

Risk perception analysis: Participation in China's water PPP market

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Abstract

In China, the massive demand for water infrastructure and lack of capital has precipitated the rapid growth of Public–Private Partnerships (PPPs) in the water sector. However, the current market indicates that numerous foreign companies have been either reducing their business or have retreated from the market whereas some are aggressively taking market share. Given the assumption that there are two broad categories of risks restricting foreign companies' market participation—PPP project risks and legal and regulatory barriers—it was found that the revocation of fixed return policy, current low level of water prices and its difficulty of adjustment are the most significant risks. Moreover, an active player has a visibly and statistically lower level of risk perception than a market retreator. This implies that active players ascribe much importance to market practices rather than the incompleteness and ambiguity of China's PPP legal system; they are more certain that the risk mitigation strategy is highly effective, and operational profits can be greatly increased through price adjustment.

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1. Introduction

Since the late 1970s, when it undertook economic reforms and opened up its economy, China has emerged as one of the world's fastest growing economies. Numerous economists speculate that China could overtake the United States by 2025 to become the world's largest economy as the global centre of economic gravity is gradually shifting to China. However, this is provided the government is able to deepen economic reforms, particularly targeting inefficient state-owned enterprises (SOEs) and the national banking system (Chinadaily, 2009; Wayne, 2003). After years of negotiations, China became a member country of World Trade Organization (WTO) on 11 December 2001. The complete implementation of the terms of WTO accession will significantly influence the Chinese economy

by committing China to reduce tariff and non-tariff barriers, thereby leading to greater competition in all sectors.

In the context of infrastructure provision to sustain such rapid economic growth, since China is experiencing rapid urbanization and industrialization, economic and population growth in urban and peri-urban areas have been outpacing the increases particularly in the supply of treated water and treatment of wastewater loads. Recent figures indicate that China's average annual water resources of 2200 cubic meters per capita are only a quarter of the world average; moreover, among 660 large cities, over 400 are chronically short of water (Asia Pacific Report, 2005; Tarant and Leland, 2002). Some of the unique factors characterizing China's deteriorated water situation are a striking regional north–south imbalance in water resources, pollution resulting from the concentration of heavy industries along water sources, underinvestment in water and sewerage works, and, above all, insufficient capital for meeting the demand for water (Chen and Doloi, 2008; Chieko, 2005; Yang and Teng, 2008).

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With the lack of operational expertise of governmental affiliates who traditionally operated water utilities and low levels of water tariffs established as part of ‘welfare’, China’s water sector suffered from poor operating efficiency and slow technological upgrades (Browder et al., 2007; New China Ventures Ltd (NCVL), 2009). In order to address these problems and mainly fill the financial gap in the huge demand for water works, China began to deregulate the water sector in the 1990s and opened up the market to the private sector (Asia Pacific Report, 2005; New China Ventures Ltd (NCVL), 2009). After several deregulation efforts of the National Development and Reform Commission, non-governmental investment including foreign investment has been permitted in the area of tap water supply and sewage treatment, and the construction and operations of water pipelines has finally been included in the ‘restricted category’. Foreign investors can now become majority shareholders in joint ventures (JVs).

Given the importance of the water sector and China’s unique characteristics, the government has granted market access to non-governmental investors through diverse private sector participation models ranging from full privatization of government assets to Public–Private Partnerships (PPPs). In particular, the massive demand for new water infrastructure and lack of capital have precipitated the rapid growth of PPPs in China over the previous 10 years. Currently, China is considered to be one of the world’s most active markets for private sector participation (ICF International, 2008). In order to further promote PPPs in China, in April 2004, the Ministry of Construction (MOC) issued a mandate entitled Regulations on Public Utilities Concession; moreover, several authorities such as Beijing, Shenzhen, Tianjin and Hubei Provinces have also issued local concession administrative rules.

With the opening up of business opportunities to foreign investors in China’s water/wastewater (hereinafter ‘water’) sector, PPPs have shown exponential growth for the last several years with over 400 projects by 2007. However, close examination of China’s water PPP projects and market participators reveals that numerous foreign companies, not limited to water transnational corporations (TNCs), have retreated from China’s water PPP market and appear to face difficulties in accessing the market due to risks related to the nature of PPP projects and specific legal and regulatory restrictions; on the other hand, certain foreign companies are aggressively targeting greater market share (Asia Pacific Report, 2005; Choi, 2008; GWI, 2004b; Pincent Masons, 2006).

With regard to legal and regulatory restrictions, numerous market experts assert that the newly promulgated construction laws and regulations issued after China’s WTO accession adversely affected the accessibility of the China’s construction market to foreign contractors and new entrants due to the restrictions placed on the manner in which foreign contractors are to conduct business in China (Ada, 2004; Construction Working Group, 2003).

Certain key changes in the regulatory environment includes the requirement of legal entity to participate in local projects, prohibition of cross-border design and construction services, increased operation cost maintaining legal entity, etc (AMCHAM, 2006). Although these changes were originally developed for regulating foreign EPC (engineering, procurement, and construction) firms, foreign companies must consider the possibility of engaging in full or partial EPC projects in association with the Chinese water PPP market as EPC projects are essential elements for increased viability of PPP projects. In this regard, this study assumes that two broad categories of risks are responsible for the exit of foreign companies or loss of their market share: risks related to water PPP projects and market access barriers resulting from China’s WTO accession. As compared with previous research (Asian Development Bank, 2005; BandM, 1996; Chen and Doloi, 2008; ICF International, 2008; Ling and Lim, 2007; Wang et al., 1999, 2000; Wayne, 2003; Zeng et al., 2008), which mostly focuses on risk identification and mitigation strategy with regard to Chinese Build–Operate–Transfer (BOT) projects or investments in China, this study is unique in that it provides an analytical linkage between the decision of foreign companies to participate in China’s water PPP market and PPP project risks and market access barriers.

