# Research Hotspots and Evolutions of SSCI Literature in Economics—Based on Keywords

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**Abstract:** This paper combines bibliometrics and historical research methods, takes English literature in the field of economics in SSCI as the research object, collects the information of its title, then extracts and analyses the keywords of English literature to find the hotpots and evolutions in the field of economics in SSCI for 15 years; the literature is divided into three periods every five years to map the keyword co-occurrence network, and to study the evolution process of keyword hotspots and links in each period.

## 1. Introduction

Bibliometrics is a discipline that takes the literature system and bibliometric characteristics as the research object, adopts the methods of mathematics and statistics to study the distribution structure, quantitative relationship, change law and quantitative management of literature information, and then discusses some structures, characteristics and rules of science and technology.

Although bibliometrics is a branch of the field of information science, it can be applied to a variety of disciplines or fields. From the past research, scholars and researchers in many other disciplines, such as medicine, agriculture, economy, education, population, industry and geology, have adopted this method to evaluate the research results and evolution process within or across disciplines. Tian and Chang analysed the current situation and development of ecological vulnerability research in China by using bibliometric analysis method. [1] Lu and Zhang conducted bibliometric analysis on CSSCI papers and drew a knowledge map, analysed the research status, hot spots and novel research directions of unconventional monetary policy in China, and explored the trend characteristics of research and development of unconventional monetary policy in China. [2] Zhao made a bibliometric study on international education economics. [3]

The arrangement of this paper is as follows: the second section introduces data collection and processing, the third section describes the research methods, the fourth section analyses and discusses the results, and the fifth section draws conclusions and puts forward some suggestions.

## 2. Data Collection and Discussion

In this paper, SSCI database is used. Each journal in this database has at least one corresponding subject category, which is represented by WC, that is, each article has at least one subject category attribute. DE is the key word given by the author, PY is the year of publication. The retrieval formula of this study is, WC =”Economics”, and the time span is 2005 to 2019. The date of data collection is November 9, 2019. Remove the data with null PY or DE, the remaining 181162 data are saved to local database as the basic data for the following research. In order to unify the data standard, we have converted the keywords into lowercase.

## 3. Research Methods

Keyword analysis is a common content in bibliometrics. The traditional and representative analysis methods are word frequency analysis and co-word analysis. Through the analysis of word frequency,

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we can get the hot topics and changes in a certain field. Co-word analysis can show us the degree of relevance between research topics. Word frequency analysis is an important means of text mining to count and analyse the frequency of important words in literature. The basic principle is to determine the hotspot and its change trend by the frequency of words. Co-word analysis was proposed by French bibliometrics in the late 1970s. The principle is: when two professional terms (usually subject words or key words) that can express the research topic or research direction of a certain discipline field appear in the same literature, it shows that there is a certain internal relationship between the two words, and the more times they appear, the closer the relationship and the closer the distance. [4]

According to the keywords in the past 15 years, high frequency words and ultra-high frequency words are selected, and the word frequency analysis method is used to show the hot spots and their changing trends in the field. In view of the correlation between keywords, it is divided into three stages for co-word analysis, and explore the hotspots of the keyword network and the change trends of correlation.

## 4. Results and Discussions

### 4.1 Overall Trends

First of all, a line char is used to show the changes in the number of published papers from 2005 to 2019(Fig 1). Through the analysis, it is found that, in general, the number of published papers is increasing year by year. In terms of sections, the number of published papers increases rapidly from 2005 to 2013, but after 2013, the number decreases slightly in 2014. After that, the number grows a little slowly, and then accelerates until 2018. (It should be noted that the decrease in the number of papers published in 2019 may be due to the fact that the time of data collection cannot completely cover all the literature, so the number in the figure is greatly reduced.)

