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Assessing the Agricultural Competitive Advantage by the RTA index: A Case Study in Vietnam

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Abstract

This study aims to measure static and dynamic competitive advantages of Vietnam's agricultural sectors by employing the relative trade advantage index (RTA). The dynamics of RTA indicators are tested in three ways: OLS method, Markov matrix, and trend analysis. The results show that Vietnam, generally, obtains the strong competitive advantages in crop sectors and fishery sectors whilst it incurs the weak competitive advantages in livestock sectors and processed food sectors. The regression model suggests that the country has the convergent pattern in agricultural competitive advantages, the Markov matrix proves the relative stabilities of the RTA values, and the trend analysis indicates that Vietnam obtains the RTA gaining trends in 12 agricultural sectors while it has the RTA losing trends in 28 agricultural sectors.

Keywords

Vietnam, agriculture trade, competitive advantage, RTA, dynamics.

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Introduction

In the new era of the economic globalization and competition, farmers, enterprises, sectors, and nations have to enhance their capacity to compete in the open domestic and international trade markets for maintaining and improving their market share, income, growth, and social welfare. Participation in international trade is important to explore the ways of improving efficiency and international competitiveness. This study focuses on the agricultural trade performance of Vietnam where the agricultural sectors play important roles in the social and economic conditions. In particular, the sectors contribute to 17.7 percent of the GDP, account for 17 percent of the total export and 48 percent of total employment in 2014 (WB, 2017; GSO, 2017).

Though achieving advantage from the natural environment, fertile soil, and abundant water resource Vietnam's agricultural sectors face the problems of domination of small-scale farms, negative impact on the environment, cultivation land conversion towards urbanization and industrialization, new challenges from climate changes, increasing input costs, and low productivity. These challenges require the government and enterprises to restructure the sectors. The conventional economic wisdom proposes that the country should utilize its scarce resources and specialize in producing agricultural commodities that have stronger competitive advantages and might create higher added values (Yu et al., 2010). Competitiveness[1] is a central concept in stimulating policy discussions by policy makers, politicians, researchers and it is widely employed in economic and business research from different points of view but there is little agreement on its definition (Bojnec and Ferto, 2009). There are various frameworks to assess the competitiveness according to five main disciplines: (1) economic indicators; (2) trade performance measures; (3) determinants of competitiveness; (4) multidimensional frameworks; and (5) benchmarking and value chain performance. Various empirical frameworks have been proposed to evaluate the competitive advantage based on trade data. The strength of the approaches is that they encompass both demand and supply simultaneously and take into account the marketing, tax, transport and other costs (Frohberg and Hartman, 1997).

This study aims to measure the competitive

[1] This study defines the concept of competitiveness as the international trade performance and would not differentiate the concept from competitive advantage and comparative advantage.

advantages of the agricultural sectors in Vietnam over the period 1997-2014 by employing the relative trade advantage (RTA) index suggested by Vollrath (1991). The paper focuses on analyzing the dynamics of the RTA indicators in three ways: OLS method, Markov matrix, and trend analysis. The research results in both academic and practical contributions. First, the study broadens the empirical competitive advantages analysis by using the RTA index in case of Vietnam and employing the different tools to identify the dynamics of these RTA indicators. Second, the results will provide the critical indicators of agricultural competitive advantages for government in making the policy and enterprises in building the business strategy.

The rest of the paper is organized as the following: Section 2 provides the literature review in international economics, trade performance indices as the foundation for solving the research questions; Section 3 explains the methods and the data used in this article; Section 4 presents and discusses the empirical results; and Section 5 concludes the research findings.

Literature review

The concept of competitiveness in classical international economic theory is synonymous with the competitive advantage of a nation and based on the concepts of the absolute advantage of Smith (1776) and the comparative advantage of Ricardo (1817). Cost, productivity, and price are the fundamentals of the concepts. According to Smith, absolute advantage is the export of the lower labor cost goods to partner countries and the import of the higher labor cost goods from the partners. Ricardo, broadly, explains the benefit from the international trade for countries if they export goods or services when producing at relatively lower labor costs and import goods or services when producing at relatively higher labor costs. Despite the criticism of limitations, the classical theory of international trade is certainly useful to explain the reasons why international trade happens and how international trade increases the welfare of countries in trade. The several empirical frameworks, backed by the classical international economic theory, are proposed by scholars to measure the competitive advantage and specialization of a country in an export commodity such as the revealed comparative advantage, the relative trade advantage, the normalized revealed comparative advantage, and the Lafay index.

