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Review Article

Dynamics of Chinese Export Comparative Advantage: Analysis Based on RSCA Index

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Based on RSCA index, using kernel density estimation, Markov chain transition probability matrix, and survival analysis method, this paper analyzes the dynamics of Chinese export comparative advantage from 2001 to 2020 and draws the following conclusions. Firstly, after 20 years of export trade development, although the comparative advantage of a few commodities of China has weakened and comparative disadvantage has increased, the comparative advantage of most commodities is improving, and the overall distribution of comparative advantage remained unchanged. Secondly, the stability of Chinese comparative advantage is higher than liquidity, and liquidity as a whole shows a good trend. In addition, the viability of Chinese commodities with comparative advantage has performed well in the past 20 years. Therefore, China should optimize export mode based on comparative advantage.

1. Introduction

The export mode of country and region has long been one of the research hot-spots in the field of international trade. Although the new trade theory in the 1980s attributed the emergence of trade to two cornerstones, namely, comparative advantage and economies of scale, comparative advantage is still the main theoretical explanation [1]. According to David Ricardo's comparative advantage theory, the difference of relative labor productivity among countries leads to the difference of relative production cost, which leads to the difference of relative export price. Hence, a country should export commodities with comparative advantage and import commodities with comparative disadvantage. Regional relative labor productivity will not always be in a static state, but will continue to change with the passage of time, and then the regional comparative advantage will also change. Therefore, comparative advantage is a dynamic concept and develops endogenously over time [2]. Countries and regions continuously strengthen or weaken the original comparative advantage due to factor endowment, technological progress, industrial policy, and so on and even lead to the reversal of original comparative advantage. In this way, the dynamics of comparative advantage is not only an indirect reflection of the changes of regional factor endowment and technology level, but also an important content to measure the impact of government policies. Hence, how to measure the dynamics of comparative advantage naturally becomes the initial task of researchers.

Since implementation of the strategy of reform and opening up in the late 1970s, China's economy has been fully integrated into the process of economic globalization. Chinese government has vigorously developed open economy, practiced open economic system and mechanism, deepened foreign trade and investment policies adapted to its national conditions, actively developed bilateral and multilateral trade relations, integrated multilateral trade organizations, implemented "going global" strategy, and deepened "The Belt and Road" initiative. These measures have improved Chinese foreign trade development environment, trained a large number of various ownership business entities facing the world market, effectively optimized export commodity structure, and improved international competitiveness. After accession to WTO, although China has experienced the 2008 international financial crisis, trade friction with major countries, rising domestic production cost, fluctuation of exchange rate, COVID-19 virus, etc., its export trade has made remarkable achievements. Chinese commodity exports amounted to US $509.6 billion in 2001. By 2020, its exports reached $2590.6 billion. The export scale has increased more than five times. China has become the largest commodity exporter and the largest foreign trade country in the world, and its import and export trade has become an important engine of global economic growth. With the growth of export scale, China's export commodity structure has also been significantly optimized, gradually reversing the export commodity structure dominated by primary products and labor-intensive products. In 2020, the export volume of manufactured commodities accounted for 95.5% of total exports volume in China, while primary products accounted for only 4.5%. In manufactured commodities, the percentage of mechanical and electrical products and high-tech products representing high technological level in total export is becoming higher and higher. For example, machinery and transportation equipment accounts for 48.6% in 2020, in such commodities, mechanical and electrical products and accessories, telephone communication and audio products, office machinery, and automatic data processing equipment are the main export commodity categories. The optimization of export commodity structure itself is the favorable result of dynamics of export comparative advantage in China. Therefore, it is necessary to conduct in-depth research on the dynamics of Chinese export comparative advantage.

The rest of this paper is organized as follows. The second part summarizes empirical methods of dynamics of comparative advantage, including a brief discussion of comparative advantage index and the statistic methods of index. The third part is the index and research methods used in this paper, including RSCA index and kernel density estimation, Markov chain transition probability matrix, and survival analysis methods. The fourth part presents results of empirical research. The fifth part is main conclusions and suggestions.

2. Literature Review

Analyzing change characteristics of comparative advantage index in certain period is the basic research way of dynamics of comparative advantage. This includes two interrelated aspects of the choice of index and application of statistical methods.

