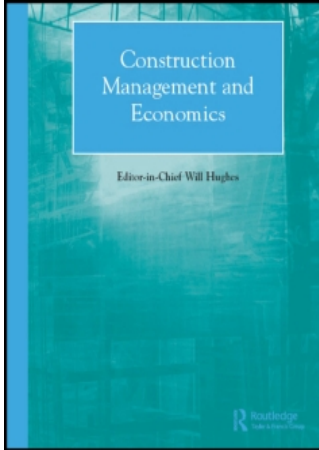


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Evaluation and management of foreign exchange and revenue risks in China's BOT projects

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China is actively investigating ways to introduce project financing, specifically through the build-operate-transfer (BOT) scheme to meet the needs for the country's infrastructure and to be attractive to foreign investors and lenders. The advent of concession agreements, backed by new BOT laws, will be a positive move forward to achieving project-financed infrastructure projects. There are thus opportunities especially in the power sector for foreign investors. However, it is important to identify and manage the unique or critical risks associated with China's BOT projects. This is especially so after policies were introduced in late 1996 when the first state-approved BOT project, the US\$650 million 2 × 350 megawatt (MW) coal-fired Laibin B Power Plant (Laibin B), was awarded. They include a competitive tendering process and 100% foreign ownership of the operating company. This paper is based on the findings from an international survey on risk management of BOT projects in developing countries, with emphasis on power projects in China. It discusses specifically the criticality of foreign exchange and revenue risks which include exchange rate and convertibility risk, financial closing risk, dispatch constraint risk and tariff adjustment risk. The measures for mitigating each of these risks are discussed also.

Keywords: Build-operate-transfer (BOT) project, risk management, foreign exchange, currency convertibility risk

Introduction

Background

The economic growth in the People's Republic of China (PRC) has resulted in a strong demand for basic infrastructure like roads, ports and power generation facilities. The World Bank has estimated that China's expenditures in infrastructure will rank top among all East Asian countries and is expected to account for US\$750 billion over the period from 1995 to 2004. Road and power projects command top priority. For example, China plans to boost the total installed capacity (TIC) of electric power by 90 gigawatts, i.e. 40% of current TIC. This requires a total investment

of US\$100 billion, about 25% of which will come from foreign capital investment (China Statistical Bureau, 1979–1997; Lianhe Zaobao, 1996; Chen, 1997; NWI, 1997). To meet the development needs, the Chinese government has granted concessions based on the build-operate-transfer (BOT) model for infrastructure projects. Several state-approved BOT projects have been awarded since late 1996, such as the Shanghai Da Chang water project, Changsha power project and Chengdu water project (Bi, 1996; Hsu, 1996; PFI, 1996a–f; 1997a–d Chew, 1997; *Infrastructure Finance*, 1997). There are thus opportunities especially in the power and road sectors for foreign investors.

Despite the opportunities, undertaking infrastructure business in China presents its risks and obstacles. The

traditional methods of project finance and risk allocation mechanisms that are available in other countries generally do not yet exist in China, or are restricted. Therefore the effective application of risk management principles to projects is especially crucial to successful investment in China, and risk strategies have to be incorporated much earlier in the development of their projects (Tiong, 1992, 1995a; Zhang *et al.*, 1998). In addition, there are some innovations that have been introduced since late 1996 when the first state-approved BOT project, Laibin B Power Plant (Laibin B), was awarded (He, 1996; Wang, 1996; Zhang, 1996a; Zhu and Li, 1996; Orr, 1997), such as the competitive tendering process and 100% foreign ownership of the operating company. Successful tenderers will have to finance their projects from a revenue stream based on letters of comfort from the provincial government supporting off-take agreements instead of the guaranteed returns that have characterized earlier BOT projects in China.

Laibin B is the second phase project for Laibin Power Plant with an estimated capacity of 2×350 megawatt (MW) coal-fired units and an estimated cost of US\$650 million (5 billion Renminbi (RMB) yuan). It is located in Laibin county of Guangxi Zhuang Autonomous Region (Guangxi), a Chinese backwater southern province. The concession terms require a very tight completion schedule and appear to offer a relatively low rate of return. The Electricite de France (EdF) and GEC Alstom consortium finally won the concession from five other shortlisted tenderers with a very aggressive tender and the backing of France's export-credit agency, Coface (Bridge of Trust, 1996).

