Barcelona School of Economics

Master's Degree in Economics and Finance

"Import Price Inflation Following the 2021 Suez Canal Blockage: (for)EVER GIVEN or Transitory?"

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ABSTRACT IN ENGLISH:

Our study uses an arguably exogenous supply chain shock generated by the March 2021 blockage of the Suez Canal to analyze contributions to import price inflation and transport method substitution. Using a quasi-experimental Event Study methodology to analyze European trade data, we identify upward pressure in import prices as well as an import quantity contraction. This suggests that supply chain disruptions may be a legitimate channel for inflation. We do not, however, identify any substitution effect; air travel does not appear to have been utilized more frequently as a result of the blockage.

ABSTRACT IN CATALAN/ SPANISH:

Nuestro estudio utiliza una perturbación de la cadena de suministro, posiblemente exógena, generada por el bloqueo del Canal de Suez en marzo de 2021, para analizar las contribuciones a la inflación de los precios de las importaciones y la sustitución del método de transporte. Utilizando una metodología cuasi-experimental de estudio de eventos para analizar los datos del comercio europeo, identificamos una presión al alza en los precios de las importaciones, así como una contracción de la cantidad de importaciones. Esto sugiere que las interrupciones de la cadena de suministro pueden ser un canal legítimo para la inflación. Sin embargo, no identificamos ningún efecto de sustitución; no parece que el transporte aéreo se haya utilizado con más frecuencia como consecuencia del bloqueo.

KEYWORDS IN ENGLISH:

Inflation, Supply Chain, Suez Canal

KEYWORDS IN CATALAN/ SPANISH:

Inflación, Cadena de Suministro, Canal de Suez

MASTER PROJECT

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Abstract

Our study uses an arguably exogenous supply chain shock generated by the March 2021 blockage of the Suez Canal to analyze contributions to import price inflation and transport method substitution. Using a quasi-experimental Event Study methodology to analyze European trade data, we identify upward pressure in import prices as well as an import quantity contraction. This suggests that supply chain disruptions may be a legitimate channel for inflation. We do not, however, identify any substitution effect; air travel does not appear to have been utilized more frequently as a result of the blockage.

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Contents

1 Introduction

The global recovery from Covid-19 has been characterized by high inflation across geographies. In many ways, the current price inflation can be characterized as a ”perfect storm”; extremely high levels of fiscal stimulus, labour market and trade frictions, and supply chain disruptions have combined to generate a multi-faceted pressure on inflation that is difficult to predict. In particular, the complexity of the situation has made it very difficult to parse out the unique effects of particular inflation channels.

It is important to remember that the Covid-19 recovery period has coincided with a number of other impactful events. A particularly memorable event from this time period was the complete blockage of the Suez Canal in March 2021. In a shocking and well-publicized accidental event, the crew of a large cargo ship named the Ever Given lost control and grounded the vessel in the middle of the Suez Canal. While maritime incidents have a tendency to arouse public interest, this particular situation stands out because of its economic implications; the Suez Canal is one of the most important waterways in global trade, with over 10% of the world's container ship traffic crossing the Canal every year. As far as supply chain disruptions go, one can think of few shock events as significant in recent memory. The blockage generated discussions around the stability of global supply chains, and also potential alternatives to existing trade routes and flows.

This paper studies the impact of the Suez Canal blockage on European product import markets. In particular, we seek to analyze short- to medium-run price dynamics in the wake of the Suez Canal blockage. In order to answer this question, we employ an Event Study approach that uses the ”Suez Intensity” of a product as a treatment variable, the idea being that there should be differential impacts related to the blockage across goods depending on the Suez Canal's relative importance to trade. We also check for the presence of substitution effects between sea and air freight, given that air travel would not be directly impacted by the blockage of the Suez Canal.

We find a sharp, short-term price increase for Suez intensive products in the two months following the blockage event. We also identify a slightly higher persistence in the medium-run, which is in line with an existing literature that suggests event-related price dynamics persist and develop over time in different sectors of import markets. On the other hand, we identify no significant substitution effect towards air freight. This is somewhat surprising, though it reflects similar results obtained in past studies.

Our study is organized as follows. Section 2 consists of a literature review, which is followed by the institutional background and a discussion of our theoretical mechanism in section 3. Section 4 contains a discussion of our data, and our empirical methodology is described in section 5. Finally, section 6 contains our results and discussion. Section 7 concludes.

2 Literature Review

Our study is closely related to literatures centred on a number of trade-related research areas. Broadly speaking, our research connects to a broad existing literature on the various effects of unexpected supply chain disruptions. Our conceptual foundation is drawn in part from a theoretical supply chain literature focused on high-impact, low-probability events. This framework is formalized in Akkermans and Van Wassenhove (2018), which develops the idea of supply chain "tsunamis" that are difficult to predict but lead to long-lasting changes in supply chain operations. A more empirically-focused study is Tokui, Kawasaki, and Miyagawa (2017), which utilizes an Input-Output model framework to quantify supply chain disruptions related to the Great East-Japan Earthquake in 2011. Other recent supply chain disruption work has focused on the disruptive impacts of the Covid-19 pandemic, which has sparked border and port closures across the globe. Goel, Saunoris, and Goel (2021) use data from 130 nations to quantify the supply chain impacts of Covid-19 related border closures. Interestingly, they treat the Covid-19 pandemic as a negative shock to trade liberalization. This is important to consider in assessing our results, because the March 2021 Suez Canal blockage took place during the middle of the Covid-19 pandemic; as such, the effects of the two shocks must be separately identified if possible.

More specifically, we build on existing research focused on disruptions related to port closures, canal closures, natural disasters, and piracy. This is not the first time that the Suez Canal has been blocked off, and it is not even the longest-lasting closure to affect this waterway. Between 1967 and 1975, the Suez Canal was completely closed for political reasons; Feyrer (2009) leverages data from this event to estimate that a 10% decrease in ocean distance results in a 5% increase in trade. There is also an existing literature around seaport closures; Tan, Lam, and Zhang (2015) use a Petri Net analysis approach to analyze the supply chain impacts of a hypothetical port closure in Shenzhen on various industry clusters.[1] A review of this literature also gives reason for caution in assessing maritime disruptions, as economic effects have been overstated in the past when substitution options are not given adequate consideration (Hall 2004).

[1] A Petri Net is a mathematical tool often used to characterize complex systems that operate concurrently.

With respect to existing research on channels of inflation, endogeneity issues often plague attempts to precisely explain specific inflationary pressures. A growing literature focuses on the impact of natural disasters and climate events on inflation, however, which present interesting parallels to our study in that they are arguably exogenous shocks. Parker (2018) employs a panel regression strategy to identify the impacts of natural disasters on price levels in affected countries, finding that developed and developing countries experience disaster-related inflation in different ways. Surprisingly, they also find that different types of disasters have markedly different impacts on price levels, highlighting the need for specific research on inflationary channels. Mukherjee and Ouattara (2021) utilize a panel-VAR approach to demonstrate that climate events are linked with inflationary pressure, results which are supported by Kunawotor et al. (2021) through their Generalized Method of Moments methodology focused on African price level data.

Our study is also connected to a literature focused on information shocks and how they impact market expectations, particularly in insurance. As an unexpected and unusual event, the Suez Canal blockage can be reasonably conceptualized as a shock that updates market participants' perceptions of the risks associated with trade through the Suez Canal. An existing literature on natural disaster information shocks is thus relevant to our study. Bashar and Mallick (2021) assess the volatility persistence of economic impacts related to natural disaster events, and found that economic distortions are particularly strong in areas where such disasters do not often occur. This is directly applicable to the Suez Canal blockage, as the event was entirely unexpected; most lengthy closures of the Suez Canal have been related to political concerns, and closures related to unexpected events were generally much shorter than the March 2021 blockage. Another relevant study is Gallagher (2014), which focuses on the impact of regional flooding on flood insurance take-up. In this study, flooding is modelled as a stochastic shock event that leads economic agents to update their expectations as a result of availability bias. We believe that this applies to Suez Canal closures, particularly given the significant media coverage that the March 2021 Suez blockage received.

Perhaps the closest study to ours is a study on South East Asian piracy by Sandkamp, Stamer, and Yang (2021). They focus on a spate of piracy in the Malacca Strait where sporadic pirate activity between 2000 and 2006 led to shipping route diversions, increased security expenditures, and delays. Using country-product fixed effects, time fixed-effects, and a series of lags, this study identifies a connection between maritime trade disruptions and altered firm behaviour and pricing strategies. This paper provides the foundation for our use of the Kropf and Sauré (2014) model for theoretical shipping cost decomposition, which is described further in section 3.3. Notably, the researchers also explore whether piracy events spurred substitution from sea freight to air freight, and surprisingly found that no significant effect was observed. The choice dynamic between sea and air freight has been specified previously in a model created by Hummels and Schaur (2013). Sandkamp, Stamer, and Yang (2021) builds upon existing piracy literature, most notably Martínez-Zarzoso and Bensassi (2013) who modelled the impact of piracy on transport costs via various channels. Bowden (2010) also quantified the cost of rerouting maritime vessels around the Suez Canal via the Cape of Good Hope in response to piracy events, a research context which shares obvious geographic parallels with our research.

With regard to our paper's specific contribution to the literature, we believe that our study is unique in that it uses an Event Study approach in examining maritime trade frictions. We also utilize a quasi-experimental framework to address this question, which is a rare and compelling opportunity in inflation literature. In addition, we are (to the best of our knowledge) the first researchers to examine the extent to which air transport was used as a substitute for sea transport as a result of the March 2021 Suez Canal blockage.

3 Institutional Background

3.1 The Suez Canal: Economic Importance and Blockage Event

On March 23, 2021, the Suez Canal, one of the most important waterways in world trade, was blocked by the Ever Given, a Japanese-owned megaship that stands as one of the largest cargo vessels in the world (DHL 2021). The highly-publicized grounding of the vessel prevented all traffic from going through the Canal, resulting in the stranding of over 400 vessels that were scheduled to pass through in both the East-West and West-East directions.[2] From barrels of oil to cattle, estimates suggest that between US$15-17 billion in trade was held up in vessels that were unable to pass through the Suez (Lee and Wong 2021). In fact, the impact of this event was so severe that estimates suggest the event was responsible for a decrease in annual trade growth from 0.4% to 0.2% in 2021 (Subran, Boata, and Huang 2021).

The usage capacity of the Suez Canal is massive; in 2020, the Suez accommodated 19,000 ships (51.5 per day) with a net tonnage of 1.17 billion metric tons (Lee and Wong 2021). It is also important to note that the Suez Canal is the most important waterway of its kind; the Panama Canal, as a point of comparison, accommodated only 25% of

[2] An intuitive graphic indicating the geographical locations of stranded vessels can be found in this linked BBC article.

the capacity that was transported through the Suez Canal in 2019. The Suez Canal is particularly important for trade between Asia and Europe, where the only alternative route is the significantly more-lengthy trip around the Cape of Good Hope in southern Africa. Specifically, the journey from Mumbai to London is 6,200 nautical miles via the Suez Canal and 10,800 nautical miles around the Cape of Good Hope (Feyrer 2009). This results in a significant increase in fuel and labour costs among other time- and distance-sensitive expenses for each vessel. Beyond the additional travel costs associated with this diversion, the journey from the Suez down to the Cape meant a trip through the historically pirate-infested waters of the Gulf of Aden (Bowden 2010). All in all, an examination of available resources suggests that very few vessels were diverted around the Cape, meaning the blockage of maritime trade between Asia and Europe was more or less complete for the 6 days that passed prior to the extraction of the Ever Given.

