Centre for
Management **P**ractice
Discussion **S**eries
(CMPDS)

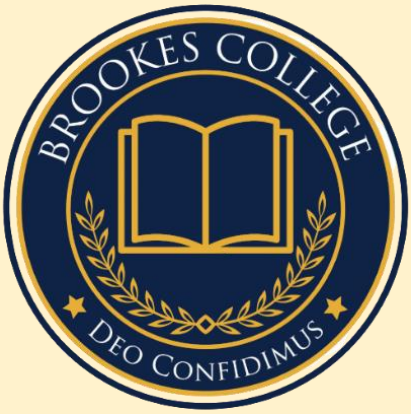
Centre for
Management
Practice
(CMP)

The Impact of Participating in the Regional Comprehensive Economic Partnership (RCEP) Agreement and Potential Export Markets for Vietnamese Rice: An Application of Augmented Gravity Model

Jadhav Chakradhar and Trinh Thanh Thao

September 2021

CMPDS – 1
September 2021
ISSN: 2563-8866 (Online)
Published Quarterly



Centre for Management Practice (CMP) consists of students, faculty, alumni, and associates of Brookes College who are working on research on Business Management Practices. CMP undertakes original management research focused on cutting-edge practical research to help practitioners across all industrial settings namely Healthcare, Retail, Oil and Gas, Real Estate, and many others.

CMP also produces the Brookes College – Centre for Management Practice Discussion Series (CMPDS) with a mandate to publish high-quality papers every quarter. Moreover, members of the research group regularly publish in general management, economics, and other specialized journals.

It runs workshops and conferences that bring together academics and practitioners to explore and discuss the important management issues of the day. The research group also provides training courses for Government departments and industries in various areas of management.

Enquiries:

Acting Director of CMP and Editor of CMPDS
Pinkal Shah
CMP
Brookes College
Address : #250, 6424 36 St NE Calgary, AB T3J 4C8
Contact no. : +1 (403) 800-6613
Email : research@brookescollege.ca
Website : www.cmp.brookescollege.ca

The 1st International Conference on Global Business Practices
Centre of Management Practice
Brookes College, Canada

The Impact of Participating in the Regional Comprehensive Economic Partnership (RCEP) Agreement and Potential Export Markets for Vietnamese Rice: An Application of Augmented Gravity Model

Jadhav Chakradhar[1] and Trinh Thanh Thao[2]

[1] *Centre for Economic and Social Studies (CESS), Hyderabad, India, chakradhar@cess.ac.in*

[2] Researcher, Agricultural Technology Transfer Center, Cuu Long Delta Rice Research Institute (CLRRI) Can Tho city, Vietnam.

Abstract

This paper examines factors affecting Vietnam's rice export to the countries participating in the Regional Comprehensive Economic Partnership (RCEP) agreement. The panel data augmented gravity model has been applied for 12 major Vietnam's rice importing countries between 2000 and 2016. The estimated results suggest a positive relationship between Vietnam's per capita export and the capita real gross Domestic Product (GDP) of the importer, Vietnam's rice production, export price, and RCEP dummy. We confirm a negative relationship between Vietnam's per capita rice export value and import country agricultural land, and rice import tariffs. In addition, the present research forecasts Vietnam's rice export value per capita in each RCEP partner using the autoregressive model. This analysis is based on three scenarios – when the RCEP agreement is reached and signed, the rice import tariff from Vietnam will reduce by 100%, 50%, or 20% on a year-on-year basis. The study shows that among RCEP members, Vietnam has potential markets if the import tariff reduction in Singapore, Brunei, Korea, Japan, and Malaysia. To efficiently use rice exports' potential benefits, Vietnam needs to increase rice value instead of expanding rice exports with the following implications: encouraging rice production, adjusting Vietnam's export market to potential markets, adopting market-oriented policies for international trade cooperation.

Keywords: Regional Comprehensive Economic Partnership (RCEP), Rice Export, Gravity model, tariff reduction, potential markets.

JEL Codes: F10, F12, F13, F150.

Introduction

Following the Doi Moi economic policy reforms in 1986, Vietnam has transitioned into the market economy and has established substantial trade liberalization policies (Van Vu, 2013). The country has entered into several bilateral and regional trade agreements (RTAs) over the years. For instance, Vietnam was one of the prominent nations in Asia for forming the Association of Southeast Asian Nations (ASEAN) in 1995. It became a member of the World Trade Organization (WTO) in 2007. The RCEP agreement, launched in November 2012 and concluded in 2020, consists of the ASEAN members (Brunei, Indonesia, Cambodia, Lao PDR, Myanmar, Malaysia, the Philippines, Singapore, Thailand, and Vietnam) and the six existing ASEAN free-trade partners—Australia, China, Japan, South Korea, New Zealand, and India. It is the world's largest trading bloc, accounting for nearly half of all global trade, to eliminate tariffs gradually and non-tariff barriers (NTBs). The RCEP member countries have more than 3.4 billion people with a total GDP at purchasing power parity (PPP) of 49.5 trillion USD; nearly 39% of the world's GDP is generated by RCEP members (WTO, 2012). In general, Vietnam is perceived as a net beneficiary of the RCEP agreement. Further regional integration can lift Vietnam's per capita income by nearly 4% (Petri and Plummer, 2012). Vietnam exports 58.1 billion USD to the RCEP member countries, accounts for 44 % of the countries country's total exports (Nguyen, 2018).

Rice is a significant crop in Vietnam, rice makes up 90% of cereal production in Vietnam, and 60% of the labor force depends on this sector (Bettman, 2014). Vietnam has transitioned quickly from being a rice importer (in 1968) to become the world's third-biggest rice exporter. Indeed, it exported 1.4 million tonnes of rice in 1989 alone (Pingali et al., 1997) had become a significant source of export earnings and contributed to the sustainable economic development of the Vietnam rice sector, which helps exploit Vietnam's advantage with RCEP members countries.

At present, Vietnam exports rice to more than 80 countries across the globe. However, the export of Vietnam's rice products to RCEP members still faces many restrictions and challenges. These are low value for rice and a lack of a brand name for Vietnamese rice. Indeed, Vietnam is up against existing competitors such as India and Thailand, and an emerging one, Myanmar, from among the RCEP members. In this context, it is necessary to assess the impact of important factors affecting and determinants of Vietnam's rice export value in RCEP members' markets. This paper also explores potential markets in RCEP countries to which Vietnam can export rice at a high value and where tariffs will decrease and or be eliminated in the future.

