Trade creation and trade diversion effects of ACFTA on seafood exports

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Abstract:

The gravity model is an econometric model used an as effective tool to explain the volume and direction of bilateral trade between countries. It is widely used in international trade and thus, in this article, we use the gravity model to examine the trade creation and diversion effects of ASEAN-China Free Trade Agreement (ACFTA) for the seafood industry by estimating the gravity trade model for the time period between 2003 and 2020 and between 10 countries. Initially, the estimation applied panel data with ordinary least squares (OLS) estimation, but there was a problem with heteroscedasticity and autocorrelation using the OLS estimator. Therefore, we will re-estimate the model by using the fixed effects model (FEM) and random effects model (REM). We estimate twice, once with data including 2020 and once excluding 2020 to understand the impact of the COVID-19 pandemic on commercial trends. The estimated results show that trade creation influences seafood. It is possible that the COVID-19 pandemic has no impact on trade diversion and creation, or that the 2020 data is too short for us to assess this impact. In conclusion, this article has achieved certain success in explaining the causes affecting trade flow in processed goods due to differences between the general tariff rate and the preferential tariff rate for ASEAN - Chinese seafood, and the close distance between commercial partners and converting certificate of origin (C/O) of goods to export. Analysis using the gravity model shows a positive impact on Vietnam's seafood trade flow when joining ACFTA.

Keywords: ASEAN-China Free Trade Agreement, gravity model, seafood, trade creation, trade diversion.

Classification number: 2.2

Introduction

Why choose the Vietnam - China relationship?

Free trade agreements (FTAs) are rapidly increasing, leading to many bilateral and multilateral trade agreements being established. By participating in international and regional organizations, Vietnam will also gradually integrate into this trend as Vietnam is increasingly entering into FTAs.

According to the General Department of Vietnam Customs statistics during the first five months of 2022, China is Vietnam's largest trading partner with a total two-way trade flow of 71.58 billion USD, followed by the US (52 billion USD), South Korea (38 billion USD), and Japan (19.2 billion USD).

It can be seen that China is Vietnam's largest and likeliest potential trading partner. Vietnamese companies want to improve their ability to access the Chinese market gradually and benefit more from FTAs with China, so they need to understand the opportunities and benefits as well as the challenges of these FTAs. Therefore, ACFTA should be of interest.

In addition, because the war on trade between the United States (US) and China, the US is considered to be in a trade deficit. The US government has therefore

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issued policies to protect domestic industry. One policy is to apply tariffs on goods imported from China to the US, while the US and China are two of Vietnam's top trading partner. Therefore, Vietnam cannot avoid being affected by the trade wars of these two countries. However, Vietnam can gain some advantages from the trade war between these two countries, for example, China cannot import from the US due to higher taxes but can increase exports of goods from Vietnam to China. Vietnam also has the opportunity to increase exports to the US as high taxes are imposed on Chinese goods.

Why choose the seafood industry?

Seafood is one of the leading export industries in Vietnam, making a significant contribution to gross domestic product. Seafood revenue is increasing and has become one of the key exports in Vietnam. As soon as the agreement comes into effect, the seafood tax rate will be zero percent.

According to the 2021 Vietnam import - export report from the Ministry of Industry and Trade, in 2021, the structure of export goods will continue to shift in a positive direction with seafood exports reaching USD 8.9 billion, an increase of 5.6%. One positive point is that the average export prices of seafood products all recorded an increase compared to the previous year. Agricultural and seafood exports grew in most market areas. Specifically, the leading export market is still the Asian market with a total turnover of 15.4 billion VND, an increase of 9.7% compared to 2020 of which the Chinese market reached 19.55 billion USD, an increase of 10.1%; ASEAN reached USD 2.89 billion, an increase of 5.0%; Japan reached 1.80 billion USD, a decrease of 0.5%, and South Korea reached 1.19 billion USD, an increase of 10.5%. Next is the Americas market with a turnover of 4.67 billion USD, which is an increase of 20.7% compared to 2020. The largest consumption market in the Americas

region is the US, which reached 3.92 billion USD, an increase of 20.7% over the same period.

Although the seafood industry is clearly determined to be the largest potential export of Vietnam in the near future, the seafood of Vietnam still faces many export difficulties overseas because of technical barriers, especially quality, food safety, and traceability.

