

# Firms in Global Value Chains during Covid-19

Evidence from Indonesia

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## Abstract

Using detailed monthly firm-level trade data from Indonesia from February 2019 to June 2021, this paper shows that firm-level exports were overall more resilient than imports during Covid-19. Firms that participated in global value chains were more resilient to the Covid-19 shock beyond the immediate short-run compared to firms that did not. However, among global value chain firms, those that faced certain types of non-tariff measures on their import products, notably port of entry restrictions, on average faced larger reductions in export quantities and number of transactions compared to firms that did not face such

restrictions, consistent with the evidence of major port congestion during Covid-19. Therefore, although international connectedness could be a source of vulnerability to global shocks in the immediate short run, policies that enable firms to be more globally engaged through global value chains could enhance resilience. Relatedly, tackling measures such as port of entry restrictions can ensure fast and efficient port and customs procedures, especially during periods of high port congestion, as global value chain trade requires goods to cross borders many times.

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# Firms in Global Value Chains during Covid-19: Evidence from Indonesia

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# 1 Introduction

Since the Covid-19 pandemic started in early 2020 there has been an increasing interest in understanding firms' resilience to economic shocks. Since firms are increasingly operating within global value chains (GVCs), it is of particular interest to scholars and policymakers to understand the vulnerabilities that come along with this interconnectedness in order to better prepare for future shocks. Covid-19 disrupted many GVCs and led to supply shortages in different sectors all around the world (Cerdeiro and Komaromi, 2020). Additionally, the pandemic revealed structural impediments in the trade sector that could be addressed with the right policy changes. However, determining whether participation in GVCs is beneficial or detrimental for firms during a global crisis situation remains a difficult endeavor, as illustrated by the fact that previous studies reveal heterogeneous effects between different firms (Cirera et al., 2021), sectors (Espitia et al., 2022), countries (Bruhn et al., 2021) and outcome measures (Constantinescu et al., 2022).

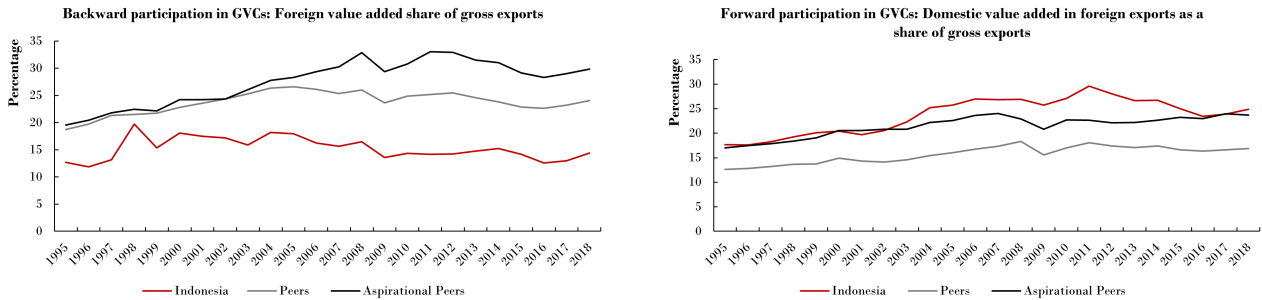
In this paper, we analyze how the pandemic affected firm-level imports and exports in Indonesia as well as quantify the role of non-tariff measures on imports, using detailed monthly firm-level trade data from February 2019 to June 2021. We measure the effect of the pandemic on a variety of outcomes, including firm-level export and import values, volumes, number of transactions, and number of products. To measure the effects of NTMs on firm-level trade, we compare various firm-level import and export outcomes before and after Covid-19 for firms exposed to NTMs compared to firms that were not, including firm-, HS-8 product-, and partner country fixed effects. We find evidence that certain types of NTMs, such as the port of entry restrictions on imports, negatively affected firm-level exports during the pandemic.

In the second step, we compare the impact of the pandemic on firms that participated in GVCs with those that did not. GVC firms are defined as firms that both imported and exported in the Covid-19 pre-period (February 2019-November 2019). All other firms are categorized as non-GVC firms. Since in GVCs, tariffs and non-tariff barriers are effectively a tax on exports (because imports are essential for exports), to further understand the effect of import policies, we differentiate between GVC firms that faced non-tariff measures (NTMs) versus those that did not. To assess the level of NTMs faced by a firm, we rely on data from the World Bank Jakarta NTM database. This data improves on other NTM data by UNCTAD-ERIA, as it is at a higher frequency (monthly), more updated (up to December 2021), and has a time dimension (panel). This makes it appropriate for the purposes of this analysis because we can capture changes in NTMs real-time during the pandemic as opposed to annual data.

Indonesia makes an interesting case for multiple reasons. High levels of raw material exports have led to high forward participation in GVCs, but this has been on a downward trend in recent years (Figure 1). The backward participation is still in its infancy, with low level of foreign value

added as a share of gross exports compared to its peers, and does not appear to be converging. The relatively lower participation in GVCs causes concern for Indonesia’s future position in the world market (Xing et al., 2021). The reconfiguration of GVCs following the Covid-19 shock may therefore provide new opportunities for GVC expansion (Antras, 2020), especially with the right policies in place. Finally, as the largest economy in Southeast Asia and an emerging market, the findings may be relevant for other similar countries.

Figure 1: Backward and Forward GVC participation



a. Peer countries include China, India, Thailand, Philippines, Mexico, and Brazil.  
 Aspiration peers include: Korea, Chile, Poland and Czech Republic  
 Source: OECD TiVA Database

We find that firm-level exports were, in general, more resilient than imports during Covid-19, and unit prices of firm-level imports and exports increased steadily following the onset of the pandemic. Firms that participated in GVCs were more resilient to the Covid-19 shock beyond the immediate short-run compared to firms that did not. However, among GVC firms, those that faced port of entry restrictions on average faced reductions in export quantities and the number of transactions relative to those that did not, consistent with the evidence of major port congestion during Covid-19. This is empirical evidence that while international connectedness could be a source of vulnerability to global shocks in the immediate short-run, being more integrated can be key to resilience and recovery beyond the short run. Policies to foster a business environment that enables firms to be more globally engaged through GVCs could enhance resilience. Additionally, tackling measures such as the port of entry restrictions can ensure fast and efficient port and customs procedures, as GVC trade requires goods to cross borders many times. This is especially true during periods of high port congestion, as was the case during Covid-19.

An increasing body of literature analyzes how Covid-19 affected trade: the effect of the pandemic on trade and GDP (Maliszewska et al., 2020; Hayakawa and Mukunoki, 2021a; Rose et al., 2021; Minondo, 2021); a focus on lockdowns and containment measures (Arenas et al., 2022; Majune, 2020; de Lucio et al., 2022); differentiating between supply and demand effects (Büchel et al., 2020; Hayakawa and Mukunoki, 2021b) or between different sectors (Espitia et al., 2022;

[Che et al., 2020](#); [Hayakawa and Mukunoki, 2021a](#)).

We contribute to two sets of literature. The first covers studies on how firms' participation in GVCs played a role in the impact of the Covid-19 pandemic. A growing body of literature has analyzed the effects that the pandemic had on different firms ([Ayres and Raveendranathan, 2021](#); [Cirera et al., 2021](#); [Bruhn et al., 2021](#); [Bricongne et al., 2012](#); [Brucal et al., 2021](#); [de Lucio et al., 2022](#)) and the role of GVCs as a potential transmitter of the Covid-19 induced consequences ([Bonadio et al., 2021](#); [Egger and Zhu, 2022](#); [Baqae and Farhi, 2020](#); [Gerschel et al., 2020](#); [Heise et al., 2020](#); [Chakrabati et al., 2021](#); [Lafrogne-Joussier et al., 2022](#); [Rose et al., 2021](#); [Arenas et al., 2022](#)). Most scholars agree that the initial impact was stronger on international firms ([Constantinescu et al., 2022](#); [Pimenta et al., 2021](#); [Borino et al., 2021](#)) and characteristics like high imports or connections to China made firms worse off ([Lafrogne-Joussier et al., 2022](#); [Meier et al., 2020](#)). However, authors also argue that internationally trading firms were more resilient and recovered faster ([Constantinescu et al., 2022](#); [Borino et al., 2021](#); [Hyun et al., 2020](#); [de Lucio et al., 2022](#)). Our paper contributes to this literature by providing novel evidence of various performance indicators of GVC firms compared to non-GVC firms following Covid-19 up to a year and a half into the pandemic, especially since GVC data is usually available with a lag.

Second, we contribute to the literature on the role of trade policy when such a shock takes place, particularly non-tariff measures. Until now, only a few studies have focused on Covid-19 and trade policy, mainly looking at the trade policy responses to the pandemic ([Baldwin and Evenett, 2020](#)). We contribute to this literature by focusing on pre-existing trade policy measures and how they amplify the effect of the pandemic on GVC firms. Our use of a novel data set for NTMs, an updated version of that used in [Cali et al. \(2022\)](#), makes such an exercise possible.

The rest of the paper is organized as follows: Section 2 describes the data used, Section 3 analyzes the trends prior to and during the Covid-19 crisis, Section 4 outlines the empirical strategy and results from the regression analysis and Section 5 concludes.

## 2 Data

The trade data is obtained from Panjiva, which is a private data provider collecting daily high-frequency customs data. We obtain the daily firm-to-firm import and export data for Indonesia from February 2019 to June 2021. The data is checked and cleaned rigorously with respect to firm identities, data completeness, quantity units, product codes, and partner countries, as detailed in Appendix [subsection A1](#). Further, we validated the data quality by comparing the annual aggregates with the World Integrated Trade Solution (WITS) and found that Panjiva's exports and imports data in 2019 captured about 94% and 79% of WITS, respectively. A summary of the firm-level data is given in [Table A1](#).

With the data, we compute firm-level export and import values, volumes, prices, number of transactions, export destinations, import origin countries, and number of products. The average price calculation at the firm-level accounts for the fact that different firms produce different products. So, for every disaggregated product (8-digit HS code), we compute the average price per unit across all firms and all destinations in that month. For every firm, we compute a ratio most disaggregated produce-wise: the numerator is the price that the firm charges for that HS-8 product and the denominator is the average price of that product. Then, we compute a weighted firm-month average price per unit of these products in the firm's export basket.

We define GVC firms as firms that imported and exported at least once in the Covid-19 pre-period (February 2019-November 2019). Non-GVC firms are either pure importers or pure exporters. There are 8,290 GVC firms (23.11%), 22,065 pure importers (61.52%), and 5,511 pure exporters (15.37%) in our data.

The data shows that 80.4 percent of export value for Indonesia was generated by GVC firms before Covid (i.e., before March 2020) and 82.1 percent after Covid. Overall, about 81.5 percent of Indonesia's exports were generated by GVC firms in the sample period. These figures are slightly higher than what was reported in other studies where about two-thirds of export values were generated by importing-exporters (Cali et al., 2022).

The data on non-tariff measures (NTMs) is sourced from the World Bank NTM database for Indonesia.<sup>1</sup> This dataset improves on existing data from UNCTAD-ERIA through more frequent updates, a wider variety of sources, and intensive forward and backward tracing that enables the creation of panel data. The data is hand collected through extensive regulatory checks, careful coding processes using the UNCTAD 3-digit MAST classification, and updated annually, making it one of the most up-to-date data on NTMs that exist, and ensuring only active regulations remain and inactive regulations are timely identified. As trade policy changes take place within the year, with over 13 government institutions issuing regulations and over 600 regulations in the data, this database allows for a timely assessment of policies, and changes to those policies, and more relevant in this paper, is sufficiently up to date for the analysis. While the data spans from January 2008 to December 2021, we use the 2019-2021 time span for the analysis to match with the trade data.

Figure 2 shows the monthly variation of incidences of NTMs in Indonesia both for products (a) and trade value (b) for all NTMs. While this gives some indication that there is some variation on a monthly basis and that the incidence has increased in 2021, it is too broad to draw meaningful interpretations. Most NTMs are designed to achieve public policy objectives, however, some NTMs can potentially affect trade. Even when this is not their main objective, such NTMs can hurt domestic producers by making imports more expensive, increasing business costs, and reducing productivity,

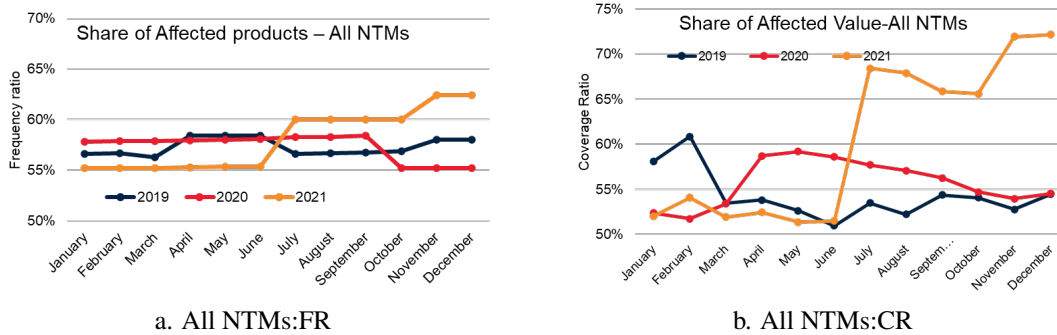
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<sup>1</sup>Available at [https://datacatalog.worldbank.org/search/dataset/0063543/indonesia\\_nontariff\\_measures](https://datacatalog.worldbank.org/search/dataset/0063543/indonesia_nontariff_measures)

thus making a country uncompetitive in export markets. Figure 2 displays all the NTMs in effect during this time frame, which includes numerous measures, some justified and some potentially trade-distorting without any meaningful justification.

