Трек 200.3: «Управление инвестиционными проектами»

Прочитайте статью[1] и сделайте её критический анализ на русском языке.

1. Introduction

Public-private partnerships (PPPs) have been widely used in the world to achieve sustainability goals over the past 30 years. PPPs are a contractual form of cooperation between public and private sectors in the development of infrastructural facilities, and refers to allocation of risks and rewards. Risk is seen as an uncertain possibility, and risk allocation refers to which parties assume the risk. Generally, private firms are willing to accept appropriate risks arising from the design, construction, operation, and maintenance of a project. Governance is defined as the traditions and institutions by which authority in a country is exercised. Therefore, governance environment is the extent of rules and requirements that have been conformed by individuals and organizations. If a country's governance environment is weak, private firms are exposed to risks of contract cancellation or opportunistic renegotiation. Compared with developed countries, developing countries have greater difficulty attracting private investors to PPP projects, because investors must assume more uncertainty and risk (e.g., demand risk and policy risk) in developing countries with poor governance environment. It is valuable to study private investment in developing countries' PPP projects from a risk-transfer perspective under a specific governance environment.

2. Risk allocation, governance environment and private investment: theories and hypotheses

Before entering the PPP market in (e.g., in PPP procurement stage), private investors pay particular attention to risk allocation, because sharing or transferring some risks to private partners is one main motivation for governments to adopt PPPs (Girth, 2014). PPP projects have many kinds of risk, including project-level risks (e.g., design, construction, finance, and ownership risks) and market-level risks (e.g., demand and investment environment risk). The allocation, transfer, and management of risk impact the quality of public and private partner relationships (Burke and Demirag, 2017). The smaller the degree of risk misallocation, the more successful PPP projects would be in attracting private investment (Ke et al., 2009). Generally, if investors assume more risk, there may be more gains for them. However, Kahneman and Tversky (1979) showed that individuals were more likely to choose certain gains rather than probable outcomes even if the probable outcome has a higher utility. Therefore, project investors are risk-averse in the project procurement or initiation stage. Less risk indicates higher degrees of certainty about return on investment. In the water industry, private sectors or foreign investors invest in a project only when it is easier to recover costs and commercial risk is relatively low (Albalate et al., 2013). When the cost sharing rate for private partners is low, the project may attract private investment in infrastructure earlier (Takashima et al., 2010). Hence, the first Hypothesis follows:

Hypothesis 1. *Private investors assume low risk will encourage more private investment in PPP projects.*

Kaufmann et al. (2011, p,222) argues that governance includes (a) the process by which governments are selected, monitored and replaced; (b) the capacity of governments to effectively formulate and implement sound policies; and (c) the respect of citizens and the state for the institutions that govern economic and social interactions among them. The above three respects of governance include six dimensions: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. The definition of governance and its six dimension provide a useful way to think about a governance environment for a country, as well as a useful way to organize an empirical governance study, because data in all six dimensions of governance are publicly available in the World Bank's Worldwide Governance Indicators (WGI) database. This study uses the Kaufmann et al. definition of governance.

Risk allocation affects private investment in PPP projects, moderated by the governance environment of a country. PPP markets in countries with good governance environment have matured, and thus private investors have full confidence in their cooperation with governments. However, this confidence is rather different in a poor governance county (Osei-Kyei and Chan, 2017). In the PPP procurement phase, good governance environment will increase project investors' expected utility, but poor governance environment may increase their extra budget expenditures and reduce the expected gains. Confronting the expected gains, investors are unwilling to give up what they will have and act in a risk-averse way. People can experience loss aversion for goods they never owned. Therefore, the governance environment may be the moderator of loss aversion.

