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The Rise in Food Prices and the Export of Milled Rice in the Greater Mekong Subregion

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ABSTRACT

Purpose: *This study examines how responsive the exports of milled rice are to rising food prices in the Greater Mekong Subregion.*

Methodology: *The research employed panel data regression models, including Fixed Effects and Random Effects, and the Pooled Ordinary Least Squares to examine data spanning from 1996 to 2020 for three countries in the subregion: Cambodia, Vietnam, and Thailand.*

Findings: *The results show that milled rice exports from the subregion were responsive to the food price surge of 2008-2009, i.e., exports increased following the price surge. In addition, the production of rice was found to be positively associated with exports.*

Implications: *The findings emphasize the importance of milled rice exports in the Greater Mekong Subregion. The responsiveness of rice exports to the price surge implies that exporters are ready to increase exports constantly. This provides policymakers with inputs to formulate policies and strategies to increase exports for stabilizing food prices and increasing rice farmers' income.*

Originality: *The study contributes to the existing body of literature, providing new evidence of the milled rice exports responding to the food price surge by looking into the major rice-exporting countries in the Greater Mekong Subregion.*

Limitations and directions for future research: *The study is not free from limitation due to the unavailability of data, leading to the exclusion of two countries in the Greater Mekong Subregion. The generalizability of the findings may be limited within this region, therefore, setting directions for future empirical studies to incorporate major rice-exporting countries in other regions.*

Keywords: *Rice export; Food price crisis; Greater Mekong Subregion*

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INTRODUCTION

In the last quarter of 2007, global food prices, including rice, wheat, and maize, started to surge rapidly, causing panic in developing and developed countries as well as in importing and exporting countries. Food-importing countries such as the Philippines rushed to buy rice to store. In contrast, exporting countries like India, Vietnam, and Cambodia implemented various restrictions on the export of rice to ensure a stable and affordable supply for domestic consumption. Although it is still a subject of debate, the root causes of the surging prices are attributable to rising fuel prices, which are one of the primary inputs of fertilizer production, thus pushing the production cost and the price of fertilizers. Another root cause is the rising purchasing power of Asian middle-income countries such as China and India; the rising income in these two large countries causes an abrupt increase in the demand for food, especially rice, the staple food for Asian consumers. In addition, drought in several major food-producing countries such as India and Australia further depressed the supply of food; the increasing demand for biofuel, the depreciation of the US dollar against other key currencies such as the Euro and Japanese Yen, and other specific-crop-related causes are also the causes of food price increase (Timmer, 2008; Headey & Fan, 2008).

Rice, one of the most important staple foods in the Greater Mekong Subregion, is the source of protein, income, and employment for local people. It plays a vital role in local culture and tradition; in short, it is fundamentally the lifeline of the subregion. Rice is such an important crop that in Cambodia, for instance, it accounts for more than 70 percent of the land area allocated for agricultural production, and its output accounts for about 50 percent of the farm output (Asian Development Bank, n.d.). During the food price surge, exporting countries such as India, Cambodia, and Vietnam restricted their exports for some time to ensure a stable supply for the domestic market (for low-income net food buyers), causing its price to increase by 117 percent to 149 percent in the first quarter of 2008 (Wailes *et al.*, 2012). The timeline of the restriction taken by major rice exporting countries is as follows: in November 2007, India banned exports, followed by Vietnam and Egypt in January, and Cambodia in March 2008; from January to April 2008, the Philippines imported normal annual quota in just four months (Headey & Fan, 2008).

In the Greater Mekong Subregion, which is comprised of Yunnan Province and Guangxi Zhuang Autonomous Region of the People's Republic of China, Cambodia, Lao PDR, Myanmar, Thailand, and Vietnam, rice plays a vital role in the livelihood of the majority of the people. These countries actively engage in international rice markets through exports, i.e., net exporters (Vietnam Plus, 2022). In 2022, Thailand was the second largest rice exporter after India, and Vietnam is the third largest. Although Cambodia is not the leading exporter of milled rice vis a vis Thailand and Vietnam, the country regularly supplies rough rice to be exported via Vietnam (USDA, 2022; Dawe & Slayton, 2010). In the first two months of 2023, for example, it was reported that Cambodia exported 871,319 tons of un-milled rice to the two neighboring counties, i.e., Thailand and Vietnam (Van, 2023). In addition, seeing the crop's potential, the Cambodian government formulated a policy in 2010 to promote rice export specifically (Royal Government of Cambodia, 2010). The surge of rice prices to the level that caused panic and distress to the world market had not just occurred in 2007-2008, but it once happened in the early 1970s, and it is uncertain whether or not the prices will surge again. Therefore, it is necessary to examine the responsiveness and behavior of the exports from the Greater Mekong Subregion during the recent rice price increase in 2007-2008, as this subregion is one of the primary sources of rice production and export. The knowledge from the study could be utilized to curb the surge in rice prices, which negatively affects the livelihood of low-income net food consumers.

