Spatial Effects on Rice Exports in ASEAN Countries

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ABSTRACT

Rice trade was also influenced by the proximity factor between regions. This study analyzed the influence of spatial effects on rice exports in ASEAN countries. The analytical method used in this study is a quantitative method and Spatial panel data regression was used in analyzing spatial effects using panel data regression analysis. The data used was panel data with a time series from 2005 to 2019 and between individuals covering 10 ASEAN member countries, namely the Philippines, Indonesia, Malaysia, Singapore, Thailand, Brunei Darussalam, Vietnam, Cambodia, Laos, and Myanmar. Data processing was assisted by using the R Studio application. Based on the regression analysis of spatial panel data to see the spatial effect on intra-ASEAN rice exports, it can be concluded that there was a spatial effect on intra-ASEAN rice exports. In addition, the results of this study also show that there was a relatively weak spatial agglomeration in rice exports in the ASEAN region.

Keywords: spatial; rice; export; ASEAN

How to cite:

1. Introduction

Rice is an important commodity in ASEAN, so it is important to keep rice stocks safe. The policy of maintaining sufficient rice stocks contributes greatly to maintaining food security. Many Asian countries, including developed nations such as Japan and South Korea, as well as developing nations such as the Philippines and Bangladesh, have adopted the policy of increasing production while maintaining rice reserves. The same is true for net exporting countries such as Thailand, Vietnam, and India, as well as net importing countries such as Indonesia, the Philippines, and Sri Lanka, for emergency purposes such as natural disasters, wars, and social conflicts, as well as price stability. Rice reserves, it will reduce rice scarcity and maintain a more stable level of rice prices (Sawit, 2010).

The 2015 ASEAN Economic Community is the right moment to achieve ASEAN’s goal of becoming a world rice center. The growing economy of ASEAN countries is an implication of the implementation of policies in terms of rice trade in the ASEAN region. The condition of the ASEAN rice market, as well as the world rice market, is a volatile market and is heavily influenced by external factors. In 2014 to 2016 the number of rice exports of ASEAN countries decreased, but in 2016 to 2018 it increased. The number of ASEAN Countries rice imports was relatively stable, although from 2017 to 2019 there was a fairly high increase, but in 2019 both exports and imports decreased.

Rice trade is also influenced by the proximity factor between regions. Phung et al. (2017) studies the trade between Vietnam and countries in the intra-ASEAN region by considering aspects of space and regional distance to see Vietnam’s trade relations with other ASEAN countries. The results of this study indicate that there was a spatial-lag interaction in trade between Vietnam and intra-ASEAN countries. Spatially, Vietnam tends to export goods to countries that are located close to Vietnam. The results of their study are in line with the research results of Nur R (2018), which
analyzes exports of vegetable and animal oil commodities by ASEAN-9 countries to the Intra-ASEAN region in an effort to determine the existence of spatial effects and the factors that influence it. The results show that there is a spatial effect on exports of vegetable and animal oil commodities in the ASEAN region.

ASEAN, as a form of regional cooperation, has interdependence among its member countries. The flow of rice trade in the ASEAN region can be influenced by geographical factors or country proximity. The geographical effect on rice commodity trade among ASEAN countries is examined in terms of spatial effects and the factors that influence it.

Thailand and Vietnam are the largest rice exporters, while Indonesia and the Philippines are the largest rice importers in ASEAN. The rice export-import activities that occurred in the ASEAN region indicated that there had been integration between the rice markets in Indonesia, the Philippines, Thailand, and Vietnam. In other words, when there is a change or a shock in one market, it affects other markets. Because of ASEAN’s high level of domestic rice consumption, not all rice-producing countries become exporting countries. According to the World Bank (2016), most cereal production is used for domestic consumption, where only 10 percent of the total world production is traded globally; rice is no exception.