The rest of the paper is organized as follows: Section 2 deals with reviewing the literature on trade determinants. Section 3 reports the empirical strategy and discussions of the panel gravity model and Vietnamese exports' trade potential. The data source, unit of measurement, and methodology are provided in Section 4. Finally, Section 5 offers conclusion and policy implications.

Literature Review

Trade-in agriculture plays a significant role in reducing food security and inclusive development. Agricultural trade has been carried out underneath GATT disciplines with the Uruguay Round (1995) and it remains the basis of arguments in the current Doha Development Agenda consultations. Indeed, the share of global agro-food trade between RTA partners rose from over 20% in 1998 to nearly 40% in 2009 (OECD, 2012). The reduction of tariffs is a crucial component of RTA negotiations. However, applied agricultural tariffs remain high in RTA negotiations (Bureau, Guimbard, & Jean, 2019). The previous empirical studies such as

Ekanayake et al. (2010) concluded that ASEAN RTA has a positive and significant impact on its ten member countries. Kim (2010) estimated the effects of ASEAN membership on Cambodia's trade flows using a gravity model and annual data from 21 years starting from 1994. As anticipated from the gravity model, Cambodia's trade pattern is determined by its geographical proximity. Nguyen (2010) conducted regressions using both static and dynamic gravity models. The study concluded that Vietnam's export growth and their trading partners' economic growth are positively correlated. Moreover, transportation cost, exchange rates, and ASEAN membership trading partners significantly affect Vietnamese export performance. Many previous studies analyze the effects of RTA by applying an augmented gravity model to examine the Vietnamese case. In Thai's (2006) examination, factors affecting the potential and level of trade between Vietnam and 23 European countries in the OECD were evaluated. Using the panel data gravity model, covering the 12 years from 1993, the results show that bilateral trade between Vietnam and other European countries was determined by economic size, exchange rate, volatility, and market size. Their study's estimated results reveal that the combination of economic size, relative factor endowment difference, and distance significantly impacts a potential trade. Several previous studies have analysed the effects of Vietnam's participation in the RCEP agreement on trade flows. Trang et al. (2011) assessed using an applied gravity model and considering 61 of Vietnam's import partners. These factors – economic distance, the population of importing countries, economic growth of Vietnam, real exchange rate, and sharing common borderland – positively related to the export value for all groups; meanwhile, distance has adverse effects on export value. Itakura (2015) created simulations of the RCEP agreement, focusing on ASEAN members. The study revealed that all RCEP member countries experience GDP growth through their participation in the agreement, which liberalizes trade and promotes investments. He concludes that trade volumes expand as participating countries commit to more considerable tariff reductions. Further, Nguyen (2018) reviewed the current trading relations between Vietnam and members of the RCEP after the ten years of integrating with regional economies and analyzed the effects of reduced tariffs for trading partners on Vietnam's exports through the RCEP agreement. The results indicate that exports to RCEP markets have considerably increased. Further, reductions in the tariff reductions have positively affected Vietnam's major exports, including agricultural and electronics products. The increasingly interdependent between Vietnam and RCEP partners facilitates the potential for expanding trade in the coming years. The formation of a regional market under the RCEP agreement can significantly increase Vietnam's exports in the regional markets through greater tariff liberalization and the removal of NTBs.

Trade potential is defined as the maximum level of trade given its current determinants and the lowest possible amount of trade partners' restrictions (Miankhel et al., 2009). A very Few previous studies have estimated the potential to export rice—Muhammad (2018), using the gravity model, forecast rice exports from Pakistan. The results show that Pakistan has abundant rice export potential with 109 countries. Although there is abundant literature on the impact of RTAs on trade flows using the gravity model, there are few empirical studies on Vietnam's rice export. Some studies focus on the effects of RTAs on Vietnam's export (see Thai, 2006; Nguyen, 2010; Trang et al., 2011; Nguyen, 2018, Kikuchi, Yanagida and Vo, 2018).

However, there is no prevailing research on the cumulative impact of the RCEP agreement on Vietnam's rice export or studies on finding potential rice markets among RCEP member countries. Therefore, this study provides new insights to policymakers and adds value to the existing literature.

Empirical Strategy

The basic formula of the gravity model in international trade is written as follows:

$$T_{ij} = A\,\frac{Y_i Y_j}{D_{ij}} \dots\dots\dots\dots (1)$$

Where Tij indicates the value of trade flows between two trading partners, i and j. Yi and Yj are the measures income levels of countries i and j, respectively. Dij is the geographical distance between countries i and j and functions as A constant. This study uses an augmented gravity model; we include specific variables. The reasons for their use are explained in the paragraphs that follow.

Instead of Vietnam's total rice export value, we consider the ratio of export value to the importing country's total population as an independent variable. This gives the individual consumption power of each importing market. Besides, we consider only the export of rice from Vietnam to its trading partners. Therefore, for the first independent variable, we consider only the income level of importing countries to represent consumers' purchasing power in importing markets.

In this model, first, we use the real GDP per capita, which is deflated by the GDP deflator. Real GDP per capita has been used in gravity model estimations as a better proxy for development level. Indeed, real GDP per capita describes the link between the level of trade and the country's stage of development. The more developed two countries are, the more likely they are to trade with one another. Therefore, we expect a positive sign in the gravity model between trade and real GDP per capita.

Second, Vietnam's rice production plays a vital role in countries economic growth. Production capacity measures Vietnam's supply capability. If the demand for rice increases in the future, the current supply growth rate will not be sufficient to meet the demand. Thus, Vietnam will eventually lose to its competitors in the international rice markets. Therefore, we have taken Vietnam rice production second independent variable in the gravity model.

Third, geographical distance is taken as a proxy for transportation costs. The remoteness between countries is often measured using the great circle distance formula (Head, 2000). According to Bougheas (1999), the cost of the international transaction of goods reflects the distance factor and negatively affects trade. This is particularly true for agricultural

products which are sensitive to the delivery time and mode of transportation. Therefore, we expect a negative sign in the gravity equation for the distance variable.

Fourth, the importer's agricultural land per capita shows the capacity of importing the country's crops, including rice. We divide agricultural land per capita by the total population of importing countries because we would like to check if the growth rate of agricultural land per person will increase or decrease with an overall growing population. If the importer's agricultural land per capita declines, it means that the country cannot produce rice domestically. In such cases, Vietnam's rice export will have an excellent opportunity to meet the high demand of these importing rice markets.

