

Research on the International Academic Influence of the Police of Building World-Class University in China

-- Based on the Difference-in-Difference Model

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Abstract: According to China's "Double First-class" construction, the first round of world-class university construction started in 2016, aiming to promote a number of high-level universities into the world first-class ranks, and accelerate the modernization of higher education governance system and governance capacity. By 2020, the first round of the construction has been completed. Whether the policy of world-class universities has achieved the above goals under the promotion of the central and local departments has become an issue of widespread concern in the society. Therefore, this paper collects the relevant data of the world-class universities in 2015 to 2020 and 42 international universities not affected by the policy. Based on the difference-in-difference model, the policy effect is evaluated from the perspective of the international academic influence of the universities. It is found that the policy of world-class universities has a significant role in promoting the international academic influence of universities, especially in the influence of high-level papers and citation.

Keywords: Construction Policy of First-class University; International Academic Influence of University; Difference-in-difference Model.

1. Introduction

Higher education is an important part of China's education cause, and the main force of national scientific research development and personnel training. Over the years, through the implementation of "211 project" "985 project" and "advantage discipline innovation platform" and "characteristic key subject project" key construction, a number of key universities and disciplines have made significant progress, which has also made important contributions to the sustainable and healthy economic and social development. But this series of construction policy also gradually show the gap with the construction of higher education power requirements, so the State Council issued in 2015 the "promote the world-class university and first-class discipline construction overall plan" (hereinafter referred to as the "overall plan"), file points out to 2020 several universities and a batch of disciplines into the world ranks of the first stage, and to improve the international competitiveness of higher education and voice, establish a good brand and image of Chinese university. In addition, the Evaluation Method for the Effectiveness of "Double First-class" Construction (Trial) released in 2021 also takes the effectiveness of continuously enhancing international influence as one of the evaluation priorities. The "Double First-class" construction policy attaches great importance to the international influence of universities, so the international academic influence of universities has become an important content to measure the effectiveness of the policy construction. In this context, based on the difference-in-difference model, this paper empirically analyzes the effect of the construction policy of world-class universities from the perspective of international academic influence of universities, to provide reference for the effectiveness of the first round of world-class universities, and provide suggestions for the next round of construction.

2. Literature Review

The systematic research on the construction of "Double First-class" was started after the release of the Overall Plan in 2015. With the implementation of the policy, there has been abundant research. At the beginning of the policy release, the research is mainly on the theoretical interpretation of policy connotation and the development path. For example, Zhong Binglin suggested that the important foundation and basic feature of building a world-class university and first-class disciplines are first-class undergraduate education [1]. Pan Jing believes that the core of the "Double First-class" construction is the construction of first-class disciplines, and analyzed the action framework under this guidance [2]. In addition, there are studies on the construction target [3], construction idea [4,5] and promotion strategy [6].

With the implementation of the first round of "double first-class" construction, scholars began to study more on the basis of practice. On the one hand, it is about the study of individual behaviors of local governments and universities. For the study of the government including the local government to promote the construction of the "Double First-class" measures and policies under the influence of the government behavior and so on. Such as Yang Xitong analyzed under the "Double First-class" construction policy of local government expansion type and risk, and found that the excessive expansion of local government autonomy led to the macro-control failure of the central government; Local protectionism prevails in higher education, and universities lack autonomy in the process of running schools facing the society [7]. The research of universities includes talent training, curriculum reform and discipline construction, such as Wang Chuanyi and other "Double First-class" construction universities based on the basis of disciplines, so as to promote the classified development of colleges and universities [8].

On the other hand, the research from the perspective of

policy is mostly analyzed by relevant research from the perspective of policy tools and policy texts. Such as the two-dimensional framework based on policy tools and policy topics [9,10]; research on the "Double First-class" policy released by provincial governments. In addition, with the completion of the first round of construction, the evaluation of the "Double First-class" construction policy effectiveness has gradually become a research hotspot, or proposing a realistic policy dilemma and evaluation direction based on theoretical analysis[11,12], or conducting empirical analysis of policy-related results based on data [13,14].