Agricultural trade in developing countries is influenced by variables such as GDP and GDP per capita of exporting and importing countries, exchange rate volatility, distance, and participation in RTA (Regional Trade Agreement). Almost all of these variables have a positive effect on trade in the agricultural sector, except for distance and GDP per capita of exporting countries. The negative influence of these two variables indicates that the farther the distance or the higher the GDP per capita of the exporting country will reduce the trade flows of the agricultural sector to other countries (Khiyavi et al. 2013).

Based on the above background, it is necessary to analyze the spatial effect affecting rice exports in ASEAN countries.

2. Theoretical Underpinning

Economic integration aims to increase competition among countries/markets which has the potential for mutual prosperity. Competition among market participants leads to lower prices for similar goods and services, thereby improving quality and increasing choices for consumers in an integrated area. Suryanta (2012) explains that in the concept of economic integration, free-trade member countries remove all trade barriers from each other. However, each country still has the right to determine the type of policy that is applied to countries that do not participate in free trade. The agreement includes the removal of tariff and non-tariff barriers to trade. The essence of the free trade commitment here is that only certain commodities from member countries have tariffs removed.

The reason for economic integration based on the theory of free trade without barriers in the form of tariffs and non-tariffs aims to increase trade volume, increase production efficiency, increase economic growth, and social welfare. Economic integration has the same principles and mechanisms as free trade, namely on the basis of an agreement between members who make agreements between countries within the same region or on certain interests.

The advantage in question is a comparative advantage where a country will specialize in producing a product. A country will produce goods and services that can be produced more at a lower cost than other countries. The existence of this kind of specialization, with the same amount of resources, can generally increase total world output and increase economic efficiency (Widyasanti 2010). Currently, ASEAN is growing as a forum for economic integration with potential markets, the influence of which has an impact on increasing wider economic cooperation, especially with countries in the East Asian region such as China, Japan, and South Korea. ASEAN economic integration faces major challenges because ASEAN countries have different and heterogeneous economic systems, per capita income, levels of economic and institutional development as well as social conditions.

The establishment of the ASEAN Economic Community (AEC) is the vision of ASEAN 2020. The AEC aims to establish a single market, which is directed at the application of a single currency which aims to maintain regional currency stability in the implementation of the single market in ASEAN. The plan for the emergence of a single currency was sparked in an ASEAN forum, and it was agreed to be the ASEAN vision 2020. The ASEAN Community itself is intended to be built based on three pillars, namely the ASEAN Security Community (ASC),
According to Baffes and Bruce (2003), the market can be said to be integrated if the price changes that occur in the world market are directly transmitted and reflected to the domestic market. In other words, the price pattern shown must be the same. An efficiently integrated market system will have a positive relationship between its prices in different market areas. Furthermore, if trade occurs in two different regions and the price in the importing area is proportional to the price in the exporting area plus the necessary costs, then the two markets can be said to have been integrated (Ravallion 1986). This is different from Barrett (2005) who states that markets that are not spatially or intertemporally integrated can indicate that there is market inefficiency such as collusion and market concentration, resulting in price games and price distortions in the market. Rifin (2005) states that whether or not a market is integrated can be analyzed by taking into account the following factors:

a. Market segmentation.

The market is said to be unintegrated if the market is segmented where the price changes that occur in the reference market have no influence, sooner or later on prices in the domestic market. Thus, it is hoped that with the integration of the domestic market, prices that occur in the domestic market are influenced by changes in prices in the reference market.

b. Short-term Integration.

The market is said to be integrated in the short term if price changes that occur in the reference market are directly and completely transmitted to prices in the domestic market. This analysis also requires that there is no lag effect on future prices. In macroeconomics and international economics, the general concept of market integration focuses on the ability to trade. The transfer of tradability signals against excess demand from one market to another is transmitted as actual or potential physical flows. Positive trade flows can demonstrate spatial market integration based on the concept of tradability (Barret 2005).