2. Research objectives and methodology

The study aims to provide a better understanding of the private activity in China’s water PPP market and identify key risk factors and market access barriers (collectively, risks) differentiating the rate of participation of foreign investors in the market. The outcome of the study will provide insight on what needs to be considered for further increase in the participation of foreign investors in the water sector. Specifically, this research was conducted in order to answer the following three questions:

- (1) How has the market been progressing and what is the current situation?
- (2) What are the major risks that cause foreign investors to retreat from the market?
- (3) What are the risk perception differentials between successful market players and those companies that have failed in participating in the market or retreated from the market?

The last two questions are collectively used to determine the policy areas for sustainable development of water infrastructure in China. The methodology developed for this study includes: (a) an analysis of the market situation based on China’s water PPP project database created for the study; (b) a comprehensive review of construction and PPP-related laws and regulations, policies, and situation of the China’s water PPP market in order to identify market access barriers and water PPP project risks from the

viewpoint of foreign companies; (c) an international survey using an unstructured interview for determining the factors that most adversely affect the decision of foreign companies to participate in the market; and lastly, (d) an analysis of the difference in risk perception between the active companies in the market and those that have retreated.

3. Current situation of private sector involvement

3.1. Data sources and database creation

The data for this analysis has been obtained from several sources. Our primary source is the private sector participation project database of the Global Water Market 2008 published by Global Water Intelligence (GWI, 2008). The database provides details of the 347 private sector companies involved and financed project deals from 1992 to 2007. The second database is the Private Participation in Infrastructure (PPI) online database managed by the World Bank Group for identifying PPI trends in developing countries (PPI On-line Database, 2008). The database provides 233 PPP water projects from 1994 to 2007. A review of these two databases revealed that the gap in the number of projects between both databases is 114 and a large number of the details are either missing or conflicting, although certain records are complementary. In order to meet the requirements of the research, rigorous clarifications and supplements have been made by reviewing relevant articles, industrial relationship reports, project track records, and websites of water companies, which produced a total of 430 projects under either construction and operation phase or cancelled in the period 1985–2007.

3.2. PPP project deals in China’s water sector

Since after 2002, when the government opened up the entire municipal sector to domestic and foreign companies, over 87% (379 projects) PPP deals were signed in mainland China. Fig. 1 presents the total PPP project numbers by project type since 1994. The remarkable trends after privatization since 2002 are the rapid increase in the number of wastewater treatment plants (WWTPs) and gradual

increase in the number of package type projects such as water treatment projects combined with WWTPs or treatment projects with private distribution networks.

The total number of PPP projects in the database that are judged to have been cancelled is 21 (4.8%). By definition, a project is said to be cancelled when the private company transfers its economic share in the project to the public sector or physically abandons the project, for example, by withdrawing all staff from the project. However, a project that sells its interest to other private companies without a cessation in services or abandonment of the project is not considered to be cancelled (Ada, 2004). It was identified that the most common reason for cancellation was the revocation of the guaranteed rate of return on capital deposited by the private company issued by the State Council in 2002. Some other reasons are disputes due to different objectives of partners in a JV and a change in the local government’s management direction. However, according to the database, controversies over price increases and difficulties in collecting tariffs from consumers that were indicated by Clive et al. (2003) as the most frequent reasons for the cancellation of a project have not been found in China’s water sector thus far.

3.3. Distribution of private participation models

Fig. 2 explains the distribution of the type of private participation models in water projects. Water supply and wastewater treatment projects are not included in Fig. 2 as the number of such projects is merely 23 and do not affect understanding overall distribution of the type of private participation. Water utility projects necessary for storing and delivering portable water to users is classified as a water supply project. It is indicated that BOT and Transfer-Operate-Transfer (TOT) are the most prevalent forms of private sector participation in both categories followed by divestiture. Specifically, in wastewater projects, the BOT model dominates the market with 73% of 254 projects, while in water supply projects, the rate of BOT models is slightly higher (37% of 152 projects) than TOT (33%) and divestiture (27%). This implies that the development of water projects is in a state of transition from new project

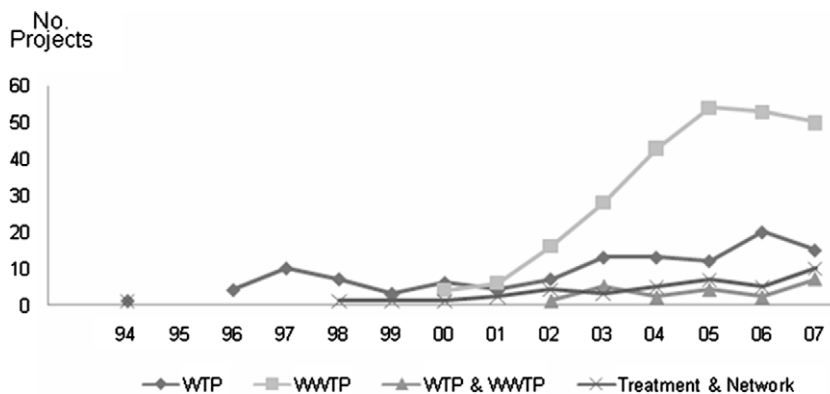


Fig. 1. Project numbers by project types.

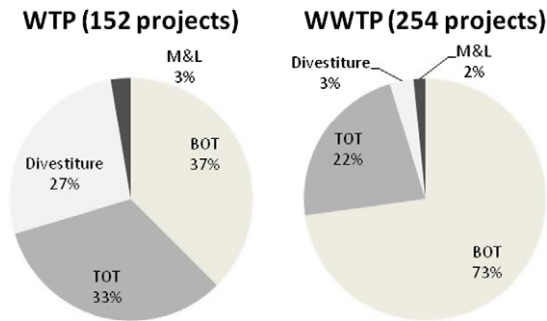


Fig. 2. Percentage of PSP models for project types: WTP versus WWTP.

development to modification or rehabilitation of prior work, and wastewater projects are mostly driven by the development of new projects.

