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Keywords: Safeguard, Export, Rice, European Union
JEL classification: F13, F63, O13

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The European Union's Safeguard for Rice Imports from Cambodia and Myanmar[†]

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Abstract

Following the rapid growth of Indica rice imports from Cambodia and Myanmar, the European Union (EU) adopted safeguard measures to reinstate the common-customs tariff rate of 175 euros per ton from 2019, with a progressive liberalization over three years. To estimate the impact of safeguard duties, this paper uses a sample of milled rice imports in 28 EU importers at the monthly level during 2017-2020 and adopts a standard triple differences approach. The results show that safeguard duties have a significantly negative impact on import values and quantity of affected goods, and a significantly positive impact on import prices. Safeguard duties appear to induce trade redirection to other third markets, but produce little substitution effects for EU rice producers.

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1. Introduction

Governments implement temporary trade policy measures such as anti-dumping (AD), anti-subsidy (AS), or safeguard duties to protect domestic industries from the adverse effects of dumping, subsidies, or a surge of import goods. Despite a continued reduction in applied import tariffs under multilateral and regional trade liberalization, the use of these trade policies has been growing in developed and developing economies (Bown, 2011). As compared with AD and AS measures, safeguard measures tend to impose duties on imports from any exporters to support inefficient domestic producers, which may increase a likelihood of trade disputes with trading partners. For this reason, the European Union (EU) has used safeguard measures only in limited cases (Vermulst and Graafsma, 2018). For instance, the EU measures for trade defense in force include 94 definitive AD measures, 15 AS measures, and only three safeguard measures at the end of 2019.[1] While prior work on EU temporary trade policies examines AD measures, there is a limited formal assessment of the EU safeguard measures (Ngyuen et al., 2017; Ketterer, 2018; Jabbour et al., 2019; Sandkamp, 2020).

In this paper, I seek to assess the impact of the EU's safeguard measures for imports of Indica rice from Cambodia and Myanmar. On February 16, 2018, Italy requested the European Commission (EC) to adopt safeguard measures for Indica rice originating in Cambodia and Myanmar because its imports into the EU market caused serious difficulties for EU producers of directly competing products. On March 16, 2018, the EC started a formal investigation to obtain information from EU producers, exporting millers, importers of Indica rice, and their association. The investigation supported the allegation that Cambodia and Myanmar exported rice products to the EU market in volume and at lower prices than EU producers. To remedy the deteriorating situation of EU millers, the EC proposed to reinstate the common-customs tariff rate of 175 euros per ton from 2019, with a progressive liberalization of 125 euros per ton over three years (EC, 2019).

In general, consumers do not make a strong distinction between the origins of rice, and their purchase is more responsive to the price than to the specific origins. Assuming that rice is a price-sensitive product and a pass-through effect of safeguard duties is positive for consumer prices, I predict that the price increase of imported rice would reduce the demand for rice imports from these countries. The EU safeguard should have a negative impact on EU import of Indica rice from Cambodia and Myanmar. Additionally, EU regulations indicate that safeguard duties do not apply to imports of products already

[1] See the 38th annual report from the commission to the council and the European parliament on the EU's anti-dumping, anti-subsidy and safeguard activities and the use of trade defense instruments by third countries targeting the EU in 2019.

on the way to the EU. Rice exporters would seek to avoid tariff increases by shipping a bulk of the affected Indica rice to the EU customs around the effective date of the safeguard duties, i.e., January 2019. Thus, I also predict a last-minute shipment effect of EU safeguard duties on EU imports of Indica rice from Cambodia and Myanmar. To identify the effects of safeguard duties, I examine a sample of semi-milled and milled rice imports in 28 EU importers from January 2017 to December 2020 at the monthly level.

The main results can be summarized as follows. First, the treatment effect of safeguard duties on the import values is significant and negative. The economic magnitude of the treatment effect is -74.8%, and thus remarkably large. Safeguard duties increased the import value of Indica rice from Cambodia/Myanmar in January 2019, consistent with a last-minute shipment effect. These results are confirmed in terms of import quantity. Second, there is evidence of country heterogeneity in treatment effects. The impact of the safeguard measure is substantially larger for Myanmar than for Cambodia, with a significant decline in Indica rice imports from Myanmar to northern EU markets. Additionally, I investigate whether safeguard measures produce a trade substitution effect. There is no evidence that rice exporters substituted husked Indica rice for milled Indica rice and milled rice exports from safeguard supporters replaced imports of milled Indica rice from Cambodia and Myanmar in non-supporting EU markets. However, I find a dramatic increase in China's import of milled rice from Myanmar from 2019, suggesting that a large amount of milled Indica rice that were previously imported from Myanmar to the EU might be redirected to the Chinese market.

This paper contributes to the related literature on the EU temporary trade policy in a following way. First, related studies focus on the impact of EU AD duties. Nguyen et al. (2017) assess the EU AD duties on footwear imports from Vietnam and find that Vietnamese firms diverted footwear exports to the U.S. market. Jabbour et al. (2019) investigate the EU AD duties on Chinese imports and find that the number of Chinese exporters declined, but surviving exporters increased productivity, employment and total exports. Sandkamp (2020) examines the impact of EU AD duties on import prices and quantity using the 2004 EU enlargement as a natural experiment and finds that the positive impact of AD duties on producer prices differs by exporting countries. Additionally, Ketterer (2018) examines the influence of AD investigations on product-level tariff changes in multilateral trade liberalization. Thus, there is little formal assessment on the impact of EU safeguard measures. Specifically, to the best of my knowledge, this paper provides the first formal assessment of the EU's safeguard duties on rice imports from Cambodia and Myanmar under the EU's Generalized System of Preferences (GSP).

The rest of this paper is structured as follows. Section 2 provides a background of EU

safeguard measures for rice imports originating in Cambodia and Myanmar. Section 3 presents an empirical framework for estimating the impact of safeguard duties on rice imports, followed by data description. Section 4 shows the estimation results and robustness checks. Finally, section 5 concludes.

2. Background

This section describes a background of EU safeguard measures for imports of Indica rice originating in Cambodia and Myanmar.[2] These countries are beneficiaries of the Everything But Arms (EBA) regime in the EU GSP and benefit from duty-free quota-free access to the EU market at the time of the EU safeguard investigation in 2018. The product concerned for the EU's safeguard measures in examination is semi-milled or milled Indica rice in the Combined Nomenclature (CN) codes 10063027, 10063048, 10063067, and 10063098.[3] These products are imported in the EU market either in bulk for milling, cleaning, and packaging, or in small bags for sale at retailers.