Any maritime disruption of this magnitude is of crucial importance for world trade, as most of the world's trade occurs via global waterways; in 2015, 80% of trade took place over the oceans and seas that connect the world (Lee and Wong 2021). In particular, more than 85% of EU imports from China were via sea in 2021 (Arriola et al. 2022). While the portion of goods that travel via maritime transport is different for goods of different product categories, it is important to recognize that even more "air-friendly" goods are still transported through maritime channels; 40% of optical products, for example, are transported via sea despite being extremely delicate (Arriola et al. 2022). As a general summary, "air-friendly" goods are more delicate, more expensive and more time-sensitive (Kim, Nicholson, and Kusumastuti 2017). The Suez Canal disruption was projected by many trade analysts and scholars to motivate a substitution towards air freight as a means of reducing risk exposure (Lee and Wong 2021).

As was widely-publicized at the time of the blockage, the associated trade disruption caused havoc across many European markets. While the impacts on global gas prices were immediate (after the blockage, gas prices jumped up by US$0.40 per liter), trade analysts and scholars across the world posited widespread price effects (Lee and Wong 2021). Particularly hard-hit goods include steel, base metals, fertilizers, and coal among other industrial essentials (Kinch et al. 2021). The Ever Given grounding contributed additional volatility to a shipping industry that had already been hit hard by Covid-19 pandemic related impacts; 2020 saw a collapse in global trade volumes, which did not recover to pre-pandemic levels until 2022 (UNCTAD Secreteriat 2021). In Europe specifically, trade volumes are still below pre-pandemic predictions for 2022. Another aggravating factor was the blockage's impact on container availability; container shortages were widespread, and the Ever Given blockage resulted in empty ships and containers being unable to return on schedule to high-export terminals in Asia (Lee and Wong 2021). This left global shippers in a position of uncertainty, with disruptions of various kinds contributing to a situation where future costs were uncertain.

Beyond trade volume, there is also an established link between shipping cost increases and increased price levels. A 2022 study by the International Monetary Fund found that a doubling in shipping costs is associated with an 0.7% increase in global price level inflation (Carriere-Swallow et al. 2022). It is important to note that they found this effect to be persistent, with potential short-term fluctuations that are proportionally even greater. On top of this, it is important to note that these effects are heterogeneous geographically with low income countries often being hit harder. Shipping costs do not impact inflation directly, but instead "pass through" various good price stages which in turn contribute inflationary pressure. Carriere-Swallow et al. (2022) also suggests that the delay, before shipping cost increases are felt at import hubs, is around 2 months, and it takes roughly a year for generalized inflationary pressures to aggregate into increased consumer price levels.

3.2 Shipping Industry Summary

Historically, shipping was a relatively competitive industry; as recently as the 1970s, maritime shipping was viewed as a highly competitive market (Sea-Intelligence Consulting 2019). This began to change with the subsequent explosion in containerized trade and within the past two decades the industry has become increasingly concentrated among a small group of large firms. As of 2019, the top 10 liners accounted for nearly 90% of global deep-water shipping with particular dominance in Europe-Asia trade (Matsuda, Hirata, and Kawasaki 2021; MI News Network 2019). The largest firm as of 2019, A.P. Moller-Maersk A/S (Maersk) accounted for 21% of the global market (MI News Network 2019). The maritime shipping industry, like many other industries, has seen an explosion in M&A activity in the past two decades that has contributed to this concentration in market power (Matsuda, Hirata, and Kawasaki 2021).

While shipping companies have limited influence over demand for their product, they do have substantial control over supply. Increased market concentration has been strongly associated with increased potential for collusion and price manipulation in industrial organization literature, as outlined in Ivaldi et al. (2003). These alliances also comprise a large portion of demand for new ships and container capacity expansion, which also has the potential to reduce competition through large influence in input markets (DHL 2022).

Were the shipping industry more competitive, individual liners would have greater difficulty in making quick adjustments to prices in light of changes in their cost structure. With all this in mind, it would appear that the maritime container shipping industry is best conceived as an oligopoly rather than a competitive market (Sea-Intelligence Consulting 2019). This structure increases the ability for shipping liners to dictate prices in the market, which connects directly to our proposed mechanism for the pass through of Suez blockage-related costs to import prices. It is therefore reasonable to expect that shipping cost increases related to the Suez blockage might be associated with increases in import prices in a reasonably short amount of time. This mechanism is discussed in greater detail in the following section.

3.3 Theoretical Mechanism

It does not require a great deal of imagination to conceptualize how the Suez Canal blockage might have led to short-run price increases; goods that were expected to arrive at a given time were delayed by a minimum of 6 days, which serves as a direct and immediate negative supply shock. With that said, a more robust theoretical framework is required to explain how the Suez Canal blockage may have led to longer term price increases. Building off of a shipping cost model developed by Kropf and Sauré (2014), we propose a mechanism for how the Suez Canal blockage may have impacted shipping costs even after the blockage was cleared. This supplements a general understanding obtained through a review of Micco and Pérez (2002), which provides a less granular review of maritime transport cost components. As explained in Kropf and Sauré (2014), fixed costs in shipping can be decomposed into entry costs, per-period fixed costs, and per-shipment fixed costs. We focus on the latter cost category, as it is a direct channel through which per-vessel cost changes can impact shipping liner cost structures. Per-shipment costs include freight collection costs, storage costs, insurance, and costs associated with delivery. The blockage also had the potential to impact shipping through direct variable cost channels, including fuel costs, labour costs, and costs associated with good spoilage and/or damage related to the Suez blockage.

We further propose that the Suez Canal blockage increased the uncertainty of shipping from Europe to Asia and vice versa, which could result in increased per-shipment fixed costs even after the immediate disruption of the blockage had been resolved. With this theoretical framework established, it is crucial to identify an outcome variable that would capture increased costs faced by global shippers. Unfortunately, this is no easy task in practice; as many shipping companies are private, it is difficult to get data on their cost structures. As such, we attempt to use the prices paid by importers as a proxy for this measure, which relies on the assumption that shippers can pass additional costs along to consumers.

With this in mind, it is important to note that shippers have many avenues through which they can pass increased shipping costs along to importers and exporters. As an illustrative example, the UNCTAD Secreteriat (2021) projected that a +243% increase in container freight rates would increase global import price levels by 11% and, by extension, increase world consumer price levels by 2.2%. It is important to consider that increases in spot freight rates also place upward pressure on contracted freight rates, linking temporary freight price increases in the present to price increases in the longer term. In general, shipping companies and liners are transnational companies with relatively easy access to global capital, good, and labour markets. Shippers also have the advantage of operating in an environment with increasing returns to scale. Shippers have a wide array of pricing tools through which they can pass costs along to consumers including fuel surcharges, packing charges, chassis utilization charges, customs fees, wharfage fees, documentation charges, ocean freight rates, and bunker adjustment factors among other relatively complex industry-specific costs. In considering the cost avenues presented above, it is important to consider that the maritime freight industry has historically been rather opaque to outsiders (Fawcett 2021). A lot of the fees charged require significant due diligence to understand. Going even further, it is widely-acknowledged in the import-export industry that shippers have the ability to charge extra "discretionary" costs that are often impossible to anticipate, and that freight quotes often do not match with final costs charged to consumers (Cogoport Editorial Team 2021). Thus, compared to many service providers, global shippers are in a relatively advantageous position with regard to their ability to pass unexpected costs on to their customers. For this reason, we feel comfortable in using import prices as a proxy measure for the increases in cost associated with the Suez Canal blockage.

A potential concern with the import price proxy measure is that, as mentioned in Carriere-Swallow et al. (2022), the time it takes for shipping cost increases to pass through to dock prices, and subsequently to import prices, and finally to prices faced by final consumers is uncertain. The stickiness of import prices means that there is likely a delay between when the blockage-related cost increases are felt by the shipping companies and when subsequent downstream price increases impact importers. We address this concern by performing our analysis on a nine month period following the Canal blockage. In addition, we assert that shipping companies' capacity to charge discretionary fees on each shipment gives a great degree of latitude in their ability to quickly pass costs along to customers. Shipping companies are still tied, to a degree, to the quotes they provide to importers and this does place a limit on the extent to which shipping prices can be adjusted in the short term to account for cost increases related to the Canal blockage.

An additional concern with our mechanism is that it relies on the Suez Canal blockage leading to increased per-shipment fixed costs, which we aren't able to confirm directly. Ideally, we would have firm or even ship-level data on such costs that could help determine the validity of this pass through idea. However, such data is privately-held and it is difficult to decompose the relative size of the various per-shipment fixed costs through any available data. While indexes for total shipping costs do exist, we do not have access to data with the granularity necessary to identify specific changes in shipment cost structures in the wake of the Suez blockage. With regard to per-shipment insurance costs specifically, insurance rates are generally viewed to be primarily related to the value of the cargo on board. However, an analysis of various characteristics of the container shipping insurance market provides some certainty regarding the ability of insurers to charge increased premiums in light of risk events. In fact, there is evidence to suggest that insurance costs can respond very quickly to unexpected events. For example, shipping insurance costs for vessels sailing through the Black Sea increased between 2-5% in the aftermath of the Russia's invasion of Ukraine (Saul 2022). In addition, per-shipment fixed costs increased significantly following piracy events in South East Asia as shown in Sandkamp, Stamer, and Yang (2021).

Altogether, this industry analysis has led us to believe that it is reasonable to expect that the March 2021 Suez Canal blockage placed upward pressure on per-shipment fixed costs. In turn, this increase in per-shipment fixed costs would reasonably be expected to be passed on to importers in at least some capacity. By extension, these same considerations could reasonably be expected to increase price pressure-related contributions towards air freight substitution. This supplements the more straightforward short-run cost increases, which are related to the direct impacts of the maritime blockage itself. Thus, our mechanism provides a theoretical justification for expecting both short-run and medium-run import price increases stemming from the Suez Canal blockage.

4 Data

4.1 Main Dataset

Our analysis is performed using official trade data from the European Union's office of statistics, Eurostat. As the official Eurostat database does not allow access to full datasets (only summary statistics are available to the public), we utilize the so-called "Bulk Download Facility"[3], where raw datasets are made available. Within the "Bulk Download Facility", we use data from the folder containing raw data with applicability to our study: "Extra-EU trade since 2000 by mode of transport, by HS2-4-6" which is available under the following link: Transport HS. From there, we scrape monthly datasets with coverage starting in the beginning of 2016.

The raw data contains monthly information on the following variables: Declarant Country (Importing country from the EU), Partner Country (Exporting country from outside of the EU), Product Category (HS trade classification), Import/Export Indication, Transport Mode, Value in euros and Quantity in metric tons.

