The Influence of Entrepreneur's Political Connection on Entrepreneurial Firm's Ambidextrous Innovation——Based on Experimental and Mathematical Statistics Analysis

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Abstract: Many pieces of research have shown that political connection has an essential effect on enterprise innovation. This paper discusses the influence of an entrepreneur's political connection on the ambidextrous innovation of entrepreneurial firms. Based on panel data of listed entrepreneurial firms of China's Growth Enterprise Market from 2012 to 2017, this paper uses a negative binomial regression model with random effect to do theoretical and empirical research. The results show that China's entrepreneurial firms tend to choose exploitation innovation rather than exploration innovation. Entrepreneur's political connection has a positive relationship with exploration innovation of entrepreneurial firms, but an inverse U type relationship with exploitation innovation of entrepreneurial firms.

Keywords: political connection; exploration innovation; exploitation innovation; entrepreneurial firm;

1 INTRODUCTION

Although the innovation input of enterprises is increasing year by year under the support of national policy and funds, enterprises still face the predicament of insufficient innovation ability and lack of core competitiveness. For enterprises influenced by internal resources and the external environment, it is risky and uncertain to carry out innovation activities. In economic transformation, the government holds many innovative resources and the right to allocate resources. Therefore, enterprises are keen to seek political connections to obtain more scarce resources [1]. The entrepreneur's political connection reflects the informal and unique connection between entrepreneurs and political institutions or government officials with political power. Entrepreneurs usually participate in national or local political entities, such as the People's Congress, to gain different strengths of government support [2]. Entrepreneurial firms usually lack resources. They need to rely on political connections to obtain policy protection and innovative resources. The political connections can provide a thriving environment for enterprise innovation [1].

There are some gaps in the current studies. Firstly, most of the studies focused on mature enterprises [3,4]. Entrepreneurial firms lack resources, so their innovation strategies dependent on the policy environment. At the same time, the entrepreneurial firm's innovation decision-making is often the embodiment of the entrepreneur's personal goals [5]. The political connection has a significant influence on the innovation of entrepreneurial firms. Secondly, most of the current studies regard innovation as a whole [2,3]. It is worthy to distinguish different types of innovation. Innovation can be divided into exploration innovation and exploitation innovation according to the risk and return. The essence of exploration innovation is a kind of risk, for it usually has a long payback period and a high risk of failure [6]. Exploitation innovation is the expansion of existing capabilities and technologies, which is generally predictable [6]. Political connection helps enterprises get more government subsidies and tax benefits [1]. Existing studies typically focus on the impact of political connection on R&D investment [2,3]. In addition, because of the constraints of resource endowment, entrepreneurial firms usually need to rely on the political connection to obtain policy protection and innovation resources. Therefore, it is necessary to distinguish different types of innovation and explore the effect mechanism of an entrepreneur's political connection on ambidextrous innovation of entrepreneurial firms.

2 HYPOTHESES

2.1 Entrepreneur's political connection and exploration innovation of entrepreneurial firms

The influence of an entrepreneur's political connection on the innovation of entrepreneurial firms will be different according to the type of innovation. Exploration innovation is essential for enterprises to acquire new technology. It is high-risk and uncertain-return [6]. Research shows that enterprises tend to choose exploitation innovation rather than exploration innovation [7]. Because of the lack of resources and the weakness of entrepreneurial firms, they are less likely to undertake high-risk exploration innovation. However, the political connection can help enterprises promote long-term growth [8].

Firstly, political connection helps entrepreneurial firms obtain government subsidies, tax benefits, and other scarce resources [4,9]. It helps entrepreneurial firms reducing the cost of exploration innovation. Secondly, political connection helps reduce the cost of debt and financing constraints [3], which is helpful for entrepreneurial firms to get out of financial trouble. An entrepreneur's political connection sends an excellent signal to banks and other financial institutions, helping to reduce financing costs and increase the amount of investment. Thirdly, an entrepreneur's political connection allows entrepreneurial firms to obtain knowledge resources [10]. These kinds of tangible resources and intangible resources promote the exploration innovation activities of entrepreneurial firms. Finally, the entrepreneur's political connection enhances the risk-taking capacity of entrepreneurial firms [8]. In conclusion, this paper proposes that:

H1: Entrepreneur's political connection has a positive effect on exploration innovation of entrepreneurial firms.

