

# Clan Culture and Business Innovation——Evidence from Chinese Family-owned Public Companies

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*Abstract:* The impact of culture on the economy is one of the hotspots in corporate finance research at present. This paper uses regional genealogy volumes to measure the strength of clan culture, combined with the data of A-share listed family businesses from 2010 to 2020, and uses the "differential pattern", the traditional clan concepts of "collectivism" and "solidarity and mutual benefit" are used to study the influence of clan culture on the innovation of family enterprises. The following conclusions can be drawn from the research of this paper: clan culture can promote the innovation of family enterprises, and at the same time, when innovation investment increases, innovation efficiency also increases, which can alleviate the current problem of "high input and low output" for enterprises. It can be seen that clan culture, as an informal system, plays a key role in the innovation of family businesses, especially when the formal system in our country is not very perfect at present, clan culture as an informal system can play a role in this.

# **1. Introduction**

The field of financial economics is currently undergoing a cultural revolution [2]. Interpreting the development of Chinese enterprises from a cultural perspective has become a new research hotspot. As one of the four ancient civilizations, China has a long history, inherited from generation to generation, and rich traditional culture. It not only has extensive and far-reaching Confucian culture and religious traditions, but also clan culture that has an extremely important impact on my country's social and economic development [3,4]. Research found that in history, China was

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dominated by clan culture, while Europe was dominated by city-state culture. From this cultural difference between China and the West, we can explore the reasons for the formation of inconsistent institutional change paths in China and Europe and how to deal with them. impact on business development. The British sinologist and anthropologist Freedman (1958, 1966) paid attention to the clan culture in China very early on, and then in the fields of sociology and anthropology, the clan was widely discussed by scholars, and was regarded as a form of village autonomy in my country. Influencing factors of important forces [6,7]. In recent years, clan culture has gradually been introduced into the research category of economics. Studies have shown [8,9] that clan culture has economic contributions such as effectively allocating economic resources, providing public goods, and promoting the development of private economy. Unfortunately, Yes, there are few studies on clan culture in the field of corporate finance at present, so it is meaningful to study clan culture in this paper.

Since my country's reform and opening up, Chinese enterprises, especially family enterprises, have achieved leapfrog development from scratch, from weak to strong, and have written many amazing stories of wealth growth [10]. The value creation and other activities of the enterprise are inseparable from the long-term innovation investment of the enterprise. In just 40 years, the family business has achieved an unshakable economic position in the Chinese market. This is all due to the emphasis that the family business attaches to innovation. Because most of the family businesses are long-term development-oriented, and the development of enterprises must be inseparable from innovation. For a long time, most Chinese family businesses are controlled by the family, and relatives control the management of the company, forming a special way of distribution of power and resources linked by blood relationship, and the clan culture is also connected by a group of blood It can be seen that clan culture and family business have coincident characteristics. Therefore, when we understand innovation, which is an important factor for the long-term development of Chinese family business, we cannot ignore Chinese data. The rich cultural heritage preserved for thousands of years [11], so it is necessary to study a special form of culture nested in the family business-that is, the clan culture, and what kind of impact it will have on the innovation of the family business. Influence, compared with Confucian culture, Confucian culture has a lot of research on corporate finance, but unfortunately, the use of clan culture to study the impact of family business innovation has not been systematically and widely discussed. In addition, for now, my country's formal system is still being perfected. Therefore, the study of the influence of clan culture on family business innovation can not only enrich the literature research, but also identify the relationship between formal and informal systems, thereby improving It has theoretical and practical guiding significance in family business innovation, formal system formulation and cultural inheritance.

For thousands of years in China, the social platform for life and economic activities has been mainly based on the clan as the unit, which is different from the West, which regards the city as the basic unit of life. Therefore, the clan's life style and long-term concepts have been handed down and deeply rooted in every society. In the footsteps of a generation, these concepts have influenced the daily behavior norms and strategic choices of Chinese people. A series of characteristics formed by clan culture are a major competitive advantage of Chinese enterprises, especially family businesses. Behind the establishment, operation, governance, management and inheritance of family businesses in my country, there are rich value orientations related to clan culture. Therefore, adopting the clan culture that has been passed down to the present is undoubtedly very important for understanding the behavioral decisions of Chinese family businesses [1]. This article attempts to understand Chinese family businesses from the perspective of Chinese traditional culture, and explores the influence of clan culture, an informal system, on the innovation of Chinese family businesses and

its impact mechanism. In addition, other cultures will also have an impact on innovation. In order to weaken the impact of omitted variables, the proxy variables of Confucian culture are added to all the regressions in this paper, making the research results more robust. These issues play a key role for long-term development-oriented family business, so there is theoretical research on this aspect. and realistic guidance.

