

## Research Article

# Analyzing Factors Influencing Government Control Rights in PPP Projects from the Perspective of Investors

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The information resources owned by the government cannot be completely defined due to the incompleteness of the PPP contract. These information resources influence investors' judgment on the government's control rights, thus influencing the fair cooperative relationship and rational decision-making. In order to analyze the criteria for investors to evaluate the government's control rights in PPP projects in the process of decision, 14 factors that influence the government's control rights are identified through literature analysis and a questionnaire survey. Factor analysis shows that 14 factors are divided into explicit control indicators and implicit control indicators, which measure the explicit control rights and implicit control rights of the government, respectively. Considering the influence of differences in investors' opinions, the entropy weighing is made. The results show that the weight of implicit control right reaches 47.90%, which cannot be ignored in practice. The risk ratio has the greatest influence on explicit control rights, followed by the equity ratio. The status of government has the greatest influence on implicit control rights. The study helps to reduce the perceived bias of investors to the government's control rights of PPP projects for achieving partnership sustainability.

## 1. Introduction

In the public-private partnership (PPP) projects, the rights generated by the information resources owned by the government are called the government's control rights, including the decision-making right, resource disposal right, and voting right [1]. Contracts are the basic way to define and connect the information resources of stakeholders in a PPP project. Due to the imperfect information and asymmetric information of the principal-agent relationship based on the contract, the government's control rights cannot be completely constrained and defined by the contract, thus forming an unfair partnership [2].

In a PPP scheme, the government and investors jointly participate in the decision-making activities of the whole life cycle of the project. The government's control rights in the

project will bring pressure to the decision-making of investors and influence their decision-making choices of investors. In China, local government has high status and rights and may use their administrative rights to interfere in the operation of the economic market, resulting in excessive investment by investors [3]. Under the influence of the status difference between government and enterprises, power differences, and superior-subordinate relationships, investors will be forced to change their decision-making attitude or behavior to avoid damaging the interests of the government. At the same time, the government has many advantageous resources, such as the right to launch PPP projects, preferential policies, and fiscal expenditure. In order to establish a good cooperative relationship with local governments to obtain long-term benefits such as project resources, policy preferences, and financial subsidies, some

investors may make excessive commitment, blind obedience and play up to the government [4].

Due to incomplete contract information, investors cannot accurately evaluate the government's control rights in the project. Usually, investors judge the government's control rights based on the resources defined in the contract such as equity ratio, risk ratio, and other explicit resources. But outside the contract, the government also has observable advantages with objectives, such as the number of policies, stock or planned PPP, financial capacity, etc. These resources reflect the government's ability to dispose of resources. Due to the administrative characteristics of the government, in practice, there is some subjective advantage information that usually can only be judged according to the cooperation experience of investors, such as status and regulatory information [5, 6]. Subjective information expands the perception bias of different investors to the government control rights, resulting in unequal control rights and contradictory decision-making, which is not conducive to the sustainability of cooperation between the government and investors [7]. When investors overestimate the government's control rights, the risk of investors' decision-making behavior will be greater [3, 4].

However, there is still a lack of research on the influence of these indicators on the perceived government control rights of investors. Therefore, the study identifies and discusses the indicators that influence government control rights and the weighing of indicators comprehensively based on the perspective of investors. The research content is helpful in improving the evaluation system of the government control rights of PPP project and reducing the influence of the evaluation bias of government control rights on investors' decision-making. The findings of the research guide allocating the control right of the PPP scheme reasonably and reducing information conflicts and promoting sustainable cooperation.

## 2. Literature Review

Control right is the core issue of enterprise governance [8, 9]. Control right refers to the right to arrange and dispose of a certain resource, which reflects the indirect or direct influence of decision-makers on enterprise decision-making. In a company, the rights of managers are defined and restricted according to laws and contracts and also depend on the use and distribution of financial and human resources of the company [6, 10]. Due to the superior-subordinate relationship, status difference, and resource allocation difference in the enterprise, large shareholders or dominant subjects usually use different resources to seek their interests, thus forming additional control rights and benefits [11]. This part of the control right is usually outside the contract, and the benefits are related to the characteristics of participants, such as winning favor and respect, personal image, professional reputation, and other nonmonetary income [12, 13]. Therefore, in the allocation of corporate control rights, there is often unequal distribution of control rights among stakeholders, or the other party overestimates the control rights of the others. This kind of estimation often

leads to a sense of fear and oppression of rights, which results in irrational decision-making behaviors such as clinging, obedience, and escalation of commitment. Especially for the PPP project companies with obvious status advantages, complex stakeholders, and incomplete contracts, investors' overestimation of government control right is more significant.