2.2 Entrepreneur's political connection and exploitation innovation of entrepreneurial firms

Exploitation innovation builds on existing technologies to help enterprises perform well by improving products and services [11]. The logical relationship between an entrepreneur's political connection and exploration innovation mentioned above is also applicable to exploitation innovation. The entrepreneur's political connection will also promote the exploitation innovation of entrepreneurial firms. Hewitt and Roper [12] found that government support for innovation leads enterprises to perform more exploitation innovation and gain short-term returns by increasing the variety of products and services. While enterprises gain resources through political connections, they also need to meet the social goals of government [13]. The low risks and immediate rewards of exploitation innovation are what governments need.

Products or technologies upgraded in exploitation innovation usually follow existing regulatory requirements and frameworks, requiring less political protection [11]. Previous studies showed that firms prefer to choose exploitation innovation when the political connection is weak [14]. On the one hand, exploitation innovation is to increase the variety of products and services available to meet the needs of existing consumers [8]. Focusing on products and customers is the key to enterprises development. On the other hand, overinvestment in political connection creates a resource curse effect that discourages exploitation innovation [15]. For entrepreneurial firms' innovation resources are limited. They can't realize both a high level of exploration innovation and exploitation innovation.

In summary, when an entrepreneur's political connection is weak, the external resources supplement and privilege protection will improve entrepreneurial firms' exploration innovation and exploitation innovation. When an entrepreneur's political connection is strong, exploration innovation has a substitution effect to exploitation innovation. A high-level political connection harms exploitation innovation. Therefore, this paper proposes that:

H2: There is an inverted U-type relationship between an entrepreneur's political connection and exploitation innovation of entrepreneurial firms.

3 METHODOLOGY

3.1 Data

This paper selects 80 entrepreneurial firms of China's Growth Enterprise Market in 2012-2017. At the same time, excluding financial firms, firms with the changed chairman, and companies with missing data. At last, this paper collected the annual data of 75 entrepreneurial firms over five years. Choose China's Growth Enterprise Market entrepreneurial firms as samples mainly based on the following considerations. Many enterprises prefer to list on Growth Enterprise Market for the low threshold of Growth Enterprise Market [16]. These enterprises have a strong desire to innovate, and they need to rely on the support of external relationship networks. These characteristics fit the needs of our study.

The data for this study are mainly from China Stock Market & Accounting Research (CSMAR) and China National Intellectual Property Administration (CNIPA). The former provides financial data, and the latter provides patent information. This paper refers to the CSMAR

database, the WIND database, Google website as well as other search platforms. In addition, the ambidextrous innovation data is hand-coded based on the patent information provided by CNIPA.

3.2 Main variables

3.2.1 Dependent variables.

Entrepreneurial firms' ambidextrous innovation includes exploration innovation and exploitation innovation. The patent data can well reflect the innovation ability of entrepreneurial firms. The first four numbers of the International Patent Classification (*IPC*) represent a technical classification. Take five years as a period. If the first four patent numbers have not appeared in the past five years, it means the firm entering a new technical field, classify it as exploration innovation. A patent is classified as exploitation innovation if the first four numbers of the patent granted have occurred in the past five years [17].

3.2.2 Independent variables.

Entrepreneur's political connection (Poc) reflects the informal relationship between entrepreneurs and government officials. If one entrepreneur has work experience in the government department, we can say that he has a political connection with the government. According to the previous research [18], scores are assigned from 1 to 5 for the county head, deputy department head, department head, vice-minister, and minister levels of different strength of the political connection. And if the entrepreneur has no connection with the government, it can be assigned with 0.

3.2.3 Controls.

This paper controls the individual, team, and company-level variables. Individual and team-level factors include entrepreneur age (Eage), gender (Egen), education (Eedu), salary (Epay), and the size of the executive team (Tsize). Company-level factors include firm size (Lnsca), top 10 shareholders' shareholding (Stock), financial leverage (Del), cash ratio (Cashtio), rate of return on common stockholders' equity (Roe), and turnover. In addition, control sample firms in the industry (ID) and year (Y), as well as the degree of marketization (Region).

