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The Utilization of Trade Preferences under the Peru-China FTA

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Abstract

This paper analyzes the utilization and effects of the tariff preferences extended by China towards Peruvian exporters in the context of the Peru-China FTA. By taking advantage of a novel database of certificates of origin matched with the export declaration registers, the first part of the study documents the patterns of the degree of utilization of preferences by using granular data at the firm-product level. We find that after 10 years of the FTA implementation, even though in aggregate exported value terms the degree of utilization of these preferences has reached almost 100%, heterogeneity is very high among different sectors and different firm sizes. This is consistent with the idea that in order to take advantage of the FTA in the destination market, exporters have to pay a fixed cost, and large firms are the ones that are most likely benefited. Also, leaving aside metals and mineral products, that dominates exports from Peru to China, we find that almost one third of the exporting firms presented a low FTA utilization. In the second part of the paper we assess the impact of the treaty on firms export performance, using matching techniques at the firm level. In this first approximation to the effects of the FTA, we find that firms that benefited from the FTA registered an export value annual growth that is 10 percentage points larger than the counterfactual. Also, we found a reduction in the likelihood of exiting the market of a firm that exports products to the Chinese market, while there are no effects in terms of product diversification at the firm level.

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THE UTILIZATION OF TRADE PREFERENCES UNDER THE PERU-CHINA FTA[1]

Jorge F. Chávez[2] Antonio Cusato Novelli[3]

1. Introduction

The signing of Free Trade Agreements (FTA) has been a fundamental piece in the trade policy agenda since the first half of the 2000s. Since the signing of the "Acuerdo de Promoción Comercial Perú - EE. UU." in 2006, to this date Peru has sealed and has in force 16 other FTAs with its leading trade partners.[4] Despite this, little is known regarding ex-post impacts of these trade agreements.

One aspect that usually goes without notice is that, despite the "free trade" denomination of these trade liberalization mechanisms, the utilization of tariff preferences, i.e the degree to which imports that are eligible to be benefited by a preferential tariff effectively enter under these rates, that they provide is not necessarily generalized.[5] The majority of studies that evaluated potential benefits and costs of the FTA (especially with the United States) assumed that all the exporters and importers would take advantage of the new preferences.[6] Even further, many times the discussion in the public policy arena regarding the effects of certain FTA is simplified to the growth of the value of exports and the number of export products and of exporting firms, without analyzing if the preferences are effectively being used.[7]

Even though it is true that the preferential deal is just one of the multiple aspects that these agreements usually include, such as investment protection, intellectual property protection, sanitary and phytosanitary measures, trade facilitation, controversy solutions, labor legislation, among others,

[1] We are thankful for the comments on the initial stages of the project by José Luis Castillo and Ana María Vera of Mincetur. Thanks are also due for the excellent research assistance of Xiomara Tantaleán and Alonso Palacios. All the errors and omissions are the responsibility of the authors.

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[4] See relation of current FTAs in: http://www.sice.oas.org/ctyindex/PER/PERagreements_e.asp

[5] This is an aspect that is not exclusive to FTAs but also occurs in other types of liberalization instrument such as the unilateral Generalized System of Preferences (GSP), the "Everything but arms" initiative (EBA) or the Andean Trade Preferences and Drug Eradication Act (ATPDEA), as well as in regional agreements. See for example Cadot and Melo 2007 y BRUNELIN et al. 2018

[6] The FTA with the United States, being the first negotiated and signed by Peru, was the most controversial regarding the estimation of its impacts on the Peruvian economy. A common point that studies have that came out in the mid-2000s, including Fairlie et al. (2004), Rodríguez et al. (2004), Fairlie (2005), MINCETUR (2005), Morón et al. (2006), is that they implicitly or explicitly assume that preferences tariffs emanating from the FTA would be used in a generalized way.

[7] For example, in the "Study on the Use of the Peru – China FTA: 10th year of validity of the FTA" published in April 2020 by the General Directorate of Research and Studies on Foreign Trade of the Ministry of Foreign Trade and Tourism of Peru (MINCETUR), discusses the use of the FTA, and makes reference to the tariff relief schedules included in this agreement (see table 13). Then there is reference to the growth of Peruvian exports to China as a result of the signing of the FTA, and it is indicated that "it is assumed that 100% of the available tariff preferences were used". Precisely, this assumption (which as will be seen later, it is not always fulfilled) is the one left aside in this study. There is also a similar situation in the note "Peruvian Exports: Benefits of the Peru-China FTA" of the Research Center of Economy and Global Business of the Association of Exporters of Peru (CIEN-ADEX).

the preferential deal in commerce is the aspect of a FTA that should impact the most in the beneficiary country directly. As Harris (2021) argues, excessive subutilization of the trade preferences extended through a FTA implies that these instruments of trade policy are not providing all the benefits that policymakers promised during the negotiation.

To analyze the degree of subutilization of tariff preferences that are extended through liberalization instruments, no matter if they are unilateral, bilateral or multilateral, it is necessary to understand that they are **facultative**: the exporters are the ones that choose to use them or not.[8] Evidently, deciding to use the available preferences after a FTA implies balancing the costs and benefits of doing it. Regarding the advantages, the main and most direct is the "preferential margin": the difference between the tariff NMF that an import that does not use the FTA should pay and the reduced tariff through the FTA. The savings in tariffs given a zero tariff preference or a reduced one with respect to the NMF tariff represents an increase in competitiveness that can be translated in last instance to the export price of the product. Regarding the disadvantages, the cost of using the FTA must be considered, which involves following with the rules of origin of the treaty. This can imply an increase in production costs, or administrative costs to collect and present all the necessary documentation to the appropriate bodies. The literature coincides in arguing that the preference utilization is suboptimal due to the combination of insufficient preferential margins and excessive compliance costs in some sectors.

Another aspect that has to be considered is that there is a learning process in order to take advantage of the preferential tariffs that a FTA provides. Once a treaty is implemented, not all exporters will know how to use the preferences that it provide, and this problem has been documented in other countries. For instance, considering a aggregated data set at the product level, Ulloa and Wagner-Brizzi (2013) find that the average utilization of a export product began near 2/3 at the moment that the FTA with the US entered into force. In the following two or three years, said rate reached about 80%. In the case of China, the *China Customs Office of Rules of Origin* showed how, for all the FTA signed by China, the ratio of preference utilization was growing slowly between 2011 and 2013, with large heterogeneity in its evolution. In the case of the Peru-China FTA, the available data shows a utilization of about 1% of the value of exports, growing to 5.5 in 2013 (see of China Customs 2014).

The economic literature in the field of international trade has studied the utilization of trade preferences extended through various types of trade liberalization instruments or trade agreements. The vast majority of studies are based on custom registers of imports declarations, given that for each import transaction this database usually contains information on the taxes that where paid and on the preferential regime in use. Unfortunately, the access to this type of data with the necessary level of desegregation is still very limited, and even more for large economies such as China. The other possibility is to study the trade preference utilization from the point of view of the exports of a country, which is only possible if there is access to data regarding the certificates of origin requested by exporters to justify the compliance of the rules of origin that a trade agreement establishes. Because of this, studies based on exports are less common in the literature.

In this context, this study takes advantage of the availability of data at the firm level for Peruvian exporters at the necessary level of desegregation and of the access to a novel database of certificates of origin to study the trade preferences utilization that came from the Peru-China FTA, which entered into force almost 11 years ago. The goal is to answer the following questions based

[8] Although much of the logic of the underutilization problem is common to other trade agreements, from now on we will generally refer to FTAs since it is the focus of empirical application analysis.

on this information. What is the utilization rate of the FTA between Peru and China for Peruvian exporters? Is it possible to identify specific products or sectors in which there is evident subutilization of these preferences? What type of firms are the ones that benefit more from the trade preferences utilization? The study of trade preferences utilization can provide evidence of great interest to the public policy debate centered around export promotion, export supply diversification, and productivity growth, in a context in which China has become the main trade partner of Peru.

What follows of the document is described next. Section 2 introduces some relevant concepts to analyze the degree of trade preferences utilization in the context of a FTA. Section 3 describes data from custom registers of exports declarations, data from the registry of certificates of origin kept by MINCETUR, and the procedure used to match each certificate of origin with its respective export declaration. Section 4 explains the main stylized facts related to the utilization of preferences. The last section presents the methodology and the results of the impact of tariff preferences on export performance indicators.

2. The utilization of tariff preferences

To analyze the tariff preferences utilization, it is fundamental to first introduce some relevant definitions. In first place, a *preferential tariff* is a reduced or removed tariff that comes with a FTA, on behalf of the importer country by a product originated in the export country. The comparison is made considering the external general tariffs denominated "most favored nation tariffs" (MFN) applied by the members of the World Trade Organization (WTO). The difference between the MFN tariffs and the preferential tariffs is referred to as the *preferential margin*. In many cases, preferential tariffs include rates of zero percent, or they may be elevated for products that are considered "sensitive", and the preferential margins differ among products, depending on the level of the MFN tariff structure applied to the imports of third countries. In general, the preferential margins and the trade value eligible for preferential treatment are the main incentive for the utilization of these preferences.

As de Melo and Gourdon (2021) suggest, the decision of an exporter to use the available preferences through a FTA has two sides. On the side of advantages, the main and most direct is the "preferential margin": the difference between the MFN tariff and the tariff reduced to through the FTA. The savings in tariffs, given a zero or reduced preferential tariff with respect to the MFN tariff, represents an increase in competitiveness that can ultimately be transferred to the export price of the product.

On the side of disadvantages, de Melo and Gourdon (2021) detail four possible factors. In the first place, there could be a distortion in the producers' decision to supply inputs since they must comply with the RoO. One type of RoO that some products face is the regional value content (RVC) requirements, where the exporter who wishes to use the preferences must use suppliers of

intermediate goods from the local country or the country with which the FTA is signed.[9] Secondly, and related to the first point, the suppliers may be taking advantage of their market power, since they can increase their margins to serve these "captive" producers. Thirdly, there are administrative costs for the issuance of a certificate of origin, for the necessity of having an information system and control that allows supporting the requirements.[10] Lastly, the burden of compliance is also costly in terms of the risk assumed, since the preferences utilization is subject to ex post monitoring mechanisms (fines, verification costs). These four factors are the ones that ultimately constitute the *compliance costs* for the use of the tariff preferences extended by a FTA.

Ultimately, a high utilization rate is the result of compliance costs being less than the preference margin. If this is the case, the exporter will decide to make use of these preferences, either because they wish to take advantage of the gain in competitiveness that this represents when looking for clients in the partner country, or because thier clients ask them to make use of the FTA. The interaction between exporters and importers is a very important element and its relevance will be discussed in future research.[11]

The fact that the compliance costs of taking advantage of the tariff preferences provided by some liberalization policies are significant suggests that those who can afford them are the largest exporting firms (Hayakawa et al. 2016). Various studies have estimated these usage costs within the framework of FTAs and regional agreements (see references in Hayakawa et al. 2016), and it has been found that the most productive companies, and therefore the largest ones, usually bear these costs. A nearby example is Cadot et al. (2014) who, based on Colombian imports from Argentina, Peru, and Uruguay, show that utilization tends to be higher in larger firms, which is consistent with the assumption of a fixed cost of usage. Likewise, these authors find lower utilization rates for firms with a broader supply of intermediate products, which seems to suggest that the cost of compliance is the variable cost of sourcing locally rather than the fixed cost of proving compliance.

Most studies in the literature use import data to analyze the use of tariff preferences granted from trade liberalization agreements, including FTAs. The reason is that, through the collection of taxes, the customs of countries collect a greater amount of information on import transactions (i.e. tariffs paid, preferential treatment used) than on exports. However, in the case of FTAs, it is possible to

[9] For example, suppose there is a Peruvian firm that produces certain types of goods and that used mainly foreign inputs that are not from China (assume more than half the value of the final good produced), before the signing of the FTA with China. Once the FTA with China has entered into force, if this firm wants to export to China with preferences, and the product it wants to export faces an RVC of 50%, then it must change its foreign suppliers for a Peruvian or Chinese supplier, so that at least 50% of the value of the merchandise corresponds to inputs from either of these two countries. Another type of stricter RoO is the "fully obtained". In this case it must be shown that all the product is local. For example, this typically applies to agricultural products, where for example it must be verified that the animal to be exported to China was born and raised locally (in Peru). Another example of RoO that applies is the "change from any other item". In this case, foreign inputs from another tariff heading (type of product) can be used, but since the process of transforming the inputs is so important and evident, the final product to be exported is totally different, so the tariff heading changes.

[10] Information must be collected from its suppliers, invoices for each input used and the production chains used.

[11] Regarding the decision to benefit from the preferences, although it is ultimately the exporter who requests it, the decision to do so may emanate from him or from the foreign buyer (importer). In the first case, it is the exporter who seeks to use the preferences as a mechanism to gain competitiveness against competitors (local or foreign) when offering them to potential buyers. In the second case, it is the importer who sets the preferential treatment as a condition to finalize the transaction. For this reason, as Nilsson (2021) points out, it would be ideal to observe the identity of both the exporter and the importer in order to better understand the determinants of low use of preferences: to see if it is the former who tends to sell without taking advantage of the preferences of an FTA, or if it is the latter who tends to buy without preferences. In other words, it would be important to have more details of the trade relationship to have a better understanding of the reasons behind the low utilization of trade preferences. See figure 11.

use export data if it can be identified the associated declaration requesting a CoO. Unlike most studies that use import data to study the use of tariff preferences, this research is based on data from export declarations to which certificates of origin are associated.