The research on the allocation of control rights in the PPP scheme is a hot topic in project governance. The rational allocation of control rights is the key to the success of PPP projects, which can solve the opportunistic behavior in the knowledge sharing process of building information modeling integrated project delivery and maximizing the revenue of the project [5, 14, 15]. However, there are still some problems such as low pertinence of laws and policies, incomplete stakeholder contract, and unclear allocation of government and enterprise control rights in PPP practice [2, 16–18]. How to allocate the control rights in the contract and judge the control right reasonably are important for the realization of project performance [19].

In the PPP project, the control right of stakeholders can be divided into substantial control rights and residual control rights [1]. The residual control right is mainly caused by the incompleteness of the contract, which is not clearly defined in the contract and is related to the type of partner [20, 21]. From the perspective of research trends, many scholars have paid attention to the distribution and division of control rights in PPP projects. However, the influence of the dominant resources caused by government characteristics on the behavior of investors is ignored, and there is a lack of specific analysis on the measurement index of control rights. The study takes the government as the object and analyzes the indicators that investors determine the government's control rights in PPP projects based on the information resources of the government inside and outside the contract. The research contents are helpful in understanding the evaluation criteria of the government's actual control right in PPP projects and reducing information conflicts and promoting sustainable cooperation.

## 3. Method

*3.1. Indicator Identification.* Combing with the literature, the study identifies the indicators of the government's control rights from the aspects of the specific information inside and outside the contract and the characteristics of the government [1, 11].

In the project contract, equity is the basis of decision-making rights and an important indicator to measure the size of control rights [22]. When the joiner has more than 50% of the shares of the company, they have the controlling right of the company. The shares of most joint-stock companies are scattered, which leads to frequent conflicts and competition of interest and rights among stakeholders within the enterprise [23]. Therefore, it is difficult for shareholders to form a unified decision-making opinion on decision-making [24]. At this time, under a certain proportion of equity, the risk, operation, and management capabilities of the stakeholders become an important factor

in controlling the direction of decision-making. Alchian and Demsetz [25] believe that it is the most efficient to let the risk-takers master the decision-making of enterprises. The higher the risk the stakeholders bear, the stronger the degree of attention to the risk, the degree of participation in the decision-making process, and the willingness to control the decision-making. At the same time, a reasonable allocation of risk control rights is not only conducive to controlling enterprise risks but also conducive to improving enterprise income [26]. Therefore, the proportion of risk-taking is an important factor affecting the allocation of control rights.

For PPP projects, the government has the right to initiate the project and supervise the whole process. Once infrastructure projects fail, the government often bears more public blame [27]. Therefore, the government will be more involved in the decision-making of large-scale PPP projects, execute strong supervision of the project, and expect to control the development situation of the project. The scale of the project can also reflect the government's attention to the project information, the degree of participation in the project decision-making, and the supervision intensity of the project. In addition to the indication of internal control right of contract, Sun and Yang [28] summed up that the technical ability, financial ability, management ability, and resource ability of decision-makers are the most representative and decisive external control indicators in PPP projects. These abilities and resources reflect the decision-maker's ability to participate in project decision-making and the authority of opinions in each decision-making process. Therefore, the government's financial ability, the number of stocked or planned PPPs, the preferential policies provided by the government, the relevant professional and technical capabilities of the government, and the number of policy documents related to the project are all indicators reflecting the external control of the government.

In addition to the investment income in the contract, the government also enjoys nonmonetary control income such as image and reputation caused by status differences ([12, 13]. In a project company with a superior-subordinate relationship, the government's high position and executive power are unique resources. Under the influence of traditional culture, the government is the image representative of the country and the public and has a higher status, image, or face demand [4]. In the process of PPP project decision-making, irrational factors such as local dominant position and executive power are used to interfere with investors' decision-making choices by the government to maintain face or image demands. Investors will also deviate from rational behavior choices because they take into account the authority of local government [27]. Therefore, the advantages of the statute and the administration of the government can affect the investors' judgment of the government's control rights.

In PPP projects, the government has the advantage of the role of regulator. The government can investigate the responsibility for negative events after the regulatory information is collected and disposed of. The level of government supervision and accountability directly affect the effect of policy implementation and administrative execution and

can control the direction of investors' behavior choices [29]. The stronger the government supervision and the degree of accountability, the more oppressive that make rational decision behavior can be perceived by investors.

The preciseness of the government organizational structure, the standardization of the system, and the strength of administrative implementation are the guarantee of government supervision, accountability, and policy implementation. These three aspects all reflect the preciseness, seriousness, and discipline of the organizational work, which is an important guarantee for the authority of government activities. Among them, institution standardization also reflects the rationality and effectiveness of administrative implementation. The higher the degree of rigor and standardization of government organization structure, the stronger the government decision-making ability and administrative management ability perceived by investors, and the government's ability to control project decision-making direction and resource allocation is also stronger. Moreover, the more standardized the government institution is, the higher the degree of trust is [30], which is more conducive to communication between partners. When the government has a high degree of trust, investors are willing to follow the government's choice, but it also leads the government allocating control rights with high risk [31]. In social activities, trust is the basis of cooperation and is an expectation to maintain cooperation. This expectation has an impact on the allocation of enterprise resources and is an important factor affecting the allocation of internal control [32, 33].