Based on the above analysis, the connotation, development path and policy text have been well studied in the research of "Double First-class" construction policy. However, there are relatively few policy assessment studies, especially the lack of policy effect assessment from a specific perspective. Therefore, this paper chooses to further evaluate the effect of the world-class university construction policy in the "Double First-class" construction policy from the international academic influence side of universities.

3. Theoretical Analysis and Research Hypothesis

The construction of world-class universities and first-class disciplines is another important strategic decision in the higher field after the "211 Project" and the "985 Project". In the programmatic document "Overall Plan", relevant support measures are specified: the central and local governments will support the construction of world-class universities by means of special funds and local financial overall arrangements respectively. In addition to the special fund support, there are other system support. For example, Li Chunlin summarized through the analysis of the Chinese provincial "double first-class" policy text: talent training, scientific research, exchange and cooperation, system and mechanism and other supporting measures [15].

First of all, the financial support provides material guarantee for the development of scientific research in universities. In the construction of world-class universities, in addition to the support of central or local financial special funds, there are also social donations. In the first round of construction, the annual total revenue of central colleges and universities reached 281.04 billion yuan, and the revenue of local colleges and universities reached 670.778 billion yuan. The support of these funds better guarantees the scientific research funds and related facilities construction of universities, and provides a better environment for the academic research of teachers and students, which can directly promote the publication of high-quality papers.

Secondly, the support of talent training and scientific research is the most direct attraction. The support of talent training and scientific research includes the support of first-class teachers and related education and teaching reform support. In terms of university teachers, there are relevant supporting policies and measures to introduce or cultivate outstanding teachers. In the education and teaching reform, there are also relevant systems to support the reform and innovation of training programs and courses, which all directly affect the high-quality development of talent training in these universities. All of the above measures have greatly affected the academic output and influence of universities in the international community.

Finally, the international cooperation and the relevant

institutional mechanism provide the institutional guarantee for the university to go international. Such as building a communication platform, strengthen the system and mechanism management and innovation. It provides a solid platform for the international cooperation of universities and promotes the sustainable development. At the same time, there is a clear system and mechanism guidance, which also provides a guarantee for the international development of academic research in universities, so that universities have more motivation and confidence to stand in the international development.

To sum up, this paper proposes hypothesis: the construction policy of world-class universities improves the international academic influence of the selected universities.

4. Research Design

4.1. Sample Selection and Data Source

The relevant data of the first round of world first-class universities from 2015 to 2020 were selected, some universities with missing data were excluded, and 20 first-class universities were finally taken as the experimental group. At the same time, 42 universities were selected as control groups in other countries, and some missing data were removed, resulting in 340 observed values. The data in this paper are all from InCites database and Qingta Panorama Cloud data platform.

4.2. Definition of Variables

Dependent variable: international academic influence. At present, there is no consistent standard for the definition of international academic influence. However, with the rapid development of higher education in China in recent years, the word has been mentioned more and more frequently, and its research has been gradually deepened. In the research on the international academic influence of Chinese universities, Li Zhimin put forward the scientific research related indicators in ESI database, including "scientific research productivity, scientific research influence, scientific research innovation, and scientific research development power" [16]. In the study of the influence of "985 Project", "publication of international academic journals, participation in international academic conferences and absorption of international students" as the three objective indicators to measure the international academic influence of universities [17]. Finally, this research selects the indicators that comprehensively reflect the internationalization and scientific research level: Web of Science Number of papers, international cooperation papers proportion, high level papers, citation influence, high cited papers to measure the international academic influence of universities.

Explanatory variables: This article selects the implementation time of the first round of world-class university construction policy as the dummy variable $post_t$, and sets the dummy variable $treat_i$ for the universities selected for the first round of world-class university construction. The core explanatory variable is the interaction item of the policy time dummy variable and the university dummy variable, $D_{i,t} = post_t \times treat_i$, to measure the effect of the construction policy of the first-class university.

