

# An Inter-provincial Comparative Study on the Programs Approved by National Natural Science Foundation of China in 2017

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**Abstract**—This paper uses annual statistical data from the National Natural Science Foundation of China, analyzes the total number of programs approved and total funding of seven main types of programs in 31 provinces of mainland China in 2017. Unlike other studies that focus on universities or disciplines, this study focuses on the gaps between provinces. The result shows that, there are huge differences between provinces in mainland China. Beijing has the largest number of programs and funding. Shanghai and Jiangsu are very close behind. The top five provinces took half of the country's programs and funding. But many provinces have obtained only a small number of programs and the amount of funding; the number of some provinces is still less than a good-ranking university. This paper visualizes the results of inter-provincial comparisons with the provincial map of China. Based on analysis results, NSFC should increase the number of programs and tilting towards backward areas, encourage outstanding universities to help other universities or build sub-campus areas in backward areas and promote balanced development of the region, reduce funding for high-funding programs and give more opportunities for young scientists, and further expand the scale and support of Fund for Less Developed Regions.

**Keywords**—National Natural Science Fund Mainland China research programs young scholars inter-provincial comparison

## I. INTRODUCTION

The National Natural Science Fund is the highest level research programs in mainland China, managed by the National Natural Science Foundation of China (NSFC). In the past decades, NSFC has established more than 10 types of programs [1], and provided important financial support for many scientific researches in various areas.

NSFC programs have played an active part in promoting China's science and technology [2-4]. Numerous scholars have made suggestions for the work of NSFC, and the NSFC funding system is constantly optimized [5]. In recent years, more and more scholars have begun to pay attention to the fairness of funding, most research is conducted between disciplines or between universities [6-8]. Only a few scholars have focused on the gaps between different regions and the future impacts. Zhong Yongheng constructed the index of basic research competitiveness, analyzed the ranking of elementary research competitiveness of 31 provinces and autonomous regions in China and its changing trend [9]. Wang Hailong analyzed the inter-provincial difference of the Fund for Less Developed Regions of NSFC [10].

This study focuses on the gaps between provinces, reorganizes the annual statistical data from the National Natural Science Foundation of China, and calculates the total number of programs approved and total funding of seven main types of programs in 31 provinces of mainland China in 2017. The seven types of programs including the General Program (General), Key Program (Key), Young Scientists Fund (Young), Fund for Less Developed Regions (Less Developed), Excellent Young Scientists Fund (Excellent), National Science Fund for Distinguished Young Scholars (Distinguished), International or Regional Cooperation and Exchange Program (International). According to the NSFC website, these seven programs are the core components of the National Natural Science Foundation of China. The statistics data of them are accurate and the provincial ownership is clear, so they can be utilized to inter-provincial comparisons. Hong Kong, Macao and Taiwan are specially funded, and they will not be discussed in this paper.

## II. THE RANKING AND VISUALIZATION OF TOTAL NUMBER OF APPROVED NSFC PROGRAMS

The seven types of programs of NSFC have their own characteristics, and the emphasis of funding is different. Without considering the weight of funding, the total number of approved programs in each province is summarized, and the ranking is shown in Table I.

Fund for Less Developed Regions is only for the less developed regions, including 11 whole provinces and several minority autonomous prefectures and special support cities in other 5 provinces. The 11 whole provinces are Inner Mongolia, Ningxia, Qinghai, Xinjiang, Xizang, Guangxi, Hainan, Guizhou, Jiangxi, Yunnan and Gansu, the minority autonomous prefectures are Yanbian of Jilin, Enshi of Hubei, Xiangxi of Hunan, Liangshan of Sichuan, Ganzi of Sichuan, Aba of Sichuan, Yan'an of Shaanxi and Yulin of Shaanxi. Other provinces cannot get this program. The other six types of programs are available to all provinces and autonomous regions.

Table I demonstrates that, in 2017, the gap between provinces in mainland China is beyond the imagination of ordinary

people. Some provinces have obtained thousands of programs; on the contrary, the number of the two provinces (Qinghai and Xizang) is even less than 100. Beijing is the biggest winner in 2017, successfully get 6057 programs, accounting for 15.11% of the whole country. In fact, it has been the same in the past few years. Therefore, it can be said that Beijing already has the most resources, but additional requests for more resources. Jiangsu and Shanghai were also very successful, followed by Guangdong and Hubei. The top five provinces have received 19388 programs in total, nearly half of the total country.

The visualization of the total number of approved NSFC programs of Mainland China in 2017 is illustrated in Figure 1.