With regard to the rate of the divestiture mode, local water companies have increased interests in adopting full or partial divestiture mode to finance operation and management (O&M) costs of existing treatment plants. Recently, with the acceleration in the reform of local water companies, the integrated transferring share ownership model—whereby a private company acquires a certain percentage (usually over 50%) of share ownership of a local water company in order to possess assets and concession management rights of water and/or wastewater plants and the entire water production system instead of acquiring a stand-alone treatment plant, as shown in typical divestiture mode—has become another alternative for financing and improving the water industry in medium-sized cities (Fu et al., 2008). Management and Lease Contract occupies a small fraction (5% of total 406 projects) as this is the least preferred mode among local officers because their performance is often judged and evaluated by the investment share of the private partner.

3.4. Active players in China's water market and company classification

The water companies currently participating in China's water market are classified into five types: (1) water TNCs, (2) foreign specialized operators, (3) Chinese investment developers, (4) privatized local water companies, and (5) domestic operators. Among these, Chinese investment developers may be categorized as quasi-private developers because these organizations are generally state-owned enterprises (SOEs) either at the central or local level. They capture market share in an aggressive manner and are considered real competitors for foreign players. Privatized local water companies are also SOEs in the process of transferring the state-owned property rights of SOEs to private investors for further reform.

In order to identify the current market participation rates of Chinese and foreign companies in China's water PPP market, the companies were grouped on the basis of the number of project deals thus far. Each group and its

description are provided in Table 1. The Tier 1 includes, among foreign companies, water TNCs such as Veolia and Suez, which have been in existence since the mid-1990s, and foreign specialized operators such as Hyflux and Asia Environment Holdings based in Singapore. Among Chinese companies, Beijing Capital, Sound Group, and Shanghai Industrial Group are the major project developers that are included in Tier 1. Tiers 2 and 3 have lesser project records than Tier 1. Tier 4, 'Market Exit', includes companies that have no project records since the year 2004. These companies have either fully exited from the market or appear to be inactive in the market. According to Table 1, there are 45 Chinese companies remaining in the market, which is a sharp increase from 14 in the first half of 2004; on the other hand, the number of foreign companies including Sino-foreign JVs (seven companies identified) increased to 24 from 23, which is reported in Water Market China 2004 (GWI, 2004b).

According to the database, based on the number of projects, 41% (171 projects) of PPP projects were undertaken by Wholly Foreign Owned Enterprises (WFOEs) or Sino-foreign JVs, whereas the remainder were developed by Chinese companies. The sharp decrease of 41% from 63% reported in Water Market China 2004 (GWI, 2004b) can be explained in light of the recent rapid increase in the number of Chinese companies in the water market. From the fact that 34% (201 projects) of PPP projects were JV projects of private companies with SOEs—for example, government-supported investment company or privatized local water company—and 14% (59 projects) were JVs between SOEs without any private participation, it is evident that the Chinese local government appears to greatly prefer contracting PPP projects to incorporated public sector entities and creating commercialized government entities as vehicles for implementing PPP projects. The cooperation between SOEs for a project is actually a public-public partnership rather than a public-private one, which has positive impacts on the project by either reducing commercial or political risks often observed in certain failed projects in other emerging markets (Braadbaart et al., 2008). However, such projects may lose the monitoring function of the third party and suffer from internal inefficiencies resulting from a lack of transparency, and in extreme cases, corruption problems that threaten the fulfillment of the objectives of introducing the PPP mode into the market.

3.5. Successful and failed cases

This section illustrates two brief case studies to present to the readers some of the causes of project failure and the key issues that led to successful project execution. The first example is the Da Chang WFOE BOT water project, the earliest PPP water project in Shanghai, begun by directly negotiating with the Thames Water and Bovis consortium in 1995 (Lee, 2006). The scope of the project is to build a water treatment plant with a capacity of filtering

Table 1
Classification of water companies by number of PPP projects (FY 2008).

Group name	Group explanation (number of projects)	Chinese company	Foreign company ^a
① 1st Tier	Market dominance (more than 10)	6	5
② 2nd Tier	In between	14	5
③ 3rd Tier	Market participation (less than 3)	26	14
④ Market exit	No more track records since 2004	21	12
Market participants	① + ② + ③	14 ^b → 45	23 ^b → 24

Hong-Kong based companies are categorized into Chinese company.

^a Sino-foreign companies are categorized into Foreign company category.

^b Number of companies participating in China water market in the first half of year 2004 (Refer to Water Market China 2004).

400,000 cubic meters per day for two million customers and to operate the plant for 20 years. The project was initially regarded as a successful case in that the municipal government independently proceeded with the project without any symbolic support from the central government, such as comfort letters or guarantees, so as to limit the financial risks involved (Fulong, 2007). Donoghue et al. (1999) attributed the success to Thames Water's firm confidence on the political and economic stability of the Shanghai government and the optimistic economic conditions for China's infrastructure projects in 1996.

However, later, during the operation phase in 2002, the profitable Da Chang project faced a sudden change of government policy targeting large international companies with bargaining power to an extent enough to insert the fixed return clause into contracts (personal interview with a local legal adviser) that the guaranteed rates of return for infrastructure projects are illegal, and risks and returns in BOT projects should be shared by Chinese as well as foreign partners according to the State Council's decision in 2002. The project guaranteed with a fixed return rate of 16% was not treated as exceptional and thus became illegal. Despite all the efforts of Thames Water to negotiate the new terms with the Shanghai Waterworks Company (owned by Shanghai government), the company could not reach any agreement and finally exited the project by selling its assets to the Shanghai Shibe (Northern City) Water Treatment Corporation in June 2004 (GWI, 2004b). In similar cases, the bulk water supply contract of Shenyang Public Utility, in which Suez held a stake, and the Xian water treatment project held by Berlinwasser were terminated because the demand was lower than the forecast, and the municipality stopped subsidizing the companies as promised in the contracts (David et al., 2004). This case is a representative project illustrating how the Chinese water market is unpredictable and risky for foreign companies.