Trade creation and trade diversion

The Custom Union Issue published in 1950 by J. Viner [1] defines trade diversion and trade creation. This is the first research done on the matter. J. Viner introduced the theories of "trade creation" and "trade diversion" which became necessary instruments for the analysis and realization of the effects of economic integration. J. Viner also explained that the shift from cheaper to more expensive producers in trade is trade diversion, while trade creation is increasing the volume of trade between countries when they agree to set up a custom union.

Any FTA is strongly associated with lower trade barriers between member countries. Therefore, not only can FTAs create new trade between members of the agreement (trade creation), but it can also divert trade from less expensive to more expensive producers of the same product (trade diversion).

Lower trade barriers between member nations are significantly related to any FTA. As a result, not only may the agreement generate new trade, but it can also redirect trade from lower-cost to higher-cost producers of the same commodity [1]. Trade creation occurs when trade barriers between FTA members are reduced, resulting in new trade. As L. Kendall and J. Gaisford (2007) [2] pointed out, because of lower tariffs between member nations, trade is diverted from a traditional exporter to a less efficient one. These two studies help us better understand and interpret international economic movements and assist us in

clarifying what it means to create and divert trades, as well as their implications.

More bilateral and multilateral FTA have been struck in the last decade. These trade agreements are anticipated to enhance products trade between member nations and have the potential to not only establish new trade between members of the agreement, but also to redirect trade from lower-cost to higher-cost producers of the same commodity [1]. As a result, some people have studied the impact of trade agreements on the creation and diversion of trade between member nations using the gravity model, which is a standard tool for evaluating the effect of FTAs. The gravity model has evolved into an essential and successful instrument for assessing two nations' trade flows. Gross domestic product (GDP) and distance are the two primary variables in the gravity model. Other factors, such as common language or population, are also included in the model depending on the authors' study goals.

Literature review

A.O. Krueger (1999) [3] has demonstrated the positive effect of North American Free Trade Agreement (NAFTA) on the trade flow of member countries. The coefficients of the distance, contiguity, and common language were highly significant and similar in most gravity equation estimates. This study showed that there was a positive increase in trade between USA and Mexico after the NAFTA agreement was signed and in effect. NAFTA creates trade creation for member countries instead of trade diversion.

The research by F. Natale, et al. (2015) [4] examined the factors of international seafood trade using the gravity model for seafood and meat. GDP, per-capita income, primary production and apparent consumption, regional trade agreements (RTAs), and geographical distances between trading partners all explain the dependent variable of bilateral trade flows in commodities.

B. Yang, et al. (2020) [5] estimated gravity models for various product shapes to assess variables impacting China's seafood exports. The findings show that transportation costs and income level appear to be significantly more essential to perishable items, whereas the effects are minor for other products. Furthermore, most trade flows are influenced by rising income to varying degrees.

Research by B.H. Baltagi, et al. (2007) [6] examined the relationship of RTAs to trade flow by applying the gravity model. They suggested that the EU was found to have a trade creation impact in agricultural commodities trade, whereas the ASEAN Free Trade Area (AFTA) and NAFTA have trade creation effects in machinery commodities trade.

S. Lin and M. Reed (2010) [7] conducted research concerning agricultural trade creation and diversion. With the purpose of dealing with heteroskedasticity and zero trade observations, trade creation and diversion effects are estimated using a Poisson Pseudo Maximum-Likelihood (PPML) estimator with various fixed effects.

Further, the article written by A. Muhammad and A. Rashid (2016) [8] argues that the greater trade creation effect in ACFTA stems from tax-favourable policy and the reduction of non-tariff trade barriers due to this agreement. Their study results show that the EU promotes trade between member countries rather than non-member countries. They used the gravity model to analyse the effect of FTAs on EU countries. The model uses the following variables: trade flows, real exchange rate, real GDP, and geographical distance. The colonial relationship, common language, and common border are also used in this model.

There exists a lot of research on trade creation and diversion. However, there is no specific research

focusing on seafood import and export of Vietnam. Therefore, this study will contribute to the existing literature.

Methodology

Methodology

The gravity model with panel data is used to examine the impact of ACFTA on trade diversion and trade creation in the seafood industry using quantitative methods.