This study holds significant importance as it aims to examine the responsiveness of the export of milled rice from three key countries in the Greater Mekong Subregion, namely Cambodia, Thailand, and Vietnam, to the increase in price. The Greater Mekong Subregion, in addition to two autonomous regions of mainland China, comprises five rice-exporting countries (alphabetically): Cambodia, Lao PDR, Myanmar, Thailand, and Vietnam. Due to data availability, the study covers only three countries for analysis. Myanmar and Lao PDR are rice-exporting countries, but their exports are relatively small. Specifically, the study explores how the global surge in rice prices affected the export of milled rice from these three countries, that is, how the export of rice

from the three countries responded to the price surge. This research is crucial in understanding the dynamics of rice export and its impact on the global market.

Following this introduction, the subsequent section reviews the literature on rice exports from the subregion and the causes and consequences of the rice price surge. Then, the study presents the results of the analysis, and finally, the study concludes with policy implications.

LITERATURE REVIEW

Rice Export from the Greater Mekong Subregion

Various heterogeneities exist among the three rice exporting countries, Cambodia, Thailand, and Vietnam, analyzed in this study. Regarding the volume of exports, Thailand has been the top rice exporter since the early 1980s and is well-known for its high-quality aromatic rice. Vietnam started to export rice in 1989, and it is better known for its low- and medium-quality rice, which has been exported to middle-income countries in Southeast Asia, such as Indonesia and the Philippines (Lan, 2018; Ear *et al.*, 2017). Cambodia is a relatively new player in the international markets. The country achieved self-sufficiency in rice production during the harvesting season of 1995-1996, and since then, it has started to export rice to international markets. The volume of exports has gradually increased. Historically, Cambodia exported rice since the French colonial period (1863 to 1953), and in the 1960s, it was once one of the leading rice exporting countries. After the coup d'état in the early 1970s, rice production was insufficient for local consumption due to the ongoing fighting that disrupted farming activities. In the early 1980s, Cambodia depended on a large amount of food aid to supplement the shortage of domestic rice for local consumption. Cambodian rice has also been well-known for its good taste and high quality and competed with Thai rice for the World's Best Rice award. In 2022, for instance, Cambodia's variety of Jasmine rice (Phka Rumduol) was crowned the World's Best Rice, while the Thai variety of Jasmine rice (Hom Mali) fell to second place (The Nation, 2022). As aforementioned, Cambodia has been exporting rough rice to neighboring Thailand and Vietnam, and it is not uncommon to observe Thai and Vietnamese traders cross the border to buy paddy rice (un-milled rice) directly from Cambodian farmers during harvesting seasons to be processed and exported (Dao & Thai, 2020; Ear *et al.*, 2017).

Among the three countries, Cambodia is somewhat less developed. Its rice export had enjoyed preferential trade policies from Europe, allowing the country to export tariff-free until January 2019, when the European Commission decided to remove tariff preferences on the imports of rice from Cambodia for three years on the ground that rice imports caused economic damage to the EU producers (Hin, 2022). The tariffs ended in January 2022, and since then, the export of Cambodian rice to the EU market started to rise (Ou & Vantha, 2022; Hin, 2022).

Figure 1 presents the trajectory of the export volume of milled rice from Cambodia, Thailand, and Vietnam from 1996 to 2020. Rice export from Cambodia, although increasing, is negligible vis a vis those of Thailand and Vietnam, whose exports have continued to dominate the global rice markets. The Cambodian government has been making efforts to penetrate the export market, as evidenced by their policies on the promotion of paddy production and rice export since 2010 (Royal Government of Cambodia, 2010) and the Cambodian Rice Federation, an association of rice exporters, has set an ambition to export one million tons of milled rice by 2025 (Chea, 2023); however, there is still plenty of room to improve the competitiveness of Cambodian rice, which must involve different stakeholders from the downstream to upstream industries including farmers, millers, bankers, traders, and policymakers.