When the data of cost, price, and productivity for every specific commodity and sector is not available, the measure of comparative advantage based on "revealed" data is the best option. Balassa (1965) proposes the index of "revealed" comparative advantage (RCA) based on the classical theory of international trade and adjusted from Liesner's (1958) first utilization. This index uses the revealed data of export to calculate the ratio of a country's export share of one commodity in the international market to the country's export share of all other commodities. Balassa argues that comparative advantage is revealed in relatively high shares of export markets and comparative disadvantage is revealed in relatively low shares of export markets. The market shares have to be compared with others to evaluate which country or commodity is comparative advantage and disadvantage (Gorton et al., 2000). The Balassa index, however, has limitations and it has been modified into different frameworks and employed in different ways. The main limitations of Balassa's index are criticized as follows: (i) it serves as export specialization index; (ii) the index is static and does not present the dynamics of comparative advantage over time; (iii) it does not include import data; (iv) the distribution of the RCA index is asymmetric and non-normal; (v) its range from 0 to + ∞ has problematic matters to interpret and compare; (vi) it double counts the data of a country and a commodity; and (vii) the index indicates the success in exporting in the world market. The exports, however, can come from incentives and the incentives explain competitiveness, not comparative advantage (Vollrath, 1991; Kreinin & Plummer, 1994; Dalum et al., 1998; Proudman and Redding, 2000; Benedictis and Tamberi, 2004; Hoen and Oosterhaven, 2006; Bojnec and Ferto, 2015).

Scholars have modified the RCA and suggested alternative measures to deal with the limitations while still covered the value of the RCA's economic implication. Vollrath (1991) suggests the relative trade advantage (RTA) that is calculated as the difference between the relative export advantage (RXA), which is similar to the RCA index, and the relative import advantage (RMA). The major difference between the RCA and Vollrath's indices are explained as follows: (i) the RXA and RMA eliminate country and product double counting; (ii) it considers all traded goods and all countries rather than subgroups and referring to global trade intensity; (iii) it uses export and import data and, therefore, encompasses both the relative supply and relative

demand dimensions; (iv) the RTA value is in (-∞, 0, +∞), that avoids the asymmetric problem of the RCA values; (v) the index is more close to real competitive advantage than the RCA when abstracting from distortionary influence; (vi) the RTA is more consistent with the actual world phenomenon of two-way trade (Vollrath, 1991; Ferto and Hubbard, 2003; Worz, 2005; Banterle and Carraresi, 2007; Crescimanno and Galati, 2014). The RTA, however, is in contrast to the RCA when: (i) the RXA is smaller than the unity but higher than the RMA, thus the RTA is higher than zero and shows competitive advantage whilst the RCA shows comparative disadvantage; (ii) the RXA is higher than the unity but smaller than the RMA, thus the RTA is smaller than zero and proves a competitive disadvantage whilst the RCA indicates a comparative advantage.

Vollrath (1991) proposes two more indices of international trade competitiveness: the relative export advantage - REA which is formulated by the logarithm of the export competitive advantage (lnRXA) to deal with the asymmetric problem of the RCAs' distribution and the revealed competitiveness - RC that is the difference between logarithm of the export competitive advantage and the logarithm of import competitive advantage (lnRXA - lnRMA). The RC, however, requires the existence of a country exporting and importing the same commodity and it is very sensitive to the small values of exports and imports.

The RTA has been employed in several empirical studies to analyze the competitive advantages and trade performances of sectors in different countries (Havrila and Gunawardana, 2003; Mosoma, 2004; Asciuto et al., 2008; Camanzi et al., 2012; Maksymets and Lonnstedt, 2016).