Limitations of the gravity model is that basic gravity models do not account for trade creation or trade diversion. The following presents two problems related to the gravity model.

First, D. Trefler (1993) [9], J.W. Lee and P. Swagel (1997) [10] discovered endogeneity problems related to FTAs, specifically, that there is a potential reverse causality between higher trade volumes and FTAs. It was argued that instead of the FTA increasing the level of trade of the two countries, the higher level of trade between two countries might lead to a higher probability for the establishment of a FTA.

Zero trade observation is involved with a double log model (the most used gravity model specification). The existence of zero-valued trade flows has the ability to appear in the volume of trade in a specific good, rather than the volume of overall trade between two countries. However, omitting or deleting zero value observations leads to serious problems by neglecting important information on low levels of trade [11]. This creates bias and deviation in the research results.

The gravity model data was run using STATA. Estimation of empirical results was accomplished with OLS, FEM, and REM estimators with ACFTA as the only agreement. There is an issue with the value of some observations being zero that causes problems when applying a logarithm. This observation is thus immediately eliminated.

With a few minor modifications, we employ the empirical model proposed by S. Lin and M. Reed (2010) [7]. Instead of the GDP variable utilized in their study, we employ the independent variable GDPPC.

The empirical model is described as follows:

$$\ln X_{ijt} = \beta 0 + \beta 1 \ln GDPPC_{it} + \beta 2 \ln GDPPC_{jt} + \beta 3 \ln POP_{it} + \beta 4 \ln POP_{jt} + \beta 5 \ln DIS_{ij} + \beta 6 Coml_{ij} + \beta 7 Coly_{ij} + \beta 8 Border_{ij} + \sum_m \gamma m ACFTA_{ijt}^m + \sum_m \lambda m ACFTA_{it}^m + \sum_m \omega m ACFTA_{jt}^m + \varepsilon v_j$$

where i represents an export country and j an import country.

The entire seafood export value from country i to country j at time t is called export flows (X_{ijt}), which is in units of thousands of dollars. The growth or reduction in trade is clear in the trade flows between the two nations as data on these trade flows represent the real status of the two countries' trading positions. When this year's X_{ij} is higher than the previous year, the two nations are anticipated to have a boost in their trade. This is the characteristic that most clearly demonstrates a country's trade patterns over time.

The distance between countries i and j is called DIS_{ij}. It refers to the distance between the exporting and importing countries, in units of kilometres and is derived from the CEPII Database. The cost of transportation for a country to export or import commodities is represented by the distance variable. This may also represent the similarity in demand owing to shared climatic and topographic factors, as well as cultural and consumption patterns. In terms of the link between X_{ij} and distance, some publications imply that this variable in the X_{ij} equation may be negative. Due to rising transportation costs, distance might restrict trade flows. The longer the distance between two points, the higher the transportation expense, and hence the smaller the trade flow. The cost of import and export rises as distance increases, as does the cost of items.

As a result, the distance will have a negative impact on trade flows into the host country.

POP_{it} is the population of the exporting country i at time t. The population of a country indicates both the labour supply and the quantity of demand. Trade flows and population have an uncertainty. According to several authors, countries with a large population would export less because they must first fulfil internal demand before selling overseas. In this instance, more people will prefer to import rather than export. When the majority of the population works in the field of seafood production, the coefficient of this variable might be positive in the equation X_{ij}; with such a big number of employees, the level of production will be higher, and the amount of output for exports will be higher.

POP_{jt} is the population of the importing country j at time t. X_{ij} and POPj have an uncertain relationship. For importing countries, the larger the population, the greater the demand for consumption. As a result, the population of the importer will have a beneficial impact on trade flows into the export country. A large population provides a chance for importing countries to produce rather than import.

A country's population expansion may affect trade flows in two ways: supply and demand. Population expansion may enhance labour resources, assuring the ability to create export commodities on the supply side. On the demand side, rising population equals more domestic consumer demand, which means more imports [12].

The strongest indicator of a country's level of life is its gross domestic product per capita ($GDPPC_{it}$ and $GDPPC_{jt}$), which are dollar-based measurements. Consumer purchasing power and affordability are reflected in this variable. It is also an indicator of a country's degree of progress when it invests more in manufacturing technologies.

Dummy variables: A few dummy factors are included in this study including shared language, common border, colonial connections, and FTAs (ACFTA).