Fifth, the critical role of the export price increases with export value. This study wants to determine whether or not consumers in RCEP markets are willing to pay a high price for good-quality rice from Vietnam. We expect this independent variable to have a positive sign.

Sixth, Oguledo and Macphee (1994) brought about innovation to the gravity model by incorporating average tariff to estimate the effect of discriminatory trade arrangements on trade flows. Indeed, the importer's tariff rate can affect export flows. Further, if import tariffs reduce, exports are expected to increase; hence, we expect a negative coefficient for tariffs. Therefore, in this study, we estimate the effect of the RCEP agreement, which has the critical target of tariff reduction. As such, the import tariff rate of rice is strongly linked with Vietnam's rice export value. A negative sign is expected for the independent variable of the import tariff rate.

Finally, if both exporting and importing countries are signatories to a trade agreement, we expect more trade between them. Krugman (1991) introduced a "natural trading bloc" based on geographical proximity that may increase both efficiency and welfare in the trade. Nguyen and Michael (2016) used ASEAN membership as a dummy variable to evaluate intra-ASEAN trade. Therefore, we include it as an independent dummy variable in this study; we expect a positive sign for ASEAN membership.

Based on the reasons for including variables offered so far, the augmented gravity model equation for this study can be written as follows:

$$ln\frac{REV_{it}}{POP_{jt}} = \beta_0 + \beta_1 \ln\left(\frac{RGDP}{POP}\right)jt + \beta_2 + lnProd_{it} + \beta_3 lnDist_{ij} +$$
$$\beta_4 ln\left(\frac{Agri\_Land}{pop}\right)jt + \beta_5 lnEx\_price_{ijt} + \beta_6 lnTariff_{jt} + \beta_7 DV_{jt} + \varepsilon_{ijt} \quad (2)$$

Where i, j, and t stand for exporting country, importing country, and year, and εi,j,t is the error term $\frac{REV_{it}}{POP_{jt}}$ indicates the ratio of export value to the total population of the importing country. RGDP shows the real GDP of the importing country. We have taken the country's population ratio to its RGDP as one of the independent variables. Prodit indicates Vietnam's rice production. Distij is the bilateral distance between the capital cities of Vietnam and the importing country. The $\left(\frac{Agri\_Land}{pop}\right)_{jt}$ suggests the ratio of the total agricultural area of the importing country to the importing country's total population. Ex_priceujt is the unit export price from Vietnam to the importing country. Tariff is considered the average of the simple import tariff on Vietnam rice exports from 2000 to 2016. DV is a dummy variable; its value is whether the importing country is an ASEAN member and zero otherwise.

In our data set, a few of the trade flows are recorded as zero or missing values. At the disaggregated level, the probability of zero trade is very high for the small or geographically distant countries; therefore, the trade is anticipated to be approximately zero (Frankel, 1997). However, an estimation log-linear gravity model with zero trade flow values can't account straightforwardly and could give biased empirical results. Specifically, if the geographical distance between trading partners is more and a lack of cultural or historical links reduces the chances of trade, omitting zero flows from the analysis tends to underestimate the other variables' effects on trade (Rauch, 1999).

The Tobit estimation method is often employed in the burgeoning literature to deal with zero trade flow values. Numerous researchers have used the standard Tobit model for an estimated gravity equation with zero flows. Specifically, Rose (2004) and Andersen (2002) have employed the Tobit model to cope with the zero trade flow values that appear either because the actual trade flows are negligible or due to measurement errors from rounding. In the Tobit model, part of the observation on the dependent variable is censored (unobservable) and represented instead by mapping the variable to a specific value, generally zero (Linders, 2006). According to Eaton and Tamura (1994), the Tobit model gives the lowest bias and outperforms all other estimators in a simulation exercise. Therefore, it is suitable to use the Tobit estimation method in this study since our data include zero trade flow values for some years.

Data Source and Measurement

All the current study data were obtained from an authorized data source (see Table 1). We collected data for 12 countries over 17 years (2000–2016). Of the 15 countries, 12 countries were members of RCEP, and each significantly affected Vietnam's rice export. Three other countries in the RCEP are Thailand, Myanmar, and India, which are among the top five exporters of rice and Vietnam's direct competitors. Countries with the lower import of Vietnam rice are not considered in the empirical estimation.

Table 1 Data sources

Variables	Expected sign	Data Source
$\frac{REV_{it}}{POP_{jt}}$	-	United Nations Commodity Trade Statistics Database (UN COMTRADE), World Bank Development Indicators (WDI)
$\left(\frac{RGDP}{POP}\right)jt$	Positive	UN COMTRADE, WDI
$Prod_{it}$	Positive	Food and Agriculture Organization (FAOSTAT)
$Dist_{i,j}$	Negative	Institute for Research in the International Economy (CEPII)
$\left(\frac{Agri\_Land}{pop}\right)_{jt}$	Negative	WDI
Ex_price_{ijt}	Positive	UN COMTRADE
$Tariff_{jt}$	Negative	WTO and TRAINS

Dv	Positive	

Source: Authors' compilation based on different databases as mentioned above.

First Order Autoregressive Model

To obtain the objective for the forecast of rice exporters, we estimated values for each market. Therefore, the data set changes from including panel data to having time-series data. To develop the forecasting model, we applied the first-order autoregressive model, denoted as AR (1), with a lag of one year of independent variables in the model. The data for bilateral distance is time-invariant, the import tariff is fixed according to the time, and then we build the scenarios for tariff reduction.

We used the Gravity Model results to calculate the predicted export value per capita by forecasting future data. According to Gul (2011), the equation's estimated coefficients are used in simulations to predict the volume of trade between any pair of countries, provided that systematic data on GDP, distance, population, etc., are available. The simulated value of bilateral trade is then compared with the observed values to infer the bilateral trade potential. By using this methodology, we can classify those countries with which Vietnamese rice has the potential to expand trade and focus on increasing value in potential markets instead of increasing quantity in exploitative markets.