Materials and methods

This study employs the RTA index (Vollrath, 1991) to measure the competitive advantage of agricultural sectors in Vietnam. The index is calculated as the difference between the relative export advantage (RXA) and the relative import advantage (RMA). The Vollrath's indices are formulated as follows:

Relative export advantage (RXA):

$$RXA_j = \left\{\frac{X_j}{X_t}\right\} \div \left\{\frac{X_{wj}}{X_{wt}}\right\}$$

Relative import advantage (RMA):

$$RMA_j = \left\{\frac{M_j}{M_t}\right\} \div \left\{\frac{M_{wj}}{M_{wt}}\right\}$$

Relative trade advantage (RTA):

$$RTA_j = RXA_j - RMA_j$$

where, X_j and X_t represent the country's export of product *j* and all commodities; X_{wj} and X_{wt} denote the world's export of product *j* and all commodities; *M* is the import and it is presented similarly to *X*, respectively. It is noted that t and w indicate the rest of commodities (excludes j) and the rest of countries (excludes the country under study). The value of RTA is between -∞ and +∞ and the competitive-advantage-neutral point is zero. The values of RTA may be positive in the case of the competitive advantage and negative in the opposite situation. The RXA shows a competitive advantage when it is greater than 1 and a competitive disadvantage when the values are between 0 and 1 (similar to the RCA). This study uses the quartile method (Hinloopen & Marrewijk, 2001) to identify the degree of competitive advantage and group the RTA indicators into four classes including the competitive disadvantage, the weak competitive advantage, the medium competitive advantage, and the strong competitive advantage.

According to Hinloopen and Marrewijk (2001) and Bojnec and Ferto (2008), there are at least two types of stability: (i) the stability of the distribution of the trade performance indices from one period to the next; (ii) the mobility of the value of the RTA indices for particular sectors every year of the full period. This paper, moreover, uses the trend analysis to analyze the third type of the RTA dynamics: (iii) the trends of the RTA values over the period and in the future.

Following Dalum et al. (1998) and Sharma and Dietrich (2007), the first type of the RTA indicator dynamics is analyzed using OLS method presented by Hart and Prais (1956) and first utilized by Cantwell (1989) in the context of specialization. The values of the RTA indicators are in (-∞, 0, +∞) thus it eliminates the asymmetric problem that violates the assumption of normality of the error term in the regression analysis and makes the t-statistics unreliable. The regression model of competitive advantage dynamics can be presented as follows:

$$RTA_j^{t2} = \alpha + \beta RTA_j^{t1} + \varepsilon_j$$

where t_1 and t_2 are the initial year and the final year respectively, *j* is the agricultural sector under study, α is a constant, β is a regression coefficient, and ε_j is a residual term. The RTA at time t_2 for agricultural sector *j* is the dependent variable and tested against the independent variable of the RTA at time t_1

for agricultural sector j. Dalum et al. (1998) affirm that the method is one of comparing two cross-sections or cross-countries at two points in time and there is no factor of time in the observations. In this study, it is assumed that regression is linear in parameters and the residual ε_j is normal identically distributed ($\varepsilon_j \sim$ n.i.d.(0, σ)).

The interpretation of the regression results is as follows. The $\beta = 1$ corresponds to an unchanged pattern of the competitive advantage from t_1 to t_2. If $\beta > 1$, the country tends to be more competitive in the groups where the competitive advantages are strong and to be less competitive in the groups where the competitive advantages are weak. On the other hand, if $0 < \beta < 1$, sectors with initial weak RTAs increase over time, while sectors with initial strong RTAs decrease. If $\beta = 0$, then there is no relation between the RTAs in the two periods. If $\beta < 0$, the competitive advantage positions of the groups are reversed. Those RTAs initially below the average value are above the average in the next year, and vice versa.

According to Dalum et al. (1998) and Cantwell (1989), another feature of the regression analysis is to test whether the degree of specialization changes over time and $\beta > 1$ is not a necessary condition for growth in the overall specialization pattern. The variance of the RTA indicators at year *t2* is denoted by $(\sigma_{t2})^2$ then:

$$(\sigma_{t2})^2 = \beta^2(\sigma_{t1})^2 + \sigma_\varepsilon^2$$

where, β^2 is the square of regression coefficient, $(\sigma_{t1})^2$ is the variance of the RTA indicators at year *t*1, and σ_ε^2 is the variance of the error term. The determination coefficient R^2 is defined as:

$$R^2 = 1 - \frac{\sigma_\varepsilon^2}{(\sigma_{t2})^2} = ((\sigma_{t2})^2 - \sigma_\varepsilon^2)(\frac{1}{(\sigma_{t2})^2})$$