Traditional market spatial integration research assumes that two regions with the same economic market for homogeneous products occur if the price difference between the two regions is exactly the same as the transaction costs associated with trade (Bernal et al. 2003). At a competitive equilibrium, trade flows occur until potential profits are saturated. If the price difference is less than the transaction costs, then the market may be segmented or if trading is still taking place then this discrepancy indicates either a long-term profit maximization strategy or short-term information failure. Autarky markets provide an alternative explanation for segmented markets with equilibrium conditions (Bernal et al. 2003). The research results of Anwar (2005) state that the two markets are integrated if the price changes of one market are propagated to other markets, the faster the propagation, the more integrated the market.

Basically, market integration analysis can be divided into two parts based on the market relationship being analyzed, namely:

c. Spatial Market Integration

Spatial market integration is the degree of interrelationship between regional markets and other regional markets. Spatial market integration shows price movements and is generally a signal of price and information transmission between spatially separated markets. Spatial price behavior in regional markets is an important indicator in viewing market performance. Unintegrated markets can carry inaccurate price information that can distort producer market decisions and contribute to inefficient product movements.

The level of efficiency between markets in far-flung locations has important implications for market liberalization and policy formulation. Given the importance of this issue, a number of empirical tests of the Single Price Theorem (The Law of One Price or often abbreviated as LOP) and measures of market unity and efficiency have been carried out (Fackler and Goodwin 2002). This postulate states that in competitive market conditions, all prices in a market will be uniform after the additional costs for the use of place, time and form of an item in the relevant market. If the market is integrated then the increase in prices in one region or country will be transmitted to other markets but there are some principles that determine the spatial market price differences between countries that apply equally to international prices, where there are no barriers to product movement between these countries. For various agricultural commodities, of course, the conditions of these obstacles are needed in free trade.

Spatial market integration analysis divides the market into two categories, namely: markets with a potential deficit or shortage and markets with a potential for surplus or excess. For example, Indonesia has a potential deficit in terms

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of fulfilling rice for consumption which causes rice imports to occur. Thailand has the potential for a surplus that makes Thailand one of the largest rice exporting countries in the world.

d. Vertical Market Integration

Vertical market integration occurs when the marketing or production and marketing chains are successively interconnected. The study of vertical market integration is important to know to see the close relationship between consumers, marketing institutions and producers. If consumers, marketing institutions and producers are interconnected and interact in determining the prices that occur in each market, it can be said that the market is running efficiently.

A change in demand will cause a change in the price at the node, which will then be forwarded to producers through changes in demand from traders and so the changes will be continued again to the producer market, and so on. One of the reasons for retail market players to integrate the process of planting to selling products to the producer level is to ensure the flow of products with certain specifications with a constant delivery period. Furthermore, integration can reduce marketing costs, especially sales from one level to another.

3. Research Methodology

3.1. Data Types and Sources

In analyzing spatial effects, the type of data used in this study was secondary data taken from various related institutions. The data used in examining the spatial effects included data on rice exports, per capita income, rice production, exchange rates, inflation, agricultural land area, world rice prices, LCSI (Liner Shipping Connectivity International), Gross Domestic Product Per capita, Trade Openness (TO), distance. Data were taken from several sources, including the ASEAN Statistics Database, the World Bank, and the United Nations Conference on Trade and Development (UNCTAD). The data used were panel data with a time series from 2005 to 2019 and between individuals covering 10 ASEAN member countries, namely the Philippines, Indonesia, Malaysia, Singapore, Thailand, Brunei Darussalam, Vietnam, Cambodia, Laos, and Myanmar.