# 2. Demonstration Results and Analysis

# **2.1. Descriptive Statistics**

Table 1 shows the descriptive statistical results of the main variables in this paper. Among the samples selected in this paper, (1) for the innovation output of the dependent variable, the average value from the total number of patent applications is 1.897, and the standard deviation is 1.52, which reflects my country's There is little difference in the number of patent applications of family enterprises. From the perspective of the average value, the number of non-invention patent applications is 1.456 more than the number of invention patent applications (1.182); from the perspective of the number of total patent authorizations, the average value is 1.733, with a standard deviation It is 1.41. It can be seen that there is not a big gap in the number of patent authorizations obtained by family enterprises in my country. From the perspective of the average value, the number of non-invention patents obtained is 1.43, which is about twice the number of invention patents. It can be seen that family enterprises apply or Authorized patents are currently mainly concentrated in non-invention patents; the number of family business patent citations is 1.184, and the standard deviation is 1.376, the maximum value is 8.004, and the minimum value is 0. (2) From the point of view of genealogy, which is a key variable to measure the intensity of local clan culture, clan culture 1 is the number of genealogy volumes owned by every 10 million people, with an average of 8.872 and a standard deviation of 2.513, indicating the clan culture of each prefecture-level city There is still a big difference in thickness. Clan culture 2 means the genealogy volumes owned by every million households, and the unit of measurement has been changed. It is used in the robust test. The average value is 6.576 and the standard deviation is 2.064, indicating that regardless of whether people are used as the unit or the number of households is used as the unit of measurement, There is a big gap in the intensity of clan culture in various regions based on the statistics of prefecture-level cities.

	Number	Mean	Std	Min	Max
Pat_apply	9,157	1.897	1.520	0	7.745
Pat_inv_apply	9,157	1.182	1.213	0	7.218
Pat_uninv_apply	9,157	1.456	1.451	0	6.852
Pat_granted	9,157	1.733	1.410	0	7.346
Pat_inv_granted	9,157	0.759	0.952	0	6.627
Pat_uninv_granted	9,157	1.430	1.423	0	6.756
Pat_citation	9,157	1.184	1.376	0	8.004
Rdexp	9,157	17.51	1.343	0	23.01
Pat_apply/ln(1+rdexp)	9,156	0.107	0.0837	0	0.371
Pat_granted/ln(1+rdexp)	9,156	0.0977	0.0778	0	0.372
Debt_cost	5,502	0.154	0.236	0	2.834
Mfee	9,157	9.609	10.65	0.128	728.4
Short_dummy	9,157	0.206	0.404	0	1
Clan1	9,157	8.872	2.513	0	13.65
Clan2	9,157	6.576	2.064	0	10.6
Size	9,157	21.71	1.042	17.81	26.50
Lev	9,157	0.357	0.191	0.00752	3.919
Roa	9,157	0.0534	0.0749	-1.872	0.675
Cashflow	9,157	0.0469	0.0740	-1.938	0.533
Indep_board	9,151	0.378	0.0532	0.143	0.750
Tobinq	9,157	2.048	1.808	0	92.25
Firmage	9,157	2.695	0.415	0.693	3.761
Rdratio	9,157	0.0379	0.0452	0	0.763
Lgdp	9,154	11.38	0.584	0	13.06
Local_techpay	8,523	13.46	1.430	7.116	16.08
Confucian	9,157	0.0608	0.0587	0	0.235

Table 1. Descriptive statistics

#### **2.2. Equations**

In formula (1), innovation represents the innovation output of the listed family business, represented by the number of patent applications, the number of authorized patents, and the number of cited patents; Book is the main key variable of this paper; controls represent a series of control variables such as company and region; this paper also controls the annual effect and industry effect;  $\varepsilon$  represents the residual item.

This article focuses on the regression coefficient  $\beta 1$  and significance of the clan culture clan culture; when the regression coefficient  $\beta 1$  of clan is significantly positive, it means that the regional clan culture can promote the innovation output of family enterprises, that is, in areas with stronger clan culture, the family The innovation output of enterprises is more, which is consistent with the result of Hypothesis 1 in this paper; on the contrary, if the regression coefficient  $\beta 1$  of the clan culture clan is significantly negative, it means that the regional clan culture inhibits the innovation output of family enterprises In other words, the weaker the clan culture is, the higher the innovation output level of the family business will be. At this time, it is necessary to be cautious about the impact of clan culture on the actual economy.

