



New models for financing and managing highways: asset-based road corporations in China

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Abstract. The China International Engineering Consulting Corporation undertook, in 1997, the study of *Viability of Asset Based Road Corporations in China* as part of the World Bank's transport sector program review. The purpose was to investigate, in a case study format, road administration in China with two specific objectives: to compare (toll) road management in different provinces and to investigate the financial viability of China's toll roads. This paper shows that the three case projects studied, each having different management structures, are all financially viable given the present financing arrangements. However, should the projects be immediately subject to market interest rates and loan maturities prevailing in China today, their financial viability would be uncertain. In a broader context, the World Bank's lending program has enabled China to experiment with different kinds of toll road management structures. These models have both advantages and disadvantages and seem to fit that province's political economic environment in which they are employed. The toll roads and, especially, the impacts of the toll road management and financing arrangements on road administration present challenges to road administration rarely faced even in the developed countries. The challenges involve questions of the congruence of public good and private interest, as well as the role of planning and public accountability – all serious questions as China moves forward in development. These questions are raised in the context of the case studies.

Abbreviations: SPC = State Planning Commission; PBC = Peoples Bank of China; PCD = Provincial Communications Department; CIECC = China International Engineering Consulting Corporation; NHTS = National Trunk Highway System; XSE = Xi-San Expressway; HYE = Hang-Yong Expressway; FKE = Fo-Kai Expressway; MOF = Ministry of Finance; MOC = Ministry of Communications; RMB = Renminbi, about US\$0.12; FIRR = Financial internal rate of return; FNPV = Financial net present value

1. Introduction

This introduction provides the context for the paper and describes the extent and classification of China's road network, the case studies that are the paper's empirical basis and the World Bank's involvement in China's road sector. In the second section the current and the emerging institutional framework of China's road sector is described. The third section examines the financial

viability of the case study roads in detail and illustrates how they are related to the provincial road sector organization and management. The fourth section discusses the toll road implementation and management models employed in China and the fifth section focuses on the factors affecting sustainability of the tolled expressways, including the government oversight in highway administration. The sixth section concludes the paper.

The road network

The total road network length in China is approximately 1,200,000 km. This is classified both administratively and technically, Table 1.

The first two classes are divided highways and the Class 2 includes both two-lane and divided highways; these are for autos-only roads. A subset of the National Highways, the National Trunk Highway System (NTHS), often called the 'high-class roads', consists of five vertical and seven horizontal expressway roads with a total length of 35,000 km, of which 4,000 km has been built. While the above classification is not as formalized as in the United States and many other countries, it provides the basis for defining jurisdictional responsibilities, planning and project development approaches, and financial responsibility.

The construction of high-class roads in China has accelerated greatly in recent years. The construction of national arterial road network, started in 1990 with the *Eighth Five-Year Plan*, will be completed in about 30 years. In this plan, the twelve high-class highways will have a high priority. Already in year 2000, the total kilometrage in China's National Roads is planned to reach 125,000 km, of which 8,000 km are expressways.

The great investment and the long repayment period of the high-class highways make the domestic financial resources insufficient to accomplish this enormous task. China needed to look for new and efficient ways of using

Table 1. China's road network in 1997 (rounded off)

| Administrative classification | | | Technical classification | | |
|-------------------------------|-------------|---|--------------------------|-------------|---|
| Type | Length (km) | % | Type | Length (km) | % |
| National | 110,000 | | Expressway | 3,600 | |
| Provincial | 170,000 | | Class 1 | 11,800 | |
| County | 350,000 | | Class 2 | 97,200 | |
| Village | 400,000 | | Class 3 | 216,700 | |
| Special Purpose | 56,000 | | Class 4 | 619,000 | |
| | | | Unclassified | 237,700 | |
| Total | 1,186 000 | | Total | 1,186,000 | |

both domestic and foreign capital for roads. The mode of raising these funds, the autonomy of the road administration, management and operation of road organizations, and the expected financial viability of privately financed projects directly influence the efficacy of the financing instrument and the confidence of investors. For this reason, a central focus in this paper is to investigate, on a case study basis, the viability of China's (which turned out to be) toll road projects and their management frameworks, and from that experience make generalizations about future road administration and management in China.

The challenge of building the national highway system and improving the lower class roads has set in motion unprecedented developments in both administration and financing of roads. Road administration in China has evolved into directions not anticipated in the beginning and these directions pose challenges not encountered in the developed countries. Concurrently, political and administrative decentralization have taken firm hold and provincial governments play a central role in economic development, including highways.