Empirical Results and Discussion

The descriptive statistics for the variables are given in Table 2 17 years. One consumer in the RCEP market paid 3 USD per year to buy rice from Vietnam. The consumer's income in the RCEP market, at about 19,000 USD per year, was huge compared with the amount of money they spent on rice. Regarding the bilateral distance, the nearest RCEP trading partner was 212.5 kilometers away from Vietnam; the farthest was 9,045.3 km. The average agricultural land per capita of the importing country was about 2 hectares. The export price was approximately 423 USD per tonne on average. The minimum import tariff was 0% and the highest 513%.

Table: 2 Descriptive statistics of variables

Variables	Unit	Observations	Mean	Std. Dev.	Minimum	Maximum
Vietnam's rice export value per capita	USD/per	204	3.03	6.68	0.00	44.87
Importer's real GDP per capita	000 USD/per	204	19.27	18.42	0.30	68.15
Exporter's production	million ton	204	38.80	4.34	32.10	45.10
Bilateral distance	kilometre	204	2831.04	2582.47	212.52	9045.30
Importer's agricultural land per capita	ha/per	204	2.03	5.45	0.00	23.78
Vietnam's export price	USD/Ton	204	423.33	121.04	121.90	788.14
Import tariff	Percent	204	80.44	153.61	0.00	513.00

Source: Authors' compilation

However, there are some common problems in the data that need to be considered. These include outliers, multicollinearity, heteroscedasticity, and underfitting or overfitting. All these issues can lead to a biased estimation, so we must choose the fittest model for each case in the data set. Indeed, every regression technique has an attached assumption, which needs to be satisfied before an analysis is done. The dependent variable's characteristics, independent variables, and distribution serve as guides to the most appropriate techniques. According to J. M. Wooldridge (2015), the simplest and most popular regression is the linear regression; it has six critical assumptions. First, there must be a linear relationship between the independent and dependent variables; second, there should be no outliers; third, there can be no heteroscedasticity; fourth, sample observations should be independent; fifth, error terms have to be normally distributed with a mean zero and constant variance; sixth, there may be no multicollinearity or autocorrelation. In the equation, the disturbances $\varepsilon_{i,j,t}$ can be autocorrelated, heteroscedastic, and cross-section dependent (Hoechle, 2007). Therefore, we conducted three tests for cross-sectional dependence, serial correlation, and heteroscedasticity.

Pesaran's cross-sectional dependence (CD) test is used to test whether the residuals are correlated across entities (Hoechle, 2007). The results are shown in Table 3; they indicate that the null hypothesis (no CD in the residuals) can be strongly rejected at the 5% level. This implies that the data has strong evidence of CD. The serial correlation results are shown in Table 3; the null hypothesis (no serial correlation) can be strongly rejected at the 5% level. It implies that the model has strong evidence of autocorrelation. Standard errors in the presence of heteroscedasticity include biased test statistics and confidence intervals. The three tests' results are shown in Table 3; the null hypothesis (residuals are homoscedastic) is firmly rejected at the 5% level. This implies that the model includes heteroscedasticity.

Table: 3 Results for cross-sectional dependence, serial correlation, and heteroscedasticity tests

Criteria	**Cross-sectional dependence**	**Serial correlation**	**Heteroscedasticity**
Method	Pesaran CD test	Breusch-Godfrey Lagrange multiplier test	Breusch-Pagan test
Null hypothesis	Residuals are not correlated	No serial correlation	Residuals are homoscedastic
Prob.	0.000	0.000	0.000
Conclusion	Cross-sectional dependence	Autocorrelation	Residuals are heteroscedasticity

Source: Authors' compilation.

Beck and Katz (1995) suggest estimates with panel-corrected standard errors (PCSE) to handle these problems. Therefore, Model II fixed the three issues (Table 4). Model II represents an estimation that shows all the variables with expected signs and significance at the 1%, 5%, and 10% significance levels.

Table 4: Estimation results

Explanatory Variables	Dependent variable: Vietnam's rice export value per capita			
	Model I		Model II	
	Coefficients	Std. Err.	Coef.	Panel-corrected Std. Err.
Log (importer's real GDP per capita)	1.618*	0.366	1.740*	0.442
Log (exporter's production rice)	6.834***	3.611	5.886**	2.734
Log (Bilateral distance)	-0.759	0.729	-0.842***	0.434
Log (importer's agricultural land per capita)	-0.969*	0.196	-0.952*	0.257
Log (export price)	1.559	1.263	1.551***	0.867
Import tariff	-0.010*	0.003	-0.010*	0.003
ASEAN dummy	3.086**	1.469	3.181*	0.745
Constant	-141.935**	60.363	-125.628*	46.127
R-squared			0.5041	
Log-likelihood	-593.53			
Observation	204		204	
Markets	12		12	

*Note: ***0.01, **0.05, *0.1 significance level respectively*

Source: Authors' compilation by using Stata 14.1

From Model II, we can identify the factors that affect Vietnam's rice export value per capita in RCEP markets. The estimated results show that the factors affecting Vietnam's rice export value per capita have positive and negative effects. Positive effects include those of the importer's real GDP per capita, exporter's production, rice quantity, export price, and ASEAN membership. The adverse effects include geographical distance, importer's agricultural land per capita, and import tariff rate.

The importer's real GDP per capita is the consumer's income, which is considered the importing market's purchasing power. "Higher GDP of an importer must have a positive and statistically significant effect on trade because it depicts the higher demand potential of the importing country" (Muhammad, 2018). The estimated results indicate that this is true for Vietnamese rice export; with a 1% increase in the real GDP per capita in rice importing countries, the rice import value per capita from Vietnam could increase by 0.0174 USD. Other variables remain constant. There is a positive, significant relationship between Vietnamese rice export value and the partner country's income. This implies that if other variables remain constant, countries with higher real GDP per capita (Japan, Korea, China, Singapore, and Australia) can pay more for rice from Vietnam.

In the case of Vietnam's rice production, the results indicate an increase in production will significantly impact Vietnam's rice exports, holding other variables constant. As we evaluated in Vietnam's rice production situation, climate change has resulted in a decline in rice production, technological improvements, and the mechanization of Vietnam's rice sector can improve its production capacity in the future.

As expected, the results show that increases in the distance between exporters and importers could decrease the import value of rice per capita, which means that more logistics and higher transportation costs could discourage countries from importing rice. The estimation indicates that with a 1% incremental increase in the geographical distance between the capitals of exporting and importing countries, Vietnam's rice import value per capita could decrease by 0.0084 USD, holding other variables constant. This explains why Vietnam has tended to export rice to RCEP trade partners primarily; transportation costs are lower than those for non-RCEP trade partners.

