Analysis of projects funded by the National Natural Science Foundation of China during the years of 2014–2018

Yihong Liu, Zhenyu Gao, Hao Wang, Jianbin Wang, Jie Shen, Changrui Wang

1National Natural Science Foundation of China, Beijing 100085, China; 2Department of Thoracic Surgery, Zhongshan Hospital, Fudan University, Shanghai 200032, China; 3Academy of Science & Technology, Zhejiang University of Technology, Hangzhou 310014, China

Contributions: (I) Conception and design: Y Liu, H Wang; (II) Administrative support: Z Gao, C Wang; (III) Provision of study materials or patients: Y Liu, Z Gao, H Wang; (IV) Collection and assembly of data: J Wang, J Shen, C Wang; (V) Data analysis and interpretation: Y Liu, H Wang, J Wang; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Hao Wang, MD. Division of Thoracic Surgery, Zhongshan Hospital, Fudan University, 180 Fenglin Rd, Shanghai 200032, China. Email: wang.hao@zs-hospital.sh.cn.

Background: The National Natural Science Foundation of China (NSFC) plays an important role in supporting scientific research. And numerous scientists and researchers are concerned about the applications and funding.

Methods: Annual reports of 2014–2018 were searched respectively from the NSFC official website. Further analysis was made to discover the regularity and tendency of projects funded by NSFC.

Results: The funding by NSFC continuously increased rapidly since its establishment. Recently, the annual amount, which is still on the rise, has reached more than 20 billion CNY. From the year 2014 to 2018 multifarious projects types were set up by NSFC to support scientific research of different level and multiple dimensions.

Conclusions: In the past years, NSFC had provides strong support to basic scientific research in all fronts and provided a mechanism for fair competition.

Keywords: National Natural Science Foundation of China (NSFC); fund

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Introduction

The National Natural Science Foundation of China (NSFC) was established on February 14, 1986. It is an institution managed by the Ministry of Science and Technology of China, tasked with the administration of the National Natural Science Fund from the Central Government. Since its establishment, NSFC has comprehensively introduced and implemented a rigorous and objective merit-review system to fulfill its mission of supporting basic research, fostering talented researchers, developing international cooperation and promoting socioeconomic development (1). With the support from NSFC and other scientific programs, remarkable growth has been registered in different scientific fields. In 2017, 64.54% of SCI papers published by Chinese researches noted the statement of funding from NSFC.

Due to the important role of NSFC for the support of scientific research, it is widely concerned and focused by numerous scientists and researchers. Therefore, we conducted this study to analyze the projects funded by NSFC during the past 5 years of 2014–2018.

Methods

The annual reports of 2014–2018 were respectively searched from the NSFC official website (2-6). Further analysis was made to discover the regularity and tendency.
Results

Overall condition

The funding by NSFC continuously increased rapidly since its establishment, owing to the allocation mainly from the Central Government budget, as well as partly form the local governments and large state-owned enterprises (7). Recently, the annual amount has reached more than 20 billion CNY which is still on the rise (Figure 1).

Projects types and proportions

From 2014 to 2018, multifarious projects types were set up by NSFC to support scientific researches of different level and multiple dimensions. The proportions of each project type is shown in Figure 2.

Detailed information of project types

General Program

The General Program supports scientists to do basic research on bottom-up based topics within the funding scope of NSFC to conduct innovative research and promote a balanced, coordinated and sustained development of all disciplines.

From 2014 to 2018, NSFC received 379,156 applications and funded 85,726 General Program projects. The detailed

Figure 1 The annual amount of funding by NSFC from 2011 to 2018 (billion CNY). NSFC, The National Natural Science Foundation of China.

Figure 2 The proportions of each project type funded by NSFC during 2014–2018. NSFC, The National Natural Science Foundation of China.
Young Scientists Fund
The Young Scientists Fund supports young scientists to freely choose their research topics within the funding scope of NSFC to conduct basic research, fosters the ability of young scientists to independently undertake research projects and conduct creative research, stimulates young scientists’ creative thinking and trains backup talents for basic research.

From 2014 to 2018, NSFC received 365,374 applications and funded 83,882 projects. The detailed information of each year is shown in Table 2.

Fund for Less Developed Regions
The Fund for Less Developed Regions supports scientists in specified regions of China to conduct creative research within the funding scope of NSFC, so as to foster and support researchers in the regions, to stabilize and gather outstanding talents to facilitate the construction of the regional innovation system as well as the social and economic development of the regions.

From 2014 to 2018, NSFC received 74,191 applications and funded 14,406 projects. The detailed information of each year is shown in Table 3.