Corruption has been broadly defined as the misuse of public offices for private gain, including petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Generally, high levels of corruption distort government decision-making and increase market risks (e.g., immature juristic system risk and illegal risk), thereby affecting private investors' decisions. Compared with developed countries, corruption is viewed as a major barrier to development and

negatively impacts the level of domestic private investment and foreign direct investment (FDI) in developing countries. Therefore, a country with high level of corruption has increased risk for private investors doing business with such governments, hindering and damaging private sectors' investment in PPP projects. In China, private investors are under great pressure to spend a great deal of money to establish the culture of guanxi (relationship) with local governmental officers, and this has hampered the investment efficiency. In Eastern European countries, administrative reform facilitates transparent governance, which contributes to curbing corruption and attracting foreign investment. Hence, the second hypothesis follows:

Hypothesis 2. *The effect of H1 is intensified in countries with greater control of corruption.*

Government effectiveness represents the quality of public services and the capacity of governments. Government effectiveness also reflects the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Highly valued government effectiveness indicates that the government adopts effective and proactive managerial behaviors, actions, and strategies to elicit high performance in various economic sectors. PPP projects involve long-term collaboration. If developing countries' governments have a fragmented administrative structure, and low technical and management capacity of the relevant organization would cause private partners to assume more risk to negotiation with the government. Higher risk (e.g., poor political decision-making risk, government intervention risk, and improper-contracts risk) leads to prudent investments for private investors. Therefore, it is unsurprising that ineffective governments often have few PPP projects and few private investments. On this basis, this paper hypothesizes that government effectiveness would be the moderator.

Hypothesis 3. *The effect of H1 is intensified in countries with higher government effectiveness.*

Political stability means government's durability and integrity; such a government would not be destabilized by unconstitutional or violent means. The political instability made a tougher business climate and leaded to reduction of private investment. If a country had a more stable political environment, private sectors would be likely to invest because political stability can reduce nationalization risk, currency risk, inflation risk, financing risk, payment risk, and so on. Therefore, the fourth hypothesis that can be inferred from the above theories follows:

Hypothesis 4. *The effect of H1 is intensified in countries with higher political stability.*

Regulatory quality is the ability of government to provide effective regulations that permit and promote private sector development. In public and private collaboration, governments not only provide service for private sectors, but also to monitor the market. Therefore, a sound regulatory institution and environment is essential. High quality regulation provides the basis for the development of private capital, protects the private sector's rights and property, and respects contractual agreements. Petersen (2010) found that regulatory difficulties caused PPPs in Denmark to fail to begin. In PPP markets, a country's regulatory institution can safeguard the PPP contractual agreement to reduce risks assumed by private partners (e.g., uncompetitive tender risk, operation cost overrun risk, and opportunistic behavior risk). Thus, regulatory quality will be a positive determinant to attract private investors by reducing private investor risks:

Hypothesis 5. *The effect of H1 is intensified in countries with higher regulatory quality.*

Rule of law is the extent to which agents have confidence in and abide by the rules of society, including the quality of contract enforcement, property rights and judicial independence. Rule of law means governments treat public and private sectors equally when disputes arise caused by an unforeseen event. If a country or a region does not obey the law, it increases risk for private companies engaging in the PPP market. Higher rule of law can protect markets from expropriation risk, thereby fulfilling concession contract agreements, which would help increase private investors' confidence and attract more private participation.

Hypothesis 6. *The effect of H1 is intensified in countries with higher compliance with the law.*

Voice means a country's citizens are able to participate in selecting their government, and participate in the decision making process of their government, as well as having freedom of expression. Voice also reflects whether citizens can hold governments accountable for actions taken. Through public participation, governments, markets, and society can know citizens' voice. Some studies show that public involvement can improve support from citizens and political leaders for PPPs in the US transportation sector, thereby attracting more private investment. However, it was pointed out that governments very seldom invite the public to have their say in the process of PPPs, especially in developing countries. Lack of public engagement would transfer more risk to private partners (e.g., public/political opposition risk). In sum, in developing countries, the citizen and private sector's concerns for transparency and accountability need to be accommodated, and the private sector needs reassurance about the safety of investments. With public participation, PPP projects can minimize the risk of conflicts with critical stakeholders like customers and nongovernmental organizations (NGOs). Therefore, the seventh hypothesis, inferred from the above studies, follows:

Hypothesis 7. *The effect of H1 is intensified in countries with higher voice.*

Considering each of the above factors, Fig. 1 depicts the analytical framework. This paper is a correlational field research, which is an empirical design to test a research question. According to the research questions, several independent, dependent, moderators and control variables combine to form research hypotheses. Then, methods are selected to help test hypotheses, and answer the research question.