The importer's agricultural land per capita shows importing countries' capacity to generate agricultural products, including rice. Therefore, the more importing countries can cultivate rice themselves, the less they import from Vietnam. Countries in the RCEP agreement with little or a decreasing trend of agricultural area per capita could become potential markets. The results show that holding other variables constant, a 1% decrease in the agricultural area per capita in the importing country would lead to an increase of 0.0095 USD in individual consumption of Vietnam's rice in that country. Figure 1 shows that the agricultural area per capita in most of Vietnam's RCEP rice trading partner countries is small – less than 0.4 ha per person. Australia and New Zealand are exceptions, with higher cultivable land per capita, but this trend has decreased; moreover, these countries have cultivated cereals such as wheat more than rice. This result could help choose potential trading partners when Vietnam wants to boost its rice export value in RCEP markets.

Based on Table 4, Vietnam's export price in this model positively affects Vietnam's rice export value per capita. The result indicates that a 1% increase in export price would lead to the rise of 0.0155 USD in the individual consumption of Vietnam's rice, while other variables remain constant. Consumers in RCEP markets are willing to pay an excellent price for high-quality rice from Vietnam. Therefore, Vietnam needs to focus on enhancing the quality of its rice, adding value to rice that is processed, and establishing a brand name in RCEP markets to achieve a high export price, which would directly and positively affect rice exports.

The simple average of import tariffs is taken as another resistance factor in the model. The results from the model show that the coefficient of the bilateral tariff has a negative sign. The estimated result indicates that a 1% decrease in import tariff would lead to an increase of 0.01 USD in individual consumption of Vietnam's rice in that country, keeping all other variables constant. For this reason, participation in the RCEP agreement is necessary for tariff reduction and elimination in the future.

The ASEAN dummy variable's positive effect shows that ASEAN member countries imported rice at higher export values from Vietnam compared with other non-member countries. This indicates that individual consumption of Vietnam's rice among ASEAN members is higher than among non-members, at 3.181 USD, holding other variables constant. One reasonable explanation is that ASEAN members have similar cultures and consumer behaviors. For instance, people in ASEAN countries tend to consume much more rice than other cereals such as wheat in their daily lives.

Results of Forecasting Potential Export Markets for Vietnamese Rice

To identify potential Vietnamese rice markets in the RECP member countries, the current study builds the scenarios for implementation in the RCEP agreement.

Baseline Scenario: No reduction in rice import tariffs for trading partners in the RCEP.
Scenario 1: Rice import tariff reduction of 100% (tariff elimination) for trading partners in the RCEP for the five years from 2020.
Scenario 2: Rice import tariff reduction of 50% for trading partners in the RCEP for the five years from 2020.
Scenario 3: Rice import tariff reduction of 20% each year for trading partners in the RCEP for the five years from 2020.

We can predict Vietnam's export value per capita from the different levels of tariff reduction, which is derived from Gravity Model II.

The Baseline Scenario results in Table 5 show that among the 12 RCEP markets for Vietnam's rice, the top five individual consumption markets are Singapore, Brunei, Malaysia, Indonesia, and Japan. Consumers in these markets spend more on Vietnam's rice than the markets. These five markets could be considered as having the most potential if RCEP negotiations cannot reduce import tariffs by 2024. The Philippines, Laos, New Zealand, and Australia are also promising markets for Vietnam's rice exports.

Table: 5 Export value per capita by each market in the future (Baseline) Unit: USD/person

Country	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**Rank**
Australia	1.80	2.17	2.49	2.79	3.08	3.35	3.61	9
Brunei	10.53	10.84	11.10	11.33	11.55	11.75	11.95	2
Cambodia	1.42	1.55	1.69	1.83	1.98	2.13	2.27	12
China	1.55	1.71	1.89	2.10	2.31	2.52	2.74	10
Indonesia	3.95	4.20	4.42	4.62	4.82	5.01	5.19	4
Japan	3.75	3.98	4.19	4.40	4.60	4.80	5.00	5
South Korea	1.33	1.51	1.69	1.88	2.07	2.25	2.44	11
Laos	4.17	4.25	4.32	4.39	4.45	4.52	4.58	7
Malaysia	5.90	6.16	6.39	6.61	6.82	7.02	7.21	3
New Zealand	2.59	2.90	3.20	3.50	3.79	4.09	4.38	8
Philippines	3.62	3.79	3.96	4.13	4.32	4.50	4.69	6
Singapore	16.77	17.11	17.48	17.89	18.37	18.95	19.78	1

Source: Author's simulation results

Suppose tariff reduction is not possible through the RCEP agreement. In that case, South Korea is not a promising destination for Vietnam's rice exports because the South Korean Government has set the tariff barrier high to protect its domestic rice production. Apart from South Korea, China and Cambodia are also not promising markets for Vietnam's rice exports.

Scenario 1 is an ideal in which the RCEP agreement will eliminate tariffs. Singapore and Brunei are still potential markets. On average, a consumer in Singapore willing to pay more than 17.48 USD per year in 2020 and nearly 20 USD per year in 2024. In the Brunei market, a consumer will be willing to pay over 11 USD per year from 2020 to 2024. Meanwhile, Japan

and Korea are emerging potential markets for Vietnam's rice exports **(Table 6).** This is because the Japanese and Korean governments have set high tariff barriers (over 300% in Japan's case and 500% in Korea's). If the import tariff for rice were eliminated through the RCEP agreement, consumers from Japan and South Korea would be potential markets for Vietnam's rice.

Table: 6 Scenario 1: Vietnam rice export value per capita (Unit: USD/person)

Countries/Year	**2020**	**2021**	**2022**	**2023**	**2024**	**Rank**
Australia	2.49	2.79	3.08	3.35	3.61	10
New Zealand	3.20	3.50	3.79	4.09	4.38	9
Brunei	11.10	11.33	11.55	11.75	11.95	2
Cambodia	1.72	1.86	2.00	2.15	2.29	12
Philippines	4.39	4.56	4.75	4.93	5.12	7
Indonesia	4.50	4.70	4.90	5.08	5.27	6
Laos	4.37	4.44	4.50	4.57	4.62	8
Malaysia	6.75	6.97	7.18	7.38	7.58	4
Singapore	17.48	17.89	18.37	18.95	19.78	1
Japan	7.25	7.45	7.65	7.85	8.05	3
South Korea	6.72	6.91	7.10	7.28	7.47	5
China	2.53	2.73	2.95	3.16	3.38	11

Source: Author's simulation results

In Scenario 2, if the RCEP agreement legislated a 50% tariff reduction, the top five potential markets for Vietnam's rice exports would be Singapore, Brunei, Malaysia, Japan, and Indonesia (Table 7).