When country i is the country's colony j, country j is the country's colony, or two nations i and j are concurrently colonies of another country, they are said to have colonial connections. Trade flows have a favourable association with language, border, and colonial ties. If two nations speak the same language, their distance is near, the former belongs to the latter, and they have a strong capacity to share culture, likes, and wants. As a result, they will be able to import more items from each other than nations that are far apart or have distinct cultures.

The following, Table 1, shows the variables and their expected signs.

Table 1. Variables and their expected signs.

Variable	Definition	Expected signs
$GDPPC_i$	GDP per capital of country i	+
$GDPPC_j$	GDP per capital of country j	+
POP_i	Population of country i	+/-
POP_j	Population of country j	+/-
DIS_{ij}	Distance between i and j	-
$Coml_{ij}$	= 1 if i and j have a common language	+
$Coly_{ij}$	=1 if i and j have colonial relations	+
$Border_{ij}$	=1 if i and j have a common border	+
$ACFTA_{ij}$	=1 if i and j both are members of ACFTA	+
$ACFTA_j$	=1 if country j is a member of ACFTA but country i isn't	-
$ACFTA_i$	=1 if country i is a member of ACFTA but country j isn't	-

Source: Authors' estimation.

Data

The sample for this study included ten countries. In the ACFTA agreement, there are five major seafood import and export nations: Vietnam, Thailand, the Philippines, China, and Singapore. There are five nations that are not part of the ACFTA agreement, including the US and the Netherlands, who are both important seafood producers, and France, the United Kingdom, and Germany, which are all large seafood importers. We employ STATA with a sample period of three years before and fifteen years after the signing of the ACFTA from 2003 to 2020 (Table 2).

Table 2. Countries included in this research.

Number	Export country	Import country
1	Vietnam	Vietnam
2	Thailand	Thailand
3	Philippines	Philippines
4	China	China
5	Singapore	Singapore
6	USA	France
7	Netherland	United Kingdom
8		Germany

However, because the logarithmic transformation of the dependent variable or independent variable may equal zero, these observations may be reduced. These observations will be cancelled in this situation. Furthermore, duplicate observations occur, and these observations are also cancelled.

This study is limited by not being able to handle estimates of zero. Eliminating zero value maybe generate more bias in estimation. To the best of the authors' knowledge, this is the only way to process the data and run the model.

Data on seafood export and import is sourced from trade map (https://trademap.org) and is expressed in thousands of USD. Data on gross domestic product per capita (GDPPC), measured in millions of USD, and

population data, measured in persons, are sourced from the World Bank Development Indicators database (https://www.worldbank.org). The Centre d'Etudes Prospectives et d'Informations Internationales (http://www.cepii.fr/cepii/en/bdd modele/bdd.asp) has data on shared language, common border, and colonial links. The following two files provide information regarding distance, common language, common boundary, and colonies: "GE O C EPI IX LS and DIST C EPI I.XLS". While the file "GE O C EPI IX LS" contains information on the general language, shared boundaries, and colonial relations. The file DIST C EPI I.XLS contains information about the geographical distance between countries. World Trade Organizatio (WTO) RTAs (http://wtocenter.vn) provides a database regarding ACFTA. Distances are measured in kilometres and originate from (https://www.freemaptools.com) providing data about the distance travelled from the exporting country's capital to the importing country's capital, in particular.

Results and discussion

Estimates and explanations are provided in this section. To begin, panel data is analysed using the OLS model. Second, the REM is utilised to estimate OLS since it has some substantial deviations. Then, the findings from the OLS, FEM, and REM models are compared.

The data for this study was gathered from five ACFTA member countries and five non-member countries between 2003 and 2020 using the REM model.

Table 3 shows the estimated results of the gravity equation. OLS regression is used after screening for multicollinearity using pairwise correlation and variance inflation factor (VIF) tests. When using the White's general and Wooldridge tests, however, the OLS estimator contained heteroscedasticity and autocorrelation errors. To address these OLS issues, we re-estimate using FEM and REM regressions.

Table 3. The results of the OLS, FEM, and REM estimation.