Example:

innovation = 
$$\alpha + \beta_1 \operatorname{clan} + \beta_2 \operatorname{controls} + \operatorname{year} + \operatorname{industry} + \varepsilon$$
 (1)

#### **2.3. Basic Regression Results**

Table 2 shows the results of the basic regression. Columns (1)-(3) show that the regional clan culture clan1 is significantly positively correlated with the number of patent applications at the 1% level. From the regression of the number of invention patents and non-invention patent applications, it is also passed at the 1% level The significance test shows a positive linear correlation, which shows that clan culture can promote the innovation output of family enterprises, thus assumption 1 is established, that is, the region with stronger clan culture, the higher the innovation output of family enterprises; in order to make the results more With a robust type, this paper will also measure the dependent variable of the family business into the number of patents authorized by the company. From (4)-(6), it can be seen that the regional clan culture is related to the total number of patents authorized by the family business, the number of invention patents authorized There is a positive linear relationship between the number of acquisitions and the number of non-invention patent authorizations at the 1% significance level, which further confirms that clan culture can promote the overall innovation output of family enterprises, and further shows that Hypothesis 1 is established; finally, this paper will also measure The dependent variable of enterprise innovation output is represented by the number of patent citations, and regression is performed. From column (7), it can be seen that the number of citations of enterprise patents and clan culture is significantly positively correlated at the level of 1%, indicating that Regional clan culture can significantly promote the innovation output of family firms, and passed the hypothesis 1 test,

Summary: Columns (1)-(7) indicate that regional clan culture can significantly promote the innovation output of family businesses, and passed the test of Hypothesis 1, that is, the stronger the clan culture, the more innovation output of family businesses. The regressions in Table 2 have all been adjusted by Cluster clustering.