Due to the characteristics of the BOT concept, it is meaningful to study in detail the unique or critical risks associated with its application in China and to investigate the corresponding mitigating measures.

Research objectives

Since late 1980s, research work has been carried out to study the risk management of BOT projects in developing countries (Tiong, 1990, 1992, 1995a; McCarthy and Tiong, 1991; B&M, 1996; Donnelly, 1997; Nielsen, 1997; Ruster, 1997; Staigerwald, 1997; Westring, 1997) such as in China (He and Tiong, 1996; Platt and Arstall, 1996; ; Shen *et al.*, 1996; Chen, 1997; Orr, 1997; Wang *et al.*, 1998a, b; Zhang *et al.*, 1998). However, there has been little research to date that focused specifically on the management of unique or critical risks of China BOT projects.

The process of risk management consists of risk identification, analysis and risk mitigation; followed by confirmation that the risk mitigation measures were implemented adequately (Staigerwald, 1997). One

important goal of this study therefore is to identify the unique or critical risks associated with China's BOT projects which are different from those in other sectors and in other developing countries. These risks are unique or critical to the foreign investors and developers; hence special attention has to be paid in taking corresponding mitigating measures. The objectives of the study are: 1. to identify the unique or critical political and currency risks associated with China's BOT projects; 2. to evaluate the effectiveness of mitigating measures that are available to manage these risks; and 3. to provide a risk management framework as guidelines for project promoters planning to invest in future BOT projects in China.

Although the objectives have been achieved successfully in the course of the research, it is not possible to report the findings in full in this paper. As the title of the paper has indicated, this paper will report on the criticality of foreign exchange and revenue risks and the effectiveness of their mitigating measures.

Research methodology

Methodology and procedure

The methodology developed for this study includes: 1. a comprehensive literature review together with some case studies to identify an initial list of unique or critical risks associated with BOT projects and mitigating measures for these risks; 2. unstructured interviews and discussions to filter the risks and measures identified in the above step; 3. a survey via questionnaires sent to project sponsors, developers, lenders, investors and contractors to evaluate the criticality of these risks and the effectiveness of corresponding mitigating measures; and 4. case studies to provide additional insight concerning contract clauses and risk management frameworks for investing in China's future BOT infrastructure projects.

The projects studied were the first provincial-approved BOT project in China, the Shajiao B Power Plant in Guangdong Province, and the first state-approved BOT project in China, the Laibin B in Guangxi Province. Other BOT projects in China, the Yan'an Second Tunnel and Da Chang Water Plant in Shanghai, Changsha Power Plant in Hunan Province, Tangshan Power Plant in Hebei Province, etc., were referred to also (Zhang *et al.*, 1999; Wang *et al.*, 1999a, b; Tiong, 1990; Chew, 1997; Guangxi, 1995; Bridge of Trust, 1996; *Infrastructure Finance*, 1997; PFI, 1996d, 1997a, c, d). About 50 risks in 6 categories associated with BOT power projects were identified (B&M, 1996; World Bank and USAID, 1994; AES, 1996; Macdonald, 1997; Lam, 1998; *New Civil Engineer*, 1994; PFI, 1997b) as shown in Table 1.

