

Identifying and Interpreting Club Convergence Across the South of Russia

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Abstract—At the present stage, the development of tourism is impossible without taking into account the territorial characteristics, strengths and weaknesses of the functioning of tourist and recreational complexes, favorable and negative trends in the development of the tourism industry. This article considers club convergence, according to the tourist flow at the level of 20 municipalities of the Krasnodar Region from 2009 to 2016. The cluster analysis, Markov's chain and the t-test were used to construct and justify the existence of club convergence, to receive and interpret the structure of clubs and to check their stability. The results of the convergence analysis in tourism at the municipal level made it possible to obtain three clubs of municipalities with low, average and high levels of tourist traffic. The results of the analysis can be used to develop strategies for promoting territories belonging to the identified clubs in order to increase their competitiveness. Our results will help avoid the heads of tourist administrations of costly and ineffective strategies for each municipality separately, to develop a joint, unified, standardized policy to attract tourists.

Keywords: *convergence hypothesis, club, the South of Russia*

I. INTRODUCTION

The South of Russia has the richest recreational potential and unique natural medical resources, which attract annually a large number of vacationers. The Black Sea coast is the favorite vacation territory not only for Russians but also for guests from the near and far abroad. However, the distribution of tourist flows is extremely uneven among the municipalities of the Krasnodar Region, which predetermines the search for new management mechanisms that would reduce the excessive gap between the territories.

The patterns of regional socio-economic development have been discussed in world literature for more than half a century. As the basic theories of analysis and assessment of the unevenness of territorial development, there are convergence models authored by Solow R. (1956); Barro RJ, Sala-I-Martin X. (1990, 1992), Mankiw G., Romer D., Weil D. (1992), Quah, D. (1996), and others. This study has received a special name - “convergence literature”.

A great number of research of the convergence hypothesis have focused on studying the relationship between economic growth and income. Meanwhile, an unequivocal answer on the relationship between economic growth and socio-economic differentiation of countries (regions) has not been received. At the theoretical and empirical levels, both a decrease and an increase in territorial differences are justified. However, Baumol (1986) found that countries which are similar in their initial levels of development and/or structural characteristics tend to converge and act as a "convergence club."

Although the concept of “club convergence” arose from empirical evidence, its theoretical foundations can be found in neoclassical and endogenous growth models. The concept of club convergence has been widely applied in analyzing regional economic growth (Wei, Y.D.; Ye, X. (2009), Fischer, M.M.; Stirböck, C. (2006), etc.). Growing empirical evidence suggests that regional economic growth is not isolated, and

there are interconnections between regional economies (Chenglin Qin et al. (2017)).

As a result of this theoretical development, this empirical work emphasizes the presence of club convergence, and econometric methods allow us to analyze the consequences of new theoretical approaches in this regard. All of these studies used data at the country level and focused on international tourists. In our study, we will consider the municipal level.

A review of literary sources emphasizes the relevance of studying club convergence. However, existing studies are limited on the use of data on international tourism flows in different countries. Unlike existing developments, in this empirical study we look at the municipal level of tourism development and use econometric methods to study club convergence in the region.

The main objective of a research was to prove the existence of club convergence, to interpret their structure, to check stability of testing the results of club convergence based on the empirical data of the tourist flow dynamics in municipalities of the Krasnodar Region for 2009-2016 years.

An analysis of the convergence processes of the tourist and recreational system in the Krasnodar Territory can provide a better understanding of the tourist market structure. This will allow municipal tourism administrations to segment the region's tourism market and develop individual promotion strategies for various groups of tourist source markets (Griffith, 2010). A converged club acts as a natural market segment suitable for a unified or standardized marketing program (Okazaki, Taylor&Doh, 2007).

II. LITERATURE REVIEW

Over the past few decades, a significant number of studies have appeared that are devoted to the research of the process of convergence of economies at different levels. However, the received results were very contradictory that, on the one hand, can be explained by different selected research framework, and on the other hand, by the fact that a lot of countries have different initial levels of development. Currently, there exists a great number of works in which the theory of convergence in the tourism industry is being investigated. Most of the published works exploring certain aspects of tourism development in Russia are related to studying the impact of tourism on the country's economy, Russia's competitiveness in the tourism market, etc., but the convergence analysis is not carried out.