(1)(2)(3)(4)(5)(6)(7) $pat_apply$ $pat_unin_apply$ $pat_unin_grantd$ </th <th></th> <th></th> <th>(-)</th> <th></th> <th>-</th> <th><i></i></th> <th>(-)</th> <th>(-)</th>			(-)		-	<i></i>	(-)	(-)
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$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		(6.22)	(6.15)	(5.23)	(3.56)	(2.15)	(3.74)	(-3.83)
cashflow $0.876^{***}$ $0.538^{**}$ $0.969^{***}$ $0.776^{**}$ $0.484^{**}$ $0.762^{**}$ $1.137^{***}$ (2.74)(2.09)(3.25)(2.42)(2.23)(2.47)(4.50)firmage $-0.277^{***}$ $-0.168^{**}$ $-0.211^{**}$ $-0.267^{***}$ $-0.101^{*}$ $-0.205^{**}$ $-0.157^{*}$ (-2.84)(-2.24)(-2.28)(-2.94)(-1.91)(-2.24)(-1.91)tobinQ $-0.025^{**}$ $0.002$ $-0.029^{**}$ $-0.018$ $0.011$ $-0.025^{**}$ $0.047^{***}$ (-2.12)(0.18)(-2.56)(-1.54)(1.14)(-2.15)(2.64)lgdp $0.100$ $0.151^{**}$ $0.009$ $0.072$ $0.070$ $0.035$ $0.152^{*}$ (1.18)(2.15)(0.12)(0.92)(1.25)(0.46)(1.91)local_techpay $0.032$ $0.031$ $0.028$ $0.045$ $0.059^{***}$ $0.024$ $0.051^{*}$ indep_board $-0.365$ $-0.519$ (1.68) $-0.020$ $-0.179$ $0.275$ $-0.219$ indep_board $-0.365$ $-0.519$ $0.168$ $-0.020$ $-0.179$ $0.275$ $-0.219$ indep_board $-1.009$ $-0.976^{*}$ $-0.539$ $-1.125^{*}$ $-1.203^{**}$ $-0.642$ $-1.309^{**}$ (-1.55) $(-1.84)$ $(-0.86)$ $(-1.84)$ $(-3.04)$ $(-1.03)$ $(-2.27)$ Constant $-4.297^{**}$ $-6.333^{**}$ $-2.843^{**}$ $-5.810^{***}$ $-3.051^{***}$ $-13.690^{***}$ <t< td=""><td>rdratio</td><td>2.450***</td><td>3.140***</td><td>1.100**</td><td>1.859***</td><td>2.498***</td><td>0.773</td><td>2.254***</td></t<>	rdratio	2.450***	3.140***	1.100**	1.859***	2.498***	0.773	2.254***
(2.74)     (2.09)     (3.25)     (2.42)     (2.23)     (2.47)     (4.50)       firmage     -0.277***     -0.168**     -0.211**     -0.267***     -0.101*     -0.205**     -0.157*       (-2.84)     (-2.24)     (-2.28)     (-2.94)     (-1.91)     (-2.24)     (-1.91)       tobinQ     -0.025**     0.002     -0.029**     -0.018     0.011     -0.025**     0.047***       (-2.12)     (0.18)     (-2.56)     (-1.54)     (1.14)     (-2.15)     (2.64)       lgdp     0.100     0.151**     0.009     0.072     0.070     0.035     0.152*       (1.18)     (2.15)     (0.12)     (0.92)     (1.25)     (0.46)     (1.91)       local_techpay     0.032     0.031     0.028     0.045     0.059***     0.024     0.051*       indep_board     -0.365     -0.519     0.168     -0.020     -0.179     0.275     -0.219       indep_board     -1.009     -0.976*     -0.539     -1.125*     -1.203**     -0.642     -1.309** </td <td></td> <td>(3.80)</td> <td>(4.71)</td> <td>(2.17)</td> <td>(3.00)</td> <td>(4.18)</td> <td>(1.53)</td> <td>(3.19)</td>		(3.80)	(4.71)	(2.17)	(3.00)	(4.18)	(1.53)	(3.19)
firmage $-0.277^{***}$ $-0.168^{**}$ $-0.211^{**}$ $-0.267^{***}$ $-0.101^{*}$ $-0.205^{**}$ $-0.157^{*}$ (-2.84)(-2.24)(-2.28)(-2.94)(-1.91)(-2.24)(-1.91)tobinQ $-0.025^{**}$ $0.002$ $-0.029^{**}$ $-0.018$ $0.011$ $-0.025^{**}$ $0.047^{***}$ (-2.12)(0.18)(-2.56)(-1.54)(1.14)(-2.15)(2.64)lgdp $0.100$ $0.151^{**}$ $0.009$ $0.072$ $0.070$ $0.035$ $0.152^{*}$ (1.18)(2.15)(0.12)(0.92)(1.25)(0.46)(1.91)local_techpay $0.032$ $0.031$ $0.028$ $0.045$ $0.059^{***}$ $0.024$ $0.051^{*}$ (1.06)(1.29)(1.02)(1.61)(3.00)(0.87)(1.77)indep_board $-0.365$ $-0.519$ $0.168$ $-0.020$ $-0.179$ $0.275$ $-0.219$ (-1.55)(-1.13)(0.33)(-0.04)(-0.47)(0.55)(-0.46)confucian $-1.009$ $-0.976^{*}$ $-0.539$ $-1.125^{*}$ $-1.203^{***}$ $-0.642$ $-1.309^{**}$ (-1.55)(-1.84)(-0.86)(-1.84)(-3.04)(-1.03)(-2.27)Constant $-4.297^{***}$ $-6.333^{***}$ $-2.843^{**}$ $-5.810^{***}$ $-3.051^{***}$ $-13.690^{***}$ (-3.27)(-5.39)(-2.41)(-3.47)(-5.64)(-2.59)(-11.15)YearYesYesYesYesYesYesYes<	cashflow	0.876***	0.538**	0.969***	0.776**	0.484**	0.762**	1.137***