3. Variables, data and method

This paper explores risk allocation and governance impact on private investment in developing countries. Private investment in a PPP project is measured as the percentage of Special Purpose Vehicle (SPV) owned by private sponsors (percentage private). A SPV is a legal entity created for narrow, specific or temporary objectives. A higher percentage of the SPV owned by private sponsors means higher degrees of private investment. The dependent variable data (percentage private) comes from the PPI database. The value of percentage private ranges from 0% to 100%. The entry of each PPP project in the PPI database yields the percentage of private equity of project investment.

The independent variable is risk allocation. Contracts display various risk assumptions that can be displayed in contracts because contracts define residual control rights. Residual control rights indicate control of ownership, and ownership determines who assumes risk and who benefits from service delivery. The higher the degree of residual control rights and ownership, the higher the degree of risk assumption. A private investor who assumes greater risk would have more residual control rights over the asset.

According to the PPI database, PPP contracts can be classified into 10 subtypes and grouped into three categories (see Appendix Table A1). These PPP contracts can be ranked by risk transfer from governments to private partners. Table 1 shows the PPP risk ranking index. The index is a subjective ranking of risk transfer across types of PPPs. A higher index indicates a higher degree of risk transfer from public to private partners. For the type of contracts: (1) the risk transfer indices of management and lease contracts are 1 and 2 respectively. Private investors do not have ownership; rather, they are only responsible for operations and maintenance risk over a short time (e.g., 3–5 years). (2) The indices of rehabilitate-operate-transfer, rehabilitate-lease/rent-transfer and build-rehabilitate- operate-transfer are 3, 4 and 5 respectively. Private investors do not have ownership, but they are responsible for operation and maintenance risk over a long period (e.g., 20–30 years). (3) The indices of build-lease-transfer, build-operate-transfer, build-own-operate, merchant and rental are 6, 7, 8, 9, and 10 respectively. Private investors have ownership over a long period (e.g., 20–30 years), and are responsible for building, operating, and maintaining risk during this period.
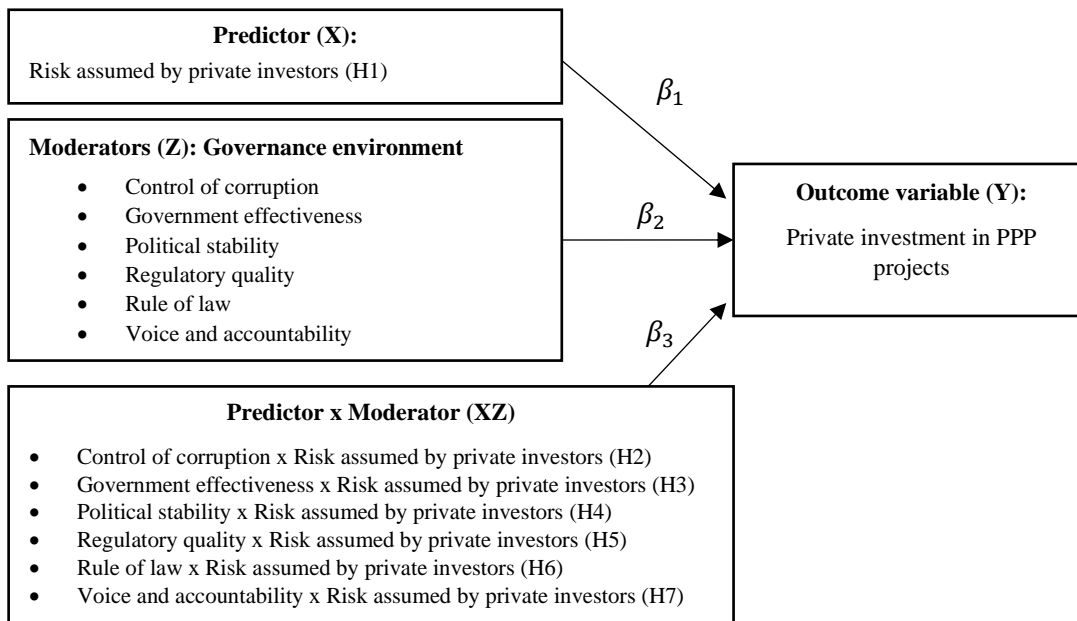