combining these two above equations, we have:

$$(\sigma_{t2})^2 - \sigma_\varepsilon^2 = \beta^2(\sigma_{t1})^2 = R^2(\sigma_{t2})^2$$

rewriting this equation to present the relationship between the variance of the two distributions:

$$\frac{(\sigma_{t2})^2}{(\sigma_{t1})^2} = \frac{\beta^2}{R^2}$$

this equation can be simplified to:

$$\frac{\sigma_{t2}}{\sigma_{t1}} = \frac{|\beta|}{|R|}$$

where, R is the correlation coefficient from the regression model and σ^2 is the variance of the dependent variable. The dispersion of a given distribution is unchanged when $\beta = R$. If $\beta > R$ (equivalent to the increase in the dispersion), then the degree of the RTA rises. If $\beta < R$ (equivalent to the decrease in the dispersion), then the degree of competitive advantage falls.

The second type of mobility and stability of the RTA value for a particular agricultural sector is assessed in two ways. First, following the empirical method utilized first by Proudman and Redding (2000), and then used by Brasili et al. (2000), Ferto (2007), this study employs the one-step Markov chains to analyze the probability of transition among four classes in term of its moving from an initial class to other classes in one-step of moving (moving within two adjacent years) and the persistence of stability in the initial class.

In a second way, the paper utilizes a mobility index to analyze the mobility degree of the RTA values. The index identifies the degree of mobility throughout the entire distribution of the RTA indicators and facilitates direct cross-sectors comparisons over the full period. The index *M*, following Shorrocks (1978), assesses the trace of the transition probability matrix. This *M* index, thus, directly captures the relative and medium magnitude of diagonal and off-diagonal terms, and the equation of *M* index can be shown as follows:

$$M = \frac{n - tr(P)}{n - 1}$$

where, *M* is Shorrocks index, *n* is the number of classes, *P* is the transition probability matrix, and *tr(P)* is the trace of *P*. A higher value of *M* index states greater mobility and a zero value of *M* index shows perfect immobility.

The paper, moreover, uses the trend analysis to examine and predict the RTA trend of a particular agricultural sector over the full period 1997-2014. This tool identifies the RTA gaining, losing, or maintaining trends in an agricultural sector based on comparing the change of the RTA values over time. The time trend model is presented as follows:

$$RTA_{j,t} = \alpha_j + \beta_j t + \varepsilon_{j,t}$$

where, α_j is a constant; β_j is the regression coefficient showing the RTA trend; t is the time index; and $\varepsilon_{j,t}$ is a residual term. Vietnam's RTA in agricultural sector j can be considered stable if the estimated β_j is close to zero (this study uses the significance level of 10 percent). The value of $\beta_j > 0$ indicates a trend in gaining the competitive advantage while the value of $\beta_j < 0$ means a trend in losing the competitive advantage.

This study follows the definition of EU (2007)

and WTO in the Revision 3 of the Standard International Trade Classification (SITC Rev. 3) to define the "agricultural commodities" as to cover the codes of 0 + 1 + 21 + 22 + 231 + 24 + 261 to 265 + 268 + 29 + 4. The trade data for this study is mainly extracted from the United Nations Comtrade based on the SITC Rev. 3. The SITC Rev. 3 offers five levels of commodity aggregation such as 1-digit sections down to 2-digit divisions, 3-digit groups, 4-digit subgroups and 5-digit items. This paper calculates the RTA indicators at 2-digit with 21 agricultural product divisions and at 3-digit with 61 agricultural commodity groups over the period 1997 – 2014. The paper defines the concept of "commodity division and commodity group" as "sector" for more effective presentations.

Results and discussion

Measuring the competitive advantages by RTA index

Analysis of competitive advantage at 2 digits

The 2-digit analysis states that crude rubber, fish, coffee, cork and wood, cereals, vegetables and fruit are the top competitive sectors of Vietnam in the world market with high world market shares (WMS). The RTA indicator shows a different result for the top competitive sectors. The country, in both 2014 and in the average of the period 1997-2014, obtains the strongest competitive advantages in crude rubber, fish, coffee, vegetables and fruit, and cereals sectors. The cereal sector significantly losses the competitiveness in 2014 in comparison with the average of the period 1997-2014. Vietnam, generally, has the competitive advantages in nine agricultural export commodity divisions in both 2014 and the average of the period 1997-2014 (Table 1).