Based on the above analysis and team discussion, 15 indicators that can influence the government's control rights are identified. The specific information inside and outside the contract mainly includes the ratio of government equity, the ratio of risks undertaken, the government financial capacity, the number of stocked or planned PPPs, the preferential policies provided by the government, the relevant professional and technical capabilities of the government, and the project scale and the number of policy documents issued by the government related to the project; the information related to the government characteristics mainly includes the status of the government, the degree of trust of government, the rigor of the government organization structure, the degree of accountability, the level of supervision, the intensity of administrative implementation, and the degree of institution normalization.

**3.2. Participants.** The study aims to analyze the criteria for investors to evaluate the government's control rights in PPP projects for reducing the perceived deviation of investors to the government's control rights so as to reduce the risk of excessive behavior such as blindly following, clinging to, and pleasing the government. The smaller the dispersion of evaluation data, the higher the consistency of investors' cognition of the influence of indicators on government control rights in the decision-making process, and the smaller the perceived deviation of investors. In order to match the research objectives, members with investment experience in the "China PPP lecture group" are selected as

TABLE 1: The background of the participants.

Characteristic	Category	Number	Percent (%)
Education	Doctor	34	19.3
	Master	91	51.7
	Bachelor	48	27.3
	Others	3	1.7
Research field (multiple choice)	Project management and investment analysis	127	
	Organization and management of public works	32	
	Enterprise strategy and organizational behavior	28	—
	Theory and application of financial engineering	17	
	Operation and service management	32	
	Others	18 (0)	
Understanding of PPP	Basic	52	29.5
	Very well	81	46.0
	Proficient	33	18.8
	Professional	10	5.7
Project experience	≤2 years	46	26.1
	2~5 years	88	50.0
	5~10 years	35	19.9
	>10 years	7	4.0
Types of enterprises	State-owned enterprise	96	54.5
	Private enterprise	73	41.0
	Other	7	4.0

Note: In the table, (0) indicates that only the subjects in “other” fields are selected, and the corresponding cases have been eliminated.

effective participants. Using investors as the participants can also help to reduce the desirability bias of the evaluation of the government’s control rights [34]. “China PPP lecture hall” is a PPP practical training course in China. The main purpose of the lecture is to train government and private capital (investors, contractors, operators, etc.) who participate in PPP projects. The lecture promotes the benign cooperation between government and social capital and speeds up the development of PPP. Most of the members in the lecture hall have good professional knowledge and practical experience and can effectively give feedback to the questionnaires.

A total of 201 questionnaires were collected from 500 members, and the response rate was 40.2%, which was higher than 12.9% in related studies [35]. Excluding invalid data including no investment experience, never heard of PPP, only another research field was chosen, the answers were filled maliciously or randomly, obvious contradictions between the subjects’ information, etc., 176 valid data were retained, which met the usual questionnaire survey standard [36], and the effective sample size was better than that in similar studies (such as 103 samples in [37]). The background of the participants is shown in Table 1.

The 7-Likert scale was used in the evaluation part of the questionnaire. The participants were required to score the indicators influencing the government’s control rights in the decision-making process according to their own experience and professional knowledge. The higher the score, the greater the influence.

## 4. Data Analysis

**4.1. Factor Analysis.** The Cronbach  $\alpha$  of internal consistency reliability and exploratory factor analysis are used to test the

reliability of the data. The reliability of the scale is 0.91, greater than 0.7 [38], indicating that the scale has very good reliability. Factor analysis (KMO = 0.92,  $p < 0.001$ ) is used to extract principal components with eigenvalues greater than 1. The results show that the third common factor only explained 7.82% of the variance. The rotated component matrix shows that the third common factor contains only the relevant professional and technical ability (PTA) possessed by the government, and loads of PTA under the other two common groups are less than 0.5. The data shows that the average value of PTA is only 3.6, which indicates that investors believe that the technical ability has little influence on the government’s control right in PPP projects and cannot better reflect the government’s advantage information in the decision-making process. This phenomenon is related to the function of the government in practice. In PPP projects, the main role of the government is to initiate the PPP project as the initiator of the project and supervise and manage the whole process of the project as the regulator. The government entrusts project financing, operation and construction to professional service providers through procurement. In fact, the government does not participate in the formulation and implementation of innovative technology, operation management technology, and maintenance technology. Therefore, the government usually does not need to have relevant technical personnel and organizations, so investors believe that the government does not have strong professional skills.

Removing the PTA, the factor analysis show that the cumulative variance contribution rate of the two extracted main components is 63.08%, greater than 0.6, and the variance contribution rate of each principal component is greater than 20% (32.06%, 31.02%), and a load of each index on the corresponding common factor is greater than 0.5

TABLE 2: Reliability and validity test.