C(-2.84)(-2.24)(-2.28)(-2.94)(-1.91)(-2.24)(-1.91)tobinQ-0.025**0.002-0.029**-0.0180.011-0.025**0.047***(-2.12)(0.18)(-2.56)(-1.54)(1.14)(-2.15)(2.64)lgdp0.1000.151**0.0090.0720.0700.0350.152*(1.18)(2.15)(0.12)(0.92)(1.25)(0.46)(1.91)local_techpay0.0320.0310.0280.0450.059***0.0240.051*(1.06)(1.29)(1.02)(1.61)(3.00)(0.87)(1.77)indep_board-0.365-0.5190.168-0.020-0.1790.275-0.219(-0.67)(-1.13)(0.33)(-0.04)(-0.47)(0.55)(-0.46)confucian-1.009-0.976*-0.539-1.125*-1.203***-0.642-1.309**Constant-4.297***-6.333***-2.843**-4.288***-5.810***-3.051***-13.690***(-3.27)(-5.39)(-2.41)(-3.47)(-5.64)(-2.59)(-11.15)YearYesYesYesYesYesYesYesYesN8,5158,5158,5158,5158,5158,5158,5158,515		(2.74)	(2.09)	(3.25)	(2.42)	(2.23)	(2.47)	(4.50)
tobinQ-0.025**0.002-0.029**-0.0180.011-0.025**0.047***(-2.12)(0.18)(-2.56)(-1.54)(1.14)(-2.15)(2.64)lgdp0.1000.151**0.0090.0720.0700.0350.152*(1.18)(2.15)(0.12)(0.92)(1.25)(0.46)(1.91)local_techpay0.0320.0310.0280.0450.059***0.0240.051*inde_board-0.365-0.519(1.02)(1.61)(3.00)(0.87)(1.77)indep_board-0.365-0.5190.168-0.020-0.1790.275-0.219confucian-1.009-0.976*-0.539-1.125*-1.203***-0.642-1.309**confucian-1.009-0.976*-0.539-1.125*-5.810***-3.051***-13.690***Constant-4.297***-6.333***-2.843**-4.288***-5.810***-3.051***-13.690***YearYesYesYesYesYesYesYesYesN8,5158,5158,5158,5158,5158,5158,515	firmage	-0.277***	-0.168**	-0.211**	-0.267***	-0.101*	-0.205**	-0.157*
(-2.12)(0.18)(-2.56)(-1.54)(1.14)(-2.15)(2.64)lgdp0.1000.151**0.0090.0720.0700.0350.152*(1.18)(2.15)(0.12)(0.92)(1.25)(0.46)(1.91)local_techpay0.0320.0310.0280.0450.059***0.0240.051*(1.06)(1.29)(1.02)(1.61)(3.00)(0.87)(1.77)indep_board-0.365-0.5190.168-0.020-0.1790.275-0.219(-0.67)(-1.13)(0.33)(-0.04)(-0.47)(0.55)(-0.46)confucian-1.009-0.976*-0.539-1.125*-1.203***-0.642-1.309**Constant-4.297***-6.333***-2.843**-4.288**-5.810***-3.051***-13.690***(-3.27)(-5.39)(-2.41)(-3.47)(-5.64)(-2.59)(-11.15)YearYesYesYesYesYesYesYesN8,5158,5158,5158,5158,5158,5158,515		(-2.84)	(-2.24)	(-2.28)	(-2.94)	(-1.91)	(-2.24)	(-1.91)
lgdp     0.100     0.151**     0.009     0.072     0.070     0.035     0.152*       (1.18)     (2.15)     (0.12)     (0.92)     (1.25)     (0.46)     (1.91)       local_techpay     0.032     0.031     0.028     0.045     0.059***     0.024     0.051*       (1.06)     (1.29)     (1.02)     (1.61)     (3.00)     (0.87)     (1.77)       indep_board     -0.365     -0.519     0.168     -0.020     -0.179     0.275     -0.219       (-0.67)     (-1.13)     (0.33)     (-0.04)     (-0.47)     (0.55)     (-0.46)       confucian     -1.009     -0.976*     -0.539     -1.125*     -1.203***     -0.642     -1.309**       (-1.55)     (-1.84)     (-0.86)     (-1.84)     (-3.04)     (-1.03)     (-2.27)       Constant     -4.297***     -6.333***     -2.843**     -4.288***     -5.810***     -3.051***     -13.690***       (-3.27)     (-5.39)     (-2.41)     (-3.47)     (-5.64)     (-2.59)     (-11.15)	tobinQ	-0.025**	0.002	-0.029**	-0.018	0.011	-0.025**	0.047***
01(1.18)(2.15)(0.12)(0.92)(1.25)(0.46)(1.91)local_techpay0.0320.0310.0280.0450.059***0.0240.051*(1.06)(1.29)(1.02)(1.61)(3.00)(0.87)(1.77)indep_board-0.365-0.5190.168-0.020-0.1790.275-0.219(-0.67)(-1.13)(0.33)(-0.04)(-0.47)(0.55)(-0.46)confucian-1.009-0.976*-0.539-1.125*-1.203***-0.642-1.309**Constant-4.297***-6.333***-2.843**-4.288***-5.810***-3.051***-13.690***(-3.27)(-5.39)(-2.41)(-3.47)(-5.64)(-2.59)(-11.15)YearYesYesYesYesYesYesYesN8,5158,5158,5158,5158,5158,5158,515		(-2.12)	(0.18)	(-2.56)	(-1.54)	(1.14)	(-2.15)	(2.64)
local_techpay0.0320.0310.0280.0450.059***0.0240.051*(1.06)(1.29)(1.02)(1.61)(3.00)(0.87)(1.77)indep_board-0.365-0.5190.168-0.020-0.1790.275-0.219(-0.67)(-1.13)(0.33)(-0.04)(-0.47)(0.55)(-0.46)confucian-1.009-0.976*-0.539-1.125*-1.203***-0.642-1.309**(-1.55)(-1.84)(-0.86)(-1.84)(-3.04)(-1.03)(-2.27)Constant-4.297***-6.333***-2.843**-4.288***-5.810***-3.051***-13.690***(-3.27)(-5.39)(-2.41)(-3.47)(-5.64)(-2.59)(-11.15)YearYesYesYesYesYesYesYesN8,5158,5158,5158,5158,5158,5158,515	lgdp	0.100	0.151**	0.009	0.072	0.070	0.035	0.152*