Table 1 List of risks associated with BOT projects

Category	Risk
1. Political risks	expropriation, revoke, sequestration exclusivity, i.e. not second facility change in law development approvals adverse Government action or inaction reliability and creditworthiness of local parties provision of utilities increase in taxes (general) increase in taxes (specific) political force majeure events termination of concession by Government payment failure by Government
2. Construction risks	land acquisition and compensation restriction on import equipment/ materials cost overrun increases in financing cost time and quality risk contractor default default by concession company time, cost and scope of identified but related work and variations environmental damage – subsisting environmental damage – ongoing protection of geological and historical object construction force majeure events
3. Operating risks	Government department default concession company default operator inability termination of concession by concession company environmental damage – ongoing operating force majeure events labour risk technology risk prolonged downtime during operation condition of facility (maintenance)
4. Market and revenue risks	insufficient fare income fluctuating demand of power generated transmission failure problem in bill collection insufficient other income power theft fluctuate of cost and availability of fuel/coal Government restriction on profit and tariff
5. Financial risks	inflation risk interest rate foreign currency exchange rate foreign currency convertibility
6. Legal risks	title/lease property ownership assets security structure insolvency of concession company breach of financing documents enforceability of security documentation/contractual risk (conflict and arbitration, applied laws)

The interviews and discussions focused on the initial list of political and currency risks associated with China's BOT projects and corresponding mitigating measures. Participants included the Director of Business Development of Foster Wheeler and 35 construction professionals. The setting for the discussion was a group workshop. The participants were selected based on their experiences with project risks and their knowledge of China's regulatory frameworks and business operations. The second author acted as the facilitator and the note-taking was done by the first author. From the workshop, the final list of unique or critical political and currency risks and corresponding mitigating measures was compiled as shown in Table 2, with the risks identified and categorized into two groups, political and force majeure risks, and foreign exchange and revenue risks. The subject of this paper is on foreign exchange and revenue risks which include principally the exchange rate and convertibility risk, the financial closing risk, the dispatch transmission constraint and tariff adjustment.

Based on Table 2, a comprehensive questionnaire for international survey was then designed. There were three parts: question 1 on criticality of risks, question 2 on effectiveness of the proposed mitigating measures and question 3 on adequacy of related clauses in Laibin B contracts. This paper reports on the findings related to foreign exchange risks from questions 1 and 2. The rating systems for the criticality of each risk and the effectiveness of generally available measures for mitigating these risks are shown in Table 3.

Respondents' particulars

The international survey was conducted from December 1997 to March 1998. Three hundred questionnaires were sent by post to international project sponsors, developers, consultants, lawyers, lenders, investors and contractors. A total of 40 valid responses was received which accounts for a response rate of about 13.3%. Although the response rate was a little low, the reliability of the survey results is high because all of the respondents are at top management level in their companies. More importantly, most (75%) of them have experience on international BOT projects, almost all (88%) of them have business experience in China and more than half (60%) of them have been involved directly in BOT projects in China. The detailed respondents' particulars are shown in Table 4.

Exchange rate and convertibility risk

For investment in China's power or other infrastructure projects, the foreign companies will invariably receive nearly all of their revenues in Ren Min Bi (RMB). A

Table 2 Political and currency risks of China BOT infrastructure projects and mitigating measures

Risk	Measure 1	Measure 2	Measure 3	Measure 4
Change in law	Obtain government's guarantees, e.g. adjust tariff or extend concession period.	Insurance for political risk.	Maintain good relationship with government authorities especially officers at state or provincial level.	
Corruption	Maintain good relationship with Government authorities especially officers at state or provincial level.	Establish joint venture (JV) with local partners especially the Central Government agency or state-owned enterprise.	Enter into contract to prevent corruption	
Delay in approval	Establish JV with local partners especially the Central Government agencies or state-owned enterprises.	Obtain Government's guarantees to adjust tariff or extend concession.	Maintain good relationship with Government.	Ask Government to establish a one-stop agency for all approvals.
Expropriation	Establish JV with local partners especially the Central Government agency or state-owned enterprise.	Rely on a combination of international consortium and insurance policies (political insurance).	Obtain support of sponsor's Government, e.g. export credit.	
Reliability and credit-worthiness of Chinese entities	Gain accurate financial and other information about Chinese entities and choose the most capable ones.	Maintain good relationship with Government officers at state or provincial level.	Appoint independent accountant to audit the Chinese entities.	
Force Majeure	Obtain Government's guarantees to adjust tariff or extend concession period.	Insure all insurable Force Majeure risks.	Obtain Government's guarantee to provide finance help if needed.	
Exchange rate and convertibility	Obtain Government's guarantees of exchange rate and convertibility, e.g. fixed rate or to adjust tariff or extend concession to cover the cost.	Use dual-currency contracts, with certain portions to be paid in RMB and other transactions denominated in foreign currency	Use hedging tools, e.g. forward, swap.	
Financial closing	Equity financing and cooperation with Government partners.	Adopt alternatives to contract payment, e.g. land development rights.	Use initial public offerings on stock to raise funds especially equity finance	
Dispatch, transmission constraint	Enter into take-or-pay power purchase arrangements with power purchaser (Government).	Enter into dispatch contracts with Government authorities to dispatch power plant at full capacity for a minimum number of hours each year.	Government to guarantee that transmission line will be ready for dispatch.	
Tariff adjustment	Have a formula for tariff adjustment that can enable objective calculation of tariffs each year.	Maintain good relations with Government and a positive public image of the project.	Separate and re-define tariff, e.g. portions of tariff fixed while portions adjusted, or portions to be paid in foreign currency.	