Thus, we further focus our analysis on four specific measures which have been shown to negatively impact firms in Indonesia (Cali and Montfaucon, 2021; Cali et al., 2022). These are Import Approval Requirements (IAR, MAST code B14), Pre-Shipment Inspections (PSI, MAST code C1), mandatory certification with Indonesian product standards or *Standar Nasional Indonesia* (SNI, MAST code B7), and Port of Entry Restrictions (PER, MAST code C3). Again we observe the frequency of changes in the share of affected trade (coverage) and share of affected products (frequency) of these measures (Figure 3 and Figure 4). In all cases, there are variations from month to month. Initially following Covid-19, there were decreases in the share of affected products in all these measures. This may be due to some measures being removed to ease imports of certain products. For instance, import approval processes for 18 widely consumed food commodities and raw materials were simplified in April 2020 through Presidential Regulation No. 58/2020. Later in 2021, we observe increased incidence, especially in the case of import approval and port of entry restrictions, while pre-shipment inspections continued to decrease.

Figure 2: Monthly Coverage ratio (CR) and Frequency ratio (FR) of all NTMs



Source: World Bank Indonesia NTM Data

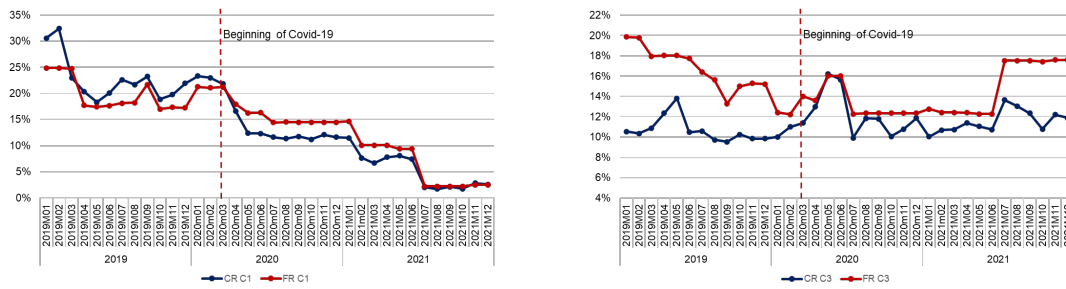
### 3 Pre-Covid and during Covid Trends

#### 3.1 All Firms

In this section, we provide descriptive evidence that firm-level imports suffered much more compared to exports due to the Covid-19 crisis, consistent with findings on analysis at a country level (Majune and Montfaucon, 2023) and results obtained from other studies (Arenas et al., 2022; Majune, 2020).



Figure 3: Coverage ratio and Frequency ratio of Pre-shipment Inspection (a) and Port of entry (b)



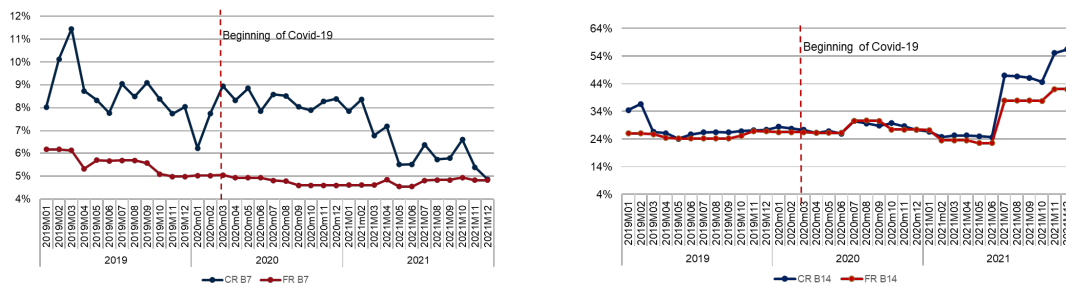
a. Pre shipment (C1)

b. Port of entry (C3)

Note: CR is the share of import value affected (coverage ratio, blue line) and FR is the share of products affected (frequency ratio, orange line)

Source: World Bank Indonesia NTM Data

Figure 4: Coverage ratio and Frequency ratio of Product Quality (a) and Import Approvals (b)



a. Product quality (B7)

b. import approval (B14)

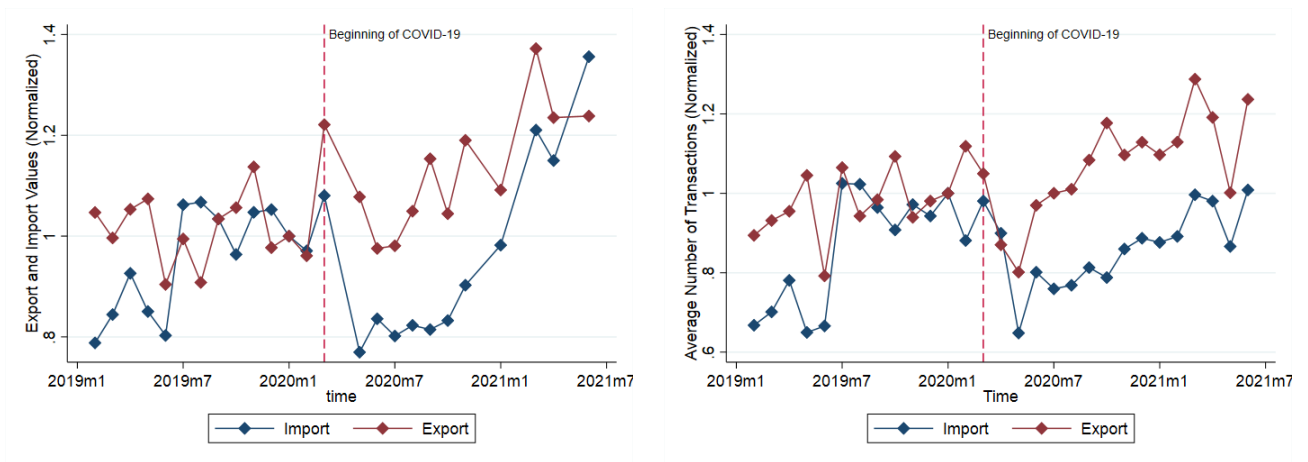
Note: CR is the share of import value affected (coverage ratio) and FR is the share of products affected (frequency ratio)

Source: World Bank Indonesia NTM Data

The monthly value of trade (Figure 5a), the number of transactions (Figure 5b), the number of countries a firm trades with (Figure 6a), and the number of firms (Figure 6b) all suffered disproportionately more for importers than for exporters.

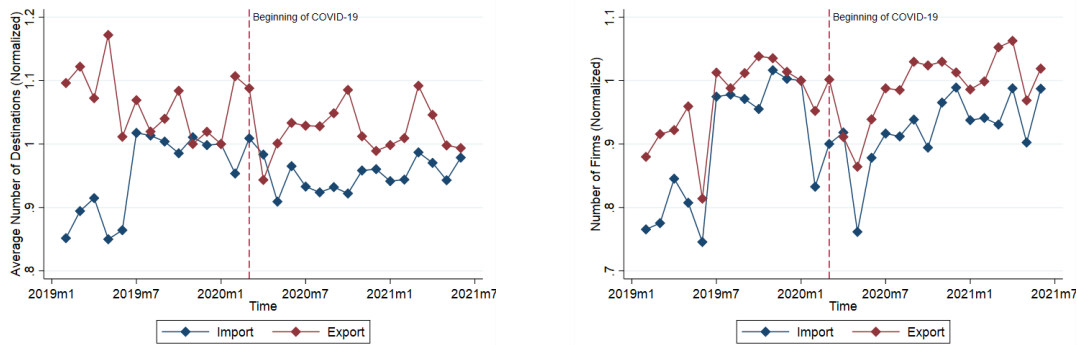
From Figure A1 in the appendix, we see no systematic differences in the number of products traded between imports and exports before and after Covid-19 began. From Figures A2 and A3, we also see that there are no systematic differences in prices for importing and exporting firms due to the Covid-19 crisis, even when we use weighted prices based on weights of the products in the firm's export basket.

Figure 5: Average monthly firm-level import and export values (a) and average monthly import and export transactions (b)



a. Average value of exports and imports  
 b. Average transaction of exports and imports  
 Normalized with respect to January 2020. The beginning of Covid-19 is marked by a red dotted line at March 2020. The source of the data is Panjiva.

Figure 6: Average monthly destinations/origins (a) Number of exporting and importing firms (b)



a. Average average monthly destinations  
 b. Monthly total number of firms  
 Normalized with respect to January 2020. The beginning of Covid-19 is marked by a red dotted line at March 2020. The source of the data is Panjiva.

### 3.2 GVC and Non-GVC Firms

In this section, we investigate whether GVC and non-GVC firms were affected differently due to the Covid-19 crisis. We will be comparing the export outcomes of firms that participate in GVCs compared to the pure exporters.

From Figure A4, we do not find any differential changes in the value of exports for firms that participate in GVCs compared to firms that do not. However, the value of exports consists of both unit prices and quantities. Therefore, if supply disruptions caused a surge in import prices and GVC firms passed on a part of their costs to export prices, we may find no overall change in export

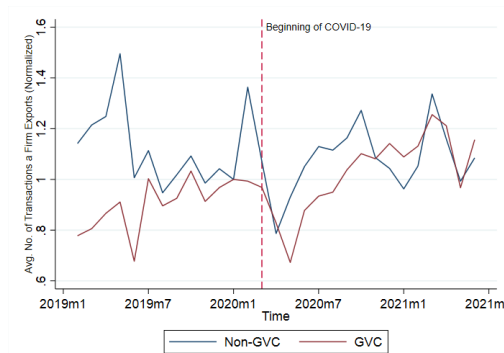
values, even if the quantity exported falls.

From Figures 7, 8a, and 8b, we see that directly following the Covid-19 crisis, the number of monthly transactions, the number of destinations a firm exports to, and the monthly number of HS-6 products a firm exports fell more for GVC firms compared to non-GVC firms. However, it is possible that in the longer run, GVC firms actually recovered better compared to non-GVC firms. In section 4.2 we analyze more formally the effects of the Covid-19 crisis on GVC and non-GVC firms separately through an event study design. We are able to track the outcomes for both GVC and non-GVC firms up to 18 months after the declaration of a pandemic by the WHO in January 2020.

Similar to the overall findings for all firms where there were no systematic differences between importing and exporting firms' prices, from Figure A5 and A6 we also find no evidence that export prices behaved differently for GVC and non-GVC firms.

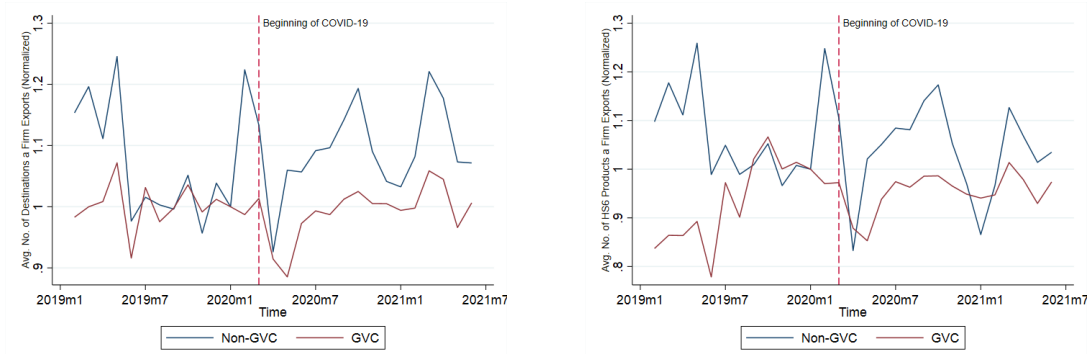
In Figure 9, we find that firms that participate in GVCs have a higher survival rate compared to firms that do not. However, given that we only have data starting February 2019, we are not able to analyze if the survival rates changed before and after Covid-19.

Figure 7: Average monthly export transactions before and after Covid-19 of GVC and Non-GVC firms



This figure plots the monthly average transaction of firm-level exports of GVC and Non-GVC firms normalized with respect to January 2020. The beginning of Covid-19 is marked by a red dotted line at March 2020.