Excellent Young Scientists Fund
The Excellent Young Scientists Fund supports young scholars with good achievements in basic research to conduct innovative research in areas on their own choice, so as to promote fast growth of creative young talents and foster a number of outstanding talents on the international science frontiers.

From 2014 to 2018, NSFC received 21,535 applications and funded 1,999 projects. The detailed information of each year is shown in Table 4.
and funded 991 projects. The detailed information of each year is shown in Table 5.

**Key Program**

The Key Program supports researchers to conduct in-depth, systematic and innovative research in directions with sound research basis or where new growth points of scientific disciplines might emerge, so as to promote disciplinary development and breakthroughs in important areas or scientific frontiers. Key Program projects should follow the principle of limited objectives, limited research scope and focused goals, pay attention to inter-crossing disciplines, make effective use of existing major scientific research bases at national and ministerial levels, and conduct substantive international cooperation and exchange.

From 2014 to 2018, NSFC received 14,988 applications and funded 3,210 projects. The detailed information of each year is shown in Table 6.

**Major Program**

Major Program serves the major needs of the scientific frontiers, national economic, social and S&T development and national security, deploys in advance, conducts multidisciplinary research, and plays the supporting and guiding role of improving the capability of indigenous innovation in China’s basic research.

From 2014 to 2018, NSFC received 242 applications and funded 142 projects. The detailed information of each year is shown in Table 7.

**Projects of Major Research Plan**

The Major Research Plan focuses on key basic scientific issues with strategic importance to the nation and major frontier areas and gives high priority identified on the basis of the capability and advantages in the country. Rather than individual project, the Major Research Plan is designed to be a program cluster which contains a number of projects with relatively identical objectives for innovative research resources integrity in order to explore the possible breakthroughs in the identified areas.

From 2014 to 2018, NSFC received 13,212 applications and funded 2,515 projects. The detailed information of each year is shown in Table 8.
Science Fund for Creative Research Groups

The Science Fund for Creative Research Groups supports prominent middle-aged and young scientists to work as academic leaders and PIs on creative research focusing on key research issues, and fosters research groups with international influence.

From 2014 to 2018, NSFC received 1,332 applications and funded 329 projects. The detailed information of each year is shown in Table 9.

Basic Science Center Program

The Basic Science Center Program expects to concentrate and integrate domestic excellent scientific research teams. Aiming at the international forefront of science, this project will give long-term and stable support for those high-level academic leaders to do concentrated research and exploration. With the advanced deployment, this project is expected to reach scientific frontier breakthrough and harvest a series of outstanding original achievements with...
From 2016 to 2018, NSFC received 30 applications and funded 11 projects. The detailed information of each year is shown in Table 10.

### Joint Funds

The Joint Funds set up by NSFC and other relevant government departments, provincial governments and industrial sectors aim at supporting basic research in agreed scientific areas. The joint funds are designed to play a guiding role of the National Natural Science Fund, guide and integrate social resources in basic research, promote cooperation of relevant departments, industries and regions with universities and research institutions, foster scientific and technological talents and enhance China’s indigenous innovation capabilities in relevant research areas, industries and regions.

From 2014 to 2018, NSFC received 22,090 applications and funded 3,644 projects. The detailed information of each year is shown in Table 11.

### Joint Research Fund for Overseas Chinese Scholars and Scholars in Hong Kong and Macao

In order to take advantage of the overseas (including Hong Kong and Macao) resources in science and technology and encourage overseas excellent young scholars to contribute to the development of basic research in mainland China, NSFC sets up the Joint Research Fund for Overseas Chinese Scholars and Scholars in Hong Kong and Macao to support excellent overseas (including Hong Kong and Macao) Chinese scholars under the age of 50 to conduct high-level joint research with scientists in mainland China.

From 2014 to 2018, NSFC received 1,993 applications and funded 658 projects. The detailed information of each year is shown in Table 12.
Table 13: International (Regional) Cooperation Research Programs projects

<table>
<thead>
<tr>
<th>Year</th>
<th>Numbers of applications</th>
<th>Numbers of awards</th>
<th>Average funding (thousand CNY)</th>
<th>Success rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>1,124</td>
<td>225</td>
<td>2,360</td>
<td>20.0</td>
</tr>
<tr>
<td>2015</td>
<td>1,288</td>
<td>276</td>
<td>2,168</td>
<td>21.4</td>
</tr>
<tr>
<td>2016</td>
<td>2,118</td>
<td>356</td>
<td>2,222</td>
<td>16.8</td>
</tr>
<tr>
<td>2017</td>
<td>2,733</td>
<td>489</td>
<td>1,984</td>
<td>17.9</td>
</tr>
<tr>
<td>2018</td>
<td>3,198</td>
<td>430</td>
<td>1,940</td>
<td>13.4</td>
</tr>
<tr>
<td>Total</td>
<td>10,461</td>
<td>1,776</td>
<td>2,098</td>
<td>17.0</td>
</tr>
</tbody>
</table>