Figure 1. Research framework. Note: The basic moderation model: $Y = a + \beta_1 X + \beta_2 Z + \beta_3 XZ + e$. Where β1 is the coefficient relating the predictor variable, X, to the outcome, Y, when Z = 0. β2 is the coefficient relating the moderator variable, Z, to the outcome Y, when X = 0. β3 is the coefficient relating the interaction variables, XZ, to the outcome Y. β3 provides an estimate of the moderation effect. a is the intercept in the equation, and e is the residual in the equation.

This paper used the subjective ranking index to stand for risk allocation for two reasons. First, the subjective ranking index of risk transfer has an advantage. For example, according to the type of contract, it can reflect the risk allocation from a macro perspective. Thus, the ranking index can make a risk-allocation comparison among PPP projects and provide the possibility for large-N sample studies. Second, previous studies has used the same research design.

Table 1. Classification of PPP contracts according to risk transfer.

Type	Subtype	Risk ranking index for the subtype
Operations and maintenance (public ownership of the facilities)	Management contract	1
	Lease contract	2
Concessions (public ownership of the facilities)	Rehabilitate-operate-transfer (ROT)	3
	Rehabilitate-lease/rent-transfer (RLT)	4
	Build-rehabilitate-operate-transfer (BROT)	5
Greenfield projects (private ownership of the facilities)	Build-lease-transfer (BLT)	6
	Build-operate-transfer (BOT)	7
	Build-own-operate (BOO)	8
	Merchant	9
	Rental	10

A moderator is a variable that influences the strength or direction of relationships between independent and dependent variables. In this paper, moderator variables are governance-environment factors, operationalized using the World Bank's WGI database. The data on those factors combine the views from a variety of credible sources (enterprise, citizen and expert survey respondents in industrial and developing countries), and are produced by a variety of survey institutes, think tanks, NGOs, international organizations, and private sector firms. The value of these indicators ranges from 0 (poor performance of governance) to 100 (strong performance of governance). This paper uses the natural logarithm of these scores to represent moderator variables.

Control variables include two aspects: project-specific and country-specific. Project-specific variables are variables from a micro-perspective to depict PPP project information. Country specific variables are variables from a macro-perspective to depict a country's situation.

Project-specific variables:
1. PPP experience. Earlier experiences of PPP adoption by the state affect the probability of attracting private investment to PPPs, because the government can learn about earlier PPP experiences. Two variables measuring past PPP experiences of a country were created: success and failure. If a country has no prior experience, the variable is set to 0.
2. Concession duration. This indicator measures if the contract period impacts private investment. Longer PPP contracts may allow investors control of the infrastructure asset for a greater period of time, and easily argued, is to the private investor's advantage. However, Wang et al. (2018) show a negative significant correlation between length of contract and private investment. The possible reason is that if a PPP project has a longer concession duration, it means the private consortium needs a longer period to recover its investments. Therefore, a long contract period hinders private investment.
3. Number of sponsors. This control variable captures the effect of the number of private sponsors in a PPP project. Large numbers of investors form big conglomerates, usually associated with higher complexity, increased need for coordination, and, in turn, increased transaction costs, thereby decreasing the attractiveness of private participation. A consortium with a foreign private sponsor has a greater chance of attracting more private investment because the existence of multinational enterprises can indicate a more open market for investors. This is a dummy variable. If a project has a foreign investor, the value of *foreign sponsor* is 1; 0 otherwise.
4. Multilateral lenders. This variable reflects whether multilateral lenders (e.g., World Bank and Asian Development Bank) participate in a particular PPP project. This is a dummy variable.