Figure 8: Average monthly destinations (a) Average number of products (b) for GVC and non-GVC firms

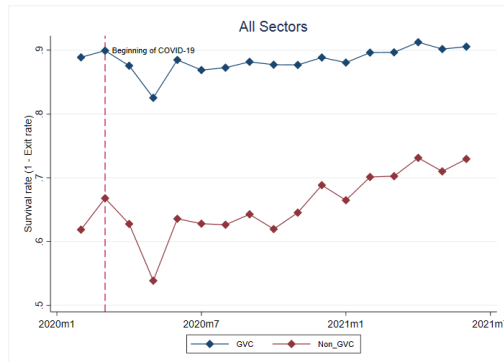


a. Average monthly destinations

b. Average number of products

Normalized with respect to January 2020. The number of products is at a 6-digit HS code. The beginning of Covid-19 is marked by a red dotted line at March 2020

Figure 9: Monthly firm export survival rate before and after Covid-19 of GVC and Non-GVC firms



This figure plots the monthly firm export survival rate of GVC and Non-GVC firms. The beginning of Covid-19 is marked by a red dotted line at March 2020. The rate is the one-year survival rate which is equal to  $1 - (\text{exitors}/\text{number of exporters})$  where exitors are the number of exporters that export in a given month of year  $t-1$  but not in the same month of year  $t$ .

### 3.3 NTM and Non-NTM Affected Firms

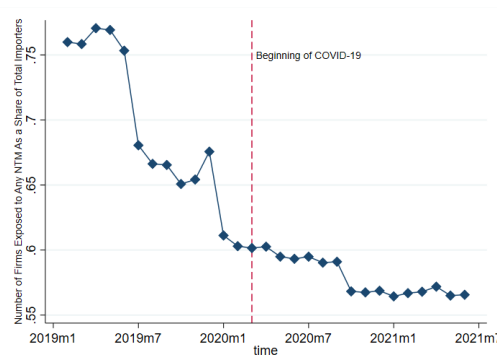
#### 3.3.1 Number of Firms Exposed to NTM

During the Covid-19 crisis, the number of firms facing NTMs significantly declined as seen below in Figure 10. Since the number of importers was generally falling during Covid-19, in order to understand whether firms facing NTMs as a share of total importers were falling, we also show in appendix A2 the corresponding figures normalized by the number of importing firms in a given year-month. We find a secular declining trend in the number of firms facing NTMs by both measures. This could be explained by the inability of firms that were facing NTMs to return to the market or stay in the market, hence leading to a declining number of such firms.

However, this measure includes all NTMs in the data. We focus on four measures that the World Bank identified for Indonesia as being less justified, unnecessarily trade restrictive and needing reform.<sup>2</sup> The identified NTMs are Pre-shipment inspections (PSI, MAST code C1), Import Approvals (MAST code B14), Compulsory compliance with SNI (MAST code B7), and Port Entry Restrictions (MAST code C3). The data shows that the share of firms exposed to these measures also dropped considerably (Figure 11a and b; Figure 12a and b).

Several reasons could account for this. First, it may be that firms facing NTMs exited from the markets; this is tested in the next section. Covid-19 may have rendered some procedures more challenging, for instance, physical audits in exporting country’s factories for product standard (SNI) or technical verification at the exporting port for pre-shipment inspections.

Figure 10: Average monthly number of firms exposed to at least one NTM before and after Covid-19 as a share of importers



This figure plots the monthly average firm-level number of firms exposed to any NTM before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March 2020.

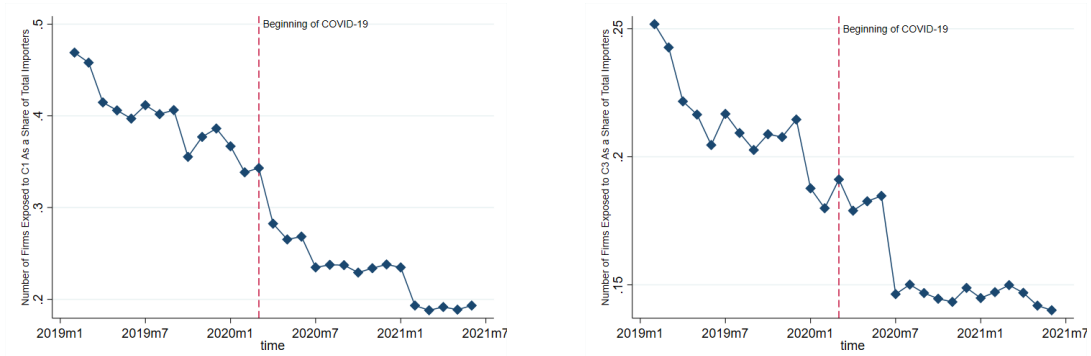
### 3.3.2 Export Trends of Firms Exposed to NTM

We next analyze how firms-level export prices and export outcomes (such as the number of monthly transactions, quantities, number of HS-6 products exported, and the number of destinations exported to) differ for firms facing NTMs compared to firms that do not face any NTMs. We use pre-period exposure ( Feb-Nov 2019) to define NTM and non-NTM exposed firms to address the concern that changes in NTMs during the Covid-19 crisis were focused on specific industries or firms with certain characteristics, and these firm or industry-level characteristics could also be correlated with firms’ export outcomes.

From Figure 13b, we see that the number of export transactions fell if the firm faced any port of entry restrictions compared to firms that do not face these NTMs. For all other export outcomes

<sup>2</sup>See Calì et al. (2022) for more details on how these were identified.

Figure 11: Firms exposed to PSI as a share of total importers (a) Firms exposed to PoE as a share of total importers (b)

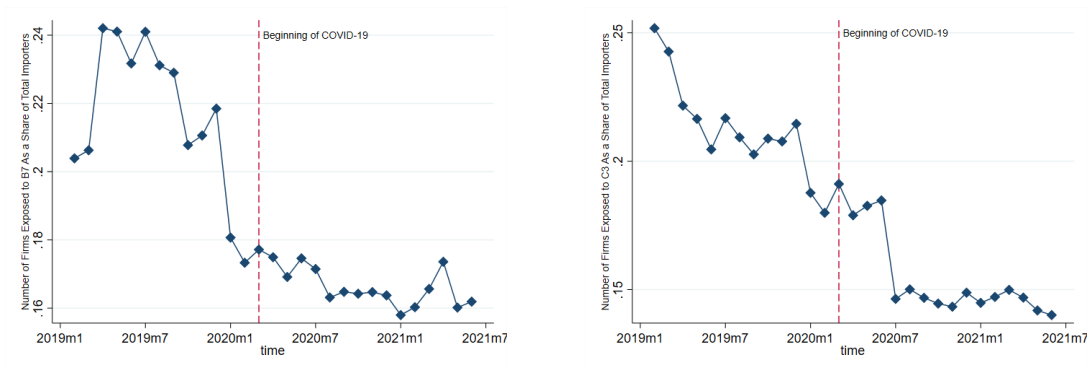


a. Pre-shipment Inspections

b. Port of Entry restrictions

Note: Normalized with respect to January 2020. The number of products is at 6-digit HS code. The beginning of Covid-19 is marked by a red dotted line at March 2020

Figure 12: Firms exposed to SNI as a share of total importers (a) Firms exposed to import approvals as a share of total importers (b)



a. SNI Certification

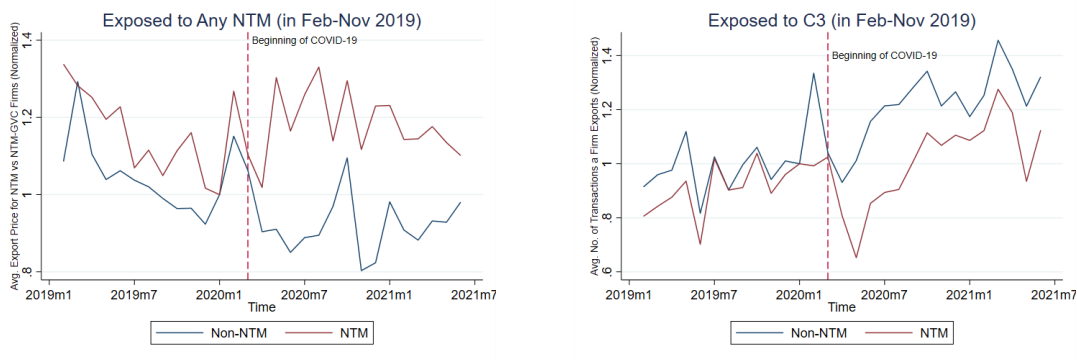
b. Import approvals

and NTMs, we do not find any noticeable differences. The results also do not change if we define NTM-exposed firms on the basis of intensity of exposure, that is, above and below median, during the pre-period.

Looking at Figures 13a, 14a, 14b, 15a, and 15b, it seems like average export prices charged by firms that face NTMs increased after the Covid-19 shock compared to firms that do not face any NTMs. This may signal that NTMs increased the prices of imports, and these were passed through and reflected in the export prices of GVC firms, which are more likely to use imported inputs. Figure 16 shows some suggestive evidence that import prices increased for firms facing any NTMs compared to firms not facing any NTMs, although we do not find that exposure to any specific type of NTM increased firm-level import prices. We will investigate this more formally in Section 4.3.

From Figures 17a and b and 18a and b, we see that firms facing any type of NTMs on average have lower survival rate compared to firms that do not face any NTMs. This is still the case when we focus on the four NTMs. This may explain the significant drop in the number of firms exposed to NTMs in the previous charts, i.e. that more of them exited the market. However, due to the shorter time span of the Panjiva data we are again unable to compare how the survival rates differed between firms facing any NTMs and firms not facing any NTMs before and after Covid-19.

Figure 13: Monthly export prices for firms facing any NTM (a) and export transactions for firms facing port of entry restrictions (b)

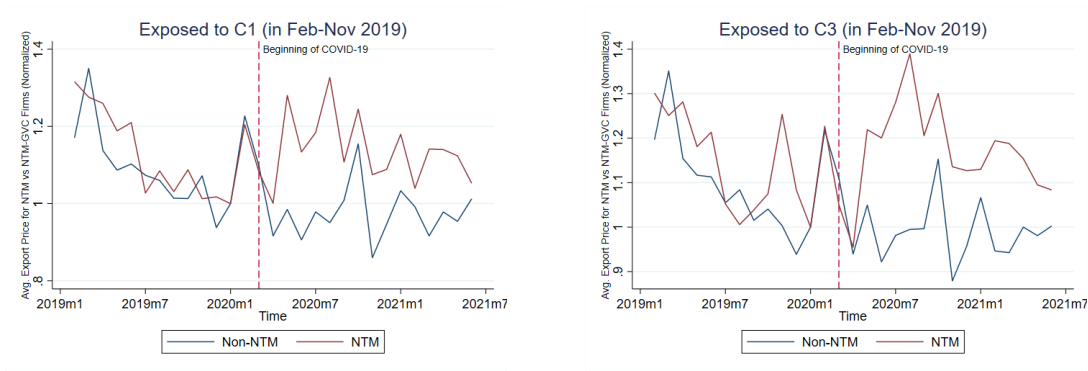


a. Export weighted prices

b. Firm-level export transactions

Note: NTM firms are firms that were exposed to the NTM during Feb-Nov 2019. Non-NTM firms are otherwise.

Figure 14: Average monthly firm-level export price (based on weight of products) of firms exposed to PSI (a) and port of entry restrictions (b) before and after Covid-19

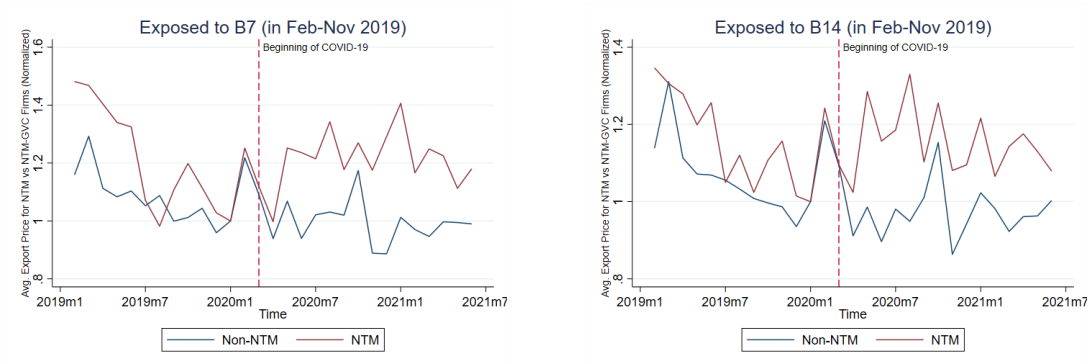


a. Pre-shipment Inspection

b. Port of Entry restrictions

This figure plots the monthly average price of firm-level exports normalized with respect to January 2020. The beginning of Covid-19 is marked by a red dotted line at March 2020. NTM firms are firms that were exposed to C1 during Feb-Nov 2019.