TABLE I. THE RANKING OF TOTAL NUMBER OF APPROVED NSFC PROGRAMS OF 31 PROVINCES IN 2017

	Province	General	Key	Young	Less Developed	Excellent	Distinguished	International	Total
1	Beijing	3342	199	2301	0	105	78	32	6057
2	Jiangsu	1868	70	1974	0	35	14	17	3978
3	Shanghai	2114	89	1420	0	48	37	17	3725
4	Guangdong	1520	45	1594	0	24	6	12	3201
5	Hubei	1201	38	1133	9	26	12	8	2427
6	Shaanxi	867	32	1001	30	15	5	3	1953
7	Zhejiang	898	27	885	0	26	9	11	1856
8	Shandong	773	22	998	0	14	1	7	1815
9	Sichuan	643	19	771	1	10	3	6	1453
10	Liaoning	628	16	627	0	13	5	3	1292
11	Hunan	579	17	600	20	7	5	4	1232
12	Tianjin	478	15	472	0	16	3	6	990
13	Anhui	461	13	472	0	25	9	7	987
14	Henan	276	1	575	0	1	0	0	853
15	Chongqing	396	8	440	0	1	2	0	847
16	Heilongjiang	472	10	350	0	4	2	0	838
17	Fujian	407	12	407	0	7	1	3	837
18	Jiangxi	71	1	156	604	0	1	2	835
19	Yunnan	122	8	135	482	2	1	0	750
20	Jilin	374	7	301	41	10	4	1	738
21	Gansu	196	10	180	249	7	0	0	642
22	Guangxi	47	1	87	413	0	0	0	548
23	Xinjiang	40	1	51	328	1	0	0	421
24	Guizhou	43	1	76	285	0	0	0	405
25	Shanxi	109	3	227	0	1	0	2	342
26	Hebei	150	1	187	0	1	0	0	339
27	Inner Mongolia	21	0	30	229	0	0	0	280
28	Hainan	28	0	46	112	0	0	0	186
29	Ningxia	6	0	11	142	0	0	0	159
30	Qinghai	5	1	16	50	0	0	0	72
31	Xizang	1	0	0	22	0	0	0	23
	Total	18136	667	17523	3017	399	198	141	40081

Source: Summarized from 2017 statistical data of NSFC approved programs.

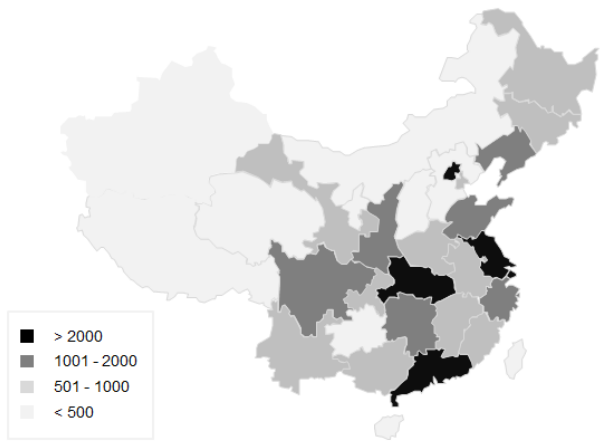


Fig. 1. The visualization of total number of approved NSFC programs of Mainland China in 2017

Figure 1 shows that, Beijing, East China, South China and Middle China have more NSFC programs, while the provinces around Beijing, Northwest China and Southwest China have fewer NSFC programs. The main reason is the stronger the ability of universities and research institutions, easier to get more NSFC programs. Most of the better universities in China are distributed in black and dark grey areas on the map.

### III. THE RANKING AND VISUALIZATION OF TOTAL AMOUNT OF FUNDING

There are pronounced differences in NSFC's program funding. The funding of General Program is about 600 thousand Yuan, the funding of Key Program is about 3 million Yuan, the funding of Young Scientists Fund is about 230 thousand Yuan, the funding of Fund for Less Developed Regions is about 360 thousand Yuan, the funding of Fund for Less Developed Regions is about 430 thousand Yuan, the funding of Excellent Young Scientists Fund is about 1.3 million Yuan, the funding of National Science Fund for Distinguished Young Scholars is about 3.5 million Yuan, and the funding of International (Regional) Cooperation and Exchange Program is about 430 thousand Yuan. The ranking of the total amount of funding of 31 provinces in 2017 is shown in Table II.

TABLE II. THE RANKING OF TOTAL AMOUNT OF FUNDING OF 31 PROVINCES IN 2017 (THOUSAND YUAN)