On February 16, 2018, Italy requested the EC to adopt safeguard measures for Indica rice originating in Cambodia and Myanmar because its imports into the EU caused serious difficulties for EU producers of directly competing products. Italy provided evidence that imports of Indica rice from Cambodia and Myanmar increased rapidly during the past period at lower import prices than those of EU producers. As the EU market shares of milled Indica rice declined significantly, these rice imports allegedly had an adverse effect on the EU producers and millers of Indica rice. Following Italy's request, the EC initiated a safeguard investigation to assess whether Cambodia and Myanmar exported Indica rice in volume and at prices to cause serious difficulties for EU producers and millers.

On March 16, 2018, the EC started a formal investigation to obtain information from EU producers, exporting millers, importers of Indica rice, and their association.[4] Specifically, the EC selected a sample of three Italian millers and one Spanish miller because Italy and Spain accounted for 50% and 30% of the total rice production in the EU, respectively. The EC also sent questionnaires to rice farmers in Italy and Spain and made verification visits to several farmers. The EC selected a sample of one exporting miller in Cambodia and three exporters in Myanmar. To verify the information obtained

[2] For details, see Commission Implementing Regulation (EU) 2019/67 of 16 January 2019 imposing safeguard measures with regard to imports of Indica rice originating in Cambodia and Myanmar/Burma.

[3] Indica and Japonica are the two major types of rice. The former is long grain rice that stays separate after cooking whereas the latter is round rice that sticks together after cooking.

[4] See Notice of initiation of a safeguard investigation concerning imports of Indica rice originating in Cambodia and Myanmar (2018/C 100/13).

from the questionnaires, the EC made verification visits to the sample millers in Italy and Spain and the rice association in Italy.

The EC confirmed the following findings on rice products during the investigation period from September 1, 2012 to August 31, 2017. First, the total consumption of Indica rice decreased from 1.06 million tons in 2012 to 0.99 million tons in 2017. EU imports of rice from Cambodia increased from 163.3 thousand tons in 2012 to 249.3 thousand tons in 2017, whereas imports from Myanmar increased from 2.0 thousand tons to 62.6 thousand tons during the same period. As a result, the market shares for Cambodia and Myanmar increased from 15.4% to 25.1% and from 0.2% to 6.3%, respectively. Import prices in euros per ton declined from 588.4 to 552.2 for Cambodia and from 420.0 to 405.4 for Myanmar, respectively. These import prices were significantly lower than EU-produced rice by 22% and 43%, respectively. These figures support the allegation that Cambodia and Myanmar exported rice products to the EU market in volume and at lower prices than EU producers.

To clarify the economic situation of EU producers, the EC shows that the production of Indica rice by EU producers decreased from 685.1 thousand tons in 2012 to 423.9 thousand tons in 2017. The total area of growing Indica rice in the EU also declined from 145.7 thousand hectares to 91.6 thousand hectares during the same period. To compete with the import pressure of low-priced rice, the sampled EU millers focused their sales on smaller volumes of semi-milled and milled Indica rice under branded products, rather than selling it under a private label to the distributors. A shift in their product mix increased the unit prices of the sampled millers by 7% during the investigation. These figures indicate a deterioration of the economic situation of the EU producers, which coincided with the rising market share of rice imports by Cambodia and Myanmar. Taken together, the EC concluded to warrant safeguard measures for import surges of Indica rice from Cambodia and Myanmar that cause serious difficulties for the EU producers.[5]

To remedy the deteriorating situation of EU producers, the EC proposed to reinstate the common-customs tariff rate on Indica rice imports from Cambodia and Myanmar for three years. However, the EC also suggested a progressive liberalization of the safeguard measures during the period because the EU initially granted Cambodia and Myanmar duty-free quota-free access in the EBA regime to support their sustainable development through international trade. These economies have low and non-diversified export bases

[5] The EC also examined whether the serious difficulties in EU millers are due to other factors including imports from other third countries, structural difficulties in the Italian rice sector, imports of paddy rice from Guyana, exports by EU producers, and EU farmers' shift of production from Indica to Japonica rice. However, the EC concluded that these other factors do not attenuate the causal link with rice imports from Cambodia and Myanmar.

and preferential treatment should contribute to employment creation in vulnerable situations. A progressive reduction of safeguard duties should have a sufficient effect to assist EU producers and gradually restore Indica rice exports from Cambodia and Myanmar. Specifically, the tariff duty in euros per ton is 175 for the first year, 150 for the second year, and 125 for the third year from the effective date of the safeguard measures in 2019. Additionally, the EC acknowledged a shipping clause in that safeguard duties are not imposed on the products already on their way to the EU market.

3. Empirical Framework and Data

3.1. Empirical Model

This section describes an empirical framework to assess the impact of EU safeguard measures on EU imports of Indica rice from Cambodia and Myanmar. As the end period of my sample is 2020, I examine safeguard duties of 175 euros per ton in 2019 and 150 euros per ton in 2020. These safeguard duties should increase the price of imported Indica rice from Cambodia and Myanmar in the EU market. In general, consumers do not make a strong distinction between the origins of rice, and their purchases should be more responsive to prices than to specific origins. Given that rice is a price-sensitive product and a pass-through effect of safeguard duties is positive for consumer prices, safeguard duties should reduce the demand for rice imports from these countries. Thus, my hypothesis is that the EU safeguard should decrease EU imports of Indica rice from Cambodia and Myanmar from the effective period of the EU safeguard measures. Additionally, I predict a shipping-clause effect of the EU safeguard. As mentioned in the previous section, the EU regulation published on January 16, 2019 indicates that safeguard duties do not apply to imports of products already on the way to the EU. As various interested parties involved in the EU safeguard duties made a request for the shipping clause, exporters would seek to avoid tariff increases by shipping a bulk of the affected Indica rice to the EU customs around the effective date of the safeguard duties, i.e., January 2019. For this reason, I predict a positive impact of the shipping clause on EU's imports of Indica rice from Cambodia and Myanmar.

To identify these effects of safeguard duties on EU imports, I examine a sample of semi-milled and milled rice imports in 28 EU importers from January 2017 to December 2020 at the monthly level.[6] Specifically, I estimate an empirical model for exporter *i*, EU importer *j*, product *p*, and time *t*:

$$\ln M_{ijpt} = \beta_0 + \beta_1 SC_{ipt} + \beta_2 SG_{ipt} + f_{ijp} + f_{ijt} + f_{jpt} + \varepsilon_{ijpt} \qquad (1)$$

[6] See Appendix Table 1 for sample product description in CN code 100630. Appendix Table 2 shows a list of sample exporting countries.

where M_{ijpt} is the value of imports for product *p* from exporter *i* to EU importer *j* in time *t*. Import products are defined at the 8-digit level within CN code 100630. Since import values capture the response of pricing and quantity to safeguard duties, I also use the quantity and unit values of milled rice imports as alternative dependent variables. SC_{ipt} is a dummy variable that takes on unity for import product *p* from Cambodia/Myanmar exporter *i* in January 2019, which is imposed by safeguard duties. This variable should capture the last-minute shipment effect of the shipping clause in the EU safeguard measures. SG_{ipt} is a dummy variable that takes on unity for import product *p* from Cambodia/Myanmar exporter *i* from February 2019 onward, which is imposed by safeguard duties. f_{ijp} is exporter-importer-product fixed effects to control for unobserved determinants of imports across exporters, importers, and products during my sample period. f_{ijt} is time-varying exporter-importer fixed effects to control for unobserved determinants of imports for exporter-importer pairs over time. f_{jpt} is time-varying importer-product fixed effects to control for unobserved importer-product-specific determinants of imports over time. Finally, ε_{ijpt} is an error term. I report standard errors corrected for clustering in exporters and products.