In terms of comparative advantage index, scholars have put forward various types of index since the 1950s, among which Balassa revealed that comparative advantage index (RCA) is most famous [3], but the index is also controversial. The main controversy is that RCA index has inherent defects in both theoretical basis and empirical application. For example, the mean value of RCA index is unstable and its distribution is nonnormal, so the accuracy of measuring comparative advantage is questionable. For this reason, later scholars put forward many alternative indexes with the aim of overcoming one or more shortcomings of the original RCA index. For example, Michaely put forward Michaely Index (MI) [4], Vollrath proposed relative trade advantage (RTS), relative export advantage (RC), and revealed competitiveness (In RCA) [5], Lafay proposed Lafay Index [6], Dalum and Laursen offered revealed symmetric comparative advantage index (RSCA) [7], Heon and Oosterhaven proposed additive (aggregated) revealed comparative advantage index (ARCA) [8], Cai and Yu proposed net export-revealed comparative advantage index (NRCA) [9], Wosiek and Visvizi proposed visviz wosiek RCA index (VWRCA) [10], and Andrey and Vladimir proposed new net trade index (nt RCA) [11]. These alternative indexes can sometimes alleviate some defects of RCA index in some specific cases. However, as Sanidas and Shin said, there is no perfect index [12].

Application of statistical methods on dynamics of comparative advantage is becoming more and more diverse and complex. For example, Benedicits and Tamberi used cumulative distribution, kernel density estimation, Lorentz curve, location index, and other methods based on RCA index [13]. Proudman and Redding and Hinloopen and Marrewijk used Markov chain transition probability matrix of RCA index and liquidity index methods [14, 15]. Laursen and Michele Alessandrini conducted regression analysis of RSCA index and Lafay Index, respectively [16, 17]. Bojnec and Fertö [2] and Olivera kostoska [18] also used regression, Markov chain transition probability matrix and survival analysis method of RCA index.

Application of the above indexes and statistical methods can reflect dynamics of regional comparative advantage to a certain extent; however, the following problems cannot be avoided. Firstly, the choice of index remains unsolved. Some scholars believe that the indexes based on the supply dimension, that is, only export data and no import data, lead to incomplete comparative advantage analysis [19]. Nevertheless, the author believes that if the demand dimension is considered, that is to say, the indexes including import data are adopted, the measurement is more distorted relative to supply dimension due to the influence of government policies, trade relations, and geographical factors. Although these factors can be measured separately, it is actually so challenging. In addition, it is reasonable to use the indexes based on the supply dimension in the current trade environment. After all, export is less affected by trade policies and trade relations than import. Of course, even if the problems related index selection is solved, there are still other straits. For example, using "ex post" trade data to reflect "ex ante" comparative advantage is naturally flawed [11, 20]. Therefore, these all depend on the progress of follow-up index research. Secondly, if we carefully study the specific methods related to dynamics of comparative advantage, we can find that most methods compare the index distribution of discrete time, such as between start time and end time, and ignore complete trend. In addition, the classification level of commodity also has an impact on the research results. For example, according to SITC classification, there may be a phenomenon that commodities with one-digit classification do not have comparative advantage, while commodities with two-digit or three-digit classification may have comparative advantage, and there may also be a phenomenon that commodities with one-digit classification have comparative advantage, but commodities with two-digit or three-digit classification may not have comparative advantage. These are also not conducive to the accurate analysis of comparative advantage. Hence, study on dynamics of comparative advantage may be more accurate when the commodity classification is more detailed. In view of this, referring to SITC three-digit classification, this paper selects RSCA index to carry out research on dynamics of export comparative advantage in China from 2001 to 2020. In addition, this study not only compares discrete years, but also studies the whole trend.