Indicators	Groups		KMO	$\alpha$
	1	2		
Preferential policies provided by the government (PP)	<b>0.82</b>	0.23		
The proportion of government equity (E)	<b>0.78</b>	0.26		
The number of stocked or planned PPP (PPPN)	<b>0.78</b>	0.18		
The ratio of risks undertaken (RR)	<b>0.76</b>	0.26		
The project scale (PS)	<b>0.76</b>	0.19		
The government financial capacity (FC)	<b>0.75</b>	0.18		
The number of policy documents issued related to the project (PD)	<b>0.70</b>	0.18		
Government supervision level (SL)	0.08	<b>0.80</b>	0.92	0.91
Status of cooperative government (S)	0.17	<b>0.80</b>		
The degree of accountability (DA)	0.19	<b>0.79</b>		
The intensity administrative execution (AEI)	0.26	<b>0.76</b>		
The degree of institution normalization (IN)	0.27	<b>0.75</b>		
The rigor of the government organization structure (ROS)	0.25	<b>0.74</b>		
The degree of trust of government (T)	0.38	<b>0.67</b>		

[39]. Therefore, it is appropriate to extract two group factors from 14 indicators (see Table 2). According to the quantifiable degree of index information, two group factors in Table 2 are named explicit control right indicators (EC) and implicit control right indicators (IC). The government's control right is divided into explicit control rights and implicit control rights. The former refers to the information resources stipulated in the contract and the objective and quantifiable information owned by the government in practice; the latter refers to the information resources unique to the government and related to the characteristics.

**4.2. Entropy Weight.** Entropy is a kind of objective weighting method for each index of the system. The dispersion degree of indicators in the system is positively related to the influence of indicators on the evaluation of system weight. The higher the dispersion is, the higher weights can be assigned. The content of this study is to analyze the factors influencing government control rights from the perspective of investors. Investors need to judge which factors can influence the control of the government in the decision-making process. When the dispersion of data is not significant, it indicates that the influence of indications on government control rights in the decision-making process is consistent in the perception of investors. In this situation, the lower the deviation of the indication influencing different investors to judge the size of government control rights, the lower the weight. The study mainly considers the influence of investor opinion dispersion on government control rights. In this study, the scale of influence degree to measure the influence of indicators on government control rights. A higher dispersion indicates that the greater the influence of the indicators, the more important it is in the indicator system of government control rights for investors. Accordingly, the entropy weighing method is chosen to assign the importance of the selected factors based on the five steps of calculation in Xiao et al. [40]. The weights of indicators are shown in Table 3.

- (1) The initial score matrix of system index variables is constructed:

TABLE 3: Influence weight of control indicators.

First-class indicators	Second-class indicators	Influence weight ranking	Weights (%)
EC	<b>RR</b>	<b>1</b>	<b>9.04</b>
	E	2	8.45
	PPPN	3	7.84
	PS	5	7.43
	PP	6	7.34
	FC	8	7.05
	<b>PD</b>	<b>14</b>	<b>4.96</b>
IC	<b>S</b>	<b>4</b>	<b>7.48</b>
	T	7	7.18
	SL	9	6.90
	DA	10	6.75
	ROS	11	6.72
	AEI	12	6.62
	IN	13	6.26

$$A = \begin{Bmatrix} a_{11} & a_{12} & \cdots & a_{1m} \\ a_{21} & a_{22} & \cdots & a_{2m} \\ & & \cdots & \\ a_{n1} & a_{n2} & \cdots & a_{nm} \end{Bmatrix} A \tag{1}$$

$$= \{a_{ij}\} n * m (i = 1, \dots, n; j = 1, \dots, m).$$

Among them,  $a_{ij}$  is the evaluation value of the  $i$ th individual participating in decision-making on the  $j$ th factor variable. The effective sample  $n$  is 176, and the number of indicators to be evaluated by the government; that is, the government's control indicators is  $m = 14$ .  $A$  is a  $176 * 14$  matrix. Because the indicators of the study are positive indicators, all indicators show the degree of influence on the control right through the score, so there is no dimensional difference in the score, and the data need not be standardized [40].

- (2) Calculating the proportion of the  $i$ th case under the  $j$ -th indicator:

$$p_{ij} = \frac{a_{ij}}{\sum_{i=1}^n a_{ij}}, \quad i = 1, \dots, n; j = 1, \dots, m. \quad (2)$$

(3) Calculating the entropy of  $j$ :

$$e_j = -k \sum_i^n p_{ij} * \ln(p_{ij}). \quad (3)$$

Here,  $k = 1/\ln n > 0, e_j \geq 0$ .