β_1 is a coefficient to measure the last-minute shipment effect of the shipping clause in EU safeguard measures for Indica rice imports from Cambodia and Myanmar. My hypothesis is that exporters may rush to deliver affected Indica rice to avoid safeguard duties, which lead to a sharp increase in Indica rice imports from Cambodia and Myanmar in January 2019. I predict that the coefficient is positive. Additionally, β_2 is a coefficient of main interest to measure the impact of safeguard duties on EU imports of Indica rice. As safeguard duties should decrease affected imports, I predict that β_2 is negative. In an empirical model, I adopt a triple-differences approach to identify the causal impact of safeguard duties. For instance, the first difference-in-differences compare changes in EU imports of Indica rice from Cambodia and Myanmar before and after February 2019 with changes in those from other exporters before and after February 2019. The second difference-in-differences compare changes in EU imports of non-Indica rice from Cambodia and Myanmar before and after February 2019 with changes in those from other exporters before and after February 2019. The impact of safeguard duties on EU imports is measured by comparing the first difference-in-differences for Indica rice imports with the second difference-in-differences for non-Indica rice imports.[7]

[7] As triple-differences estimation assumes parallel trends in imports between treatment and control groups, I estimated specification (1) with $SG_{ip,2018}$ or $SG_{ip,2017}$, and found insignificant coefficients for these variables. This suggests no evidence of significant differential trends between the treatment and control groups.

I seek to identify the treatment effects of EU safeguard measures by estimating the coefficients β_1 and β_2. It is crucial to discuss potential estimation bias in equation (1). To reduce omitted-variable bias arising from unobserved determinants of EU imports, I include a wide range of fixed effects in the model. The fixed effects f_{ijp} account for any time-fixed determinants across importers, exporters, and milled rice products during my study period. These include geography, cultivation area, transportation infrastructure, and consumer preferences for rice products. The fixed effects f_{ijt} control for any time-varying determinants in importers and exporters, including macroeconomic conditions, regional trade agreements, and political relation. Additionally, the fixed effects f_{ipt} address any time-varying determinants in importers and products, such as time-varying multilateral trade resistance, local competition for rice products, a change in local consumption of rice products, and local lobbying power for rice imports. These fixed effects should substantially remove the omitted-variable bias from the estimated treatment effects.

However, it is difficult to rule out omitted-variable bias arising from other unobserved determinants that correlate with a change in EU imports of Indica rice originating in Cambodia and Myanmar from January 2019. For instance, these determinants depend on changes following EU safeguard measures in January 2019, including the production capacity of exporting millers for Indica rice in Cambodia and Myanmar, their Indica rice exports to other markets, and political support for rice millers in these countries. Because the safeguard policy variables are perfectly collinear with time-varying exporter-product fixed effects, my data structure does not allow for removing these unobserved determinants of Indica rice exports in Cambodia and Myanmar. However, it is not clear as to a direction of bias from these combined effects. On the one hand, exporting millers in these countries may improve productivity in milling processes in response to temporary safeguard duties, which should reduce the negative impact of safeguard measures. Political support such as subsidies for exporting millers should also mitigate the safeguard impact. On the other hand, safeguard duties may induce exporting millers to shift their Indica rice exports from the EU to other third markets, which may magnify the negative effect of safeguard measures. These responses can offset each other, and thus may produce only weak systematic bias in the estimated treatment effects. Alternatively, I can interpret the treatment effect more broadly by assuming that the treatment effect of EU safeguard measures encompasses any of these consequent responses to Indica rice exports.

3.2. Data Description

Data on EU imports come from the Eurostat database. I use data on monthly import values and quantities for all EU member states at the CN 8-digit product level within CN code 100630, i.e., semi-milled or wholly milled rice. The sample includes 16 import products for 28 EU members as of January 2019 and 44 non-EU exporters from January 2017 to December 2020. To use the variation of imports across non-EU exporters, I exclude EU imports of milled rice from other EU exporters in the main sample.

Table 1 presents the trend in EU imports of milled rice from Cambodia and Myanmar for 2017-2020. Imports for safeguards and non-safeguards include milled Indica rice and other milled rice in CN code 100630, respectively. In panel A for Cambodia, import values of milled Indica rice decreased from 137.8 million euros in 2018 to 118.0 million euros in 2019 and 99.5 million euros in 2020. The import quantities decreased from 215.3 thousand tons in 2018 to 146.7 thousand tons in 2019 and 125.9 thousand tons in 2020. Measuring the price by the ratio of the values and quantity of import shipments, I find that the price of milled Indica rice increased from 654.6 euros in 2018 to 913.4 euros in 2019. There is no clear change in import values, quantity and price for other milled rice.

---Table 1 here---

In panel B for Myanmar, the import values of milled Indica rice decreased substantially from 52.3 million euros in 2018 to 16.8 million euros in 2019 and 0.2 million euros in 2020. Accordingly, the import quantity declined from 129.9 thousand tons in 2018 to 42.3 thousand tons in 2019 and 600 tons in 2020. Meanwhile, the import values of other milled rice increased from 11.5 million euros in 2018 to 43.5 million euros in 2019 and 65.3 million euros in 2020. The import quantity increased from 30.8 thousand tons in 2018 to 111.3 thousand tons in 2019 and 161.4 thousand tons in 2020. The import price of milled Indica and other rice appears to remain similar during this period. These figures show a dramatic decline in Indica rice imports and a subsequent increase in other Japonica rice imports.

Figure 1 presents graphical evidence for the impact of safeguard duties on EU imports of milled Indica rice from Cambodia and Myanmar.[8] The import values are normalized to take a value of 100 in December 2018. During 2018, similar trends are observed in the import values for Cambodia, Myanmar, and other exporters. When the EU safeguard measures were published in January 2019, there was a sharp increase in the import values of Indica rice originating in Cambodia and Myanmar. However, these import values decreased largely within a few months after the imposition of safeguard

[8] As EU imports of milled Indica rice from Cambodia and Myanmar do not increase immediately following the EC's announcement of a formal investigation, I do not find clear evidence of the announcement effect of safeguard investigation.

duties, which remained at a much lower level during the subsequent period. As compared with the decline in imports, the other imports do not exhibit any sharp change before and after the EU safeguard. Thus, the graphical evidence suggests that safeguard duties should cause a substantial change in EU imports from Cambodia and Myanmar.