Table: 7, Scenario 2: Vietnam rice export value per capita (Unit: USD/person)

Country/Year	**2020**	**2021**	**2022**	**2023**	**2024**	**Rank**
Australia	2.49	2.79	3.08	3.35	3.61	10
New Zealand	3.20	3.50	3.79	4.09	4.38	9
Brunei	11.10	11.33	11.55	11.75	11.95	2
Cambodia	1.70	1.85	1.99	2.14	2.28	12
Philippines	4.17	4.35	4.53	4.72	4.91	7
Indonesia	4.46	4.66	4.86	5.04	5.23	5
Laos	4.34	4.41	4.48	4.54	4.60	8
Malaysia	6.57	6.79	7.00	7.20	7.40	3
Singapore	17.48	17.89	18.37	18.95	19.78	1
Japan	5.72	5.92	6.12	6.32	6.53	4
South Korea	4.20	4.39	4.58	4.77	4.95	6
China	2.21	2.42	2.63	2.84	3.06	11

Source: Author's simulation results

In Scenario 3, if the RCEP agreement mandated a gradual tariff reduction of 20% each year, East Asian markets would flourish rapidly. More specifically, Japanese and Korean markets would have the highest growth. The top five potential markets for Vietnam's rice exports would be Singapore, Brunei, Japan, Malaysia, and Korea (Table 8).

Table: 8 Vietnam rice export value per capita (Unit: USD/person)

Country/Year	**2020**	**2021**	**2022**	**2023**	**2024**	**Rank**
Australia	2.49	2.79	3.08	3.35	3.61	10
New Zealand	3.20	3.50	3.79	4.09	4.38	9
Brunei	11.10	11.33	11.55	11.75	11.95	2
Cambodia	1.70	1.84	1.99	2.15	2.29	12
Philippines	4.04	4.31	4.57	4.85	5.12	7
Indonesia	4.44	4.66	4.87	5.07	5.27	6
Laos	4.33	4.41	4.48	4.56	4.62	8
Malaysia	6.46	6.75	7.04	7.31	7.58	4
Singapore	17.48	17.89	18.37	18.95	19.78	1
Japan	4.80	5.62	6.43	7.24	8.05	3
South Korea	2.70	3.89	5.08	6.28	7.47	5
China	2.02	2.35	2.69	3.03	3.38	11

Source: Author's simulation results.

According to the three simulated scenarios, we can see that the RCEP agreement presents an excellent opportunity for Vietnam to export rice to RCEP trading partners. Vietnam will benefit most when its goods reach these markets with low or zero import tariffs. Thus, this benefit will be most evident in markets with already high import tariffs, such as Korea and Japan. In these markets, tariffs are the only barriers to Vietnamese domination over the rice markets.

Being an export-oriented economy with access to large, high-value markets, such as Japan and Korea, zero tariffs will further grow Vietnam's earnings from exports. In the near future, if RCEP negotiations are finalized, this agreement will open up more opportunities for rice exports to Japan, Korea, Singapore, Brunei, Malaysia, and Indonesia, where prices are higher if Vietnam's take policy steps to produce high-quality rice to overcome technical barriers to trade (TBT). To take advantage of rice exports' potential benefits, Vietnam needs to enhance the quality and value of its rice instead of increasing its export volume.

Conclusions

The results from the analysis demonstrate that real GDP per capita of importers, Vietnam's rice production, export price, and ASEAN membership have a positive effect on Vietnam's rice export value per capita; the adverse effects include distance, agricultural land in the importing country, and import tariff on rice. Estimated results indicate that with a 1% increase in the real GDP per capita in rice importing countries, Vietnam's rice import value per capita could increase by 0.0174 USD. The increase in Vietnam's rice production has a noticeable impact on Vietnam's rice exports. However, with a 1% incremental increase in the geographical distance between the exporting and importing countries' capitals, Vietnam's rice import value per capita could decrease by 0.0084 USD. Besides, a 1% decrease in the importing country's agricultural area would lead to an increase of 0.0095 USD in the individual consumption of Vietnam's rice. Further, a 1% increase in Vietnam's export price would lead to the rise of 0.0155 USD in individual consumption of Vietnam's rice; however, if importing partners decreased the rice import tariff by 1%, it would lead to an increase of 0.01 USD in the individual consumption of Vietnam's rice in that country.

The Baseline Scenario indicates that South Korea is not a promising destination for rice exports from Vietnam. In Scenario 1 (import tariff elimination), markets in Singapore and Brunei have

the most potential. Meanwhile, Japan and Korea are emerging potential markets. In Scenario 2, if the RCEP agreement mandated a 50% tariff reduction, the top five potential markets for Vietnam's export rice would be Singapore, Brunei, Malaysia, Japan, and Indonesia. Further, Japanese and Korean markets would have the highest growth. In Scenario 3, if the RCEP agreement established a gradual tariff reduction of 20% per year, Japanese and Korean markets would experience the most growth. In this case, the top five potential markets for Vietnam's rice exports would be Singapore, Brunei, Japan, Malaysia, and Korea. Consequently, Korean and Japanese markets would have the most significant surpluses of Vietnamese rice if the RCEP agreement reduced import tariffs in any way.

The simulated scenario outcomes for rice exports to potential markets in the RCEP conclude that Vietnam still has plenty of potential markets in Singapore, Brunei, Korea, Japan, and Malaysia, remarkably if the import tariffs are reduced. Indeed, Vietnam is currently focusing on rice exports to countries with high potential. Fortunately, Vietnam's rice export potential is bright because it can still improve its earnings and reduce import tariffs when the RCEP agreement goes into force. Vietnam will likely export more rice to these potential markets, contributing to the increased output and export turnover of this commodity while diversifying Vietnam's rice export markets.

Policy Implications

This study clarifies the opportunities and challenges associated with rice export activities if Vietnam participated in the RCEP agreement. We propose a few solutions to help Vietnam to take advantage and overcome the obstacles. Based on the study's outcomes, there are three main policy implications for boosting Vietnam's export value.