Table 3 Rating systems for criticality of risks and effectiveness of mitigating measures

Rating score	Criticality of unique or critical risks	Effectiveness of mitigating measure
0	Not applicable	Not applicable
1	Not critical	Not effective
2	Fairly critical	Fairly effective
3	Critical	Effective
4	Very critical	Very effective
5	Extremely critical	Extremely effective

Table 4 Respondents' particulars of the international survey

Respondents' particulars	No. of respondents	% of respondents
By respondent's company category		
Banker/financier	17	43
Consultant (accountant/business development)	5	12
Developer/independent power producer	8	20
Lawyer	9	22
Main contractor	1	3
Total	40	100
By respondent's resident country		
Australia	2	5
China	4	10
Hong Kong	13	32
Japan	1	2.6
Korea	1	2.6
Malaysia	2	5
Peru	1	2.6
Philippines	1	2.6
Singapore	10	25
Sweden	1	2.6
UK	2	5
USA	2	5
Total	40	100
By respondent's designation		
Head project financing (Vice-) managing director	8	20
(Vice-) president/general manager	16	40
Others (consultant, partner, lawyer etc.)	7	18
	9	22
Total	40	100
By respondent's experience		
With BOT experience internationally	30	75
With business experience in China	35	88
With BOT experience in China	24	60

significant portion of this revenue will need to be converted to other currencies, primarily US dollars, and remitted outside of China. The remittances are used to meet foreign currency obligations to equipment suppliers, to repay borrowings from foreign lenders and to make payments to the companies in respect of equity distributions and shareholder loans. The RMB is not freely convertible into US dollars; even if it is convertible (currently only convertibility on current account is available and it was introduced in Dec. 1996), the exchange rate fluctuates all the time in the market or subject to the approval of the State Administration for Exchange Control (SAEC). Although the approval to convert RMB into foreign currencies and to remit foreign currencies outside China is routine for approved foreign investment enterprises, there can be no assurance that the Chinese Government will continue to provide such approvals.

Financial closing risk

Financial closing occurs when all the conditions of lenders have been met and the loan facilities are arranged. Financial closing risk includes the difficulty in raising the finance, the high cost of financing and even being unable to close financing within the time frame stipulated in the concession agreement. Generally this is due to the high level of perceived risks in China's BOT power projects. The success or failure in raising finance depends on fair risk allocation and a sound contractual structure. There is a need to establish enhanced credibility for the BOT project because ultimately the financial market will judge the project on its own merits without the traditional Government repayment guarantees.

Dispatch constraint risk

In China, the power grids are in the monopoly of the Government enterprises. Dispatch constraint risk exists as the power plant is subject to Governmental and electric power regulation in virtually all aspects of its operations, including the amount and timing of electricity generation, performance of scheduled maintenance and compliance with power grid control and dispatch directives. To the extent that substantial new transmission construction is required in relation to an independent power project, the power bureau may be faced with the question of how to finance the capacity expansion. This may lead to delay in the construction of the new transmission line. The power bureau may subsequently refuse to pay or may re-negotiate the scope of payments, especially if the Government's resources are under pressure due to difficult economic times and if the demand for power is below forecast.