Control variables: Referring to existing research, three variables related to the outcome variables were selected as control variables. The first is the "scientific research reputation" of scientific research factors, which directly

affects the academic level of universities. The scientific research reputation in incite database is horizontally comparable in the world. Secondly, it is "talent training", the key factor affecting the academic achievements and international influence of universities. As the core goal in the construction of first-class universities, talent training requires the joint role of students and teachers to cultivate high-quality talents. If the teacher-student ratio cannot meet certain

standards, it will affect the role played. The third is "internationalization of teachers". Some studies have found that in the implementation process of the "Double First-class" policy, the international influence of universities can improve by adjusting the internationalization level of the teaching staff [18]. Therefore, the three control variables were selected comprehensively, and the specific variables are defined as shown in Table 1 below.

Table 1. Variable Definition

Type of Variable	Variable Name	Variable Symbol	Variable Declaration
Dependent Variable	Number of papers published in WOB	Inpapers	The log of the number of papers in web of science
	International academic exchanges	Coper	Percentage of published papers with international co-authors
	High level paper	High-level	The ratio of the top 1% of the most cited papers to the total number of papers
	Citation influence	Influ	Mean frequency of paper citations
Explanatory Variable	High cited paper	High-cited	Top 1% number of papers cited by field and year of publication
	Policy effect	$D_{i,t}$	Whether the university is selected into the list of world first-class universities
Controlled Variable	Scientific research factors	Fame	Global research reputation
	Internationalization of teachers	Internation	The proportion of international teaching staff in all teaching staff
	Talent training factors	Students	The ratio of the teaching staff to the number of students

5. Measurement Model

As the main method of policy evaluation, the difference-in-difference model has been widely used in the field of public policy. In order to test whether the construction policy of world-class universities has improved the international academic influence of the selected universities, this paper uses the difference-in-difference model for the test. At the same time, through the Houseman test, the results show that Probchi2 =0.0000 so the fixed effect model is selected. Referring to the study of Yu Minggui et al. [19], the following model was established finally:

$$Y_{i,t} = \beta_0 + \beta_1 D_{i,t} + \beta_2 treat_i + \beta_3 post_t + \beta_4 control_{i,t} + Id + Year + \varepsilon_{i,t}$$

Among them, $Y_{i,t}$ is the dependent variable, representing the international influence of universities. $treat_i$ is the dummy variable for first-class universities, with 1

representing the experimental group: universities selected for world-class university construction; 0 representing the control group: universities not selected for world-class university construction. $post_t$ is the dummy variable of policy time, referring to Ma Junfeng's research, the release time of the first round of "Double First-class" construction list is taken as the policy implementation point [22], with 1 representing before policy implementation and 0 representing after policy implementation. $D_{i,t}$ is the product of $treat_i$ and $post_t$, and its coefficient reflects the policy effect. $control_{i,t}$ is a control variable group, where $Year$ and Id represent time fixed effects and industry fixed effects, respectively. β_0 is the intercept term, $\varepsilon_{i,t}$ is the random perturbation term.

6. Result Analysis

6.1. Descriptive Statistics

Table 2. Descriptive Statistics

variable	observations	mean	standard deviation	Q1	median	Q3	min	max
$D_{i,t}$	340	0.226	0.419	0.000	0.000	0.000	0.000	1.000
Inpapers	340	8.134	0.948	7.323	8.196	8.863	6.263	9.985
Coper	340	0.423	0.122	0.310	0.460	0.520	0.160	0.640
High-level	340	0.024	0.008	0.020	0.020	0.030	0.010	0.040
Influ	340	19.530	6.579	14.790	18.940	24.550	2.843	36.080
High-cited	340	83.840	88.420	20.000	53.000	113.000	0.000	464.000
Internation	340	48.190	10.840	40.620	46.200	53.860	26.060	92.770
Students	340	72.580	22.820	55.210	79.970	92.040	22.520	99.950
Fame	340	14.440	22.220	2.095	6.124	14.370	0.226	99.950

Table 2 shows the descriptive statistics of the variables. The minimum value of the number of international journal articles published in the sample is 6.263, the maximum value is 9.985, and the standard deviation is 0.948. This indicates that there is a significant difference in the number of international journal articles published by sample universities between