---Figure 1 here---

Another key implication for my analysis is that similar trends in safeguard (treatment) and non-safeguard (control) imports appear to support a parallel-trends assumption in a difference-in-differences method to identify the causal effect of safeguard duties on imports. For instance, I implicitly assume that EU imports of milled Indica rice from other exporters represent counterfactual imports of the same product from Cambodia and Myanmar that would have prevailed in the absence of the EU safeguard measures. Without the EU safeguard, import trends would need to move in tandem between the treatment and control groups. However, the counterfactual trends in Indica rice imports from Cambodia and Myanmar are not observable, and thus it is not possible to prove whether the parallel-trends assumption is valid. In this respect, the similar import trends in the treatment and control groups before the EU safeguard support the assumption that these imports would exhibit similar trends in the absence of the EU safeguard. Additionally, I estimate a benchmark model that allows for a treatment-group-specific linear trend and test the null hypothesis that the coefficient of the group-specific linear trend is zero (Wing et al., 2018). I find no evidence to reject the null hypothesis.

4. Results

4.1. Main Results

Table 2 shows the summary statistics of the sample used in estimation. The number of observations is 9,058 for log import values and 8,713 for log import quantity and log price. The sample size is smaller for the latter two variables as information on quantity tends to be missing. Table 3 presents the benchmark results estimated by an ordinary-least squares (OLS) method. In column (1) for log import values, the coefficient of SC_{ipt} is not significant, and thus the result does not support the impact of the shipping clause on imports. The coefficient of SG_{ipt} is significant and negative, suggesting that the treatment effect of safeguard duties on EU imports of Indica rice from Cambodia and Myanmar is significantly negative. To gauge the economic magnitude, the treatment effect is -74.8%, and thus remarkably large in magnitude.

---Tables 2 and 3 here---

In column (2) for log import quantity, the coefficient of SC_{ipt} is not significant and the coefficient of SG_{ipt} is significant and negative, consistent with the result for log

import values. The import quantity decreased by 67.7% following safeguard duties. In column (3) for log price, the coefficient of SG_{ipt} is significant and positive, suggesting that safeguard duties increased the import price of Indica rice originating in Cambodia and Myanmar by 20.9%. By comparison, Sandkamp (2020) reports that EU antidumping duties increased import prices by 25% and decreased import quantity by 74%. Although this study examines only the EU safeguard measures for Indica rice imports from Cambodia and Myanmar, the estimated treatment effect of safeguard duties is similar in magnitude.

A potential issue in the benchmark results is that the large impact of safeguard duties may be partly driven by a rapid shift of rice imports from Indica rice to Japonica rice, as observed for milled rice imports from Myanmar in Table 1. Since the control group includes EU imports of Japonica rice from Myanmar, the growth of Japonica rice imports from Myanmar may have an influential impact on the estimated treatment effects. To address this issue, Appendix Table 3 presents the OLS results for the sample excluding major Japonica rice imports from Myanmar.[9] The coefficients of SG_{ipt} are significant and negative for log values and quantities, which are slightly smaller in size. The coefficient of SG_{ipt} is significant and positive for log price, which is slightly larger in size. While these results are consistent with the influential role of Japonica rice imports from Myanmar in estimating the treatment effect of safeguard duties, it is also clear that the benchmark results are not driven strongly by the potentially influential part of the control group.

The main specification may be subject to a bias arising from an econometric problem of heteroscedasticity and the presence of zero import flows (Santos Silva and Tenreyro, 2006). To address a bias in the OLS estimator for heteroscedasticity in import flows, I use Poisson pseudo-maximum likelihood (PPML) estimation for import values and quantities including zeros.[10] In column (4) for import values, the coefficient of SC_{ipt} is significant and positive, consistent with the shipping-clause effect on last-minute imports of affected Indica rice to the EU customs in January 2019. The coefficient of SG_{ipt} is significant and negative, with the similar coefficient size as in column (1). In column (5) for import quantity, the coefficient of SC_{ipt} is significant and positive whereas the coefficient of SG_{ipt} is significant and negative, consistent with the result for import values. To gauge the economic magnitude, the safeguard duties increased the import value of Indica rice from Cambodia and Myanmar in January 2019 by 124.8% and the import quantity by

[9] These products include CN codes 10063046, 10063063, 10063065, 10063094, and 10063096.
[10] I adopt the estimation approach by Correia et al. (2020), i.e., ppmlhdfe in STATA command, to implement PPML estimation with high dimensional fixed effects.

185.8%. As compared with the OLS results, the coefficient for the shipping-clause effect becomes significant, consistent with the finding in Figure 1. Because a natural logarithm of import values and quantity removes a large number of observations in the sample, zero import flows should play a key role in identifying an instantaneous change in the last-minute imports.

An alternative approach is to specify safeguard duty rates in an empirical specification. To this end, I replace the variable SC_{ipt} with a log of safeguard duty rates on Indica rice imports from Cambodia and Myanmar: 175 euros per ton for 2019 and 150 euros per ton for 2020. Table 4 presents the PPML results of this specification for import values in column (1) and import quantity in column (2). These results show that the coefficients of log duty rates are significant and negative, suggesting that safeguard duty rates decrease the import values and quantity of affected goods from Cambodia and Myanmar. Column (3) reports the OLS result of this specification for the log price. The coefficient of log duty rates is positive and significant, implying that import values increase with safeguard duty rates. For instance, a 10% increase in duty rates is associated with a 0.37% increase in the price of Indica rice per ton.

---Table 4 here---

4.2. Robustness Checks

To check the robustness of the main results, I provide the PPML estimation results for import values by estimating alternative specifications of column (4) in Table 3. First, the main sample includes the United Kingdom (UK) as EU importers because the U.K. was formally a member state of the EU at the effective time of the EU safeguard measures in January 2019. Since the U.K. left the EU in January 2020, the EU's safeguard duties on these products may be replaced by a tariff framework such as the GSP in the U.K. In Table 5, column (1) shows the result excluding the U.K. from EU importers. The coefficients of SC_{ipt} and SG_{ipt} remain similar, suggesting that the withdrawal of the UK from the EU has little influence on the result.