Table 14: International (Regional) Exchange Programs projects

<table>
<thead>
<tr>
<th>Year</th>
<th>Numbers of applications</th>
<th>Numbers of awards</th>
<th>Average funding (thousand CNY)</th>
<th>Success rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>1,538</td>
<td>746</td>
<td>90</td>
<td>48.5</td>
</tr>
<tr>
<td>2015</td>
<td>1,207</td>
<td>384</td>
<td>129</td>
<td>31.8</td>
</tr>
<tr>
<td>2016</td>
<td>1,472</td>
<td>583</td>
<td>130</td>
<td>39.6</td>
</tr>
<tr>
<td>2017</td>
<td>1,585</td>
<td>531</td>
<td>94</td>
<td>33.5</td>
</tr>
<tr>
<td>2018</td>
<td>1,807</td>
<td>601</td>
<td>118</td>
<td>33.3</td>
</tr>
<tr>
<td>Total</td>
<td>7,609</td>
<td>2,845</td>
<td>110</td>
<td>37.4</td>
</tr>
</tbody>
</table>

Table 15: Research Fund for International Young Scientist

<table>
<thead>
<tr>
<th>Year</th>
<th>Numbers of applications</th>
<th>Numbers of awards</th>
<th>Average funding (thousand CNY)</th>
<th>Success rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>154</td>
<td>107</td>
<td>187</td>
<td>69.5</td>
</tr>
<tr>
<td>2015</td>
<td>205</td>
<td>107</td>
<td>262</td>
<td>52.2</td>
</tr>
<tr>
<td>2016</td>
<td>250</td>
<td>117</td>
<td>256</td>
<td>46.8</td>
</tr>
<tr>
<td>2017</td>
<td>413</td>
<td>155</td>
<td>290</td>
<td>37.5</td>
</tr>
<tr>
<td>2018</td>
<td>652</td>
<td>140</td>
<td>321</td>
<td>21.5</td>
</tr>
<tr>
<td>Total</td>
<td>1,674</td>
<td>626</td>
<td>268</td>
<td>37.4</td>
</tr>
</tbody>
</table>

(Regional) Cooperation and Exchange Programs aim at funding Chinese scientists to conduct substantial cooperation with their international collaborators in science frontiers and leverage international scientific and technological resources on the basis of “equal cooperation, mutual benefits, and equal sharing of research results”. This program consists of three subtypes: International (Regional) Cooperation Research Program, International (Regional) Exchange Programs, and Research Fund for International Young Scientist.

The detailed information of each subtype is shown in Tables 13-15.

Special Fund for Research on National Major Research Instruments

The Special Fund for Research on National Major Research Instruments aims to encourage and foster the exploratory research and development of instruments with creative ideas, and major research instruments and equipment with original creative ideas, which should be based on frontiers of science and national needs and guided by scientific targets, so as to provide new means and tools for scientific research and enhance indigenous innovation in China. This program could be applied independently or by the recommendation of scientific administrative departments.
From 2014 to 2018, NSFC received 3,357 applications and funded 423 projects. The detailed information of each year is shown in Table 16.

**Tianyuan Fund for mathematics**

Tianyuan Fund for mathematics is a special fund designed to integrate collective wisdom of mathematicians, explore funding method that suits the unique features of mathematics, and make China strong in mathematics. This fund supports researchers to conduct research according to the features and need of mathematics department, foster young talents, promote academic exchange, optimize research environment, disseminate mathematical culture and thus strengthening innovation for China in mathematics.

From 2014 to 2018, NSFC received 2,916 applications and funded 933 projects. The detailed information of each year is shown in Table 17.

**Conclusions**

In the past years, NSFC had provided strong support to basic scientific research in all fronts and provided a mechanism for fair competition. In the future, NSFC will stress on the development of the following aspects including innovative research, talents cultivation, international cooperation and management of excellence. NSFC expects to be a key contributor to the progress and prosperity of the basic research of China, and meanwhile to grow along with it.

**Acknowledgments**

None.

**Footnote**

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

**References**

2. NSFC Annual report in 2014. NSFC official website.
4. NSFC Annual report in 2016. NSFC official website.
5. NSFC Annual report in 2017. NSFC official website.