The second example is the Shanghai Pudong Water Utility Project. This project was the first integrated transferring share ownership contract under which a Chinese public authority allowed a private partner to manage all its drinking water services, including water distribution network management, billing, and customer management. Veolia Environment, one of the water TNCs, acquired 50% of equity of a local water company and established the Shang-

hai Pudong Veolia Water Corporation (Lee, 2006). It managed six treatment plants and eight pumping stations that supplied 1.4 million cubic meters of water per day via a network of pipelines totaling 2500 km (Veolia Water Press, 2008).

At the time of bidding, despite quoting a much lower water tariff rate that was below the break-even point, Veolia Environment was selected as the winner of the international bidding for the contract by offering 2.66 times premium of the net assets on the basis of the positive expectation that water sales would increase up to 3%. Thus, the number of customers would cross 0.5 million, and a fraction of the non-revenue water reduction, which was initially known to be over 30% due to network deterioration in Shanghai area, would greatly increase the profitability of the project. In addition, the company put much weight on the possibility of incremental price adjustment as they were firmly assured that the government was interested in the sustainable use of water resources and the marketization of water price (US Department of Commerce, 2005).

4. Risks faced by foreign companies in China's water PPP projects

This section illustrates key considerations that should be assessed by foreign PPP developers prior to market participation. Risks are determined through the following three approaches: (1) selecting market access barriers by reviewing the current laws and regulations regarding market access from the perspective of foreign contractor, (2) reviewing relevant research papers, market analysis report, and articles, and lastly, (3) inputs from industry professionals and legal consultants located in China. Table 2 shows risk classification and detailed risks.

4.1. Legal and regulatory risks

4.1.1. Uncertain concessionaire selection method

In China, the first state-level tendering law, the Bidding Law, was promulgated in 1999 to regulate the project procurement and reduce related corruption. However, in relation to the BOT scheme, the Bidding Law only specifies that construction contract in all infrastructure projects that adopts BOT scheme are awarded to foreign developer only

Table 2
The comparison of risk perception on risks between market retreaters and active players.

Risk classification	Market access barriers & risks	Risk code ^a	Market retreater			Active player			Univariate ANOVA results			DL ^c
			Mean	SD	Rank ^b	Mean	SD	Rank	Wilks's Lambda	F	Sig.	
Legal and regulatory risks	Uncertainty of selecting method of concessionaire	LR-1	7.5	1.58	5	3.5	2.25	8	0.429	10.67	0.011	0.094
	Prohibition of cross-border design and construction	LR-2	5.9	2.39	11	2	1.07	12	0.369	13.71	0.006	0.106
	Right to select EPC contractor	LR-3	7.5	1.43	4	4.29	1.98	5	0.259	22.88	0.001	0.138
	Ban on guaranteed rates of return	LR-4	8.8	0.79	1	3.38	1.41	10	0.104	68.78	0.000	0.239
	Legal effectiveness of gov. guarantee	LR-5	7.4	0.97	6	3.14	1.57	11	0.204	31.20	0.001	0.161
Financing risks	Disallowance of long-term financing	FN-1	6.5	1.75	10	3.86	2.12	6	0.732	2.93	0.125	–
	Restriction of refinancing techniques	FN-2	6.64	1.69	9	3.43	1.51	9	0.383	12.91	0.007	0.103
Water market risks	Low level of water prices	WM-1	8.18	1.47	2	6.04	1.31	2	0.603	5.26	0.051	–
	Difficulty of price adjustment	WM-2	7.91	1.51	3	6.14	1.21	1	0.573	5.96	0.041	0.070
	Local company's growth	WM-3	6.7	0.95	8	3.75	1.75	7	0.352	14.74	0.005	0.110
Creditworthiness risks	Gov. breach of contract	CW-1	6.73	2.00	7	4.86	1.35	3	0.719	3.12	0.115	–
	Joint venture risks	CW-2	5.44	0.88	12	4.57	1.9	4	0.999	0.01	0.921	–

^a LR: legal and regulatory risks, FN: financing risks, WM: water market risks, CW: creditworthiness risks.

^b The "Rank" is determined first based on "Mean" value and then "SD" value.

^c Discriminant loading of structure matrix.

through competitive tendering. Moreover, the Scope and Scale Standards (2000) describing which types of projects are subject to the Bidding Law does not specifically mention the granting of a concession with regard to a BOT project as these two regulations, by their origin of engineering and construction, were enacted to deal with selecting an EPC contractor.

In order to clearly straighten out the need of a tender to select a qualified concessionaire, the Licensing Law and the Concession Rights were promulgated in 2004. Although both state that a concessionaire shall be selected through open tendering, however, they do not mention any penalty or other adverse effects on the concessionaire unless open tendering is not applied. This may reduce the enforceability and effectiveness of the legislations, thus making it difficult the consistent application of the tendering method in China. When direct negotiation is employed by going through the appropriate procedures to obtain approvals on the project feasibility study, the local government's role is considered important for foreign investors not to be faced with adverse consequence after concession is awarded through direct negotiation. The risks concerning with selecting a concessionaire are that there is no clear cut guideline of choosing tendering method at least in legal perspective and, when direct negotiation is applied, host government's support for concessionaire's future risk in relation to concessionaire selection should be considered for successful project contracting.

4.1.2. Prohibition of cross-border design and construction services

In design and construction sector, the major legal and regulatory market access barriers that foreign investors are most concerned are Decrees 113 and 114, which became effective 1st December 2002. While the former regulates foreign companies in the construction works, the latter regulates them in the design and engineering sector. According to these two new regulations, foreign-invested firms can no longer operate on a cross-border supply mode, which they had been doing for decades. They have to set up a local legal entity and apply for the construction grade qualifications of 'Special Grade' for any types and value of project or any one of level 1, 2, or 3 (lowest level) to provide design and construction services.