As Hayakawa et al. (2013) suggest, an important weakness of the study of the use of preferences based on CoO is that it tends to overestimate this use. The main reason is that we only observe the issuance of the certificate, but not if it is ultimately used by the exporter or if it is rejected by the customs authorities in the country of destination. Additionally, it must be taken into account that the definitions of products, typically 8 or 10-digit tariff codes, which are used to establish the reduction baskets within the framework of the FTA, are constructed from the importing country, and do not coincide with the codes used by the exporting country. In the case of the Peru-China FTA, for example, the certificates of origin only include the 6-digit product code of the harmonized system (HS6), while the Chinese tariff applies to a 10-digit code, which is different from the 10-digit number used by Sunat Customs to classify Peruvian exports and imports.

Hayakawa et al. (2013) compare utilization estimates based on customs records (import declarations) and CoO for the FTA between the Association of Southeast Asian Nations (ASEAN) and South Korea. They found that indeed utilization rates tend to be higher when calculated on the basis of certificates of origin, compared to those estimated from import data.

3. Data and Stylized Facts

The official export statistics of a country do not record whether an export operation makes use of tariff preferences granted by the destination country within the framework of a trade agreement.[12] However, for most of the agreements signed by Peru (except for the FTAs with the United States, Canada and South Korea), the exporter who wishes to avail himself of these preferences must process the issuance of a Certificate of Origin (CoO), the same that must be included in the documentation that accompanies the shipment of the products. For this reason, to study the use of tariff preferences extended by China to Peruvian exports through the Peru-China FTA, microdata from two sources are used: data from the export customs registry and data from certificates of origin.

3.1 Export Data

In first place, we have a definitive export registration database compiled by SUNAT-Customs. These records include information on all export transactions from January 1994 to May 2021. The observation unit is the customs declaration of merchandise (DAM or DUA) filled out by an exporter that includes the date of shipment or arrival of the merchandise, the products included, the country of destination or origin, the value of the sale, the weight, among other characteristics of the transaction.[13]

Exporting companies are identified by their Single Taxpayer Registry number (RUC). Products

[12] On the other hand, the records of import declarations do record the intention of an importer to avail himself of a tariff preference granted by Peru.

[13] See table 8 of appendix A for the complete detail of the data obtained from these databases.

are identified using the ten-digit Nandina classification, whose first six digits correspond to tariff subheadings of the Harmonized System (hereinafter, 6-digit codes will be referred to as HS6 subheadings).[14]

An exhaustive cleaning of this data has been done so that shipments that do not correspond to export operations for commercial purposes are excluded from the analysis. For example, shipments with no commercial value, ship ranch, shipments to embassies, jet fuel are excluded. Likewise, those RUCs that do not correspond to a definition of for-profit firm, such as embassies, public entities, foreign individuals, etc., were excluded from the analysis.

In addition to the data that is included in the customs registry databases that SUNAT makes publicly accessible (See table 8 of appendix A), we use additional data for each export transaction, which can be obtained through mass download techniques (web scrapping) through the search engines of the SUNAT website.[15] For each export declaration it is possible to view the number and amount of up to three invoices issued by the exporter and that support the shipment of products.[16] In addition to the invoice number, other data collected includes the invoice issue date, the cargo manifest number of the vehicle in which the merchandise is shipped, and the incoterms used (if the transaction was made on an FOB, CIF, or CFR basis, among others).

3.2 Certificates of Origin Data

The second source of data is the registry of Certificates of Origin (CoO) maintained by the Direction of Unit of Origin (DUO) of MINCETUR. The issuance of these certificates is decentralized in different public and private sector entities such as Chambers of Commerce and other regional associations and, although they have been issued since the initial implementation of all FTAs (in the case of the FTA with China, since 2010), the DUO has only centralized this information since mid-2013. For this reason, the availability of data from this registry goes from 2014 onwards, as shown in Table 1.[17]

Table 1: Availability of Certificates of Origin (CoO) Data

	2014	2015	2016	2017	2018	2019	2020	2021
Num. of CoO	5,048	11,302	8,951	11,059	11,750	14,147	12,977	8,882
Num. of firms (rucs)	313	384	381	417	446	466	431	369
Num. of products (HS6)	129	149	143	188	216	186	170	124

Notes: The information for 2021 includes the certificates up to May.
Source: Certificates of Origin Registry (MINCETUR).

[14] The DAM must be filled out through a customs agent when the amount exceeds 5,000 US dollars.

[15] Among other difficulties, this process requires solving the captcha that SUNAT has recently placed on individual queries. Once this impasse is overcome, it is possible to collect the necessary information automatically.

[16] A statement can have more than three invoices associated with it. In these cases, the number of invoices is truncated to three and details of invoices number four onwards cannot be observed. The vast majority of export declarations (a little over 90%) have only one invoice, 3% with two invoices, and the remaining 2% with three or more invoices.

[17] The data was provided by the Vice Ministry of Commerce of MINCETUR to the investigators within the framework of Law No. 27806, Law of Transparency and Access to Public Information.

The information included in the CoO varies according to the technical specifications of each agreement. Thus, for example, only some treaties require that, in addition to the name of the exporter, their tax identification number (RUC) be included; all treaties require the number of the invoice issued by the exporter to be included, but not all of them include the amount of said invoices or their date of issue; in some cases, the HS6 code of the exporting product is included, while in others only the description of the product is included; finally, some treaties require the weight of products to be included and others do not. The FTA with China is one of the treaties that requires more information to fill out the CoO.[18]

It should be noted that the information provided includes both preferential and non-preferential certificates of origin. In the first case, they are documents that prove the origin of an exportable product in order to claim the preferential treatment provided by the FTA in the country of destination. In the case of non-preferential CoOs, these certify compliance with non-preferential rules of origin, and are used to prove that the merchandise they consign is subject to antidumping, countervailing or safeguard duties due to its origin. Although the CoO registry does not distinguish between preferential and non-preferential certificates, most of the latter correspond to goods that already enjoy zero tariffs in the MFN system.

3.3 Data Matching

A very time-intensive task, but essential to carry out the analysis of the use of the tariff preferences granted by an FTA to exporting firms, is to match the data from the export registry (DAM) and the registry of certificates of origin (CoO). This is done to identify those export transactions that were accompanied by a CoO (fundamental requirement to be able to access preferences).

This work is possible only if the data included in the CoOs allow the identification of the export declarations that appear in the customs register. In the case of the China FTA, the issued CoO includes the number, amount and date of the invoices that support the transaction requesting the certificate. These variables together with the identity of the exporter, the date of issuance of the CoO, the HS6 code of the product in question are essential for the procedure. See Annex B for more detail.

3.4 Evolution and Characterization of the Utilization Ratios

Two ratios are defined, at the aggregate level and at the firm level. As indicated in equation (1), the aggregate utilization ratio ($\mathcal{U}^{Ag}$) is calculated for each year. The notation includes the firm i, the export or transaction j, and the exported product p.

$$\mathcal{U}^{Ag} = \frac{\sum_{ijp/[\{j\in(CoO\cap DUA)\}\cap\{p\in(TLC\cap\tau>0)\}]} x_{ijp}}{\sum_{ijp/[\{j\in DUA\}\cap\{p\in(TLC\cap\tau>0)\}]} x_{ijp}} \tag{1}$$

[18] See Table 7 of Appendix A for the complete list of the fields received from the CoO record.

We can analyze the utilization ratio by looking at the numerator and denominator. In both cases, it is a summation of x_{ijp} export transactions. The numerator refers to all the exports that benefited from the FTA, while the denominator indicates all the exports that could have benefited. What conditions are required in the numerator? Several conditions are asked of an x_{jip} transaction. On the one hand, the firm i must carry out a particular export j that has an export registration (DUA) and request a certificate (CoO) for the exported product p. In addition, this product must be within the products exempted by the treaty (FTA) and, additionally, the Chinese MFN tariff must be positive ($\tau > 0$). This last condition implies that, although the FTA may have reduced the tariff on Peruvian exports to 0 for product p, for there to be an impact, the tariff that it would have had without FTA (the MFN or the one that any exporter from another country of the world faces in China without an FTA) must be positive. In short, four conditions are asked of the numerator. In the case of the denominator, or those transactions that could potentially be benefited (whether or not they received CoO), three conditions are asked of them. Thus, in the denominator is no longer required for transaction j to have a CoO.

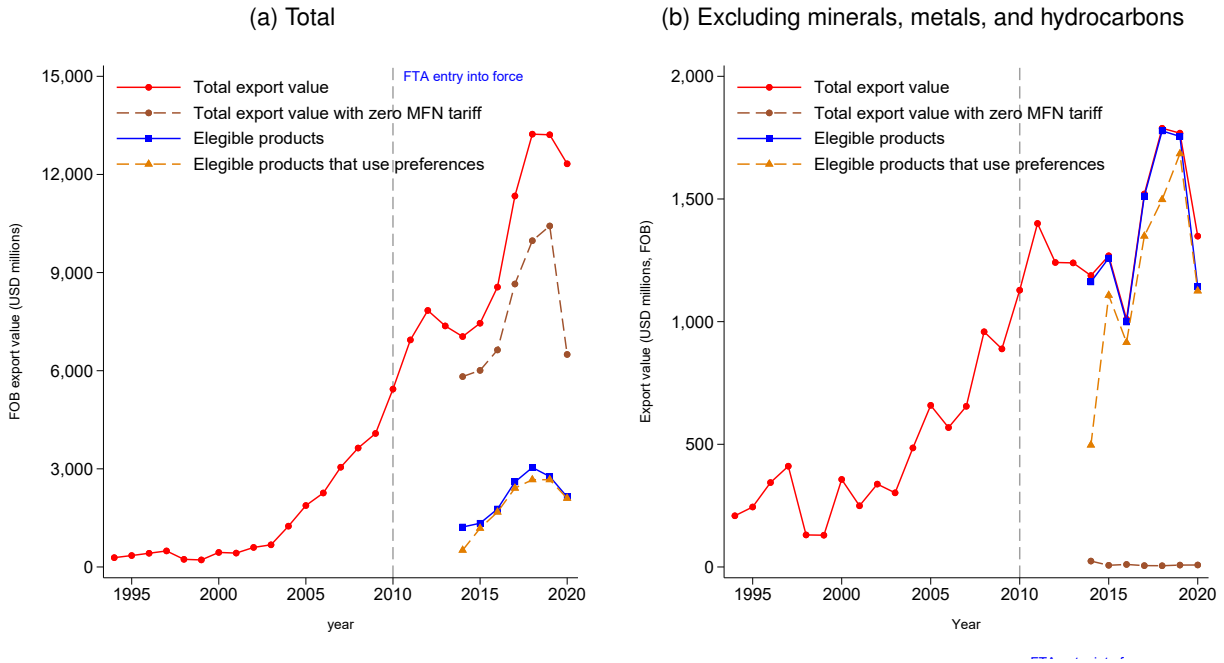
Additionally, the utilization ratio is calculated at the firm level. Equation (2) shows this ratio for firm h in year t. The way of calculating the ratio is exactly analogous to that of equation (1), only that the sum of exports is restricted to the transactions of firm i. Equation (3) shows the average utilization ratio at the firm level ($\mathcal{U}^{Fir}$), which is one of the statistics shown in the results section (in addition to the standard deviation, percentiles, and plots of the complete distribution).

$$\mathcal{U}^i = \frac{\sum_{jp/[\{j\in(CoO\cap DUA)\}\cap\{p\in(TLC\cap\tau>0)\}]} x_{jp}}{\sum_{jp/[\{j\in DUA\}\cap\{p\in(TLC\cap\tau>0)\}]} x_{jp}} \tag{2}$$

$$\mathcal{U}^{Fir} = \sum_i U^i \Big/ \sum_i 1 \tag{3}$$

Figure (1) shows the evolution of exports to China, which show rapid growth since the early 2000s. Consequently, the share of exports to China over total exports from Peru has gone from around 15% to 30% since the entry into force of the FTA in 2010. Panel (a) of figure (1) shows that the majority of exports to China were made under a zero MFN tariff, which implies that even without the FTA, Peruvian exports would have paid a zero tariff. Panel (a) of the figure also shows the universe of eligible products, which reached in the best of years around 3 billion dollars (2018), a small fraction of the 13 billion exported in total.