Figure 15: Average monthly firm-level export price (based on the weight of products) of firms exposed to Quality (a) and port of entry restrictions (b) before and after Covid-19



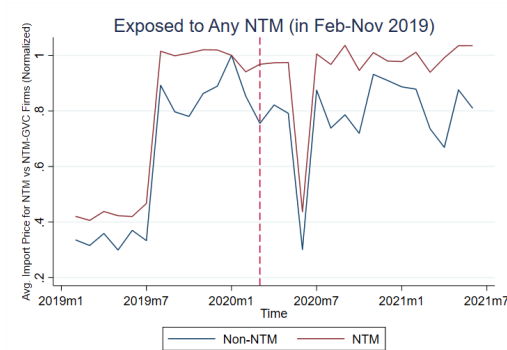
a. Product Quality Requirement (SNI, B7)

b. Import Approval (B14)

This figure plots the monthly average price of firm-level exports normalized with respect to January 2020. The beginning of Covid-19 is marked by a red dotted line at March 2020. NTM firms are firms that were exposed during Feb-Nov 2019.

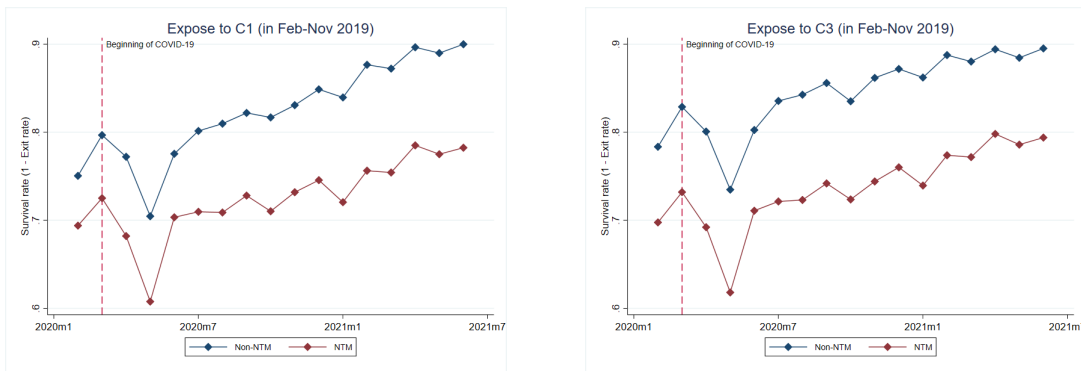


Figure 16: Average monthly firm-level import price (based on the weight of products) of firms exposed to any NTM before and after Covid-19



This figure plots the monthly average price of firm-level imports normalized with respect to January 2020 of firms exposed to any NTM before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March 2020. NTM firms are firms that were exposed to at least one NTM during Feb-Nov 2019. Non-NTM firms are those not exposed to any NTM.

Figure 17: Monthly firm survival rate of firms exposed to PSI (a) and PoE (b)

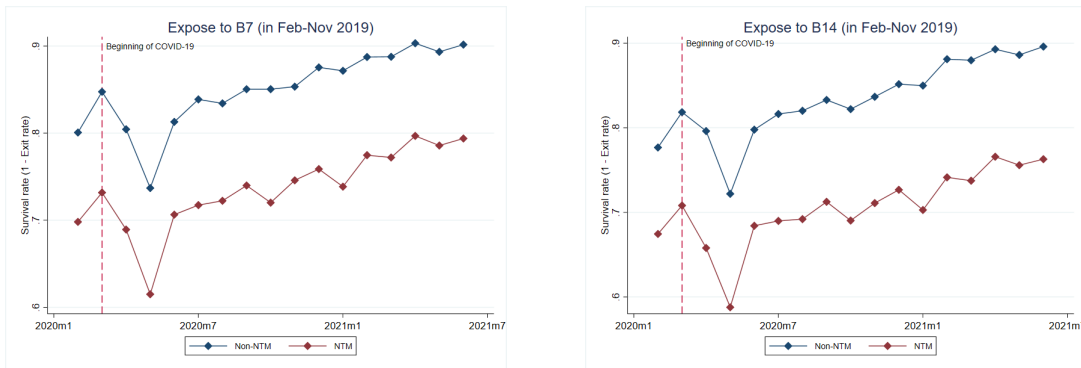


a. Pre-shipment Inspections

b. Port of Entry restrictions

Note: NTM firms are firms that were exposed to the NTM during Feb-Nov 2019. Non-NTM firms are otherwise.

Figure 18: Monthly firm survival of firms exposed to product quality (a) and import approvals (b)



a. SNI Certification

b. Import approvals

Note: NTM firms are firms that were exposed to the NTM during Feb-Nov 2019. Non-NTM firms are otherwise.

## 4 Regression Analysis and Results

In this section, by using event study and differences in difference designs, we empirically investigate how Covid-19 affected export outcomes for a) all importers and exporters, b) firms that participate in GVCs compared to firms that do not participate in GVCs and c) firms that face NTMs in the pre-period compared to firms that did not face NTMs in the pre-period.

### 4.1 All Importers and Exporters

We do the following event study to analyze the impact of the Covid-19 shock on firm-level imports and exports. We also investigate whether the effects differ depending on whether firms participate in GVCs or not, that is, run equation 1 separately for GVC versus non-GVC firms in section 4.2.

$$Y_{it,pc} = \alpha_i + \alpha_p + \alpha_c + \sum_{t=-12}^{t=19} \beta_t + \epsilon_{it,pc} \quad (1)$$

$Y_{it,pc}$ : outcome variable for firm  $i$  selling HS-8 product  $p$  to country  $c$  at year-month  $t$ . We use the inverse hyperbolic sign transformation of the dependent variable so that zero observations are not dropped out. We control for firm, HS-8 product, and partner country fixed effects. Standard errors are clustered at the 8-digit product level. The period of our analysis is February 2019-June 2021 and the frequency is monthly. The time period in our analysis is limited by the availability of high-frequency firm-level data from Panjiva. The omitted month is March 2020, when the WHO characterized Covid-19 as a pandemic. We plot the  $\beta_t$  coefficients associated with the outcome variables for each month.

**Fact 1: Exports were more resilient to the Covid-19 shock than imports (Figures 19, 20, 21).**

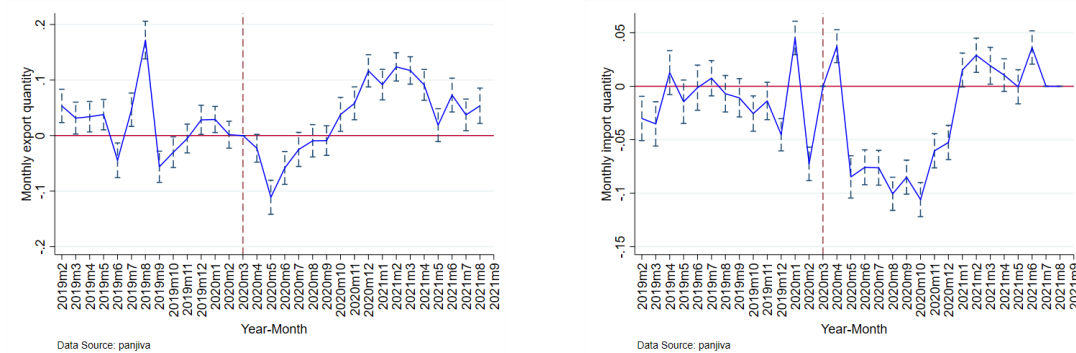
This is both on the intensive margin (export volumes [Figure 19](#)) and extensive margin (export transactions [Figure 20](#) as well as the number of products exported [Figure 21](#)). Even though we observe a decline in imports and exports in our results, the drop in imports for all three measures ([Figures 19b, 20b, 21b](#)) is more significant - both in terms of magnitude and duration - than for exports ([Figures 19a, 20a, 21a](#)).

Our findings are corroborated by [Arenas et al. \(2022\)](#), who compare the effects of domestic and external lockdowns on trade in the Philippines and also come to the conclusion that overall imports were more affected by the crisis than exports. When differentiating between the different lockdowns, the authors find that domestic lockdowns did not affect international trade, while external lockdowns affected imports and exports negatively. [Arenas et al. \(2022\)](#) also conclude that this decline was largely due to a drop in the number of products. This, in turn, aligns with the results we obtained, as illustrated by [Figure 21](#), which shows a large drop in quantity around May

2020. [Majune \(2020\)](#) also finds a larger drop in imports compared to exports when estimating a difference-in-difference as well as an event study design. Their analysis focuses on Kenya and uses weekly product-by-country data.

By contrast, [de Lucio et al. \(2022\)](#) found that exports experienced a larger drop due to containment measures relative to imports. They conclude that the reduction in trade must therefore stem from a demand-side crisis rather than from the supply side. This difference with our findings may be because the authors focus on Spain, a country that is very different from Indonesia. Therefore the impact of the pandemic might have affected the countries differently. Second, the scope of the study is more limited since they only focus on containment measures and study a much shorter time interval (only up to July 2020).

Figure 19: Monthly export and import quantities: Results from event study specification 1

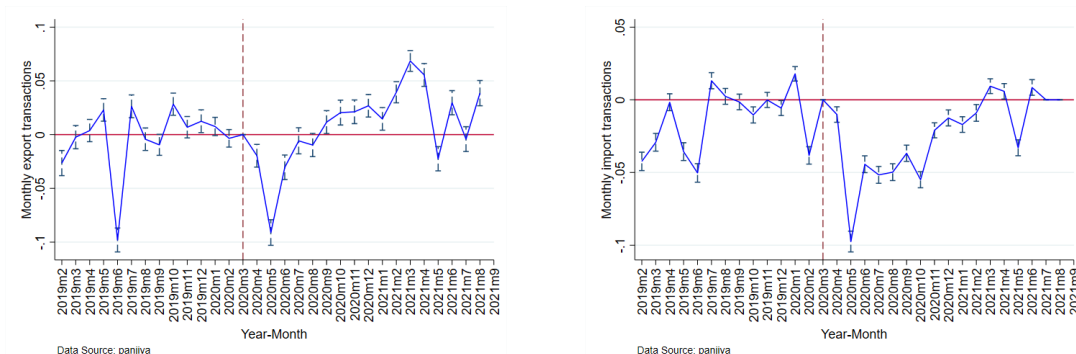


a. Monthly export quantities

b. Monthly import quantities

The graph reports the results from the event study specification in 1, where panel (a) and panel (b) report the results for firm-level monthly quantities of export and import respectively.

Figure 20: Monthly export and import transactions: Results from event study specification 1

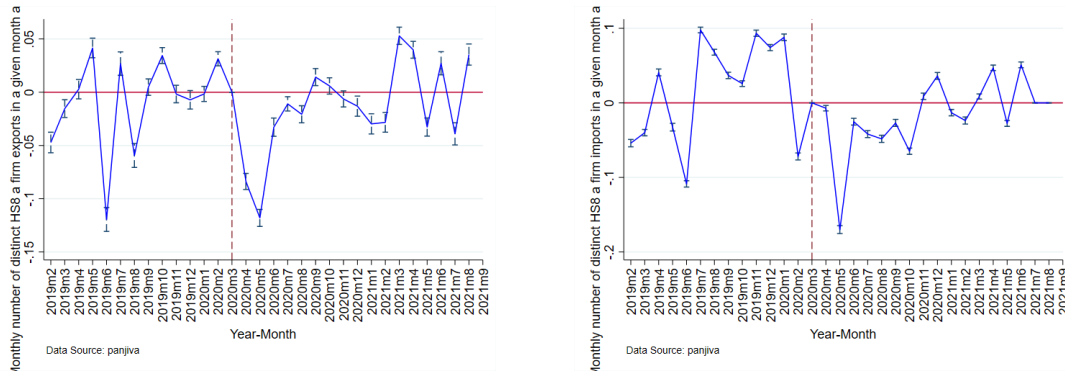


a. No. of export transactions

b. No. of import transactions

The graph reports the results from the event study specification in 1, where panel (a) and panel (b) report the results for firm-level monthly number of export and import transactions, respectively.