Tariff adjustment risk

For power plants with foreign investment, tariffs payable under power purchase agreement (PPA) entered into by foreign project developer are established on the basis of tariff formulas which are agreed upon after discussions among the company's directors, its local partner, the prospective power purchaser, the local governments, the pricing bureau and the relevant planning commission. Once established, the tariffs are subject to annual review by the pricing bureau and adjustments are in accordance with the formulas. Usually the tariff formulas contained in the PPA are structured to permit the foreign developer to pay the operating expenses of the plant, the financing costs of each particular project and to enable the developer to realize a return on its investment. While the relevant China pricing bureaux may agree to utilize the adjustment formulas, there is no assurance that the formulas would not be re-negotiated and subsequently changed. There is therefore the risk that the adjustment is not enough to cover increased cost due to various reasons, such as, force majeure and changes in laws.

Criticality of risks

Table 5 shows the criticality of the foreign exchange and revenue risks. The ranking of the risk factors as well as the mitigating measures in the next section are based on the averages of the respondents' scores. The factor with the highest mean score would be ranked 1 and so on. There are 3 categories of ranking in Table 5 based on the mean scores of (a) all the responses, (b) only the banking and accounting professionals, and (c) responses from the other groups. There are three main conclusions: (i) all the factors are considered critical as their mean scores are above 3.0; (ii) the rankings by the respondents in groups (b) and (c) are different for the first 3 risks, the banking and accounting professionals having viewed foreign exchange and tariff adjustment as having a higher level

of criticality than dispatch constraint while the other respondents regarded dispatch constraint as the most critical risk; and (iii) the financial closing risk is considered as very critical (4.06) by the non-finance professionals while the level of criticality as rated by the finance professionals is lower at 3.40, and the reason could be that the non-finance professionals were unfamiliar with the uncertainties related to work involved in financial closing.

A detailed analysis of each of the factors is presented in this section. As shown in Table 5, tariff adjustment is deemed as the most critical risk, with a mean score of 4.50 based on all the responses. The reasons could be: 1. the Chinese government usually insists on renegotiating tariffs each year to control inflation, thus rendering overall project revenues and rates of return unpredictable; 2. the adjustment is subject to the approval of a Government price control authority at central or provincial level; 3. there is confusion in the international investment community with regard to perceived 'price caps' or rate of return imposed by Chinese authorities. While the Government's State Planning Commission (SPC) has declared that there are no such policies, several developers have complained about a 15% cap on a project's rate of return. If such caps do, in fact, exist, they significantly reduce the viability of infrastructure investment projects since they limit foreign companies' ability to balance Chinese risks with corresponding returns.

Dispatch constraint risk is ranked the second most critical risk in the overall category, with a mean score of 4.36. The reasons for its criticality are that, similar to electric power companies in other countries, BOT power plants in China are subject to governmental and electric power regulation in virtually all aspects of their operations. These include the amount and timing of electricity generation, the setting of electric power tariffs, performance of scheduled maintenance, and compliance with power grid control and dispatch directives. There can be no assurance that these regulations and restrictions will not change in the future in a manner which could adversely affect the operations of the power plants. In addition, foreign ownership of

Table 5 Ranking of criticality of foreign exchange and revenue risks

	(a) All respondents		(b) Banker/accountants		(c) Other respondents	
	Mean	Ranking	Mean	Ranking	Mean	Ranking
Tariff adjustment	4.50	1	4.69	1	4.31	2
Dispatch constraint	4.36	2	4.12	3	4.63	1
Foreign exchange	4.30	3	4.47	2	4.13	3
Financial closing	3.74	4	3.40	4	4.06	4

electric power plants in China is also restricted or controlled in varying degrees for the electric grids in China are all owned by Government utilities. Power developers can sell power only to Government utilities and are not permitted to sell directly to other customers.