3.3 Model

The dependent variable in this study is a counting variable, and the maximum likelihood test of Alpha indicates that it has the problem of over-dispersion. Therefore, we use the random panel effects, adverse binomial model to estimate the individual effects by Hausman test and considering the distribution of dependent variables. Two models construct as follows:

$$E(\text{Exploration innovation}_{i,t}) = \exp\left(\varphi_0 + \varphi_1 Poc_{i,t-1} + \varphi_2 Poc^2_{i,t-1} + \varphi_3 X_{i,t-1} + \sum \lambda_{1,t} ID_i \right.$$
$$\left. + \sum \lambda_{2,t} Y_t + \varepsilon_{i,t}\right) \tag{1}$$

$$E(\text{Exploitation innovation}_{i,t}) = \exp\left(\varphi_0 + \varphi_1 Poc_{i,t-1} + \varphi_2 Poc^2_{i,t-1} + \varphi_3 X_{i,t-1} + \sum \lambda_{1,t} ID_i \right.$$
$$\left. + \sum \lambda_{2,t} Y_t + \varepsilon_{i,t}\right) \tag{2}$$

Figure 1: Models

4 RESULTS AND DISCUSSION

4.1 Descriptive statistics

Table 1 shows that the average value of exploitation innovation is about four times that of exploration innovation. It indicates that entrepreneurial firms tend to choose exploitation innovation rather than exploration innovation. It is consistent with previous research [7]. The mean of Poc is 2.387, which indicates that the political connection is more common in entrepreneurial firms. The standard deviation of Poc is 2.271, which suggests that the political connection is different between entrepreneurial firms.

TABLE 1: DESCRIPTIVE STATISTICS

Variable	Mean	Median	Std. Dev.	Min	Max
Exploration	4.504	1	9.580	0	81
Exploitation	17.115	4	49.446	0	652
Poc	2.387	3	2.271	0	5
Eage	50.443	50	6.577	35	74
Egen	0.960	1	0.196	0	1
Eedu	2.440	2	0.771	1	4
Epay	12.983	13.067	0.638	9.306	14.584
Tsize	6.765	6	2.319	3	15
Stock	0.600	0.611	0.116	0.208	0.817
Cashtio	0.042	0.011	0.136	0.001	1.370
Roe	0.070	0.056	0.073	-0.223	0.331
Lnsca	20.790	20.991	1.545	16.605	25.725
Del	0.402	0.260	0.706	0.015	6.781
Turner	11.027	11.002	0.911	8.600	14.603
Regien	9.895	11.330	4.429	1.810	16.190

4.2 Regression analysis

Table 2 shows the panel data analysis results. According to columns (1) and (2), the coefficient of the entrepreneur's political connection is 0.109, which is significant at the level of 5%. The corresponding quadratic term is positive but does not pass the significance test. The entrepreneur's political connection has a significant positive effect on the entrepreneurial firm's exploration innovation. Hypothesis 1 is confirmed. From columns (3) and (4), the coefficient of the entrepreneur's political connection is 0.141 and significant at the level of 5%. The corresponding quadratic coefficient is -0.200, which is effective at the level of 1%. Therefore, there is an inverted U-type relationship between the entrepreneur's political connection and exploitation innovation of entrepreneurial firms. Hypothesis 2 is confirmed.