Analysis of competitive advantage at 3 digits

The analysis at 3-digit level is useful to understand the competitive advantage of the more specific agricultural sectors in particular and to compare with economic indicators such as price, productivity and profit. The analysis result of agricultural relative trade advantage at 3-digits level (Table 2) shows that, in 2014, Vietnam obtains the strongest

Code	Commodity	**WMS** (2014)	**RTA** (2014)	**RTA** (1997-2014)
23	Crude rubber	10.18%	12.86	18.60
03	Fish, crustaceans, mollusc	5.73%	6.72	11.99
07	Coffee, tea, cocoa, spices	5.05%	6.38	9.14
05	Vegetables and fruit	1.72%	1.45	1.72
04	Cereals, cereal preprtns.	1.82%	0.58	4.53
41	Animal oils and fats	1.07%	0.56	0.21
06	Sugar, sugr.preptns, honey	0.75%	0.29	-0.24
12	Tobacco, tobacco manufact	0.63%	0.13	-0.39
11	Beverages	0.25%	0.11	0.03
24	Cork and wood	2.22%	-0.08	-0.53
01	Meat, meat preparations	0.04%	-0.16	0.05
43	Animal, veg.fats, oils, nes	0.10%	-0.45	-0.52
42	Fixed veg. Fats and oils	0.25%	-0.82	-1.24
02	Dairy products,bird eggs	0.10%	-0.84	-0.92
09	Misc.edible products etc	0.50%	-0.94	-0.01
29	Crude animal, veg.materl.	0.22%	-1.04	-0.15
21	Hides, skins, furskins, raw	0.04%	-1.15	-0.61
22	Oil seed, oleaginus fruit	0.03%	-1.24	0.38
00	Live animals	0.03%	-1.56	-0.20
08	Animal feed stuff	0.58%	-4.25	-4.38
26	Textile fibres	0.30%	-7.80	-3.90
	Max		**12.86**	**18.60**
	Average		**0.42**	**1.60**
	Competitive divisions		**9**	**9**

Source: own calculation (2017)

Table 1: The competitive advantage of Vietnam's agricultural sectors at 2-digit level.

Code	Commodity	**WMS** (2014)	**RTA** (2014)	**RTA** (1997-2014)
246	Wood in chips, particles	14.98%	21.79	12.03
075	Spices	14.30%	19.27	19.73
042	Rice	11.39%	15.85	44.99
231	Natural rubber, etc.	10.18%	13.02	18.70
071	Coffee,coffee substitute	9.27%	12.47	18.90
037	Fish etc.prepd,prsvd.nes	7.25%	9.64	5.98
036	Crustaceans,molluscs etc	7.75%	8.62	25.72
034	Fish,fresh,chilled,frozn	4.25%	4.57	6.08
265	Vegetable textile fibres	3.24%	4.11	5.13
074	Tea and mate	2.93%	3.52	7.33
057	Fruit,nuts excl.oil nuts	2.67%	2.24	3.00
035	Fish,dried,salted,smoked	1.20%	1.40	4.83
054	Vegetables	1.59%	1.37	1.07
046	Meal,flour of wheat,msln	1.21%	1.22	-3.42
245	Fuel wood, wood charcoal	1.06%	1.06	3.98
058	Fruit,preserved,prepared	0.85%	0.97	1.81
122	Tobacco, manufactured	0.78%	0.82	0.27
411	Animal oils and fats	1.07%	0.57	0.19
062	Sugar confectionery	0.83%	0.43	0.16
056	Vegtables,prpd,prsvd,nes	0.47%	0.29	0.41
024	Cheese and curd	0.00%	-0.10	-0.13
012	Other meat, meat offal	0.08%	-0.15	0.14
043	Barley, unmilled	0.00%	-0.26	-0.27
011	Bovine meat	0.00%	-0.27	-0.10
292	Crude veg.materials, nes	0.23%	-0.28	0.01
048	Cereal preparations	0.37%	-0.38	-0.31
212	Furskins, raw	0.00%	-0.42	-0.06
268	Wool, other animal hair	0.00%	-0.43	-0.19
431	Animal,veg.fats,oils,nes	0.10%	-0.44	-0.62
264	Jute,oth.textl.bast fibr	1.32%	-0.54	-0.98
091	Margarine and shortening	0.01%	-0.72	-1.11
098	Edible prod.preprtns,nes	0.54%	-0.95	0.08
023	Butter,other fat of milk	0.00%	-1.11	-1.34
261	Silk	0.18%	-1.16	-12.10
222	Oilseed(sft.fix veg.oil)	0.01%	-1.31	0.29
022	Milk and cream	0.18%	-1.37	-1.59
211	Hides,skins(ex.furs),raw	0.07%	-1.53	-0.81
422	Fixed veg.fat,oils,other	0.17%	-1.54	-1.68
121	Tobacco, unmanufactured	0.23%	-1.57	-1.96
001	Live animals	0.03%	-1.57	-0.20
041	Wheat, meslin, unmilled	0.00%	-1.81	-2.17
247	Wood rough,rough squared	0.34%	-2.59	-2.68
248	Wood, simply worked	0.64%	-2.71	-1.44
291	Crude animal materls.nes	0.22%	-4.17	-0.81
081	Animal feed stuff	0.58%	-4.29	-4.22
044	Maize unmilled	0.09%	-4.51	-1.42
263	Cotton	0.17%	-12.87	-5.88
	Max		**21.79**	**44.99**
	Average		**1.22**	**2.24**
	Competitive groups		**27**	**28**