(4) The entropy redundancy: the larger the entropy redundancy is, the more important the corresponding index is in the comprehensive evaluation.

$$h_j = 1 - e_j. \quad (4)$$

(5) The weight of each indicator:

$$\omega_j = \frac{h_j}{\sum_{j=1}^m h_j}. \quad (5)$$

## 5. Discussion

The perceived intensity of the government's explicit control indicators is slightly higher than that of the implicit control indicators ( $w_{EC} = 52.10\% > w_{IC} = 47.90\%$ ). In practice, the indicators of explicit control rights can be directly observed or measured by investors, which better reflect the actual control right of the government. In the reality of local economic development and resource allocation differences, the dispersion of investors' perception of explicit control rights in different governments will also become larger. At the same time, due to the universality of the administrative attribute of local government, investors tend to judge the implicit indicators of the government consistently. Therefore, implicit indicators have little influence on investors' judgment of government control rights.

However, implicit indicators are related to the cooperation experience of private capital, in addition to the characteristics of local governments. In the process of project cooperation, different governments have different administrative execution intensities (AEI), supervision level (SL), and trust (T). Investors with sensitivity or neuroticism will pay more attention to implicit information advantages such as the status of the government in the project, and act out of fear or attachment to high power, thus overestimating the government's control rights in PPP projects. Therefore, the weight of implicit control rights (IC) reaches 47.90%, which cannot be ignored in practice.

The indicators that affect investors' judgment of the government's explicit control rights mainly include the preferential policies provided by the government, equity ratio, the number of stocked or planned PPPs, risks ratio bore by the government, project scale, financial capacity, and the number of policy documents related to the project. The above indicators can be defined in the project contract or objectively measured by investors in practice, and the indicators do not change with the changes of investors. The equity ratio and risk ratio are related to the investment

amount and type of the project. In the face of different projects, there is a perception bias among investors, resulting in a greater influence on decision-making. According to Table 3, the proportion of risks borne by the government in the project has the greatest influence on the government's control right and is the most important indicator that affects investors' judgment of control right ( $w_{RR} = 9.04\%$ ), followed by the equity ratio agreed in the project contract ( $w_E = 8.45\%$ ). Controlling risk means mastering the development direction of a successful project, which is the basic condition of a successful project. The risk of the stakeholders corresponds to the risk cost one by one. The higher the risk the government takes, the stronger the government's attention to risk, participation in the decision-making process, and willingness to control decision-making. Therefore, the risk ratio reflects the responsibility and participation of the subject in the project. A larger proportion of risk-taking means that the stakeholders need to consider more information in the decision-making process and reasonably allocate all kinds of resources involved so as to reduce the probability of unreasonable decision-making and avoid the expansion of risk cost. In PPP projects, in order to avoid the imbalance of risk distribution. The risk of the project should be borne by the party that has the most control over the risk. Local governments and private capital should fulfill their obligations to bear risks in accordance with the contract. At the same time, local governments should avoid transferring unreasonable risks due to the abuse of administrative power.

The equity ratio ( $w_E = 8.45\%$ ) is the decisive factor in the distribution of corporate control rights. Generally, the higher the proportion of equity, the higher the decision-making right and voting rights. When the equity ratio is more than 50%, the decision-maker has a controlling interest in the enterprise. Therefore, the equity ratio is a direct measure of the government's control rights and is the basis for the government to participate in the decision-making of the project. However, due to the low equity of the government in PPP projects (not more than 20%) and the equity of large-scale projects is dispersed. It is difficult to concentrate on the project resource allocation and decision-making opinions. Therefore, in order to achieve the optimal allocation and management of project decision-making risk, a lot of project decisions are often undertaken by the stakeholders with more risk control power. The influence of the equity ratio on government control rights is slightly lower than that of risk allocation.

Table 3 shows that the number of policy documents related to the project ( $w_{PD} = 4.96\%$ ) has the least influence on government control rights. PPP policy documents are the unique dominant resources of the government, which can reflect the development plan of the government for PPP projects to a certain extent and the development trend of the project market. However, PPP policies are fixed and limited. Generally, the information displayed in policies has no difference between investors. Many policies have a great impact on the project market at the beginning of promulgation. With the progress of the project and the normal implementation of policies, the relevant regulations and laws

in PPP projects will gradually become fixed. Therefore, the policy has little influence on the size of government control rights.

The weight of preferential policies, the number of stocked or planned PPP, project scale, and financial capacity indicators is about 7%. These indicators reflect the ability of local governments to control local resources and the local competitiveness of local governments. Under the premise of taking political performance as the evaluation standard, the more these resources are, the more capable the local government is of investing in infrastructure construction, driving local economic growth, and guaranteeing social public services.