---Table 5 here---

Second, Italy and Spain are major rice producers in the EU, and political support for rice millers and farmers in these markets may have a stronger negative impact on Indica rice imports from Cambodia and Myanmar when EU safeguard measures were implemented. While this concern is largely addressed by the importer-product-month fixed effects, unobserved factors in these markets may affect the main results. In column (2), I exclude these countries from the sample and find that the coefficients of SC_{ipt} and SG_{ipt} remain unchanged. Third, the EU's safeguard motivation is a significant increase

in rice imports from Cambodia and Myanmar since 2012, and a pre-policy trend in EU imports before 2018 may affect the main results. In column (3), I exclude the year 2017 from the sample. While the coefficient of SC_{ipt} becomes insignificant for larger standard errors due to the smaller sample size, the coefficient of SG_{ipt} remains similar. Additionally, I separately include the variable SG_{ipt} for 2019 and 2020 to account for different duty rates. Column (4) shows that the coefficients of SG_{ipt} are significant and negative for both years. Although the safeguard duties were smaller in 2020 than in 2019, the negative impact is larger in 2020. This result may capture partly the impact of COVID-19 pandemic in 2020.

4.3. Country Heterogeneity

Discussions up to this point have examined the aggregate accumulated effects of safeguard duties on EU imports of Indica rice from Cambodia and Myanmar, which may mask substantial heterogeneity across importers and exporters. As explained previously, rice producers in the EU such as Italy and Spain supported the implementation of safeguard duties while most northern EU members did not explicitly support the initial request made by Italy. A reason is that northern EU countries are importers of rice products and the safeguard duties aim to reduce competition for semi-milled and milled Indica rice in their markets. In this respect, safeguard duties may have different impacts on safeguard supporters and other EU members. In addition, Cambodia and Myanmar may respond differently to safeguard duties.

To address this issue, I define the variables SC_{ipt} and SG_{ipt} separately for Cambodia and Myanmar in the model and distinguish the EU importers between safeguard supporters and other EU members. Table 6 reports the PPML estimation to deal with zeros in import values and quantities. In column (1) for safeguard supporters, the coefficient of SC_{ipt} for Cambodia is not significant, whereas the coefficient of SC_{ipt} is significant and negative. Safeguard duties reduce import values from Cambodia by 31.6%. The coefficient of SC_{ipt} for Myanmar is significant and negative, while the coefficient of SC_{ipt} is significant and negative. Following the safeguard duties, Indica rice imports from Myanmar increased in January 2019 by 3,312% and decreased subsequently by 99.9%. As compared with Cambodia, the impact of the EU's safeguard measure is surprisingly large for Myanmar. Additionally, column (2) for import quantity shows the result consistent with column (1).

---Table 6 here---

In column (3) for other EU members, the coefficients of SC_{ipt} and SC_{ipt} for Cambodia are not significant, suggesting that safeguard duties had little impact on Indica

rice imports from Cambodia in the northern EU market. The coefficient of SC_{ipt} for Myanmar is not significant, but the coefficient of SC_{ipt} is significant and negative. The safeguard duties did not cause last-minute imports of Indica rice imports from Myanmar, but Indica rice imports decreased subsequently by 99.9%. Thus, I predict that safeguard supporters would expect safeguard duties to mitigate import competition for milled Indica rice in the northern EU market. However, the large negative impacts are limited to Indica rice imports from Myanmar.

4.4. Trade Substitution

Previous results have highlighted the large negative impact of safeguard duties on Indica rice imports from Cambodia and Myanmar. These results raise the question of whether safeguard duties produce a trade substitution effect. For instance, the EU imposed safeguard duties only on milled Indica rice while Cambodia and Myanmar still maintained duty-free quota-free access of husked Indica rice to the EU market. If rice producers export husked Indica rice without milling processes, they would not need to pay safeguard duties. As a result, the safeguard duties may induce exporters to substitute husked Indica rice for milled Indica rice, suggesting an increase in EU imports of husked Indica rice from Cambodia and Myanmar following the EU safeguard measure.

To examine this substitution effect, I estimate the following model:

$$M_{ijpt} = exp\left(\gamma_0 + \gamma_1 Indica_p \cdot KM_i \cdot Post_t + f_{ijp} + f_{ijt} + f_{jpt}\right) \cdot e_{ijpt} \quad (2)$$

where M_{ijpt} is the value of imports for husked rice product p from exporter i to EU importer j in time t. Import products are defined at the 8-digit level within CN code 100620, with eight product categories. The sample period is from January 2017 to December 2020. $Indica_p$ is a dummy variable that takes on unity for long-grain husked rice in CN codes 10062017 and 10062098. KM_i is a dummy variable that takes on unity for exporters in Cambodia and Myanmar. $Post_t$ is a dummy variable that takes on unity from March 2019 onward. If husked Indica rice was substituted for milled Indica rice, I predict that the coefficient γ_1 is positive. In column (1) of Table 7, the PPML result shows that γ_1 is positive, but not significant. Thus, there is no evidence of import substitution from milled Indica rice to husked Indica rice.

---Table 7 here---

A related question is whether safeguard supporters would replace milled Indica rice imports in other EU markets with their milled rice exports. As a key motivation for the EU safeguard is a declining market share of milled rice sales by safeguard supporters, this question is highly relevant from a policy perspective. To examine this question, I estimate the model for EU safeguard supporter *i*, other EU importer *j*, and time *t*:

$$E_{ijt} = exp\left(\delta_0 + \delta_1 Post_t + \delta_2 Trend_t + f_i + f_j\right) \cdot u_{ijt} \quad (3)$$

where E_{ijt} is the total value of milled rice exports in CN code 100630 from EU safeguard supporter *i* to other EU importer *j* in time *t*, with a sample period between January 2017 and December 2020. $Trend_t$ is a time-trend variable. f_i is an exporter-fixed effect, and f_j is an importer-fixed effect. u_{ijt} is an error term. δ_1 is a coefficient of the variable $Post_t$, which measures an aggregate change in milled rice exports from EU safeguard supporters to other EU importers following EU safeguard duties in February 2019. I report the PPML result in column (2) of Table 7, with standard errors clustered by exporter-importer pairs. The result shows that δ_1 is not significant, suggesting that milled rice exports from safeguard supporters did not replace the imports of milled Indica rice from Cambodia and Myanmar in other EU markets.

Finally, I discuss the question of whether non-EU markets would import a redirection shipment of milled Indica rice that was previously exported to the EU market. Since trade statistics do not track the previous destination of shipments, it is not feasible to identify the redirection of milled Indica rice from the EU market. A plausible approach is to examine a quantitative change in exports of milled Indica rice from Cambodia and Myanmar to non-EU markets following safeguard duties in February 2019. On examination, I find that China accounted for a large share of milled rice exports from these countries. Using importer statistics in Harmonized System (HS) code 100630 from the UN Comtrade database, I show China's official imports of milled rice in Figure 2.[11] It is clear that China's imports of milled rice from Myanmar increased dramatically in 2019, which coincides a sharp drop of its milled Indica rice exports to the EU following the safeguard duties.[12] Thus, a plausible consequence is that the Chinese market absorbed a large amount of milled Indica rice from Myanmar that had been previously exported to the EU.