Dependent variable $\ln X_{ij}$			
Variable	**OLS-1**	**FEM-1**	**REM-1**
$\ln GDPPC_i$	-0.161*** (-2.66)	0.298*** (5.16)	0.236*** (4.33)
$\ln GDPPC_j$	0.343*** (5.83)	0.359*** (8.33)	0.378*** (9.01)
$LnPOP_i$	0.563*** (10.97)	0.295*** (5.66)	0.338*** (6.78)
$\ln POP_j$	0.449*** (6.13)	0.253*** (4.71)	0.258*** (4.85)
$\ln DIS_{ij}$	-0.345* (-1.81)	8.154 (1.27)	-0.680* (-1.82)
coml	-0.606***	.	-0.954**
	(-3.03)	.	(-2.18)
border	1.193***	.	1.707
	(3.92)	.	(1.36)
coly	0.377	.	0.642
	(1.59)	.	(0.68)
$ACFTA_{ij}$	0.883***	0.681***	0.704***
	(3.38)	(4.69)	(4.86)
$ACFTA_i$	0.885***	0.432***	0.508***
	(3.65)	(2.87)	(3.46)
$ACFTA_j$	0.755***	0.834***	0.796***
	(2.74)	(4.65)	(4.38)
_cons	-7.790***	-76.93	-1.274
	(-3.58)	(-1.40)	(-0.38)

Note: *, ** and *** denote 10, 5, and 1% levels of significance, respectively. Source: Authors' estimation.

Most of the variables are significant, with the exception of two: coly and border. Variables $GDPPC_i$, $GDPPC_j$, POP_i, POP_j, coml, $ACFTA_{ij}$, $ACFTA_i$, and $ACFTA_j$ have significant effects, but DIS_{ij} has negative impacts. Because the OLS estimator has heteroscedasticity and autocorrelation issues, we interpret the findings using REM regressions.

To interpret GLS findings, S. Lin and M. Reed (2010) [7] found that trade creation for imports (exports) occurs when γm>0 and λm>0 or γm>0 and ωm>0. When γm>0 and λm+ωm<0 or γm>0 with λm<0 and ωm<0, trade diversion occurs.

From the results of the REM model, it can be seen that γm=0.704>0; λm=0.508>0; and ωm=0.796>0

means trade creation, specifically, trade creation between ASEAN and China.

During the data collection process, we noticed that the data tends to increase gradually over the years, but suddenly decreases in 2020. One of the main reasons for this decrease is the COVID-19 pandemic. Therefore, we decided to run the model again without 2020 data to see whether the COVID-19 pandemic affected the creation and diversion of trade.

Looking at Table 4 below, we can see that the same result occurs when the model is run without the 2020 COVID-19 pandemic period.

Table 4. The results of the OLS, FEM, and REM estimation without 2020 data.

Dependent variable $\ln X_{ij}$			
Variable	**OLS-2**	**FEM-2**	**REM-2**
$\ln GDPPC_i$	-0.186*** (-2.95)	0.329*** (5.42)	0.260*** (4.55)
$\ln GDPPC_j$	0.325*** (5.24)	0.385*** (8.28)	0.407*** (8.99)
$LnPOP_i$	0.544*** (9.89)	0.297*** (5.19)	0.346*** (6.34)
$\ln POP_j$	0.420*** (5.23)	0.245*** (4.14)	0.241*** (4.28)
$\ln DIS_{ij}$	-0.308 (-1.56)	4.329 (0.50)	-0.750** (-1.97)
coml	-0.550***	.	-0.867*
	(-2.62)	.	(-1.67)
border	1.187***	.	1.733
	(3.74)	.	(1.35)
coly	0.348	.	0.627
	(1.40)	.	(0.65)
$ACFTA_{ij}$	0.917***	0.626***	0.654***
	(3.44)	(4.34)	(4.53)
$ACFTA_i$	0.947***	0.419***	0.498***
	(3.79)	(2.79)	(3.40)
$ACFTA_j$	0.786***	0.797***	0.734***
	(2.77)	(4.48)	(4.21)
_cons	-6.878***	-44.38	-1.157
	(-2.96)	(-0.59)	(-0.33)

Note: *, ** and *** denote 10%, 5% and 1% levels of significance, respectively. Source: Authors' estimation.