Eurostat does not manipulate the data in any way, which means that they do not adjust for the fact that February only has 28 days or for the presence of other seasonal trends. Further, they use daily exchange rates to the euro to calculate trade value in euros. In this dataset, products are categorized using the Harmonized System (HS). The HS classification system is a standardized numerical method of identifying traded products at various levels of granularity. To demonstrate this system, take the code: 270710, which is the product *Benzol*. The associated HS2-Code is 27, which means that *Benzol* is part of the group: *"Mineral fuels, mineral oils and products of their distillation"*. The associated HS4-Code is 2707, which means that *Benzol* is part of the subgroup *"Oils and other products of the distillation of high temperature coal tar"* together with other extremely similar products like *Toluol* (270720) or *Xylol* (270730). While this coding framework provides the opportunity to collect data on very specific product types, it does not come without associated issues; the high granularity of the HS6-Code specification ($\sim$ 5600 different HS6 codes) means that our data includes outlier entries of very rarely-traded products that are associated with large fluctuations in price and quantity. To avoid potential confounding effects from these outliers, we decide to run our analysis on the HS4-Code level which provides sufficient detail ($\sim$ 1200 different HS4 codes) while also smoothing over the confounding effect of rare deliveries. One peculiarity of the Eurostat data is that there are a few data entries where the product categorization number is manipulated in a

[3] Link to Bulk Download Facility

way that the full categorization is not visible. This is done for confidentiality reasons (for example, national security concerns) at the discretion of member state governments/trade authorities.[4][5]

To obtain the dataset used for our estimation, we first restrict the raw data such that it only includes sea imports. Afterward, we extract the HS4 product code out of the full HS6 product numbers. In the process of doing so, we remove products subject to confidentiality at the HS4 level from our data.[6] Next, we delete observations that exhibit logical mistakes (positive value but zero quantity).[7] Since we are only interested in EU-wide imports, we then aggregate observations that feature the same product, month, and partner/exporting country. We proceed by categorizing each partner/exporting country based on whether they ship their goods through the Suez Canal or not.[8]

Using the classification of countries as Suez-exporting and non-Suez exporting, we are then able to aggregate the data on a *product* $\times$ *time* dimension. *Suez Trade Quantity* and *Suez Trade Value*, are the total quantity and value of imports of a given product from Suez-exporting countries, while *Total Sea Trade Quantity* and *Total Sea Trade Value* represent the same measures calculated over both Suez-exporting and non Suez-exporting countries. Using these, we are then able to calculate our main outcome variable: *Sea Import Price (Total Sea Trade Value / Total Sea Trade Quantity)*, as well as our explanatory variable: *Suez Trade Intensity (Suez Trade Quantity / Total Sea Trade Quantity)*. While *Sea Import Price* is in principal measured in euros per ton, we will use its log-transformation in the main specification to facilitate interpretation. *Suez Trade Intensity* is, by design, a variable located on the unit interval, which takes the value 1 if the sea imports of a good are exclusively imported through the Suez Canal and 0 if a good is not imported through the Suez Canal at all.[9] The *Suez Trade Intensity* thus represents the extent of the exposure of a given good to the Suez Canal, and by extension the March 2021 Suez

[4] The confidentiality adjustment is made either at the HS4-level or at the HS6-level. At the HS4-level, a code could be $17SSS6$, which only gives us the information that the product is part of the HS2 Code 17 (*Sugars and sugar confectionery*). At the HS6-level, a code could be $2711S3$, which gives us the information that the product is part of the HS4 Code 2711 (*Petroleum gases and other gaseous hydrocarbons*).

[5] More information on the whole dataset can be found in the following user guide.

[6] Less than 1.5 % of observations

[7] Less than 2.0 % of observations

[8] This categorization is done manually using a world map. The world map used is visible in Figure 3 and shows that all countries on the African East Coast, the Middle East, (South-East) Asia as well as Australia and New Zealand are categorized as trading through the Suez Canal.

[9] The formal definition of the *Suez Share Intensity* of a given good i in month t is:

$$Suez\_share\_intensity_{i,t} = \frac{\sum_{s=1}^{S} quantity_{i,t,s}}{\sum_{c=1}^{C} quantity_{i,t,c}} \quad with \;\; s \in S, \;\; c \in C, \;\; S \subset C,$$

where S is the set of all Suez-exporting countries and C is the set of all exporting countries.

Canal blockage. Hence, we expect the rise in import prices following the shock to increase with a given product's *Suez Trade Intensity*.

In a last step, we restrict the dataset used in our analysis to the time period between April 2020 to December 2021. The reason for this is to partially control for macroeconomic effects induced by the Covid-19 pandemic, as discussed in section 5.2. April is chosen as the beginning of our analysis, as it is the first month in which one can plausibly speak of a Covid-19 era trade equilibrium. Additionally, the usage of an Event Study methodology does not require the pre- and post periods to span extensive time-frames.

The result of this procedure is an unbalanced panel dataset[10] which varies in both the HS4 product- and time dimension and includes information on the Suez intensity and the import price for every observation. The final dataset includes 28,810 observations, covers 1,220 distinct product categories, and spans a period of 21 months (April 2020 to December 2021). Summary statistics are provided in Table 1.

4.2 Control Variables

While the factual treatment of the Suez blockage is plausibly exogenous (due to the vessel grounding being entirely unexpected and unpredictable), this is not as certain for the variable we use to measure the extent of the treatment in the data (*Suez Trade Intensity*). It is possible, that there are outside variables that determine both the *Sea Import Price* and the *Suez Trade Intensity*. For example, a higher distance between the origin country and the European destination is likely to increase import prices while also decreasing the Suez intensity (through either a higher propensity to use air trade or a higher propensity to import from different countries of origin that are geographically closer).

To alleviate these concerns, we include a number of control variables in our main regression. Unfortunately, the existing literature provides minimal direction with regard to appropriate control variables, as these sorts of questions have not been studied using quasi-experimental methods and an Event Study approach (see section 2). Hence, we base our choice of controls on what we believe to be the most relevant determinants of firms' price-setting behavior, including their marginal costs, the competitiveness of their respective product markets, and macroeconomic conditions in their country of origin. In addition, we include controls to account for potential distortions stemming from Covid-related factors, as well as time and product fixed effects.

[10] There are a few products that are not observed in every month, even after HS4 aggregation.

It is worth noting that our regression specification only allows for the inclusion of control variables that vary in both the time and product dimensions. Any other potential controls (such as air/sea transportation costs) that only vary over 1 dimension are not included because these effects are already accounted for through the inclusion of product and time fixed effects. The inclusion of such controls would therefore result in concerns over multicollinearity.

Furthermore, many control variables, such as macroeconomic indicators, vary in the time- and country dimensions while not being inherent to a specific product (e.g. producer price indices or exchange rates). In order to include such controls in our regression specification, we build value-weighted averages, which measure a given product's exposure to macroeconomic shocks across its various countries of origin.[11]

In our main specification, we directly control for the *Geographical Substitutability* as well as for the *Transportation Mode Substitutability* of goods. Additionally, we use value-weighted indices as controls based on the following variables: *Shipping Distance*, *Producer Price Index*, *Nominal Effective Exchange Rate* and *Covid-19 Stringency Index.* A detailed description of these control variables as well as an extensive discussion of their rationale is included in section A of the Appendix (section 7).

5 Empirical Strategy

5.1 Methodology

As outlined in section 3.3, we have identified both short- and medium-run channels through which the Suez Canal blockage could have increased import costs. It is reasonable to assume that there is significant heterogeneity within products based on their respective exposure to the Suez Canal. To analyse this heterogeneity, we propose measuring the exposure of a given good to the Suez Canal blockage using a Suez share intensity measure, which we have defined in section 4.1. Since we are studying a one-off shock, a straightforward approach to estimate the effect of the Suez share intensity on import prices would be to use a simple differences-in-differences model (diff-in-diff), which is specified as follows:

$$y_{i,t} = \alpha + \beta Treatment_{i,t} + \gamma Post_t + \delta(Post_t \times Treatment_{i,t}) + \boldsymbol{x}_{i,t}^{\top}\zeta + \eta_i + \epsilon_{i,t} \qquad (1)$$

[11] Take a product i imported from two countries in time t. Country A provides 90% of importing value and faces a producer price index of 1.1, while Country B provides the remaining 10% of importing value and faces a producer price index of 1.0. Thus, the value-weighted producer price index in time t for product i is 1.09.

where the subscript i denotes a given product and t indexes a given month. In our main specification, the dependent variable, $y_{i,t}$, is the log of import prices. $Treatment_{i,t}$ indicates whether a given product was exposed to the Suez Canal blockage or not. $Post_t$ is a dummy variable, which is equal to zero if a given observation was observed before the crisis, and equal to one otherwise. The vector of controls $\mathbf{x}_{i,t}$ varies in both the time and product dimension. A set of product dummies η_i controls for time-invariant product characteristics. Finally, $\epsilon_{i,t}$ denotes the error term. Given a set of identifying assumptions, the coefficient of the interaction term, δ, would estimate the average causal impact of the Suez Canal blockage on the outcome variable.

However, employing a diff-in-diff approach comes with several important limitations that make it ill-suited to address our particular estimation problem.[12] First, our measure of the Suez share intensity is a continuous variable. Thus, using a simple dummy variable to partition products into treated and untreated categories ignores the fact that the effect of the Suez Canal crisis on import prices is likely to gradually increase with the degree of a given product's exposure to the shock. To account for this, we separate the products into quartiles according to their Suez share intensity in month t. This allows us to compare the effects of the Suez Canal blockage on a more granular level, namely, depending on the products' exposure to the shock.

Additionally, in the scenario of a major but relatively brief disruption to the supply chain, we would expect to see a dynamic effect, including a build up and subsequent dissipation. Yet, by including a single time dummy that is equal to one if an observation was recorded after the Suez Canal crisis, we would overlook these dynamic effects. Instead, the coefficient of interest, δ, would estimate the average treatment effect of the crisis throughout the entire post-crisis time period and we would not be able to capture the time-based heterogeneity in reactions to the shock.

Consequently, instead of using the simple binary time dummy $Post_t$, we employ an Event Study approach and include separate time dummies for each respective month in our sample into the regression. Additionally, this specification includes interaction terms for each possible combination of month and quartile dummies. This will allow us to estimate the dynamic effects of the Suez Canal blockage on a month-by-month basis. Additionally, this approach also allows us to test our model for the satisfaction of identifying assumptions, which we discuss in section 5.2.

[12] We thank Prof. Glitz for helping us to determine an appropriate estimation strategy.

Given these considerations, we arrive at our main regression specification:

$$y_{i,t} = \alpha + \sum_{s=2}^{4} \beta_s Quartile_{i,s,t} + \sum_{t=-10}^{9} \delta_t Month_t \\ + \sum_{s=2}^{4} \sum_{t=-10}^{9} \gamma_{s,t}(Month_t \times Quartile_{i,s,t}) + \boldsymbol{x}_{i,t}^{\top}\zeta + \eta_i + \epsilon_{i,t} \quad (2)$$

In this equation, $Quartile_{i,s,t}$ is a dummy indicator that is equal to one if product i is in quartile s with respect to its Suez share intensity at time t, and is equal to zero otherwise.[13] Since the first quartile is omitted from the regression to avoid issues related to multicollinearity, $s \in \{2, 3, 4\}$. Hence, in the estimation of the regression, the effects of the respective quartile dummies will be measured relative to the the 1st quartile (the quartile with the lowest exposure to the shock). Similarly, $Month_t$ is a dummy variable that is equal to one if an observation is made in month t and is equal to zero otherwise. In our sample, we include each month in the timeframe between May 2020 and December 2021. Hence, $t \in \{-10, -9, ..., 0, ..., 8, 9\}$, where $t = 0$ indexes March 2021, the month of the Suez shock. Our sample starts in April 2020 ($t = -11$) which, again, is excluded to avoid multicollinearity. Thus, each δ_t measures an effect of a given month t relative to April 2020. Additionally, the equation includes interaction terms for each possible combination of time- and quartile dummies. Hence, $\gamma_{s,t}$ (our coefficient of interest) measures the effect of quartile s on $y_{i,t}$ relative to the effect of the first quartile in month t, and therefore represents our coefficient of interest. As before, $\mathbf{x}_{i,t}$ is a vector of control variables that vary in both the time- and product dimension, η_i is a set of product-dummies, and $\epsilon_{i,t}$ denotes the error term.