Country-specific variables:
1. Economic growth. This variable was measured as average annual GDP growth one year before of the financial closure of the PPP contract. This is a dummy variable. If the GDP growth is negative, the value of this dummy is 0. If GDP growth is between 0 and <3%, the value is 1; between 3 and 6%, the value is 2; if it more than or equal to 6%, the value is 3.
2. Country's income. This study argues that richer countries rely less on private investment in developing countries, because these countries have sufficient government funds for infrastructure development. Developing countries can be classified in three groups based on per capita income: low income; lower middle-income; and upper-middle-income. This control variable is a dummy. The upper-middle-income variable was 1 if the PPP project was in an upper-middle income country, 0 otherwise.
3. Country's region. Regions where PPP projects are located usually have various cultural and socioeconomic characteristics. This paper created three dummy variables: Asia was 1 if the PPP project was in southern Asia, eastern Asia, and the Pacific region, 0 otherwise. Africa was 1 if the PPP project was in Sub-Saharan Africa, the Middle East, or northern Africa regions, 0 otherwise. Latin was assigned 1 if the PPP project was in Latin America and the Caribbean region, 0 otherwise. PPP projects in Europe and Central Asia regions were taken as the base case, represented when the three dummy variables became 0.

The final cross-sectional data include projects in 138 developing countries from 2001 to 2015. These developing countries are distributed in Africa, Asia, Latin America, and the Middle East. The year means the date of PPP financial

closure, representing the amount of private investment stated in the final contract. Country specific control variables are in the year preceding financial closure of the PPP contract. Therefore, variables from the WDI are from 2001 to 2014, and variables from the PPI and WGI are from 2002 to 2015. Descriptive statistics of all variables appear in Table 2.

WGI data sources include surveys of firms and households, as well as subjective assessments of a variety of commercial business-information providers, NGOs, and a number of multilateral organizations and other public sectors.

The dependent variable, percentage private, is a ratio from 0 to 100%. The appropriate statistical model is the Tobit regression model (also called a censored regression model), designed to estimate linear relationships between variables with either left- or right-censoring in the dependent variable (also known as censoring from below and above, respectively). In this paper, all data are at 0 or above 0. Thus, censoring from above takes place. Therefore, this paper applies Tobit model regression.

Dependent (private investment) and independent variables (risk allocation) are at the project-level. Their relationship may have an endogeneity problem. In particular, private-investment decisions may affect a project's risk-allocation strategy ("reverse" causation). To address the possible endogeneity and measurement error biases of the regression model, an increasing number of studies since the 1970s have turned to instrumental variables regression (IV regression). The main requirement for using IV is that the IV should correlate with the endogenous independent variables. If this correlation is strong then IV is said to have a strong first-stage.

This paper creates risk allocation at the sector-level as the IV in the Tobit regression model. Sector-level risk allocation (subtype-IV) is exogenous to private investment decisions at the project-level. The project-level risk-allocation strategy (subtype) is often influenced by its sector's risk allocation (subtype IV). The index of sector-level risk allocation (e.g., transport, water and sewerage, energy, and information communications technology sectors) in a country can be calculated as follows: First, a project's investment accounts for the proportion of total investment in all projects in the sector as a weight coefficient; second, sector-level risk allocation (subtype-IV) in a country accrues from the average value of the weight coefficient times the index of subtype for every project. This is an IV-estimation strategy, often used in political science and social science to address the endogeneity problem.

