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Research of Policy Diffusion of Innovation and Entrepreneurship Education in Universities

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Abstract: ***Strengthening innovation and entrepreneurship education in the universities is one of the key measures to promote "Widespread Entrepreneurship and Innovation". After the top-level design is completed, the effect of the university's innovation and entrepreneurship education policy mainly depends on the level of policy diffusion-the comprehensive response of each university. Taking the policy responses of 30 "Double First-Class" A-level universities in China from 2015 to 2018 as example, the factors that affect the diffusion of innovation and entrepreneurship education policies in universities are analyzed, and the empirical results show that: "tenure of principal" "subject characteristics" "support for decision making" and "response of other universities in the province (city)" have a significant impact on the response of universities. This means that the realization of a modest flow of university principals, the cultivation of innovative and entrepreneurial teaching and research talents, and the establishment of a school-school collaborative education mechanism will help to improve the degree of response to innovative and entrepreneurial education policies in universities.***

Keywords: University, Innovation and entrepreneurship education, Policy diffusion

1 Introduction

Strengthening the education of innovation and entrepreneurship in universities is an important part of Chinese innovation-driven strategy and a key measure to promote "mass innovation and entrepreneurship". In May 2015, the State Council of China issued the Implementation Opinions on Deepening the Reform of Innovation and Entrepreneurship Education in Universities, which basically established the top-level design of the reform of innovation and entrepreneurship education in colleges and universities. However, the implementation and effect of the policy ultimately depends on the comprehensive response degree of colleges and universities, that is, the speed, breadth, intensity and degree of innovation of innovative entrepreneurship education policy according to the top-level design of the country and its own characteristics [1]. The policy response of colleges and universities is essentially a kind of policy diffusion behavior, which is the process of transmission and innovation of innovation and entrepreneurship education policy in colleges and universities [2]. Therefore, this paper tries to discuss the reform of innovation and entrepreneurship education in colleges and universities in China from the perspective of policy diffusion.

2 Domestic and foreign literature review

2.1 Policy Diffusion

Policy Diffusion is the process by which a policy innovation is transferred from one region or sector to another and adopted and implemented by new policy subjects [3]. Walker emphasizes that this policy innovation is the first nature of the adopter rather than the originality of the policy itself [4]. Therefore Policy diffusion is also the process by which policies are transmitted and innovated in the social system. At present, the research on policy diffusion by domestic and foreign scholars mainly focuses on the policy diffusion mechanism and the influence factors of policy diffusion. The conclusions of the study on the policy diffusion mechanism tend to be consistent, which can be summarized as four kinds: learning mechanism, competition mechanism, imitation mechanism and coercion mechanism. However, in terms of the influence factors of policy proliferation, the conclusions of domestic and foreign scholars based on different research angles and policy practices are quite different [5].

This paper holds that the influence factors of policy diffusion can be divided from the three dimensions of micro, meso and macro. Among them, at the micro level, the actor in the policy process is the characteristics of policy entrepreneurs. At the mid-view factor level, the organizational factors and policy attribute factors as the main body of policy. At the macro-factor level, geographical, political, economic, social and other environmental factors. The above results provide a basic theoretical framework for analyzing policy diffusion, but for a specific policy scenario (for example, the policy diffusion of innovation and entrepreneurship education in colleges and universities in China), there are still some new factors to explore further.

In determining the principle of the effect of various influence factors on policy diffusion, the quantification of policy diffusion results has always been one of the key issues discussed by scholars. Most of the existing studies have set policy diffusion results as "adopted" or "not adopted" in the d subvariable. This approach ignores policy characteristics and tool attributes, blurs the causal interpretation of policy diffusion at different levels, and makes it difficult to accurately measure the degree of policy adoption [6].

2.2 Chinese innovative and entrepreneurial education policies in universities

Regarding the development stages of China’s innovation and entrepreneurship education policy, scholars have put forward a three-stage theory based on policy text analysis (Policy inception period, policy diffusion period and policy full implementation period), four-stage theory (initial stage, pilot stage, development stage, and promotion stage) and five-stage theory (government-led stage, political-school cooperation stage, enterprise intervention stage, tripartite coordination stage, and system construction stage). Although these studies differ in the specific timing of each stage, they all believe that the reform of innovation and entrepreneurship education in Chinese universities has entered a period of comprehensive advancement since 2015.Existing research has generally clarified the evolution process of university innovation and entrepreneurship education policies, , the effect and path of policy implementation were also discussed at the same time.