2015 and 2020. International academic exchange reflects the international cooperation of published papers, with a standard deviation of 0.122 and a mean of 0.423, indicating that the proportion of international cooperation in the sample university papers is relatively small and the difference is not significant. The standard deviation of a high-level paper is

0.008, and the difference between samples is smaller, which is also consistent with the actual situation of publishing high-level papers. The minimum value in highly cited papers is 0, and the maximum value is 464, indicating that some universities in the sample do not have highly cited papers, which is very different from the maximum value. In terms of controlling variables, there are significant differences in internationalization, talent cultivation, and scientific research factors among the sample universities in terms of comprehensive standard deviation and maximum value.

6.2. DID Estimation Results

The results of DID estimation are shown in Table 3 below. The interaction terms $D_{i,t}$ in (1)-(5) have R2 values above 0.9, except for (3) which is above 0.7, indicating that the model has a good fitting effect. At the same time, the interaction terms are also significant, indicating that the implementation of world-class university construction policies has significantly promoted the international academic influence of first-class university construction universities. Specifically, in terms of the number of publications in international journals, compared to the control group universities that were

not implemented, the implementation of the world-class university construction policy increased the number of experimental group universities by $e^{0.16}$, which is 1.17, and is significant at the 1% level. From the perspective of international academic exchange, the estimated policy effect is 0.028, which is also significant at the 1% level, indicating that the international academic exchange of universities selected for world-class university construction is 0.028 higher than that of the control group universities during the policy implementation period. From the DID results of high-level paper quantity, citation influence, and high cited paper quantity as the dependent variables, the interaction coefficient coefficients are 0.004, 2.597, and 44.029, respectively, indicating that universities affected by world-class university construction policies are higher than those unaffected in all three aspects, and are all significant at the 1% level. In summary, during the first round of first-class university construction, the international academic influence of the sample universities has significantly increased, indicating that the implementation of policies for world-class university construction has produced good results.

Table 3. Estimated Results

	(1)	(2)	(3)	(4)	(5)
	lnpapers	Coper	High-level	Influ	High-cited
$D_{i,t}$	0.162***	0.028***	0.004***	2.597***	44.029***
	(0.018)	(0.006)	(0.001)	(0.636)	(4.851)
Treat	1.075***	0.080***	-0.002	-0.936	79.471***
	(0.074)	(0.024)	(0.006)	(2.559)	(19.512)
Post	0.249***	0.088***	0.002*	-12.805***	29.896***
	(0.014)	(0.005)	(0.001)	(0.491)	(3.744)
Internation	0.001	0.000	0.000	0.016	0.076
	(0.001)	(0.000)	(0.000)	(0.038)	(0.288)
Students	0.002***	0.000	0.000	0.055**	-0.024
	(0.001)	(0.000)	(0.000)	(0.022)	(0.170)
Fame	0.002	0.001*	0.000	0.052	1.063***
	(0.001)	(0.000)	(0.000)	(0.040)	(0.306)
Constant	7.757***	0.481***	0.016***	20.071***	25.641
	(0.081)	(0.026)	(0.006)	(2.775)	(21.164)
Time fixed effect	Yes	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes	Yes
N	340	340	340	340	340
R ²	0.996	0.976	0.703	0.907	0.970

Note: *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively. The standard error is indicated in parentheses, and the table below is the same as this one.