Figure 1: Peruvian exports to China (millions of USD)



Exports to China are dominated by minerals, metals, and hydrocarbons. Therefore, panel (b) of figure (1) excludes this type of exports, and as can be seen in the figure, exports to China have been reduced to a value of less than 2 million dollars in recent years. In this case, the products eligible for the FTA (and which also face a positive MFN tariff) are almost equal in value to the total exported. The figure also shows the exports that used the tariff preferences, and except for the first year with available data (2014), the exports that benefited from the preferences closely resemble the eligible products. In other words, at the aggregate level, the aggregate utilization ratio is high as of 2015. The aforementioned high aggregate utilization ratio is much clearer if we restrict the sample as of 2014 (the first year with information on the CoO). This can be clearly seen in figure (2), which shows only the exports of eligible products (the denominator of equation 1) and the exports that used the preferences (the numerator of the same equation), for all products, such as for those that are not minerals, metals and hydrocarbons.

Figure 2: Peruvian exports to China (eligible products that used preferences, millions of USD)

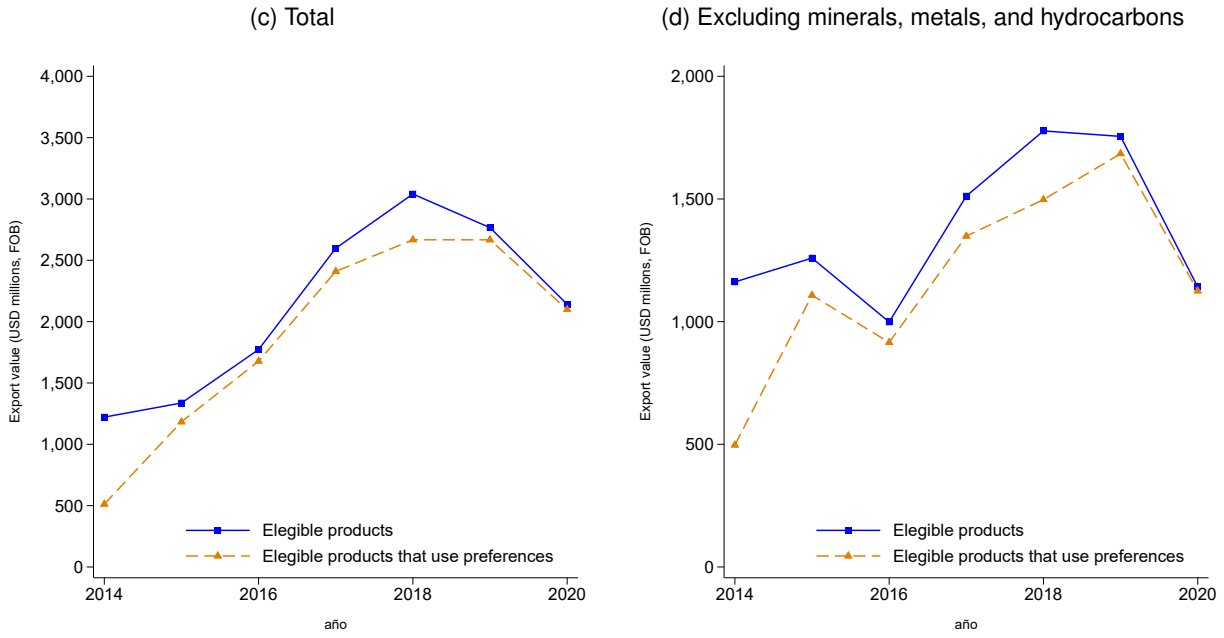


Figure (3) shows the evolution of the aggregate utilization ratio. The ratio jumps from 41.9% in 2014 to 88.4% in 2015, and rises to 96.4% in 2019 (it remains at 97.9% in 2020). The figure also reports the utilization ratio between 2011 and 2013. These data have been obtained from the Office of Rules of Origin of the General Administration of China Customs, and were calculated by the Chinese authorities based on information on Chinese imports from Peru. Although the aggregate utilization ratio is very high, the same does not occur with the utilization ratio at the firm level (see equations 2 and 3).

The utilization ratio at the firm level differs from previous calculations reported in the literature, such as the Chilean case (Ulloa and Wagner-Brizzi 2013), where there was no information at the firm level but only at the exported product level.[19] For policy purposes, the utilization ratio at the firm level may give a better picture than the aggregate utilization ratio in the presence of firms that export large values. Thus, when reporting the average utilization ratio at the firm level, the same weight is implicitly given to all exporters, regardless of their size.

[19] The authors do not perform data matching work, but rely on official US import statistics to estimate the use of the Chile-US FTA.

Figure 3: Ratio of aggregate use of tariff preferences (exported value with preferences over eligible exported value)

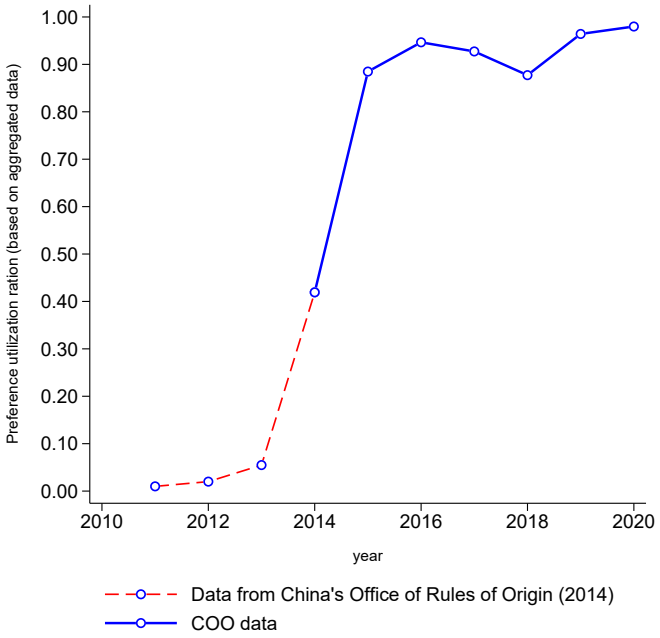


Table 2: Distribution of the ratio of utilization of preferences at firm level

	(1) Mean	(2) Standard Dev.	(3) p25	(4) p50	(5) p75
2014	0.42	0.42	0.00	0.31	0.95
2015	0.69	0.45	0.00	1.00	1.00
2016	0.64	0.46	0.00	1.00	1.00
2017	0.69	0.45	0.00	1.00	1.00
2018	0.67	0.45	0.00	1.00	1.00
2019	0.74	0.41	0.52	1.00	1.00
2020	0.66	0.47	0.00	1.00	1.00

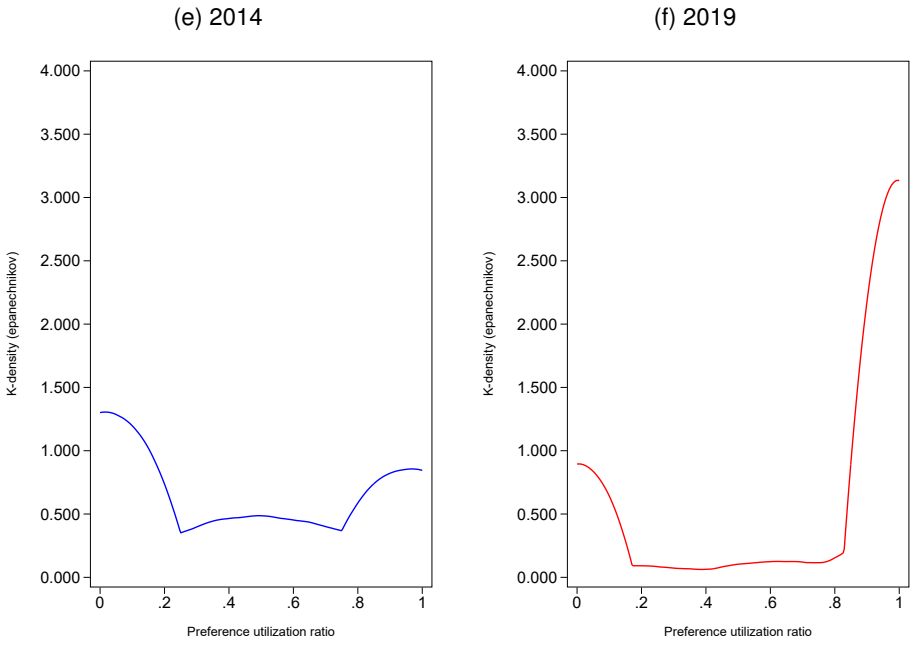
Note: Utilization is calculated as the ratio between the value of eligible exports of a firm using preferences (i.e. requesting CoO) and the total value of eligible exports. Eligible exports are those that have a positive tariff and that have been considered in the FTA reduction schedule.

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 2 shows the evolution of the average utilization ratio, the dispersion of the firm level ratio, as well as the 25th, 50th and 75th percentiles of the distribution of firms for each year. The 2014 ratio is reported to have reached 42%, while the ratio jumped rapidly to 69% in 2015. Since that year, the average firm-level ratio has fluctuated around 70%. Naturally, this is a much lower number than that reported for the aggregate ratio, which fluctuated above 90% in almost every year. Naturally, the difference between the two ratios is explained by the fact that the aggregate ratio is basically influenced upwards by the large exporters. On the contrary, the ratio at the firm level, by giving the same weight to all (regardless of their size), shows that the access of the smallest firms is less

than that of the largest firms. Table 2 also shows very high volatility, measured by the standard deviation. As shown in figure (4), the distribution of the utilization ratio at the firm level is bimodal: either the firms use mostly the CoOs in their exports, or there are other types of firms that hardly have access to the preferences of the TLC.

Figure 4: Distribution of the ratio of the total utilization of preferences at firm level, 2014 - 2019



To be more precise about figure (4), the distributions for 2014 and 2019 are shown. In the first case, a bimodal distribution (with two peaks) is observed, where these peaks correspond to the probabilities that the firms do not access the benefits (ratio between zero and twenty) or completely access the benefit (ratio between 80 and 100). It is observed that, in the first years of the sample, in 2014, the height of the ratio of no access was greater than that of high access. On the contrary, for 2019 it is clearly seen how the distribution has varied, maintaining the two modes, but reflecting an important change in their probabilities. Now, fully accessing the benefit (ratio close to 100) is 3 times more likely than not accessing the benefit (ratio around 0).

Figure 5: Utilization ratio, by firm size

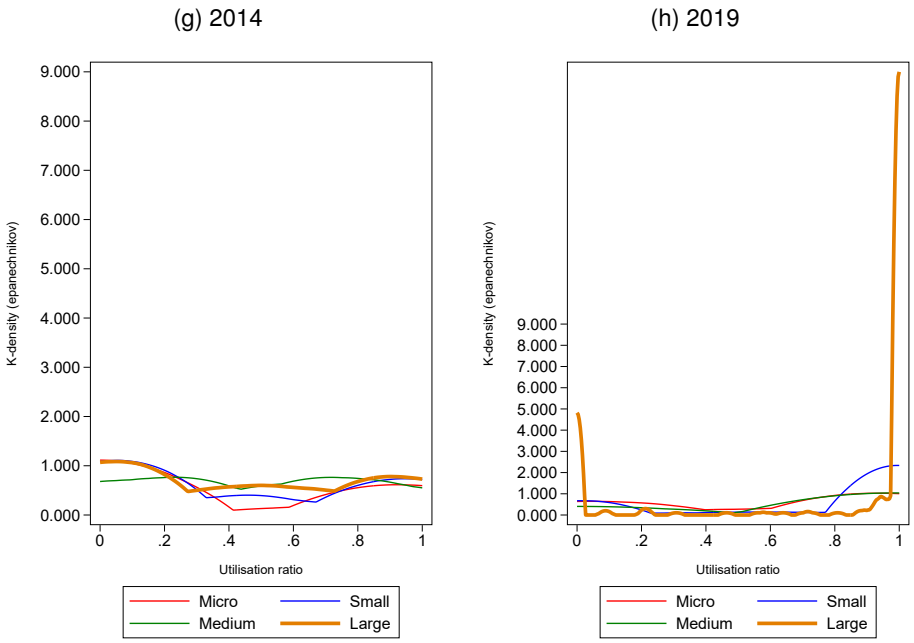


Figure (5) repeats the same exercise of the previous figure, by showing the distributions of the utilization ratio at the firm level for the years 2014 and 2019, but calculates the ratio according to firm size. The figure corresponding to the year 2014 reveals that the distributions of use between different types of firms were very similar. In 2019, the same does not happen, and the most marked differences are clearly noticeable in the case of large firms. These types of firms are the ones that have best exploited the tariff preferences derived from the treaty with China and the ones that explain why the probability of high use in 2019 is three times greater than the probability of low use in the same year (aggregate results presented in the previous figure, or 4). As previously discussed, this is consistent with what is stated in the international trade literature, the presence of fixed costs to access the benefits of the agreements can limit their use, and this is reflected in the greater use of the benefits by the largest companies.