3. Methodology and Data

3.1. RSCARSCA Index, Commodity Classification, and Data

3.1.1. RSCA Index. Revealed symmetric comparative advantage (RSCA) index was proposed by Dalum and Laursen [7]. This index is the modification of the revealed comparative advantage (RCA) index. The RCA index formula is

$$\mathrm{RCA}_{ij} = \frac{X_{ij}/\sum_{i=1}^{m} X_{ij}}{X_{in}/\sum_{i=1}^{m} X_{in}}, \tag{1}$$

where X_{ij} is export volume of region j commodity i. $\sum_{i=1}^{m} X_{ij}$ is total export volume of region j commodity i. X_{in} is export volume of commodity i in reference region n. Then $\sum_{i=1}^{m} X_{in}$ is total export volume of reference region. The value range of RCA_{ij} index is $[0, +\infty)$. When the value of RCA_{ij} index is greater than 1, it indicates that region j has comparative advantage in commodity i; otherwise it is the opposite; when the value of index is equal to 1, it indicates the median point of comparative advantage and represents neutral comparative advantage.

RSCARSCA index is converted from RCA index to alleviate the defect of asymmetric distribution of RCA index. The formula is

$$\mathrm{RSCA}_{ij} = \frac{\mathrm{RCA}_{ij} + 1}{\mathrm{RCA}_{ij} + 1}, \tag{2}$$

where the value of RSCA_{ij} index ranges from $[-1, 1]$. When RSCA_{ij} value is greater than 0, it indicates that region j has comparative advantage in commodity i; otherwise it is the opposite. When the value of index is equal to 0, it represents the median point of comparative advantage and neutral comparative advantage.

3.1.2. Commodity Classification and Data. This paper quotes the three-digit commodity classification in the Standard of International Trade Classification (SITC Rev 3). The classified export data of China and world involved in the index calculation are all from UN COMTRADE database. Due to lack of world's three-digital classified commodity export data in the database, the annual export volume of three digit commodities of each country included in the database is aggregated as the total classified export volume of world. The export data of Chinese classified commodity from 2001 to 2020 are relatively complete in the database, and only two categories of commodities are not included in the analysis due to lack of data of complete years, that is, Ores and concentrates of uranium or thorium (286) and Gold, nonmonetary (excluding gold ores and concentrates (971). A total of 255 commodities are selected finally. In addition, the reason why RSCA index is selected is also due to the consideration of data quality. The quality of export data in the database is better than that of import data. If the selected comparative advantage index contains import data, it will be difficult to have measurement results of 255 categories due to research cycle, commodity classification level, and other reasons.

3.2. Dynamics of Comparative Advantage Method

3.2.1. Kernel Density Estimation. Kernel density estimation is a nonparametric method to estimate the probability density function of continuous random variables without assuming the basic distribution of random variables. Let $(x_1, x_2, \ldots, x_n)$ be a random sample from the same unknown probability density function $f(x)$ and its kernel density estimator is

$$\begin{aligned} f(x) &= \frac{1}{n}\sum_{i=1}^{N} K_h(x - x_i) \\ &= \frac{1}{nh}\sum_{i=1}^{N} K\left(\frac{x - x_i}{h}\right), \end{aligned} \tag{3}$$

where K is kernel function and $h > 0$ is the smoothing parameter (also called the bandwidth). In this paper, the default Epanechnikov kernel function of Stata software is used to obtain the kernel density curve.

After kernel density estimation, two-tailed Wilcoxon signed rank test is also performed. This test is a nonparametric test used to test the difference in the distribution of two samples. The premise of two samples is not independent, or matched samples or paired samples, or repeated measurement of a single sample. Thus, the Wilcoxon signed rank test tests for the null hypothesis of equal distributions through equal means against the alternative hypothesis of unequal distributions through unequal means.

3.2.2. Markov Chain Transition Probability Matrix. Generally, random variables X are considered as a Markov random process. For each n and all states $i_1, \ldots, i_n$,

$$\begin{aligned} &P\left[X_n = i_n | X_{n-1} = i_{n-1}, \ldots, X_1 = i_1\right] \\ &\quad = P\left[X_n = i_n | X_{n-1} = i_{n-1}\right]. \end{aligned} \tag{4}$$

We use our transition matrices as in a Markovian analysis, as a consequence relative frequencies should be interpreted as probabilities; in practice we utilize the transition matrics as if they had been generated by a stationary Markov process:

$$P[X_n = j|X_{n-1} = i] = P[X_{n+k} = j|X_{n+k-1}]. \tag{5}$$

For all states i and j, $k = (n-1), \ldots, 1, 0, 1, \ldots$.