One of the first to use the convergence hypothesis in tourism was Narayan (2006). Using an assessment of the convergence between the general tourist flows to the country and the tourist flows of individual countries sending tourists, he proposed to evaluate the effectiveness of the marketing policy in the field of tourism. In his opinion, if tourist flows from a separate country converge with the general flow of international tourists, then the policy in relation to this country was effective. This means that an increase in tourist flows from this tourist market will contribute to the growth of international arrivals, and hence revenue.

Quite a lot of research on the convergence hypothesis was carried out on the example of the Turkish tourist market. Yilanci and Eris (2012), Hepsag (2016), Kaplan & Şule (2017), Bozkurt K., Güler N., Bahar O. (2018) studied the Turkish tourist market since 1996, using different methods: the Fourier approach to testing stationarity, unit root test, the club convergence algorithm of Phillips and Sul (2007), methods of fuzzy logic. The results showed that, in general, most tourist flows from different countries converge with the general tourist flow, which means that the actions of the Turkish government are effective.

The results of most studies confirm the convergence of tourism markets, while many researchers use the model proposed by Narayan (2006, 2007) as an empirical model. Sigma and beta convergence methods (Lin & Deng, 2018), unit root tests with or without breaks (e.g. Narayan (2006), Lorde & Moore (2008), Tang (2011), Tan & Tan (2013), etc. were used as convergence analysis methods, co-integration along with unit root tests (e.g. Abbott et al. (2012), Yilanci& Eris (2012)), etc.

Baumol (1986) was one of the first who noted that the process of convergence belongs not to all countries and only to some groups with similar characteristics. The revealed regularity is called a hypothesis of "club convergence" which means that groups of economies can meet with each other in the long term while separately among themselves they have no convergence. It forced researchers to look for new approaches and methods to study the club convergence hypothesis.

The concept of club was put into practice by D.Quah (1993) who by means of the mathematical apparatus of Markov chains managed to show that the rich countries are grouped in convergence level with the countries with higher rates of income per capita (the rich grow rich), the poor countries (with low indicators) meet with each other and create the club of convergence at the low level of wealth per capita (the poor grow poor), and the countries with the average level of income are gradually distributed on two regional clusters.

The club convergence represents a hypothesis according to which the countries which have similar entry conditions (GDP per capita, the human capital, infrastructure, etc.) will meet on the level of the economic development subsequently.

Now a lot of types of research that used various methods for the definition of club convergence are conducted. For example, in early studies of club convergence regression tree analysis was used (Durlauf and Johnson, 1995), in later endogenized grouping to identify club convergence (Pesaran, 2007), nonlinear logarithmic approach (Phillips and Sul, 2007), etc. were used.

At the same time, not so many works are devoted to the analysis of club convergence in the tourism sector, and most studies analyzing club convergence are represented by works in the example of the Turkish tourist market. Abbott, De Vita and Altinay (2012) investigated the convergence of Turkish tourist markets and concluded that there are no proofs of long-term "convergence" or "club convergence" among the main tourist markets of Turkey. Kaplan F. et al (2017) analyzes the

Turkish tourism demand market via the convergence club algorithm using the Phillips and Sul (2007) approach, with annual panel data that belong to 29 countries and cover the period between 1996 and 2014. This research revealed to the groups of the countries for which the convergence hypothesis is accepted so that the strategy used in these countries is effective. Zhibin Lin et al (2019) investigated the market of Turkey during the period with 2001-2015, covering 81 markets. They used Phillips and Sul (2007) methodology and also, in addition, studied structural gaps by the test of structural gaps of Perron and Yabu (2009) which are connected both with internal and global events in Turkey. As a result, before testing for a gap, the authors received five clubs.

In Russia, the similar research related to the tourist market of the country has not been carried out.