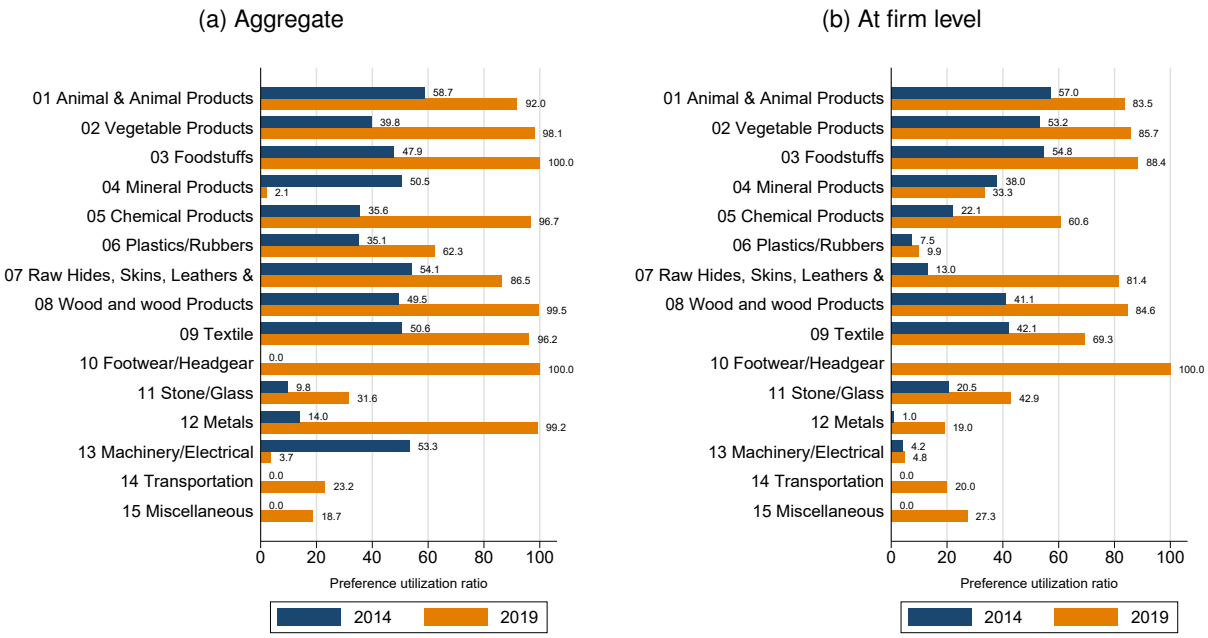
In terms of sectors, the breakdown by product type of total exports to China is shown in Table 3. The classification presented follows Ahn et al. (2011). Outside of metals and mineral products, the sectors of animals and animal products stand out (with 201 million dollars exported in 2019), vegetable products (with 234 million dollars), and food products (with 1,231 million dollars). Figure (6) shows the utilization rate according to sectors. While the aggregate rates for these three sectors fluctuate between 90% and 95%, the average utilization rate at the firm level (panel (b)) is between 80% and 85%. Naturally, when performing the average calculation, important differences are hidden.

Table 3: Peruvian exports to China - (millions of USD)

	(1) 2014	(2) 2015	(3) 2016	(4) 2017	(5) 2018	(6) 2019	(7) 2020
01 Animals and animal products	34	25	24	35	51	201	77
02 Vegetable products	168	144	112	185	219	234	232
03 Food products	854	982	755	1,146	1,370	1,231	957
04 Mineral products	4,857	5,259	6,774	8,734	10,248	10,455	9,712
05 Chemical products	17	10	17	21	22	19	17
06 Plastic and rubber	7	1	1	1	1	0	1
07 Leather and fur	7	22	18	14	4	1	1
08 Wood and wood products	66	56	61	57	52	51	35
09 Textiles	33	26	22	61	68	29	27
10 Footwear and accessories	0	0	0	0	0	0	0
11 Glass/stones	0	0	0	0	1	0	0
12 Metals	999	924	773	1,087	1,196	990	1,265
13 Machinery/electric equipment	1	1	0	1	1	1	2
14 Transport	0	0	0	0	0	0	1
15 Miscellaneous	0	0	0	1	0	0	1
Total	7,044	7,452	8,557	11,342	13,232	13,213	12,326

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Figure 6: Preference utilization rate, by sectors 2014 and 2019



To analyze the differences at the firm level, table (4) shows the total number of exporting firms as of 2019 according to three utilization rate categories: low (if $\mathcal{U}^i$ is less than 0.25), intermediate (if the ratio is greater than 0.25 and less than 0.75) and high (if the ratio is greater than 0.75).

Adding the number of firms that export in the first three sectors, which, as already mentioned, are the most important in terms of exported value (in addition to metals and minerals), there are 467 firms. Of this group, 137 firms presented low utilization. In other words, 29% of the firms used very little or not at all the tariff preferences derived from the FTA for these three important sectors.

Table 4: Number of exporting firms in 2019 according to Utilization Rate (U.) (number)

	Total	Low U.	Medium U.	High U.
		$\frac{x_i^{CoO}}{x_i} < 0.25$	$0.25 \leq \frac{x_i^{CoO}}{x_i} < 0.75$	$\frac{x_i^{CoO}}{x_i} \geq 0.75$
01 Animals and animal products	122	18	9	95
02 Vegetable products	194	26	9	159
03 Food products	59	8	1	50
04 Mineral products	9	2	0	7
05 Chemical products	23	9	0	14
06 Plastic and rubber	10	9	0	1
07 Leather and fur	12	2	1	9
08 Wood and wood products	32	4	2	26
09 Textiles	34	11	2	21
10 Footwear and accessories	2	0	0	2
11 Glass/stones	7	4	0	3
12 Metals	26	21	0	5
13 Machinery/electric equipment	21	20	0	1
14 Transport	5	4	0	1
15 Miscellaneous	12	8	0	4

Notes: The table is constructed taking the hsx firm-sector pair as the observation unit. In total there are 478 firms, of which 116 export products in some sector with low use of preferences, 24 export products in some sector with medium use of preferences and 349 export products in some sector with high use of preferences.

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

4. FTA Impact Estimation

This section seeks to estimate the impact of the tariff preferences from the FTA on the export performance of firms.

4.1 Stylized Facts

Empirical studies on the effects of free trade are already several decades old. In 2007, Baier and Bergstrandestiman published in the leading international economics journal, the Journal of International Economics, an article that uses panel data at the country level for a long period of time and for many treaties. The authors conclude that the effect on trade growth varies between 0.6 and 0.8 (Baier and Bergstrand 2007). More than a decade later, the authors (Baier et al. 2019) acknowledge that these estimates are too high to be explained solely by the reduction in tariffs. Therefore, they seek to study explanations associated with these results.

As a result of the increasing availability of administrative data over the last two decades, the liter-

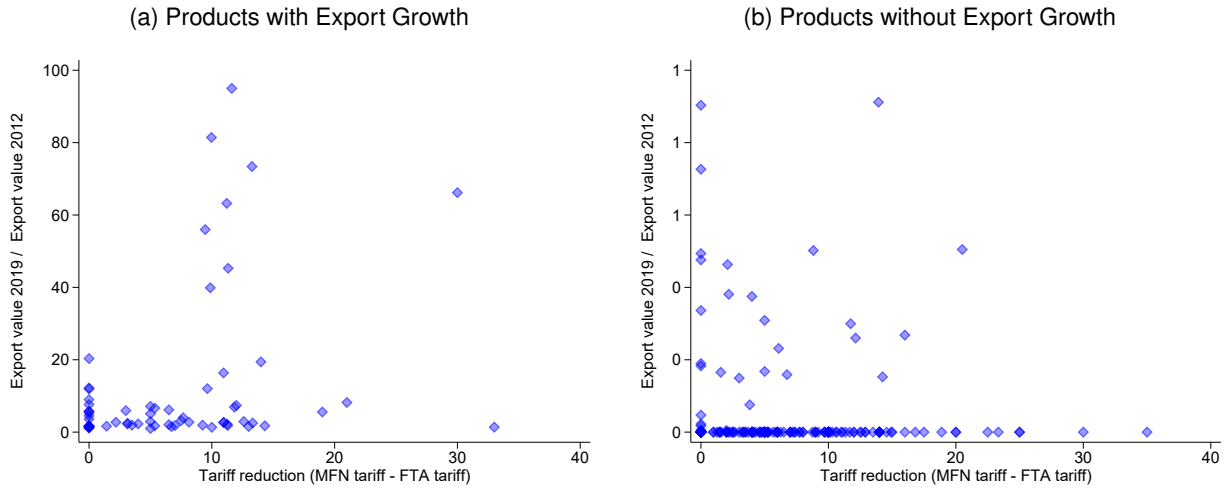
ature has used more disaggregated data (than a country's total exports) to measure the impact of trade liberalization, particularly data at the firm level. The reduction of tariffs (both for exported products and imported inputs for production) has been used to measure the impact on the productivity of firms in Chile (Linarello 2018), but there are several studies that have similar objectives, in India, China, and other countries. However, from the literature review carried out for the project, it is concluded that the information from the CoOs has not been used to measure the impact at the firm level on the exports of a country (only on the imports and they have studied mainly the pass-through on imported prices).

4.2 Correlation Analysis

As discussed, the literature indicates that a better export performance should be expected because of the FTA with China, and this could be corroborated using the CoO data. Before discussing the formal methodology, a visual analysis gives us clues about this hypothesis. Thus, for this preliminary analysis, different variables were added at the $hs6$ product level, and the following indicators were used:

- The ratio of 2019 exports over 2012 exports for product p. Naturally, if the ratio is greater than one, it is because exports grew during 2012-2019, and if it is less than one, it is because they fell.
- The average the tariff reduction by type of product. For this, the difference between the average MFN tariff was taken, and a proxy of the tariff associated with product p as a result of the FTA reduction (zero if product p does not pay tariff, and the same MFN value if it has not yet been deducted).
- The average utilization rate aggregated at the product level. For this, the exports at the $hs6$ level (x_p) and the exports that used CoO at the same level (x_p^{CoO}) were added, and the ratio was calculated: $R = x_p^{CoO}/x_p$.

Figure 7: Relationship between Export Growth and Tariff Reduction, by product p



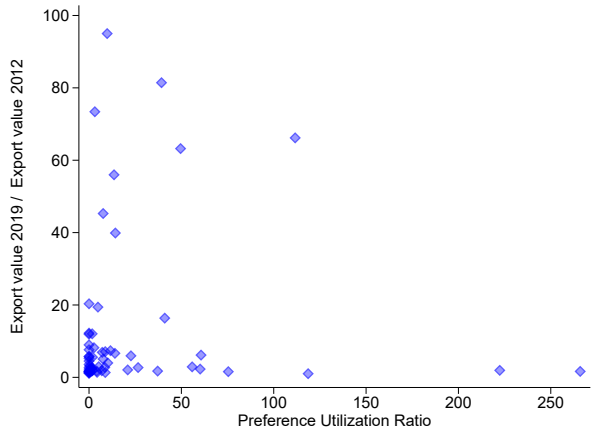
Note: Panel (a) does not include an outlier.

Panel (a) of figure (7) shows the expected relationship. Those products that received a higher tariff reduction are those that showed a higher export growth. This is quite clear in the figure, since those products whose exports multiplied more than 20 times (y-axis of the figure) had substantial tariff reductions or greater than 10 percentage points (x-axis of the figure). Panel (b) shows the products that decreased or stopped exporting in the period, and naturally it is difficult to try to infer something about these contractions from the tariff reductions.

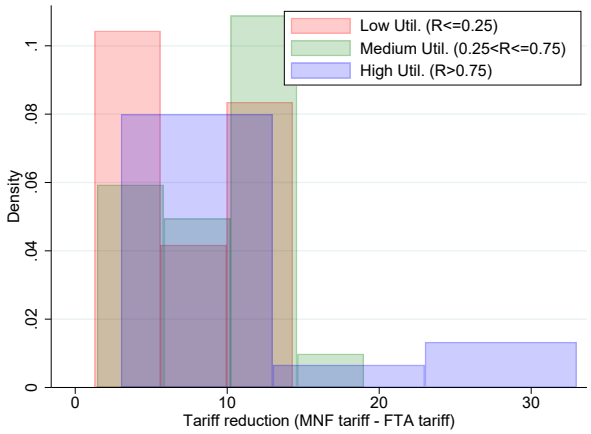
To better explore the performance of those products that grew the most (panel (a) of the previous figure), figure (8) works with this subgroup of products (those where the ratio between the value exported per product in 2019 between the value exported in 2012 is greater than one). Panel (a) shows that the products with the highest export growth ratio were those with a higher utilization rate R. Again, focusing on those products with a ratio greater than 20, eight out of ten products showed utilization rates higher than 50%. In this way, the correlations indicate that higher export growth is associated with (i) higher tariff reduction (figure 7) and (ii) higher utilization rate of the preferences granted by the FTA (figure 8).

Figure 8: Export Growth, Tariff Reduction and Utilization Rate, by product p

(c) Products with Export Growth and Utilization by Product



(d) Histogram of Tariff Reduction and Utilization Levels for Products with Export Growth



Note: Both panels do not include outliers.

Naturally, a positive relationship between tariff reduction (or FTA benefits) and a higher utilization rate should be observed. This is presented in panel (b) of figure (8). A histogram of the tariff reduction is shown according to the rate of use ($hs6$ products with R less than 0.25, products with R between 0.25 and 0.75 and the rest). It is observed that the products with low use are those that register the lowest tariff reduction, while the products with high use at the product level are associated with the largest reductions. In other words, the figure shows the positive association between points (i) and (ii) discussed in the previous paragraph.