In addition, it is important to mention that our use of product-level data has implications for the regression specification. In particular, some products constitute a higher share of total imports than others. Were we to run an unweighted regression, we would give major products like oil the same importance as rarely-traded products like living animals or sports cars. As such, we weight every observation by the ratio of product i's total value of sea traded imports to the total (cross-product) value of sea-traded imports in a given month.

5.2 Identifying Assumptions

In order for the regression specification outlined in section 5.1 to effectively deliver a robust causal interpretation, a number of criteria must be satisfied. In the following section, we

[13] We allow the Suez share intensity to vary in the time dimension in order to capture changes in global trade flows as the effects of the shock develop. Were we to fix the Suez share intensity through time, we would be unable to accurately capture the unique exposure of goods at given time t.

will briefly characterize these criteria, discuss whether they are realistic assumptions, and explore whether we able to test their validity using our model.

Exogenous Shock Assumption

First, we require the March 2021 blockage of the Suez Canal to be plausibly exogenous. This is required because a potential anticipation of the blockage would dilute the effect and potentially lead to biased estimation results. Such anticipation effects are a much-discussed topic in the difference-in-difference and Event Study literature. Per this literature, anticipation effects often stem from private information. An example of such an effect is found by Hendren (2017), where the effect is related to unemployment spells. In our case, it is reasonable to argue that the shock is fully exogenous and is thus likely to be free from any anticipation effects. Neither shipping companies nor importers or exporters had any knowledge or expectation of the blockage; the general sentiment across the literature is that it was a complete surprise. While it may be true that the Canal has been blocked sporadically for periods in the past (as described in Dzhanova (2021)), and ships increased in size which makes blockages more likely, it is impossible to exactly pinpoint the likelihood or timing of such an event. Thus, we view this assumption as being fulfilled.

Treatment Compliance Assumption

The second assumption states that the assigned treatment status of a given product must coincide with its actual treatment status. In other words, if we assign a product i as being shipped through the Suez Canal based on our Suez intensity measure, it is necessary that its trade was affected by the Suez Canal blockage in actuality. This assumption generally holds if ships did not bypass the Suez Canal blockage on a large scale by taking the longer route around the Cape of Good Hope. As discussed in section 3.1, this alternative journey would, on average, prolong the trip by one full week. It is no surprise, then, that over 400 ships waited for the re-opening of the Suez Canal instead of diverting from their original route.[14] Due to the insignificant amount of rerouting observed, we consider this assumption to be met. With that said, note that a small number of goods are transported around the Cape of Good Hope by default, since the size of the ships needed to transport these particular goods prevents them from passing through the Suez. The presence of such goods is addressed in our robustness checks. Although our discussion above mostly rules out the possibility of substitution toward alternate sea trade routes, there is still the possibility that trade shifted from sea to air. We analyse this further in section 6.3.

[14] As an additional (albeit informal) check, it is mentioned in section 3.1 that 50 ships pass through the Canal per day on average. An easy back of the envelope calculation (400/50 = 8) corroborates our finding that most ships did not choose another route.

Parallel Trend Assumption

The assumption which is crucial for the identification of a causal effect concerns the existence of parallel trends for more and less Suez intensive goods prior to the blockage. Causally interpreting $\gamma_{s,t}$, our coefficient of interest, is only plausible if, prior to the Suez Canal crisis, the import price trends in each of the Suez intensity quartiles follow a common trend. This is also where we highlight the main advantage of an Event Study over the diff-in-diff approach. Since our model includes interactions between the quartile dummies and each of the month dummies before the Suez Canal blockage, we are able to test for the Parallel Trend Assumption using the estimated coefficients $\gamma_{s,t}$, where $t \in \{-10, -9, ..., 0\}$ (again, $t = 0$ indexes March 2021, the month of the Suez blockage[15]). If each of these coefficients is statistically insignificant, the quartiles $s \in \{2, 3, 4\}$ do not exhibit relevant deviations from the time-trend of the first quartile prior to the Suez Canal crisis. In this case, we may conclude that the Parallel Trend Assumption holds conditional on the other covariates included in the model. We will revisit this assumption in section 6.4.

Only Shock Assumption

As a continuation of the Parallel Trend Assumption, the difference between the 'treatment' and 'control' group has to be constant over time in the absence of the Suez Canal blockage. This assumption could be potentially violated by two distinct developments concerning our period of interest. Firstly, it might be the case that the Suez Canal blockage overlapped with a general resurgence of the economy after the Covid-19 slump, which may have created associated general price pressure not directly related to the blockage. While this concurrent development can not be dismissed, it could reasonably be expected to result in a gradual price increase, which is very unlikely to create spikes in certain months around the blockage. Secondly, China (as one of the largest trading partners of the EU) implemented extremely strict Covid policies that lasted well into 2021. These policies also included port closures[16] that may have created supply chain disruptions not stemming from the Suez Canal blockage. While, in general, the overall impact of these closures should be limited due to the existence of numerous alternative ports in China that were still operating, we try to alleviate these concerns by including a control for Covid-Stringency (section 4.2) as well as running a robustness check in which we exclude good flows from China from the sample (section 6.4). Further, since the closures occurred after May 2021, they should not have effects on import prices in April or May 2021. In general, our estimation technique allows us to confirm the Only Shock Assumption

[15] Since the blockage occurred in late March 2021, we assign March to the pre-shock period.

[16] The most prominent case is the closure of the Meishan terminal at China's Ningbo-Zhoushan port which was completely shut down for around two weeks in August 2021.

with some degree of certainty. If we find a clear cut effect starting in April, the month following the Suez Canal blockage, this would provide some evidence that it was caused by the shock, and not by either of the potential confounding events (Covid-19 catch-up and port closures).[17] If, however, a potential effect only begins in June or July, this may indicate flaws in our identification strategy. We will revisit this question when discussing the results in section 6.1.

6 Results

In the following section, we describe the analytical results regarding the effects of the Suez blockage. As mentioned above, we contend that the Suez blockage constitutes an unanticipated supply shock with potential short- and medium-run effects on trade patterns.

In section 6.1 we examine changes in import prices of goods that are predominantly transported via the Suez Canal. In section 6.2, we look at whether there is a direct connect between price changes and import quantities. Also, we determine if oft-proposed supply chain frictions are associated with quantity changes. In section 6.3, we study whether there has been substitution away from sea trade towards air trade. As sea trade is a comparatively slow means of transportation, additional orders shipped by sea might not be an effective alternative for cargo stuck in the Suez blockage. Air trade, in contrast, might substitute delayed inputs in a timely manner. With an eye to the longer term effects of the blockage, it is possible that agents "on the margin" between air and sea shipping might be more inclined to ship via air after the March 2021 Suez Canal blockage.

6.1 Sea Trade Import Price Effects

In this section, we explore whether the blockage of the Suez Canal had short- and/or long-run effects on import prices. The empirical design described in section 5.1 allows us to gain deeper insights into the potential price effects of the Suez blockage. We regress the log of import prices on the specification presented above (equation 2). Our econometric analysis reveals that, following the Suez blockage, goods that are predominantly shipped through the Suez Canal experienced persistent relative price increases.

Figure 1a displays our results. It shows the estimated coefficients $\gamma_{s,t}$ for each of the interaction terms $Month_t \times Quartile_{i,s,t}$ as dots and the respective 95% confidence

[17] Another potential violation of the Only Trend Assumption is that our effect is not driven by a price increase in the 'treatment group', but by a price decrease in the 'control' group. That is, decreasing prices of imports that are not shipped via the Suez Canal. Since no major event was reported that could plausibly account for the magnitude of our findings, we discard this possibility.

intervals as attached whiskers. The point estimate for the 4th quartile interaction term in April 2021, $\gamma_{4,1}$ indicates that the April 2021-specific mean price change for product groups in the 4th Suez share quartile is approximately 7% higher relative to the mean price change in the 1st Suez share quartile.

Hence, we observe a direct reaction to the blockage of the Suez Canal for product groups with the highest exposure to the shock relative to those that have the lowest exposure. The effect is persistent, peaking in May 2021 and fading out towards the end of the year. Interestingly, the import prices of goods in the 2nd and 3rd Suez share quartiles show a pronounced uptick in relative prices in May 2021. Until September 2021, they seem to remain on a slightly higher level than in the pre-blockage period, although this difference is not statistically significant. Moreover, we see a sharp relative drop in prices across quartiles in October 2021. Since this effect is smallest for the 4th Suez share quartile, it is likely not associated with the Suez blockage.

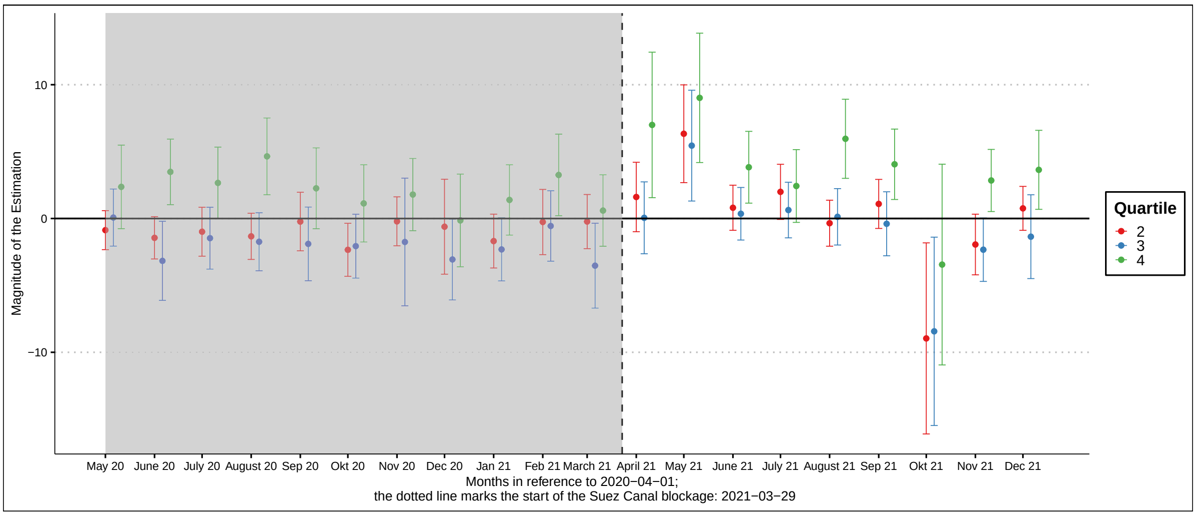
One explanation for our result is that the Suez Canal blockage caused immediate price jumps for goods with a high Suez exposure. In the months following the blockage event, supply chain frictions and backlogs enhanced the initially observed effect and subsequently spilled over to goods with less exposure to the Suez Canal in second-round effects. While those spillovers appear to be persistent, although small in magnitude for goods with a relatively small exposure to the Suez Canal, goods in the 4th Suez share quartile are continually affected.

Table 2 presents our results in more detail. The table is separated into three parts. The upper part shows the time-invariant coefficients of the Suez share quartile dummies (column (1)). The middle and lower parts show the month-by-month results for the Pre-Suez blockage period and the Post-Suez blockage period, respectively. Column (2) displays our estimates of each month dummy.[18] Columns (3) to (5) show the estimated coefficients of the interaction terms of the month dummies with the three respective quartile dummies. These are our coefficients of interest.