Image: Constant     (1.06)     (1.29)     (1.02)     (1.61)     (3.00)     (0.87)     (1.77)       indep_board     -0.365     -0.519     0.168     -0.020     -0.179     0.275     -0.219       (-0.67)     (-1.13)     (0.33)     (-0.04)     (-0.47)     (0.55)     (-0.46)       confucian     -1.009     -0.976*     -0.539     -1.125*     -1.203***     -0.642     -1.309**       (-1.55)     (-1.84)     (-0.86)     (-1.84)     (-3.04)     (-1.03)     (-2.27)       Constant     -4.297***     -6.333***     -2.843**     -4.288***     -5.810***     -3.051***     -13.690***       (-3.27)     (-5.39)     (-2.41)     (-3.47)     (-5.64)     (-2.59)     (-11.15)       Year     Yes     Yes     Yes     Yes     Yes     Yes     Yes       Industry     Yes     Yes     Yes     Yes     Yes     Yes     Yes       N     8,515     8,515     8,515     8,515     8,515     8,515     8,515 <		(1.18)	(2.15)	(0.12)	(0.92)	(1.25)	(0.46)	(1.91)
indep_board     -0.365     -0.519     0.168     -0.020     -0.179     0.275     -0.219       (-0.67)     (-1.13)     (0.33)     (-0.04)     (-0.47)     (0.55)     (-0.46)       confucian     -1.009     -0.976*     -0.539     -1.125*     -1.203***     -0.642     -1.309**       (-1.55)     (-1.84)     (-0.86)     (-1.84)     (-3.04)     (-1.03)     (-2.27)       Constant     -4.297***     -6.333***     -2.843**     -4.288***     -5.810***     -3.051***     -13.690***       (-3.27)     (-5.39)     (-2.41)     (-3.47)     (-5.64)     (-2.59)     (-11.15)       Year     Yes     Yes     Yes     Yes     Yes     Yes     Yes       Industry     Yes     Yes     Yes     Yes     Yes     Yes     Yes       N     8,515     8,515     8,515     8,515     8,515     8,515     8,515	local_techpay	0.032	0.031	0.028	0.045	0.059***	0.024	0.051*
Image: constant(-0.67)(-1.13)(0.33)(-0.04)(-0.47)(0.55)(-0.46)confucian-1.009-0.976*-0.539-1.125*-1.203***-0.642-1.309**(-1.55)(-1.84)(-0.86)(-1.84)(-3.04)(-1.03)(-2.27)Constant-4.297**-6.333***-2.843**-4.288***-5.810***-3.051***-13.690***(-3.27)(-5.39)(-2.41)(-3.47)(-5.64)(-2.59)(-11.15)YearYesYesYesYesYesYesIndustryYesYesYesYesYesYesN8,5158,5158,5158,5158,5158,5158,515		(1.06)	(1.29)	(1.02)	(1.61)	(3.00)	(0.87)	(1.77)
confucian-1.009-0.976*-0.539-1.125*-1.203***-0.642-1.309**(-1.55)(-1.84)(-0.86)(-1.84)(-3.04)(-1.03)(-2.27)Constant-4.297***-6.333***-2.843**-4.288***-5.810***-3.051***-13.690***(-3.27)(-5.39)(-2.41)(-3.47)(-5.64)(-2.59)(-11.15)YearYesYesYesYesYesYesIndustryYesYesYesYesYesYesN8,5158,5158,5158,5158,5158,515	indep_board	-0.365	-0.519	0.168	-0.020	-0.179	0.275	-0.219
(-1.55)(-1.84)(-0.86)(-1.84)(-3.04)(-1.03)(-2.27)Constant-4.297***-6.333***-2.843**-4.288***-5.810***-3.051***-13.690***(-3.27)(-5.39)(-2.41)(-3.47)(-5.64)(-2.59)(-11.15)YearYesYesYesYesYesYesIndustryYesYesYesYesYesYesN8,5158,5158,5158,5158,5158,515		(-0.67)	(-1.13)	(0.33)	(-0.04)	(-0.47)	(0.55)	(-0.46)
Constant-4.297***-6.333***-2.843**-4.288***-5.810***-3.051***-13.690***(-3.27)(-5.39)(-2.41)(-3.47)(-5.64)(-2.59)(-11.15)YearYesYesYesYesYesYesIndustryYesYesYesYesYesYesN8,5158,5158,5158,5158,5158,515	confucian	-1.009	-0.976*	-0.539	-1.125*	-1.203***	-0.642	-1.309**
(-3.27)     (-5.39)     (-2.41)     (-3.47)     (-5.64)     (-2.59)     (-11.15)       Year     Yes		(-1.55)	(-1.84)	(-0.86)	(-1.84)	(-3.04)	(-1.03)	(-2.27)
Year     Yes     Yes     Yes     Yes     Yes     Yes     Yes       Industry     Yes     Yes     Yes     Yes     Yes     Yes     Yes     Yes       N     8,515     8,515     8,515     8,515     8,515     8,515     8,515	Constant	-4.297***	-6.333***	-2.843**	-4.288***	-5.810***	-3.051***	-13.690***
Industry     Yes     Yes     Yes     Yes     Yes     Yes       N     8,515     8,515     8,515     8,515     8,515     8,515     8,515		(-3.27)	(-5.39)	(-2.41)	(-3.47)	(-5.64)	(-2.59)	(-11.15)
N 8,515 8,515 8,515 8,515 8,515 8,515 8,515 8,515	Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N 8,515 8,515 8,515 8,515 8,515 8,515 8,515 8,515	Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2     0.186     0.155     0.211     0.199     0.149     0.205     0.298	N	8,515	8,515	8,515	8,515	8,515	8,515	8,515
	R2	0.186	0.155	0.211	0.199	0.149	0.205	0.298