3 The mechanism of the impact of industrial manufactured exports on China's wage level

3.1 Actor traits

First of all, since the motivation for university presidents to innovate policies often comes from their promotion opportunities, however, there is an inverted U-shaped relationship between promotion opportunity and age, so it can be seen that age has an inverted U-shaped relationship with the degree of university policy response. Secondly, new principals tend to innovate policies in order to establish merits and establish authority as soon as possible. However, as the length of service increases and their in-depth understanding of the actual situation, their willingness to innovate will gradually decrease. When a certain number of years worked, there is a tendency to inhibit policy innovation. Finally, there are mainly two methods for the appointment of presidents of Chinese universities: internal selection ("self-produced") and external transfer ("airborne").Compared with the "airborne" principals, the "self-produced" principals of our school are more able to make a more effective policy response based on the actual situation of the school.

H1a: Age and degree college principal policy response has an inverted U-shaped relationship.
H1b: Term policy response to the degree of university president has an inverted U-shaped relationship
H1c:"Self-produced" principals have a higher degree of policy response.

3.2 Characteristics of Universities

First, colleges and universities often make policy response decisions based on cost-benefit analysis. The cost of direct expenditures for the performance of policy formulation and implementation process occurring universities. The benefit of cost is mainly reflected in the improvement of the quality of innovation and entrepreneurship of students, but it has obvious lag. Therefore, colleges and universities with abundant economic resources are more motivated to adopt new policies. Then, compared with liberal arts colleges and universities, science and engineering colleges and universities have higher enthusiasm to respond to policies [7]. The science and engineering universities are more closely connected with the industrial chain, so they are more inclined to actively participate in the innovation and entrepreneurship

education reform. Last but not least, decision support plays an important role in making policy decisions in response to the college and its influence. Experts can promote more scientific policy responses by universities in way of consulting.

H2a: The degree of economic resources and university policy response positively correlated.
H2b: Polytechnic universities have a higher degree of policy response.
H2c: Decision support and respond positively correlated with the degree of university policy.

3.3 Environmental characteristics

First of all, compared with the higher learning costs of neighboring universities, universities choose to compete and learn from each other in the same province (city) [8]. Therefore, the higher the degree of policy response of colleges and universities in the same province (city), the more likely neighboring colleges and universities are to make positive policy responses. Secondly, the government's administrative instructions to promote policy adoption will push universities to respond to policies. Based on the policy background of the joint construction of provinces and ministries, the administrative directives promoted by the provincial (city) government for policy adoption provide a policy basis for colleges and universities to carry out policy innovation. The higher the level of regional innovation more favorable policies to make a positive response colleges and universities. The higher level of regional innovation means that the practical education resources needed by universities to carry out innovation and entrepreneurship education are more abundant.

H3a: Respond positively correlated with the degree of university degree policy to respond to other colleges and universities in the province (city).
H3b: Provincial (municipal) government pressure is positively related to the degree of policy response of colleges and universities.
H3c: The level of regional innovation is positively correlated with the degree of policy response of universities.

4 Empirical study

4.1 Sample selection and data source

We select 30 “double first-class” A-type universities as the research sample, and the time span of the research sample is 2015-2018. Relevant data comes from the official websites of various universities, the website of the Academic Affairs Office, the Open Information Network of Universities, the China Knowledge Network, the website of the magic weapon of Peking University and the Qingta website.

4.2 Variable selection and definition

Table 1: Variable Description and Data Source

Type	variables	Abbreviation	Variable Description	Data Sources
Dependent variable	Policy response degree of universities	PO	Annual policy adoption by universities	*
Core variables	Principal's age	AGE	Current year－Year of birth	*
	Principal's term	TE	Current year－Year of appointment	*
	Way of appointment	EX	Produced by university=1 , Externally transferred =0	*
	Economic resources	FU	The final income accounts of universities minus the final expenditure accounts, and then divided by the final income accounts, lagging one period	Qingta website
	Discipline characteristic	SU	Colleges of Science and Technology =1, others=0	Ministry of Education of the People's Republic of China
	policy support	KN	The number of papers with the theme of innovation and entrepreneurship education (reform) published by the university staff in that year	cnki.net
	Responsiveness of	LO	The total number of methods adopted by other	*

	other universities		colleges and universities in the province (city) that year	
	Pressure from the provincial (city) government	GO	The number of documents related to innovation and entrepreneurship education reform issued by the provincial (city) government in the year	the magic weapon of Peking University
	Regional innovation level	RI	The comprehensive scientific and technological innovation level index of each province (city), lag one period	Regional Science and Technology Innovation Evaluation Report of China
Control variable	Cumulative response level at the beginning of the year	TO	Total number of policies adopted by colleges and universities, lag one period	
	time	T	The base year is 2015, which is recorded as 2015=1, 2016=2, 2017=3, 2018=4	
	Square of time	T^2		
	Cube of time	T^3		

Note: * indicates that the data comes from the official website of colleges and universities, the website of the Academic Affairs Office and the public information network, etc.