Exchange rate and convertibility is ranked the third most critical risk in this category. Foreign companies in China are exposed to the exchange rate and convertibility risk for several years. China has gone through difficult times with its currency, switching from a two-currency system to the RMB single-currency system in 1994 and coming through periods of dangerously low foreign exchange reserves. Its foreign reserves are now among the world's highest. China is continuing foreign exchange reform and is doing much to allay foreign investors' fear about currency conversion. It has pledged to make its currency convertible on the capital account by the year 2000 following the phasing-in of current account convertibility on 1 Dec. 1996. Be that as it may, the RMB is still only a partially convertible currency. There are corresponding risks related to the ease with which a foreign company in China can convert and repatriate RMB profits into foreign currency and at a reasonable rate. In addition, although China was not affected by the recent Asian financial turmoils it still has weaknesses in its financial system and others. That is why the exchange rate and convertibility of RMB are regarded as a very critical risk.

As for financial closing risk, it is also regarded as critical, though it ranks fourth in this category. In the face of Chinese BOT power project risks, project financing can be difficult, with high costs of capital due to the high levels of perceived risk. The Chinese government is unwilling to provide financial guarantees to private infrastructure developers, since one of the primary objectives in letting concessions in the first place is to off-load its own financial exposure. BOT developers in China are challenged to assure investors of guaranteed high rates of return in the face of inherent uncertainty. Thus, creative approaches to financing and investment security are required to avoid extremely high costs of capital.

Effectiveness of mitigating measures

Exchange rate and convertibility risks

The options that presently are available to foreign companies in China wishing to convert RMB into foreign currency include: direct conversion through Chinese banks, currency swaps with other companies, balancing between projects, dual currency contracts, and special hedging measures for RMB. However, based on the overall responses from the survey, obtaining Government guarantees on exchange rate, and convertibility, e.g. fixed rate, or to adjust tariff or extend concession to cover the cost, is the most effective measure for mitigating the exchange rate and convertibility risks. This measure is regarded as much more effective than the other two measures for its mean score (3.97) is much higher than the other two measures (2.94 and 2.50) as shown in Table 6.

The second effective measure is to use dual-currency contracts with certain portions of tariff to be paid in RMB and other transactions denominated in foreign currency. The above mentioned two measures have been adopted partially in Laibin B.

Hedging tools specifically tailored to China's partially convertible currency by foreign banks are the third but less effective measures. Foreign banks are strictly limited in the scope of their transactions allowed within China using RMB; however, banks in Hong Kong and Singapore have come up with ways around these limitations to respond to demand by foreign companies in China for ways to protect against devaluation of the RMB. One example is the 'non-delivery forward' (NDF), a hedging instrument where no actual RMB cash is required for the transaction. Instead, the entire transaction is conducted in foreign currency (usually US dollars) outside of China, with the payout tied to the official closing RMB rate posted each day by the SAEC. The NDF requires a contract rate and reference rate (the official rate). The difference between the two rates then determines the gain or loss for each party in the transaction. Either way, transactions are automatically converted into foreign currency, so no RMB ever changes hands. Hence the non-delivery aspect of the forward (Macdonald, 1997).

Table 6 Effectiveness of mitigating measures for exchange rate and convertibility risk

Mitigating measure	Effectiveness	
	Mean score	Ranking
1. Obtain Government's guarantees of exchange rate and convertibility, e.g. fixed rate or to adjust tariff or extend concession to cover the cost.	3.97	1
2. Use dual-currency contracts, with certain portions to be paid in RMB and other transactions denominated in foreign currency.	2.94	2
3. Use hedging tools, e.g. forward, swap.	2.50	3

Other measures suggested by respondents for this risk include: (a) linking tariff to exchange rate change; (b) using an experienced-in-China bank or financial institution to arrange financing; (c) obtaining SAEC guarantees plus foreign exchange adjustment formula in PPA with sufficient support from a Government authority; and (d) obtaining an offshore branch of a Chinese bank to support foreign currency requirements.

