 (-0.077)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry×Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Product FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475
R-squared	0.338	0.221	0.347	0.380	0.368	0.386	0.187	0.187	0.192
VARIABLES	South America			East Europe & Russia			Taiwan		
	(19) By Weight (Tons)	(20) By Volume (TEU)	(21) By Shipments	(22) By Weight (Tons)	(23) By Volume (TEU)	(24) By Shipments	(25) By Weight (Tons)	(26) By Volume (TEU)	(27) By Shipments
<i>World Pandemic Index</i>	-0.000** (-2.121)	-0.000** (-2.148)	-0.000** (-2.165)	0.000 (0.371)	0.000 (0.126)	0.000 (0.032)	0.000 (0.060)	-0.000 (-0.306)	-0.000 (-0.176)
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry×Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Product FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475	251,475
R-squared	0.264	0.261	0.269	0.164	0.158	0.167	0.236	0.235	0.243

Note. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ using two-tailed tests. OLS estimates with robust t statistics are in parentheses. Control variables include *US Economic Uncertainty*, *Sourcing Country Economic Uncertainty*, *US Geopolitical Risk*, *Net Income*, *PPENT*, *COGS*, *Cash Efficiency*, *Gross Margin*, *Capital Intensity*, *Sales Growth*, *Size*, *ROA*, *Inventory*, and *Inventory Turnover*.

Table OF4 Sourcing Frequency and Shipment Batch Size: Replacing the Independent Variables with the “World Pandemic Index”

VARIABLES	(1) Shipments per quarter	(2) Quantity per shipment	(3) Volume per shipment
<i>World Pandemic Index</i>	-0.032*** (-4.322)	2.406*** (3.532)	0.003*** (3.528)
Controls	Y	Y	Y
Firm FE	Y	Y	Y
Industry×Quarter FE	Y	Y	Y
Product FE	Y	Y	Y
Observations	251,475	251,475	251,475
R-squared	0.162	0.216	0.234

Note. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ using two-tailed tests. OLS estimates with robust t statistics are in parentheses. Control variables include *US Economic Uncertainty*, *Sourcing Country Economic Uncertainty*, *US Geopolitical Risk*, *Net Income*, *PPENT*, *COGS*, *Cash Efficiency*, *Gross Margin*, *Capital Intensity*, *Sales Growth*, *Size*, *ROA*, *Inventory*, and *Inventory Turnover*.

Table OF5 Sourcing Concentration: Replacing the Independent Variables with the Reciprocal of Government Non-pharmaceutical Interventions

VARIABLES	(1) Number of Origins	(2) Number of Regions	(3) Number of Suppliers	(4) Number of New Suppliers	(5) Ratio of New Suppliers
$1/(IsGovInterventions + 1)$	0.018 (1.114)	0.018 (1.624)	0.175*** (2.613)	0.164*** (4.840)	0.037*** (5.287)
Firm FE	Y	Y	Y	Y	Y
Industry \times Quarter FE	Y	Y	Y	Y	Y
Product FE	Y	Y	Y	Y	Y
Observations	144,954	144,954	144,954	144,954	144,954
R-squared	0.192	0.188	0.118	0.111	0.202

Note. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ using two-tailed tests. OLS estimates with robust t statistics are in parentheses. Control variables include *US Economic Uncertainty*, *Sourcing Country Economic Uncertainty*, *US Geopolitical Risk*, *Net Income*, *PPENT*, *COGS*, *Cash Efficiency*, *Gross Margin*, *Capital Intensity*, *Sales Growth*, *Size*, *ROA*, *Inventory*, and *Inventory Turnover*.

Table OF6 Geographic Distribution: Replacing the Independent Variables with the Reciprocal of Government Non-pharmaceutical Interventions