In this paper, the degree of innovation and entrepreneurship policy response of universities is taken as the explained variable, and adopts the following methods to measure it: This paper divides the university's innovation and entrepreneurship education policy into 27 items from 9 dimensions, and uses the number of policies adopted by a university in a certain year to measure this The degree of policy response of the school that year. Among them, the policies that have been adopted will no longer be counted repeatedly, but colleges and universities will count when they adjust or supplement the adopted policies.

In this paper, three variables of time, time square and time cube are selected as control variables to describe the nonlinear trend of policy adoption over time. In addition, the cumulative response degree at the beginning of the year is selected as the control variable. This treatment is intended to reflect the fact that universities that have adopted more policies in the past have less opportunity to respond in the future Specific variable descriptions and data sources are shown in Table 1.

4.3 Model construction

The explained variable in this paper, namely the degree of response of colleges and universities, is a typical non-negative discrete counting variable. Poisson regression model or negative binomial regression model of counting model can be selected to test the theoretical hypothesis proposed in this paper. Since the variance of the number of college indicators adopted in the sample is about three times of its mean value, there is excessive discreteness, and it does not meet the requirement that the mean value and variance of the explained variable in the Poisson regression model are the same, so the negative binomial regression model will have better effect. For further validation of this judgment, This paper uses Stata12.0 software to carry out the negative binomial regression analysis of the clustering robust standard errors, and the 95% confidence interval of the over-dispersion parameter α is [0.0022, 0.3182], so the null hypothesis "H0: α=0" is rejected. The mean and variance of the explanatory variables are over-dispersed, so this paper constructs a negative binomial regression model to test the theoretical hypothesis.

4.4 Empirical research conclusions

Table 2: Regression results

variates	Negative binomial regression								Poisson regression	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7		Model 8	
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	IRR	Coef.	IRR
AGE	-0.200 7 (0.305 2)			0.127 7 (0.357 0)	-0.351 3 (0.283 9)		0.207 1 (0.307 6)	1.230 1	0.237 1 (0.326 5)	1.267 6
AGE^2	0.001 8 (0.002 6)			-0.001 1 (0.002 9)	0.003 1 (0.002 5)		-0.001 7 (0.002 7)	0.998 3	-0.002 0 (0.002 9)	0.998 0

TE	0.070 5 (0.070 5)			0.073 4 (0.063 2)	0.079 5 (0.066 0)		0.089 0 (0.061 5)	1.093 1	0.095 6 (0.062 2)	1.100 2
TE^2	-0.004 9 (0.004 5)			-0.005 6 (0.004 0)	-0.006 0** (0.004 2)		-0.006 6** (0.003 8)	0.993 4	-0.007 1** (0.003 9)	0.992 9
EX	0.008 2 (0.125 8)			0.057 3 (0.099 9)	-0.004 7 (0.127 6)		0.083 3 (0.103 3)	1.086 8	0.083 6 (0.103 9)	1.087 2
FU		0.082 6 (0.605 4)		0.261 7 (0.635 3)		0.265 7 (0.562 8)	0.568 6 (0.577 9)	1.765 9	0.592 7 (0.581 5)	1.808 8
SU		0.924 9*** (0.090 7)		0.933 7*** (0.112 8)		1.051 9*** (0.149 7)	1.118 8*** (0.174 2)	3.061 1	1.132 4*** (0.174 3)	3.103 2
KN		0.005 7** (0.002 4)		0.006 2** (0.002 8)		0.005 5** (0.002 5)	0.005 9** (0.002 9)	1.005 8	0.005 9** (0.002 8)	1.005 9
LO			-0.002 1 (0.006 3)		-0.001 7 (0.006 1)	0.006 8** (0.003 4)	0.008 3*** (0.003 2)	1.008 3	0.008 5*** (0.003 2)	1.008 5
GO			0.001 0 (0.027 1)		0.002 4 (0.027 8)	0.012 4 (0.023 7)	0.013 5 (0.022 8)	1.013 6	0.013 4 (0.022 5)	1.013 5
RI			-0.009 1 (0.006 7)		-0.010 7 (0.007 2)	-0.005 7 (0.006 1)	-0.006 3 (0.006 2)	0.993 7	-0.006 5 (0.006 3)	0.993 6
TO	-0.006 5 (0.014 1)	-0.013 8 (0.012 3)	-0.004 8 (0.014 3)	-0.018 6 (0.014 1)	-0.008 3 (0.014 4)	-0.016 6 (0.012 7)	-0.022 5 (0.015 5)	0.977 7	-0.023 5 (0.016 2)	0.976 8
T	-4.036 8*** (1.101 8)	-3.778 0*** (1.159 3)	-4.004 0*** (1.025 0)	-3.747 1*** (1.135 7)	-3.987 1*** (1.078 8)	-3.468 8*** (1.110 2)	-3.338 8*** (1.122 5)		-3.324 5*** (1.124 2)	
T^2	1.510 8*** (0.501 7)	1.393 8** (0.545 9)	1.487 8*** (0.497 1)	1.402 1*** (0.534 1)	1.495 6*** (0.511 2)	1.289 6** (0.519 6)	1.266 7** (0.516 6)		1.264 1** (0.518 8)	
T^3	-0.185 7** (0.072 0)	-0.169 1** (0.076 7)	-0.182 1** (0.071 1)	-0.171 2** (0.075 1)	-0.183 8** (0.072 4)	-0.156 2** (0.072 8)	-0.154 8** (0.072 1)		-0.154 6** (0.072 5)	
_Cons	10.261 3 (8.763 7)	3.714 9*** (0.724 9)	5.465 0*** (0.643 8)	-0.487 5 (9.734 0)	15.198 4* (8.075 5)	3.599 1*** (0.870 3)	-2.976 3 (8.948 7)		-3.867 1 (9.457 0)	