3.2.3. Survival Analysis. Kaplan–Meier product limit method is used to estimate the survival function. This method is a nonparametric estimation method, which is used to estimate the survival probability beyond a given point in time; that is, the survival distribution is calculated according to the life experience data, and the censored case is considered. In other words, it is a statistical technique for describing and quantifying "time of event" data.

The survival function $S(t)$ is estimated using the Kaplan–Meier product limit method. The specific derivation is as follows: it is assumed that the sample contains n independent observations, expressed as $(t_i; c_i)$, $i = 1, 2, \ldots n$, where t_i is the survival time and c_i is the censored dummy variable C of the observation value i. If the "failure" event occurs, it is taken as 1; otherwise it is taken as 0. In addition, it is assumed that there are $m < n$ recorded failures. Then, the ordered survival time $t(1) < t(2) < \cdots < t(m)$ is defined. Let n_j be the number of failures at $t(j)$, let d_j be the number of failures observed, and the Kaplan–Meier estimate of the survival function is

$$\widehat{S}(t) = \prod_{t(i)<t} \frac{n_j - d_j}{n_j}. \tag{6}$$

By convention, when $t < t(1)$, $\widehat{S}(t) = 1$. Considering that many observations are censored, the estimator is robust to censoring and uses the information of censored and noncensored observations.

4. Empirical Analysis Results

4.1. Kernel Density Estimation. The kernel density of RSCA index in 2001–2002, 2008–2009, and 2019–2020 is estimated, as shown in Figure 1. The two-year average index is used to mitigate the impact of export fluctuations in a single year. At the same time, the reason for choosing the year 2001–2002 is not only the starting year of this study, but also the period of China's entry into WTO. 2008–2009 is a period of international financial crisis and 2019–2020 is the end year of the study. From the distribution pattern, there is an obvious peak on the left of the median point (RSCA = 0) in 2001–2002, indicating that most commodities have no comparative advantage. Actually, the percentages of commodity in the three years are 64.3%, 63.9%, and 62.0%, respectively, and the above results are proved. In 2008–2009, two more flat peaks are formed compared with 2001–2002. The first peak is on the left side of the peak in 2001–2002, which is comparative.

Advantage of some commodities is deteriorating; the second peak is on the right side of the peak in 2001–2002, indicating that comparative advantage of some commodities is improving. In 2019–2020, the left peak moves further to the left, indicating that comparative advantage of some commodities continues to deteriorate. On the right side of the median point (RSCA = 0), the curve in 2008–2009 moves upward relative to that in 2001–2002, indicating that the number of commodities with comparative advantage increases. The curve in 2019–2020 moves further upward, indicating that the number of commodities with comparative advantage is further increased compared with the previous two years, thus forming the highest peak. Obviously, since China's accession to the WTO, although the degree of comparative disadvantage of a few export commodities has increased, it can still be seen that more and more commodities have obtained comparative advantage, and the overall trend is improving. In addition, by observing the tails at both ends of the three curves, it can be seen that the left curve moves up and the right curve moves down, which further shows that the comparative advantage of commodities with strong original advantage decreases and the comparative disadvantage of commodities with weak original disadvantage increases. This phenomenon can be explained to some extent by the calculation of RCA index. Although this study makes analysis based on RSCA index, some defects of RCA index will not be eliminated by conversion to RSCA index. Yeats believes that RCA index calculation result may be more beneficial to small economies [21]. When China joined the WTO, it was not a major exporter in the world, and only a few commodities are exported to the world market. These commodities account for a large share of Chinese total exports, while most other commodities account for a small share, which affects the numerator of RCA index ($X_{ij}/\sum_{i=1}^{m} X_{ij}$). Although Benedicit believes that the value of RCA index depends on the change of numerator and denominator ($X_{in}/\sum_{i=1}^{m} X_{in}$) and the simultaneous change of numerator and denominator [13], the author believes that the numerator influence is greater for China, thus amplifying the comparative advantage of commodities with high export share and weakening the comparative disadvantage of commodities with low export share. More than 20 years after joining WTO, China has become a major exporter. The export commodities with comparative advantage and disadvantage have a lower share compared with more than 20 years ago, which leads to