Indicators that investors judge the government's implicit control include the level of government supervision, the status of the cooperative government, the degree of accountability, the strength of administrative implementation, the degree of institution normalization, the rigor of the organizational structure of the cooperative government, and the trust of the government. These indicators cannot be measured objectively by investors. They can just make subjective judgments based on the experience of cooperation with the government. In the process of cooperation, when the local government shows a high demand for dignity, face, and prestige, that is, "putting on airs" or over the protection of status, investors will perceive that the status difference between government and enterprises is expanding, and then overestimate the actual control of the government. In addition, there are local, provincial and national differences in the status of the government. Accordingly, the government's status ( $w_s = 7.48\%$ ) has the largest weight in the implicit control rights. Status directly reflects the rights of the government. On the one hand, in the traditional Chinese culture, the government usually has a high status, and enterprises also have a fear of power because of the unequal status of cooperation. On the other hand, the high status indicates high image demand. The local government is the image representative of the country and the public. The high-quality public infrastructure can improve the government's image in front of the public. As the initiator of PPP projects, the government often bears the public blame and accusation brought by the failure of the project. They hope to maintain a good image and dignity in front of the public. Therefore, in the process of decision-making, there is the pressure that the government uses the status advantage to require private capital to make unreasonable decisions, which leads to the emergence of the "image project."

The degree of institution normalization ( $w_{IN} = 6.26\%$ ) has the smallest weight on the implicit control rights. Institution refers to the rules and regulations of behavior activities, which is the condition to ensure the consistency of individual behavior direction and organizational goals. The government institution is usually constrained by documents, and the behavior of each member needs to meet the requirements of the administrative system. However, in practice, there are still some government violations with "playing edge ball," such as regulating debt in disguised form. Therefore, in the process of PPP cooperation, when the government's behavior is unreasonable or lacks behavior

norms, investors have an insufficient perception of the dignity of the government and think that they pay less attention to the project, which reduces the original prestige of the government departments in the hearts of investors, and then reduces the perception of the size of control rights.

Compared with the level of government supervision, the degree of accountability, the degree of administrative implementation, the rigor of the government's organizational structure, and the trust of the government, the possibility of substantial changes of the government's institution with specific document stipulations possibility is low. However, the supervision level, administrative enforcement, and trust are not constrained by documents. They will change substantially with the differences of subjects and deviations in behavior activities. At the same time, in PPP projects, the level of supervision, the degree of accountability, the degree of administrative implementation, and other indicators are the performance of whether the government's administrative institution can be standardized and are the conditions for the realization of institution standardization. Therefore, the influence of these five indicators on the government's implicit control rights is greater than the degree of institution normalization (the weight is both about 7%).

According to the data in Table 1, the proportion of state-owned enterprises participating in PPP projects is higher than that of private capital. To a certain extent, it reflects the low degree of participation, low enthusiasm, and difficulty of domestic private enterprises in PPP projects; on the other hand, it reflects the phenomenon that the proportion of state-owned capital is too large. The main purpose of PPP is to attract more private capital to participate in it so as to reduce the financial burden and accelerate the development of the project. Therefore, the domestic PPP model system needs to be further improved.

## 6. Conclusion

Through theoretical and data analysis, the paper identifies 14 indicators that affect investors' evaluation of government control rights in PPP projects. According to the quantitative degree of the indicators and the corresponding information acquisition methods, the 14 indicators are divided into explicit control indicators and implicit control indicators, which measure the explicit control rights and implicit control rights of the government in PPP projects, respectively.

In order to consider the influence of investor opinion dispersion on government control rights. The entropy weighing method is used to assign the importance of the selected factors. Entropy weight shows that the implicit control right of government cannot be ignored. Among all the indicators, the risk ratio (9.04%) has the greatest influence on government control rights, followed by the equity ratio owned by the government (8.45%), and the third is the number of stocked or planned PPP projects (7.84%). These three indicators have significant differences in the perception of investors and are the basic information influencing the explicit control of the government. It shows that

investors pay priority to the equity and risk ratio agreed by the government in the contract, followed by the project resource information owned by the government as the project initiator. Among the top seven influencing factors, only the recessive index of government status advantage (7.48%) is included (ranking fourth). It shows that investors pay more attention to the obvious control information, which can be observed directly. The position advantage with regional differences is unique to the government. The fixed characteristics formed in Chinese cultural tradition have a great influence on investors' decision-making.

In order to reduce the judgment bias of investors on government control rights in the decision-making process, some advice is provided as follows.

In PPP project cooperation, stakeholders should first try to improve the definition of relevant explicit information in the contract. Secondly, the importance of the contract as the basis of decision-making should be emphasized, and the interference of implicit information in investors' decision-making should be avoided. Finally, investors should cooperate equally with the government on a legal basis, should not have the tendency of status, authority, and power, and should avoid the negative impact of subjective and irrational control rights information judgment on decision-making. The findings provide theoretical support and practical guidance for investors to recognize and evaluate the size of government control rights in PPP projects and have important theoretical and practical significance for improving the governance mechanism of government control allocation.