Financial closing risk

The measures for mitigating this risk for the respondents' ratings are all less than 3 (effective) as shown in Table 7. Nevertheless, equity financing and cooperation with Government partners is still the most effective measure, for these can enable the project developer to limit risk. Equity financing is critical to the success of BOT projects, and often influences the ability of a company to secure further debt financing (Tiong, 1995b, c).

Cooperation with a Government partner in a JV relationship can help a foreign company to finance a BOT power project. Since it is guaranteed to own the asset after the concession JV period, the Government partner is often willing to take a reduction in its early dividend stream in return for greater dividends later. Such cooperation in revenue-sharing can assist the foreign company greatly with its equity returns and debt financing.

Some alternatives to contract payment, especially the land development rights, are being considered by some foreign developers as an alternative method of deriving value from BOT projects, especially road projects; however, it is not so effective for a power project as usually power plants are located in backward or remote area. Though the measure is second, it cannot be considered as effective.

Initial public offerings (IPOs) of China-linked project companies are popular on the Hong Kong stock exchange and provide an excellent vehicle for raising equity project finance. It can be ideal for a foreign company to use IPO to cover the construction costs of a power plant when debt financing is most difficult. After the plant is built and the high risk construction

phase has been passed successfully, the company can access cheaper debt from the capital markets. The use of equity capital to finance construction not only protects the lenders from construction completion risk, but also it gives the developer a chance to verify that plant usage levels are real and bankable. However, it is regarded as a fairly effective measure as it is not easy for a non-Hong Kong-based foreign company to adopt. For a successful listing, a company should have a portfolio of projects already in operation to attract the equity investors.

Though the respondents did not suggest other more effective measures than those in Table 7, one practical approach as recommended by one respondent is that the BOT concessionaire should communicate well with the Government in seeking a realistic target date for financial close. If the date were already specified in the tender document, it should negotiate for a longer financial closing period. This was what the concessionaire for the Laibin B project actually did. In Laibin B's tender document, the original schedule for financial closing was 60 days. This was extended to 180 days in the final concession agreement after the concessionaire negotiated with the government. Nevertheless, the financing of the project was actually closed 270 days after the concession award, a delay of three months from the official schedule.

Dispatch constraint risk

The most effective measure for this risk is to enter into a take-or-pay contract in the PPA with the power purchaser (usually local government agency or enterprise), as shown in Table 8. A take-or-pay contract is an agreement by the power agency to pay specified tariff payments periodically for the electricity purchased, and it must make specified minimum payments even if it does not take delivery. This agreement guarantees the producer that fixed costs such as debt-service payments, fixed operation and maintenance costs and return on equity will be covered. Variable costs such as fuel costs will be paid only if power is actually purchased. Entering into dispatch contracts with Government authorities to dispatch a power plant at full capacity for a minimum

Table 7 Effectiveness of mitigating measures for financial closing risk

Mitigating measure	Effectiveness	
	Mean score	Ranking
1. Equity financing and cooperation with Government partners.	2.65	1
2. Adopt alternatives to contract payment, e.g. land development rights.	2.21	2
3. Use initial public offerings on stock to raise funds especially equity finance.	1.83	3

(guaranteed) number of hours each year is the second most effective measure, while obtaining Government's guarantee that the transmission line will be ready in time for dispatch is also an effective measure. All these measures are incorporated in the Laibin B project. The Guangxi Government guarantees to purchase the minimum net electrical output of 3500 million kWh each operating year in a take-or-pay PPA manner and provide all transmission lines in time.

Other measures suggested by respondents for this risk include: 1. ensuring capacity objectives are met during the concession period; 2. treating dispatch constraint as force majeure risk; 3. understanding clearly the dispatch regulations and how these relate to obligations.

Tariff adjustment risk

The most effective measure for mitigating tariff adjustment risk is to have a formula for the adjustment that can make possible objective calculations of tariffs each year. The second effective measure is to separate and redefine a tariff, e.g. portions of a tariff fixed while portions adjusted, or portions to be paid in foreign currency. The third measure, i.e. maintaining good relationship with the Government and a positive public image of the project, is regarded as fairly effective (Table 9).