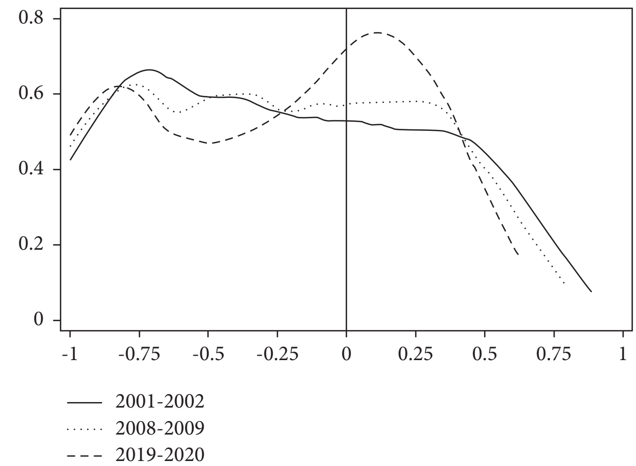

Figure 1: Kernel density estimation of Chinese RSCA index distribution.

decline of advantages of the commodities with strong comparative advantage and enhancement of disadvantages of the commodities with weak comparative advantage.

Wilcoxon signed rank two-tailed test is performed. The test about comparative advantage index distribution can be seen in S. Bodhisattva and D. Kaveri [22]. Here, the original hypothesis (H_0) is that there is no significant difference in the distribution of RSCA index in the above three years, while there is a significant difference in the alternative hypothesis (H_1). The results show that the original hypothesis is not rejected at the 5% significance level, as shown in Table 1. This means that although Chinese RSCA index kernel density curve shows a certain change, the change does not deviate from the original distribution state. That is to say, despite the impact of major external environmental changes such as entry into WTO and the 2008 international financial crisis, the dynamics of Chinese export comparative advantage have changed to a certain extent, but its export specialization mode is still stable.

4.2. Transition Probability Matrix. Taking 2001–2002 as the base year, four intervals, I, II, III, and IV, are divided according to the quartile of RSCA index in 2001–2002. Interval I is between the minimum and lower quartile of RSCA index in 2001–2002, interval II is between the lower quartile and median, III is between the median and upper quartile, and IV is between the upper quartile and maximum. In this way, the transition probability matrices of 2008–2009 and 2019–2020 relative to 2001–2002 are obtained, respectively. Similarly, the other I, II, III, and IV intervals are divided based on the quartile of RSCA index in 2008–2009, and the transition probability matrix in 2019–2020 relative to 2008–2009 is also calculated. All results are shown in Table 2.

Generally speaking, the probability of the diagonal element of the matrix represents stability. When the diagonal probability value is larger, it indicates that the stability is higher. When the probability of each row of elements moves across the interval relative to probability of diagonal elements, it indicates liquidity. When crossing multiple intervals, the liquidity is greater. Since probability values of the matrix are all between [0, 1], the stability and liquidity are evaluated by summing the probability of diagonal elements and nondiagonal elements. Firstly, the transition matrix in 2019–2020 relative to 2001–2002 is analyzed. The sum of probability of diagonal elements and nondiagonal elements is 2.16 and 1.84, respectively, indicating that stability is higher than liquidity. In addition, the probability of the elements in the upper right corner outside the diagonal indicates that the liquidity is in the improving direction, and the probability of the elements in the lower left corner indicates that the liquidity is in the deterioration direction. The sum of probability of the elements in the upper right corner is 0.98, which is greater than the sum of the probability of the elements in the lower left corner which is 0.86, and the overall trend is improving. Secondly, the transition matrix in 2008–2009 relative to 2001–2002 is obtained. The sum of probability value of diagonal elements and nondiagonal elements is 2.5 and 1.5, respectively, and stability is higher than liquidity. Similarly, the total probability values of the upper right corner and lower left corner of the matrix are 0.73 and 0.77, respectively, and there is a deterioration trend as a whole.

Finally, the transition matrix of 2019–2020 relative to 2008–2009 is analyzed. The sum of probability value of diagonal elements is 3.09, and the sum of the probability of nondiagonal elements is 0.91; stability is higher than liquidity. The sum of the probability values in the upper right corner and the sum of the probability value of the elements in the lower left corner of the matrix are 0.52 and 0.39, respectively, showing a good trend as a whole.