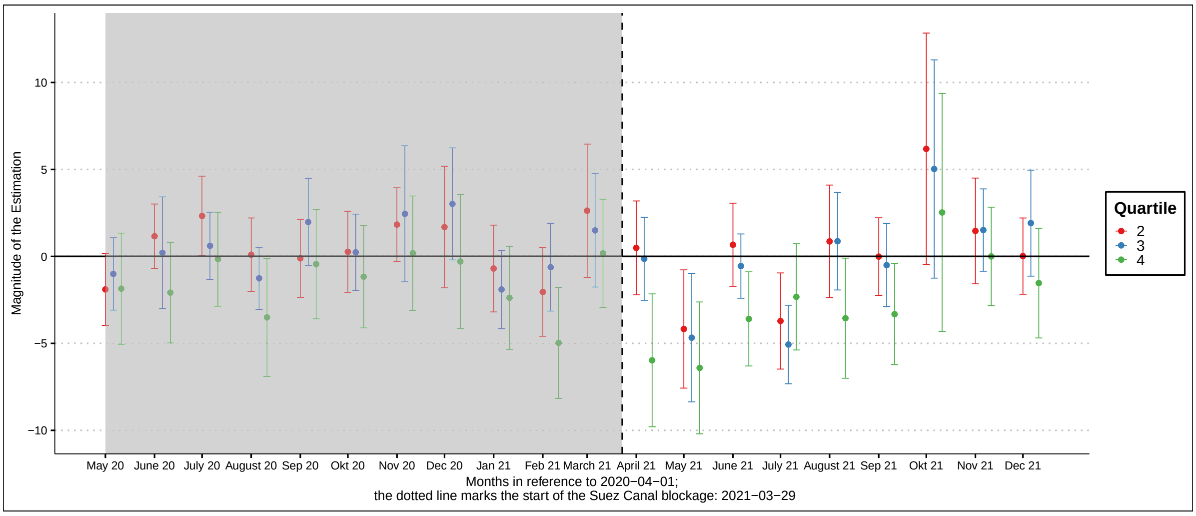
[18] The interpretation of the individual dummies is the following: The month dummies show the average price change relative to April 2020 in the cross-section. The 4th quartile dummy denotes the average price difference relative to the 1st Suez share quartile in the cross-section.

Figure 1: Interaction Term Effects by Regression Specification

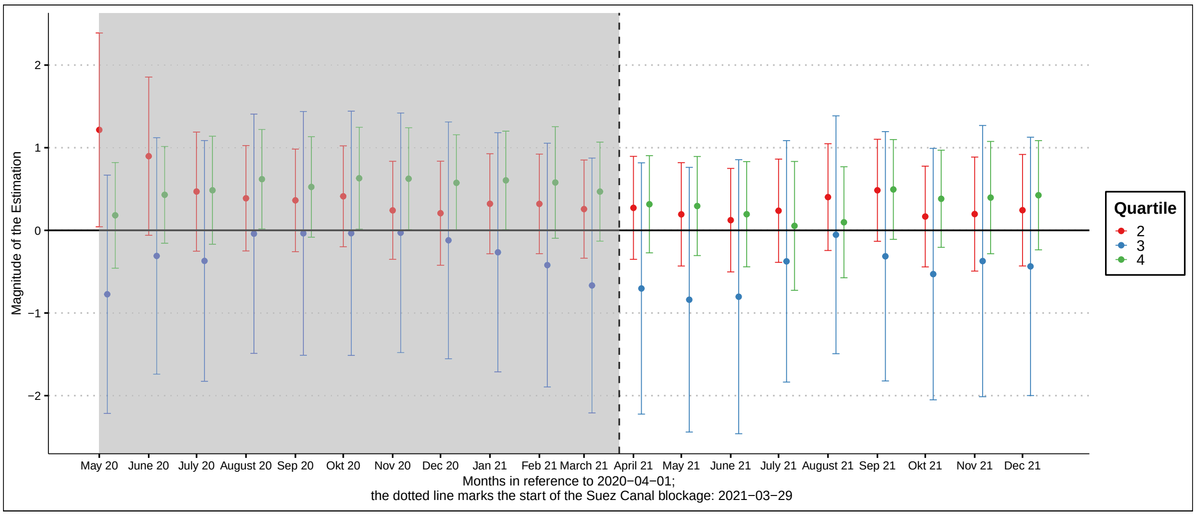
(a) Sea Trade Import Price Effects



(b) Sea Trade Quantity Effects



(c) Sea Trade Substitution by Air Trade



The figures show the results of the specification presented in section 5.1. The dependent variables are the log of sea trade import prices (Figure 1a), the log of sea trade volume (Figure 1b), and the log of air trade volume (Figure 1c) respectively. The dots show the point estimates of the interaction terms of the month and quartile dummies (4^{th} quartile green; 3^{rd} quartile blue; 2^{nd} quartile red).

The plot discussed above suggests the satisfaction of the Parallel Trend Assumption, which is an important prerequisite for our result (section 5.2). For the assumption to hold, the plotted interaction terms should not be statistically different from zero. Hence, the confidence bands should intersect with the zero-line. In general, this criterion seems to be satisfied. There are only a few exceptions that we do not consider to be overly concerning. For the 4th quartile estimate, the outlier is not in the period before the shock. Whereas for the 3rd quartile, the deviation points towards the other direction. The few remaining significant pre-shock coefficients lie well ahead of the shock and do not seem to follow a pattern. After the Suez blockage, the interaction terms are clearly different from zero.

In summary, we find an immediate and persistent price response to the Suez Canal blockage. The persistence of the price effect suggests that the blockage caused both short- and medium-run cost changes. This is in line with the theoretical mechanism presented in section 3.3.

6.2 Sea Trade Quantity Effects

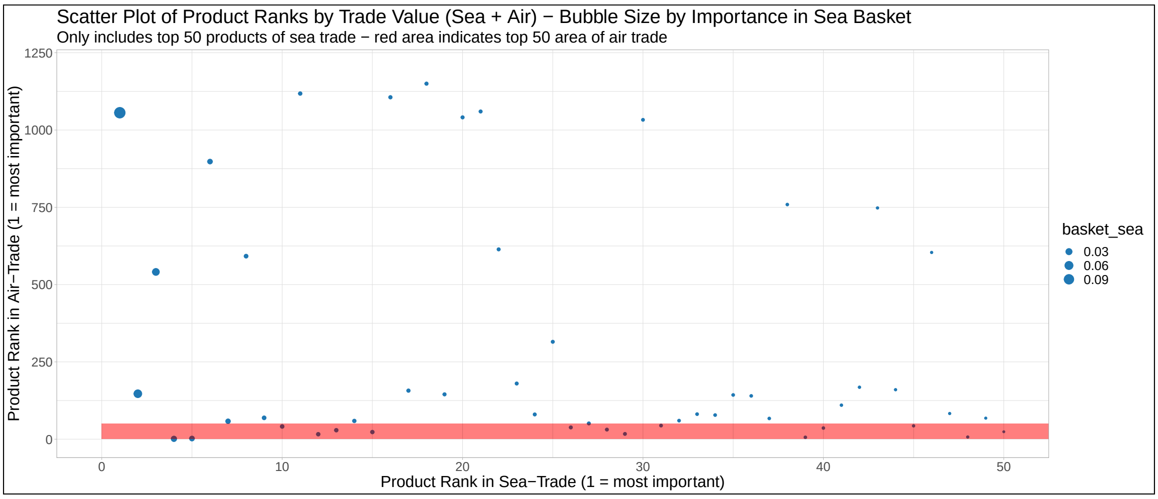
We continue by investigating whether the price effect is partly driven by supply shortages. We use the same empirical approach as above, with the exception that the dependent variable for this specification is the log of sea import quantity. We observe that the Suez blockage caused a considerable relative decline in the sea trade volume of exposed goods. Figure 1b shows the results. Following the blockage, we observe an immediate relative drop in the sea trade quantity of products in the 4th Suez share quartile, i.e., those with the highest exposure to the blockage. This relative decrease in sea trade is persistent until September 2021. Additionally, we observe relative decreases in the sea trade quantity of the the 2nd and 3rd quartiles in May and July 2021. Further, we find a large jump in the relative sea trade quantity across quartiles in October 2021, corresponding to the price drop observed in section 6.1. The plotted price effects (figure 1a) are roughly the inverse of the graph of the quantity effect (figure 1b). While quantity effects seem to play a role, they are not able to explain the entire observed price effects of November 2021 and beyond. Here, the price mechanism laid out in section 3.3 might fill the explanatory gap.

Further our results suggest that the parallel trend assumption is likely satisfied, although it is not as definite as before. Figure 1b illustrates that before the blockage, most interaction coefficients are not statistically different from zero, as indicated by the 95 % confidence intervals. In January and February 2021, however, there is a notable downward trend of the 4th Suez share quartile coefficient. While this does not render the Parallel Trend Assumption violated, this should be kept in mind when interpreting results. In Appendix C, table 3 lays out our detailed results.

6.3 Sea Trade Substitution by Air Trade

In the following section, we examine whether the blockage of the Suez Canal was associated with substitution between freight methods. More directly, we examine whether goods that were stuck because of the Suez blockage or delivered with a delay thereafter were shipped via air trade routes in greater amounts following the clearing of the blockage.

Figure 2: Sea Trade - Air Trade Rank Analysis by Trade Value



The figure is created using data from the Pre-Shock period (from April 2020 to December 2021). The figure shows a rank analysis of sea and air trade product groups. The 50 most important sea trade product groups (in terms of value) are included. The x-axis shows the product rank for sea trade. The y-axis shows the rank for air trade. The size of the bubbles shows the relative importance of the product group in terms of value relative to total sea trade value. If a product is both in the top 50 of sea and air traded products its respective data-point is located in the area shaded in red.

In general, sea transport and air transport are used more or less frequently for different types of goods in terms of physical trade volume. However, there is a certain level of overlap; put simply, there are some high-value goods that are shipped via both sea and air. Figure 2 shows a rank analysis of sea and air trade. The x-axis shows the 50 most important product groups by their respective sea trade value over total sea trade value. Hence, rank 1 is the product group with the highest sea trade value. The y-axis shows the corresponding importance of the respective product type for air trade. The size of the points reflects the relative size of sea trade value of the respective product groups. The area highlighted in red displays the overlap of the top 50 sea- and air-traded goods. While the three most important sea-traded product groups do not play a major role in air trade, 15 product groups are ranked within both the top 50 sea and air trade product groups. The rank analysis provides evidence that there is potential for substitution of sea trade with air trade because certain highly-relevant product types are transported via both means of transportation. For example, the top 10 sea trade product groups account for around 30% of total sea trade value. Hence, three overlaps between the top 10 sea trade and top 50 air trade product groups illustrates the potential for substitution in terms of value.

Employing the same approach as above, we examine whether there was substitution of sea transport with air transport. We restrict our sample to product groups that are amongst both the top 100 sea and air trade products in terms of value. The sample restriction allows us to filter for product groups with substitution potential as discussed above. That is, we implicitly discard heavy goods such as oil and steel. We regress the log of air trade quantity on our regression design introduced in section 5.1. We find that there is no structural substitution of product groups that are predominantly exported via the Suez sea route. Figure 1c shows our results. The interpretation of the interaction term estimate of the 4^{th} Suez share quartile in April 2021 is the following. The April 2021-specific mean air trade quantity change for product groups in the 4^{th} Suez share quartile is approximately 0.3% higher relative to the 1^{st} Suez share quartile.