TABLE 2: REGRESSION OF ENTREPRENEUR'S POLITICAL CONNECTIONS ON EXPLORATION INNOVATION AND EXPLOITATION INNOVATION

Variable	Exploration innovation		Exploitation innovation	
	(1)	(2)	(3)	(4)
Poc	0.109*	0.106*	0.141*	0.161*
	(2.440)	(2.470)	(2.270)	(2.450)
Poc²		0.077		-0.200**
		(1.820)		(-2.710)
Eage	-0.001	-0.000	0.072***	0.062**
	(-0.050)	(-0.010)	(3.190)	(2.570)
Egen	0.562	0.639	0.219	0.163
	(1.080)	(1.230)	(0.360)	(0.260)
Eedu	-0.075	-0.058	0.099	0.060
	(-0.540)	(-0.430)	(0.490)	(0.280)
Epay	0.181	0.200	0.116	0.068
	(1.310)	(1.490)	(0.840)	(0.480)
Tsize	0.067	0.074	-0.044	-0.059
	(1.680)	(1.860)	(-1.120)	(-1.540)
Stock	0.261	0.256	2.079*	1.717
	(0.330)	(0.330)	(2.300)	(1.940)
Cashtio	0.774*	0.779*	0.841**	0.890**
	(2.040)	(2.160)	(2.880)	(3.000)
Roe	4.234***	4.081***	2.362*	2.355*
	(3.610)	(3.560)	(2.070)	(2.020)
Lnsca	-0.055	-0.080	-0.015	-0.022
	(-0.860)	(-1.240)	(-0.230)	(-0.360)
Del	-0.141	-0.145	0.052	0.018
	(-1.110)	(-1.150)	(0.430)	(0.150)
Turner	-0.159	-0.142	-0.111	-0.089
	(-1.440)	(-1.300)	(-0.990)	(-0.780)
Regien	-0.008	0.001	0.026	0.011
	(-0.350)	(0.030)	(0.910)	(0.380)
ID	Yes	Yes	Yes	Yes
Y	Yes	Yes	Yes	Yes
Log likelihood	-800.065	-798.458	-1058.865	-1054.887
Wald chi-square	79.080***	86.670***	117.070***	124.570***
Hausman Test	Chi²= 28.080 P=0.257 RE	Chi²= 0.000 P=1.000 RE	Chi²= 5.980 P=0.113 RE	Chi²= 0.000 P=1.000 RE

Note: *, ** and *** indicate significance at 5%, 1%, and 0.1% confidence level respectively. The numbers in the parenthesis are corresponding Z-values.

4.3 Robustness checks

4.3.1 Endogenetic test.

In this paper, we use the Hausman test, DWH test, and GMM test to test the endogeneity of an entrepreneur's political connection. Take exploration innovation as the dependent variable, the result shows that the $\chi^2(1)$ value is 0.770, and the P-value is 0.380, which indicates that there is no endogenous independent variable. Since the traditional Hausman test does not hold in the case of heteroscedasticity, the DWH test is needed. The results of the DWH test shows that the $\chi^2(1)$ value is 0.865, the P-value is 0.352, the F value is 0.769, and the corresponding P-value is 0.381. It also indicates that there is no endogenous independent variable. In addition, the result of the GMM test is consistent with the Hausman test and the DWH test. In the same way, take exploitation innovation as the dependent variable. There is no endogenous independent variable according to Table 3.

TABLE 3: THE RESULTS OF THE ENDOGENETIC TEST

Variable	Hausman test		DWH test		GMM test	
	$\chi^2(1)$	P-value	$\chi^2(1)$	P-value	$\chi^2(1)$	P-value
	DV: Exploration innovation					
Poc	0.770	0.380	0.865	0.352	0.671	0.413
	DV: Exploitation innovation					
Poc	1.330	0.249	1.493	0.222	1.192	0.274

4.3.2 Reverse causality test.

On the other hand, there may be reverse causality between an entrepreneur's political connection and ambidextrous innovation of entrepreneurial firms. To carry out ambidextrous innovation, entrepreneurial firms will actively seek the political connection to obtain the resources needed for innovation. The entrepreneurial firms engaged in ambidextrous innovation will have better performance. It is helpful to establish political connections between entrepreneurs and the government. This paper takes the exploration innovation and exploitation innovation of the t period as independent variables and the entrepreneur's political connection of the t+1 period as the dependent variable for regression analysis.

The results of columns (1) and (2) in Table 4 show that both exploration innovation and exploitation innovation have no significant effect on an entrepreneur's political connection. Similarly, take t period of entrepreneur's political connection as the dependent variable, t period of exploration innovation and exploitation innovation as the independent variables for regression analysis, results of column (3) and column (4) in Table 4 are not significant. These results rule out the possibility of reverse causality.