Figure 21: Monthly distinct no. of HS-8 products exported and imported : Results from event study specification 1



a. No. of distinct HS-8 products exported

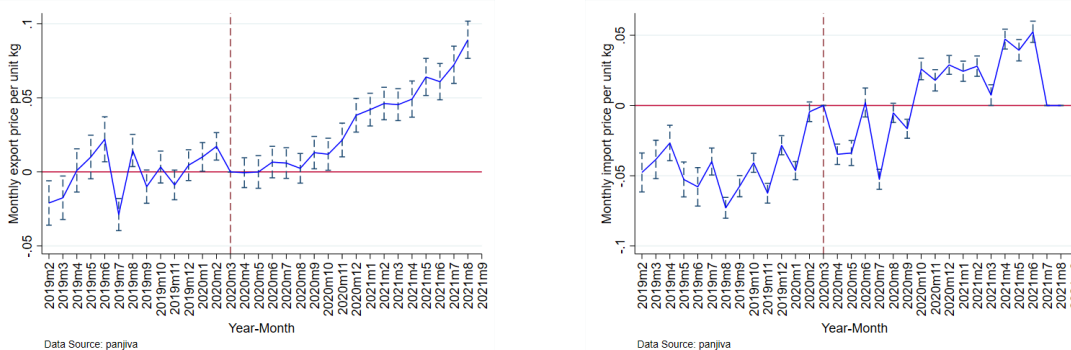
b. No. of distinct HS-8 products imported

The graph reports the results from the event study specification in 1, where panel (a) and panel (b) report the results for monthly number of distinct HS-8 products exported and imported.

**Fact 2: The unit prices of both firm-level imports and exports show a steady increase following Covid-19 (Figure 22).**

While both import and export prices increased, export prices showed a steadier and more continuous increase while import prices were much more volatile.

Figure 22: Monthly average price per unit (kg.) of exports and imports: Results from event study specification 1



a. Monthly firm-level average export price per unit

b. Monthly firm-level average import price per unit

The graph reports the results from the event study specification in 1, where panel (a) and panel (b) report the results for monthly firm-level average prices of exports and imports.

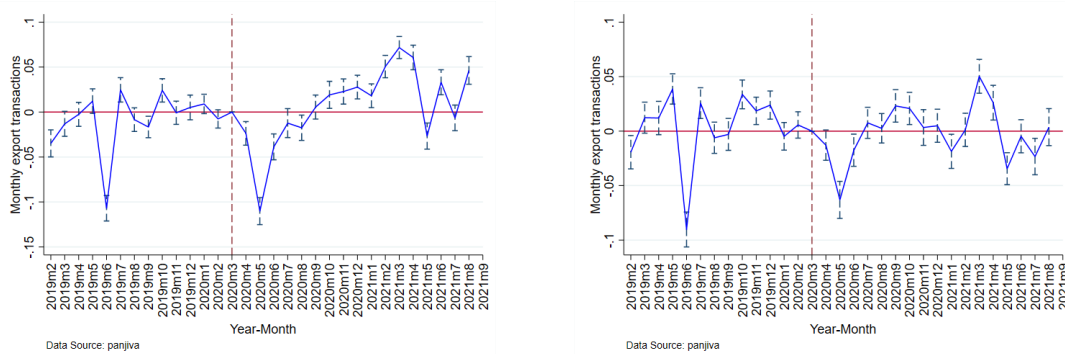
## 4.2 GVC versus Non-GVC Firms

**Fact 3: GVC firm exports were more resilient than non-GVC firms beyond the immediate short-run (see Figures 23, 24, and 25).**

Although GVC firm exports appeared to suffer more in the immediate short-term, we found that GVC firms not only recovered quicker than non-GVC firms but also experienced higher subsequent

growth rates. Our results thus support the findings of other scholars, who also found that despite experiencing a more severe initial impact (Lafrogne-Joussier et al., 2022; Bas et al., 2022; Meier et al., 2020), globally engaged/international firms ultimately seemed to demonstrate a higher level of resilience in the aftermath of the Covid-19 shock (Constantinescu et al., 2022; Borino et al., 2021; de Lucio et al., 2022; Hyun et al., 2020). Eppinger et al. (2021) concluded that decoupling from GVCs would negatively affect welfare, even though it limits the exposure to foreign supply shocks. As such, participating in GVCs seems to make firms more resilient.

Figure 23: Monthly export transactions: Results from event study for GVC and non-GVC firms

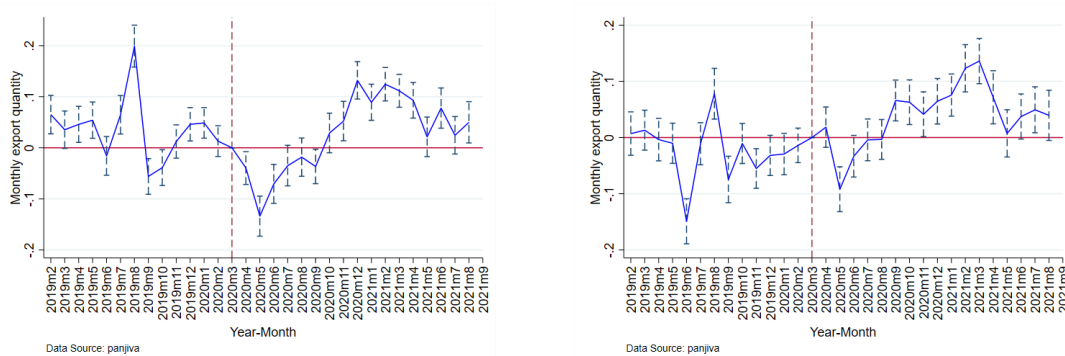


a. GVC firms

b. Non-GVC firms

The graph reports the results from the event study specification in 1, where panel (a) and panel (b) report the results for the monthly number of export transactions for GVC and non-GVC firms, respectively.

Figure 24: Monthly export quantities: Results from event study specification for GVC and non-GVC firms

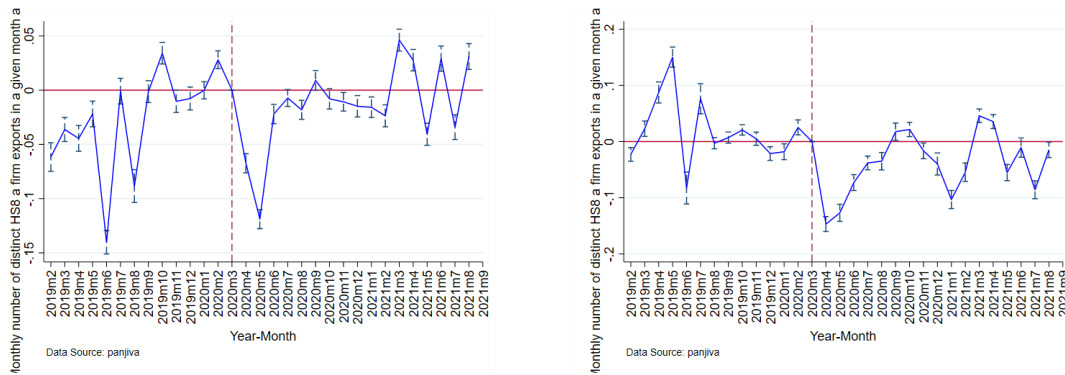


a. GVC firms

b. Non-GVC firms

The graph reports the results from the event study specification in 1, where panel (a) and panel (b) report the results for monthly export quantities for GVC and non-GVC firms, respectively.

Figure 25: Monthly distinct no. of HS-8 products exported: Results from event study specification for GVC and non-GVC firms



a. GVC firms

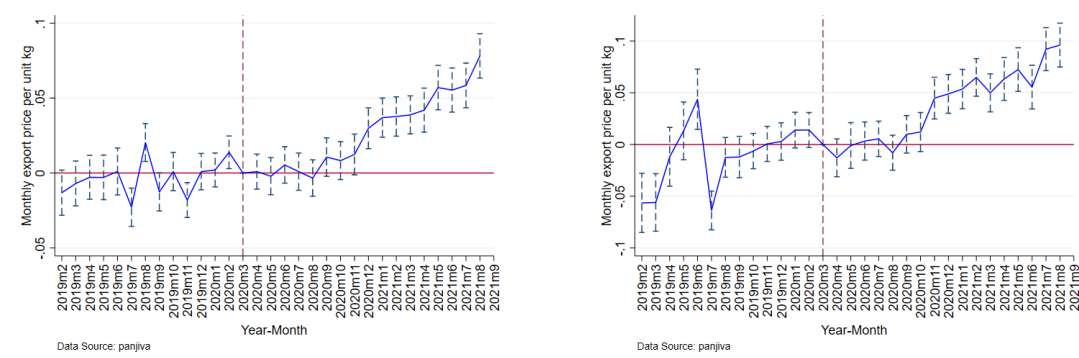
b. Non-GVC firms

The graph reports the results from the event study specification in 1, where panel (a) and panel (b) report the results for monthly number of distinct HS-8 products exported for GVC and non-GVC firms, respectively.

**Fact 4: The unit prices of exports increased for both GVC and non-GVC firms following the Covid-19 shock (see Figure 26).**

This is different from the findings of Meier et al. (2020), who found that sectors with increased exposure to Chinese intermediate goods showed higher relative input and output prices, thereby implying that we should observe a higher price increase for GVC firms. Focusing on the first three months after the start of the pandemic we do find a higher unit price of exports of GVC firms relative to non-GVC firms (Figure 26). However, this difference is marginal and does not persist in the longer run. There are multiple reasons that could explain the differences in results. First, contrary to our study, which analyzes the entire trading sector, Meier et al. (2020) only focus on the effect of intermediate goods imports from China. Second, Meier et al. (2020) analyze a much shorter time frame than our study (until January 2021 compared to our data that spans until June 2021). Nevertheless, it is worth noticing that both studies agree that any resulting price difference does not persist for long. Finally, it is important to note that although Meier et al. (2020)’s conclusion largely holds for import prices, their results regarding the difference between producer prices of exposed versus non-exposed firms are less statistically significant, which in turn aligns with our analysis of export prices.

Figure 26: Monthly average export price per unit kg: Results from event study specification for GVC and non-GVC firms



a. GVC firms

b. Non-GVC firms

The graph reports the results from the event study specification in 1, where panel (a) and panel (b) report the results for monthly average export price per unit kg. of for GVC and non-GVC firms respectively.

### 4.3 NTM Exposed versus Non-NTM Exposed Firms

In this section, we analyze the export outcomes of firms that were exposed to any NTMs in the pre-period compared to firms that were not. We use pre-period exposure to define treatment to address the concern that the reduction in NTMs during the Covid crisis was focused on specific industries or firms with certain characteristics, and these firm or industry-level characteristics could also be correlated with firms' export outcomes.

$$Y_{it,pc} = \alpha_i + \alpha_p + \alpha_c + \alpha_t + \sum_{t=-12}^{t=19} \beta_t * treat + \epsilon_{it,pc} \quad (2)$$

$Y_{it,pc}$ : outcome variable for firm  $i$  selling HS-8 product  $p$  to country  $c$  at year-month  $t$ . We use the inverse hyperbolic sign transformation of the dependent variable so that zero observations are not dropped out.

$treat = 1$  whenever the firm was exposed to any NTM in the pre-period (defined pre-Covid, from February to November 2019) and 0 otherwise. We repeat this regression for five different sets:

1. If the firm is exposed to any NTM
2. If the firm is exposed to C1 Pre-shipment inspections
3. If the firm is exposed to C3 Port Entry Restrictions
4. If the firm is exposed to B7 Compulsory compliance with SNI
5. If the firm is exposed to B14 Import Approvals

$\beta_t$  thus denotes the dynamic treatment effect of firms exposed to certain NTMs compared to firms that are not exposed on the outcome  $Y_{it,pc}$  in year-month  $t$  compared to the baseline month March 2020.

We control for firm, HS-8 product, year-month, and partner country fixed effects. Standard errors are clustered at the 8-digit product level. The period of our analysis is February 2019-June 2021 and the frequency is monthly. The time period in our analysis is limited by the availability of high-frequency firm-level data from Panjiva. The omitted month is March 2020, when the WHO characterized Covid-19 as a pandemic. We plot the  $\beta_t$  coefficients associated with the outcome variables for each month.

**Fact 5: Firms subject to Port of entry restrictions (C3) saw a large fall in their export quantities and transactions following Covid-19 compared to those that did not face any restrictions (Figures 27a and b).**

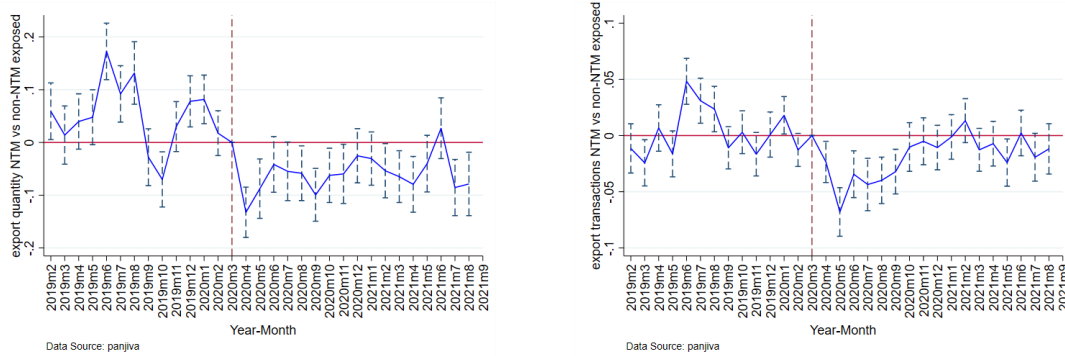
This is consistent with the evidence of major port congestion during Covid-19, as the pandemic led to disruptions in maritime trade due to port terminal closures and transportation delays (UNCTAD, 2022).