According to Food and Agriculture Organization (FAO) forecast, the global demand for rice will increase until 2030, and the rice trade will continue to expand after that. To take advantage of this opportunity, Vietnam needs a specific rice exporting strategy. In particular, Vietnam needs to produce and ensure a high-quality rice production so that demand for exports will be stable. The simulation scenario indicates that potential markets are Japan and South Korea; these markets demand better quality rice.

Forecasting potential rice markets give the direction for identifying and setting up suitable strategies. Vietnam's farmers need to shift the cultivating varieties that meet the demand and acclimatize potential markets' demand. Moreover, Vietnam's domestic rice production should increase in the future. By linking the growth rate of rice productivity to innovation, public investments for innovations in the rice sector should be given more attention. The Vietnamese Government should ensure the agricultural industry's sustainable development with public investments in research and development (R & R&D).

Vietnam must adjust its exports for potential markets. First, Vietnam must consider which markets in the RCEP have high real GDP per capita (Japan, Korea, China, Singapore, and Australia) and increased purchasing power to determine its potential markets. Second, distance negatively affects Vietnamese trade flows to many foreign markets. In the near future, nearby markets should be prioritized, especially those in Asia (Singapore, Brunei, Malaysia, Indonesia, Korea, and Japan). In the long term, Vietnam needs to develop transportation systems and infrastructure to facilitate exports.

Finally, the Vietnamese Government should adopt market-oriented policies for international cooperation in trade. Trading partners in the RCEP with disadvantageous agricultural circumstances may divert their agricultural sectors' investments into Vietnam. The inflow of foreign investments may bring more employment opportunities and income. In addition, and importantly, the Vietnamese agricultural sector may embrace new scientific and technological

advancements to improve its current, inefficient, traditional rice production methods. For instance, Japanese investors are coming to Vietnam to produce high-quality, hygienic rice and ensure food safety before exporting the produce to their home country. This is an excellent way for Vietnam to integrate into global value chains of rice production and increase its rice export value.

References

Anderson, J. E. (1979). "A Theoretical Foundation for the Gravity Equation". The American Economic Review, 69(1), 106-116. Retrieved from http://www.jstor.org/stable/1802501.

Anderson, J.E. and D. Marcouiller (2002). Insecurity and the Pattern of Trade: An Empirical Investigation, Review of Economics and Statistics, 84, pp. 342–352.

Beck, N., and J. N. Katz (1995). What to do (and not to do) with time-series cross-section data. American Political Science Review 89: 634–647.

Bettman, J.R., Luce, M.F., Payne, J.W., Abdullah, Ab., Shoichi Ito, Adhana, K., Dever, J., Tuong, D.M., Hai, L.T., Schmeiser, J. (2014). Vietnam: grain and feed annual. Omonrice 1960, 463–465.

Bergstrand, J. H. (1985): The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence. The Review of Economics and Statistics, 67(3), 474-481.Retrievedfrom https://www.jstor.org/stable/1925976?seq=1#page_scan_tab_contents.

Bougheas, Spiros (1999). Infrastructure, Transport Costs, and Trade. Journal of International Economics, vol.47, pp.169-189.

Bussière, M., Fidrmuc, J., & Schnatz, B. (2005). Trade integration of Central and Eastern European countries: Lessons from a gravity model.

Brock R. Williams (2018). Bilateral and Regional Trade Agreements: Issues for Congress. Congressional Research Service, p.3 available at https://fas.org/sgp/crs/row/R45198.pdf (accessed on 25 Oct 2018)

Carrere, C. (2006). Revisiting the effects of regional trade agreements on trade flows with the proper specification of the gravity model. European Economic Review, 50(2), 223-247.

Childs NW, Kiawu J (2009). Factors behind the rise in global rice prices in 2008: US Department of Agriculture, Economic Research Service.

Cororaton, C. B. (2016). Potential effects of the Regional Comprehensive Economic Partnership on the Philippine economy (No. 2016-30). PIDS Discussion Paper Series.

Demont, M., & Rutsaert, P. (2017). Restructuring the Vietnamese rice sector: towards increasing sustainability. Sustainability, 9(2), 325.

Ekanayake, E. M., Mukherjee, A., &Veeramacheneni, B. (2010). Trade blocks and the gravity model: A study of economic integration among Asian developing countries. Journal of Economic Integration, 25(4), 627–643. doi:10.11130/jei.2010.25.4.627.

Eaton, J., and A. Tamura (1994). "Bilateralism and Regionalism in Japanese and U.S. Trade and Direct Foreign Investment Patterns," Journal of the Japanese and International Economies, (8):478-510.

Food and Agriculture Organization of the United Nations FAOSTAT. Available from: http://www.fao.org/faostat/en/#data (accessed on 10 Jun 2018)

Frankel, J.A. (1997). Regional Trading Blocs in the World Economic System, Washington D.C.: Institute for International Economics.

General Department of Vietnam Customs. Some statistical data on Vietnam's agricultural exports in 2016. Available from: https://www.customs.gov.vn/Lists/EnglishNews/ViewDetails.aspx?ID=547&Category=News%20and%20Events&language=en-US (accessed on 10 Jun 2018)

Gul, N. and Yasin, H. (2011). The Trade Potential of Pakistan: An Application of the Gravity Model. Lahore Journal of Economics, 16(1), 23-62.

Head, K. (2000). Gravity for Beginners, teaching note. The University of British Columbia, Department of Economics, Vancouver.

Hoechle, D. (2007). Robust standard errors for panel regressions with cross-sectional dependence. Stata Journal, 7(3), 281.

Huy, D. Q., & Chang, T. (2013). Impacts of Economic Integration on Vietnam's Trade Flows., 22(3), 59-94.

İncekara, A. and Ustaoğlu, M. (2012): "European Union's Multilateralism on Trade Policies, Customs Unions and Free Trade Agreements; Comparative SWOT Analyses of Turkey and South Korea's Automotive Industries". Procedia - Social and Behavioral Sciences, 58, 464-473. http://doi.org/10.1016/j.sbspro.2012.09.1023.

Itakura, K. (2015), 'Assessing the Economic Effects of the Regional Comprehensive Economic Partnership on the ASEAN Member States', in Ing, L.Y. (ed.), East Asian Integration. ERIA Research Project Report 2014-6, Jakarta: ERIA, pp.1-24.