Source: own calculation (2017)

Table 2: The competitive advantage of Vietnam's agricultural sectors at 3-digit level (selected).

competitive advantage in wood in chips; spices; rice; natural rubber; and coffee with the RTA values of 21.79, 19.27, 15.85, 13.02, and 12.47, respectively. The world market share in 2014 also indicates the similar results for the top competitive agricultural sectors. Vietnam, in 2014, achieves the competitive advantages in 27 agricultural sectors. Based on the classification of the RTA values into four groups by quartile method (Table 5), the country has seven strong competitive advantage agricultural sectors, four medium competitive advantage agricultural sectors, and 16 weak competitive advantage agricultural sectors.

Vietnam, generally, has strong competitive advantages in crop sectors such as spices, rice, coffee, tea, fruit & nut, and vegetables; and fishery sectors such as crustaceans and fish whilst the country has weak competitive advantages in livestock sectors such as live animal, meat, and eggs & birds; and processed food sectors such as chocolate, cheese, butter, and other processed meat & foods (Table 2).

The average values of the RTA indicators for the full period 1997 - 2014 show that rice is the strongest competitive advantages sector with the value of 44.99. The next strong competitive sectors in period average are crustaceans and molluscs; spices; coffee; and natural rubber. There are significant variations between the RTA values in 2014 and in period average. This indicates the relative change of the RTA indicators at 3-digit level over time.

Analyzing the dynamics of the RTA indicators

The changes of the RTA indicators between 1997 and 2014

The variation of the RTA values between 1997 and 2014 shows Vietnam's changes in positions of competitive advantages. There are 33 competitive agricultural sectors in 1997 and only 27 competitive agricultural sectors in 2014. The country obtains the increase of the competitive advantages in 22 agricultural sectors but losses the decrease of the competitive advantages in 39 agricultural sectors. The top increasing agricultural sectors are wood in chips; meal, flour of wheat; and fish etc. prepared, preserved. The top decreasing agricultural sectors are rice; crustaceans, molluscs; and cotton. Notably, crude animal material; eggs, birds, yolks; jute, other textile bast fibres; oil-seeds, soft fixed vegetable oils; and edible products and preparations move from strong competitive advantages class to competitive disadvantages class (Table 3).