At present, major difficulties impeding setting up a legal entity are overly high registered capital requirements (USD 36 mil. for construction works qualification of Special Grade) and restriction of the maximum amount of contract they could receive, which should be less than five times of the registered capital for grades except Special Grade. There may be very few foreign contractors who can put such an excessive initial capital without being able to estimate future investment returns and ensure the continuity of business in China. Another discouraging issue to foreign contractors is that they are limited to undertaking construction work within the lowest qualification grade held by the individual consortium members when more than

two qualified construction companies work together in a consortium. From the PPP project development point of view, it will give adequate comfort to foreign investor and project lender who may be concerned about the financial status and technical capacity of local construction companies by having more experienced and knowledgeable foreign contractor involved on the project. This is directly linked to lower cost of capital and thus improved project economics.

4.1.3. Right to select an EPC contractor in a BOT project

As previously mentioned, the Bidding Law requires a tendering process in one of two ways: by public or invited tender to select an EPC contractor in the BOT scheme and the Scope and Scale Standards specifies in what circumstances public tender and invited tender should be used and exempted. However, in relation to work scope of a foreign-led BOT project, in general, foreign developer wishes to participate in whole or partial of EPC works (e.g., basic design input, procurement or project/construction management) to improve project economics or recoup the investment earlier. Neither a host government nor preferred bidder wants to go through the public tendering process to select an EPC contractor for the project of interest after project sponsors are composed. In addition, it should be also considered that, due to the non-recourse nature of project finance in a BOT project, lenders may be unwilling to finance the project unless they are ensured that a qualified and experienced EPC contractor is employed for successful completion of the facilities. This discordance between the Bidding Law and the practices is a critical market access barrier that could bring more confusion to foreign contractors and remains to be clarified otherwise facing future claims.

4.1.4. The ban on guaranteed rates of return for foreign invested projects

During 1990s to the early of 2000s, it is believed that many of PPP projects where foreign companies are involved were contracted with either flexible rate or fixed investment return rate, which incurs an intermediate or much lesser project operation risks to the project sponsors, respectively. Especially regarding to the fixed return rate model, the Chinese government's view on this tendency was that the fixed return clause is against the principal of sharing benefits and jointly bearing risks by Chinese and foreign investors and is in violation of relevant laws and regulations on JVs and Sino-foreign cooperatives (Li, 2007). In order to curb such tendency of using the fixed return clause in contracts of China-foreign co-operations, the State Council specially issued the Notice on Appropriate Handling of Existing Problems in Guarantee of Foreign Investment Fixed Return Projects on 10 September 2002. This policy led many of foreign invested PPP projects to be renegotiated to replace fixed return with a legitimate proceeds allocation method such as 'return of investment' or acquired by local government.

4.1.5. *Legal effectiveness of government guaranty and assurance*

According to the main provisions concerning government guaranty¹, except under special situations, various government forms such as government guarantees on loaning from foreign governments or international economic organizations existing in BOT water projects in practice are void. Government assurance is another government credit enhancing form existing together with a government guaranty in BOT water project. The two has fundamental distinction in that guaranty refers to a third party's guarantee for both parties and assurance is the hosting state's promise of its own behavior. The latter is to show the hosting government's willingness in bearing obligations under the project franchise agreement, thus ensuring the smooth progressing of the project development and increasing the level of comfort of private investor. This usually includes a promise for favorable taxes, remittance of foreign currencies and non-competition, less limitation on equipment imports, and so forth. According to a relevant provision², government agencies generally shall not make guaranties of promises in any form for BOT projects such as those mentioned above. On the other hand, another provision³ illustrates that a project company may be allowed to reasonably raise charging standards or prolong a franchise term if it suffers severe economic loss due to China's policy changes, and the state ensures exchange and remittance abroad needed in repaying loans, interests or bonuses (Li, 2007).

In addition to this, in current BOT projects, the 'take or pay' contract or 'off-take contract' in which governments usually promise the lowest water quantity and agreed prices arouses a controversy whether the contract falls into 'fixed return'. This conflicting issue also increases the uncertainty of the project viability resulting in chilled foreign investor sentiment. The uncertainty of government guaranty and assurance is also considered affecting foreign investors in designing security package as the Chinese banks are skeptical about other forms of security required for financing a project such as the expected cash flows and the contractual rights associated with the project other than property and land.

4.2. *Water market risks*

4.2.1. *Low level of water price*

As economic reform program has gradually introduced market-oriented pricing policies, urban price management

was standardized and legalized aiming to cover operating costs and some 'reasonable' or 'thin' profit. Since 2000, to further solve water scarcity problem and encourage water conservation, agencies of central government have issued a series of regulations, guidelines and circulars⁴ to further encourage water treatment development and water conservation.

However, from the implementation point of view on those frequently pronounced policies, due to China's complex hierarchical government structure and slow roll-out of tariff reforms, it is extremely difficult for the central government to propagate recent policies to over 660 cities in China (GWI, 2004b). Although China has hiked average water price more than tenfold in the past two decades and recently some cities with high population density such as Beijing and Shanghai have faced a sharp rise in water prices, prices are still below global market prices. Standard sewage treatment fees are also not sufficient enough to meet the cost of treatment and more time will take to reach a level high enough to encourage efficiency and reduce wastage.

4.2.2. *Difficulty of price adjustment*

Whether the promised tariff rises will materialize is a key risk to private investment in the water industry as the water tariff remains a politically sensitive area for most local governments. The price bureaus tend to look at the necessity of price increases independently of the capital injection and return demanded on the investment (Asian Development Bank, 2005) and public hearing process to be held prior to price adjustment makes tariff increase difficult and time consuming. The uncertainty surrounding tariff rises have made foreign firms to look at how to efficiently manage water and sewage services to bring down non-revenue water levels, generally 20–30% in Chinese cities (GWI, 2004a).