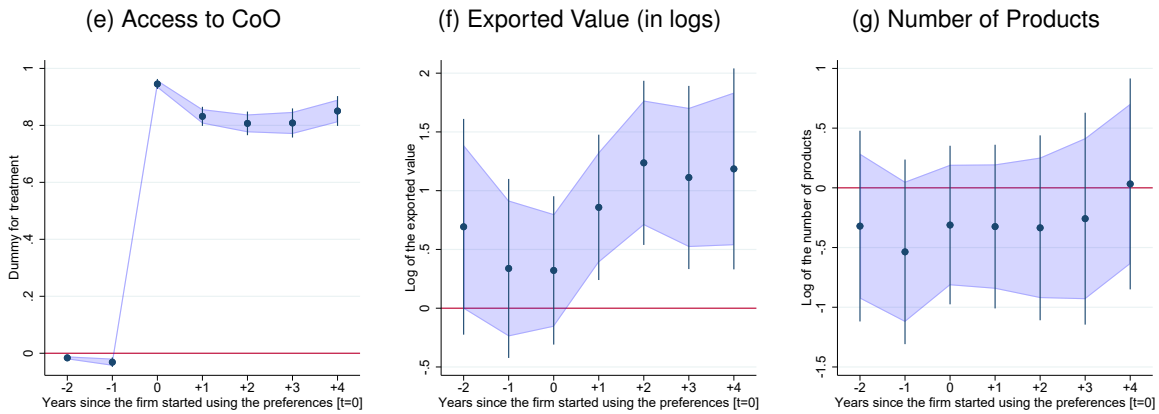
4.3 Events Study Analysis

To go a little further than the analysis of correlations presented in the previous figures, an event study analysis was chosen. This methodology seeks to show the evolution of a variable around a point in time. For example, in the literature on financial crises, the aim is to analyze what happens to economic growth at the moment of the crisis (year t), one year before ($t-1$), two years before ($t-2$), or for years after the event or crisis. In this case, a single crisis or country is not analyzed, but rather a large sample of countries that may have several crises. A similar exercise can be carried out to analyze the *access to the FTA* event.

Figure (9) shows the results of the event analysis for an indicator of access to a CoO (panel (a)), for what happens to the logarithm of exports (panel (b)), and for what happens with the number of products (panel (c)). In panel (a) it shows that for $t-1$ and $t-2$, the value of the figure approaches zero (it is negative because of the constant), and only takes a value close to one from period t (again, it is not equal to one because of the constant). That is, by construction, the graph analyzes

what happens on average with the firms that access a CoO to export a product in year t (where, in addition, this CoO corresponds to a product with a positive MFN tariff). What is interesting about this first panel is that it indicates that on average, those firms that agreed to a CoO for t also did so up to four years later (for $t+1$ to $t+4$).

Figure 9: Event Analysis Around the First Year (period t) that a Firm i Requests a CoO for the product p



Note:The figures are constructed from an analysis of events. In particular, the following model is estimated for the logarithm of exports: $x_{ipt} = c + \sum_{k=-2}^{4} \delta_k D_{ipt}^{t+k} + \alpha_{it} + \zeta_{pt} + \varepsilon_{ipt}$. The dummy D_{ipt}^{t+k} takes the value of 1 after k years before or after the first year in which the firm i requests a CoO for the product p. In this regression, we control for supply-level shocks, or for a time-varying firm-level fixed effect α_{it}; and it is also controlled for product demand shocks, or for a fixed effect at the product type level $hs6$ that varies over time ζ_{pt}. The parameters of interest are δ_k, and these are plotted together with their respective confidence intervals in panel (b). In the case of the treatment or *access to a CoO* dummy (panel (a)), this is defined if the firm i agreed to a CoO for the product p. Only fixed effects per year are included in this estimate. For the case of panel (c), or number of products exported to China, fixed effects are included at the product level $hs2$ (the number of products is defined at the level of $hs6$) and year.

Panel (b) shows the evolution of the logarithm of exports. As can be seen, the values for the periods $t-2$ to t are very close (around 0.5), and only at $t+1$ and $t+2$ do they show a significant jump (on average they reach a little above 1), to later stabilize between $t+2$ and $t+4$. The difference between the value exported between $t+2$ and $t-1$ is approximately 1 in the figure. In simple terms, it seems that the effect on exports occurs in the first two years of access to the FTA, and then there are no significant jumps in the value exported. This does not mean that firms stop requesting CoOs as of $t+2$, as panel (a) shows, and naturally exports could suffer a negative impact if they stop doing so (they would face tariffs). It is worth noting that this result (on exports) considers or controls for potential supply and demand shocks, which naturally affect export performance (if, for example, this were not done, the effect of access to the FTA would be overestimated, and the log of exports would go from less than 1 at t to almost 3.0 at $t+4$).

Finally, panel (c) of figure (9) shows that there is no effect on the number of products exported. This can be seen both because the average hardly varies in the years analyzed, and because the confidence bands include zero.

The evidence shown indicates that the FTA with China has had a favorable effect on exports. However, it does not answer the question: what would have happened if the FTA with China had

not been signed? Or, what is the impact of the FTA with China? In order to answer the questions, a methodology must be used where a counterfactual is constructed, or where a scenario of what would have happened without the FTA is created, and from this the impact can be measured. Naturally, to do this the literature is followed and the methodology is discussed in the next section.

4.4 Impact Estimation

4.4.1 Methodology

Given that exporters must make a decision whether or not to use tariff preferences, the methodology used must consider this point. As a basic estimator, it is proposed to use the propensity score matching (*Psm*), as in the literature on export promotion (Volpe Martincus and Carballo 2008 o Munch and Schaur 2018). In this literature, exporters must also decide whether to use the benefits or services offered by the State (in the Peruvian case, the services offered by PromPerú). In this study, exporters must decide whether to apply for a CoO. In simple terms, the estimate must consider the fact that there is a potential selection problem, since some firms will make use of the preferences derived from the FTA while other firms will not. This decision must be explained and must be taken into consideration when calculating the impact of the FTA on export performance.

Our estimates will be based on data at the transaction level (firm-product-year or ipt), and the definition of treatment will be made at the same level (ipt). In short, those firms that obtain a CoO, for a particular product and at a given moment in time, will be considered treated firms.

Similarly, Chávez, Cusato Novelli, and Perez Leon (2020) use a DiD matching approach (Heckman et al. 1997) to compare the change in exports before and after firms access an export subsidy (the drawback), with the firms of the control group (untreated or without subsidy). It is important to mention that the matching considers the differences in the distribution of covariates between firms that did or did not access the CoOs. Naturally, the ultimate goal of this matching is to make as close a comparison as possible between a treated firm and a firm that was not treated, but closely resembles the treated one. Thus, observable characteristics of the signatures are used to construct the best possible counterfactual: the firm(s) most similar to a treated firm. Naturally, when this procedure is carried out, the identification assumption is that it is possible to control for all the variables that affect the selection of the firm (access to the CoO) and the export performance, so that the comparison of the differences is due to the treatment (CoO) and not to endogenous selection (Heckman et al. 1999).

Second, by taking differences, the methodology allows time-invariant effects to be eliminated. For example, in Chávez, Cusato Novelli, and Perez Leon (2020) and in the present work, firm productivity estimates are not available, as in most of the export promotion literature. It can be argued that it is easier for the most productive firms to access a CoO, and this should be a variable to consider in the selection model. However, if productivity is assumed to change slowly over time, when performing the analysis in differences, time-invariant factors (such as productivity) would not affect the results. Naturally, this is a relatively strong assumption, and the literature has recognized that this could bias the impacts of export promotion policies upwards (Görg et al. 2008, Volpe Martincus and Carballo 2008, Volpe Martincus and Carballo 2010, Van Biesebroeck et al. 2016). In the case of this study, the same is true.

Formally, the estimator used is

$$\delta = \sum_{i \in \{I^t, Z\}} \left[\Delta x_{ip,t} - \sum_{j \in \{I^c, Z\}} \hat{v}_{ij} \Delta x_{jp,t} \right] v_{ij} \tag{4}$$

In this case t denotes the time, Z is the common support, I^t is the group of firms-products treated, I^c is the group of firm-products of control, i are those observations treated that belong to the common support, j are control observations that belong to the common support, $\hat{v}$ is the weight associated with the comparison between observation j with observation i ($\hat{v}$ depends on the matching estimator), v is the weight for the process that allows the reconstruction of the distribution of outcomes for the treated ones, and $\Delta x_{ip,t}$ is the change in the export performance indicator for observation i during period t.

As usual in this literature, other estimators should be used, such as the doubly-robust matching estimator (Wooldridge 2007). Examples of related literature are citet*exportprom2016, Defever, Reyes, Riano, and Varela (2020) or Chávez, Cusato Novelli, and Perez Leon (2020). An estimator with these characteristics is the inverse-probability-weighted regression-adjustment estimator ($Ipwra$), which is also reported in the results subsection. This estimator ensures that satisfactory results are found in the event that one of the two models (the one that explains the treatment or the one that explains the outcome of the export performance) is not well specified.

4.4.2 Data

There are different ways to define a treated firm. For this study, an ipt combination is defined as treated if firm i in year t registered any export associated with a certificate (CoO) for a type of product p. This condition can be written as $X_{ipt}^{CoO} > 0$. It does not matter if the firm requested the CoO for part or all of its exports of product p, it is enough that there is a fraction of exports of said product that received a certificate for said combination ipt for it to be considered as treated. In other words, if the exports to China of firm i and product p in year t are X_{ipt}, and it is the case that all these exports did not access the CoO, or $X_{pdt} > 0$ and $X_{pdt}^{CoO} = 0$, then these would be observations belonging to the control group. On the other hand, if exports with a certificate are positive and less than or equal to total exports, or $0 < X_{ipt}^{CoO} \leq X_{ipt}$, then they would belong to the treatment group. Therefore, the treatment is denoted as $\mathbb{T}(X_{ipt}^{CoO} > 0)$. Naturally, as in the rest of the document, this definition considers that product p must pay a positive MFN tariff in China in year t.

The related literature has used different definitions of treatment. For example, a stricter definition of treatment is the one used by Munch and Schaur (2018) or Chávez, Cusato Novelli, and Perez Leon (2020). In this case, the firms are treated if and only if they did not receive treatment in the previous period. For this study, this strict definition is not used in the base estimate, since the number of treated observations is substantially reduced.[20] A laxer definition is the one used by Van Biesebroeck, Konings, and Volpe Martincus (2016), where a firm is treated if in any year within a range of years the firm accessed a program (regardless of whether it did so once, twice,

[20] With the base definition, approximately 40% of the observations were treated, and if only a firm that was not treated at $t-1$ and $t-2$ is considered as treated, said proportion is reduced to less than half.

etc. or during the whole period). In a very similar way, Defever, Reyes, Riano, and Varela (2020) also use a laxer definition, when defining treatment to that firm that received the program at any time after its start.

To analyze the evolution of exports, $\ln(X_{ipt}) - \ln(X_{ipt-1})$ is used, or the change in the logarithm of exports for product p and firm i between t and $t-1$. The RUC of the exporting firm is used and the $hs6$ classification to define the product. To analyze the exit probability of an exporting firm i that exported product p, the indicator function $\mathbb{1}(X_{ipt+1} = 0 \mid X_{ipt} > 0 \;\&\; X_{ipt-1} > 0 \;\&\; X_{ipt-2} > 0)$ is used, which takes the value of one when a company stops exporting in the following year $(t+1)$, conditioned to the fact that it exported in the current year and in the two previous ones (in t, $t-1$ and $t-2$), and takes the value of zero otherwise. Finally, it is also evaluated whether the firms increased the number of different products they export to China, and for this, $\ln(n^p_{it}) - \ln\left(n^p_{it-1}\right)$ is used, which is an indicator of the growth in the number of exported products. In this case, n refers to the number of products exported to China with a different $hs6$ classification, associated with firm i in year t.

As previously discussed, the methodology to be used contemplates the estimation of a selection equation, to understand the predisposition of the firms to use the CoO. As usual in the literature on the evaluation of export promotion programs, indicators are used before treatment to predict such use. Three indicators are used: (i) the first lag (or the value of the year prior to treatment) of the logarithm of the number of products exported to different parts of the world by firm i; (ii) the first lag of the logarithm of an indicator of the range of the number of workers of company i; and (iii) the first lag of the growth of exports of product p of firm i, measured as the difference of logarithms. By including (i) in the selection equation, the methodology is trying to make a more precise comparison between firms, considering that firms may have different degrees of diversification (or number of products exported). Indicator (ii) seeks that, when making the comparisons, or when constructing the counterfactual, the size of the firms (measured with an indicator of the number of workers) is similar between treated firms and control firms. Indicator (iii) seeks that the pre-treatment trends, or state of the previous growth of the firms, be relatively similar when making the comparisons.

4.4.3 Selection Model

The estimators used seek to make a comparison between the firms that had access to the tariff benefits of the FTA with China with those firms that did not have access to them.