### 6.1. Contributions, Limitations, and Future Directions.

Theoretical significance: first, the research is conducive to further improving the evaluation system of government's control rights in PPP projects and verifying the impact of various indicators in the literature on control right; Second, based on the influence of stakeholders, this paper evaluates the government's control rights from the perspective of investors, and discusses the way investors judge the government's control rights, which is helpful to guide investors to make a rational decision in practice; Third, the weight analysis of control indicators is helpful for investors to consider the importance of different indicators.

Practical significance: This paper provides guidance and suggestions for reducing the subjective judgment of government control rights in the decision-making process of investors. This can reduce the irrational decision-making risk caused by the perception deviation of control right in the practice process, achieve partnership sustainability, save the project cost and promote the project's success.

Research deficiencies and future research: due to the limitations of research, the factors identified in this paper that influence the government's control rights may be missing. The sample size may be slightly small because of the higher requirements for participants. In the follow-up study, the shortcomings of this paper should be improved. Secondly, based on the study, the influence of the government's

control rights on investors' behavior (such as conformity) can be discussed; Thirdly, from the cultural differences between China and the West, the perception and evaluation of investors or governments on control rights in different cultural backgrounds can be analyzed.

## Data Availability

Some or all data, models, or code that support the findings of this study are available from the corresponding author upon reasonable request.

## Conflicts of Interest

The authors declare that there are no conflicts of interest.

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## References

- [1] X. S. Ye, P. C. Yi, and S. X. Wu, "The discussion of PPP project control rights' essence," *Science & Technology Progress and Policy*, vol. 28, no. 13, pp. 67–70, 2011.
- [2] N. S. Mansor and K. A. Rashid, "Incomplete contract in private finance initiative (PFI) contracts: causes, implications and strategies," *Procedia-Social and Behavioral Sciences*, vol. 222, pp. 93–102, 2016.
- [3] L. Deng, P. Jiang, S. F. Li, and M. Q. Liao, "Government intervention and firm investment," *Journal of Corporate Finance*, vol. 63, Article ID 101231, 2020.
- [4] J. Q. Liu, J. J. Liu, and N. N. Liu, "Government's control rights influence investor's escalation of commitment in PPP project: regulating effect of other-face concern," *Physica A: Statistical Mechanics and Its Applications*, vol. 545, Article ID 123617, 2020.
- [5] H. Sun and X. Ye, "Study of the allocation of residual control rights in the public-private partnership under incomplete contracts," *Journal of Systems Engineering*, vol. 28, no. 2, pp. 227–233, 2013.
- [6] A. Babeau, A. A. Berle, G. C. Means, and A. Babeau, "The modern corporation and private property," *Revue Économique*, vol. 20, no. 6, 1969.
- [7] A. MacDonald, A. Clarke, and L. Huang, "Multi-stakeholder partnerships for sustainability: designing decision-making processes for partnership capacity," *Journal of Business Ethics*, vol. 160, no. 2, pp. 409–426, 2019.