Note that the coefficient is not statistically significantly different from 0. In addition, none of the Post-Suez blockage interaction term coefficients are statistically significant; their confidence bands intersect with the zero-line. In Appendix C, table 4 lays out our detailed results. Hence, our analysis gives us no reason to suggest that there was any significant structural substitution of sea trade towards air trade due to the blockage of the Suez Canal.[19] The finding is surprising, because we found a notable overlap in product groups traded via sea and air. One explanation might be that the products shipped via sea and air, respectively, differ on a more granular HS product code; very specific products may be substituted, but these products are insignificant at the aggregate level. Another reason might be that supply chains are incapable of reacting to shocks such as the Suez blockage in the short-run.

We also refer to figure 1c to test the Parallel Trend Assumption. As before, our results imply the satisfaction of the Parallel Trend Assumption as only a a handful of outliers do not intersect the zero line before the Suez blockage.

[19] As expected, we obtain the same result without restricting the sample to the top 100 sea and air trade products in terms of value.

6.4 Discussion & Robustness Checks

While we are confident that our results are clearly identified, our approach has some caveats. Below we identify 3 concerns that necessitate additional robustness tests.

The first concern regarding our analysis is the viability of the Only Shock Assumption. It is possible that other shocks happened at the same time as, or in the aftermath of, the Suez Canal blockage. For example, Covid-19 related port closures such as those described in section 5.2 could influence our results. Hence, we perform two robustness checks. First, we run a regression using our main specification that excludes the top 10 trade partners (in terms of sea trade value).[20] The results are reported in table 5. We conclude that our results are generally robust to this check. While the short-run price effect observed in April 2021 becomes insignificant, the effects in May and June 2021 remain statistically significant. Hence, the results reflect positively on the robustness of our findings. Secondly, we run the exact same regression except we only exclude China (to account for the closure of the nation's ports on account of Covid-19 measures). The results are reported in table 6. While the price effect is still statistically significant in May 2021, where it is actually most pronounced, the remaining coefficients become insignificant. With that said, the direction and magnitude of the point estimates are preserved. It also seems likely that this is not simply a result of port closures; the first port closure was in Yantian in May 2021. One reason for the finding might be that China is the most important trade partner of Europe. Thus, it is natural that Chinese imports play a major role in generating our effect. Next, we turn towards removing product groups with component products that are not regularly shipped via the Suez Canal for logistical reasons. These are particularly heavy industrial materials, as explained in section 5.2.[21] We show the results in table 7. The results are largely unchanged. Hence, it seems safe to say that the excluded goods are not biasing our results.

Another concern related to our analysis is that our control variables are not perfectly absorbing their designated effects as a result of them being imperfect proxies of the "true" data; for example, Covid-19 stringency indices cannot possibly account for all price variations related to the Covid-19 pandemic. In addition, it is always possible that the dataset that we use contains measurement errors of some form or another; trade data is usually quite good, but incorrect measurement does occur. Both concerns above can potentially lead to biased estimates. However, we do not believe that these omnipresent data concerns represent a significant problem in our case.

[20] The top 10 trade partners are: China, Japan, (South) Korea, India, Vietnam, Saudi Arabia, Taiwan, Malaysia, Indonesia, and Bangladesh.

[21] We exclude the product groups 1) ores, slac, and ash, 2) iron and steel, and 3) other metals.

Overall, we have reason to believe that we have identified a clean price effect related to the blockage of the Suez Canal. By running the described robustness checks, we are able to alleviate concerns regarding the possibility that our specification is picking up the effects of other overlapping shocks. We also bolstered our results by removing product groups that may be regularly shipped around the Cape of Good Hope. Given our data and resource constraints, we are not able to completely rule out the possibility that our results are biased as a result of imperfect controls and measurement error. Thus, the exact interpretation of our point estimates must inevitably be conducted with a grain of salt. Nonetheless, we have valid reason to consider the order of magnitude and direction of our measured effects as indicative of a legitimate price level effect.

7 Conclusion

Our study exploits the blockage of the Suez Canal by the grounded container ship Ever Given as an arguably exogenous global supply chain shock, in order to demonstrate that disruptions of this nature can exert upward pressure on import price levels. Using an Event Study design, we are able to analyze the heterogeneity of the price effects based on the exposure of imported products to the shock, as well as their persistence over time. We find that prices of highly-exposed products increased sharply relative to those of less exposed products in the 2 months after the blockage. Furthermore, the price effects of the blockage on exposed products remained positive for months after the blockage was cleared. This finding supports the oft-espoused claim that supply chain disruptions appear to be a legitimate channel contributing towards current increases in inflation. As a secondary result, we find that the Suez Canal Blockage did not result in noticeable transport mode substitution effects away from sea trade and towards air trade. This non-result even occurs after restricting the sample to products that have high substitution potential. Further promising research areas include investigating the effective pass through of higher, supply-chain induced import prices to actual consumer prices, as well as exploring the causes of the lack of transport mode substitution.

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Appendix

Appendix A: Control Variable Description & Discussion

Weighted Shipping Distance:

As highlighted previously, longer shipping distances increase the costs associated with transporting a specific product and can influence buying decisions from importers (Ivaldi et al. 2003). After identifying the largest harbour of each partner country, we use the online tool ShipTraffic.net (2022) to obtain nautical mile distances to the harbour of Amsterdam.[22] The nautical miles are then weighted for each product i based on the importing value in month t. For fully landlocked countries that do not have a port, we calculate the distance using the largest port of the closest neighbouring non-landlocked country.

Weighted Producer Price Index:

Higher producer prices have (depending on relative market power levels) the potential to lead to higher importing prices. Furthermore, a relative change in producer prices can lead to geographical substitution across partner countries. Producer Price Indices are sourced from the World Bank where data using the methodology of Ha, Kose, and Ohnsorge (2021) is published.

Geographical Substitutability:

If a product is regularly imported from a large number of countries it can be more easily substituted in times of a supply shock, such as the Suez Canal blockage, which might reduce the hypothesized upwards price pressure in its aftermath. To account for this geographical substitutability, we calculate the share of total import volume accounted for by the 4 largest exporting countries of a given product i in time t. The resulting index is between 0 and 1, with 1 indicating that the 4 largest partner countries (or fewer) are responsible for the whole supply, while 0.5 indicates that the 4 largest partner countries are responsible for 50% of the whole supply of this product. A lower number thus proxies for a higher degree of geographical substitutability. This measure is inspired by market concentration ratios, which are commonly used in competition economics. Pavic, Galetic, and Piplica (2016) provide a summary of this methodology.

[22] Using Amsterdam is an arbitrary decision between all large European ports. We decided on Amsterdam, because it is the largest oil port in Europe. It is highly unlikely that this decision has any substantial effect on the results due to the relative geographical closeness of large European ports.

Transportation Mode Substitutability:

The only other transportation mode that can be used as a valid substitute for international sea trade is air trade, since both road and rail trade are restricted by their inability to cross large bodies of water. Within products, there are large differences in the substitutability of sea trade with air trade, which can be seen more extensively in our discussion in section 6.3. If a product is regularly transported via both air and sea it is less likely that its price increases starkly in times of a supply shock, because the transportation mode can be more easily changed on short notice. To account for this heterogeneity between products we include the air quantity of product i in time t as a control. This data is again directly extracted from the Eurostat database described in section 4.1.

Weighted Nominal Effective Exchange Rate:

Another determinant of import prices that is not directly set by firms is the exchange rate. In the case of European importers, the exchange rate of the exporting country relative to the euro has an important price impact. If country A's exchange rate to the euro is weaker than country B's, country A has a competitive advantage over country B. Hence, European importers might choose to order more goods from country A and, subsequently, import at a lower cost. Contrarily, a depreciating Euro leads to an associated increase in import costs. Nominal effective exchange rates (NEER) are an indicator of the competitiveness of a country's exchange rate. Any country's exchange rate is weighted against a basket of exchange rates of its trading partners. Hence, including NEER accounts for import price increases if a given country's currency appreciates or if the euro depreciates. We obtain the data from a public Bruegel (2022) dataset.

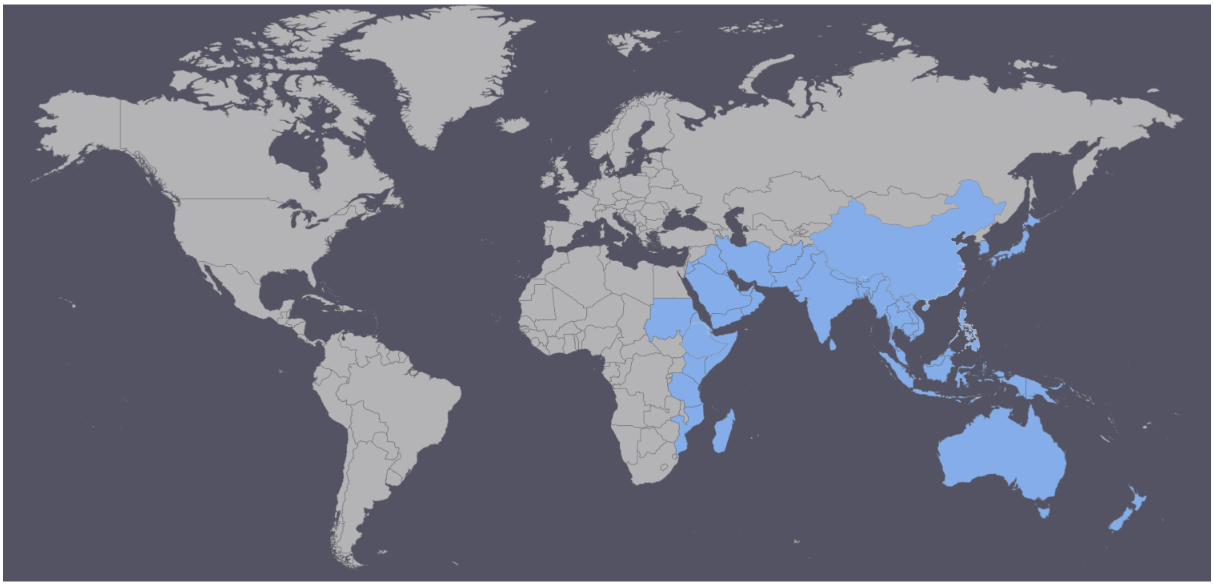
Weighted Covid-19 Stringency Index:

Our approach is directed towards exploiting the supply chain shock related to the blockage of the Suez Canal. Another potential cause of supply chain disruptions during this time period is the response of governments in partner countries to Covid-19 (see section 5.2). Measures to combat the spread of Covid-19 often included the closure of production or transport facilities (Arriola et al. 2022). While most of these closures were concentrated in the early stages of the pandemic, and were thus less prevalent during the time of the Suez Canal crisis in March 2021, we nevertheless control for the possibility that governments' Covid response caused upward pricing pressure during the timeframe we consider in our analysis. To do so, we include the "Covid Stringency Index", which is calculated by the Oxford Covid-19 Government Response Tracker (OxCGRT) (Hale et al. 2021) using 8 items reflecting the "Containment and closure policies" of countries over time. This "Stringency Index" ranges from 0 to 100, with higher numbers indicating a more disruptive government response to Covid-19.[23] Again, we build a value weighted average to transform this country based indicator into a product based indicator.

Ideally, we would also control for the presence and magnitude of import tariffs. Unfortunately, this data is not available for free at the level of granularity necessary to include it in our analysis; granular data is only available through purchasing access, as outlined in (Shapiro 2021, P.840). However, we are confident that omitting tariffs from our analysis does not pose a fundamental problem with regard to our estimation results. Tariffs are usually fairly constant over time and, given the absence of major trade wars in our period of interest, we think that minor changes would be absorbed by the included time fixed effects.