Selection of the case studies

A steering committee of experts from State Planning Commission (SPC), Peoples Bank of China, National Audit Office, State Development Bank and China International Engineering Consulting Corporation (CIECC) supervised the work on which this paper is based (CIECC, 1997). The steering committee formulated the study plan and chose the case study projects as representative of the situation in China. They are:

- Xi-San Expressway (XSE), a 34.5 km long Class 1 access-controlled highway northward from the historic city of Xi'an to Sanyuan, in Shaanxi province mid-west of China. This project was built and is managed by the Shaanxi Provincial Communications Department (*government-build-and-operate* model). It is one of China's first highway projects supported by the World Bank.
- Hang-Yong Expressway (HYE), a 145 km long expressway from Hangzhou to Ningbo, in the rapidly developing Zhejiang province in China's eastern coast. The ownership and management of this road was reorganized in 1996 as an asset-based road corporation, and (33% of) the toll road operation company's stock was listed on the Hong Kong Stock Exchange in 1997 (*toll road company* and *toll road operation company* models).
- Fo-Kai Expressway (FKE), a 79.8 km long expressway from Foshan to Kaiping, in the province of Guangdong southern China. This project is supported by a World Bank loan and funds raised from issuing shares (*joint venture with a foreign company* – the market model).

The details of the management and ownership structures are described later.

Table 2. Road networks (km) in Shaanxi, Zhejiang and Guangdong in 1997

| Class of road | Shaanxi | Zhejiang | Guangdong |
|---------------|---------|----------|-----------|
| Expressway | 16 | 94 | 358 |
| Class 1 | 228 | 110 | 2,731 |
| Class 2 | 1,549 | 2,610 | 6,374 |
| Class 3 | 10,947 | 4,254 | 5,190 |
| Class 4 | 19,461 | 21,516 | 55,760 |
| Unclassified | 7,420 | 5,963 | 14,150 |
| Total | 39,621 | 34,547 | 84,563 |

For reference, the technically classified network lengths for the three provinces are given in Table 2.

Road projects supported by the World Bank

The World Bank has supported China's transport sector since 1983 through loans and grants. Currently, China has the biggest road portfolio among the World Bank's client countries. The Ministry of Finance (MOF) is China's window and the responsible counterpart to the World Bank. By 1998, China had obtained eighteen road loans from the World Bank totaling about US\$3,300 million. Of these, nine projects are completed or almost completed. The World Bank loans have supported the financing of 1,300 km of high-class roads and 4,000 km of other roads. The loans have played a central role in helping solve the funding shortfall in China's road construction. And, as discussed later, they have fundamentally shaped the way (autos only) roads are planned and financed in China.

2. Institutional framework in the highway sector

Until the early 1990s, China's highway administration was straightforward. The Ministry of Communications (MOC) set the policies and guidelines and the Provincial Communication Departments (PCD) implemented them. Those few Class 1 highways that were built were financed primarily by the international lending organizations and overseen by the traditional institutions in which the SPC and MOC were the principal national agencies. Major policy issues dealing with highway development and land use, intermodal planning and coordination, and highway financing strategies were dealt with at the SPC and State Council levels. MOC had the overall responsibility for planning and allocating Vehicle Purchase Fee revenues for the NTHS. The SPC departments reviewed national highway plans and project proposals and helped

develop financing at both the program and project levels. With some provincial differences, the PCD developed the provincial network plan for the first four road classes for approval by the provincial government. After approval it was responsible for the planning, design, construction and management of these roads in the province, including the national roads. Counties are responsible for the two lower road classes; technical and financial support is provided by the provincial and, in some cases, the central government. This institutional arrangement is still in effect for the inland provinces.