VARIABLES	China			Share of Imports from Vietnam			India		
	(1) By Weight (Tons)	(2) By Volume (TEU)	(3) By Shipments	(4) By Weight (Tons)	(5) By Volume (TEU)	(6) By Shipments	(7) By Weight (Tons)	(8) By Volume (TEU)	(9) By Shipments
$1/(IsGovInterventions + 1)$	-0.039*** (-5.997)	-0.038*** (-5.819)	-0.039*** (-6.151)	0.006*** (2.597)	0.006*** (2.685)	0.006*** (2.800)	0.017*** (5.624)	0.017*** (5.588)	0.017*** (5.701)
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry \times Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Product FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	144,954	144,954	144,954	144,954	144,954	144,954	144,954	144,954	144,954
R-squared	0.399	0.397	0.404	0.221	0.220	0.224	0.300	0.300	0.312
VARIABLES	North & Central America			West Europe			Japan & South Korea		
	(10) By Weight (Tons)	(11) By Volume (TEU)	(12) By Shipments	(13) By Weight (Tons)	(14) By Volume (TEU)	(15) By Shipments	(16) By Weight (Tons)	(17) By Volume (TEU)	(18) By Shipments
$1/(IsGovInterventions + 1)$	0.007** (2.338)	0.002 (0.592)	0.007** (2.546)	-0.002 (-0.461)	-0.003 (-0.637)	-0.003 (-0.520)	-0.004 (-1.536)	-0.005* (-1.685)	-0.005* (-1.725)
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry \times Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Product FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	144,954	144,954	144,954	144,954	144,954	144,954	144,954	144,954	144,954
R-squared	0.400	0.260	0.411	0.412	0.400	0.418	0.217	0.218	0.223
VARIABLES	South America			East Europe & Russia			Taiwan		
	(19) By Weight (Tons)	(20) By Volume (TEU)	(21) By Shipments	(22) By Weight (Tons)	(23) By Volume (TEU)	(24) By Shipments	(25) By Weight (Tons)	(26) By Volume (TEU)	(27) By Shipments
$1/(IsGovInterventions + 1)$	0.001 (0.356)	0.001 (0.575)	0.001 (0.459)	0.001 (0.884)	0.002 (1.177)	0.001 (0.408)	0.004 (1.178)	0.003 (0.849)	0.005 (1.454)
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Firm FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry \times Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Product FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	144,954	144,954	144,954	144,954	144,954	144,954	144,954	144,954	144,954
R-squared	0.314	0.313	0.320	0.200	0.194	0.204	0.245	0.245	0.252

Note. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ using two-tailed tests. OLS estimates with robust t statistics are in parentheses. Control variables include *US Economic Uncertainty*, *Sourcing Country Economic Uncertainty*, *US Geopolitical Risk*, *Net Income*, *PPENT*, *COGS*, *Cash Efficiency*, *Gross Margin*, *Capital Intensity*, *Sales Growth*, *Size*, *ROA*, *Inventory*, and *Inventory Turnover*.

Table OF7 Sourcing Frequency and Shipment Batch Size: Replacing the Independent Variables with the Reciprocal of Government Non-pharmaceutical Interventions

VARIABLES	(1) Shipments per quarter	(2) Quantity per shipment	(3) Volume per shipment
$1/(IsGovInterventions + 1)$	-0.536** (-2.068)	48.871** (1.997)	0.053 (1.558)
Controls	Y	Y	Y
Firm FE	Y	Y	Y
Industry×Quarter FE	Y	Y	Y
Product FE	Y	Y	Y
Observations	144,954	144,954	144,954
R-squared	0.168	0.220	0.251

Note. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ using two-tailed tests. OLS estimates with robust t statistics are in parentheses. Control variables include *US Economic Uncertainty*, *Sourcing Country Economic Uncertainty*, *US Geopolitical Risk*, *Net Income*, *PPENT*, *COGS*, *Cash Efficiency*, *Gross Margin*, *Capital Intensity*, *Sales Growth*, *Size*, *ROA*, *Inventory*, and *Inventory Turnover*.

Table OF8 Alternative Dependent and Independent Variables Utilized in Robustness Checks

Variable	Measurement	Data source
Alternative Dependent Variable		
<i>Logarithm of Total Imports from {Region}</i>	Logarithm of Import size from {Region} in terms of weight (tons), volumes (TEU), and number of shipments for a company sourcing a specific product in a quarter.	Global Shipment Dataset
Alternative Independent Variable		
<i>World Pandemic Index</i>	A quarterly-level pandemics index measured by discussions about pandemics at the global level. The higher the index, the greater the pandemic exposure.	https://worlduncertaintyindex.com/data/
$1/(IsGovInterventions+1)$	<i>IsGovInterventions</i> equals 1 for a firm in a quarter if the state where the firm is located has adopted gathering size limitations of no more than 10 people, and 0 otherwise.	Zhao et al. (2024)