Table 5: Selection Model and Matching Quality Indicators (E)

	Dependent variable: $\mathbb{T}\left(X_{ipt}^{CoO} > 0\right)$									
			Mean treat.	Mean. control	Standardized differences			Variance ratio		
	Coef.	SE	Pre-E	Pre-E	Pre-E	Post-E *Psm*	Post-E *Ipwra*	Pre-E	Post-E *Psm*	Post-E *Ipwra*
$\ln(\#prod_{t-1})$	-0.045	0.041	1.706	1.647	0.055	0.003	0.004	1.229	0.973	1.200
$\ln(\#trabaj_{t-1})$	0.443***	0.065	1.527	1.338	0.282	0.000	0.005	0.763	0.998	1.045
$\ln(X_{t-1}) - \ln(X_{t-2})$	-0.008	0.030	0.226	0.262	-0.026	-0.014	0.007	0.899	0.853	0.945
Observations	2,519		1,477	1,042						
Pseudo R^2 (before/after matching): 0.015 / 0.000										
χ^2 test (before/after matching): 49.77 / 0.16										
χ^2 test p-value (before/after matching): 0.000 / 0.984										
Imai-Ratkovic overidentification test p-value (H_0: covariates are balanced): 0.4877										

Notes: Pre-E denotes pre-match and Post-E denotes post-match. *Psm* denotes propensity score matching and *Ipwra* denotes inverse-probability-weighted regression-adjustment. Statistical significance $^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$.

To do this, table (5) shows the selection or prediction model of access to CoOs, and basically what it shows is that after the matching procedure (a counterfactual is constructed), there are no systematic differences between the two groups (the treaty and the constructed counterfactual). While the differences in means are very evident in the case of the indicator of the number of workers, they are substantially reduced as a result of the matching. Similarly, the variance ratios also fall, except in the case of the number of products. Additionally, the pseudo R^2 and the test of the joint significance of the covariates of the selection model are also shown. As expected, the pseudo R^2 is reduced and the test goes from rejection to non-rejection of the null hypothesis as a result of the matching. Importantly, the overidentification test of Imai and Ratkovic (2014) does not reject the null hypothesis that the three covariates are balanced. This last test is important to guarantee that the inclusion of the three variables of the selection model provides the desired match.

4.4.4 Results

The results of the impact of the FTA with China (Average Treatment Effect on the Treated, ATET) are reported in table (6). The results of the estimation by *Psm* and *Ipwra* are reported, and for each case, the estimated coefficient (ATET), the standard error (clustered at the firm level), and the number of observations. The impacts were estimated on export growth, the exit of firms that export a particular product, and the growth of the number of products exported to China by a firm (the description of the variables is in the preceding section). Impacts were calculated for all available data and for a sample excluding minerals, metals, and hydrocarbons.

Table 6: Impact of tariff preferences on export performance

	Psm			*Ipwra*		
	Coef	S.E.	Obs.	Coef	S.E.	Obs.
EXPORT GROWTH						
$\ln(X_{ipt}) - \ln(X_{ipt-1})$	0.188***	0.056	2,519	0.110**	0.052	2,519
$\ln(X_{ipt}) - \ln(X_{ipt-1})$ / Sample	0.150**	0.058	2,069	0.105*	0.063	2,069
PROBABILITY THAT A FIRM STOPS EXPORTING A PRODUCT						
$\mathbb{1}(X_{ipt+1} = 0 \mid X_{ip\ t,\ t-1,\ t-2} > 0)$	-0.110***	0.026	2,113	-0.076***	0.018	2,113
$\mathbb{1}(X_{ipt+1} = 0 \mid X_{ip\ t,\ t-1,\ t-2} > 0)$ / Sample	-0.103***	0.029	1,734	-0.096***	0.023	1,734
GROWTH OF THE NUMBER OF PRODUCTS EXPORTED TO CHINA						
$\ln(n^p_{it}) - \ln(n^p_{it-1})$	0.014	0.017	2,519	0.008	0.017	2,519
$\ln(n^p_{it}) - \ln(n^p_{it-1})$ / Sample	-0.002	0.020	2,069	-0.001	0.021	2,069

Notes: The sample excludes minerals, metals and hydrocarbons. $\ln(X_{ipt})$ denotes the logarithm of the exports of firm i times product p in year t. $\mathbb{1}(X_{ipt+1} = 0 \mid X_{ip\ t,\ t-1,\ t-2} > 0)$ is an indicator function that refers to those firms i that export the product p, that they exported in the current year and in the two previous but do not export the following year. $\ln(n^p_{it})$ denotes the logarithm of the number of products exported to China by firm i in year t. *Psm* denotes propensity score matching and *Ipwra* denotes inverse-probability-weighted regression-adjustment. S. E. denotes standard errors, and Obs. denotes number of observations. Standard errors were clustered at the signature level. Statistical significance: $^{*}p < 0.10, ^{**}p < 0.05, ^{***}p < 0.01$.

The results show that the FTA with China increased the growth rate of exports between 10 and 18 percentage points (pp), depending on the estimator analyzed. The result is maintained both for the complete sample and for the one that excludes minerals, and the estimates are very similar in both cases. This result, which is the difference of the logarithm of the value of exports, is consistent with the event analysis. In the latter case, it was shown that the firms that accede to the FTA typically do so for several years, but that the effect on the increase in the value exported (around 100 pp or a difference of 1 in the log of exports) is centered on the first years. Naturally, the estimate of the impact via Psm or $Ipwra$ is the average of the impact of all the years in which the firm requested a CoO, and goes beyond the initial two years (where the event analysis shows no growth). A second reason why the base estimates are lower is because by using the Psm or $Ipwra$ estimators, a finer or fairer comparison is being made between those firms that accessed the CoOs, and those firms that did not access the CoOs but that are very similar to the beneficiaries in terms of export diversification, size of the firm, and past export growth.

Table (6) also shows a clear reduction in the probability of stopping exporting as a result of accessing the FTA. In this case, the chances of firm i stopping exporting product p, given that it exports in the current year and exported said product in the two preceding years, are reduced by between 7 and 11 pp. Again, the result holds if mineral products are excluded from the sample. When analyzing if the firms that acceded to the FTA increased the number of products exported to China, we do not find any impact.

5. Conclusions

Among the different benefits associated with signing an FTA is the reduction of tariffs between the signatory countries, which potentially facilitates the work of exporters from both countries. This study seeks to answer two questions about the FTA between Peru and China, which has been in force for a decade. What has been the degree of use of the tariff preferences granted by China

to Peruvian exporters? What has been the impact of these tariff preferences granted by China on indicators of the export performance of Peruvian firms?

To answer the first question, it must be considered that for an exporter to avail himself of the tariff benefits of the FTA, he must meet a group of requirements, which ultimately end up constituting a cost to access the tariff reduction offered by the FTA. Exporters analyze the benefits and associated costs, and if they choose to apply for tariff reduction in China, they must present a document called a Certificate of Origin. Using detailed information about these certificates, this paper has been able to identify the Peruvian firms that have availed themselves of the benefits of the FTA to export a particular product to China. Now, to estimate the benefits of the FTA, those products where the tariff was reduced or eliminated have been considered, and those products where it was not necessary for the exporter to request a certificate, simply because the tariffs that had to be paid in China (without FTA) were equal to zero were not considered. From this information, the paper calculates what is called the utilization ratio, which is nothing more than the division of the transactions benefited by the FTA, over all those transactions that could potentially benefit. Thus, for example, a utilization ratio of 50% would indicate that only half of the benefits that the FTA offered in terms of tariff reduction were taken advantage of.

There are several alternative ways to calculate the utilization ratio. The simplest way is to add the value of all the benefited exports in a particular year and divide it by all the exports that could benefit, or all the eligible exports. Thus, the ratio goes from a relatively low level at the beginning of the decade, around 5% in 2013, to a level of 95% in 2019, the year before the pandemic. This ratio was calculated based on the products that were eligible to be exported with tariff reductions, and these represented around 3 billion dollars in 2018, a small fraction of the total exported to China (13 billion dollars). The difference between the total exported and the eligible products are those products where China does not charge tariffs, with or without FTA.

An aggregate utilization ratio of 95% hides the significant heterogeneity that characterizes international trade patterns, which are highly influenced by large exporting companies. Therefore, given the availability of detailed information on the certificates, it was possible to calculate the utilization ratio at the level of each firm. That is, the total exported with tariff benefits at the firm level, over the total exports of the same firm that were eligible to receive such benefits. Taking a simple average of the utilization ratio at the firm level, it takes a value of 74% for 2019 (20 points below the aggregate ratio). This indicates that the high value of the aggregate utilization ratio is being explained by the presence of large exporters. When disaggregating the analysis by firm size, and when comparing the types of companies (micro, small, medium, and large), it is corroborated that the increase in the utilization ratio has been explained mostly by the largest firms, which tripled their probability of having high utilization compared to low utilization during the analysis period (2014-2019).

The analysis of the utilization ratio at the firm level also allows us to understand what happened at the sector level. Outside of exports of metals and mineral products (which represented 86.6% of exports to China in 2019), the rest of exports to China are concentrated in animals, animal products, vegetable products and balanced feed (which represent 12.6% of the total exported and reached 1,666 million dollars in 2019). For these sectors and discarding all those products that without the FTA would pay zero tariff, the average aggregate utilization rate of the sector fluctuated between 90% and 95%, while that calculated at the firm level averaged between 80% and 84%. Looking at the detail of these sectors, a total of 137 firms used the FTA very little (with usage rates at the firm level of less than 25%), out of a universe of 467 firms. In short, almost a third of the

firms in these crucial sectors in the relationship with China made minimal use of the benefits of the treaty.

The second question that this paper seeks to answer is what happened to the firms that did agree to the tariff reductions provided by the FTA. For this, matching techniques were used at the firm level, to build a counterfactual or a scenario that sheds light on what would have happened if those same firms had not enjoyed the tariff reductions. Thus, to construct the counterfactual, firms that had a level of export diversification similar to the firms that obtained the certificates, firms that registered a similar firm size measured through the number of workers, and firms that had a similar past export growth were considered. Three indicators of export result or performance were evaluated, the growth of exports, the probability that a firm stops exporting a particular product considering that it had done so during the previous three years, and finally the growth in the number of products exported to China.

The results of the analysis indicate that the firms that accessed the benefits of the FTA had a higher export growth per year. In particular, the firms that accessed the certificates registered an annual growth in the value of their exports of around 10 additional percentage points in relation to the export growth of the counterfactual firms. Second, those firms that accessed the benefits of the FTA had a reduction of approximately 7 percentage points in the probability of stopping exporting. Finally, no differences were found in the growth of the number of exported products. For this reason, in this first decade of validity of the FTA between Peru and China, the benefits of the agreement have focused on the growth of exported value and the resilience of exporting firms, rather than on indicators associated with export diversification. Naturally, given these positive results and focusing on the main sectors of the relationship with China, it is worth asking why almost a third of exporting firms have a very low degree of use of the benefits of the FTA. We leave this question open for future research.

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Annex A: Structure of used data

Table 7: Fields received from the register of certificates of origin (COO)

Order	Description
1	Certificate number
2	Name and adress of the exporter
3	Name and adress of the remittee
4	Transport route (as far as known)
5	Date of departure
6	Vessel/flight/train/vehicle number
7	Loading port
8	Discharge port
9	Item number
10	Number and types of packages; description of the goods
11	HS product code (6 digits)
12	Origin criteria
13	Gross weight
14	Invoice number and date
15	Billed amount
16	Country of production
17	Importer country
18	Declaration date
19	Certificate date

Source: MINCETUR

Table 8: Fields included in the public databases of the SUNAT-Customs export registry

Field name	Description
CADU	customs code
FANO	year
NDCL	shipping order number
FNUM	date numbering
FEMB	shipping date
FECH_RECEP	receipt date of the declaration
NDCLREG	declaration number
FREG	regularization date
FANOREG	year of export regularization
NDOC	ruc
CPAIDES	destination country - country where the merchandise will arrive
CPUEDES	destination port - the first stopover port
CVIATRA	transport route
CUNITRA	transport unit
CEMPTRA	transport company
DMAT	ship registration
NCON	knowledge number
CENTFIN	financial entity
NSER	series number
PART_NANDI	entry
DCOM	commercial description
DMER2	commercial description
DMER3	commercial description
DMER4	commercial description
DMER5	commercial description
VFOBSERDOL	fob value
VPESNET	series net weight
VPESBRU	series gross weight
QUNIFIS	quantity exported
TUNIFIS	unit of measurement
QUNICOM	trade unit quantity
TUNICOM	trade unit type

Fuente: SUNAT-customs

Table 9: HSx classification - Aggregation of 2-digit Harmonized System (HS) product codes

HSX code	Description	HS codes (2 digits)	
		From	Up to
1	Animals and animal products	1	5
2	Vegetable products	6	15
3	Food products	16	24
4	Mineral products	25	27
5	Plastic and rubber	28	38
6	Chemical products	39	40
7	Leather and fur	41	43
8	Wood and wood products	44	49
9	Textiles	50	63
10	Footwear and accessories	64	67
11	Glass/stones	68	71
12	Metals	72	83
13	Machinery/electric equipment	84	85
14	Transport	86	89
15	Miscellaneous	90	97
16	Services	98	99

Fuente: Ahn et al. (2011)

Annex B: CoO data and customs registration matching

The procedure of matching data from the CoO and the customs registry is complex due to the number of inconsistencies between common variables in both registries. In the first place, there is a wide variety of styles used to fill in the names of the vehicles used to transport the products (e.g. the name of the container ships, or the codes and number of flights in the case of exports carried out via aerial).