We show that the results hold even if we change the definition of treated firms and define the treated firms as firms that face above the median level of port of entry restrictions (Figures A25 and A26 in appendix A2).

We do not find any systematic evidence that other NTMs negatively affected firms' ability to export during the pandemic. The disproportionately large effects of the port of entry restrictions NTM is therefore likely related to port congestion. These results are consistent with those of Majune and Montfaucon (2023), who find that imports subject to port of entry restrictions and pre-shipment inspections were more negatively affected by Covid-19-related lockdown measures by trading partners.



Figure 27: Monthly average export quantities (a) and number of transactions (b) of firms exposed to port of entry restrictions before and after Covid-19



a. Quantities

b. Transactions

The graph reports the results from the event study specification in 2 where the dependent variable is the monthly average export quantities (a) and monthly average export transactions (b). NTM firms are firms that were exposed to C3 during Feb-Nov 2019. Non-NTM firms are otherwise.

We find some evidence of firms exposed to NTMs facing higher import prices compared to firms exposed to no NTMs, although the evidence is noisy. We do not find any systematic evidence on export prices (see Figures in appendix A2, from Figure A27 to Figure A38).

## 5 Conclusion

Using novel high-frequency transaction-level trade data from February 2019 to June 2021, we studied the effect that Covid-19 had on trade in Indonesia. More specifically, the paper analyzes the effect on firms, by differentiating between GVC firms and non-GVC firms as well as firms that are subjected to NTMs versus firms that are not.

The study adds to the highly relevant literature on GVCs as well as to the effect that Covid-19 had on international trade. Globally engaged firms are more subjected to international shocks, but studies have reached different conclusions on whether this is beneficial for the economy in the long run.

The results show five facts: First, exports were more resilient to the Covid-19 crisis than imports. Second, unit prices increased for exports and imports following the pandemic. Third, firms that are part of a GVC were more resilient in the longer run. Fourth, unit prices increased for both GVC and non-GVC firms, and fifth, NTMs like the port of entry restrictions led to a fall in firms' export quantities and transactions.

These results are highly important for Indonesia since its position in GVCs is limited, and its trade contributes relatively little to the growth path. On the other hand, trade has the potential to accelerate Indonesia's growth.

The results imply that since GVC firms recovered much better from a crisis, being globally integrated may be beneficial for firms and the economy in the longer run. Policies to foster a business environment that enables firms to be more globally engaged through GVCs could be key, including tackling non-tariff measures such as the port of entry restrictions would ensure fast and efficient port and customs procedures since value chains require goods to cross borders many times. This is especially true during periods of high port congestion, as was the case during Covid-19.

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# Appendix

## A1 Data cleaning and aggregation

The original data does not contain cleaned firm IDs but contains firm names, which can have errors due to manual entry. For example, the original Panjiva dataset recorded Gajah Tunggal Tbk PT and Gajan Tunggal as different firms and assigned different IDs. We converted these firms to a single identical name and assigned a unique ID. In order to match firm names, we used a number of data analytics tools to calculate similarity scores. Finally, we manually checked if a firm has a unique name and ID.

We also wanted to make sure that firm IDs were consistent through time. The check was done by ranking the firms by their total exports or total imports per year and observing if these rankings remain consistent over time.

To ensure data quality and completeness, we checked if there were no randomly missing months in the dataset and checked if observations and total imports and exports for each month-year were reasonable before starting the dataset cleaning. Then, we checked if all variables contain reasonable values. For example, we checked if the date variable contained the date format for all observations. For missing import and export values, we checked if there was a different variable that records the value in another currency and if there was a variable with the exchange rate between the domestic currency and USD. If so, we replaced the missing values with this conversion. We finally dropped all the missing values for imports and exports.

Before calculating the unit price, we ensured that the quantity unit is constant across different observations for a given firm-month-year-HS-8-partner country. In other words, we wanted to make sure that the same company in the same month used the same unit of quantity to measure the same product sold to all foreign firms in a particular country.

We checked and dropped duplicates in the dataset.

We cleaned the partner country by extracting country data from the full address if the partner country variable is missing. If Indonesia appeared as a partner country, we would set the partner country as missing.

The original Panjiva dataset provides the import and export data at an 8-digit HS code. We checked if all HS codes have 8 digits. We dropped observations with missing or invalid codes.

## A2 Figures and Tables

### A2.1 Descriptives

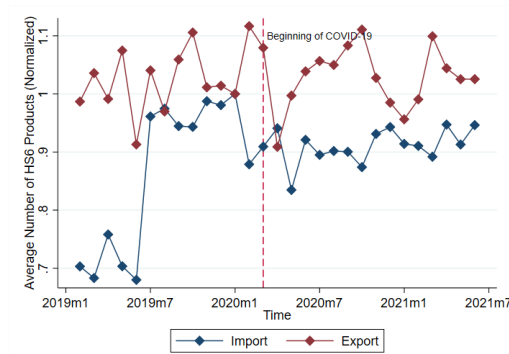
Table A1: Summary of the Indonesian Firm-Level data

	Export dataset	Import dataset
Time period covered	February 2019-2021 (June)	
# Variables in cleaned dataset	74	73
# Unique domestic firm names before cleaning	20,869	43,080
# Unique foreign firm names before cleaning	232,835	286,339
# Unique foreign countries	206	195
# Unique domestic firm names after cleaning	20,591	42,651
# Unique foreign firm names after cleaning	214,830	260,352
# Rows domestic firm names changed	1,568,409 (7.26%)	2,892,470 (5.88%)
# Rows foreign firm names changed	5,848,908 (27.08%)	11,902,709 (24.2%)
# Unique our_domestic_id**	20,591	42,652
# Unique our_foreign_id	226,265	312,674

\* Dropped due to missingness > 90%

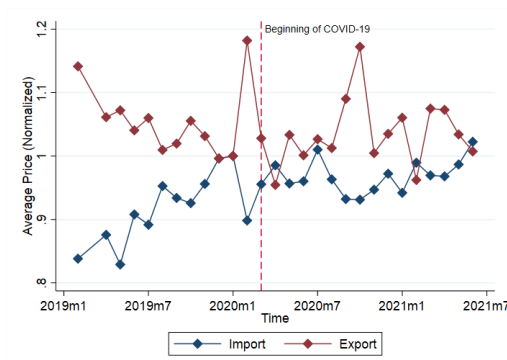
\*\* Unique firm identification is assigned by a unique firm name-country

Figure A1: Average monthly number of products of exporting and importing firms before and after Covid-19



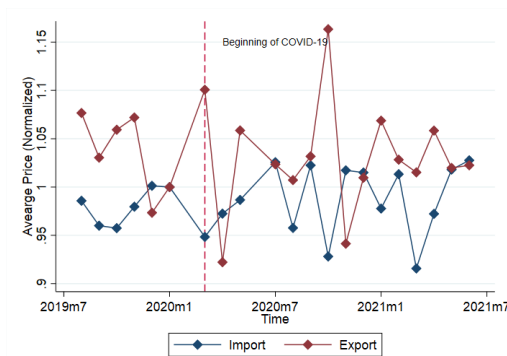
This figure plots the average monthly number of products a firm exports or imports to normalized with respect to January 2020. The beginning of Covid-19 is marked by a red dotted line at March 2020. s

Figure A2: Average monthly firm-level import and export price per unit before and after Covid-19



This figure plots the average price of firm-level exports and imports normalized with respect to January 2020. The beginning of Covid-19 is marked by a red dotted line at March 2020.

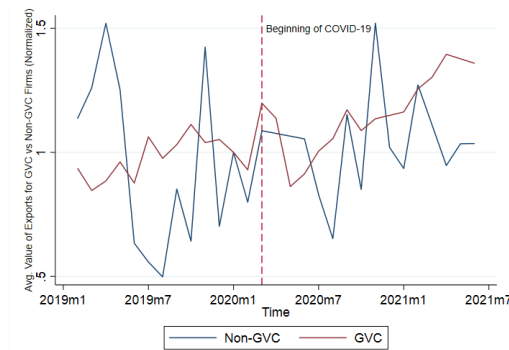
Figure A3: Average monthly firm-level import and export price (based on weights of products) before and after Covid-19



This figure plots the average price of firm-level exports and imports normalized with respect to January 2020. The beginning of Covid-19 is marked by a red dotted line at March 2020. The only difference from the previous plot is that we use the weighted price based on the weights of the products in the firm's export basket.

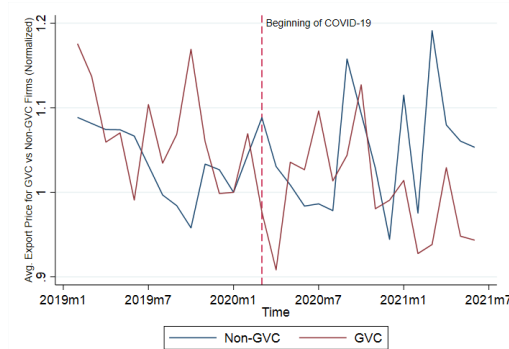


Figure A4: Average monthly firm-level export before and after Covid-19 of GVC and Non-GVC firms



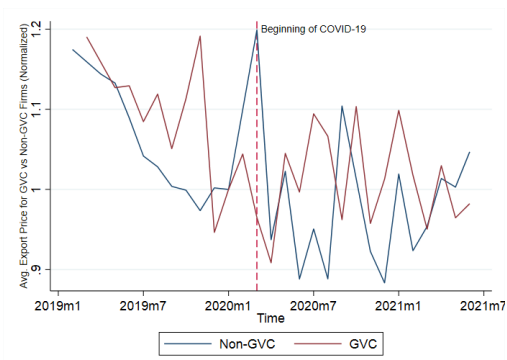
This figure plots the average value of firm-level exports of GVC and Non-GVC firms normalized with respect to January 2020. The beginning of Covid-19 is marked by a red dotted line at March 2020.

Figure A5: Average monthly firm-level export price before and after Covid-19 of GVC and Non-GVC firms



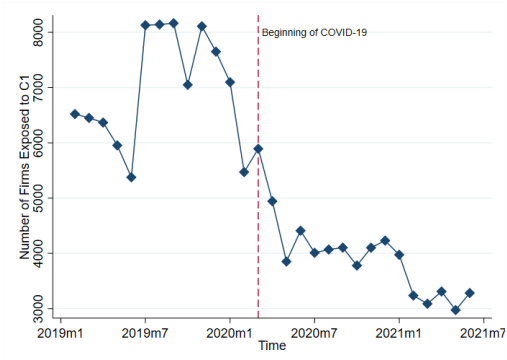
This figure plots the weighted average price of firm-level exports of GVC and Non-GVC firms normalized with respect to January 2020. The beginning of Covid-19 is marked by a red dotted line at March, 2020. The methodology for the weighted price is explained in Figure A2. Note that GVC firms are defined as firms that import and export in the same month. This is quite restrictive in the sense that usually, GVC firms are defined as firms that import and export in the same year, but we have nevertheless used this definition for the purpose of this graph because of the shorter duration of the Panjiva data, as well as the nature of the Covid shock that induces a lot of monthly variations

Figure A6: Average monthly firm-level export price (based on weights of products) before and after Covid-19 of GVC and Non-GVC firms



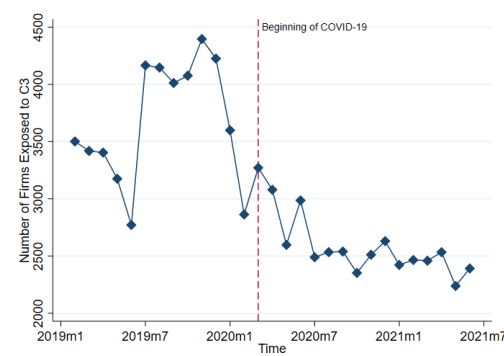
This figure plots the weighted average price based on weights of products of firm-level exports of GVC and Non-GVC firms normalized with respect to January 2020. The beginning of Covid-19 is marked by a red dotted line at March, 2020. The methodology for the weighted is explained in Figure A2.

Figure A7: Average monthly number of firms exposed to C1 before and after Covid-19



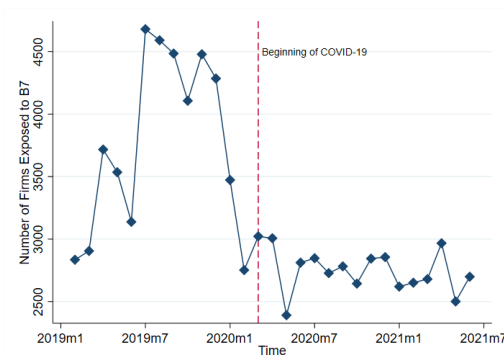
This figure plots the monthly average of number of firms exposed to C1 before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March 2020.