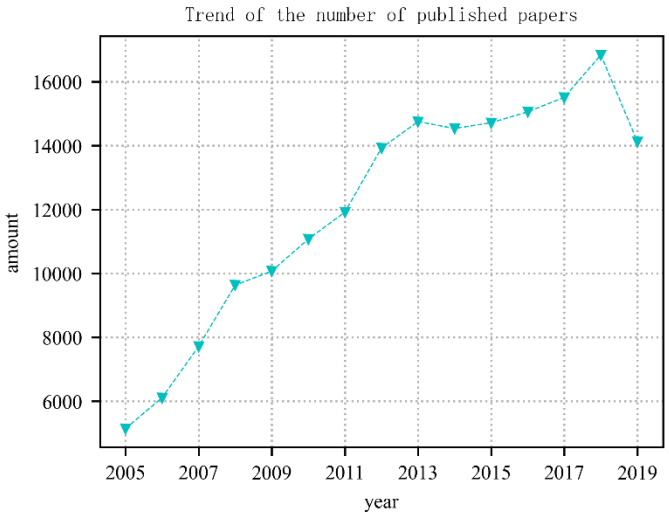


Figure 1. Trend of the number of published papers

Secondly, a column chart is selected to analyse the number and frequency of keywords in these 15 years. The frequency and number are grouped and summarized annually, as shown in Fig 2. It can be seen that the total number and frequency of keywords increase year by year. With the growth of the number of published papers, the frequency rises quickly from 2011 to 2013, and then the growth rate slows down. Until 2018, the rate increases rapidly again. (Similarly, the condition in 2019 is the same as above.)

### 4.2 High-frequency Keywords and Evolution

The size of keyword frequency can fully reveal the research hotspot and development trend in a certain field. In this paper, we use Python to process the bibliography, focus on the evolution of keywords, and make a series of visualization of keyword frequency.

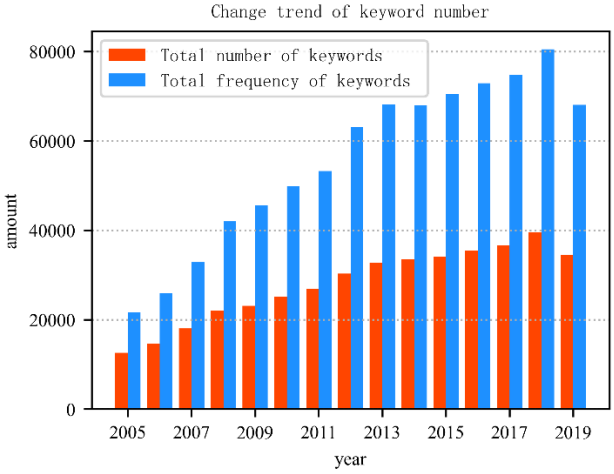


Figure 2. Change trend of keywords


Figure 3. Word cloud(Top 500)

The word cloud in Fig 3 shows the keywords (top 500 according to word frequency) of all the literature in the past 15 years. Through the font size, it can be clearly seen how the research hotspots are distributed in the field of economics. The keywords such as China, economic growth, monetary policy, productivity, innovation, climate change, efficiency, education, human capital, inequality and so on, directly show the hot topics.

Table.1. Top 5 keywords of each year

| Year | Keyword(frequency) |
|---|---|
| 2005 | economic growth(71), growth(57), productivity(55), innovation(55), panel data(54) |
| 2006 | china(86), economic growth(74), monetary policy(72), growth(69), human capital(69) |
| 2007 | china(110),monetary policy(99), economic growth(94), growth(88), efficiency(84) |
| 2008 | china(155), economic growth(142), monetary policy(117), growth(108), efficiency(101) |
| 2009 | china(197), economic growth(143), growth(104), monetary policy(99), human capital(85) |
| 2010 | china(172), economic growth(154), growth(109), climate change(104), monetary policy(102) |
| 2011 | china(219), economic growth(176), monetary policy(129), panel data(107), productivity(102) |
| 2012 | china(264), economic growth(210), innovation(142), monetary policy(139), panel data(132) |
| 2013 | china(262), economic growth(245), monetary policy(180), innovation(134), financial crisis(133) |
| 2014 | china(320), economic growth(231), monetary policy(182), innovation(151), climate change(149) |
| 2015 | china(294), economic growth(228), monetary policy(161), panel data(152), innovation(149) |
| 2016 | china(342), economic growth(226), innovation(154), monetary policy(152), climate change(132) |
| 2017 | china(388), economic growth(223), innovation(190), panel data(155), inequality(154) |
| 2018 | china(374), economic growth(247), climate change(192), innovation(186), inequality(184) |
| 2019 | china(309), economic growth(221), monetary policy(159), inequality(155), innovation(143) |