The general pattern of the RTA indicators by the OLS method

The estimation results for the RTA indicators over three periods result in the values of $0 < \beta < 1$ and values of $\beta/R < 1$ (Table 4). The results indicate that Vietnam, in general, has the convergent pattern in the agricultural competitive advantage. In other words, the country loses the competitive advantage in the initial strong competitive agricultural sectors whilst it gains the competitive advantage in the initial weak competitive agricultural sectors. The values of $0 < \beta < 1$ also prove the process of de-specialization in Vietnam's agricultural export competitiveness. The possible explaination for the result is that: Vietnam's agricultural competitive advantage pattern is based on natural resources with the primary agricultural products thus the country's increases in the productions and exports of the strong competitive advantage sectors result in the utilization of higher opportunity cost resources. Therefore, the competitive advantages of these sectors decrease. On the other hand, the resources of the new and weak competitive advantage sectors are still abundant with lower opportunity cost. Therefore, the competitive advantages of these sectors increase. This result is consitent with the traditional economic theory explaining that a country tends to decrease the competitive advantage in a product when it increases the specialization and exports the product to the world market

Top Increase	Top Decrease	Strong to Weak	Strong to No
Wood in chips, particles	Rice	Fuel wood, wood charcoal	Crude, animal,material
Meal,flour of wheat	Crustaceans, molluscs	Fruit,preserved, prepared	Eggs, birds, yolks
Fish,etc.prepd, prsvd.nes	Cotton	Fish, dried,s alted, smoked	Jute, oth.textl.bast fibre
Animal,veg.fats, oils,nes	Crude animal materls		Oilseed (sft.fix veg.oil)
Tobacco	Tea and mate		Edible, prod. preprtns, nes

Source: own analysis (2017)

Table 3: The changes of the RTA indicator ranks between 1997 and 2014 (selected).

1997 - 2005			2006-2014			1997 - 2014		
β	R	β/R	β	R	β/R	β	R	β/R
0.72	0.88	0.82	0.52	0.81	0.65	0.29	0.63	0.46

Source: own calculation (2017)

Table 4: The OLS estimation results for the RTAs indicators over three periods.

The mobilities and stabilities of the RTA indicators by Markov matrix

The RTA values are classified into four groups including competitive disadvantage, weak competitive advantage, medium competitive advantage, and strong competitive advantage. The boundary of competitive and uncompetitive groups is remained (the RTA neutral value is 0) and the authors then divide the RTA values into 3 classes of weak, medium and strong advantages by quartile method (Table 5). Let p_{ij} (i, j = 1, 2, 3, 4) denotes a one-step transition probability, that is the transition probability for the agricultural sectors which are in class "i" of year "t" moving to class "j" of year "t+1".

Categories	Interpretation	RTA values
Class 1	Competitive disadvantage	≤ 0
Class 2	Weak competitive advantage	≤ 1.41
Class 3	Medium competitive advantage	≤ 7.48
Class 4	Strong competitive advantage	> 7.48

Source: own calculation (2017)

Table 5: The classification of the RTA values and the interpretations by quartile method.

The stabilities and mobilities of the RTA values are investigated by using the Markov transition probability matrix and mobility index for yearly values of the RTA indicators from 1997 to 2014. The diagonal elements of the Markov matrix show the probability of remaining persistently in the initial class. The other elements of the Markov transition probability matrix provide further information on the mobility of the RTA values. Specifically, they show the probabilities of moving from one class to another from the year "t" to the year "t+1". There is a 4x4 matrix with 1,037 observations.

The result indicates that the high probabilities of the RTA indicators remain in their initial class (high diagonal elements) in which the uncompetitive sectors (in class 1) and the strong competitive sectors (in class 4) maintain the highest probabilities and the most stable. In other words, the groups with initial competitive disadvantage seem to stay uncompetitive whilst the groups with initial strong competitive advantage maintain to be strongly competitive. The average probability of stability in initial class is 84.07 percent whilst the average probability of mobility to other classes is only 5.31 percent. There is no sector moving from class 4 backwards class 1 and class 2, and from class 2 forward class 4. The probabilities of closer movings are higher than the probabilities of longer moves between classes. The M-Shorrocks of 0.21, generally, presents a relatively low degree of mobility between classes in the matrix (Table 6).

Table 6 also presents total probability (empirical ergodic) distribution and long run probability (implied ergodic) distribution. The total run and the long run distributions are relatively similar and this means that the Markov matrix accurately captures the underlying distribution of the RTA indicators (Hinloopen and Marrewijk, 2001). The difference between total run and long run probabilities confirms that the shares of uncompetitive and weak competitive sectors increase whilst the medium and strong competitive sectors decline in the long future.