- [8] D. Chappell and M. Jacob, "Role of the glycocalyx in fluid management: small things matter," *Best Practice & Research Clinical Anaesthesiology*, vol. 28, no. 3, pp. 227–234, 2014.
- [9] J. Yang, D. Lu, and D. Yang, "State-owned enterprises' government control right transfer," *Economic Research Journal*, vol. 45, no. 2, pp. 69–82, 2010.
- [10] R. N. Langlois, "The entrepreneurial theory of the firm and the theory of the entrepreneurial firm," *Journal of Management Studies*, vol. 44, no. 7, pp. 1107–1124, 2007.
- [11] S. J. Grossman and O. D. Hart, "The costs and benefits of ownership: a theory of vertical and lateral integration," *Journal of Political Economy*, vol. 94, no. 4, pp. 691–719, 1986.
- [12] M. C. Jensen and W. H. Meckling, "Theory of the firm: managerial behavior, agency costs and ownership structure," *Journal of Financial Economics*, vol. 3, no. 4, pp. 305–360, 1976.
- [13] I. J. A. Dyck and L. Zingales, "Private benefits of control: an international comparison," *SSRN Electronic Journal*, vol. 59, no. 2, pp. 537–600, 2004.
- [14] B. Guo and M. Luo, "Allocation of control right between the participants of building information modeling-integrated project delivery project from the perspective of knowledge sharing," *International Journal of Electrical Engineering Education*, Article ID 002072092092853, 2020.
- [15] Y. Zhang, J. Feng, and S. Yang, "Allocation of control rights in the PPP project: a cooperative game model," *IOP Conference Series: Earth and Environmental Science*, vol. 69, no. 1, Article ID 012075, 2017.
- [16] D. Liu, W. Mo, and C. Yin, "Impact of rule governance mechanism on project performance in public rental housing PPP projects: control rights as a moderating variable," *Discrete Dynamics in Nature and Society*, vol. 2021, Article ID 5557941, 13 pages, 2021.
- [17] S. Q. Wang, D. Wu, W. Peng, and Q. Cui, "Allocation of control rights between governments and companies in urban development PPP projects," *Journal of Tsinghua University*, vol. 57, no. 4, pp. 369–375, 2017.
- [18] Z. Zhang, M. Jia, and D. F. Wan, "Theoretical study on the efficient allocation of control rights in the public-private partnership (PPP)," *Journal of Industrial Engineering and Engineering Management*, vol. 23, no. 3, pp. 23–29, 2009.
- [19] C. Panico, "Control and contract design in research collaborations: a complete contract perspective," *International Journal of Industrial Organization*, vol. 30, no. 5, pp. 459–470, 2012.
- [20] O. Hart and J. Moore, "Foundations of incomplete contracts," *The Review of Economic Studies*, vol. 66, no. 1, pp. 115–138, 1999.
- [21] O. Hart, A. Shleifer, and R. W. Vishny, "The proper scope of government: theory and an application to prisons," *Quarterly Journal of Economics*, vol. 112, no. 4, pp. 1127–1161, 1997.
- [22] M. Dewatripont and J. Tirole, "A theory of debt and equity: diversity of securities and manager-shareholder congruence," *Quarterly Journal of Economics*, vol. 109, no. 4, pp. 1027–1054, 1994.
- [23] Z. G. Zheng, "How to choose the corporate governance mode in the era of equity decentralization," *Securities Market Herald*, vol. 12, 2016.
- [24] H. L. Wang and D. Y. Feng, "The culture interpreting of China's listing abroad companies' management structure," *Management World*, vol. 7, pp. 151–152, 2006.
- [25] A. A. Alchian and H. Demsetz, "Production, information costs, and economic organization," *IEEE Engineering Management Review*, vol. 3, no. 2, pp. 21–41, 1975.
- [26] D. X. Zhang and B. Deng, "Performance of the Chinese financial holding companies in the financial crisis: a perspective of the micro-agent's risk control rights allocation," *Journal of Management Sciences in China*, vol. 16, no. 7, pp. 70–83, 2013.
- [27] J. C. Liu, J. Q. Liu, and Y. N. Zhou, "Impact of face concerns on stakeholder's escalation of commitment in PPP project: base on the government and private sector," *Journal of Industrial Engineering and Engineering Management*, vol. 33, no. 4, pp. 167–175, 2019.
- [28] H. Sun and Y. T. Yang, "Evaluation of factors influencing allocation of control rights in PPP projects," *Project Management Technology*, vol. 14, no. 5, pp. 13–19, 2016.
- [29] B. Chen and M. Gao, "Golden rules of management in Chinese face culture: based on cultural ecosystem theory," *Chinese Journal of Management*, vol. 7, no. 6, pp. 797–803, 2010.
- [30] D. Eek and R. Bo, "Exploring a causal relationship between vertical and horizontal trust," 2005, <http://hdl.handle.net/2077/39200>.
- [31] B. Wang, Y. G. Liu, and C. H. Zeng, "The influence of trust on the allocation of corporate control," *Economist*, vol. 1, pp. 49–56, 2011.
- [32] C. F. Sabel, "Studied trust: building new forms of cooperation in a volatile economy," *Human Relations*, vol. 46, no. 9, pp. 1133–1170, 1993.
- [33] L. Wang, "Specific investment, trust and control rights governance in venture capital-backed entrepreneurial firms," *Management Sciences in China*, vol. 5, pp. 50–68, 2014.
- [34] R. J. Bennett and S. L. Robinson, "Development of a measure of workplace deviance," *Journal of Applied Psychology*, vol. 85, no. 3, pp. 349–360, 2000.
- [35] N. Zainul Abidin, N. Yusof, and A. A. E. Othman, "Enablers and challenges of a sustainable housing industry in Malaysia," *Construction Innovation*, vol. 13, no. 1, pp. 10–25, 2013.
- [36] H. E. A. Tinsley and D. J. Tinsley, "Uses of factor analysis in counseling psychology research," *Journal of Counseling Psychology*, vol. 34, no. 4, pp. 414–424, 1987.
- [37] R. Osei-Kyei and A. P. C. Chan, "Comparative analysis of the success criteria for public-private partnership projects in Ghana and Hong Kong," *Project Management Journal*, vol. 48, no. 4, pp. 80–92, 2017.
- [38] R. B. Kline, *Principles and Practices of Structural Equation Modeling*, Guilford, New York, NY, USA, 1998.
- [39] R. P. Bagozzi and D. F. Larcker, "Evaluating structural equation models with unobservable variables and measurement error: a comment," *Journal of Marketing Research*, vol. 18, no. 3, pp. 375–381, 1981.
- [40] Y. L. Xiao, X. J. Liu, and J. B. Liu, "The method of giving weight for performance indicator based on entropy method," *Journal of the Daqing Petroleum Institute*, vol. 29, no. 1, pp. 107–109, 2005.