TABLE 4: THE RESULTS OF THE REVERSE CAUSALITY TEST

Variable	Poct+1		Poct	
	（1）	（2）	（3）	（4）
Exploration	0.000		0.001	
	(0.010)		(0.150)	
Exploitation		0.000		0.000

		(0.080)		(0.080)
Eage	0.004	0.004	0.007	0.007
	(0.110)	(0.110)	(0.210)	(0.210)
Egen	1.599	1.597	1.247	1.248
	(1.050)	(1.050)	(0.920)	(0.920)
Eedu	0.128	0.128	0.169	0.168
	(0.340)	(0.340)	(0.490)	(0.490)
Epay	-0.048	-0.048	-0.116	-0.119
	(-0.430)	(-0.430)	(-0.590)	(-0.610)
Tsize	0.021	0.021	0.018	0.020
	(0.510)	(0.520)	(0.330)	(0.360)
Stock	0.619	0.622	1.266	1.270
	(0.680)	(0.690)	(1.030)	(1.030)
Cashtio	0.041	0.042	-1.700	-1.706
	(0.130)	(0.130)	(-0.800)	(-0.800)
Roe	-0.139	-0.127	-0.032	-0.034
	(-0.120)	(-0.110)	(-0.02)	(-0.030)
Lnsca	0.027	0.027	0.084	0.084
	(0.430)	(0.420)	(0.850)	(0.840)
Del	0.006	0.005	0.012	0.010
	(0.060)	(0.050)	(0.070)	(0.060)
Turner	0.008	0.007	0.010	0.011
	(0.090)	(0.070)	(0.100)	(0.100)
Regien	-0.010	-0.010	-0.010	-0.010
	(-0.200)	(-0.200)	(-0.210)	(-0.230)
ID	Yes	Yes	Yes	Yes
Y	Yes	Yes	Yes	Yes
Log- likelihood	-382.792	-382.788	-305.837	-305.844
Wald chi-square	8.980	9.000	12.290	12.26
Hausman test	Chi2= 0.000 P=1.000	Chi2= 0.440 P=0.979	Chi2= 1.630 P=0.990	Chi2= 0.990 P=1.000
	RE	RE	RE	RE

Note: *, ** and *** indicate significance at 5%, 1%, and 0.1% confidence level respectively. The numbers in the parenthesis are corresponding Z-values.

4.3.3 Additional test.

This paper also includes some further tests that are unreported here. Firstly, consider the entrepreneurial firm as state-owned or private [2]. Secondly, consider corruption spending of the entrepreneurial firm, which represents the relationship between the entrepreneurial firm and the government. The conclusion is robust.

5 CONCLUSIONS

This paper explores the impact of entrepreneur's political connection on ambidextrous innovation of entrepreneurial firms and comes to the following conclusions:

Firstly, an entrepreneur's political connection has a positive relationship with the exploration innovation of entrepreneurial firms. This study divides innovation into exploration innovation and exploitation innovation, then finds that an entrepreneur's political connection promotes

entrepreneurial firms' exploration innovation. It is consistent with the findings of Krammer and Jiménez, who use sample data from Central Asia and Europe [8]. An entrepreneur's political connection is helpful for entrepreneurial firms considering long-term development to engage in the exploration innovation with high risk and high uncertainty.

Secondly, an entrepreneur's political connection has an inverse U-type relationship with the exploitation innovation of entrepreneurial firms. Entrepreneurial firms are short of resources. The entrepreneur's political connection is a double-edged sword to the exploitation innovation of entrepreneurial firms. Entrepreneurial firms should weigh the advantages and the disadvantages of an entrepreneur's political connection.

The contribution of this paper mainly reflects in the following aspects. First of all, different from previous studies that view innovation as a whole, this paper studies the impact of an entrepreneur's political connection on the entrepreneurial firm's ambidextrous innovation strategy from the perspective of exploration innovation and exploitation innovation. This paper expands the theory of the political connection and ambidextrous innovation. It contributes to the practice of ambidextrous innovation of entrepreneurial firms. Secondly, this paper takes entrepreneurial firms with the strong will to innovate as samples. Because of the disadvantageous position in the market, the innovation decision-making of entrepreneurial firms depends on the environment, which provides a good perspective for the research of the functional mechanism of an entrepreneur's political connection.

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