Table 2. Descriptive statistics

	Variables	Source	Obs	Mean	S.D.	Min	Max
Dependent variable	Percentage private	PPI	4563	0.925	0.182	0.050	1.000
Independent var.	Subtype	Percoco (2014); Zhang (2014)	4563	6.839	2.1837	1	10
Moderator variables	ln(Control of corruption)	WGI	4556	3.642	0.540	−0.747	4.519
	ln(Effectiveness)	WGI	4554	3.873	0.470	−0.723	4.475
	ln(Political stability)	WGI	4550	3.138	0.761	−0.747	4.561
	ln(Regulatory quality) ln(Rule of law)	WGI	4560	3.791	0.465	−0.747	4.537
		WGI	4553	3.714	0.500	−0.747	4.494
	ln(Voice and accountability)	WGI	4561	3.361	0.974	−0.737	4.493
Control variables (project specific)	Success experience	PPI	4563	335.00	328.05	−0.756	1213
	Failure experience	PPI	4563	15.105	13.868	0	42
	Contract period	PPI	4563	22.807	9.451	0	99
	Sponsors	PPI	4559	1.330	0.703	1	9
	Foreign sponsor	PPI	4559	0.395	0.489	0	1
	Multilateral lenders	PPI	4563	0.108	0.310	0	1 3
Control variables (country specific)	GDP growth	WDI	4562	2.392	0.833	0	1
	Country's income	PPI	4563	0.375	0.484	0	1
	Country's region (Asia)	PPI	4563	0.518	0.500	0	1
	Country's region (Africa)	PPI	4563	0.104	0.305	0	1
	Country's region (Latin)	PPI	4563	0.269	0.444	0	

4. Results

The empirical models appear in Tables 3 and 4. Model 1a consists of control variables only and demonstrates the appropriateness of the control variables chosen to estimate the dependent variable (percentage private). Model 2a reports the results of Tobit regression among the dependent variable, independent variable (subtype), and all control variables without controlling for endogeneity and measurement biases. In model 3a, to address possible endogeneity and measurement error biases, this paper added the subtype-IV. In model 3a, the Durbin-Wu-Hausman (DWH) Chi^2 test is significant (p < .01), which means endogeneity exists between the independent and dependent variables. The first-stage F-value (84.66) is larger than the critical value of 16.38, which is supported by Stock and Yogo (2005). This indicates that subtype-IV is an effective instrument variable for the subtype variable. In model 3a, risk transfer to private partners has a negative impact on private investment (β = −0.245, p < .01), which means more risks assumed by private partners would hinder their investment.

For control variables, the contract period (β = −0.012, p < .01) has negative impacts on private investment, which means long-term contract duration would hinder private investment. The possible reason is that a long-term contract means a large scale and complex project. A large project needs huge investment, more professional technique, and risk-management

methods, but private investors do not have the capacity to do it. Failure experiences ($\beta = -0.002$, p < .05) also have negative impacts on private investment. However, successful experiences were insignificant. Unsuccessful PPP projects in the past indicated governments engendered long-lived negative perceptions of their operations and management of PPP projects, thereby discouraging future private investments. According to the prospect theory, individuals are loss averse, because disadvantages of losing it loom larger than advantage of getting it. Losses hurt more than equal gains.

Foreign sponsor ($\beta = 0.140$, p < .1), multi lenders ($\beta = 0.031$, p < .01), country's income ($\beta = 0.194$, p < .01), and the Latin region ($\beta = 0.228$, p < .01) have positive impacts on private investment.

Table 3. Effect of risk allocation on private investment: Basic relationship and IV-estimation.