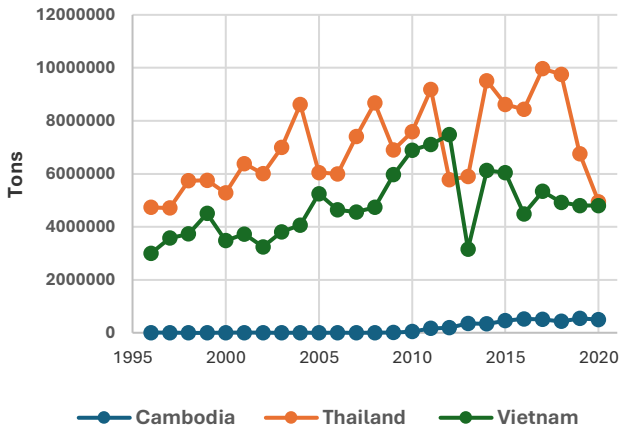

Figure 1: The Volume of Milled Rice Export from Cambodia, Thailand, and Vietnam from 1996 to 2020

Source: FAO database, online.

Figure 2 presents milled rice prices exported from Cambodia, Thailand, and Vietnam. Export prices are computed by dividing the quantity of exports (in tons) by the value of exports (in USD). Rice is exported in various forms and grades; therefore, prices vary by categories of exports. However, only the aggregate data for milled rice is available in the FOA online database, and so is the price. The average prices in 2020 were USD 504, USD 449, and USD 364 for Cambodian, Thai, and Vietnamese rice, respectively. As mentioned in the previous section, while the exports from Cambodia and Thailand are concentrated in high-quality aromatic jasmine rice, Vietnam exports more low- and medium-quality rice. Therefore, the average price of rice from Vietnam is lower. The ANOVA results to compare the average rice prices from the three countries demonstrated that at least one of the prices is significantly different at a five percent significant level (p-value = 0.014). Furthermore, the analysis using Tukey's HSD test to find which mean is different showed that the significant difference in mean prices occurs between the price of Cambodian rice and that of Vietnamese rice at a one percent significance level (Tukey critical value = 3.40, the absolute value of q = 4.24). The ANOVA and Turkey's HSD test results are not presented in the paper but are available upon request.

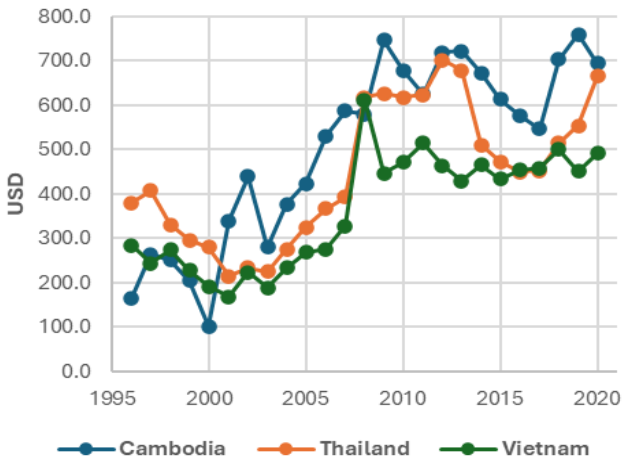

Figure 2: Export Prices of Milled Rice from Cambodia, Thailand, and Vietnam from 1996 to 2020

Source: FAO database, online.

Causes and Consequences of Rice Price Surge

The reasons behind the surge in rice prices are similar to those affecting other food crops. These factors include rising oil prices, the weakening US dollar (since most commodity prices are denominated in USD, a dollar depreciation leads to higher prices), increased demand for biofuels, and other specific factors related to rice (Headey & Fan, 2008). For some commodities, such as maize, stock speculation can cause a price surge and the market to panic; however, as rice is not traded in the forward/future market, speculation did not affect rice prices. While Timmer (2008) stated that the rising income of China and India was one of the main factors that caused the upsurge in demand for food crops, Heady and Fan (2008) downplayed this hypothesis; they argued that the rising income in the two countries had started well before the price surge. In addition, increasing demand for biofuel has a less direct effect on rice prices since rice is not used for biofuel production, and the land used for planting rice cannot be straightforwardly used for planting other crops for biofuel production. However, rice is a close substitute for wheat, and when wheat production is reduced due to the allocation of land for planting biofuel crops, the demand for rice increases, thus causing its prices to surge (Brahmbhatt & Christiaensen, 2008). Given different analyses of the causes of the rice price surge, Dawe and Slayton (2010) argued that the world rice crisis in 2007-2008 was not attributable to market failure but to the policy decision of the government, such as the panic buying by importing countries such as the Philippines and the restrictions of export by exporting countries such as Cambodia, Vietnam, and India. They further explained that rice is thinly traded internationally, with most transactions occurring through government-to-government contracts. Asian governments, recognizing rice's significance as a staple crop, closely manage its trade to maintain stability, as uncontrolled price fluctuations could impact social and economic stability in these countries.