Appendix B: Figures

Figure 3: Countries Categorized as Using the Suez Canal for Their Sea Exports to Europe



The figure shows our classification of countries with sea trade routes to Europe through the Suez route (marked in blue).

[23] 0 indicates no restrictions at all, while 100 has only been recorded in three cases (by Honduras in 04/2020 and 05/2020 and the Philippines in 04/2020). As a reference, Spain's Stringency Index peaked in 04/2020 at 85.2 and is now (05/2022) at 27.6.

Appendix C: Tables

Table 1: Summary Statistic Table

	Observations	Mean	St. Dev.	Median	Max	Min
Panel A: Main Data						
Import Prices	28,810	55.73	1,277.01	4.21	88,681.60	1.00
Suez Quantity Share	28,810	0.59	0.37	0.72	1.00	0.00
Panel B: Product-based Controls						
Air Quantity (kg)	28,810	244,058.69	2,121,518.53	20,998.50	262,812,545.00	0.00
Top 4 Country Share	28,810	0.90	0.11	0.94	1.00	0.31
Panel C: Country-based Controls[24]						
Shipping Distance (nmiles)	164	7,005.86	3,350.94	6,784.00	15,949.00	169.00
Producer Price Index	2,141	0.02	0.21	0.01	1.10	-1.00
Nominal Effective Exchange Rate	4,779	88.69	32.92	99.10	196.91	0.00
Covid-19 Stringency Index	4,488	50.55	23.66	52.62	100.00	0.00

[24] Observations for these class of controls are lower since these variables are only available at a *country* × *time* level (only at a product level in case of the Shipping Distance). We transform them into *product* × *time* based controls using the weighting procedure outlined in footnote 11.

Table 2: Results of Regressing Log Import Prices on the Main Specification (Eq. 2)

	(1) Quartile	(2) Month	(3) 2nd Quartile × Month	(4) 3rd Quartile × Month	(5) 4th Quartile × Month
Quartile Dummies					
2nd Quartile	0.767				
	(0.757)				
3rd Quartile	0.912				
	(1.001)				
4th Quartile	-3.779***				
	(1.311)				
Pre-Suez blockage					
May 2020		0.762	-0.871	0.072	2.363
		(0.593)	(0.744)	(1.089)	(1.593)
Jun 2020		1.491**	-1.445*	-3.166**	3.486***
		(0.741)	(0.806)	(1.508)	(1.252)
Jul 2020		1.100	-0.987	-1.471	2.661*
		(0.878)	(0.932)	(1.178)	(1.366)
Aug 2020		0.758	-1.334	-1.741	4.643***
		(0.819)	(0.882)	(1.106)	(1.466)
Sep 2020		0.382	-0.232	-1.897	2.254
		(1.071)	(1.116)	(1.406)	(1.542)
Oct 2020		2.027**	-2.339**	-2.067*	1.128
		(0.973)	(1.011)	(1.217)	(1.471)
Nov 2020		0.213	-0.215	-1.755	1.788
		(0.872)	(0.934)	(2.434)	(1.378)
Dec 2020		2.682**	-0.615	-3.062**	-0.146
		(1.291)	(1.807)	(1.544)	(1.770)
Jan 2021		2.123**	-1.688	-2.312*	1.387
		(0.922)	(1.027)	(1.201)	(1.339)
Feb 2021		0.600	-0.262	-0.560	3.253**
		(1.113)	(1.242)	(1.341)	(1.556)
Mar 2021		0.641	-0.228	-3.525**	0.593
		(0.732)	(1.033)	(1.618)	(1.362)
Post-Suez blockage					
Apr 2021		-0.984	1.607	0.050	6.993**
		(1.194)	(1.324)	(1.371)	(2.774)
May 2021		-5.500***	6.334***	5.446***	9.017***
		(1.743)	(1.864)	(2.112)	(2.466)
Jun 2021		-0.535	0.803	0.355	3.831***
		(0.796)	(0.860)	(1.002)	(1.368)
Jul 2021		-0.609	1.991*	0.631	2.428*
		(0.867)	(1.051)	(1.060)	(1.387)
Aug 2021		-0.180	-0.352	0.125	5.956***
		(0.785)	(0.876)	(1.075)	(1.508)
Sep 2021		-0.543	1.089	-0.396	4.052***
		(0.792)	(0.935)	(1.221)	(1.342)
Oct 2021		8.766**	-8.963**	-8.433**	-3.445
		(3.542)	(3.643)	(3.592)	(3.828)
Nov 2021		1.508	-1.944*	-2.332*	2.842**
		(1.041)	(1.157)	(1.209)	(1.184)
Dec 2021		-0.440	0.757	-1.359	3.637**
		(0.819)	(0.838)	(1.597)	(1.507)
Observations	25219				
R2	0.931				

The table shows the results of the specification presented in section 5.1. The dependent variable is the log of the import price of product group i in time t. The results are organized in three parts. The upper part shows time invariant coefficients of the Suez share quartile dummies (column (1)). The middle and lower part show our results for each month, first for the Pre-Suez blockage period and, thereafter, for the Post-Suez blockage period. Column (2) displays our estimates for each month dummy. Column (3) to (5) show the interaction terms between the month dummy and each of the three respective quartile dummies. Standard errors are shown in parentheses. Statistical significance is denoted as * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table 3: Results of Regressing Log Sea Quantity on the Main Specification (Eq. 2)

	(1) Quartile	(2) Month	(3) 2nd Quartile × Month	(4) 3rd Quartile × Month	(5) 4th Quartile × Month
Quartile Dummies					
2nd Quartile	0.089				
	(0.938)				
3rd Quartile	1.306				
	(0.836)				
4th Quartile	3.221**				
	(1.297)				
Pre-Suez blockage					
May 2020		-0.016	-1.897*	-1.007	-1.853
		(0.662)	(1.055)	(1.061)	(1.630)
Jun 2020		-0.742	1.158	0.209	-2.084
		(0.714)	(0.947)	(1.639)	(1.476)
Jul 2020		-0.571	2.326**	0.611	-0.161
		(0.774)	(1.167)	(.987)	(1.378)
Aug 2020		0.150	0.100	-1.260	-3.506**
		(.786)	(1.077)	(0.911)	(1.730)
Sep 2020		0.640	-0.109	1.975	-0.449
		(0.938)	(1.145)	(1.282)	(1.604)
Oct 2020		0.583	0.266	0.237	-1.170
		(0.983)	(1.189)	(1.121)	(1.501)
Nov 2020		-0.326	1.830*	2.448	0.185
		(0.792)	(1.080)	(1.995)	(1.679)
Dec 2020		-2.281*	1.686	3.017*	-0.293
		(1.254)	(1.781)	(1.644)	(1.966)
Jan 2021		1.243	-0.696	-1.902*	-2.381
		(1.003)	(1.275)	(1.150)	(1.511)
Feb 2021		0.729	-2.042	-0.621	-4.972***
		(0.947)	(1.301)	(1.287)	(1.629)
Mar 2021		0.634	2.629	1.496	0.177
		(0.902)	(1.956)	(1.662)	(1.591)
Post-Suez blockage					
Apr 2021		0.788	0.489	-0.138	-5.974***
		(1.097)	(1.377)	(1.217)	(1.949)
May 2021		4.136***	-4.172**	-4.673**	-6.410***
		(1.483)	(1.734)	(1.883)	(1.934)
Jun 2021		0.655	0.672	-0.556	-3.593***
		(0.889)	(1.219)	(0.943)	(1.381)
Jul 2021		2.916***	-3.714***	-5.066***	-2.326
		(0.906)	(1.410)	(1.153)	(1.558)
Aug 2021		0.094	0.862	0.873	-3.553**
		(1.329)	(1.653)	(1.430)	(1.761)
Sep 2021		1.364	-0.011	-0.503	-3.320**
		(0.935)	(1.138)	(1.217)	(1.481)
Oct 2021		-5.391*	6.181*	5.026	2.527
		(3.199)	(3.397)	(3.201)	(3.490)
Nov 2021		-0.668	1.463	1.515	-0.002
		(1.154)	(1.551)	(1.208)	(1.445)
Dec 2021		0.859	0.018	1.913	-1.535
		(0.928)	(1.118)	(1.555)	(1.609)
Observations	25219				
R2	0.946				

The table shows the results of the specification presented in section 5.1. The dependent variable is the log of the sea quantity of product group i in time t. The results are organized in three parts. The upper part shows time invariant coefficients of the Suez share quartile dummies (column (1)). The middle and lower part show our results for each month, first for the Pre-Suez blockage period and, thereafter, for the Post-Suez blockage period. Column (2) displays our estimates for each month dummy. Column (3) to (5) show the interaction terms between the month dummy and each of the three respective quartile dummies. Standard errors are shown in parentheses. Statistical significance is denoted as * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table 4: Results of Regressing Log Air Quantity on the Main Specification (Eq. 2), Top 100 Products in Air & Sea Imports

	(1) Quartile	(2) Month	(3) 2nd Quartile × Month	(4) 3rd Quartile × Month	(5) 4th Quartile × Month
Quartile Dummies					
2nd Quartile	-0.345				
	(0.299)				
3rd Quartile	0.084				
	(0.746)				
4th Quartile	-0.618*				
	(0.324)				
Pre-Suez blockage					
May 2020		-0.134	1.216**	-0.773	0.182
		(0.257)	(0.599)	(0.736)	(0.326)
Jun 2020		-0.022	0.897*	-0.310	0.430
		(0.248)	(0.489)	(0.730)	(0.299)
Jul 2020		0.118	0.470	-0.370	0.485
		(0.280)	(0.368)	(0.743)	(0.333)
Aug 2020		-0.094	0.388	-0.041	0.619**
		(0.245)	(0.325)	(0.739)	(0.307)
Sep 2020		0.067	0.363	-0.036	0.525*
		(0.240)	(0.317)	(0.753)	(0.310)
Oct 2020		0.070	0.412	-0.035	0.630**
		(0.242)	(0.311)	(0.754)	(0.314)
Nov 2020		0.209	0.242	-0.029	0.625**
		(0.233)	(0.303)	(0.740)	(0.314)
Dec 2020		0.224	0.207	-0.121	0.575*
		(0.227)	(0.321)	(0.731)	(0.297)
Jan 2021		0.224	0.321	-0.266	0.605**
		(0.232)	(0.308)	(0.738)	(0.304)
Feb 2021		0.216	0.320	-0.421	0.579*
		(0.238)	(0.307)	(0.752)	(0.344)
Mar 2021		0.380	0.257	-0.667	0.469
		(0.235)	(0.303)	(0.787)	(0.306)
Post-Suez blockage					
Apr 2021		0.415*	0.272	-0.703	0.316
		(0.249)	(0.318)	(0.776)	(0.300)
May 2021		0.375	0.194	-0.839	0.294
		(0.249)	(0.319)	(0.817)	(0.306)
Jun 2021		0.448*	0.123	-0.803	0.195
		(0.247)	(0.319)	(0.846)	(0.325)
Jul 2021		0.336	0.237	-0.375	0.054
		(0.250)	(0.319)	(0.745)	(0.398)
Aug 2021		0.234	0.402	-0.053	0.098
		(0.240)	(0.329)	(0.734)	(0.343)
Sep 2021		0.165	0.485	-0.314	0.495
		(0.242)	(0.315)	(0.770)	(0.308)
Oct 2021		0.309	0.167	-0.529	0.382
		(0.244)	(0.311)	(0.776)	(0.300)
Nov 2021		0.456	0.197	-0.372	0.396
		(0.291)	(0.352)	(0.837)	(0.347)
Dec 2021		0.198	0.244	-0.436	0.425
		(0.274)	(0.344)	(0.797)	(0.337)
Observations	945				
R2	0.749				

The table shows the results of the specification presented in section 5.1. The dependent variable is the log of air trade quantity of product group i in time t. The results are organized in three parts. The upper part shows time invariant coefficients of the Suez share quartile dummies (column (1)). The middle and lower part show our results for each month, first for the Pre-Suez blockage period and, thereafter, for the Post-Suez blockage period. Column (2) displays our estimates for each month dummy. Column (3) to (5) show the interaction terms between the month dummy and each of the three respective quartile dummies. Standard errors are shown in parentheses. Statistical significance is denoted as * p<0.1, ** p<0.05, *** p<0.01.