TABLE I lists the top five keywords of each year from 2005 to 2019, in which the frequency of the keywords is shown in brackets. It can be clearly found that the keyword "economic growth" has always been in the top five. The word "China" has been ranked first since 2006. Monetary policy and innovation are also the ones that appear in these lists, while the keywords -productivity, panel data, human capital- appear less frequently in these top five lists, and after 2014 a new keyword - climate change emerges more times.

Economic growth is the premise and guarantee of economic and social development, so how to promote rapid and good economic growth is a topic of concern to all disciplines of economics. There is no doubt that economic growth has always been a hot topic in the field of economics. As China's dominant position in the world economy is becoming more and more obvious, China's influence cannot be ignored by economic scholars from all over the world, so the word "China" has gradually become the hottest topic. Monetary policy is an important means of national macro-control, to which no country will not pay attention. Therefore, the study of monetary policy in economic literature is also an important hot spot. In recent years, innovation driven and climate change have been the topic areas of concern to all of governments, societies and individuals, so we can see that innovation and climate change are at the forefront.

According to the change of keyword frequency heat, this paper makes a comparison of different years, extracts the top 20 high frequent keywords in 2005, 2010, 2015 and 2018, and compares their ranking changes, as shown in TABLE II. It can be seen that (1) in 2010, compared with 2005, the keywords with greater changes are China, efficiency, innovation, regulation, productivity and wealth; (2) in 2015, compared with 2010, the keywords with greater changes are productivity, education, employment, gender, growth, climate change and Africa; (3) in 2018, compared with 2015, the key words with greater changes are climate change, inequality, financial crisis, renewable energy and experience.

Although the statistics of keyword frequency can get the hot topics in the field, but the frequency ranking of keywords is relative to all the keywords in the year, the change of the number cannot reflect the change trend on the time axis. Therefore, this paper adopts the keyword weight, that is, the word frequency of a keyword divided by the total number of keywords, to reflect the evolution of keywords, as shown in Fig 4.

As can be seen from Fig 4, the trend of the word "China" is generally on the rise. Economic growth and monetary policy fluctuate, but on the whole, the change is still in a stable trend, while uncertainty and productivity are basically on the decline.