Figure A8: Average monthly number of firms exposed to C3 before and after Covid-19



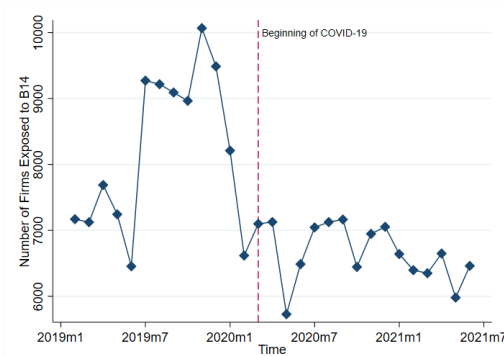
This figure plots the monthly average of number of firms exposed to C3 before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020.

Figure A9: Average number of firms exposed to B7 before and after Covid-19



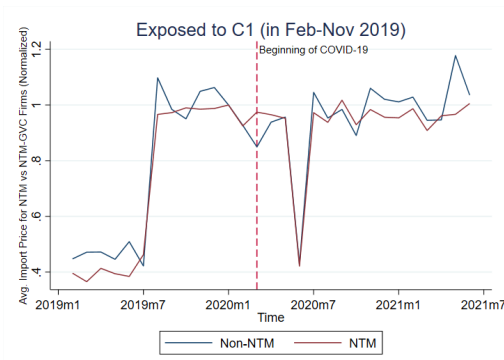
This figure plots the monthly average of number of firms exposed to B7 before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020.

Figure A10: Average number of firms exposed to B14 before and after Covid-19



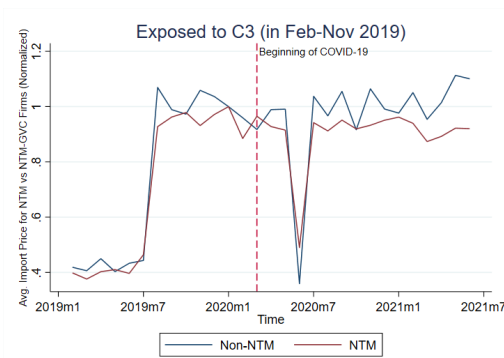
This figure plots the monthly average of number of firms exposed to B14 before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020.

Figure A11: Average monthly firm-level import price (based on weight of products) of firms exposed to C1 before and after Covid-19



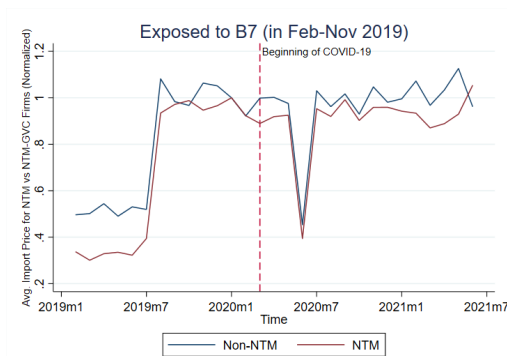
This figure plots the monthly average price of firm-level imports normalized with respect to January 2020 of firms exposed to C1 before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020. NTM firms are firms that were exposed to C1 during Feb-Nov 2019. Non-NTM firms are those not exposed to C1.

Figure A12: Average monthly firm-level import price (based on weight of products) of firms exposed to C3 before and after Covid-19



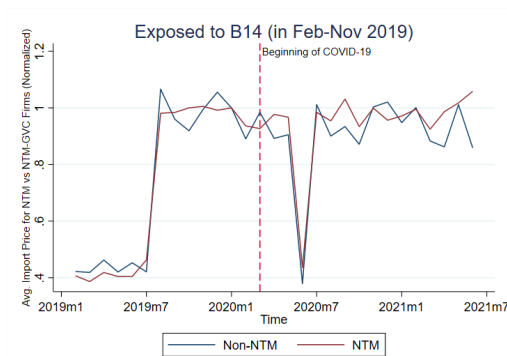
This figure plots the monthly average price of firm-level imports normalized with respect to January 2020 of firms exposed to C3 before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020. NTM firms are firms that were exposed to C3 during Feb-Nov 2019. Non-NTM firms are those not exposed to C3.

Figure A13: Average monthly firm-level import price (based on weight of products) of firms exposed to B7 before and after Covid-19



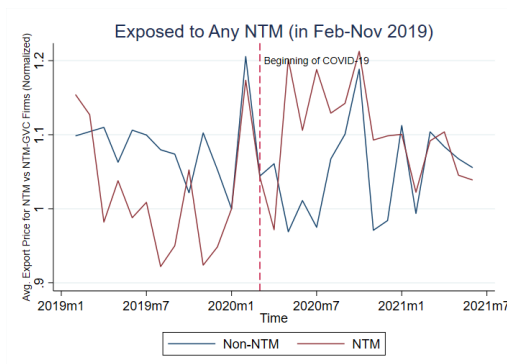
This figure plots the monthly average price of firm-level imports normalized with respect to January 2020 of firms exposed to B7 before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020. NTM firms are firms that were exposed to B7 during Feb-Nov 2019. Non-NTM firms are those not exposed to B7.

Figure A14: Average monthly firm-level import price (based on weight of products) of firms exposed to B14 before and after Covid-19



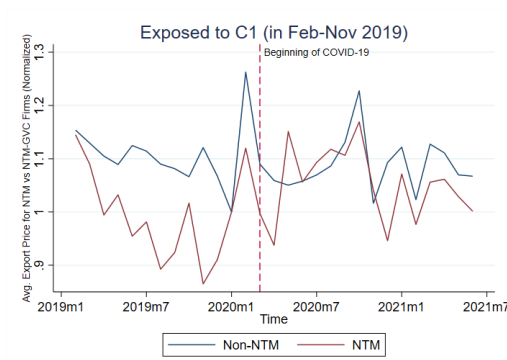
This figure plots the monthly average price of firm-level imports normalized with respect to January 2020 of firms exposed to B14 before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020. NTM firms are firms that were exposed to B14 during Feb-Nov 2019. Non-NTM firms are those not exposed to B14.

Figure A15: Average monthly firm-level export price of firms exposed to any NTM before and after Covid-19



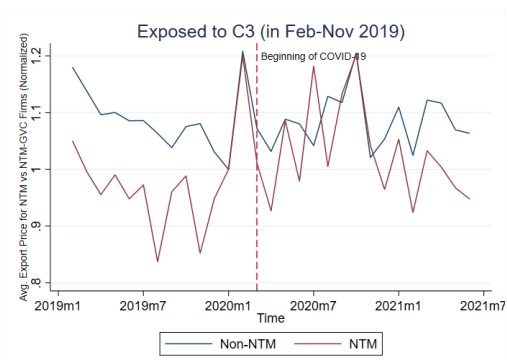
This figure plots the monthly average price of firm-level exports normalized with respect to January 2020 of firms exposed to any NTM before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020. NTM firms are firms that were exposed to any NTM during Feb-Nov 2019. Non-NTM firms are otherwise

Figure A16: Average monthly firm-level export price of firms exposed to C1 before and after Covid-19



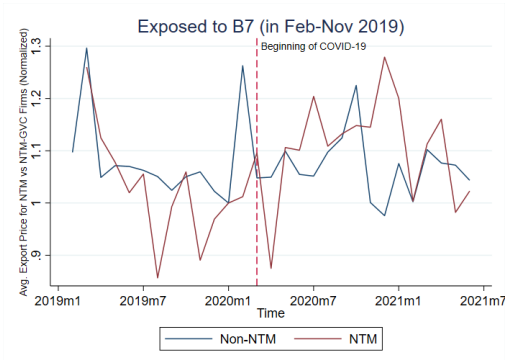
This figure plots the monthly average price of firm-level exports normalized with respect to January 2020 of firms exposed to C1 before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020. NTM firms are firms that were exposed to C1 during Feb-Nov 2019. Non-NTM firms are otherwise

Figure A17: Average monthly firm-level export price of firms exposed to C3 before and after Covid-19



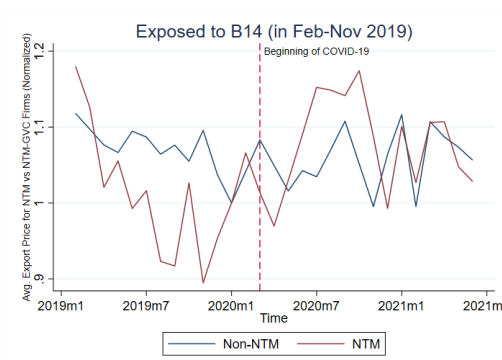
This figure plots the monthly average price of firm-level exports normalized with respect to January 2020 of firms exposed to C3 before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020. NTM firms are firms that were exposed to C3 during Feb-Nov 2019. Non-NTM firms are otherwise

Figure A18: Average monthly firm-level export price of firms exposed to B7 before and after Covid-19



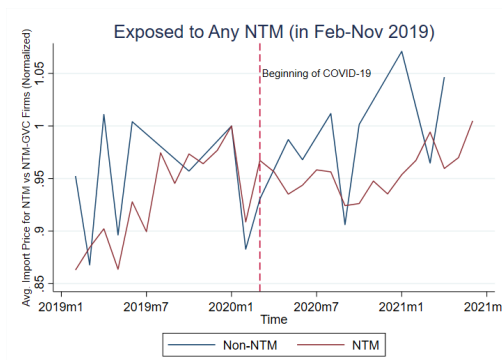
This figure plots the monthly average price of firm-level exports normalized with respect to January 2020 of firms exposed to B7 before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020. NTM firms are firms that were exposed to B7 during Feb-Nov 2019. Non-NTM firms are otherwise

Figure A19: Average monthly firm-level export price of firms exposed to B14 before and after Covid-19



This figure plots the monthly average price of firm-level exports normalized with respect to January 2020 of firms exposed to B14 before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020. NTM firms are firms that were exposed to B14 during Feb-Nov 2019. Non-NTM firms are otherwise

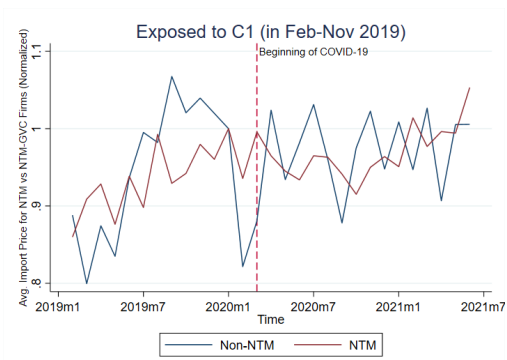
Figure A20: Average monthly firm-level import price of firms exposed to any NTM before and after Covid-19



This figure plots the monthly average price of firm-level imports normalized with respect to January 2020 of firms exposed to any NTM before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020. NTM firms are firms that were exposed to any NTM during Feb-Nov 2019. Non-NTM firms are otherwise

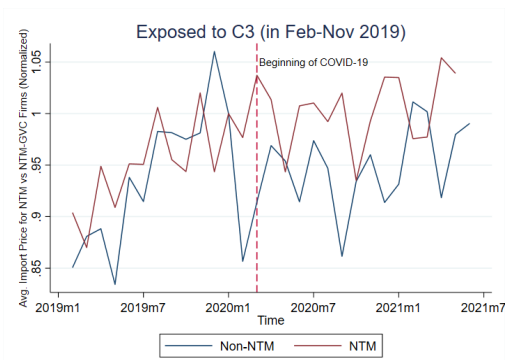


Figure A21: Average monthly firm-level import price of firms exposed to C1 before and after Covid-19



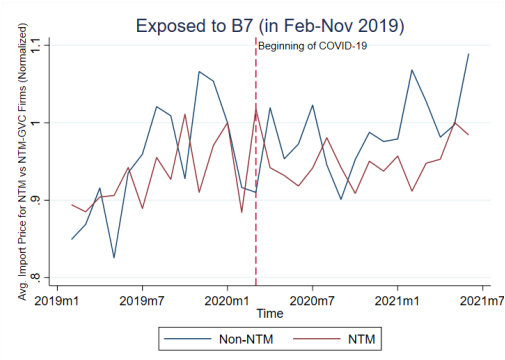
This figure plots the monthly average price of firm-level imports normalized with respect to January 2020 of firms exposed to C1 before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020. NTM firms are firms that were exposed to C1 during Feb-Nov 2019. Non-NTM firms are otherwise

Figure A22: Average monthly firm-level import price of firms exposed to C3 before and after Covid-19