Table 2. Clan culture and family business innovation

#### 2.4. Innovation Investment Returns

This paper constructs two variables of innovation input to study the relationship between clan culture and innovation input of family enterprises. It can be seen from Table 3 that the proxy variable of innovation input in column (1) is rdexp, and the logarithm of R&D investment is taken and put In the regression, it is found that the clan culture is significantly positively correlated with the innovation investment of the family business; column (2) uses the innovation input to construct the dummy variable rdexp\_dummy, makes a difference for the R&D investment, first removes the missing value, and then uses the t+1 year R&D Expenditure minus R&D expenditure in year t, if it is less than 0, set it as dummy variable 1, and set it as 0 otherwise. From column (2) of the table, we can see that the coefficients of clan culture and innovation input dummy variables are significantly negative. It can be shown that through the three influence mechanisms of clan culture, the

acquisition of innovation resources and innovation willingness of family enterprises are improved, which can promote the innovation investment of family enterprises. When the innovation investment increases, the innovation output of family enterprises will also increase in the long run. will increase, which once again confirms the hypothesis that the stronger the clan culture, the more innovative output of family businesses.

	-	
	(1)	(2)
	Rdexp	Rdexp_dummy
Clan1	0.052***	-0.035***
	(4.69)	(-2.67)
Size	0.858***	-0.106***
	(32.10)	(-2.81)
Lev	0.050	-0.763***
	(0.37)	(-3.47)
Roa	1.441***	-6.566***
	(5.73)	(-9.52)
Rdratio	7.756***	-8.116***
	(9.98)	(-6.68)
Cashflow	1.326***	0.043
	(4.99)	(0.09)
Firmage	-0.133**	0.018
	(-2.33)	(0.21)
Tobinq	0.020	0.016
	(1.44)	(0.70)
Lgdp	0.040	-0.001
	(0.66)	(-0.02)
Local_techpay	0.088***	-0.007
	(3.82)	(-0.22)
Indep_board	-0.202	0.527
	(-0.67)	(0.99)
Confucian	-0.884***	1.640***
	(-2.60)	(2.86)
Constant	-4.692***	1.850
	(-5.48)	(1.62)
Year	Yes	Yes
Industry	Yes	Yes
N	8,515	7,289
R2	0.601	0.0535
· · · · · ·		

Table 3. The return of clan culture and innovation investment

# 2.5. Innovation Efficiency Regression

Refer to Xu Xixiong (2019) to construct the proxy variable of innovation efficiency, and divide the total number of patent declarations and the total number of patent authorizations by the logarithm of R&D expenditure to obtain innovation efficiency[12]. As can be seen from Table 4, clan culture is significantly positively correlated with innovation efficiency, indicating that clan culture can promote the innovation efficiency of family businesses, that is, the same R&D investment can produce more innovation results. Through the promotion of clan culture on innovation efficiency, the problem of "high input and low output" currently faced by our country in technology can be solved to a certain extent. After the improvement of innovation efficiency, it can make the life of the family business longer. Comprehensive clan culture can promote both innovation input and innovation efficiency. It can be further concluded that clan culture can promote the innovation output of family enterprises, which indirectly verifies the establishment of hypothesis 1.

	(1)	(2)
	Pat_apply/ln(1+rdexp)	Pat_granted/ln(1+rdexp)
Clan1	0.002***	0.002***
	(3.03)	(2.93)
Size	0.004*	0.005**
	(1.75)	(2.26)
Lev	0.017	0.008
	(1.55)	(0.85)
Roa	0.114***	0.055***
	(6.01)	(3.12)
Rdratio	0.102***	0.071**
	(3.01)	(2.20)
Cashflow	0.041**	0.035**
	(2.39)	(2.00)
Firmage	-0.015***	-0.014***
	(-2.78)	(-2.81)
Tobinq	-0.002***	-0.001**
	(-2.81)	(-2.09)
Lgdp	0.005	0.004
	(1.15)	(0.90)
Local_techpay	0.001	0.002
	(0.69)	(1.20)
Indep_board	-0.022	-0.004
	(-0.77)	(-0.13)
Confucian	-0.047	-0.053
	(-1.33)	(-1.59)
Constant	-0.093	-0.102
	(-1.38)	(-1.61)
Year	Yes	Yes
Industry	Yes	Yes
N	8,514	8,514
R2	0.167	0.180