Variables	Model 1a: Tobit	Model 2a: Tobit	Model 3a: IV-Tobit
Subtype		−0.075*** (0.007)	−0.245*** (0.016)
Success experience	0.001 (0.002)	0.001 (0.002)	0.002 (0.002)
Failure experience	−0.003** (0.001)	−0.002*** (0.001)	−0.002** (0.001)
Contract period	−0.012*** (0.002)	−0.013*** (0.001)	−0.012*** (0.001)
Sponsors	0.022** (0.021)	0.003** (0.021)	0.020 (0.028)
Foreign sponsor	0.150*** (0.030)	0.149*** (0.030)	0.140* (0.030)
Multi lenders	0.028* (0.045)	0.030** (0.044)	0.031*** (0.045)
GDP growth	0.064 (0.020)	0.058** (0.020)	0.065 (0.021)
Country's income	0.150*** (0.042)	0.149*** (0.044)	0.194*** (0.044)
Asia region	0.044 (0.060)	−0.007 (0.059)	−0.014 (0.061)
Africa region	−0.083 (0.059)	−0.151** (0.058)	−0.054 (0.059)
Latin region	0.237*** (0.052)	0.175*** (0.051)	0.228*** (0.052)
Trend	0.083** (0.004)	0.062*** (0.004)	0.064*** (0.004)
Cons	1.597*** (0.078)	2.214*** (0.101)	1.650*** (0.080)
Pseudo R-squared	0.310	0.343	
DWH Chi^2			10.97***
First-stage F-value			84.66
IV t-value			11.08

*Notes: DWH = Durbin-Wu-Hausman. Standard errors are in parenthesis below the coefficient. *, ** and *** denotes 10%, 5% and 1% level of significance, respectively.*

Table 4. Moderate effect of governance environment and risk allocation on private investment (IV-Tobit regression).

	Model 1b	Model 2b	Model 3b	Model 4b	Model 5b	Model 6b
Subtype	−0.814*** (0.178)	−1.393*** (0.254)	−0.435*** (0.120)	−1.264*** (0.237)	−0.705*** (0.199)	−0.049 (0.074)
ln(Control of corruption)	0.303** (0.148)					
Subtype*ln(Control of corruption)	0.130*** (0.049)					
ln(Effectiveness)		−0.735*** (0.197)				
Subtype* ln(Effectiveness)		0.271*** (0.065)				
ln(Political stability)			0.261** (0.110)			
Subtype* ln(Political stability)			0.030 (0.036)			
ln(Regulatory quality)				0.657*** (0.191)		
Subtype* ln(Regulatory quality)				0.242*** (0.062)		
ln(Rule of law)					0.257 (0.159)	
Subtype* ln(Rule of law)					0.097** (0.053)	
ln(Voice and accountability)						0.467*** (0.070)
Subtype* ln(Voice and accountability)						0.123 (0.023)
Cons	3.720*** (0.557)	5.497*** (0.780)	3.482*** (0.381)	5.129*** (0.744)	3.594*** (0.598)	1.113*** (0.238)
Project specific control variables	yes	yes	yes	yes	yes	yes
Country specific control variables	yes	yes	yes	yes	yes	yes
Observations	4551	4549	4545	4555	4548	4557
DWH Chi^2	17.20***	16.95**	17.28***	16.88***	17.20**	16.07***
First-stage F-value	86.57	85.02	88.43	85.50	86.21	85.00
IV t-value	9.44	9.86	9.09	9.12	9.65	9.31

*Notes: Standard errors are in parenthesis below the coefficient. *, ** and *** denotes 10%, 5% and 1% level of significance, respectively.*

The engagement of foreign investors and multi lenders in an SPV can attract private investment, perhaps because it indicates a more open society, where foreign investors and foreign financial institutions may wish to support local infrastructure development. For country-specific variables, private investors prefer to invest in a richer country that has sufficient financial resources to support PPP projects. In addition, the Latin region has more experience attracting private investment; this is an important factor in attracting private investment.