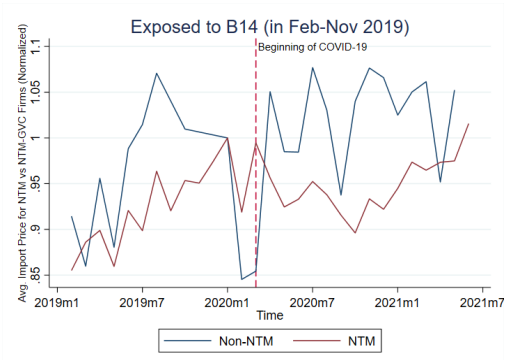
This figure plots the monthly average price of firm-level imports normalized with respect to January 2020 of firms exposed to C3 before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020. NTM firms are firms that were exposed to C3 during Feb-Nov 2019. Non-NTM firms are otherwise

Figure A23: Average monthly firm-level import price of firms exposed to B7 before and after Covid-19



This figure plots the monthly average price of firm-level imports normalized with respect to January 2020 of firms exposed to B7 before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020. NTM firms are firms that were exposed to B7 during Feb-Nov 2019. Non-NTM firms are otherwise

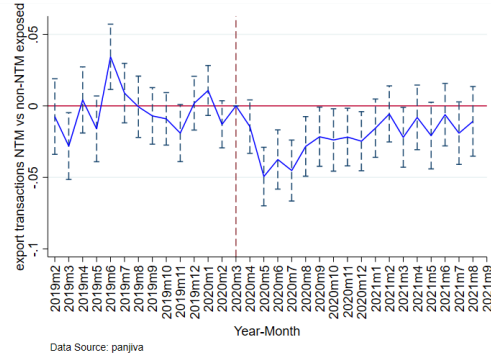
Figure A24: Average monthly firm-level import price of firms exposed to B14 before and after Covid-19



This figure plots the monthly average price of firm-level imports normalized with respect to January 2020 of firms exposed to B14 before and after Covid-19. The beginning of Covid-19 is marked by a red dotted line at March, 2020. NTM firms are firms that were exposed to B14 during Feb-Nov 2019. Non-NTM firms are otherwise

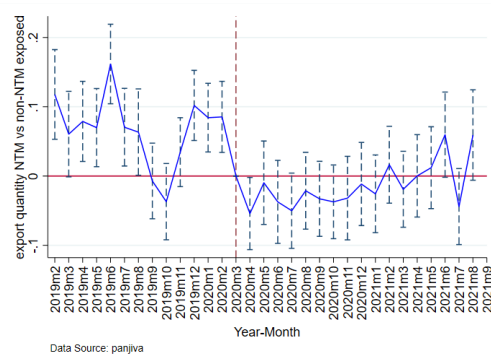
### A3 Regression Results

Figure A25: Monthly average export transactions of firms exposed to port of entry restrictions before and after Covid-19



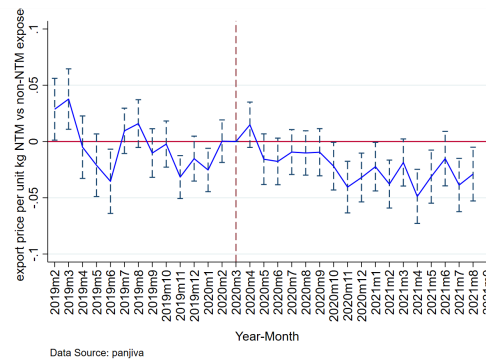
The graph reports the results from the event study specification in 2 where the dependent variable is the monthly average export transactions. NTM firms are now defined on the basis of intensive margin: that is firms that were exposed to above median amount of C3 during Feb-Nov 2019.

Figure A26: Monthly average export quantities of firms exposed to port of entry restrictions before and after Covid-19



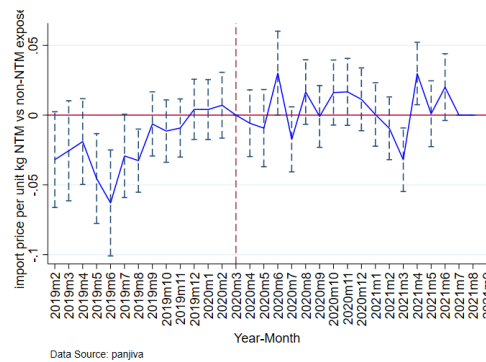
The graph reports the results from the event study specification in 2 where the dependent variable is the monthly average export quantities. NTM firms are now defined on the basis of intensive margin: that is firms that were exposed to above median amount of C3 during Feb-Nov 2019.

Figure A27: Monthly average export prices of firms exposed to B14 before and after Covid-19



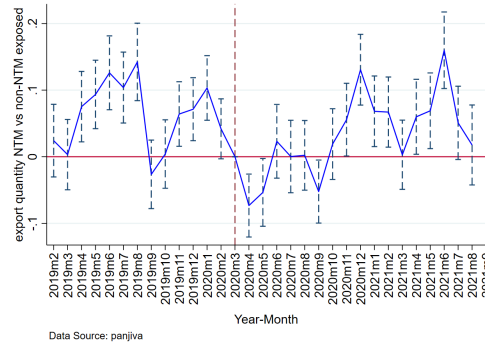
The graph reports the results from the event study specification in 2 where the dependent variable is the monthly average export price per unit kg. NTM firms are those that were exposed to any B14 during Feb-Nov 2019.

Figure A28: Monthly average import prices of firms exposed to B14 before and after Covid-19



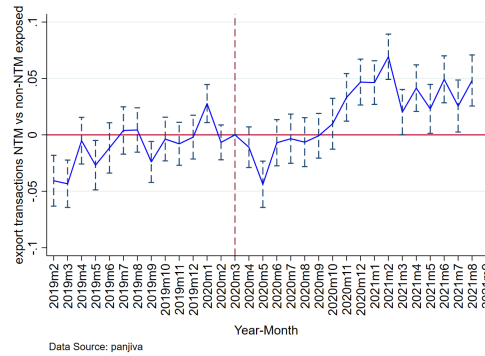
The graph reports the results from the event study specification in 2 where the dependent variable is the monthly average import price per unit kg. NTM firms are those that were exposed to any B14 during Feb-Nov 2019.

Figure A29: Monthly average export quantities of firms exposed to B7 before and after Covid-19



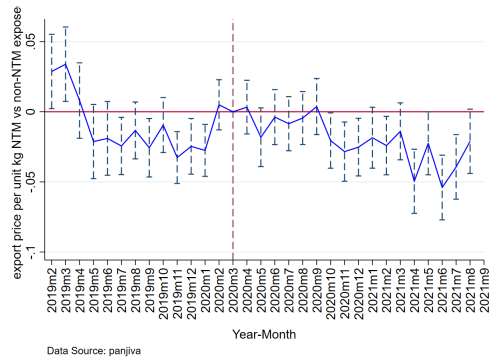
The graph reports the results from the event study specification in 2 where the dependent variable is the monthly average export quantities. NTM firms are those that were exposed to any B7 during Feb-Nov 2019.

Figure A30: Monthly average export transactions of firms exposed to B7 before and after Covid-19



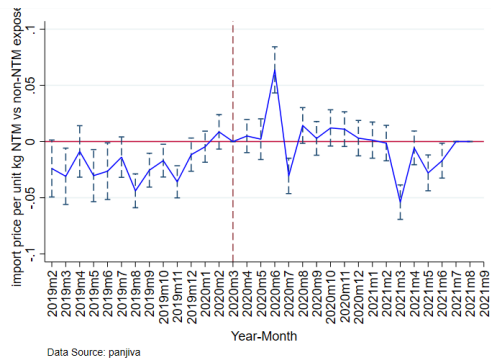
The graph reports the results from the event study specification in 2 where the dependent variable is the monthly average export transactions. NTM firms are those that were exposed to any B7 during Feb-Nov 2019.

Figure A31: Monthly average export prices of firms exposed to B7 before and after Covid-19



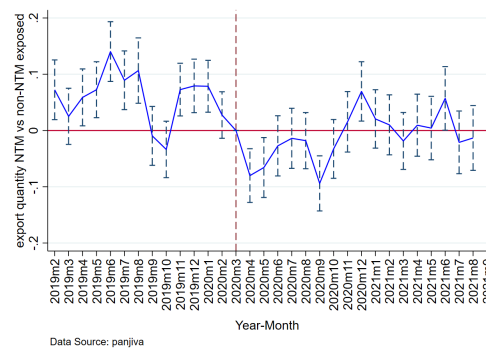
The graph reports the results from the event study specification in 2 where the dependent variable is the monthly average export price per unit kg. NTM firms are those that were exposed to any B7 during Feb-Nov 2019.

Figure A32: Monthly average import prices of firms exposed to B7 before and after Covid-19



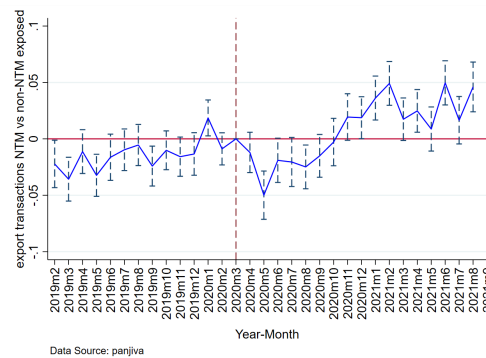
The graph reports the results from the event study specification in 2 where the dependent variable is the monthly average import price per unit kg. NTM firms are those that were exposed to any B7 during Feb-Nov 2019.

Figure A33: Monthly average export quantities of firms exposed to C1 before and after Covid-19



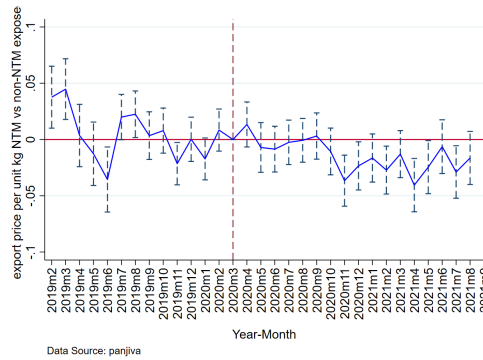
The graph reports the results from the event study specification in 2 where the dependent variable is the monthly average export quantities. NTM firms are those that were exposed to any C1 during Feb-Nov 2019.

Figure A34: Monthly average export transactions of firms exposed to C1 before and after Covid-19



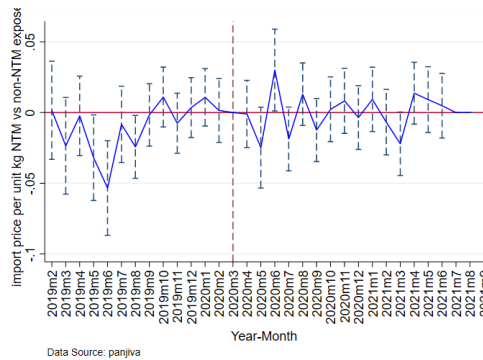
The graph reports the results from the event study specification in 2 where the dependent variable is the monthly average export transactions. NTM firms are those that were exposed to any C1 during Feb-Nov 2019.

Figure A35: Monthly average export prices of firms exposed to C1 before and after Covid-19



The graph reports the results from the event study specification in 2 where the dependent variable is the monthly average export price per unit kg. NTM firms are those that were exposed to any C1 during Feb-Nov 2019.

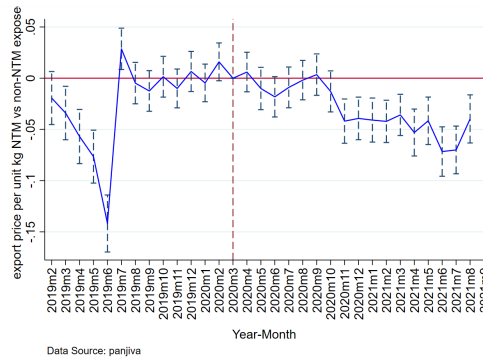
Figure A36: Monthly average import prices of firms exposed to C1 before and after Covid-19



The graph reports the results from the event study specification in 2 where the dependent variable is the monthly average import price per unit kg. NTM firms are those that were exposed to any C1 during Feb-Nov 2019.

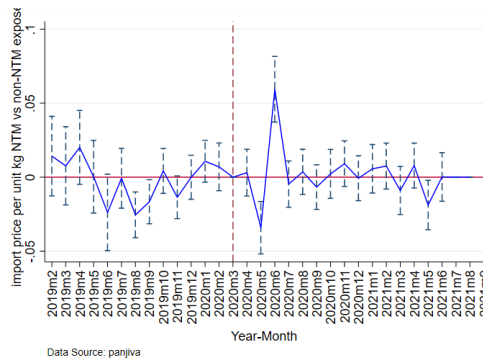


Figure A37: Monthly average export prices of firms exposed to C3 before and after Covid-19



The graph reports the results from the event study specification in 2 where the dependent variable is the monthly average export price per unit kg. NTM firms are those that were exposed to any C3 during Feb-Nov 2019.

Figure A38: Monthly average import prices of firms exposed to C3 before and after Covid-19



The graph reports the results from the event study specification in 2 where the dependent variable is the monthly average import price per unit kg. NTM firms are those that were exposed to any C3 during Feb-Nov 2019.