III. METHODOLOGY FOR STUDYING CLUB CONVERGENCE PROCESSES IN THE SOUTH OF RUSSIA

To test the club convergence of the tourist market in the South of Russia the approach synthesizing the ideas of D.Quah (1993) and results of a rather wide range of the works devoted to the club convergence, including Phillips, Sul (2007) is offered. At the allocation of club convergence, we assume that the municipalities belonging to one or another club have rather close rates of tourist flow that allows us to decrease the variation in the studied indicator within the club. Thus, the club is a group of municipalities that rather close value of deviations from a certain average (tourist flow level).

The modified D.Quah (1993) method has been used as a tool, which proposed to analyze the dynamics of the entire distribution of the set of indicator values of the considered sample of territories in order to study the convergence process.

For the analysis of convergence, D.Quah applied Markov chains based on the construction of the transition matrix, which are determined by the probability distribution from the state n to the state m . D. Quah divided countries into three conditional categories: "developed", "medium" and "poor" and determined that the rich countries are more likely to increase their wealth, while the poor will most likely become poorer, which predetermines the potential for convergence clubs.

The essence of a method of D.Quah comes down to the distribution of the average per capita income on regions in initial and final timepoints, so-called target years. Then the countries are ranged on the increase and on this distribution, 20% of the group are allocated (quantiles for every year separately). As result the matrix of probability of transition of regions from one quantile in other acts.

In order to overcome a number of shortcomings of the D.Quah methodology (in particular, the inability to form the list structure of convergence clubs), the procedure for calculating the transition matrix will be carried out in two stages:

1. Definition of a possible number of clubs by means of the cluster analysis.

2. Under a club, we will consider a group of municipalities that are not passing through a quartile within 4 years.

Also, we will apply one of the modern analytical approaches to the analysis of club convergence and clustering of Phillips, Sul (2007) who uses the econometric test (log t -test) for the existence of convergence and also the procedure of identification of clubs based on it (1).

$$X_{it} = \delta_{it} \mu_{it}, \quad (1)$$

where μ - common factor for all countries (general trend), δ_{it} - a country-specific time-varying factor (transition rate).

The relevant hypotheses are:

H0: $\delta = \delta$ and $\alpha \geq 0$

H1: $\delta \neq \delta$ or $\alpha < 0$.

The algorithm of a clustering Phillips, Sul, (2007) allows to find any subgroups, which meet, and also to determine convergence speed. Advantages of this approach are that it does not demand any assumptions of stationarity processes and allows to consider individual heterogeneity. In spite of the fact that it in the economic literature is possible to find a lot of studies of the convergence process using these methods, there is a limited amount of such works in tourism studies.

IV. RESULTS

Analysis of convergence processes in the South of Russia will be based on an indicator of the volume of tourist flow. For empirical analysis, we used official statistics for 20 municipalities of the Krasnodar Territory for the period from 2009 to 2016.

The lack of convergence in the full panel of municipalities does not assume an automatic lack of club convergence. In practice, the following algorithm of implementation D.Quah method was offered.

A. Step 1. Clustering of municipalities

To define a number of classification groups the hierarchical agglomerative method - Ward's method is used. As a result of the application of a method the branched classification structure was received (Fig. 1).

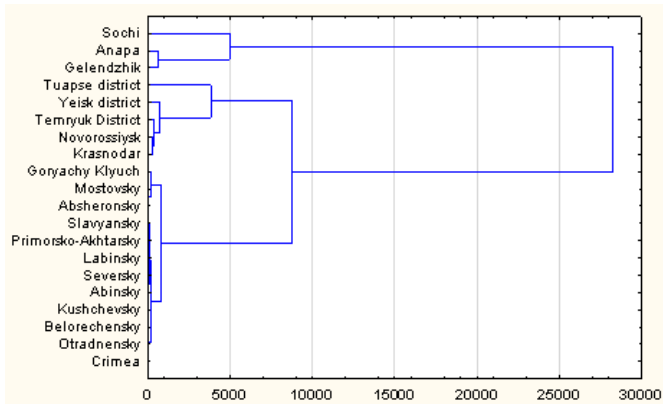


Fig. 1. Dendrogram of multidimensional classification of municipalities by the level of tourist traffic (data is normalized and centered)

Apparently from the drawing, one of the possible options of splitting the initial set is the clustering of municipal units in three uniform groups as communication length size between them is maximum concerning other options of splitting.