---Figure 2 here---

5. Conclusion

The EU granted Cambodia and Myanmar duty-free quota-free access in the GSP program. A growing import of Indica rice from these countries in the EU brought political

[11] While trade between China and Myanmar is conducted by an ocean-carrying vessel and informal land transportation via borders, China's official statistics on imports from Myanmar may cover only the former. Specifically, informal rice trade is conducted through Muse, a border town in northern Myanmar, but may not officially exist in China's official statistics (World Bank, 2014).

[12] While informal rice trade enters the Chinese market under an export quota by Chinese authorities, China's permission for formal import of rice via Muse may explain the sudden jump in rice imports from 2019.

pressure to protect EU producers and millers of directly competing products. To remedy serious difficulties in the EU market, the EU imposed safeguard duties on Indica rice imports from Cambodia and Myanmar. The common-customs tariff rate of 175 euros per ton was imposed from 2019, with a progressive liberalization over three years. Assuming that a pass-through effect of safeguard duties is positive for consumer prices, the price increase of imported rice should reduce rice imports from these countries. Meanwhile, EU regulations indicate that safeguard duties do not apply to imports of products already on the way to the EU. Rice exporters would seek to avoid tariff increases by shipping a bulk of the affected Indica rice to the EU customs around the effective date of the safeguard duties, i.e., January 2019. This paper seeks to identify the effects of EU safeguard duties by using a sample of milled rice imports in 28 EU importers from January 2017 to December 2020 at the monthly level.

The results show that safeguard duties increased the import values of milled Indica rice in the EU from Cambodia and Myanmar for January 2019 and decreased the import values significantly in the following period. Similar results are found for import quantity. Meanwhile, the impact of the safeguard measure is substantially larger for Myanmar than for Cambodia. Indica rice imports from Myanmar in the northern EU market declined significantly following safeguard duties. A further investigation shows no evidence for trade substitution effects in that exporters substitute husked Indica rice for milled Indica rice. Safeguard supporters did not replace the imports of milled Indica rice from Cambodia and Myanmar in other EU markets. A descriptive analysis indicates that the Chinese market may have absorbed a large amount of milled Indica rice that had been imported from Myanmar in the EU.

These results highlight that the EU safeguard measures had a strong effect to deter the import of targeted goods. However, safeguard supporters in the EU were not able to increase their milled rice exports to the other EU markets, and thus it is not clear whether safeguard measures would help to restore the market share of EU producers. If the safeguard measure had only an effect to increase the import price of milled rice, a decline in the targeted imports implies a simple reduction in the demand for milled rice by EU consumers. As a result, safeguard measures might lead to a welfare loss for EU consumers. Meanwhile, non-EU markets such as China could import a greater volume of Indica rice at lower prices following the EU safeguard measures, possibly suggesting a welfare gain for non-EU consumers. Thus, a fruitful line of research is to investigate welfare consequences of safeguard measures.

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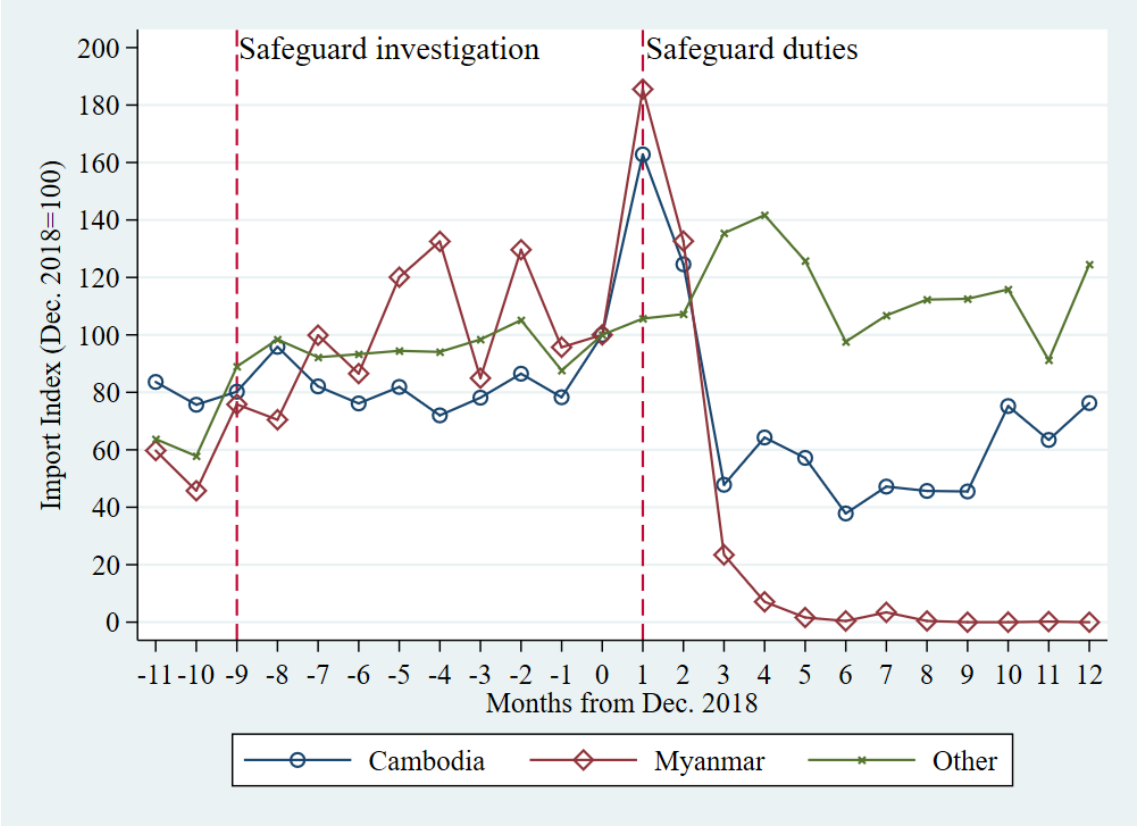
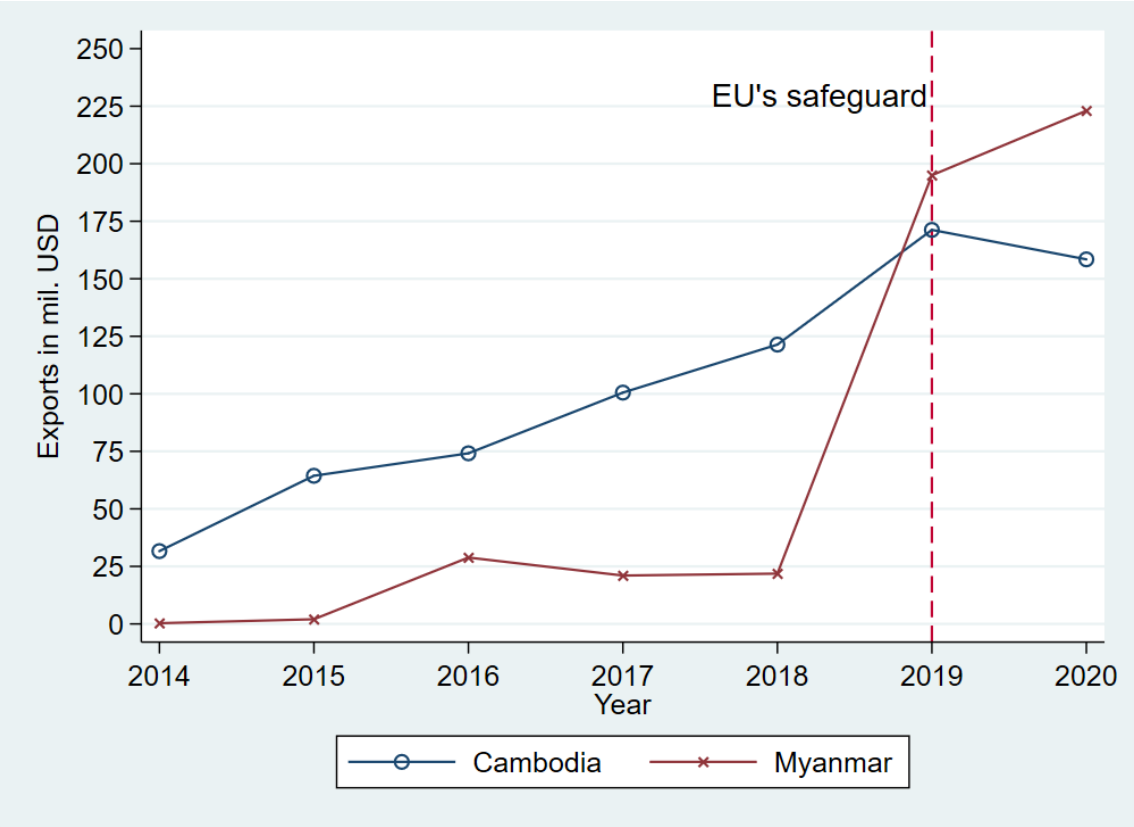
Figure 1. Trends in EU import of milled Indica rice