3.2. Model Specification

Regression analysis used in this study was regression analysis of static panel data. By developing the model from Alamdarlo (2016), in detail the general model in this study is as follows:

\[
\text{Rice Exports}_{it} = \alpha + \beta_1 \text{Rice Exports}_{i,t-1} + \beta_2 \text{INF}_{i,t} + \beta_3 \text{GDP}_{i,t} + \beta_4 \text{TO}_{i,t} + \beta_5 \text{ER}_{i,t} + \beta_6 \text{LCSI}_{i,t} + \beta_7 \text{AGLND}_{i,t} + \beta_8 \text{PROD}_{i,t} + \beta_9 \text{PRICE}_{i,t} + \psi_i + \epsilon_{it} \]

where:

- \( \text{Rice Exports} \) = Rice Exports (tonnes/year)
- \( \text{GDP} \) = Gross domestic product
- \( \text{TO} \) = Trade openness (Percent)
- \( \text{INF} \) = Inflation (Percent)
- \( \text{ER} \) = Exchange Rate (Rp/US$)
- \( \text{AGLND} \) = Agricultural land (Ha)
- \( \text{LCSI} \) = Liner Shipping Connectivity International Import tariff (Index)
- \( \text{PROD} \) = Rice production (tonnes/year)
- \( \text{PRICE} \) = World Rice Price (USD)
- \( \alpha \) = Constant
- \( \beta \) = Coefficient
- \( \psi_i \) = Galat of spatial autocorrelation
- \( \epsilon_{it} \) = error term

3.3. Data Analysis Method

This research uses quantitative analysis method. Spatial panel data regression is used to examine the spatial effects and factors affecting rice exports in ASEAN countries. The R Studio application is used to help process data processing.

a. Moran Index

The first step in conducting a spatial analysis was to determine whether or not a spatial influence existed. The Moran index is a test statistic used to assess spatial autocorrelation. This statistic calculates the correlation between observations that are close to each other by comparing the values in one area to the values in other areas. The Moran Index Value is calculated using the following equation:

\[
I = \frac{1}{n} \sum_{i=1}^{n} \sum_{j=1}^{n} w_{ij} (x_i - \bar{x})(x_j - \bar{x}) \sum_{i=1}^{n} (x_i - \bar{x})^2 \]

The hypothesis used is as follows:

H0: \( I = 0 \) (no autocorrelation between locations)
H1: \( I \neq 0 \) (there is autocorrelation between locations)
The Moran Index value was between -1 and 1 (-1 indicates a perfect negative autocorrelation and 1 indicates a perfect positive autocorrelation). If the value of I is greater than the value of I0, it means that there is a positive autocorrelation in the data. Conversely, if the value of I < I0, it means that there is a negative autocorrelation. Meanwhile, if the value of I = 0, it means that there is no spatial autocorrelation.

b. Moran’s Scatterplot

The pattern of grouping and distribution between locations can be presented by Moran’s Scatterplot, which shows the relationship between the observed values at a location (standardized) and the average observed values from locations that are adjacent to the location in question (Lee and Wong, 2001).

4. Result and Discussion

The relationship between rice exports among ASEAN countries was analyzed using the Moran Index which was carried out by making a spatial weighting first. It aimed to see the effect of spatial aspects on the model. This study used a weighting matrix, namely the inverse distance matrix based on the assumption that spatial interaction will decrease by increasing the geographical distance between regions. The inverse matrix was chosen because the objects of the rice trading areas studied were several countries that had cooperation in rice exports. If the probability value is greater than the 5 percent level of significance, then there is no spatial relationship between rice trade between countries and vice versa, so the hypothesis in the research used is as follows:

H0: I = 0, (no spatial correlation)
H1: I ≠0, (there is a spatial correlation)

In rice exports between ASEAN countries, there are spatial and mutual linkages that significantly affect each other if the probability value of the Moran index is smaller than the 0.05 level of significance. The spatial autocorrelation of rice trade between ASEAN countries was analyzed using the Moran Index test. The following is Table 1.