Second, the number of invoices accompanying the export declarations varies from one register to another. For example, the invoice "001-003-00435" is specified in the DAMs register and the corresponding invoice in the CoO register appears as "F3-435". Once verified that the exporter, the date of shipment, and the name of the vehicle match, it is possible to conclude that both invoices are the same and therefore the matching can be carried out. The reason for these differences is that, in the first case, the invoices that appear in the DAMs registry are entered by the customs agencies that are responsible for filling out the export declarations, and these entities are more likely to place the complete information according to SUNAT requirements. For their part, the CoOs are filled by decentralized entities that do not necessarily follow a common standard.

Thirdly, although the date of dispatch of the product appears in the CoO registry, and this 'should' coincide with the date of dispatch of the customs declaration, what is reported in the CoO is tentative since in most cases, this certificate is issued before the date on which the dispatch actually takes place. In the event of any delay in the process of going through customs, the final clearance date may vary, and it has been found in these cases that variation occurs more frequently between 1 and 2 weeks after the date that appears in the CoO.

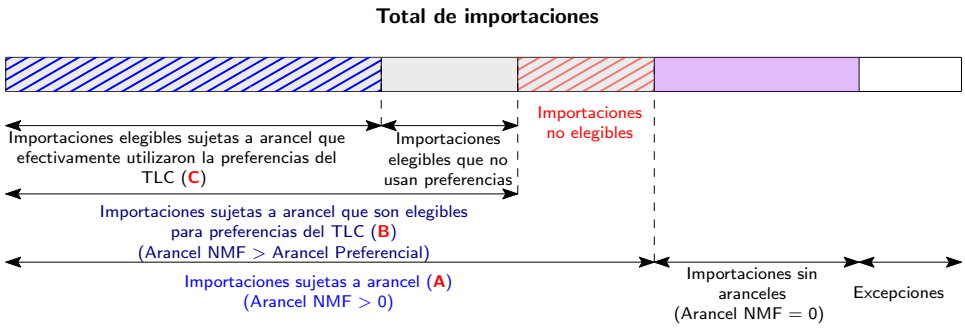
There are other factors that make this match difficult. For example, cases have been detected of products that claimed a CoO under an HS6 code, but that, in reality, in the customs database, the record corresponding to that transaction (identifying it according to the exporter, date of shipment, number and date of invoice) appears with another HS6 code. This may be due to errors in the registry or corrections made by SUNAT when processing the export declaration. Likewise, some transactions have been detected that appear in the CoO registry and that appear in the customs registry, but with a destination other than China. These transactions are usually listed as being sent to countries close to China, such as Taiwan or Korea. The reasons for this apparent error may range from errors in the registration by the customs agent, to commercial practices that imply the use of a transport route that requires the nationalization of the product in a neighboring economy to later be transported by land, for example, to the final destination, which would be a Chinese port.

For these reasons, the pairing is carried out in multiple stages, in hierarchical steps that seek to relax the criteria on the basis of which it is concluded that a CoO is associated with a particular DAM. [21] Once the pairing process is complete, the quality of the pairing should be verified. A first way to verify this quality is by identifying those observations in the CoO database that have been effectively matched with the customs record. So far, approximately 17% of the CoO observations in a given year are not paired (with the exception of the year 2020, when this proportion rises to 31%), but given that work continues on this procedure, this proportion should be reduced for the final version of this research.

[21] So far there are more than 20 criteria.

Annex C: Additional tables and figures

Figure 10: Tariff preferences indicators



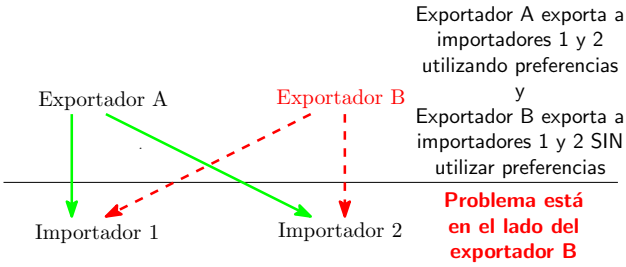
$$\text{Tasa de cobertura} = \frac{B}{A} \times 100$$

$$\text{Tasa de utilización} = \frac{C}{B} \times 100$$

Source: Based on Cheong (2010)

Figure 11: The microstructure behind preference utilization

(a) Problems on the exporter side



(b) Problems on the importer side

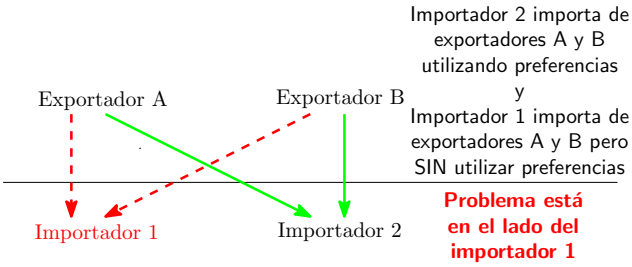


Table 10: Exported value, number of exporters and number of products - Peruvian exports to China

	Total			Elegible products		
	(1) FOB value (thousands of USD)	(2) # of firms (rucs)	(3) # of products (hs6)	(4) FOB value (thousands of USD)	(5) # of firms (rucs)	(6) # of products (hs6)
2014	7,044	537	255	1,222	446	212
2015	7,452	494	240	1,337	409	202
2016	8,557	487	241	1,772	419	192
2017	11,342	523	343	2,598	425	258
2018	13,232	560	332	3,040	464	262
2019	13,213	600	342	2,766	478	230
2020	12,326	590	272	2,141	432	199

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 11: Fields available in the COO record of the Directorate of Origin of MINCETUR

variable	Pacific Alliance	China	Costa Rica	AELC	EU	Honduras	Japon	Mexico	Panama	Singapur	Tailandia	Total
# coo	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11
coo date	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11
declaration date	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11
criteria	✓	✓	✓			✓	✓	✓	✓	✓	✓	9
exporter ruc	✓		✓			✓		✓	✓			5
exporter name	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11
tax id importer	✓		✓			✓		✓	✓			5
importer name	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11
country	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11
# item	✓	✓	✓	✓		✓	✓		✓		✓	8
HS6	✓	✓	✓			✓	✓	✓	✓	✓	✓	8
quantity	✓	✓										2
unit of quantity	✓	✓										2
# of invoice	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11
invoice date	✓	✓		✓	✓		✓	✓		✓	✓	8
billed amount		✓	✓			✓			✓			4
description	✓		✓			✓		✓	✓	✓	✓	7
shipping date		✓		✓			✓				✓	4
vehicle id		✓										1
cargo transport mode		✓			✓		✓				✓	4
entry port		✓			✓		✓				✓	4
unloading mode of transport		✓			✓		✓				✓	4
discharge port		✓			✓		✓				✓	4
# packages		✓										1
gross weight		✓		✓	✓		✓				✓	5
gross weight unit				✓	✓		✓				✓	4
mode of transportation												0
description 1				✓	✓							2
description 2				✓	✓							2
description 3				✓	✓							2
transport details				✓	✓		✓					3
# of packages							✓					1
comments							✓					1

Note: The highlighted fields are those that allow this data to be matched with the data from the SUNAT Customs registry.

Notes: Simple averages. Source: Trains (UNCTAD).

Table 12: Mean MFN tariff of China (% *ad valorem*)

HSX	2014	2015	2016	2017	2018	2019	2020
01 Animals and animal products	12.0	12.0	12.3	11.8	11.7	10.1	10.2
02 Vegetable products	11.9	12.0	13.9	16.7	17.7	19.0	18.6
03 Food products	5.1	4.3	4.3	4.4	4.5	4.1	4.1
04 Mineral products	0.2	0.3	0.1	0.1	0.0	0.0	0.1
05 Chemical products	6.0	6.1	6.3	6.3	6.5	6.8	6.5
06 Plastic and rubber	6.9	7.3	7.7	7.5	8.6	8.6	8.0
07 Leather and fur	7.5	6.5	6.8	9.3	16.4	8.9	8.8
08 Wood and wood products	2.5	3.0	2.4	3.6	3.5	3.7	3.2
09 Textiles	7.0	8.8	9.3	9.3	10.1	6.1	6.0
10 Footwear and accessories	0.0	18.0	0.0	17.8	18.9	7.0	7.0
11 Glass/stones	13.0	10.9	13.9	12.5	16.1	7.5	8.7
12 Metals	0.7	0.6	2.4	3.1	2.6	2.7	2.3
13 Machinery/electric equipment	7.5	6.3	4.3	5.2	6.6	2.9	2.5
14 Transport	12.0	12.7	11.3	22.3	16.0	6.0	6.0
15 Miscellaneous	8.4	8.2	8.1	9.8	2.6	6.6	1.0

Note: The treaty enters into force on March 1, 2010. Source: Annex 2 of the Free Trade Agreement between the Government of the Republic of Peru and the Government of the People's Republic of China.

Table 13: Tariff reduction calendar for baskets considered in the Peru-China FTA

				Year since start of FTA																
Basket	# HS8 lines	Liberalization	Stages	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
A	4,744	immediate (0% tariff)																		
B	900	equal step reduction	5	80%	60%	40%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
C	1,558	equal step reduction	10	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%	0%	0%	0%	0%	0%	0%	0%
D	422	exempt		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
E	5	preferential margin		3%	3%	5%	7%	7%	5%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	0%
F	14	equal step reduction	8	88%	75%	63%	50%	38%	25%	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
G	24	equal step reduction	12	92%	83%	75%	67%	58%	50%	42%	33%	25%	17%	8%	0%	0%	0%	0%	0%	0%
H	12	equal step reduction	15	93%	87%	80%	73%	67%	60%	53%	47%	40%	33%	27%	20%	13%	7%	0%	0%	0%
I	20	equal step reduction	17	94%	88%	82%	76%	71%	65%	59%	53%	47%	41%	35%	29%	24%	18%	12%	6%	0%
K	1	applied tariff		8%	7%	5%	4%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
L	1	applied tariff		1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Annex C.1: Data by sectors

Table 14: Peruvian exports to China - Animals and animal products

	Total			Eligible products		
	(1) FOB value (thousands of USD)	(2) # of firms (rucs)	(3) # of products (hs6)	(4) FOB value (thousands of USD)	(5) # of firms (rucs)	(6) # of products (hs6)
2014	34	87	15	34	87	14
2015	25	75	17	25	73	14
2016	24	68	17	23	66	11
2017	35	87	20	33	84	14
2018	51	101	27	50	97	21
2019	201	127	25	199	122	18
2020	77	90	20	58	82	15

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 15: Peruvian exports to China - Vegetable products

	Total			Eligible products		
	(1) FOB value (thousands of USD)	(2) # of firms (rucs)	(3) # of products (hs6)	(4) FOB value (thousands of USD)	(5) # of firms (rucs)	(6) # of products (hs6)
2014	168	170	19	168	163	16
2015	144	171	35	143	159	31
2016	112	164	32	112	158	27
2017	185	163	35	184	156	29
2018	219	190	43	216	181	34
2019	234	200	36	233	194	31
2020	232	200	33	193	171	29

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 16: Peruvian exports to China - Food products

	Total			Eligible products		
	(1) FOB value (thousands of USD)	(2) # of firms (rucs)	(3) # of products (hs6)	(4) FOB value (thousands of USD)	(5) # of firms (rucs)	(6) # of products (hs6)
2014	854	72	19	854	72	19
2015	982	68	15	982	68	15
2016	755	63	13	755	63	13
2017	1,146	64	16	1,146	64	16
2018	1,370	66	26	1,369	64	22
2019	1,231	61	27	1,230	59	24
2020	957	56	19	827	52	17

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 17: Peruvian exports to China - Mineral products

	Total			Eligible products		
	(1) FOB value (thousands of USD)	(2) # of firms (rucs)	(3) # of products (hs6)	(4) FOB value (thousands of USD)	(5) # of firms (rucs)	(6) # of products (hs6)
2014	4,857	64	21	19	9	6
2015	5,259	56	16	13	6	4
2016	6,774	58	20	1	5	5
2017	8,734	58	20	2	3	3
2018	10,248	63	19	67	8	7
2019	10,455	68	16	21	3	2
2020	9,712	70	16	1	4	3

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 18: Peruvian exports to China - Chemical products

	Total			Eligible products		
	(1) FOB value (thousands of USD)	(2) # of firms (rucs)	(3) # of products (hs6)	(4) FOB value (thousands of USD)	(5) # of firms (rucs)	(6) # of products (hs6)
2014	17	25	21	16	24	20
2015	10	24	18	9	22	16
2016	17	25	19	17	23	18
2017	21	29	23	21	25	19
2018	22	32	24	22	26	19
2019	19	34	25	19	23	16
2020	17	22	20	15	19	15