B. Step 2. Creation of a matrix of transition

The structure of clusters is determined by clustering by the method of K-averages. Three groups of municipal units – with low, average and high level of tourist flow were as a result created, however, the received groups are not yet clubs as the dynamics of the happening processes are not considered. To reflect the transition of municipalities from one club to another, we construct a transition matrix (Table I).

TABLE I. MATRIX OF TRANSITIONS OF MUNICIPALITIES FROM ONE CLUB TO ANOTHER (2009-16)

Groups according to the level of tourist traffic		End states			The number of initial states in the group
		developed	medium	poor	
Baseline states	developed	22	10	0	32
	medium	2	15	10	27
	poor	0	5	96	101
The number of end states in a group		27	24	30	160

^a. Source: Authors' own calculations

In this matrix, we can see how many times and in which groups the municipalities passed during the period under review. The numbers on the diagonal of the matrix reflect the unchanged position of municipalities in their group.

As a result, a matrix of dimension i by j is formed, which reflects the probability of the transition of municipalities from group i to j (Table II).

TABLE II. TRANSITION PROBABILITY MATRIX

End states	developed	medium	poor
developed	0.6875	0.3125	0
medium	0.074	0.5555	0.3703
poor	0	0.0495	0.9504

^b. Source: Authors' own calculations

For this matrix the following rules put forward by D.Quah are applied:

1. The existence of convergence clubs among 20 municipal units of the Krasnodar Region is confirmed, since the diagonal probabilities are higher than the others.

2. The bimodality hypothesis is not confirmed, since the probability of transition from one group (in particular, highly developed municipal units) to the average group is rather high (more than 5%).

3. Instability is observed in club formations since the probability of transferring to another club exceeds 5%.

4. The quantitative criterion $Q(M)$ (the determinant of the matrix) is 0.328, which indicates the possibility of the existence of stable clubs in municipalities by 32.8%.

The carried out analysis made it possible to form three clubs of the municipalities, the structure of which is given in Table III.

TABLE III. CLUBS OF MUNICIPALITIES IN TERMS OF TOURIST FLOW

Club in terms of tourist flow	Chance to stay in the club, %	Municipality
developed (4 municipalities)	100	Sochi
	62-90	Anapa, Gelendzhik, Tuapse district
medium (4 municipalities)	100	Yeisk district
	70-90	Krasnodar, Novorossiysk, Temryuk District
poor (12 municipalities)	100	Goryachy Klyuch, Abinskiy, Absheronskiy, Belorechenskiy, Crimea, Kushchevskiy, Labinsk, Mostovskiy, Otradnenskiy, Primorsko-Akhtarskiy, Severskiy, Slavyansk districts

^c. Source: Authors' own calculations

Moreover, in each club, there are municipalities that have not changed their position, and for them, the probability of remaining in the club is 100 %.

We also check the club convergence based on the algorithm for identifying clubs Phillips, Sul (2007), in which municipalities converge to private club equilibria. The testing procedure involves the following four steps.

Step 1. Ordering. The municipalities of the Krasnodar Territory considered by us are arranged in decreasing order of the value of tourist flow in the last year of observation (2016).

Step 2. Formation of the core of the club.

We apply the log t-test to the two first municipal units ($k=2$) with the greatest values of a tourist stream which form subgroup G_k . If the calculated value of the test statistics $t_b(k=2) > -1.65$, then these municipalities form the core of G_k group. The log t-test is carried out for the G_k group plus the following municipality until $t_b(k) > t_b(k-1)$ for all $N > k \geq 2$, at the same time each subsequent municipal unit is added to the G_k group. If the condition $t_b(k=2) > -1.65$ is not satisfied, then the first municipality is rejected and the procedure is performed for other blocks. If the sample does not contain a pair of countries for which the condition $t_b > -1.65$ is satisfied, then we conclude that in this selection there are no convergence clubs.

Step 3. Joining the club members.