Table 4 shows that model estimation excluding 2020 data does not significantly change the estimated results. The coefficients of the variables in Tables 3 and 4 have the same sign and almost equivalent magnitude ratios. This further confirms the sustainability of the research results. In all cases, the main variable to be studied in this paper - ACFTA's trade creation and trade diversion estimators-also gives similar results to previous estimates. Thus, it can be concluded that the estimated results of the gravity model in this study are robust.

Evaluating the COVID-19 impact by re-estimating the model without 2020 data is not a persuasive strategy because a 1-year period is too short to assess the actual impact of the pandemic on the potential trade of countries. But at least we can see and evaluate the short-term impact of the pandemic.

According to empirical findings, the GDPPC of the exporting country has a favourable impact on trade flows. This might imply that wealthy nations, with the resources to spend more on manufacturing technologies, can produce more valuable goods. As a reality, estimating a country's demands or resources is challenging due to the population issue. The rate of migration and labour export grows every day, resulting in a shift in labour resources from densely populated to sparsely populated nations causing population figures to misrepresent the true source of a country's labour. As a result, trade flows are influenced by the amount of income or population. Distance is a negative representation of transportation expenses. Transportation expenses are cited as a hindrance to export and import. However, distance is not a significant issue. Logistics operations have improved in recent years. Logistics expenses become more effective and inexpensive when logistics operators understand how to employ and integrate multimodal transport and consolidation. Furthermore, we must consider the fact that the ACFTA member nations are quite near physically thereby reducing geographical obstacles.

Next, trade flows exhibit negligible coefficients for the border and colony relations variables. The shared language elements have a favourable impact on trade. However, we believe in the context of globalization that linguistic differences are not a significant obstacle to trade because English is so widely spoken. The current educational level has substantially improved. There are many formal language training programs available now, and investments in education and specific languages have expanded allowing a greater number of people to learn a range of languages.

So, ACFTA has trade creation impacts due to differences between the general tariff rate and the preferential tariff rate for ASEAN and Chinese seafood, the close distance between commercial partners, and converting C/O of goods to export. Analysis using the gravity model shows a positive impact on Vietnam's seafood trade flow when joining ACFTA.

Conclusions

The ACFTA has a positive impact on trade flows. The correct policy consequence of this study is that ACFTA member nations should aim to employ tax incentives to promote trade flows between them, particularly in the seafood industry. Member nations' governments should take appropriate steps to boost trade volume with others. Furthermore, maintaining a high level of trade with existing partner countries is essential.

Based on the findings of this study's estimations, some conclusions may be formed. ACFTA membership has an impact on member nations' trade with a notably beneficial impact on the seafood industry. This shows that implementing ACFTA might result in increased intra-regional seafood trade among ACFTA countries, resulting in trade creation.

The use of favourable tariffs amongst ACFTA members has resulted in an increase in intra-regional trade. Furthermore, this study's findings suggest that trade development as a result of ACFTA adoption might present a considerable potential for reaching China's seafood market. The participation of Vietnam in ACFTA has a favourable influence on the seafood industry's exports. As a result, creating long-term advantages,

improving competitiveness, and continuing and strengthening this collaboration in the aim of generating additional benefits are all important. Vietnamese firms may deliver items with comparative advantages in both quality and price to compete with other countries in the area by enhancing product quality, packing, conserving goods, and making use of logistical combinations.

As previously mentioned, one of the causes for the aforementioned trade formation is the conversion of product origin to obtain tax benefits. Because of the increased trade flows between countries, this instance will produce a misconception of trade creation. The following is an example of goods origin conversion: seafood items and, notably, bananas from Laos that are shipped straight to China would face higher taxes than bananas from Vietnam. As a result, price padding occurs, raising the price of bananas in Laos. As a result, dealers frequently import bananas from Laos into Vietnam using C/O form D to benefit from the Common Effective Preferential Tariff (CEPT) agreement's 0% tax benefits. The ACFTA also has a positive impact on trade flows. The study's accurate policy conclusion is that ACFTA member countries should use tax incentives to encourage trade between them, notably in the seafood industry. Governments of member countries should take necessary actions to increase trade volume with others. Maintaining a high level of trade with current partner countries is also critical.

One of this study's flaws is that it ignores how changes in exchange rates effect cross-border trade flows. Hopefully, this material remains useful as a reference, and future research will be able to fill in the gaps in this study.

COMPETING INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this article.

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