4.2.3. *Local company's rapid growth*

With so many regional and national domestic companies piling into China's water market, industry watchers say intense competition may curtail project margins and thus dampen the attractiveness of water projects in the near term. Foreign companies have considered political risks and foreign exchange risks as critical in deciding market participation but, for now, such rapid growth of local companies in water PPP market is an emerging risk to foreign companies as they have better position in terms of regional based connection to local government and lesser project risk exposure linking to more competitive bidding price (GWI, 2004a).

4.3. *Financing risks*

4.3.1. *Limitation of long-term financing*

In most international projects, it is usual for infrastructure BOT project to have 15–20 years of loan repayment

¹ Article 8 of the Guaranty Law and the Measures on Administration of Domestic Organizations' External Foreign Exchange Guaranty issued by China People's Bank.

² The Notice on Relevant Issues Concerning Attracting Foreign Investment under BOT mode issued by Ministry of Foreign Economic And Trade Cooperation (1995).

³ The Notice on Relevant Issues Concerning Approval Administration of Experimental Foreign Investment Franchise Projects jointly issued by State Planning Commission, Ministry of Electricity, Ministry of Transportation (1995).

⁴ The Water Law of China (2002), the opinion of promoting the development of city sewage and rubbish treatment industrialization (2002), and the notice on promotion of water price reform, enhancing water saving and protecting water resources (2004).

period depending on the nature of project and its future cash flows. However, this much long-term financial debt instruments do not have legal support and the availability of domestic loans is limited, especially for large amounts (Asian Development Bank, 2005; GWI, 2004b; Wayne, 2003). According to Article 11 (Loan Term) and 12 (Extension of Loan Term) of the General Rules for Loans, the term for self-support loans shall not exceed 10 years and extension for long-term loans shall not be longer than 3 years, unless the state stipulates otherwise. This implies that the loan term can be extended to 13 years, which apparently lags behind the due financing demand required for BOT water projects (Li, 2007).

4.3.2. Weak institutional capacity of domestic banking lending

One of key financing risks to foreign investor is that clear loan syndication strategy is difficult to develop because of uncertain state of the banking system and capital markets. Among several elements causing the weak domestic banking system, the biggest concern to foreign firms is foreign exchange risks as the revenue from infrastructure projects is primarily in local currency. Although domestic lending has been used extensively in financing infrastructure projects as a hedge against foreign exchange risk and Chinese foreign reserves have been greatly increased in past years, investors still have concerns about conversion and remittance risks of foreign currency as the old policies and practices are still prevail which may cause approval delays (Asian Development Bank, 2005; Chen and Doloi, 2008). Some other elements are the restriction of refinancing techniques and the restriction of interest rate which is currently set as fixed rate.

4.4. Creditworthiness risks

4.4.1. Risks in government's breach of contract

In PPP projects, government credibility alongside with project viability is critical in determining whether a long-term project operation can be maintained without government's non-performance. Li (2007) asserts that the rate for government breaches of contract is rather high and this has been a major concern on a number of failed projects in China by illustrating three representative cases. Non-payment of tariffs, land use right invalidation after capital injection, and unilateral breach of contract are the main causes of such failures. Two primary reasons behind the failures are lack of understanding of the contract terms and their impacts on the unexpected consequences and resentment over excessive guarantee provisions on a project with very low profitability (Asian Development Bank, 2005).

4.4.2. Joint venture risks

Some of the risks relevant to JV can be classified into two parts: JV administration risk and counterparty risk. The first includes the difficulty of changing JV registration

conditions (e.g., investment structure, paid-in capital) after more detailed project information is available, which can prevent foreign investor from having better chance to reduce project risks and increase performance. Slow approval process and uncertainty of obtaining approval for changing the conditions are also included in this category. Counterparty risks are miss-alignment of objectives of local government and international partners, non-performance of contractor, subcontractors, and other project entities, and financial insolvency of the consortium partners.

5. Risk perception analysis and discussion

5.1. Three rounds of questionnaire survey

In order to meet the second and third of objectives of the study, risk perception on the 12 risks previously identified was evaluated by administering three rounds of a research questionnaire survey. First, questionnaires were sent by email to foreign experts who either have direct water PPP business experiences in China or are positioned as decision-makers in water PPP project development in foreign companies (including Sino-foreign JVs) that are included in Table 3. The companies subject to the questionnaire survey are financially stable and representative companies in their own country having water-related division and strong domestic and overseas track records of accomplishment of environmental projects. They are participating in both EPC and O&M works aiming to become a global water company. Since all the risks described in the previous section are fairly applicable to all the foreign companies and the way of developing a PPP project is similar, although the strategy of selecting a project or target cities and financial structure may slightly different from one project to another, this study is assured that there are no selection biases resulting from the financial situations, history, or nationalities of the foreign companies with regard to the risk perception analysis between two groups.

However, since such a questionnaire survey administered through email tends to have a rather low rate of response (only six responses, 2 from Tier 3 and 4 from Tier 4, were received from foreign companies), the face to face interview technique was adopted by visiting Chinese subsidiaries or JVs of foreign companies located in Beijing and Hong Kong for 2 weeks during January and February 2009. However, since a majority of relevant departments in foreign companies that belong to Tier 4 are either non-existent or difficult to arrange for a meeting, face to face interviews with top management personnel belonging to four Korean contractors that had either exited China's water market or were facing internal decision hurdles with regard to participation in the water PPP market were also conducted from August 2008 to March 2009. Another nine responses were added to those obtained from the previous interview, thereby resulting in a total of 19 responses as shown in Table 3.

Table 3
Overall characteristics of survey respondents (foreign companies).