After the formation of the core of the G_k club, we successively add one municipality to the members of this club, and if the corresponding t-statistics for this group is more than zero, then we consider this municipality to be a member of the club. For a club formed in this way, the log t-test is carried out, using criterion $t_b > -1.65$ for all groups. If the group does not take this test, the critical value of t-statistics increases, and the procedure repeats again.

Step 4. Stop rule. If there are any municipalities which are not included into the first club, then the log t-test is carried out for them. If $t_b > -1.65$ for the remained group, then we conclude that in our selection there are two clubs. If $t_b < -1.65$, then it is necessary to find another club by repeating the steps 1-3 for all remaining municipal units. If the hypothesis of convergence is rejected, then the remaining municipalities diverge.

For all selections of municipalities, according to the carried-out log t-test, the hypothesis of convergence was rejected on 5% significance value as the corresponding t-statistics is equal to -69.3518 that less than -1.65. Results are given in Table 4.

TABLE IV. THE RESULT OF CLUB CONVERGENCE HYPOTHESIS

	Municipalities	t-stat	b-coef
Full Sample	Full	-69.3518	-0.6898
1st subgroup	Sochi, Anapa, Gelendzhik, Tuapse district	-3.768	1.304
2nd subgroup	Yeisk district, Krasnodar, Novorossiysk, Temryuk District, Goryachy Klyuch	-2.806	0.507
3rd subgroup	Abinsky, Absheronky, Kushchevsky, Labinsky, Mostovsky, Primorsko-Akhtarsky, Seversky, Slavyansky districts	-2.346	2.105
Non-convergence	Otradnensky, Crimea, Belorechensky	-9.367	-16.780

^d. Source: Authors' own calculations

Thus, three clubs and three municipalities were identified, showing divergence.

The first club included the municipalities with the largest volume of tourist flow located in the Black Sea tourist recreational zone - Sochi, Anapa, Gelendzhik, Tuapse district, which coincides with the results of the implementation of the D.Quah method. This club shows the largest increase in revenue, it is characterized by the optimal combination of balneological and climatic factors, a developed leisure infrastructure, a variety of types of tourism.

The second club included municipalities with an average level of tourist flow, mainly located in the Priazovskaya zone - Yeisk district, Krasnodar, Novorossiysk, Temryuk District, GoryachyKlyuch. This area is more focused on health-improving and sightseeing tourism. Only one municipality was included in this club, which was not included in the second club when implementing the D.Quah methodology.

The third club included municipalities of both the Azov and mountain foothill zones with a low level of tourist flow - Abinsky, Absheronky, Kushchevsky, Labinsky, Mostovsky, Primorsko-Akhtarsky, Seversky, Slavyansky districts. The flow of tourists to this club is growing at a slow pace. For this club of municipalities, spa and resort vacations and extreme tourism are also added.

And three municipalities showed the lack of club convergence Otradnensky, Crimea, Belorechensky and are characterized by extremely low levels of tourist flow in the past few years.

Thus, the main task of the administration of the Krasnodar Territory is to redistribute tourist flows between municipalities, using both natural and various anthropogenic factors, developing the types of tourism related to event, business, gastronomic, sport, etc.

V. CONCLUSIONS

Thus, in this study, we tested the club convergence analysis of the tourist South of Russia using the methodology of D.Quah (1993) and the algorithm of Phillips and Sul (2007). Based on the proposed approaches to club convergence, three stable convergence clubs have been identified in terms of tourist flow, however, the list of clubs is slightly different. The presence of stable convergence clubs indicates that, despite the active policy of the administration of the Krasnodar Territory to reduce inequality, it is growing, and a more differentiated approach is needed to stimulate the development of municipalities belonging to different clubs.

The results of the study can be used as an important tool by various stakeholders, ranging from public administration to research institutes, to evaluate multiple aspects of tourism activities. First of all, the results of the analysis can be used to develop strategies for promoting territories belonging to the identified clubs in order to increase their competitiveness. Our results will help avoid the heads of tourist administrations of costly and ineffective strategies for each municipality separately, to develop a joint, unified, standardized policy to attract tourists. The development of a consolidated, unified,

standardized marketing strategy for each club will significantly increase the effectiveness of tourism policy, including attracting tourist flows from other markets of one club.

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