The liberalization of the economy set in motion rapid economic growth and required prompt responses to meet the ensuing travel demands. In the early 1990s, China recognized that the highway expansion needs would not be met by the traditional revenue sources then in use. After utilizing loans and credits of multilateral and bilateral organizations, foreign private investment sources were tapped for developing the high-class highway network. Fast developing coastal provinces evolved complicated organizational structures for highway administration. New organizations – holding companies, toll road operating companies, and the like – were created to meet the legal, technical, and marketing requirements involved in using foreign and domestic private capital. The traditional organization structure underwent a near revolutionary change. The new structure is schematically shown in Figure 1 (J.P. Morgan, 1997). A number of other changes also occurred in the institutional support struc-

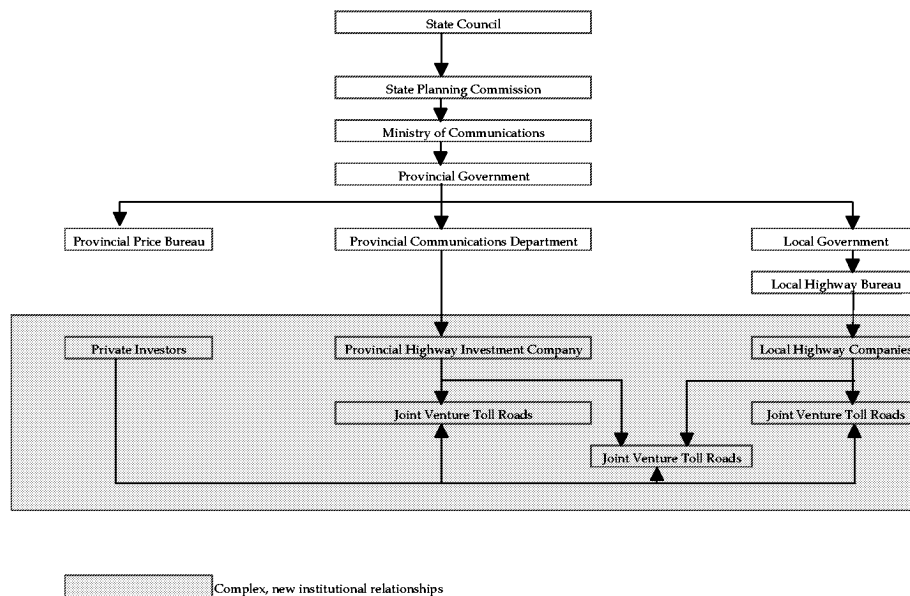


Figure 1. Institutional structure of highway administration in China, 1997.

ture of the sector. The most important was the increasing power decentralization confers on the provinces and the PCDs (Weingast, 1994). The PCD will continue to develop the provincial network plan for approval by the provincial government.

Currently the Hong Kong Stock Exchange lists eight stocks that have a substantial part of their assets in Chinese roads, mostly in Guangdong.¹ Many of the companies are diversified companies with comprehensive portfolios. Many if not most, are ultimately controlled by entities associated with the PCDs in provinces where the assets are located. The toll roads that are analyzed below differ in their degree of control by the provincial road authorities. In the first case study (the XSE), the toll road is managed by the PCD. In the second (the HYE), a road operation company listed in a stock exchange owns the road and the rights to the toll revenues for a long time period. In the third case study (the FKE), the road company develops the road from plan to finish and also operates it.

3. Viability of case study toll road projects

According to regulations MOC, SPC, and MOF issued, in 1994, only certain infrastructure facilities can collect toll fees regardless of funding source. These facilities, which include expressways, large bridges, tunnels and ports have the income potential to repay the needed loans. The toll rates are regulated and approved by the provincial price bureau and the PCD. The following sections describe the management organization and the financial viability of the three case study toll roads.

Xi-San Expressway in Shaanxi Province

The Xi-San Expressway (XSE) is a major project in China's *Seventh Five-Year Plan*. The expressway, starting from a suburb of the historic city of Xi'an, crosses three rivers, a railway and ends in Sanyuan County, 34.5 km north of Xi'an. There are three toll stations. The road shortens the length of National Road 210 in Shaanxi province by 15 km, and National Road 211 to Ningxia province by 13.5 km. The road was opened to traffic in 1989, as directed by the State Council.

The construction and management organization has evolved by gradually improving the existing road organization of the Shaanxi PCD. Three departments are involved with XSE and the other province's World Bank highway loans: the Shaanxi Projects Executive Office (SPEO), the High Class Road Management Bureau (SHMB) and the Provincial Road Management Bureau (SRMB). The SPEO is in charge of planning, coordination, construction