The fact that rice-importing governments panic-bought rice is not irrational. Many governments fear that rising rice prices will cause social unrest. Various reports had warned about the possibility of turmoil and unrest as rice prices continued to rise (The StraitsTimes, 2022; NBC, 2008; Bradsher, 2008; The Guardian, 2008).

In addition to the decision of governments in importing countries to panic-buy rice to stock for fear of food shortage, amid the food price crisis, exporting countries in Southeast Asia, led by Thailand, considered founding a rice exporter cartel, namely the Organization of Rice Exporting Countries (OREC) to control rice export similarly to that of the Organization for Petroleum Exporting Countries (OPEC) 's control of the production and export of oil. However, just one week after the initiative, the proposal to found OREC was dropped due to pressure from public opinion (Dawe & Slayton, 2010), which believed that creating OREC would increase rice prices and hurt the poor urban rice consumers. Thus, it is unhumanitarian. The proposal to create OREC was not the only consequence of the rice price surge on public policy but also the formulation of the ASEAN Integrated Food Security Framework to avoid a repeat of the price crisis (Asian Development Bank, 2012).

The Current Rice Trade Policies beyond the Greater Mekong Sub-region

Outside the Greater Mekong Subregion, India, the largest rice exporter, significantly influences the global rice trade and its price. In July 2023, India banned the export of non-basmati rice to stabilize the local price in response to the reduced production due to unfavorable weather events such as the impact of El Nino (Shimoda, 2023), prompting concern about global food insecurity. It was estimated that after the ban, rice prices increased to the level seen in 2007 and 2008 (Montesclaros, 2023). According to the International Food Policy Research Institute (IFPRI), India has often imposed export restrictions during global food price surges; the restriction is on rice and wheat exports (Glauber & Mamun, 2023). There is a fear that the ban would lead to an international price crisis due to trade speculation from other countries that depend on revenue from rice imports, exports, and consumption; thus, it is critical to seek a multilateral solution to solve this problem (Montesclaros, 2023). The negative consequence may be beyond Asia and may be severe for food-importing countries in Africa and the Middle East (Baum & Klimek, 2023).

The recent rice price surge prompted policy responses from governments in Southeast Asian regions, especially the rice-importing countries. In late September 2023, the Philippines and Myanmar introduced a rice ceiling for farmers, followed soon by Malaysia (Donnelly, 2024). Vietnam, the Philippines' major rice supplier, has signed a bilateral agreement to ensure a stable rice supply (Donnelly, 2024). Indonesia, one of the largest rice importers in Southeast Asia, also responded to the price surge by securing a commitment to supply rice from India and reaching out to Cambodia for additional supply (Nitta & Inoue, 2024). From the position of exporting countries, the ban on Indian rice exports saw a surge in prices and exports from major exporters such as Thailand and Vietnam (Nitta & Inoue, 2024). In conclusion, the recent surge in price, although less severe than in 2007-2008, saw similar responses from the governments; both importing and exporting countries seek to stabilize local prices and consumptions. While importing countries seek to increase the volume of imports, exporting countries may ban exports or set price ceilings to ensure affordable prices for domestic consumption.

METHODOLOGY

According to the law of supply, when prices increase, the quantity supplied will increase as incumbent suppliers increase their quantity supplied to maximize profits, and increasing prices will attract new suppliers to enter the industry. The supply for export follows the same law. In addition, how responsive a particular commodity is to the price surge depends on its supply elasticity. Agricultural commodities such as rice are relatively less supply elastic since it is time-consuming for producers to increase the productivity and capacity to produce rice output (it takes time to enlarge and prepare land, transplant, and at the earliest, it takes several months for rice from planting to be ready for harvest). Various methodologies, including the Gravity Model and the Computable General Equilibrium Model (CGE), were used to examine the behavior of the export of agricultural commodities, including rice, such as the study by Pham *et al*. (2014), Yu and Bandara (2017), and Kea, *et al*. (2019).