	Province	General	Key	Young	Less Developed	Excellent	Distinguished	International	Total
1	Beijing	2006413	593650	527538	0	136500	265650	13860	3543611
2	Shanghai	1221099	264850	313029	0	62400	128450	6300	1996128
3	Jiangsu	1095070	207080	448809	0	45500	49000	9540	1854999
4	Guangdong	883739	135260	360243	0	31200	21000	5400	1436842
5	Hubei	708402	112330	259039	3190	33800	40950	7920	1165631
6	Shaanxi	518705	95000	231313	11050	19500	17500	2160	895228
7	Zhejiang	519512	78780	199116	0	33800	31500	3600	866308
8	Shandong	460980	66490	232373	0	18200	3500	1260	782803
9	Sichuan	379510	57370	176265	390	13000	8400	2700	637635
10	Liaoning	367595	46400	143695	0	16900	17500	2160	594250
11	Hunan	334065	50250	136191	7620	9100	17500	720	555446
12	Anhui	280090	39520	111294	0	32500	31500	2880	497784
13	Tianjin	280430	43750	107659	0	20800	8400	1080	462119
14	Heilongjiang	273980	30810	81155	0	5200	7000	0	398145
15	Fujian	238400	35180	92909	0	9100	3500	540	379629
16	Jilin	227750	21740	70934	14515	13000	14000	180	362119
17	Chongqing	229120	23820	97847	0	1300	7000	0	359087
18	Yunnan	73410	24430	31796	175050	2600	3500	0	310786
19	Jiangxi	41210	3000	36247	217285	0	3500	360	301602
20	Gansu	122110	30350	43655	92510	9100	0	0	297725
21	Henan	158740	3000	131751	0	1300	0	0	294791
22	Guangxi	27030	3050	20020	148815	0	0	0	198915
23	Xinjiang	22990	2800	12450	119140	1300	0	0	158680
24	Guizhou	27640	3000	17701	102190	0	0	0	150531
25	Hebei	87590	3000	43041	0	1300	0	0	134931
26	Shanxi	64280	8790	52604	0	1300	0	360	127334
27	Inner Mongolia	12300	0	7081	84925	0	0	0	104306
28	Hainan	16710	0	10805	40810	0	0	0	68325
29	Ningxia	3420	0	2470	50875	0	0	0	56765
30	Qinghai	2950	3300	3670	18405	0	0	0	28325
31	Xizang	660	0	0	8430	0	0	0	9090
Total		10685900	1987000	4002700	1095200	518700	679350	61020	19029870

Source: Summarized from 2017 statistical data of NSFC approved programs.

It can be found that, the ranking of Table II is similar to that of Table I. Only a few neighboring provinces have exchanged their ranking. Beijing is the biggest winner again, and totally gets 3.54 billion Yuan from NSFC, account 18.62% of the total funding. The total amount of Shanghai and Jiangsu is very similar, and the total amount funding of top five provinces is 9.98 billion Yuan, account over half of the total country.

Since Xizang only has 1 General Program and 22 Fund for Less Developed Regions Programs and none of other types of program, the total amount of funding is only 9.09 million. It is even lower than any of the top 300 universities or institutions of mainland China. In 2017, NSFC's funding to Beijing is 390 times that of Xizang. Due to long-term accumulation, the gap between provinces will be bigger and bigger.

The visualization of the total amount of funding of Mainland China in 2017 is shown in Figure 2. The funding is divided into four groups, over 1 billion, 501 million to 1 billion, 201 million to 500 million, and less than 200 million, the map is very

similar as Figure 1, only one province's color (Guangxi) has been changed. So the conclusion is also similar.

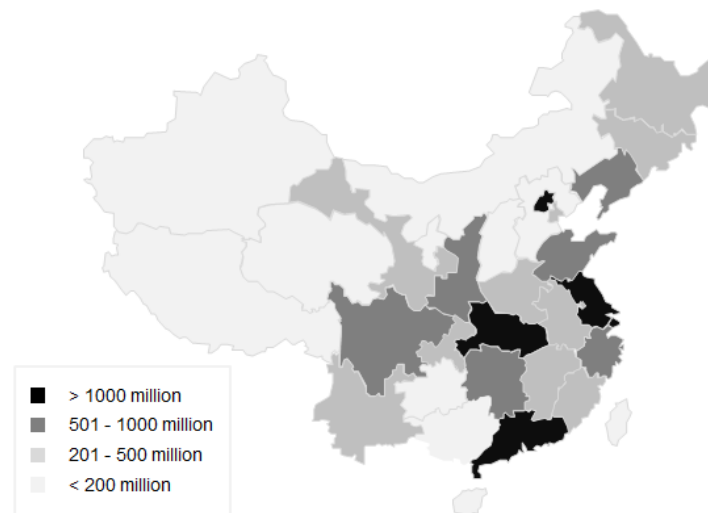


Fig.2 The visualization of total amount of funding of Mainland China in 2017

#### IV. SUGGESTIONS FOR REDUCING REGIONAL DISPARITIES

Regional differences exist objectively, but the gradual expansion of the gap will lead to adverse consequences. The central government should take various measures to reduce the gap. First, NSFC should increase in the number of programs and tilting towards backward areas. Secondly, the Ministry of education should encourage outstanding universities to help other universities or build sub-campus areas in backward areas. Some universities should move from one area to another. Third, NSFC should reduce funding for high-funding programs and give more opportunities to young scientists. Finally, NSFC should further expand the scale of the Fund for Less Developed Regions and provide more funding. China should narrow the gap between the provinces, not expand. Only in this way can be the country's all-round development be realized.

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