Table 4. Clan culture and innovation efficiency regression

# 2.6. Clan Culture Re-measured

Dong Jing (2019) measures the strength of clan culture by whether there are ancestral halls, and

the data comes from the Qiancun survey conducted by Shanghai University of Finance and Economics[13]. Guo Yunan (2013) also used genealogy and ancestral halls as proxy variables of clan culture[14]. This paper refers to Xiao Jinli's (2018) measurement unit of clan culture, from the number of genealogy volumes owned by every 10 million people as the unit, to clan2's genealogy volumes owned by every million households[15], as another independent variable to measure clan culture , as can be seen from the following table 5, the proxy variable clan2 of the new clan culture is significantly positively correlated with the innovation output of the family business, indicating that the region with a stronger clan culture has more innovations in the family business. The establishment of the hypothesis: clan culture can promote the innovation of family enterprises.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		pat_inv_appl	pat_uninv_app	pat_grante	pat_inv_grant	pat_uninv_grant	pat_citatio
	pat_apply	У	ly	d	ed	ed	n
clan2	0.052***	0.042***	0.039**	0.048***	0.030***	0.037**	0.049***
	(2.93)	(2.98)	(2.33)	(2.91)	(2.85)	(2.23)	(2.80)
size	0.179***	0.218***	0.143***	0.187***	0.206***	0.151***	0.531***
	(3.68)	(5.02)	(3.25)	(4.07)	(5.42)	(3.42)	(11.97)
lev	0.340*	0.246	0.350**	0.199	0.008	0.288*	-0.270
	(1.76)	(1.59)	(2.02)	(1.12)	(0.06)	(1.70)	(-1.56)
roa	2.177***	1.753***	1.585***	1.149***	0.459**	1.143***	-1.129***
	(6.23)	(6.15)	(5.23)	(3.57)	(2.16)	(3.75)	(-3.81)
rdratio	2.448***	3.140***	1.099**	1.857***	2.497***	0.773	2.256***
	(3.80)	(4.71)	(2.16)	(2.99)	(4.19)	(1.52)	(3.19)
cashflow	0.875***	0.540**	0.970***	0.774**	0.482**	0.763**	1.143***
	(2.74)	(2.09)	(3.25)	(2.41)	(2.21)	(2.47)	(4.50)
firmage	-0.278***	-0.170**	-0.212**	-0.268***	-0.102*	-0.206**	-0.159*
	(-2.86)	(-2.26)	(-2.29)	(-2.96)	(-1.93)	(-2.26)	(-1.94)
tobinQ	-0.025**	0.002	-0.029**	-0.019	0.011	-0.025**	0.047***
	(-2.12)	(0.17)	(-2.56)	(-1.54)	(1.14)	(-2.15)	(2.64)
lgdp	0.086	0.142**	-0.000	0.059	0.061	0.026	0.143*
	(1.02)	(2.03)	(-0.01)	(0.75)	(1.11)	(0.34)	(1.77)
local_techpa y	0.029	0.028	0.025	0.042	0.058***	0.021	0.046
	(0.95)	(1.14)	(0.92)	(1.52)	(2.94)	(0.77)	(1.58)
indep_board	-0.382	-0.534	0.155	-0.035	-0.188	0.263	-0.239
	(-0.70)	(-1.16)	(0.31)	(-0.07)	(-0.49)	(0.53)	(-0.50)
confucian	-0.943	-0.883*	-0.470	-1.080*	-1.180***	-0.566	-1.151**
	(-1.43)	(-1.65)	(-0.74)	(-1.74)	(-2.96)	(-0.89)	(-1.98)
Constant	-4.043***	-6.117***	-2.646**	-4.057***	-5.668***	-2.861**	-13.418** *
	(-3.10)	(-5.23)	(-2.27)	(-3.30)	(-5.52)	(-2.45)	(-10.90)
Observation s	8,515	8,515	8,515	8,515	8,515	8,515	8,515
R-squared	0.186	0.154	0.211	0.198	0.149	0.204	0.296

Table 5. Robustness check: re-measurement of lineage culture

# **3.** Conclusion

Studying Chinese localized family businesses from a cultural perspective is a current research hotspot, which has theoretical and practical guiding significance. Clan culture has a long history in the process of Chinese society, and it still affects the behavior and decision-making choices of our people in modern society. Therefore, it is of academic value and Practical significance. Existing studies have confirmed that clan culture can promote the development of private economy, but there is a lack of extensive and systematic research on the impact of clan culture on family business behavior decision-making. The following conclusions can be drawn from the research of this paper: clan culture can promote the innovation of family enterprises, and at the same time, when innovation investment increases, innovation efficiency also increases, which can alleviate the current problem of "high input and low output" for enterprises. It can be seen that clan culture, as an informal system, plays a key role in the innovation of family businesses, especially when the formal system in our country is not very perfect at present, clan culture as an informal system can play a role in this.

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# **Data Availability**

Data sharing is not applicable to this article as no new data were created or analysed in this study.

# **Conflict of Interest**

The author states that this article has no conflict of interest.

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