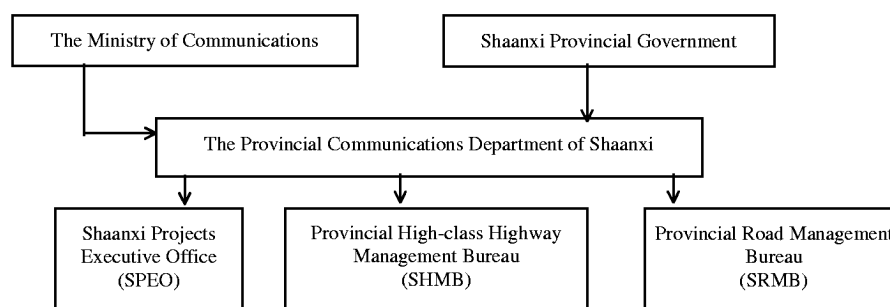


Figure 2. Partial organization chart of Shaanxi Provincial Communications Department.

management and supervision of World Bank supported road projects. The SRMB is responsible for provincial roads and roads in Shaanxi's poverty regions. The SHMB maintains and operates the expressways in Shaanxi, including toll collection. The capital investment for XSE and its debts due to the World Bank are managed and paid by the PCD. Figure 2 shows the organization structure, which has been found to be satisfactory.

Financial viability of Xi-San Expressway

According to a 1992 SHMB study, the financial internal rate of return of XSE was 16.5%, a much higher figure than the 3% estimated at appraisal.² Traffic had almost doubled the original forecast. Sensitivity analyses show that if the toll rates were decreased by 20%, the FIRR would still remain a solid 12.5%. In sum, the XSE is delivering benefits and has the ability to repay the loan from the World Bank.

Later studies showed that the traffic volumes and the toll revenue from XSE are even higher than forecasted in the 1992 evaluation, Table 3. Since the Shaanxi PCD is the owner of the expressway, there is no statement of assets and liabilities and the financial viability of XSE project is evaluated from FIRR,

Table 3. Before-and-after statistics for Xi-San toll road

| Project year | Estimate in 1992 | | | Actual Situation | | |
|--------------|------------------|--------------|----------------|------------------|--------------|----------------|
| | Traffic ADT | Toll revenue | Costs millions | Traffic ADT | Toll revenue | Costs millions |
| 1992 | 17,500 | 117.7 | 16.2 | 24,500 | 161.1 | 19.1 |
| 1993 | 19,100 | 128.3 | 16.2 | 26,900 | 188.2 | 18.2 |
| 1994 | 20,800 | 139.8 | 16.2 | 36,000 | 246.0 | 70.8 |
| 1995 | 22,700 | 152.4 | 16.2 | 49,000 | 355.0 | 36.4 |
| 1996 | 24,700 | 166.1 | 17.8 | 49,800 | 546.4 | 69.2 |

project income and the 'loan repayment coefficient' (annual net revenue/annual loan payments). Based on reasonable projections, the FIRR for XSE is 9% and financial net present value (FNPV) of RMB26.76 million. On average, the coefficient of loan repayment over the 16-year payback period is 4.7. Thus, the net income of XSE is not only enough to repay the capital and interest of the loan, but also could be used to invest in other expressway projects. The substantial equity investment by the PCD is not included in the above calculations.

Hang-Yong Expressway in Zhejiang Province

The Hang-Yong Expressway (HYE), with a total length of 145.0 km, is part of the NTHS and opened for traffic in 1996. It starts from a suburb of Hangzhou, runs southeast and ends at Dazhujia, a few kilometers east of the port city of Ningbo. Twelve toll stations are at interchanges connecting with regional main roads and (eleven) cities.

Like in Shaanxi, the Zhejiang PCD formulates the province's road network plan for the provincial government's approval. Implementation of expressway projects in Zhejiang is carried out by the Zhejiang Provincial Expressway Project Executive Commission (ZPPC), an agency of the provincial government, headed by a vice-governor of Zhejiang. ZPPC coordinates all expressway projects and intervenes during project implementation whenever required, and to solve disputes in resettlement, procurement, and contract supervision. At completion it withdraws and transfers the assets to a holding company, the Zhejiang Expressway Investment Corporation (ZHIC), a State owned enterprise. This arrangement can be regarded as a 'transition' model from a centrally planned economy to market economy, Figure 3.