Respondent classification ^a		Method	Number of responses	Response rate		
Active market players (successful market participants)	Tier 1	Com. 1	FTF	1	60% (out of 5)	
		Com. 2	FTF	1		
		Com. 3	FTF	1		
	Tier 2	Com. 4	FTF	1	40% (out of 5)	
		Com. 5	FTF	1		
	Tier 3	Com. 6	FTF	1	21% (out of 14)	
		Com. 7	SVE	1		
		Com. 8	SVE	1		
		Com. 9	SVE	1		
	Market retreaters (unsuccessful market participants)	Tier 4	Com. 10	FTF	1	17% (out of 12) plus Four (4) Korean contractors ^b
			Com. 11	FTF	3 ^c	
			Com. 12	FTF	2 ^c	
		Com. 13	FTF	1 ^c		
		Com. 14	SVE	3 ^c		

^a Com.: company, SVE: survey via e-mail, FTF: face-to-face interview.

^b Including two companies from Tier 4 and four (4) Korean contractors which failed in participating in the market.

^c Responses from Korea contractors.

5.2. Perspective of market retreaters on risks

The specific question that was posed to potential respondents was ‘What is the perceived level of influence of risks on the company’s decision to participate in China’s water PPP market?’ The ratings of the 19 respondents on a scale from 1 (the least influential) to 10 (the most influential) with regard to 12 risk factors are summarized in Table 2. The Coefficient of Variation (CV) for each factor was also used to examine the consistency of the respondents’ opinions. The CV values of the active players range from 27% to 64% and, especially, the CV value of LR-1, LR-2, LR-3, LR-5, FN-1 and FN-2 of active player group marked more than 50% whereas those of the market reterer are all below 40%. This strong inconsistency especially in the active player group is attributed to the group formation of Tier-1, Tier-2, and Tier-3 companies classified by the number of track records and the limitation of CV method that when the mean value is near zero, the coefficient of variation is sensitive to small changes in the mean, limiting its usefulness.

The companies affiliated with Tier-1 group responded to the questionnaire with a much smaller level of influence on the company’s decision per each risk factor compared to Tier-2 and Tier-3, resulting in the high CV values in the active group. The low level of inputs from Tier-1 on the interpretation of the analysis can be explained via two aspects: adjusting the risk perception of the active group and/or misleading analysis results. In order to consider these effects on the analysis and outliers, the study deleted extreme opinions using outlier detection method both in the active player and market reterer groups. This has resulted in smaller CV values in some of the datasets and is reflected in Table 2.

From the perspective of the market reterer group, all the risks are found to be influential in the foreign company’s decision on market participation with a mean score ranging from 8.8 to 5.44. According to Table 2, among the various risks, it is considered that the withdrawal of foreign companies from the market and the lack of participation of new foreign companies have been generally due to the revocation of the fixed return policy (LR-4) by a State Council ruling in 2002, and the current low level of water tariff

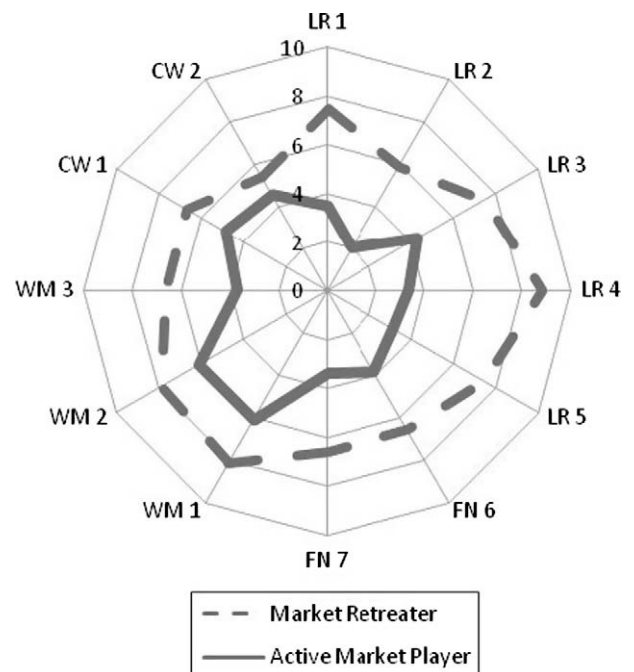


Fig. 3. Different risk perception profiles: responses of market reterer versus active player.

(WM-1) and difficulty of adjustment of water tariff during the operation period (WM-2) based on the mean scores of the risks, which are directly relevant to project viability and totally under governmental control. Therefore, it appears that the foreign companies that have exited the market are unsure with regard to profitability in China’s water PPP projects, although the current law guarantees thin or reasonable profits for foreign investors. However, ‘thin’ is a rather ambiguous word, and the linkage between a guarantee and probability of an increase in tariff is considerably weak.

The compulsory requirement of open tenders for selecting an EPC contractor (LR-3), uncertainty of the selection method of concessionaire (LR-1), and conflicting aspects of government guarantees for improving investor comfort with regard to a project (LR-5), all of which are directly related to the current ambiguous or conflicting aspects of China’s PPP legal system, are also critical market access barriers.

5.3. Comparative analysis on risk perception profiles for two groups

Fig. 3 indicates that the level of risk perception is completely different visually between two groups: market retreaters and active players. The average risk perception on all risks is 7.1 for market retreaters and 4.1 for active players. As illustrated in the previous section, market retreaters consider all the risks that are listed in Table 2 as key factors in determining market participation with the lowest risk perception being 5.44, which signifies a more than average effect on the decision on market participation. However, active players only consider 4 risks: WM-2, WM-1, CW-1, CW-2, and LR-3, in order of significance, as having, in greater or lesser degree, average effects on market participation decision, with the highest risk perception level being 6.14.

On account of the research setting in which foreign companies were classified into four tiers, Tiers 1–4 based on project track records, it may be stated that past experiences of successful projects in the local market is an important factor that can drastically reduce the risk perception level. Further, it also became apparent during interviews with foreign companies that market retreaters with past unpleasant experiences focus on the negative effects of risks, such as cancellation of project, disputes between joint

members, and sudden change of government management direction regarding ownership structure on a project or limited project experience in the local market; on the other hand, active players place greater importance on the improved effectiveness of risk mitigation methods for each risk by effectively applying accumulated risk mitigation knowledge from past project experiences and adjusting themselves to the project’s risk environment and local practices.