From this, it can be concluded that dynamics of Chinese export comparative advantage is stable. Except that Chinese comparative advantage deteriorated slightly during international financial crisis in 2008, the overall comparative advantage has an improving trend, which also verifies the relevant results of kernel density estimation.

4.3. Survival Analysis. The above two methods only use six years' RSCA index distribution information and do not show the complete dynamics of Chinese export comparative advantage. In order to further clarify dynamics of Chinese export comparative advantage, the survival analysis of RSCA index from 2001 to 2020 is carried out. It is defined as 0 when the value of RSCA index is greater than 0 and 1 when the value is less than 0. The Kaplan–Meier method is used to estimate the cumulative survival function. Firstly, find out the uninterrupted sequence with RSCA > 0 from 2001 to 2020, which means that the value of a specific commodity in 20 years is 0. Then consider two cases.

Case 1. If RSCA > 0 turns to RSCA ≤ 0 for a commodity in a certain year, it indicates that an event has occurred and is marked 1 at the end of the time sequences of successive 0's. The minimum length of the sequence is 2. The maximum length of the time sequence is 19.

Case 2. Case I does not occur. This includes two kinds of censored cases. (i) The sequence is 1 from the first year; after multiple consecutive 0's or 1's, it is finally censored with 0 in the 20th year. (ii) The sequence was 1 in 20 years and finally censored with 1.

For Kaplan Meier analysis, here, the censored case (ii) in case II is excluded, so 120 commodities are eliminated and 135 commodities remained. The following situations will happen to 135 commodities: (a) it has been 0 for 20 years; (b) Case 1 occurs; (c) there is also Case 1 and case (i) in Case 2 that occur at the same time. Thus, 173 independent observations were formed, of which 93 commodities are censored with 0, accounting for 53.7%, and 80 commodities are censored with 1, accounting for 46.3%. The survival probability of Chinese survival function in the first year is 1, which decreases to 0.661 after 5 years, 0.578 after 10 years, 0.522 after 15 years, and 0.507 after 16 years and then remains stable (see Table 3).

Table 1: Results for Wilcoxon's signed rank test of Chinese RSCA index.

year	2001-2002 vs. 2008-2009	2008-2009 vs. 2019-2020	2001-2002 vs. 2019-2020
z-value	−0.422	−0.513	−0.506
p-value	0.673	0.595	0.613

Note. Significance level $\alpha = 5\%$.

Table 2: Markov transition probability matrix of Chinese export comparative advantage.

State	2001-2002 vs. 2008-2009				2008-2009 vs. 2019-2020				2001-2002 vs. 2019-2020			
	I	II	III	IV	I	II	III	IV	I	II	III	IV
I	0.734	0.219	0.031	0.016	0.891	0.109	0.000	0.000	0.672	0.219	0.094	0.015
II	0.210	0.500	0.290	0.000	0.143	0.603	0.254	0.000	0.238	0.302	0.429	0.031
III	0.063	0.187	0.578	0.172	0.000	0.110	0.734	0.156	0.063	0.219	0.531	0.187
IV	0.046	0.077	0.185	0.692	0.000	0.000	0.141	0.859	0.094	0.047	0.203	0.656

Table 3: Kaplan–Meier survival analysis of Chinese RSCA index (2001–2020).

Time	Beg. total	Fail	Net lost	Survivor function	Std. error	[95% conf. int.]	
1	173	0	2	1.0000	.	.	.
2	171	23	2	0.8655	0.0261	0.8046	0.9085
3	146	14	2	0.7825	0.0316	0.7126	0.8373
4	130	12	3	0.7103	0.0349	0.6355	0.7725
5	115	8	4	0.6609	0.0366	0.5837	0.7271
6	103	2	0	0.6480	0.0370	0.5704	0.7152
7	101	4	0	0.6224	0.0377	0.5438	0.6913
8	97	3	0	0.6031	0.0381	0.5241	0.6732
9	94	3	0	0.5839	0.0385	0.5045	0.6550
10	91	1	2	0.5775	0.0386	0.4980	0.6489
11	88	2	2	0.5643	0.0388	0.4847	0.6364
13	84	0	4	0.5643	0.0388	0.4847	0.6364
14	80	3	0	0.5432	0.0392	0.4631	0.6163
15	77	3	4	0.5220	0.0396	0.4417	0.5962
16	70	2	3	0.5071	0.0398	0.4266	0.5820
17	65	0	1	0.5071	0.0398	0.4266	0.5820
18	64	0	1	0.5071	0.0398	0.4266	0.5820
19	63	0	2	0.5071	0.0398	0.4266	0.5820
20	61	0	61	0.5071	0.0398	0.4266	0.5820