Notes: Monthly import values are normalized by the value in December 2018 to compute the import index; milled Indica rice is defined as the products in CN codes 10063027, 10063048, 10063067, and 10063098; circle and diamond markers indicate EU imports from Cambodia and Myanmar, respectively; Other indicates EU imports from other exporters.

Source: Author's calculation using Eurostat.

Figure 2. China's imports of milled rice from Cambodia and Myanmar



Source: Author's calculation using UN Comtrade.

Table 1. EU imports of milled rice

Year	2017	2018	2019	2020
Panel A: Imports from Cambodia				
Safeguards				
Value in mil. Euro	132.0	137.8	118.0	99.5
Quantity in thou. ton	242.0	215.3	146.7	125.9
Price in Euro	564.1	654.6	813.4	811.9
Non-safeguards				
Value in mil. Euro	10.2	11.1	11.5	9.5
Quantity in thou. ton	15.2	15.8	16.3	15.3
Price in Euro	671.0	746.0	797.1	723.0
Panel B: Imports from Myanmar				
Safeguards				
Value in mil. Euro	25.8	52.3	16.8	0.2
Quantity in thou. ton	65.9	129.9	42.3	0.6
Price in Euro	402.9	410.2	420.6	435.5
Non-safeguards				
Value in mil. Euro	4.7	11.5	43.5	65.3
Quantity in thou. ton	12.7	30.8	111.3	161.4
Price in Euro	387.4	404.9	422.0	423.3

Notes: EU includes 28 EU members as of 2019; Safeguards indicate milled Indica rice in CN codes 10063027, 10063048, 10063067, and 10063098; Non-safeguards include other milled rice at the 8-digit level in CN code 100630.

Source: Author's calculation using Eurostat.

Table 2. Summary statistics of the sample

Variable	No. of obs.	Mean	Std. Dev.	Min	Max
Log import value	9,058	10.26	2.38	2.30	15.95
Import value	39,194	56,813	266,044	0	8,480,050
Log import quantity	8,713	3.58	2.39	-2.30	9.11
Import quantity	35,719	80.6	357.6	0	9,049
Log price	8,713	6.82	0.51	5.07	11.38
Shipping clause	9,058	0.01	0.08	0	1
Safeguard	9,058	0.02	0.14	0	1

Notes: Import value and quantity are measured in euro and ton, respectively; Log price is the log of import value divided by import quantity.

Table 3. Benchmark results

	(1)	(2)	(3)	(4)	(5)
Estimation	OLS	OLS	OLS	PPML	PPML
Dependent variable	Log value	Log quantity	Log price	Value	Quantity
Shipping clause	-0.87	-0.59	0.039	0.81+	1.05*
	(0.59)	(0.63)	(0.077)	(0.45)	(0.47)
Safeguard	-1.38**	-1.13**	0.19**	-1.39*	-1.79**
	(0.40)	(0.29)	(0.065)	(0.55)	(0.58)
Importer-exporter-product fixed effects	Yes	Yes	Yes	Yes	Yes
Importer-exporter-month fixed effects	Yes	Yes	Yes	Yes	Yes
Importer-product-month fixed effects	Yes	Yes	Yes	Yes	Yes
No. of observations	9,058	8,713	8,713	39,194	35,719
R-squared	0.92	0.93	0.91		
Pseudo R-squared				0.96	0.95

Notes: Parentheses report standard errors corrected for clustering in exporters and products; constant is not reported; **, *, and + denote significance at the 1%, 5%, and 10% level, respectively.

Table 4. Results of safeguard duty rates

	(1)	(2)	(3)
Estimation	PPML	PPML	OLS
Dependent variable	Value	Quantity	Log price
Shipping clause	0.82+	1.06*	0.040
	(0.46)	(0.48)	(0.077)
ln(duty rates)	-0.27*	-0.35**	0.037**
	(0.11)	(0.11)	(0.013)
Importer-exporter-product fixed effects	Yes	Yes	Yes
Importer-exporter-month fixed effects	Yes	Yes	Yes
Importer-product-month fixed effects	Yes	Yes	Yes
No. of observations	39,194	35,719	8,713
R-squared	0.96	0.95	
Pseudo R-squared			0.91

Notes: Parentheses report standard errors corrected for clustering in exporters and products; constant is not reported; **, *, and + denote significance at the 1%, 5%, and 10% level, respectively.