Table 5: Results of Regressing Log Import Prices on the Main Specification (Eq. 2), Excluding the Top 10 Partner Countries

	(1) Quartile	(2) Month	(3) 2nd Quartile × Month	(4) 3rd Quartile × Month	(5) 4th Quartile × Month
Quartile Dummies					
2nd Quartile	-0.771				
	(0.489)				
3rd Quartile	0.019				
	(0.423)				
4th Quartile	0.299				
	(0.671)				
Pre-Suez blockage					
May 2020		0.053	0.163	0.701	0.479
		(0.469)	(0.715)	(0.568)	(0.866)
Jun 2020		0.749	-0.260	-0.173	-0.051
		(0.457)	(0.554)	(0.528)	(0.734)
Jul 2020		0.591	-0.228	-0.552	-0.887
		(0.431)	(0.576)	(0.479)	(0.785)
Aug 2020		-0.023	0.424	0.032	-1.535
		(0.533)	(0.607)	(0.525)	(0.951)
Sep 2020		0.328	0.489	-0.333	-0.461
		(0.508)	(0.601)	(0.498)	(0.873)
Oct 2020		0.380	0.083	-0.267	-0.698
		(0.722)	(0.831)	(0.764)	(0.975)
Nov 2020		-0.422	1.538***	0.801	0.047
		(0.552)	(0.593)	(0.714)	(0.775)
Dec 2020		-0.059	1.668*	0.407	-0.293
		(0.648)	(0.902)	(0.669)	(0.952)
Jan 2021		0.723	0.181	-0.131	-0.316
		(0.495)	(0.567)	(0.579)	(0.755)
Feb 2021		-0.316	2.000***	0.636	0.614
		(0.499)	(0.648)	(0.529)	(0.774)
Mar 2021		-0.228	1.214*	1.068*	0.376
		(0.479)	(0.661)	(0.626)	(0.755)
Post-Suez blockage					
Apr 2021		0.441	0.159	0.051	-0.563
		(0.572)	(0.641)	(0.614)	(1.121)
May 2021		-2.915***	3.561***	3.478***	4.312***
		(1.065)	(0.883)	(1.048)	(1.294)
Jun 2021		-0.125	0.694	-0.107	2.689**
		(0.517)	(0.514)	(0.438)	(1.235)
Jul 2021		-0.166	0.354	0.060	-3.639***
		(0.759)	(0.667)	(0.653)	(1.083)
Aug 2021		0.465	0.118	-0.997	-0.663
		(0.588)	(0.622)	(0.620)	(0.801)
Sep 2021		0.154	-0.043	-0.669	0.192
		(0.526)	(0.640)	(0.570)	(0.839)
Oct 2021		0.704	-0.384	-0.831	-0.270
		(0.955)	(1.303)	(1.190)	(1.252)
Nov 2021		0.105	-0.572	-0.895	1.266
		(0.638)	(0.794)	(0.733)	(0.836)
Dec 2021		0.211	0.314	-0.178	0.587
		(0.532)	(0.631)	(0.568)	(1.134)
Observations	24770				
R2	0.922				

The table shows the results of the specification presented in section 5.1. The dependent variable is the log of the import price of product group i in time t. The results are organized in three parts. The upper part shows time invariant coefficients of the Suez share quartile dummies (column (1)). The middle and lower part show our results for each month, first for the Pre-Suez blockage period and, thereafter, for the Post-Suez blockage period. Column (2) displays our estimates for each month dummy. Column (3) to (5) show the interaction terms between the month dummy and each of the three respective quartile dummies. Standard errors are shown in parentheses. Statistical significance is denoted as * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table 6: Results of Regressing Log Import Prices on the Main Specification (Eq. 2), Excluding China

	(1) Quartile	(2) Month	(3) 2nd Quartile × Month	(4) 3rd Quartile × Month	(5) 4th Quartile × Month
Quartile Dummies					
2nd Quartile	-0.409				
	(0.829)				
3rd Quartile	1.681**				
	(0.704)				
4th Quartile	-0.125				
	(1.432)				
Pre-Suez blockage					
May 2020		0.399	2.049*	-1.015	0.828
		(0.900)	(1.179)	(0.922)	(1.678)
Jun 2020		1.849**	-0.055	-2.198**	-0.345
		(0.844)	(0.953)	(0.878)	(1.550)
Jul 2020		1.200*	0.293	-1.207	-1.614
		(0.712)	(0.879)	(0.840)	(1.639)
Aug 2020		0.270	1.555*	-0.328	0.625
		(0.779)	(0.869)	(0.810)	(1.517)
Sep 2020		0.572	0.802	-0.608	0.665
		(0.827)	(0.910)	(0.909)	(1.632)
Oct 2020		0.762	1.179	-1.178	4.638
		(0.780)	(0.897)	(0.886)	(2.986)
Nov 2020		-0.254	2.036*	-0.274	-0.931
		(0.933)	(1.060)	(0.938)	(1.586)
Dec 2020		0.094	1.336	1.905	0.794
		(0.809)	(0.939)	(1.228)	(1.660)
Jan 2021		1.590*	-0.161	-1.421*	-2.597*
		(0.813)	(0.935)	(0.843)	(1.524)
Feb 2021		0.908	1.120	-0.412	0.106
		(0.800)	(0.910)	(1.013)	(1.532)
Mar 2021		0.282	1.421*	-0.434	-1.392
		(0.686)	(0.771)	(0.837)	(1.571)
Post-Suez blockage					
Apr 2021		1.699	0.155	-1.755	2.516
		(1.073)	(1.094)	(1.112)	(2.779)
May 2021		-3.603*	4.163***	3.686*	5.093**
		(1.861)	(1.569)	(1.972)	(2.442)
Jun 2021		0.037	3.176***	-0.556	1.581
		(0.775)	(1.044)	(0.836)	(1.523)
Jul 2021		-0.968	2.233*	1.482	2.102
		(1.366)	(1.269)	(1.201)	(2.257)
Aug 2021		1.127	0.227	-1.151	1.948
		(1.026)	(1.298)	(1.091)	(1.795)
Sep 2021		0.130	0.955	-0.595	1.522
		(0.857)	(0.978)	(0.848)	(1.600)
Oct 2021		4.677	-4.820	-5.395*	-2.218
		(2.981)	(3.667)	(3.252)	(3.253)
Nov 2021		1.314	0.426	-1.942**	1.042
		(0.876)	(0.925)	(0.836)	(1.526)
Dec 2021		0.393	1.884*	1.260	-1.540
		(0.802)	(1.111)	(1.415)	(1.471)
Observations	24991				
R2	0.915				

The table shows the results of the specification presented in section 5.1. The dependent variable is the log of the import price of product group i in time t. The results are organized in three parts. The upper part shows time invariant coefficients of the Suez share quartile dummies (column (1)). The middle and lower part show our results for each month, first for the Pre-Suez blockage period and, thereafter, for the Post-Suez blockage period. Column (2) displays our estimates for each month dummy. Column (3) to (5) show the interaction terms between the month dummy and each of the three respective quartile dummies. Standard errors are shown in parentheses. Statistical significance is denoted as * p<0.1, ** p<0.05, *** p<0.01.

Table 7: Results of Regressing Log Import Prices on the Main Specification (Eq. 2), Excluding Ores and other Metals

	(1)	(2)	(3)	(4)	(5)
	Quartile	Month	2nd Quartile × Month	3rd Quartile × Month	4th Quartile × Month
Quartile Dummies					
2nd Quartile	0.911				
	(0.832)				
3rd Quartile	1.067				
	(1.081)				
4th Quartile	-3.506***				
	(1.342)				
Pre-Suez blockage					
May 2020		1.115*	-1.032	-0.368	1.944
		(0.612)	(0.794)	(1.135)	(1.615)
Jun 2020		1.629**	-1.539*	-3.317**	3.297**
		(0.806)	(0.887)	(1.515)	(1.294)
Jul 2020		1.310	-1.278	-1.908	2.320*
		(0.943)	(1.008)	(1.234)	(1.391)
Aug 2020		0.889	-1.370	-1.904	4.298***
		(0.885)	(0.958)	(1.165)	(1.495)
Sep 2020		0.547	-0.337	-2.135	2.071
		(1.118)	(1.177)	(1.495)	(1.581)
Oct 2020		1.458*	-1.671*	-1.531	1.639
		(0.868)	(0.970)	(1.131)	(1.388)
Nov 2020		0.400	-0.404	-3.564*	1.571
		(0.928)	(1.002)	(2.102)	(1.415)
Dec 2020		1.800*	0.554	-2.344*	0.641
		(0.952)	(1.635)	(1.337)	(1.571)
Jan 2021		2.291**	-1.920*	-2.542*	1.254
		(1.043)	(1.151)	(1.303)	(1.425)
Feb 2021		0.028	0.597	-0.013	3.759**
		(1.039)	(1.169)	(1.306)	(1.502)
Mar 2021		0.625	-0.225	-3.398**	0.568
		(0.770)	(1.011)	(1.565)	(1.389)
Post-Suez blockage					
Apr 2021		-0.632	0.873	-0.273	6.654**
		(1.140)	(1.218)	(1.343)	(2.896)
May 2021		-4.74***	5.632***	4.649**	8.189***
		(1.594)	(1.723)	(1.977)	(2.448)
Jun 2021		-0.229	0.550	0.013	3.505**
		(0.828)	(0.894)	(1.035)	(1.398)
Jul 2021		-0.250	1.816*	0.327	1.965
		(0.912)	(1.096)	(1.111)	(1.414)
Aug 2021		-0.399	0.111	0.335	6.092***
		(0.838)	(0.957)	(1.122)	(1.531)
Sep 2021		-0.462	1.137	-0.293	3.803***
		(0.869)	(1.001)	(1.368)	(1.377)
Oct 2021		10.786***	-10.951***	-10.38***	-5.542
		(3.593)	(3.680)	(3.646)	(3.859)
Nov 2021		1.832	-2.137*	-2.630**	2.507**
		(1.129)	(1.249)	(1.301)	(1.230)
Dec 2021		-0.105	0.520	-1.597	3.125**
		(0.860)	(0.878)	(1.597)	(1.521)
Observations	21741				
R2	0.897				

The table shows the results of the specification presented in section 5.1. The dependent variable is the log of the import price of product group i in time t. The results are organized in three parts. The upper part shows time invariant coefficients of the Suez share quartile dummies (column (1)). The middle and lower part show our results for each month, first for the Pre-Suez blockage period and, thereafter, for the Post-Suez blockage period. Column (2) displays our estimates for each month dummy. Column (3) to (5) show the interaction terms between the month dummy and each of the three respective quartile dummies. Standard errors are shown in parentheses. Statistical significance is denoted as * p<0.1, ** p<0.05, *** p<0.01.