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 19: Peruvian exports to China - Plastic/rubber

	Total			Eligible products		
	(1) FOB value (thousands of USD)	(2) # of firms (rucs)	(3) # of products (hs6)	(4) FOB value (thousands of USD)	(5) # of firms (rucs)	(6) # of products (hs6)
2014	7	26	16	7	26	16
2015	1	16	14	1	16	14
2016	1	17	12	1	16	11
2017	1	18	17	1	15	14
2018	1	15	16	1	15	16
2019	0	16	14	0	10	9
2020	1	17	16	1	15	15

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 20: Peruvian exports to China - Fur and leather

	Total			Eligible products		
	(1) FOB value (thousands of USD)	(2) # of firms (rucs)	(3) # of products (hs6)	(4) FOB value (thousands of USD)	(5) # of firms (rucs)	(6) # of products (hs6)
2014	7	17	11	7	17	11
2015	22	17	11	22	17	11
2016	18	18	9	18	18	9
2017	14	17	14	14	16	13
2018	4	8	8	4	7	7
2019	1	13	8	1	12	7
2020	1	7	3	1	7	3

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 21: Peruvian exports to China - Wood and wood products

	Total			Eligible products		
	(1) FOB value (thousands of USD)	(2) # of firms (rucs)	(3) # of products (hs6)	(4) FOB value (thousands of USD)	(5) # of firms (rucs)	(6) # of products (hs6)
2014	66	64	18	42	39	8
2015	56	54	7	49	45	5
2016	61	50	14	51	44	8
2017	57	57	21	51	39	11
2018	52	44	14	47	30	6
2019	51	40	14	43	32	9
2020	35	46	12	23	24	7

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 22: Peruvian exports to China - Textiles

	Total			Eligible products		
	(1) FOB value (thousands of USD)	(2) # of firms (rucs)	(3) # of products (hs6)	(4) FOB value (thousands of USD)	(5) # of firms (rucs)	(6) # of products (hs6)
2014	33	28	36	33	27	35
2015	26	25	43	26	25	43
2016	22	38	35	22	37	34
2017	61	43	73	61	40	70
2018	68	46	70	68	44	68
2019	29	35	48	29	34	47
2020	27	87	46	22	73	43

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 23: Peruvian exports to China - Footwear and accessories

	Total			Eligible products		
	(1) FOB value (thousands of USD)	(2) # of firms (rucs)	(3) # of products (hs6)	(4) FOB value (thousands of USD)	(5) # of firms (rucs)	(6) # of products (hs6)
2015	0	1	1	0	1	1
2017	0	6	2	0	5	2
2018	0	5	3	0	5	3
2019	0	2	1	0	2	1
2020	0	3	1	0	3	1

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 24: Peruvian exports to China - Glass/stone

	Total			Eligible products		
	(1) FOB value (thousands of USD)	(2) # of firms (rucs)	(3) # of products (hs6)	(4) FOB value (thousands of USD)	(5) # of firms (rucs)	(6) # of products (hs6)
2014	0	11	13	0	11	13
2015	0	5	4	0	5	4
2016	0	9	10	0	9	10
2017	0	12	15	0	7	11
2018	1	11	11	1	11	11
2019	0	9	11	0	7	9
2020	0	7	9	0	7	8

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 25: Peruvian exports to China - Metals

	Total			Eligible products		
	(1) FOB value (thousands of USD)	(2) # of firms (rucs)	(3) # of products (hs6)	(4) FOB value (thousands of USD)	(5) # of firms (rucs)	(6) # of products (hs6)
2014	999	33	21	41	18	16
2015	924	26	21	65	13	15
2016	773	29	25	772	28	24
2017	1,087	33	32	1,085	29	25
2018	1,196	22	20	1,196	21	18
2019	990	30	38	990	26	24
2020	1,265	32	28	999	25	23

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 26: Peruvian exports to China - Machinery/electric equipment

	Total			Eligible products		
	(1) FOB value (thousands of USD)	(2) # of firms (rucs)	(3) # of products (hs6)	(4) FOB value (thousands of USD)	(5) # of firms (rucs)	(6) # of products (hs6)
2014	1	27	29	1	24	25
2015	1	21	25	1	17	19
2016	0	20	24	0	14	15
2017	1	25	35	0	14	19
2018	1	22	23	1	17	17
2019	1	38	53	0	21	19
2020	2	26	28	1	9	9

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 27: Peruvian exports to China - Miscellaneous

	Total			Eligible products		
	(1) FOB value (thousands of USD)	(2) # of firms (rucs)	(3) # of products (hs6)	(4) FOB value (thousands of USD)	(5) # of firms (rucs)	(6) # of products (hs6)
2013	0	4	4	0	4	4
2014	0	3	3	0	3	3
2015	0	6	4	0	6	4
2016	0	4	4	0	4	4
2017	0	4	4	0	4	4
2018	0	5	6	0	4	5
2019	0	7	6	0	5	5
2020	1	1	1	1	1	1
2021	0	2	2	0	2	2

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 28: Peruvian exports to China - Services

	Total			Eligible products		
	(1) FOB value (thousands of USD)	(2) # of firms (rucs)	(3) # of products (hs6)	(4) FOB value (thousands of USD)	(5) # of firms (rucs)	(6) # of products (hs6)
2013	0	8	10	0	8	10
2014	0	13	13	0	12	12
2015	0	8	8	0	8	8
2016	0	6	6	0	6	6
2017	1	14	15	1	14	15
2018	0	22	20	0	22	20
2019	0	19	19	0	19	19
2020	1	18	19	1	17	18
2021	0	11	7	0	11	7

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Annex C.2: Utilization ratio by sector

Table 29: Rate of utilization of preferences at firm level
Sector: Animals and animal products

	(1)	(2)	(3)	(4)	(5)
	Mean	Standard Dev.	p25	p50	p75
2014	0.52	0.43	0.00	0.57	1.00
2015	0.70	0.44	0.16	1.00	1.00
2016	0.62	0.47	0.00	1.00	1.00
2017	0.73	0.42	0.35	1.00	1.00
2018	0.67	0.45	0.00	1.00	1.00
2019	0.78	0.38	0.70	1.00	1.00
2020	0.81	0.37	0.93	1.00	1.00

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 30: Rate of utilization of preferences at firm level
Sector: Vegetable products

	(1) Mean	(2) Standard Dev.	(3) p25	(4) p50	(5) p75
2014	0.54	0.45	0.00	0.63	1.00
2015	0.75	0.42	0.52	1.00	1.00
2016	0.77	0.42	0.95	1.00	1.00
2017	0.81	0.39	1.00	1.00	1.00
2018	0.80	0.40	1.00	1.00	1.00
2019	0.80	0.39	1.00	1.00	1.00
2020	0.89	0.31	1.00	1.00	1.00

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 31: Rate of utilization of preferences at firm level
Sector: Food products

	(1) Mean	(2) Standard Dev.	(3) p25	(4) p50	(5) p75
2014	0.55	0.40	0.00	0.63	1.00
2015	0.77	0.40	0.83	1.00	1.00
2016	0.74	0.41	0.57	1.00	1.00
2017	0.83	0.37	1.00	1.00	1.00
2018	0.78	0.41	1.00	1.00	1.00
2019	0.79	0.41	1.00	1.00	1.00
2020	0.64	0.48	0.00	1.00	1.00

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 32: Rate of utilization of preferences at firm level
Sector: Mineral products

	(1) Mean	(2) Standard Dev.	(3) p25	(4) p50	(5) p75
2014	0.38	0.47	0.00	0.00	0.91
2015	0.33	0.51	0.00	0.00	0.98
2016	0.30	0.45	0.00	0.00	0.50
2017	0.33	0.58	0.00	0.00	1.00
2018	0.13	0.35	0.00	0.00	0.00
2019	0.33	0.58	0.00	0.00	1.00
2020	0.25	0.50	0.00	0.00	0.50

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 33: Rate of utilization of preferences at firm level
Sector: Chemical products

	(1) Mean	(2) Standard Dev.	(3) p25	(4) p50	(5) p75
2014	0.24	0.30	0.00	0.09	0.43
2015	0.61	0.50	0.00	1.00	1.00
2016	0.52	0.48	0.00	0.67	1.00
2017	0.66	0.47	0.00	1.00	1.00
2018	0.65	0.49	0.00	1.00	1.00
2019	0.69	0.47	0.00	1.00	1.00
2020	0.58	0.50	0.00	1.00	1.00

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 34: Rate of utilization of preferences at firm level
Sector: Plastic/rubber

	(1) Mean	(2) Standard Dev.	(3) p25	(4) p50	(5) p75
2014	0.06	0.15	0.00	0.00	0.00
2015	0.24	0.44	0.00	0.00	0.00
2016	0.39	0.49	0.00	0.00	1.00
2017	0.24	0.40	0.00	0.00	0.37
2018	0.17	0.38	0.00	0.00	0.00
2019	0.08	0.29	0.00	0.00	0.00
2020	0.09	0.30	0.00	0.00	0.00

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 35: Rate of utilization of preferences at firm level
Sector: Fur and leather

	(1) Mean	(2) Standard Dev.	(3) p25	(4) p50	(5) p75
2014	0.16	0.33	0.00	0.00	0.00
2015	0.65	0.46	0.00	1.00	1.00
2016	0.58	0.46	0.00	0.82	1.00
2017	0.45	0.49	0.00	0.00	1.00
2018	0.56	0.49	0.00	0.80	1.00
2019	0.83	0.34	0.91	1.00	1.00
2020	0.71	0.49	0.00	1.00	1.00

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 36: Rate of utilization of preferences at firm level
Sector: Wood and wood products

	(1) Mean	(2) Standard Dev.	(3) p25	(4) p50	(5) p75
2014	0.40	0.41	0.00	0.31	0.79
2015	0.93	0.25	1.00	1.00	1.00
2016	0.81	0.39	1.00	1.00	1.00
2017	0.82	0.39	1.00	1.00	1.00
2018	0.93	0.24	1.00	1.00	1.00
2019	0.82	0.37	0.99	1.00	1.00
2020	0.82	0.38	1.00	1.00	1.00

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 37: Rate of utilization of preferences at firm level
Sector: Textiles

	(1) Mean	(2) Standard Dev.	(3) p25	(4) p50	(5) p75
2014	0.38	0.42	0.00	0.20	1.00
2015	0.86	0.35	1.00	1.00	1.00
2016	0.64	0.48	0.00	1.00	1.00
2017	0.79	0.40	1.00	1.00	1.00
2018	0.73	0.43	0.32	1.00	1.00
2019	0.69	0.45	0.00	1.00	1.00
2020	0.39	0.48	0.00	0.00	1.00

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 38: Rate of utilization of preferences at firm level
Sector: Footwear and accessories

	(1) Mean	(2) Standard Dev.	(3) p25	(4) p50	(5) p75
2015	1.00		1.00	1.00	1.00
2017	0.80	0.45	1.00	1.00	1.00
2018	1.00	0.00	1.00	1.00	1.00
2019	1.00	0.00	1.00	1.00	1.00
2020	0.00	0.00	0.00	0.00	0.00

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 39: Rate of utilization of preferences at firm level
Sector: Glass/stone

	(1) Mean	(2) Standard Dev.	(3) p25	(4) p50	(5) p75
2014	0.33	0.49	0.00	0.00	1.00
2015	0.20	0.45	0.00	0.00	0.00
2016	0.17	0.39	0.00	0.00	0.00
2017	0.04	0.16	0.00	0.00	0.00
2018	0.56	0.50	0.00	1.00	1.00
2019	0.33	0.49	0.00	0.00	1.00
2020	0.22	0.44	0.00	0.00	0.00

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 40: Rate of utilization of preferences at firm level
Sector: Metals

	(1) Mean	(2) Standard Dev.	(3) p25	(4) p50	(5) p75
2014	0.04	0.13	0.00	0.00	0.00
2015	0.13	0.34	0.00	0.00	0.00
2016	0.17	0.38	0.00	0.00	0.00
2017	0.14	0.35	0.00	0.00	0.00
2018	0.27	0.45	0.00	0.00	1.00
2019	0.19	0.39	0.00	0.00	0.00
2020	0.21	0.40	0.00	0.00	0.00

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Table 41: Rate of utilization of preferences at firm level
Sector: Machinery/electric equipment

	(1) Mean	(2) Standard Dev.	(3) p25	(4) p50	(5) p75
2014	0.04	0.19	0.00	0.00	0.00
2015	0.05	0.21	0.00	0.00	0.00
2016	0.00	0.00	0.00	0.00	0.00
2017	0.00	0.00	0.00	0.00	0.00
2018	0.05	0.22	0.00	0.00	0.00
2019	0.04	0.19	0.00	0.00	0.00
2020	0.20	0.42	0.00	0.00	0.00

Source: Data from definitive export regimes, database of certificates of origin compiled by the authors.

Annex D: About the authors

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