Current structure of road corporations in Zhejiang Province

After taking over the capital assets and debts from ZPPC at project completion, ZHIC is responsible of both the (re)investments on Hu-Hang-Yung (HHY) expressway and all other high-class highway projects in Zhejiang. In part, ZHIC exercises this responsibility through Hu-Hang-Yong Expressway Company Ltd. (HHYEC), a company listed in the Hong Kong stock exchange with ZHIC as the majority owner. HHYEC is designated as the developer and operator of expressways in Zhejiang. It operates two sections of the Hu-Hang-Yong and holds the majority shares of the subsidiary companies operating the other two sections of the 247.6 km long Hu-Hang-Yung Expressway. The subsidiary toll road operating companies are Yu-Hang High-Class Highway Co. Ltd. (YHHC) and Jiaxing High-Class Highway Company Ltd. (JHHC), Figure 4.

HHYEC leases the right of way, owns the rights to the toll revenue and

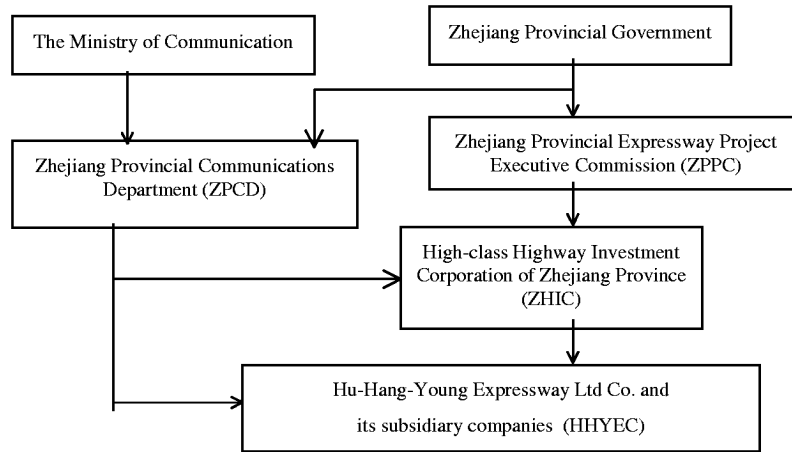


Figure 3. Organization chart for the Zhejiang Expressways.

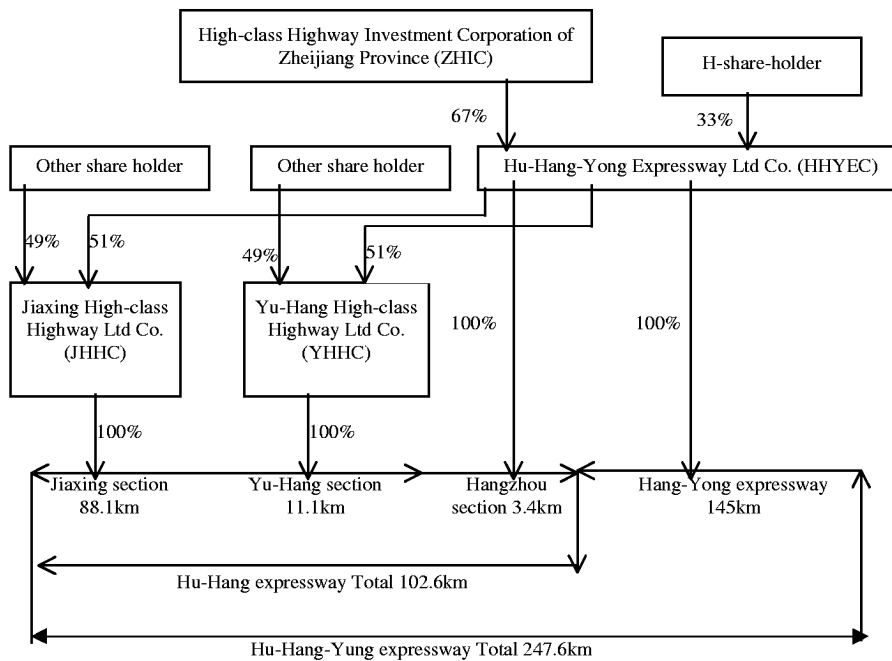


Figure 4. Ownership structure of the Hu-Hang-Yung Expressway.

is responsible for road maintenance and loan repayment of the Hangzhou and Hang-Yong sections of the HHY expressway. The concession period of HHYEC is 30 years in accordance with MOC and Provincial Government regulations. Similarly, YHHC and JHHC are responsible for the repayment

of the debts of their respective road segments and in charge of tolling, and maintenance, over 30 years.