Notes:1) All the models passed the significance test and The values in parentheses are robust standard errors. 2) *、**、*** respectively represent significant at the level of 10%, 5%, and 1%. 3) In Model 1 - Model 6, only some variables entered the regression equation, so the incidence ratio IRR was not reported.

Table 2 provides the data results of negative binomial regression and Poisson regression using Stata12.0 software, and reports the incidence ratio IRR. Model 1, Model 2 and Model 3 perform regression analysis on actor trait factors, university characteristic factors, and environmental characteristic factors, respectively. Model4, Model 5 and Model 6 select from actor trait factors, university characteristic factors, and environmental characteristic factors. Two types of regression analysis were performed. Model 7 and Model 8 performed negative binomial regression and Poisson regression analysis on all variables, and reported the incidence ratio IRR.

In terms of actors idiosyncratic factors, TE has significant effects on the PO, the AGE and the EX not through the significance test. Can be seen from all models, the coefficient of TE2 is negative in significant at the 5% level, showed the influence of TE on PO presents an "inverted U"-shaped nonlinear relationship and hypothesis H1b established. AGE has no significant effect on the PO, the meaning that hypothesis H1a did not get the support, which This may be related to the small age difference between the principals. EX had no significant effect on the PO, hypothesis H1c has not been verified.

In terms of university characteristics, SU and KN have significant effects on PO, and hypotheses H2b and H2c are supported. Among them, the incidence rate in Model 7 than IRR shows that when other variables remain unchanged, the average number of policy adoptions of science and technology universities is 206% higher than that of other types of universities, indicating that the policy response of science and technology universities is more positive than other universities. Although FU has a positive effect on PO, it is not significant. Hypothesis H2a failed the verification.

In terms of environmental characteristics, LO has a positive influence on PO, and it is significant at the 1% level. Hypothesis H3a is supported. GO is not significant, and the hypothesis H3b has not been verified. RI is not significant, hypothesis H3c has not been verified.

The control variable TO has a negative impact on PO, but it is not significant. This may be because the peak of the total number of policies adopted by some colleges and universities appears in the later period. The control variables T, T2, and

T3 are all significant at the 5% level, and PO shows a cubic curve characteristic over time, indicating that the number of colleges' annual policy adoption shows an S-shaped fluctuation over time.

5 Conclusion

This study used data from 30 "Double First-class" A-level Universities in china from 2015 to 2018 to build a model of actor characteristic factors, university characteristic factors and environmental characteristic factors. The results show that the term of the president and the degree of policy response of colleges and universities are inverted U-shaped relationship, the characteristics of disciplines and decision-making support are important factors affecting the policy innovation of colleges and universities, science and engineering colleges and universities and universities with strong decision-making support have a higher degree of policy response, and the response level of other colleges and universities in the province (city) also has a significant impact on the policy innovation of colleges and universities.

The above conclusions have the following enlightenment: First, to realize the moderate flow of university principals, cultivating innovative entrepreneurship teaching and research talents will accelerate the spread of innovation and entrepreneurship education policy in colleges and universities. Second, the ultimate goal of policy proliferation is to achieve policy effectiveness, colleges and universities should formulate policies that are in line with the actual situation and avoid simple policy imitation. Third, strengthening the link between industry and universities, raising the level of infrastructure construction of innovation and entrepreneurship, and shaping a good culture of innovation and entrepreneurship will help to further promote the reform of innovation and entrepreneurship education in colleges and universities in China. Fourth, it has become the consensus of colleges and universities to strengthen the quality education of innovation and entrepreneurship among college students, but different universities with different educational resources and development history often need differentiated development orientation (research universities, teaching universities or entrepreneurial universities), so the policy response of colleges and universities may have different views on what degree should be made.

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