6.3. Robustness Check

Table 4. Robustness Test

	(1)	(2)	(3)	(4)	(5)
	lnpapers	Coper	High-level	Influ	High-cited
$D_{i,t}$	0.113***	0.031***	0.002	1.037	37.852***
	(0.027)	(0.008)	(0.002)	(0.878)	(7.077)
Internation	-0.000	-0.000	0.000	-0.002	-0.282
	(0.001)	(0.000)	(0.000)	(0.039)	(0.312)
Students	0.003***	-0.000	0.000	0.073***	0.131
	(0.001)	(0.000)	(0.000)	(0.023)	(0.185)
Fame	0.003***	-0.001**	0.000	0.088**	1.430***
	(0.001)	(0.000)	(0.000)	(0.041)	(0.329)
Constant	7.743***	0.472***	0.015**	19.073***	28.669
	(0.091)	(0.027)	(0.007)	(2.937)	(23.678)
Time fixed effect	Yes	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes	Yes
N	340	340	340	340	340
R ²	0.995	0.976	0.696	0.901	0.964

The table below shows a robustness test. The robustness of the effect of first-class university construction policies on the international academic influence of universities was tested. The control group and experimental group were changed for counterfactual testing, and the starting year of policy implementation was changed to 2016 before returning. From the robustness test conducted using this method, it can be seen that the interaction terms of (3) and (4) are not significant, indicating that the detection effect of high-level papers and citation influence is good. However, other factors may be affected by some accidental factors, which may not explain the policy effect well.

7. Conclusion and Recommendations

7.1. Conclusion

This article collected relevant data from 2015 to 2020, with world-class university construction as the experimental group and 42 international universities as the control group. Based on a difference-in-difference model, the policy effects of world-class university construction policies on the international academic influence of universities were analyzed. Through empirical analysis of the 340 observations obtained through the final screening, the research results found that the construction policies of world-class universities have a significant promoting effect on the international academic influence of universities, especially in the promotion of high-level papers and citation influence, which are more stable. The number of published papers and international academic exchanges, as well as the number of highly cited papers, may not have passed the robustness test of counterfactual evidence due to the length of data and processing issues, which is also the shortcomings of this article.

7.2. Suggestion

Firstly, we should focus on international cooperation and exchange, and strengthen substantive cooperation with world-class universities and academic institutions. When measuring the international academic influence of universities, international communication ability is one of the key factors, and in the construction of world-class universities, the improvement of ability still focuses on universities. To maintain long-term cooperation and exchange with international universities or institutions, it is necessary to build a good platform, improve management systems, and enhance the level of cooperation. Under this, actively utilizing high-quality educational resources from abroad and combining them with our own development needs, promoting the spirit of innovation, and creating unique competitive advantages can promote sustained high-quality development. Secondly, universities should actively participate in or lead the organization of major international and regional scientific plans and projects, or participate in the formulation of international education rules, increase their influence internationally, effectively improve the international competitiveness and discourse power of China's higher education, establish a good brand and image of Chinese universities, and promote Chinese universities to enter the international academic center.

Secondly, promote both introduction and education, and strengthen the construction of the teaching staff. The quality of the teaching staff in universities is related to the cultivation

and development of young talents. Universities should first increase their efforts to cultivate their own advantages in teaching staff, especially in cultivating young teachers. We need to break away from the concept and practice of seniority, support the development of young teachers in all aspects, and promote the improvement of their abilities. At the same time, it is necessary to improve security measures from institutional and material aspects, increase incentives, and retain outstanding talents. In addition, we should actively introduce first-class scientists, discipline leaders, and innovative teams who are active at the forefront of international academia and meet the major strategic needs of the country, gather outstanding talents from around the world, and provide faculty support for the academic development and scientific research of universities.

Thirdly, highlight the core position of talent cultivation and promote the development of students' comprehensive abilities. In international academic influence, the academic and research strength of universities is valued, and students are the most solid foundation. Therefore, universities should improve their talent training programs, especially focusing on the development of students' comprehensive abilities, breaking away from the only fraction theory, and strengthening the cultivation of scientific research ability, practical ability, and innovation ability. At the same time, in talent cultivation, universities also pay attention to international development trends, vigorously cultivate high-precision and urgent talents in key fields, and explore the establishment of a new mechanism for cultivating high-level composite talents with strong political skills, urgent industry needs, and outstanding abilities. Especially in recent years, it has been advocated both domestically and internationally to promote the growth of composite talents through interdisciplinary training mechanisms, thereby enhancing the influence of academic research.