Financial viability of Hang-Yong Expressway (HYE)

The HYE toll rates will generate expected revenues and other income of RMB550 million in 1997. The expected costs for operation, maintenance and management will be RMB163.45 million, yielding a net income of RMB385.5 million. Subtracting the loan repayments of RMB72 million to the World Bank and RMB160 million to domestic banks, a repayment coefficient of 1.67 is obtained for 1997. As traffic develops, the toll income will increase and the estimated repayment coefficient of the project will reach 4.2 in the future. The balance sheet for 1996 shows that the ratio of assets to liabilities is 52%. A reasonably safe conclusion is that the project is financially satisfactory and the road loans from both the World Bank and the local banks can be repaid as planned. The FIRR of the project is 9 %, and the FNPV RMB237.58 million. In sum, HYE will yield sustained benefits.

The picture changes, however, if a position is taken that the World Bank loan must be paid earlier than planned because the Government no longer remains the sole owner of the road. Two alternatives were considered: the loan must be paid immediately, or that it must be paid back in five years. In both cases, it is assumed that domestic or foreign loans would substitute the Bank loan at prevailing interest rates. Results showed that in either case, the HYE would not be financially viable given the short maturities of the local loans. It was further inferred that with a fifteen-year maturity and market interest rate, this toll road would become financially viable.³

Fo-Kai Expressway (FKE) in Guangdong Province

Guangdong has several expressways financed in corporate financing mode. One of them, the Fo-Kai expressway, an extension of the Guang-Fo expressway, is an important section of the Sanya National Expressway. This road, with ten toll stations, starts from Xiebian in the city of Foshan and ends at Zhishan in Kaiping County. Some sections of FKE were opened to traffic in July 1996 and the entire road is expected to open for traffic by the end of 1997.

Guangdong Province high-class road management organization

Guangdong is perhaps the most advanced province in developing expressways in China; over 700-km of expressways are in operation. Guangdong PCD (GPCD) is the administrative department for the planning, construction and management of national and provincial highways in the province. It plans the road network, approved by the provincial government, but, more impor-

tantly, investors may be permitted to invest in roads that are different from the plan approved by the provincial government. The organization, management and financing framework for Guangdong's expressways is complex and sophisticated. The Guangdong Provincial Expressway Company (GPEC), Guangdong Road Construction Company (GRCC) and Guangdong Road and Bridge Development Company (GRBDC) are separate State owned enterprises, managed by the GPCD, Figure 5.

GPEC is the main shareholder of the Guangdong Expressway Development Company (GEDC). It also fully owns five Guangdong expressway companies, and is the main shareholder or shareholder in more than 10 expressway operation companies in Guangdong, including the Fo-Kai Expressway Company (FKEC). GRCC's specialty is the construction management of roads and bridges; it also operates as a contractor in overseas road projects. GRBDC specializes for the construction management of tolled national and provincial highways.

Relationships between FKEC, GPEC and GEDC

In order to speed up construction of expressways in Guangdong, the province, through GPEC, formed Guangdong Expressway Development Joint-stock Company (GEDC) to raise construction funds for expressways. The FKE, sponsored by the GPEC, is maintained and operated by the FKEC in which GEDC has a 25% equity share in return for raising RMB834 million for construction by listing itself (B-shares) in the stock market. Figure 6 shows the relationship among the GPEC, FKEC and GEDC.

The Fo-Kai Expressway

FKEC does not publish statements of its assets and liabilities because the assets belong to GPEC and GEDC (but all debts are liabilities of GPEC). GPEC owns 75% of FKEC shares and the dividends from this ownership are used for financial viability analysis. The summary of the results is as follows: the FIRR

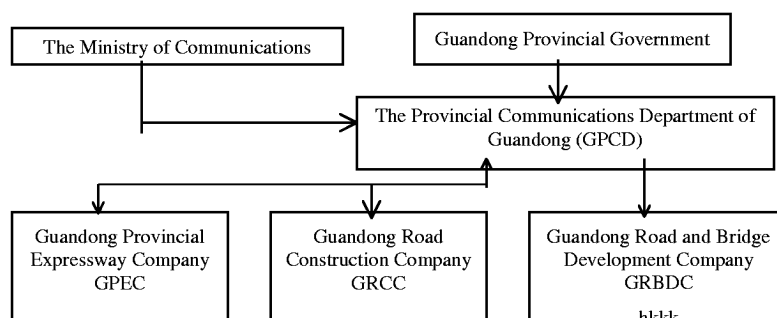


Figure 5. Guangdong road management organization.