In other words, although the two groups face the same circumstances (i.e., market access barriers and risks), the level of experience in the market and assurance on the effectiveness of the risk mitigation strategy produce two contrasting aspects between the two groups. Consequently, these different aspects result in the development of a different perception of the significance and authenticity of risks. Perception discrepancy on each risk between the two groups is explained in greater detail in the following section.

5.4. Comparative analysis on each risk

Using SPSS software, the univariate analysis of variance (ANOVA) and discriminant analysis (DA) are also conducted with all predictor variables entered in one step to statistically describe how individual variables differ across two groups. Table 2 reports summary information about individual variables, evaluated using both univariate methods (individual ANOVAs) and multivariate methods (DA). The former result indicates that based on Wilks’s lamda and significance level, all the variables differ significantly beyond 0.05 for the two groups, except for FN-1, WM-1, CW-1, and CW-2. The variables selected from the individual ANOVAs test are then entered into DA to assess whether the group means are different.

Table 4 shows the Eigen values and Wilks’s lambda of the discriminant function created from the DA. The function has a canonical correlation of 0.997 (1.00 means perfect correlation between the discriminant scores and the levels of the dependent variable); thus, it is very strongly related to group membership. The Wilks’s lambda (0.007) and the associated significance value (0.010) indicate that the group means are significantly different. DA also provides information related to the evaluation of the contribution of individual predictors or discriminating variables (Warner, 2006). The discriminant loading number of the

Table 4
Summary of canonical discriminant function.

Function	Eigenvalue	% of Variance	Cumulative%	Canonical correlation	
<i>Eigenvalues</i>					
1	151.113 ^a	100.0	100.0	.997	
Test of function(s)	Wilks’ Lambda		Chi-square	df	Sig.
<i>Wilks’ Lambda</i>					
1	.007		20.099	8	.010

^a Com.: company, SVE: survey via e-mail, FTF: face-to-face interview.

structure matrix, shown in Table 2, denotes the relative importance of each variable (Joseph et al., 2006). In other words, variables with large discriminant loading numbers contribute more to the discriminating power of the discriminant function model. Among the eight risk factors entered into DA, LR-4 has the greatest weight in computing the discriminant function score when intercorrelations among the discriminating variables are considered, followed by LR-5 and LR-3 in the order of the biggest contribution to group difference. It is found that the perception levels on LR-4, LR-5, and LR-3 are the biggest three risks that classify the foreign companies into two groups. It is interesting to note that market retreaters view LR-4, LR-5, and LR-3 as highly significant factors affecting the decision for market participation, whereas active players regard these risks as having very little influence on the decision for market participation.

It is found that LR-4 has the largest gap in risk perception between two groups. The fact that market retreaters want a safeguard against the cash flow risk during the operation period as they previously only participated in projects that secured their return on investment to a certain extent is responsible for this gap. However, active players appear to admit that all investments are accompanied by risks; therefore, they adopt a positive attitude in order to reduce the losses on transactions by alleviating all future project risks. Above all, active players have been trained in projects in which the return on investment is not guaranteed in their own countries and have a greater certainty that operational profits will be greatly increased by adjusting the currently low level of water prices, improving efficiency, and reducing the problem of leakages.

With regard to LR-3, it appears that active players do not consider the requirement of open bidding for selecting the EPC contractor as a significant risk. Active players are aware that once the PPP contract has been obtained, a tender for the construction project is not required. Therefore, this aspect is not problematic if they specify the contractor in a concession agreement and prior approval is obtained from the local government. On the other hand, market retreaters often give much more importance to participating in all or certain portions of EPC projects for an early recovery of their investment; therefore, in a large number of cases, the assurance of participating in EPC projects is an important internal investment criterion for this group. In terms of the business model, active players view the PPP model as a financing and operation business rather than a construction business in which the major source of profits is generated from long-term operation of the plants and not from EPC projects. As compared with market retreaters, active players appear to focus on market practices rather than the incompleteness and ambiguity of China's PPP legal system.

The difference in LR-5 between two groups can be also explained with the same reasons as that of the big difference in LR-3 and LR-4 stated above. The ambiguous legal effectiveness of take-or-pay contracts and conflicting compo-

nents of China's PPP legal system regarding several government assurances for PPP projects are considered much less important than current practices, at least for active players in the market.

6. Conclusion

This study addressed the most significant market access barriers or risks that cause foreign companies to retreat from China's water PPP market, and how the risk profile of market retreaters is different from successful active players. The analysis results indicate that market retreaters are considering the policy change associated with the ban of fixed return, initial level of water price, and assurance of future tariff increase as the most significant factors affecting the decision to participate in China's water market, followed by the incompleteness and ambiguity of the PPP legal environment such as legal conflicts among relevant laws and regulations, uncertainty of the method used for EPC contractor selection in a BOT project, and non-robust concessionaire selection method. These are the potential policy improvement areas for the Chinese government, which must become more attentive in attracting and controlling foreign investments. More systemized or detailed investment guarantee methods and greater assurance of price increase must be provided by the government.

With regard to the risk perception profiles of the active players and market retreaters, the analysis reveals that the latter have a visibly greater risk perception across all risks. It becomes apparent that market retreaters focus on the negative effects of the risks, whereas active players are firmly assured with regard to the effectiveness of mitigation methods that must be applied. By comparing each of the risks using univariate ANOVAs and DA methods, active players give greater importance to market practices without placing excessive importance on the incompleteness and ambiguity of China's legal PPP system and are more certain that operational profits will be greatly increased through price adjustment, efficiency gain, and reduced leakage. On the other hand, market retreaters give more importance to being able to participate in all or certain portions of EPC projects for an early recovery of their investment. What market retreaters and new participants must take into account is that China's economic reforms and market-oriented policy is being pursued in order to encourage foreign investment in the water sector; rather than being over-sensitive to risks, market practices must be respected in order to reach a consensus on market participation.

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