Table 5. Robustness checks

	(1)	(2)	(3)	(4)
Estimation	PPML	PPML	PPML	PPML
Dependent variable	Value	Value	Value	Value
Shipping clause	0.91*	0.81+	0.82	0.81+
	(0.45)	(0.45)	(0.55)	(0.45)
Safeguard	-1.43*	-1.39*	-1.50*	
	(0.60)	(0.55)	(0.69)	
Safeguard 2019				-1.17*
				(0.50)
Safeguard 2020				-1.61**
				(0.59)
Importer-exporter-product fixed effects	Yes	Yes	Yes	Yes
Importer-exporter-month fixed effects	Yes	Yes	Yes	Yes
Importer-product-month fixed effects	Yes	Yes	Yes	Yes
No. of observations	35,329	39,194	27,808	39,194
Pseudo R-squared	0.96	0.96	0.96	0.96
Sample	Excluding U.K.	Excluding Italy/Spain	Excluding year 2017	

Notes: Parentheses report standard errors corrected for clustering in exporters and products; constant is not reported; **, *, and + denote significance at the 1%, 5%, and 10% level, respectively.

Table 6. Heterogeneous impacts of safeguard measures

	(1)	(2)	(3)	(4)
Importer	Safeguard supporters		Other EU members	
Estimation	PPML	PPML	PPML	PPML
Dependent variable	Value	Quantity	Value	Quantity
Shipping clause for Cambodia	0.68	0.43	0.24	0.19
	(0.84)	(0.81)	(0.17)	(0.21)
Safeguard for Cambodia	-0.38+	-0.47+	-0.17	-0.35
	(0.21)	(0.28)	(0.39)	(0.41)
Shipping clause for Myanmar	3.53**	2.72**	-0.0065	0.30
	(0.75)	(0.74)	(0.19)	(0.21)
Safeguard for Myanmar	-8.23**	-8.56**	-8.38**	-8.22**
	(1.09)	(1.27)	(1.42)	(1.26)
Importer-exporter-product fixed effects	Yes	Yes	Yes	Yes
Importer-exporter-month fixed effects	Yes	Yes	Yes	Yes
Importer-product-month fixed effects	Yes	Yes	Yes	Yes
No. of observations	11,291	10,229	27,903	25,490
Pseudo R-squared	0.97	0.96	0.96	0.95

Notes: Safeguard supporters include EU import countries such as Italy, Spain, France, Portugal, Greece, Romania, Bulgaria, and Hungary; parentheses report standard errors corrected for clustering in exporters and products; constant is not reported; **, *, and + denote significance at the 1%, 5%, and 10% level, respectively.

Table 7. Results of trade substitution

	(1)	(2)
Estimation	PPML	PPML
Dependent variable	Value	Value
Indica rice×Cambodia/Myanmar×Post	1.62	
	(1.15)	
Post		0.063
		(0.072)
Trend		0.0047*
		(0.0022)
Importer-exporter-product fixed effects	Yes	Yes
Importer-exporter-month fixed effects	Yes	Yes
Importer-product-month fixed effects	Yes	Yes
No. of observations	8,010	7,680
Pseudo R-squared	0.98	0.89
Sample	Husked rice	Milled rice
Exporter		Safeguard supporters

Notes: Safeguard supporters include Italy, Spain, France, Portugal, Greece, Romania, Bulgaria, and Hungary; parentheses report standard errors corrected for clustering in exporters and products; constant is not reported; **, *, and + denote significance at the 1%, 5%, and 10% level, respectively.

Appendix Table 1. Product description in milled rice imports

CN codes	Product description
100630	Semi-milled or wholly milled rice, whether or not polished or glazed
10063021	Semi-milled round grain rice, parboiled
10063023	Semi-milled medium grain rice, parboiled
10063025	Semi-milled long grain rice, length-width ratio > 2 but < 3, parboiled
10063027	Semi-milled long grain rice, length-width ratio >= 3, parboiled
10063042	Semi-milled round grain rice (excl. parboiled)
10063044	Semi-milled medium grain rice (excl. parboiled)
10063046	Semi-milled long grain rice, length-width ratio > 2 but < 3 (excl. parboiled)
10063048	Semi-milled long grain rice, length-width ratio >= 3 (excl. parboiled)
10063061	Wholly milled round grain rice, parboiled, whether or not polished or glazed
10063063	Wholly milled medium grain rice, parboiled, whether or not polished or glazed
10063065	Wholly milled long grain rice, length-width ratio > 2 but < 3, parboiled, whether or not polished or glazed
10063067	Wholly milled long grain rice, length-width ratio >= 3, parboiled, whether or not polished or glazed
10063092	Wholly milled round grain rice, whether or not polished or glazed (excl. parboiled)
10063094	Wholly milled medium grain rice, whether or not polished or glazed (excl. parboiled)
10063096	Wholly milled long grain rice, length-width > 2 but < 3, whether or not polished or glazed (excl. parboiled)
10063098	Wholly milled long grain rice, length-width ratio >= 3, whether or not polished or glazed (excl. parboiled)

Source: Eurostat

Appendix Table 2. List of exporting countries

Argentina	Israel	Saudi Arabia
Australia	Japan	South Africa
Bangladesh	South Korea	Sri Lanka
Brazil	Laos	Suriname
Cambodia	Lebanon	Switzerland
Canada	Malaysia	Taiwan
China	Mauritius	Thailand
Cote d'Ivoire	Myanmar	Togo
Dominican Republic	Nigeria	Turkey
Egypt	North Macedonia	Ukraine
Guyana	Norway	United Arab Emirates
Haiti	Pakistan	United States
India	Paraguay	Uruguay
Indonesia	Peru	Viet Nam
Iran	Russia	

Appendix Table 3. Results excluding Japonica rice imports from Myanmar

	(1)	(2)	(3)
Estimation	OLS	OLS	OLS
Dependent variable	Log values	Log quantity	Log price
Shipping clause	-1.02	-0.88	0.053
	(0.64)	(0.66)	(0.072)
Safeguard	-1.14**	-1.06**	0.23**
	(0.31)	(0.22)	(0.070)
Importer-exporter-product fixed effects	Yes	Yes	Yes
Importer-exporter-month fixed effects	Yes	Yes	Yes
Importer-product-month fixed effects	Yes	Yes	Yes
No. of observations	8,792	8,469	8,469
R-squared	0.92	0.93	0.90

Notes: The sample excludes EU imports of Japonica milled rice from Myanmar in CN codes 10063046, 10063063, 10063065, 10063094, and 10063096; parentheses report standard errors corrected for clustering in exporters and products; constant is not reported; **, *, and + denote significance at the 1%, 5%, and 10% level, respectively.