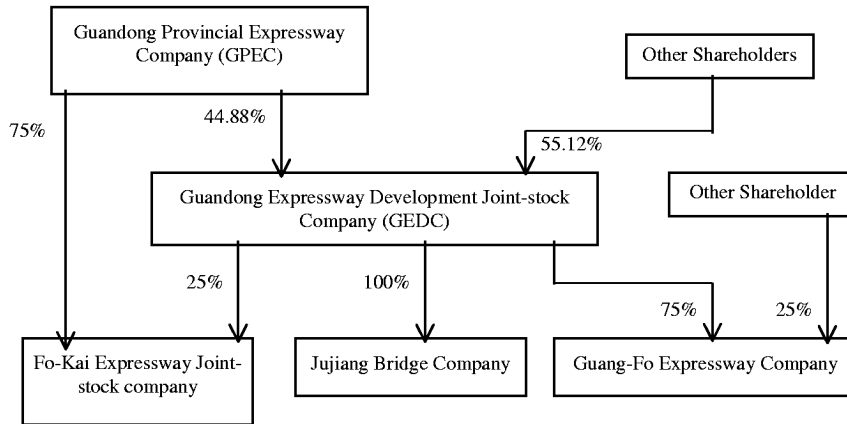


Figure 6. Ownership of Fo-Kai Expressway.

for FKE is 8% and FNPV RMB50.96 million. These values are higher than prevailing standards in China's transport sector and the project is deemed financially viable and sustainable. However, they are slightly below the current market interest rates of 10–10.5%.

In 1997, GPEC applied to the Bank for a transfer of 26% of its stock rights in FKEC to GEDC in return for GEDC completing the FKE. A 10% transfer has already been approved. If the full 26% transfer is performed as anticipated, GPEC would hold 49% of the FKEC stock and its shares in GEDC would decline to 39%. The current GPEC take of 65% of the FKEC dividends yields an average repayment coefficient of 5.7 which is more than adequate for the loans' repayment.

Sensitivity analyses show that if the FKE toll income decreases and operating cost increase 20%, the average repayment coefficient of the loan would be 2.88. This is satisfactory for meeting the repayment requirements of bank loans, including that from the World Bank. If the stock transfer is approved, FKEC plans to transfer part of its stock to a market-listed stock company. In this way the company can raise funds and reinvest into itself or other expressway projects. This is a concrete example on how an expressway (company) supported by the World Bank can be leveraged in a corporate financing mode to spur expressway development.

4. Discussion the expressway implementation and management models in China

The essential characteristics of the four models being experimented with in developing expressways are the following:

- *Government built and operated toll road.* The PCD, a government agency, is the owner and debtor of the toll road. The planning, construction, maintenance and operation of the project are all directly under the management of PCD's departments. ('Shaanxi model').
- *Toll road operation company,* listed in a stock exchange, owns the rights to the toll revenue for a long time period, normally thirty years. The company's controlling shareholder is (ultimately) the local PCD. A variant of this is the 'asset injection' format in which the provincial highway authority sells to a *foreign investor* the right to operate a road for a finite period.
- *Toll road company,* listed in a stock exchange, to which the assets and the rights to the toll revenue and the debt service are transferred or leased from a government owned parent company after the completion of the road for a long period, normally thirty years. The toll road management and operation may be performed by the *toll road company* itself, or through another stock-exchange listed *road operation company* which would have the rights to (a share of) the toll revenues. The parent company or the toll road company have monopoly-like rights over future road development in the area. Ultimately, however, the controlling shareholder is the local PCD, which initially built and financed the road ('Zhejiang model').
- *Joint venture with a foreign company,* normally located in Hong Kong, which may have a controlling stake in the joint venture. In this format, the company is responsible for raising the money and for management from planning to implementation and operation of road(s), and is required to take the responsibility for (loan) liabilities. The foreign partners contribute money to build the highway and may have preferential access to toll revenues. The Chinese counterpart contributes its share of capital in terms of highways (not necessarily completed), land use rights and even cash. The companies may enjoy tax and other privileges. ('Guangdong market model').