As stated in the objective, this study tested the hypothesis that the export of milled rice would increase after the price surge in 2007-2008 by estimating export function as in Abolagba *et al*. (2010), whose study applied a time series data model to investigate factors that influence the export of

cocoa and rubber in Nigeria. This study is different as the panel data model was employed to analyze the data that is publicly accessible in the online database of the Food and Agriculture Organization of the United Nations (FAO), spanning from 1996 to 2020. Three countries in the Greater Mekong Subregion, namely Cambodia, Thailand, and Vietnam, were included in the analysis, thanks to the consistent availability of the data from the three countries. In addition to the FAO database, the study utilized data from the World Bank's World Development Indicator (WDI).

The panel data regression was employed to regress the export supply of milled rice, the dependent variable, on explanatory variables, including rice production, producer's prices, exchange rate, year dummy, and the interaction between price and year. Specifically, the regression equation was adapted from the study of Abolagba *et al*. (2010) and expressed in the following econometric forms.

$$X_{it} = \beta_0 + \beta_1 PRO_{it} + \beta_2 PP_{it} + \beta_3 EX_{it} + \beta_4 YEAR_{it} + \beta_5 PP \times YEAR_{it} + \varepsilon_{it} \quad (1)$$

Where:

i is the country (i = 1, 2, 3 for Cambodia, Thailand, and Vietnam)

t is the year (t = 1, 2,..., 25 is for the years from 1996 to 2020)

X_{it} is the export of milled rice

PRO_{it} is the production of rice

PP_{it} is the producer price of rice

EX_{it} is the exchange rate

YEAR is the dummy variable representing the year immediately after the world food price increase (Y =1 if the year is 2009, 2010, 2011, and 2012, and is zero otherwise; the export of milled rice is assumed to increase several years after the price surge in 2007-2008).

PP×YEAR is the interaction between time and producer price

ε_{it} is the disturbance terms

Table 1 presents the descriptive statistics of variables used to estimate the regression model. These include the value of milled rice in thousand USD, the producer price in USD, the exchange rate expressed as the value of USD per unit of local currency, and the volume of production in 1000 tons. The data spans from 1996 to 2020, so, generally, the minimum value represents the initial year.

Table 1: Descriptive Statistics for the Model Variables

Variable	Obs	Mean	SD	Min	Max
Milled rice (in 1000 USD)	75	1715006	1608867	150	5732154
Producer prices (in USD)	63	214.56030	76.86337	96.30000	345.50000
Exchange rate (USD per LUC)	75	0.00975	0.01383	0.00004	0.03946
Production (in 1000 tons)	75	25100	13900	3404	45100

Source: Author's calculation based on FAOSTAT.

The Hausman test results indicate that the random effect model is preferable (Table 2). For comparison, the results of three models, the Random Effects, Fixed Effects, and Pooled OLS, were analyzed and presented in Table 3. However, only the Random Effects result is used to analyze the determinants of rice exports and their responsiveness to the price surge.

Table 2: The Results of the Hausman Test

Variables	Fixed Effects Model (1)	Random Effects Model (2)	Differences (1)-(2)	SE
PP	-2.426	2.166	-4.592	4.177
EX	-15.949	48.292	-64.241	40.277
PRO	2.260	3.267	-1.008	0.638
YEAR	0.756	0.568	0.188	0.136
$PP \times YEAR$	0.002	-0.001	0.002	0.002

Note: chi-squared = 3.99; probability > chi-squared = 0.4073

Source: Author's calculation.

According to Table 3, the export of milled rice was significantly positive after the global food price rise (p-value = 0.021). This indicates that exporters responded to the increase in prices by increasing exports. For the controlled variables, the coefficient of producer prices *(PP)* is positive but not significant (p-value = 0.790). The production of rice *(PRO)* is positively correlated with export and is significant at a

one percent significance level (P-value <0.001). This finding implies that the larger the production, the more significant the export. It also means that a larger rice surplus is available for export after domestic consumption is fulfilled. In addition, the exchange rate *(EX)* positively correlates with exports; thus, when the local currency appreciates, a larger volume of milled rice is exported. The interaction between time and price $(PP \times Y)$, which could be used to assess the impact of price on export, was found to be negative but not significant (p-value = 0.816).