References

- [1] Zhong Binglin, Fang Fang. First class undergraduate education is an important connotation of "Double First Class" construction. *Chinese University Teaching*. 2016, No. 04, p. 4-8.
- [2] Pan Jing The Connotation and Action Framework of "Double First Class" Construction. *Jiangsu Higher Education*. 2016, No. 05, p. 24-27.
- [3] Bie Dunrong. On the Construction of "Double First Class". *China Higher Education Research*. 2017, No. 11, p.7-17.
- [4] Zhou Guangli The Triple Breakthroughs of "Double First Class" Construction: System, Management, and Technology. *University Education Science*. 2016, No. 04, p. 4-14+122.
- [5] Hong Dayong. Vigorously Strengthening Undergraduate Talent Training in the Construction of "Double First Class". *Chinese University Teaching*. 2016, No. 04, p. 9-16.
- [6] Song Dan, Zeng Jianxiong, Gao Shuren, et al. New Development Concept: A New Direction for the Construction of "Double First Class". *University Education Science*. 2017, No. 04, p. 7-23.
- [7] Yang Xitong, Chen Tingzhu The types, risks, and regulations of local government autonomy expansion in the construction of "Double First Class". *Jiangsu Higher Education*. 2023, No. 02, p. 28-34+48.
- [8] Wang Chuanyi, Gu Liujuan, Yuan Jifang. Research on the Classification of Universities Based on Disciplinary

- Characteristics: A Case Study of "Double First Class" Construction of Universities. *China Higher Education Research*. 2022, No.351 (11), p. 38-44.
- [9] The Attention Allocation of Local Governments in the Construction of "Double First Class": An Analysis of NVivo Software Based on 30 Provincial Policy Texts. *Education Development Research*. 2017, 37 (21), p. 31-38.
- [10] Zhang Wei, Zhang Maocong. Comparison of inter provincial policies for the construction of "Double First Class" in China: A textual analysis based on the implementation opinions of "Double First Class" in 26 provinces. *Higher Education Management*. 2018, 12 (04), p. 19-26.
- [11] Sun Technology, Zhu Yiming The Realistic Dilemma and Beyond of the Evaluation of "Double First Class" Construction: A Theoretical Perspective of Fourth Generation Evaluation. *Fudan Education Forum*. 2021, 19 (04), p. 100-106.
- [12] Zhong Binglin, Wang Xinfeng. Several reflections on the evaluation of the effectiveness of China's "Double First Class" construction. *Higher Education Management*. 2020, 14 (04), p. 1-6.
- [13] Liu Shengbo, Luo Xiaoting, Liu Ye Does the construction of "Double First Class" promote the international academic influence of Chinese universities: an empirical study based on the PSM-DID method. *Modern Education Management*. 2023 (01), p. 55-65.
- [14] Ma Junfeng, Luo Zhimin. A Study on the Effectiveness of Policies for Building World Class Universities in China: Empirical Evidence Based on the Double Difference Model. *Higher Education Management*. 2022, 16 (02), p. 59-74.
- [15] Li Chunlin, Deng Hanyi. Quantitative Analysis of the Policy Text of "Double First Class" in Chinese Provinces. *Higher Engineering Education Research*. 2019 (04), p. 145-151.
- [16] Li Zhimin, Yang Jian'an. On the International Academic Influence of Chinese Universities. *Science and Technology of Chinese Universities*. 2015 (09), p. 4-7.
- [17] Bao Wei, Ha Wei, Min Weifang, Wu Hongbin, Wan Junting, Deng Shanglu Evaluation of the Driving Effect of the "985 Project" on the International Academic Influence of Chinese Universities. *Education Research*. 2017, 38 (09), p. 61-69.
- [18] Chen Yan, Ren Chao, Wang Qisi, et al. Exploring the Evaluation of Subject Teacher Teams under the Background of "Double First Class" Construction Degree and Graduate Education. 2017 (10), p. 55-58.
- [19] Yu Minggui, Fan Rui, Zhong Huijie. China's Industrial Policy and Enterprise Technology Innovation. *China Industrial Economy*. 2016 (12), p. 5-22.