Table 4 examines the moderating effects of governance environment on the relationships between risk allocation and private investment. Six models (1b-6b) tested the interaction between six dimensions of governance environment and risk transfer, respectively. The six models detected significant moderating effects for the positive interaction between control of corruption and risk transfer ($\beta = 0.130$, $p < .01$), government effectiveness and risk transfer ($\beta = 0.271$, $p < .01$), regulatory quality and risk transfer ($\beta = 0.242$, $p < .01$), and rule of law and risk transfer ($\beta = 0.097$, $p < .05$). These results show that negative effects of risk assumed by private partners on private investment decreases with a good institutional environment (e.g., control of corruption, high level of government effectiveness, good regulatory quality, and abiding by rule of law). In other words, private investors assuming low risk encourages more private investment in PPP projects, intensified by a higher governance environment. These findings indicate that investors are more likely to reduce risks when they face expected gains in a good governance environment, and confirm that the governance environment plays the moderator for the effect of risk aversion. However, the interaction between political stability and risk transfer, and voice and risk transfer were not significant. These two governance indicators cannot enhance or dampen the negative influence of risk allocation on private investment.

This study performed some robustness checks to validate the results and assess their consistency. The robustness check examines how certain core regression coefficient estimates behave when the regression model is modified by adding, removing, or changing variables. For parsimony, this paper did not tabulate outcomes but summarized them below. This research assessed robustness in two ways. First, the robustness of the findings was tested by changing methods. Because the dependent variable was the ration from 0 to 100%, this paper re-ran the regression adopting the generalized linear model (GLM) proposed by Papke and Wooldridge (1996). Comparing the two models adopted (Tobit and GLM models), significant consistency emerged. The independent variable (subtype) and moderator variables (control of corruption, government effectiveness, regulatory quality, and rule of law) have significant and correctly signed coefficients.

Second, the robustness of the findings was tested by changing data for the moderating variables. In the WGI database, governance environment indicators can be viewed as a percentile rank, ranging from 0 to 100, or a standard normal distribution, ranging from −2.5 (poor performance) to 2.5 (strong institutional performance). In Tables 3 and 4, governance-environment indicators were in the form of percentile rank from 0 to 100. The robustness checks used the data of standard normal distribution (−2.5 to 2.5) to replace the data of percentile rank to check regression consistency. The outcomes of the Tobit regression fully confirmed results disclosed in Tables 3 and 4.

Appendix A

Table A1. PPP contracts.

Type	Subtype
Management and lease contracts	Management contract: transfer responsibility for managing a utility to a private operator, often for three to five years.
	Lease contracts: an operator is responsible for operating and maintaining the business, but not for financing investment
Brownfields	Rehabilitate-operate-transfer (ROT): a private sponsor rehabilitates an existing facility, then operates and maintains the facility at its own risk for the contract period.
	Rehabilitate-lease/rent-transfer (RLT): a private sponsor rehabilitates an existing facility at its own risk, leases or rents the facility from the government owner, then operates and maintains the facility at its own risk for the contract period.
	Build-rehabilitate-operate-transfer (BROT): a private developer builds an add-on to an existing facility or completes a partially built facility and rehabilitates existing assets, then operates and maintains the facility at its own risk for the contract period.
Greenfield projects	Build-lease-transfer (BLT): a private sponsor builds a new facility largely at its own risk, transfers ownership to the government, leases the facility from the government and operates it at its own risk, then receives full ownership of the facility at the end of the concession period. Build-operate-transfer (BOT): a private sponsor builds a new facility at its own risk, owns and operates the facility at its own risk, then transfers the facility to the government at the end of the contract period.
	Build-own-operate (BOO): a private sponsor builds a new facility at its own risk, then owns and operates the facility at its own risk. Merchant: a private sponsor builds a new facility in a liberalized market in which the government provides no revenue or payment guarantees. The private developer assumes construction, operating, and market risk for the project
	Rental: a private sponsor places a new facility at its own risk, owns and operates the facility at its own risk.