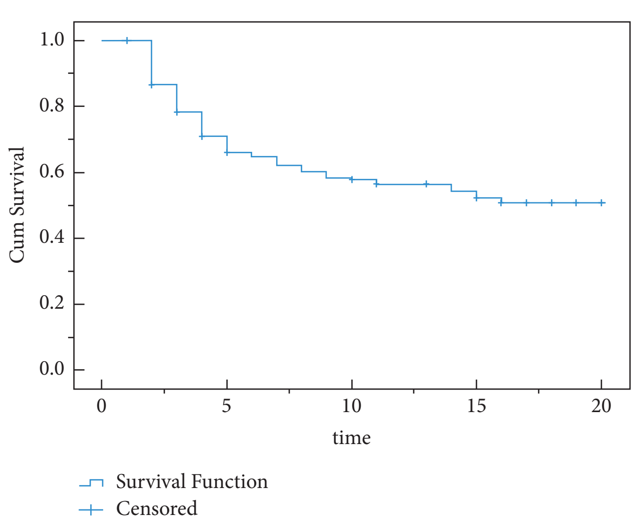

Figure 2: Kaplan–Meier survival analysis of Chinese RSCA index (2001–2020).

Graphically, the period of rapid decline in Chinese survival rate is mainly 1–5 years, the degree of decline decreases in 5–15 years and remains stable after 16 years (see Figure 2). This means that about 50% of China's export commodities with comparative advantage have a chance to survive for more than 16 years. At the 95% confidence level, the mean survival time is 12.84 years and the standard error is 0.61. This shows that, even in the face of fierce international market competition, after excluding the commodities without comparative advantage in the past 20 years, the viability of China's commodities with comparative advantage performs well, which means that China's existing export mode can still support the viability of most commodities.

5. Conclusions and Suggestions

Since entrance to WTO, the development of Chinese foreign trade has significantly improved its position in world trade and become the largest commodity trade country and largest exporter. This is the result of China's continuous optimization of import and export trade mode to meet the needs of world market based on its own comparative advantages. Based on the RSCA index, this paper studies the dynamics of Chinese export comparative advantage from 2001 to 2020; by kernel density estimation method, it is obtained that although China is facing the impact of more fierce international market competition after entrance to WTO, the export comparative advantage of a small number of commodities has weakened, and comparative disadvantage has increased, but most of commodities' comparative advantage has improved, and through Wilcoxon signed rank two-tailed test, it is concluded that the original comparative advantage state of China has not changed. Through analysis of Markov chain transition probability matrix, it is concluded that Chinese export trade mode is relatively stable, the stability of comparative advantage is higher than liquidity, and the liquidity presents an improving trend as a whole. From survival analysis, after excluding the commodities that have not had comparative advantages for 20 years, the viability of China's commodities with comparative advantages performs well, which means that existing export mode can still support viability of most commodities.

As COVID-19 continues to rage, competition between China and major trading partners in trade and other fields will have a greater impact on world trade. Therefore, China needs to be based on the reality and evolution characteristics of export commodities comparative advantage, adapt to the dynamic demand change of international market, actively optimize specialized export mode, and enhance comparative advantage. Specifically, firstly, China should further clarify the status and trend of comparative advantage of various commodities in world market and major export markets, adapt to market dynamic demand, strengthen product innovation, improve the supply chain, improve level of value chain, and further improve added value of export commodities so as to stabilize and develop comparative advantage. Secondly, China should focus on the export of commodities with improved comparative advantages, promote diversification of export markets, and further improve the way of trade organization so as to promote the release of potential of such commodities. Thirdly, China should continue to strengthen the existing export mode and improve the viability of export products continuously in international market based on comparative advantage.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflicts of interest regarding the content and implications of this manuscript.

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