In Table 1, the Moran I Test shows that all probability values are equal to this value less than the 5 percent real level, indicating that there is a spatial effect on intra-ASEAN rice exports. The results of the Moran index obtained are the greater the value of the Moran index, the greater the spatial effect caused. The results of the Moran index are positive. This means that there is a relatively weak positive spatial relationship between countries in the ASEAN region in the case of rice exports to ASEAN countries. A positive value on the Moran index indicates the occurrence of agglomeration or grouping between regions of countries that have a high value of rice exports.

Table 1. Moran I Test Results for Rice Exports in ASEAN Countries in 2005-2019

<table>
<thead>
<tr>
<th>Year</th>
<th>p-value</th>
<th>Moran Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>0.004849</td>
<td>0.112510635</td>
</tr>
<tr>
<td>2006</td>
<td>0.001206</td>
<td>0.151221784</td>
</tr>
<tr>
<td>2007</td>
<td>0.002652</td>
<td>0.129938227</td>
</tr>
<tr>
<td>2008</td>
<td>0.001902</td>
<td>0.139102940</td>
</tr>
<tr>
<td>2009</td>
<td>0.0006293</td>
<td>0.167744966</td>
</tr>
<tr>
<td>2010</td>
<td>0.001187</td>
<td>0.151632073</td>
</tr>
<tr>
<td>2011</td>
<td>0.001025</td>
<td>0.155447601</td>
</tr>
<tr>
<td>2012</td>
<td>0.01178</td>
<td>0.084645279</td>
</tr>
<tr>
<td>2013</td>
<td>0.000164</td>
<td>0.199463527</td>
</tr>
<tr>
<td>2014</td>
<td>0.001238</td>
<td>0.150540970</td>
</tr>
<tr>
<td>2015</td>
<td>0.0007122</td>
<td>0.164670657</td>
</tr>
<tr>
<td>2016</td>
<td>0.0007374</td>
<td>0.163798793</td>
</tr>
<tr>
<td>2017</td>
<td>0.001998</td>
<td>0.137769542</td>
</tr>
<tr>
<td>2018</td>
<td>0.008752</td>
<td>0.094316349</td>
</tr>
<tr>
<td>2019</td>
<td>0.00927</td>
<td>0.092474329</td>
</tr>
</tbody>
</table>

The existence of agglomeration in the ASEAN region is in accordance with the results of mapping the average value of Intra ASEAN rice exports in Figure 2 which explains that Thailand is the country with the highest intra-ASEAN rice exports which is depicted in yellow. With the agglomeration, countries that are located close to Thailand also have a relatively higher value of rice exports compared to countries that are located far from Thailand.

4.1. Moran Scatterplots

The spatial interaction of rice exports in ASEAN countries is grouped based on Moran Scatterplots. The results of the Moran Index are illustrated through the Moran Scatterplot which shows that there are groupings of areas consisting of four quadrants. Quadrants are divisions of regional groups that can determine the relationship between regions, both positive and negative. An area is said to have high characteristics if the value is above the average. Conversely, an area with low characteristics if it has a value below the average. which consists of four quadrants. The grouping of these relationship patterns is formed due to the spatial interaction of rice exports in the ASEAN region for the period 2005-2019 which is presented in Figure 1.
Figure 1. Moran Scatterplot of rice exports in ASEAN Countries 2005-2019

Based on the Moran Scattermap with a significance level of 5%, it shows that the average rice export from 2005 to 2019 had a significant positive spatial correlation. Regions that have a spatial correlation are included in the High-High cluster, which is a grouping of countries that have a high rice export value and is surrounded by countries that have a high rice export value as well. Here, the local Moran of ASEAN countries based on the Moran Scatterplots quadrant in 2005-2019 is presented in Table 2 as follows:

Table 2. Local Moran Rice Exports in ASEAN Countries 2005-2019

<table>
<thead>
<tr>
<th>Countries</th>
<th>Ii</th>
<th>Z.Ii</th>
<th>Pr(z &gt; 0)</th>
<th>Quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>0.086</td>
<td>0.339</td>
<td>0.735</td>
<td>Low-Low</td>
</tr>
<tr>
<td>Malaysia</td>
<td>-0.453</td>
<td>-0.936</td>
<td>0.349</td>
<td>Low-High</td>
</tr>
<tr>
<td>Singapore</td>
<td>0.566</td>
<td>1.284</td>
<td>0.199</td>
<td>Low-Low</td>
</tr>
<tr>
<td>Thailand</td>
<td>6.035</td>
<td>5.779</td>
<td>0.000*</td>
<td>High-High</td>
</tr>
<tr>
<td>Philippines</td>
<td>0.179</td>
<td>1.043</td>
<td>0.297</td>
<td>Low-Low</td>
</tr>
<tr>
<td>Myanmar</td>
<td>0.372</td>
<td>1.157</td>
<td>0.247</td>
<td>Low-Low</td>
</tr>
<tr>
<td>Cambodia</td>
<td>0.317</td>
<td>0.595</td>
<td>0.552</td>
<td>Low-Low</td>
</tr>
<tr>
<td>Brunei</td>
<td>0.664</td>
<td>1.285</td>
<td>0.199</td>
<td>Low-Low</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>1.059</td>
<td>1.152</td>
<td>0.249</td>
<td>High-High</td>
</tr>
<tr>
<td>Laos</td>
<td>0.314</td>
<td>0.558</td>
<td>0.577</td>
<td>Low-Low</td>
</tr>
</tbody>
</table>

From the analysis above, it can be seen that the countries in The High-High quadrant are Thailand and Vietnam. It can be explained that these countries are regions of countries that have a high average value of rice exports and are surrounded by countries that have a high average value of rice exports as well. In addition, there are countries in The Low-Low quadrant, namely Indonesia, Singapore, the Philippines, Myanmar, Cambodia, Brunei, and Laos. It can be explained that these countries are countries that have a low average value of rice exports and are surrounded by countries that have a low average value of rice exports as well.

Malaysia is in The Low-High quadrant, so it can be explained that Malaysia is a country that has a low average value of rice exports but is surrounded by countries that have a high average value of rice exports (Thailand).

In the era of globalization, food supply in a country is increasingly dependent or at least related to other countries. Empirically, there is no country in the world whose food supply is not related to or dependent on other countries, whether through trade or food assistance (Hermanto 2015). Analysis of the export development of the agricultural sector is carried out as an effort to evaluate the performance and achievements of the agricultural sector development quantitatively in increasing its contribution to state revenues. The agricultural sector in this case includes the food crops sub-sector, especially rice or rice

Thailand and Vietnam are the largest rice exporters, while Indonesia and the Philippines are the largest rice importers in ASEAN. The rice export-import activities that occurred in the ASEAN region indicated that there had been integration between the rice markets in Indonesia, the Philippines, Thailand and Vietnam. In other words, when a change or shock in one market will affect other markets. The high level of domestic consumption of rice in ASEAN has made rice producers not all exporting countries. According to the World Bank (2016), most cereal production is used for domestic consumption, where only 10 percent of the total world production is traded globally, rice is no exception.
In ASEAN countries in geographically adjacent areas and forming economic areas with increasingly free trade, it is necessary to carry out further research on the factors affecting rice trade by including spatial characteristics included in the data in this analysis. The spatial aspect is an important attribute because neighboring countries can have an effect on one another. Research that analyzes the determinants of a country's international trade was carried out by Quang et al. (2017).

AEC (ASEAN Economic Community) as a form of economic integration that occurs between countries in ASEAN has a mutual agreement to integrate the economy including the markets of all ASEAN member countries. The implementation of AEC leads to market integration between countries, which means that the market of one country will influence each other with the market of other countries. This means that price changes in one market are partially or totally transmitted to prices that occur in other markets, either in the short or long term (Aryani 2009).