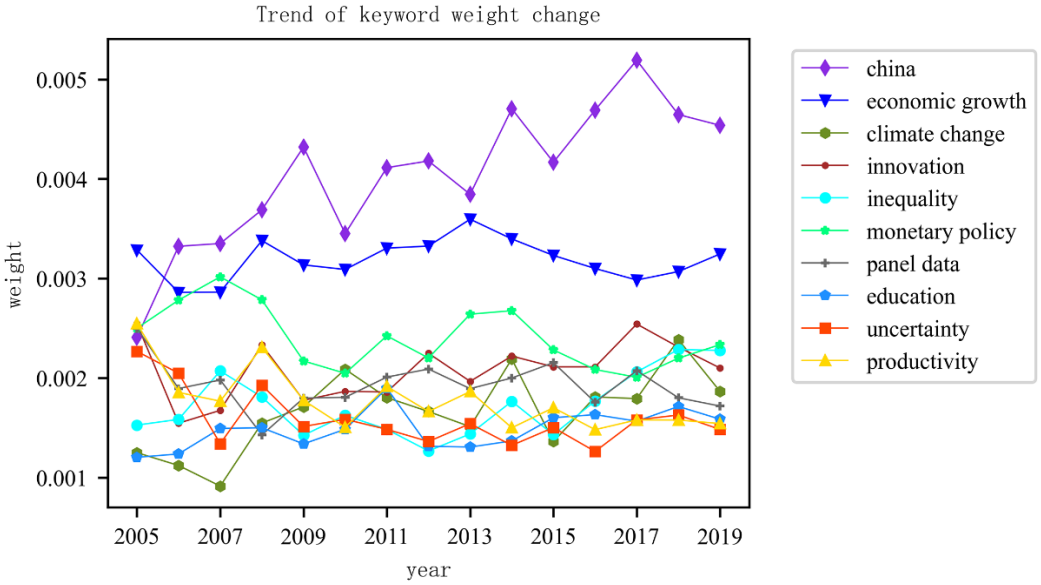


Figure 4. Trend of keyword weight change

Table.2. High-frequency keyword ranking changes

| No. | 2005 | 2010 | Change | 2015 | Change | 2018 | Change |
|---|---|---|---|---|---|---|---|
| 1 | economic growth | china | ↑7 | china | —— | china | —— |
| 2 | growth | economic growth | ↓1 | economic growth | —— | economic growth | —— |
| 3 | productivity | growth | ↓1 | monetary policy | ↑2 | climate change | ↑15 |
| 4 | innovation | climate change | ↑↑ | panel data | ↑6 | innovation | ↑1 |
| 5 | panel data | monetary policy | ↑1 | innovation | ↑1 | inequality | ↑9 |
| 6 | monetary policy | efficiency | ↑10 | financial crisis | ↑↑ | monetary policy | ↓3 |
| 7 | poverty | innovation | ↑↑ | human capital | ↑1 | panel data | ↓3 |
| 8 | china | regulation | ↑↑ | productivity | ↑8 | education | ↑1 |
| 9 | uncertainty | human capital | ↑1 | education | ↑7 | uncertainty | ↑3 |
| 10 | inflation | panel data | ↑↑ | unemployment | ↑9 | productivity | ↓2 |
| 11 | human capital | cointegration | ↑4 | gender | ↑↑ | unemployment | ↓1 |
| 12 | regulation | inequality | ↑↑ | uncertainty | ↑2 | human capital | ↓5 |
| 13 | learning | inflation | ↑↑ | inequality | ↓1 | india | ↑5 |
| 14 | economic development | uncertainty | ↓5 | efficiency | ↓8 | gender | ↓3 |
| 15 | cointegration | institutions | ↑↑ | growth | ↓12 | institutions | ↑1 |
| 16 | efficiency | productivity | ↓13 | institutions | ↓1 | financial crisis | ↓10 |
| 17 | political economy | education | ↑↑ | entrepreneurship | ↑↑ | efficiency | ↓3 |
| 18 | trade | poverty | ↓11 | climate change | ↓14 | entrepreneurship | ↓1 |
| 19 | unemployment | unemployment | —— | india | ↑1 | renewable energy | ↑↑ |
| 20 | contingent valuation | india | ↑↑ | africa | ↑↑ | experiment | ↑↑ |

### 4.3 Keyword Co-occurrence Networks and Evolutions

In this paper, the keywords with high frequency are selected and divided into three stages: 2005-2009 (Fig 5(a)), 2010-2014 (Fig 5(b)), 2015-2019 (Fig 5(c)). The dots in co-occurrence graph represent keywords, and their size and colour represent the frequency of keywords. The larger the dot, the deeper the colour, the higher the frequency. The line between dots represents the co-occurrence of keywords, and its colour and thickness represent the weight of co-occurrence. The deeper the colour is, the thicker the line is, the more co-occurrence is.

Since the evolution of word frequency hotspots has been introduced in the previous section, this part will focus on the analysis of the co-occurrence relationship between keywords, and explore the evolution process of keyword co-occurrence network as time goes by. As shown in Fig 5(a), it can be seen that the darker colour lines and thicker lines are distributed among the poverty and inequality, inflation and monetary policy, human capital and education, China and economic growth, growth and inequality, productivity and efficiency, economic growth and human capital, etc. This shows that in the past five years, the number of co-occurrence of these keywords is more frequent, which means that the literature on poverty also involves inequality. The literature on monetary policy often pays attention to inflation. The research on education and human capital are closely related. Economic growth, China and human capital are more studied in the literature at the same time. Productivity and efficiency are inseparable. In addition, we can also see that some lines and dots form a circular closed connection, which shows that these keywords are often studied together, such as China, India and poverty, and monetary policy, inflation and unemployment, poverty, inequality and growth, etc.