The only other measure suggested by respondents for mitigating this risk is to obtain the Government's guarantee to adjust the tariff when certain unfavourable conditions, such as interest or exchange rates or fuel price exceeding certain thresholds, occur.

Other foreign exchange and revenue risks

Other risks in this category as suggested by respondents, and their mitigating measures, are shown in Table 10.

Conclusions

China has introduced new policies in awarding BOT contracts since the end of 1996 when the concession of the first state-approved BOT project, the Laibin B was awarded. The BOT model will be an essential part of the financing necessary for the massive investment in infrastructure. It is likely that the government will adopt a gradual approach to the introduction of BOT, choosing carefully the pilot batch of projects. The choice will reflect a desire to introduce appropriate technology and to bring investment to the provinces of China that most need it, subject to that province being able to support the undertakings necessary for project financing. Nevertheless, international investors cannot afford to ignore the scale of the infrastructure market in China. Their keenness to invest in this market, combined with the Government's determination to attract the necessary funding, will ensure that ways are found to make BOT work. However, China's unique culture and social systems make the tendering system, the administrative procedures and regulations in China different from those of western countries. Only those foreign contractors who have fully understood the system can survive and succeed in tendering for construction contracts and BOT projects in China. In this research, the unique or critical risks associated with China's BOT projects are investigated. This paper

Table 8 Effectiveness of mitigating measures for dispatch constraint risk

Mitigating measure	Effectiveness	
	Mean score	Ranking
1. Enter into take-or-pay PPA with power purchaser (Government).	4.33	1
2. Enter into dispatch contracts with Government authorities to dispatch power plant at full capacity for a minimum number of hours each year.	3.79	2
3. Obtain Government's guarantee that transmission line will be ready in time for dispatch.	3.31	3

Table 9 Effectiveness of mitigating measures for tariff adjustment risk

Mitigating measure	Effectiveness	
	Mean score	Ranking
1. Have a formula for tariff adjustment that can enable objective calculation of tariffs each year.	4.26	1
2. Maintain good relationship with Government and a positive public image of the project.	2.50	3
3. Separate and redefine tariff, e.g. portions of tariff fixed while portions adjusted, or portions to be paid in foreign currency.	3.17	2

Table 10 Other exchange and revenue risks and their mitigating measures

Risk	Criticality	Measure 1	Measure 2	Measure 3
Interest rate: set by Government	4	Enter into a fixed rate loan with Bank of China.	Invite foreign JV partners and tap into overseas capital market.	Structure debt to minimize interest rate exposure.
		Effectiveness score: 3	Effectiveness score: 4	Effectiveness score: 3
Cost overrun	5	Secure standby financing, i.e. more than 100% financing commitments to assure financing will be there when needed.	Build-transfer structure where contractors provide financing.	Shareholders undertakings.
		Effectiveness score: 5	Effectiveness score: 4	Effectiveness score: 3

specifically presented the findings on the criticality of the foreign exchange and revenue risks. The main conclusions are as follows.

1. The identified unique or critical risks in their criticality sequence are: tariff adjustment; dispatch constraint; exchange rate and convertibility; and financial closing. The first three factors were viewed as very critical by international professionals. The fourth factor, of financial closing, was viewed as critical by the financial professionals and very critical by the other respondents.
2. The measures for mitigating each of these risks have been evaluated by respondents. Most of the measures are regarded as effective or very effective and only a few of them are regarded as fairly effective. Investors and lenders should ensure that three key measures are incorporated in the concession agreement as they are considered to be very effective in mitigating the risks of tariff adjustment, dispatch constraint and exchange rate and convertibility. These measures are: (a) have a formula for tariff adjustment that would make possible objective calculations of tariffs each year; (b) enter into take-or-pay power purchase agreement with the power purchaser; and (c) obtain Government guarantees of exchange rate and convertibility such as agreement on fixed exchange rate, adjusting tariffs if RMB depreciates, or extending the concession period to cover any additional costs for foreign exchanges. For financial closing, the practical approach is to communicate well with the Government and to negotiate for a longer financial closing period so that there is sufficient time to raise the project funds successfully.

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