The trends of the RTA indicators

The result of the RTA indicator trend analysis during the period of 1997–2014 shows that Vietnam has the RTA gaining trends in 12 agricultural sectors with $\beta > 0$ whilst the country incurs the RTA losing trends in 28 agricultural sectors with $\beta < 0$. Vietnam achieves the most RTA growing trends in wood in chips; meal, flour of wheat; fish.prepared, preserved; vegetable textile fibres; and fish, fresh, chilled, frozen during this period. This suggests that the country continues to obtain the stronger competitive advantage in these agricultural sectors in the future. During the same period, Vietnam has the most RTA losing trends in rice; crustaceans, molluscs; coffee, coffee substitute; natural rubber; and tea and mate. The country will continue to incur the weaker competitive advantage in these agricultural sectors in the future (Table 7).

	Obs: 1,037	1	2	3	4
M-Shorrocks	1	91.94	6.99	0.9	0.18
0.21	2	18.14	78.06	3.8	0
Average stability	3	6.56	12.30	73.77	7.38
84.07	4	0	0	7.5	92.5
Average mobility	Total	54.39	23.05	10.9	11.67
5.31	Long run	58.70	23.55	8.19	9.56

Source: own calculation (2017)

Table 6: The M-Shorrocks and Markov transition matrix for the RTA values.

Code	Commodity	β	p-value	R^2
246	Wood in chips, particles	1.50	0.00	0.88
046	Meal,flour of wheat,msln	0.99	0.00	0.62
037	Fish etc.prepd,prsvd.nes	0.43	0.00	0.67
265	Vegetable textile fibres	0.31	0.02	0.28
034	Fish,fresh,chilled,frozn	0.29	0.01	0.36
122	Tobacco, manufactured	0.17	0.00	0.54
411	Animal oils and fats	0.12	0.00	0.61
081	Animal feed stuff	-0.22	0.00	0.63
035	Fish,dried,salted,smoked	-0.29	0.03	0.27
075	Spices	-0.31	0.06	0.21
263	Cotton	-0.31	0.00	0.55
291	Crude animal materls.nes	-0.32	0.00	0.83
074	Tea and mate	-0.40	0.00	0.77
231	Natural rubber, etc.	-0.45	0.01	0.37
071	Coffee,coffee substitute	-0.47	0.01	0.32
036	Crustaceans,molluscs etc	-1.53	0.00	0.57
042	Rice	-3.03	0.00	0.78
	Gaining trend sectors	**12**		
	Losing trend sectors	**28**		

Source: own calculation (2017)

Table 7: The top gaining and losing trends of the RTA indicators (selected).

Conclusion

The study shows that Vietnam, in 2014, obtains the competitive advantages in 27 agricultural sectors and the competitive disadvantages in 34 agricultural sectors. The strongest competitive sectors are wood in chips, spices, rice, natural rubber, and coffee. The country, generally, has strong competitive advantages in crop sectors such as spices, rice, coffee, tea, fruit & nut and vegetables; and fishery sectors such as fish and crustaceans whilst it is clearly uncompetitive in livestock sectors such as live animal, meat, eggs & birds; and processed food sectors such as chocolate, cheese, butter, and other processed meat & foods.

The OLS estimation indicates that Vietnam has the convergent pattern in agricultural competitive advantages. In other words, the country decreases the competitiveness in the initial strong competitive sectors whilst it increases the competitiveness in the initial weak competitive sectors. The Markov matrix presents that the RTA indicators stay stable over time, especially the uncompetitive and strong competitive sectors, with the average stability probability of 84.07 percent while the average mobility probability is only 5.31 percent. The M-Shorrocks of 0.21 also shows a relatively low degree of mobility. The RTA trend analysis shows that Vietnam has the RTA gaining trends in 12 agricultural sectors and the RTA losing trends in 28 agricultural sectors and these trends will continue in the future.

The research results allow to recommend that

Vietnam needs to maintain the competitive advantage degrees and ranks of the important agricultural sectors such as rice, crustaceans, fish, tea and mate, rubber, and coffee which have lost competitive advantages significantly over the period 1997-2014 by planning cultivated areas, enriching product qualities, improving production productivities, and enhancing the global market linkages. The country should also shift its agricultural competitive advantage pattern from the primary and low value-added agricultural sectors to the processed food and high value-added sectors based on high technologies, large-scale productions, vertical and horizontal linkages, and global value chains.

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