Fig 5(b) shows the co-occurrence relationships between 2010 and 2014. We can see that some relationships are the same as those in the previous stage (2005-2009), and there are also changes. This demonstrates that the hot spots and their relations in the literature have changed with time. Specifically, in addition to the fact that innovation is closely related to growth as it was in the previous five years, in these five years it is more closely related to enterprise activities. This may be driven by the hot spot of innovation in this period, more enterprises have joined the ranks of innovation, which makes researchers pay more attention to it. The relationship between uncertainty and investment has declined compared with the previous five years, but has more to do with climate change. Climate change is undoubtedly one of the hotspots in this century. All nations, societies and individuals are making great

efforts to improve the environment and save the earth on which they depend. The uncertainties in climate change research mainly include: uncertainty in the cause, in the prediction, and in the impact. It is worth mentioning that monetary policy has added a more obvious co-occurrence keyword financial crisis, and the frequency of this keyword is higher - the dot is deeper and larger. This may be the outbreak of the financial crisis in 2008, which has become a research hotspot in the following years; the relationship between China and innovation has also improved significantly compared with the previous five years, indicating that China is gradually realizing innovation oriented economic development.

Fig 5(c) shows the degree of keyword relevance in the last five years. Compared with the first two stages, there are some new changes. To start with, as time goes on and the global economy recovers, the heat of the financial crisis has greatly decreased; secondly, the relationship between climate change and uncertainty is no longer the closest, but more closely related to agriculture and renewable energy. On the one hand, the reason for this result is that the huge impact of climate change will directly affect agricultural production, agricultural economy and other aspects, and then directly affect human survival; on the other hand, it can be seen that human beings are actively exploring renewable energy, reducing the use of fossil fuels, and striving to improve the ecological environment and alleviate the harsh climate. Thirdly, compared with the first two stages, the lines between innovation and enterprise activity, and productivity are thicker and deeper in this figure, which shows that in the past five years, promoting innovation to guide enterprise activities and to improve productivity has become a hot research field. In addition, there is a new related keyword health in education, and the link between fiscal policy and monetary policy has become stronger.