Jayasinghe, S., & Sarker, R. (2008). Effects of regional trade agreements on trade in agri-food products: Evidence from gravity modeling using disaggregated data. Review of agricultural economics, 30(1), 61-81.

Johnson, H. G. (1953): "Optimum Tariffs and Retaliation". The Review of Economic Studies, 21(2), 142-153. Retrieved from https://doi.org/10.2307/2296006.

Kim, Sokchea (2010). An Analysis of Cambodia's Trade Flows A Gravity Model. MPRA Paper, no. 21461.

Karagöz, K., & Saray, M. O. (2010). Trade Potential of Turkey with Asia-Pacific Countries: Evidence from Panel Gravity Model. International Economic Studies, 36(1), 19-26.

Kompas, T., Pham, V. H., Tuong, N. C., Nguyen, T. M. H., & Bui, T. (2010). The Effects of Rice Export Policy on Regional Income, Prices and the Poor: A' Bottom-Up 'Regional CGE Model for Vietnam.

Krugman, P. R., Obstfeld, M., & Melitz, M. (2011). International Economics: Theory and Policy, 9th edition.

Knutson, R. D., Penn, J. B., & Boehm, W. T. (1995). Agricultural and food policy. Prentice Hall Education, Career and Technology.

Lee, H., & Itakura, K. (2015). Mega-regional free trade agreements in the Asia-Pacific: How do productivity gains, cost mitigations and agricultural policy reforms affect the results? The 18th Annual Conference on Global Economic Analysis, Melbourne Convention Centre.

Linders, G. J., & De Groot, H. (2006). Estimation of the gravity equation in the presence of zero flows.

Maggi, B. G. and Rodriguez-clare, A. (2007): "A Political-Economy of Trade Theory Agreements". The American Economic Review, 97(4), 1374-1406. Retrieved from http://www.jstor.org/stable/pdf/30034097.pdf.

Miankhel, A. K., Thangavelu, S., & Kalirajan, K. (2009, August). On modeling and measuring potential trade. In Quantitative Approaches to Public Policy Conference in Honor of Professor Krishna Kumar, Bangalore, August (pp. 9-12).

Muhammad SaqibIrshad, Qi Xin & Hamza Arshad (2018). Competitiveness of Pakistani rice in the international market and export potential with the global world: A panel gravity approach, Cogent Economics & Finance.

Nguyen, B. X. (2010). The Determinants of Vietnamese Export Flows Static and Dynamic Panel Gravity Approaches. International Journal of Economics and Finance, vol.2, no.4

Nguyen, T.V., Michael H. (2016). Vietnam's export to TPP countries Gravity model, trade determinants and trade potentials.

Nguyen, T. D. (2018). Do trade agreements increase Vietnam's exports to RCEP markets? Asian Pacific Economic Literature, 32(1), 94-107.

OECD (2015), "Regional trade agreements and agriculture", OECD Food, Agriculture and Fisheries Papers, No. 79, OECD Publishing, Paris. http://dx.doi.org/10.1787/5js4kg5xjvvf-en

Oguledo, V., & MacPhee, C. R. (1994). Gravity models: a reformulation and an application to discriminatory trade arrangements. Applied Economics, 26(2), 107-120.

Pesaran, M. H. (2004). General diagnostic tests for cross section dependence in panels (IZA Discussion Paper No. 1240). Retrieved from http://repec.iza.org/dp1240.pdf

Peterson, E., Grant, J., Roberts, D., Karov, V. (2013). Evaluating the trade restrictiveness of phytosanitary measures on U.S. fresh fruit and vegetable imports. Am. J. Agric. Econ. 95, 842–858.

Petri, P. A., Plummer, M. G. (2012). The Trans-Pacific Partnership and Asia-Pacific Integration: Policy Implications.

Plummer, M. G., Cheong, D. and Hamanaka, S. (2010): Methodology for Impact Assessment of Free Trade Agreements. Mandaluyong City: Asian Development Bank. Retrieved from http://www.perpustakaan.kemenkeu.go.id/FOLDEREBOOK/impact-assessment-fta.pdf

Pingali PL, Khiem NT, Gerpacio RV, Xuan V-T (1997). Prospects for sustaining Vietnam's reacquired rice exporter status. Food Policy, 22(4): 345-358.

Rauch, J.E. (1999). Networks versus Markets in International Trade, Journal of International Economics, 48, pp. 7–35.

Rose, A.K. (2004). Do We Really Know That the WTO Increases Trade? American Economic Review, 94, pp. 98–114.

Smith, W. (2013). Agriculture in the Central Mekong Delta: Opportunities for Donor Business Engagement; Overseas Development Institute: London, UK.

Tomoo Kikuchi, Kensuke Yanagida, HuongVo (2017). The effects of Mega-Regional Trade Agreements on Vietnam, Journal of Asian Economics.

Thai, D.T. (2006). A Gravity Model for Trade between Vietnam and Twenty-Three European Countries. Högskolan Dalarna, Institute one för Akademi Industri ochsamhälle.

Thuong, N.T.T. (2017). The effect of Sanitary and Phytosanitary measures on Vietnam's rice exports, Journal of Economia.

Trang N.T., Tam N.T., Nam V.H. (2011). An inquiry into the determinants of Vietnamese product export. Development and Policies Research Center (DEPOCEN), working paper no.08, Vietnam.

UN Comtrade Database. Available from: https://comtrade.un.org/data/ (accessed on 1 Jun 2018)

Van Vu, H. (2013). Vietnams trade liberalization and accession to the WTO (Doctoral dissertation).

Virág-Neumann, I. (2009). Regional Trade Agreements and the WTO. In 7th International Conference on Management, Enterprise and Benchmarking (pp. 5-6).

Waheed, A., & Abbas, S. (2015). Potential export markets for Bahrain: A panel data analysis. International Journal of Trade, Economics, and Finance, 6(3), 165.

World's Top Export. Available from: http://www.worldstopexports.com/rice-exports-country/ (accessed on 19 Jun 2018)

Wooldridge, J. M. (2015). Introductory Econometrics: A modern approach. Nelson Education.

Center for Management Practice
Brookes College
#250, 6424 36 St NE
Calgary, AB T3J 4C8
+1 (403) 800-6613
research@brookescollege.ca
www.cmp.brookescollege.ca