The factors that influence the demand and supply of rice in Indonesia are: (1) rice demand is significantly influenced by the real price of Indonesian rice, population, and previous demand for rice; (2) rice supply is influenced by rice production, total rice imports, rice stocks, and rice stocks in the previous year; (3) the real price of grain at the farm level is significantly influenced by the real price of government purchases, rice production, and the real price of grain at the farmer level in the previous year; and (4) the real price of Indonesian rice is significantly influenced by the real price of government purchases. Several alternative government policies in research, the government should continue to apply fertilizer subsidy policies, increase the purchase price of grain and rice prices, encourage increased rice production through intensification programs (Widyastutik et al., 2011).

Research on the spatial effect on export flows of COMESA (Common Market for Eastern and Southern African) member countries was conducted by Hamzalouh et al. (2017). The panel data used in this study are based on 14 member countries of COMESA in 2005-2013. The findings of this study are that the best model to test the spatial effects of COMESA trading is the Durbin spatial model with fixed effects. The variables used include real exports, exchange rate, population, cost of export, real GDP, and general government final consumption expenditure. Export activities in COMESA member countries are influenced by the conditions of other member countries.

Phung et al. (2017) conducted a study on trade between Vietnam and countries in the intra-ASEAN region by using the gravity model and by considering the Hausman-Taylor model of spatial analysis. This study considers aspects of space and regional distance in the analysis to see Vietnam's trade relations with other ASEAN countries. The results of this study indicated that there is a spatial-lag interaction in trade between Vietnam and intra-ASEAN countries, then this study also explains spatially that Vietnam tends to export goods to countries that are located close to Vietnam.

The research results of Thi Hong et al. (2015) showed that rice has a relatively low elasticity of demand. The GDP of importing countries has a positive value that has an influence on Vietnam's export activities. In terms of the distance factor, boundaries do not have much influence on rice export activities because rice is the main commodity in large quantities and can be transported and stored for a long time.

4.2. Impact of Spatial Interaction

Based on Spatial autoregressive coefficient result, the known value of Lambda (λ) describes the value of the spatial error coefficient. Based on the estimation results, Lambda has a significant effect on the export of rice commodities at a significant level of 0.05. The coefficient of

Figure 2. Moran Scattermap of Spatial Relations of Rice Exports in ASEAN Countries 2015-2019
0.360224 means that the percentage of rice commodity exports has an effect of 0.360224 times the average export of rice commodities by neighboring countries. The sizeable impact that comes from neighboring countries should be utilized by ASEAN member countries to further strengthen their integration relationship. This is something that needs to be done so that these exporting countries do not only compete in trade but cooperate with each other so that they can increase exports both to intra and extra regions. Cooperation to increase exports can be done by looking at the potential and characteristics of each member first. As is well known, in the case of rice commodities, each ASEAN member country has different potentials, as producers, consumers, and traders. These interrelated potential differences can be used as a basis or idea in building a kind of regional value chain in the ASEAN region. Regional value chains in ASEAN involve value addition or interrelated creation of various operations carried out by local and foreign companies based in the region (ASEAN 2014). Moreover, after the implementation of the ASEAN Economic Community, the regional value chain concept should become more open and easy to implement. In this case, the regional value chain aims to increase rice exports, which are mainly dominated by rice commodities to intra and extra ASEAN.

5. Conclusion

Based on the regression analysis of spatial panel data to see the spatial effect on intra-ASEAN rice exports, it can be concluded that there was a spatial effect on intra-ASEAN rice exports. In addition, the results of this study also show that there was a relatively weak spatial agglomeration in rice exports in the ASEAN region.

The government is expected to continue to encourage increased rice production and reduce domestic rice consumption to maintain the stability of domestic rice stocks, reduce imports, and increase rice exports. The government can respond to the discovery of spatial effects by increasing the quality of rice commodity exports so that they can compete with neighboring countries that also export the same commodity.

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