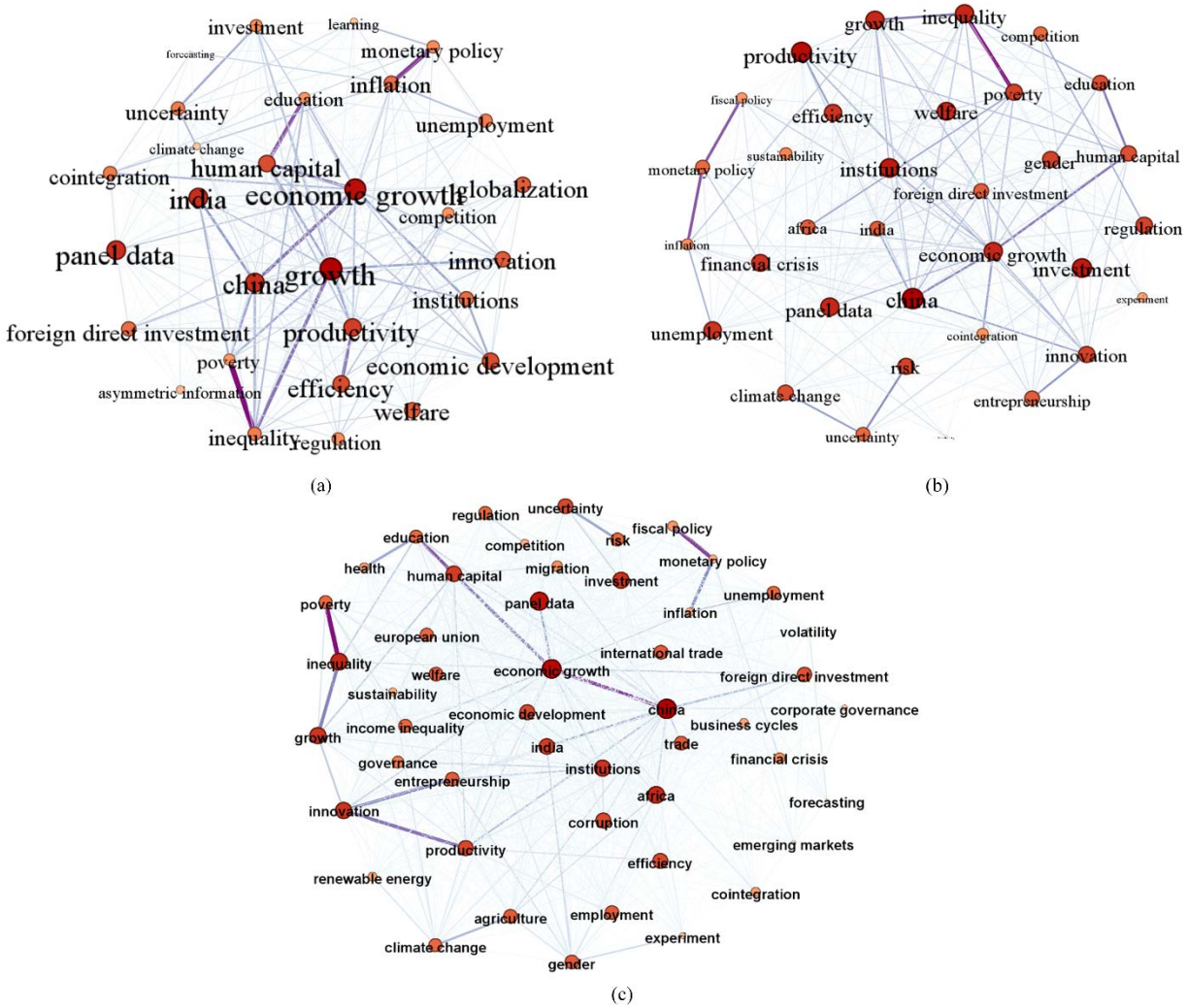


Figure 5. Keyword co-occurrence networks

Generally speaking, the relevance between keywords does change over time, or emerged or disappeared, or the degree of correlation has increased or decreased. Through the co-occurrence analysis of keywords, especially after drawing the network diagram, we can grasp the research hotspots and research relevance in different periods and explore their evolution process.

## 5. Conclusions and Implications

In this paper, word frequency analysis and co word analysis are used to analyse the hot spots and evolution of English literature in the field of economics in SSCI. Some conclusions are as follows:

(1) From the perspective of time distribution and the number of papers published, the research in the field of economics has been on the rise, but in recent years, especially after 2014, the growth rate of the number of papers published has slightly slowed down.

(2) From the perspective of keyword frequency, the research hotspots in this field focus on China, economic growth, monetary policy, innovation, climate change and panel data, education, etc., but at different times, researchers' focus will also change.

(3) From the perspective of keyword co-occurrence network, the relevance of keywords will also change over time. The change of keywords associated with innovation and the increase or decrease of their correlation degree reflect the change of innovation application in recent years; with the rapid development of China's economy, the research on China and economic growth is in full swing; climate change has become a research topic that cannot be ignored. In recent years, people are also actively exploring renewable energy; in the economic field, monetary policy will never be reduced. In the past 15 years, it has been more closely associated with inflation. Based on this, it can be interpretable that inflation and monetary policy have been studied continuously.

Although keywords cannot cover all the contents of the literature, the analysis in this paper will inevitably omit some details, but this kind analysis of literature based on keywords can still provide us with some hotspots and evolution clues.

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