Table 3: Factors Affecting the Export of Milled Rice

Variables	Random Effects	Fixed Effects	Pooled OLS
PP	2.166 (8.130)	-2.426 (9.140)	2.166 (8.130)
EX	48.292*** (6.494)	-15.949 (40.798)	48.292*** (6.494)
PRO	3.267*** (0.121)	2.260*** (0.649)	3.267*** (0.121)
YEAR	0.568** (0.247)	0.756** (0.282)	0.568** (0.247)
$PP \times YEAR$	-0.001 (0.004)	0.002 (0.004)	-0.0001 (0.004)
Constant	-44.697*** (2.649)	-28.553** (10.977)	-44.697*** (2.649)
Number of obs.	63	63	63
R-sq	Within = 0.648 Between = 1.000 Overall = 0.962	Within = 0.669 Between = 0.916 Overall = 0.855	R-sq = 0.962 Adj R-sq = 0.958

Note: Standard errors in the parentheses. ** and *** indicate significant at 5% and 1%, respectively.

Source: Author's calculation.

Discussions

The rise in rice prices benefits exporting countries such as those in the Greater Mekong Subregion, which are the net exporters of rice. When the prices of rice increase in the global market, farmers who can produce a surplus of rice for export would increase profit. They would supply a larger volume for export rather than selling in the local market. However, the increasing exports would also put upward pressure on domestic prices, which hurt the farmers whose capacity to produce is low. So, their production volume is insufficient for household consumption, let alone for selling at the market. In addition, the urban poor who depend on non-farm activities to generate income and spend most of their income on food would see their expenditure rise. Even in rice-exporting countries like Cambodia, Thailand, and Vietnam, only some farming households can produce a surplus for export. Therefore, given the increase in rice prices, there are losers and winners. A study in Vietnam indicates that although rising rice prices and other grains raise the overall Vietnamese household's welfare, some households have worse welfare (Vu & Glewwe, 2011). In Indonesia, one of the largest rice-importing countries, for example, the majority of people, including those in the rural areas, consume more rice than they produce and thus are hurt by the increase in price (McCulloch, 2008). Given that not everyone, even in the exporting countries, benefits from price upsurges, stable food or rice prices are preferable. As the world economy grows more interconnected, a crisis in one country or region can have ripple effects on other regions or countries. For instance, while a rice price surge may benefit Cambodia, Thailand, and Vietnam, it could adversely affect importing nations like the Philippines, Indonesia, or Europe, which also purchase other products such as garments and electronics from these three exporting countries.

The finding that when the exchange rate appreciates, the exports will increase contrasts with the conventional economic theory, which suggests that when a currency appreciates, exports should decrease due to higher prices in international markets. Conversely, a depreciating currency is expected to boost exports by lowering product prices. However, rice exports behave differently. Because rice is necessary, a price increase due to the currency's appreciation does not necessarily negatively impact exports as its demand is relatively inelastic. That means that although rice prices increase, consumers continue to consume rice even as prices rise, and any demand reduction is insignificant. For instance, a study on general agricultural exports in Turkey found that exchange rate volatility, particularly depreciation, did not significantly impact agricultural exports (Buguk *et al.*, 2003).

CONCLUSION AND IMPLICATIONS

The export of milled rice is found to be responsive to rises in world food prices. This responsiveness allows

exporting countries in the Greater Mekong Subregion to generate more foreign exchange, which can then be invested in other sectors. Additionally, rice farmers stand to benefit from rising prices, as they can retain larger profits. When exports are responsive—meaning there are no restrictions during price surges—importing countries also gain advantages. They can source food from various suppliers, and prices are less likely to spike rapidly. Consequently, responsive exports contribute to price stability, benefiting consumers in importing and exporting nations.

However, deciding to create a rice cartel or restrict exports to stabilize local prices and consumption may seem rational and reflect a somewhat selfish policy akin to "beggar thy neighbor." Such an approach could backfire because when prices rise in importing countries, it may trigger a crisis that spreads to other sectors, causing problems for the exporting nations. As the world becomes increasingly globalized, crises in one country or region can quickly spread to others.

While exporting countries may gain more during food price increases, not everyone benefits. Rising food prices negatively affect net food buyers within these exporting nations. To mitigate this impact, redistribution policies should be considered. Additionally, research should be conducted to understand the food industry's characteristics, allowing governments to identify which population groups might suffer during a food crisis. Mismanaged food prices can lead to severe consequences, including riots or social unrest.

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