In the Shaanxi model, XSE is a tolled segment with the State PCD as the owner and manager from planning to operation. This model makes it is easy for the local governments and beneficiaries to participate in project formulation and implementation. Use of eminent domain and other government interventions, and procurement of required permits for land acquisition and resettlement is straightforward and predictable. It was a practical model in the centrally planned system. The main disadvantage is the lack of transparency in financial responsibility both in terms of project borrowing and debt service. This is particularly so after China's banking reform when it became increasingly difficult to borrow directly for a government project such as a road. Today, it would be very troublesome for government agencies to own financially unviable projects. Because the demand for road transport is growing rapidly

in China, most of the road projects completed using this model in the past fifteen years will succeed. For its simplicity and strong latent demand, it is likely to remain in use for several more years, especially in China's western provinces, but it may be expected that its usefulness will not last long.

The model Zhejiang adopted for toll road development separates construction from toll road operation. A government agency is responsible for construction and financing. After completion it transfers the fixed assets to ZHIC, a State owned holding company. ZHIC has agreed with a toll road operating (joint-stock) company (HHYEC) on land lease, first rights of refusal to develop other classified roads in Zhejiang, protection from competition, and transfer of debt service and road maintenance to HHYEC for thirty years. In this way, the advantages of governmental functions for permits and other interventions by local government offices and efficient toll road operation by a private manager were achieved. The model appears on surface a mixed model, neither a pure planned economy nor a market model, and it has solved many emerging issues in project implementation and operation. It was found to be a good model for managing projects from concept to operation and has wide application possibilities in today's China. There are, however, several clauses in the agreement between ZHIC and HHYEC that limit competition and accountability, and require monitoring to fully evaluate its advantages and disadvantages.

The model adopted in Guangdong province is closest to the functioning of market economy. Stock companies manage everything from planning to operation of roads. Companies have the right to develop a road and raising the funds, and are required to take responsibility of liabilities. This aspect has played the most important role in these projects. From practical point of view, the biggest advantage of the model is its direct connection to financial viability and sustainability through the market mechanism. The disadvantages are safeguarding investor interests, protecting the users from the road companies becoming monopolies, and the conflicts of interest in planning.

In addition to the above three models, two other models of road management and financing may be tested in China. One is Build-Operate-Transfer (BOT) currently being developed for two projects and the other is a modified Zhejiang model in which the project is developed by government (agency) while the operation is by an international management company for a limited time.

The build-operate-transfer (BOT) model has been studied for the Kaiping-Yangjiang Expressway, however the proposal has been suspended for further study. In addition, Changjiang Junshan bridge project in Wuhan is proposed for BOT financing, including participation by the World Bank. The proposal has been submitted to the central government by SPC, but it has not yet been approved. A toll road from Guangzhou to Shenzhen is an early BOT-like

project built by a Hong Kong developer. Also, this toll road has close ties to provincial authorities. The highway administration has a policy and operations committee consisting of the developer and officials from the Guangdong Provincial Government.

5. Factors affecting sustainability of the tolled expressways in China

In this section the factors affecting sustainability of the tolled expressways in China are discussed. To begin this, summary indicators for the three case study roads' financial viability is shown in Table 4. In all cases, the commercially financed and operated road projects in China, including those supported by World Bank loans, are financially viable. Several factors will continue to affect sustainability of these roads and, especially, the expansion of the network by these or other asset-based road companies. These factors are discussed next.

Management and implementation

Management's capability and skills in planning, construction, maintenance and operation are the key factors in creating good projects and making them sustainable. High quality project development, operation and management can reduce the construction and operation costs and directly affect the financial benefits from the project. During implementation, construction costs, delays, quality of equipment and technology, resettlement, mitigation of environmental harm, permits, utilities, and so forth, pose risks and influence the financial viability and success of the project.

Table 4. Summary indicators for the three toll roads financial viability

| Project | Xi-San Expressway | Hang-Yong Expressway | Fo-Kai Expressway |
|-------------------------------------|-------------------|----------------------|-------------------|
| Total investment | RMB147 million | RMB3982 million | RMB3337 million |
| World bank loan | US\$12.59 million | US\$220 million | US\$100 million |
| Grace period | 4 years | 5 years | 4 years |
| FIRR | 9% | 9% | 8% |
| FNPV ($i = 8\%$) | 26.76 million | 237.58 million | 50.96 million |
| Investment recovery period (years) | 11 | 14 | 13 |
| Ratio of assets and liabilities (%) | – | 46.7 | – |
| Repayment coefficient of loans | 4.7 | 3.1 | 4.7 |

Exchange rate

January 1, 1994, the government adopted a unified foreign exchange rate (FER) in China. Under the new system, FER is determined by market supply and demand. The foreign loans are repaid in foreign currencies. The fluctuation of FER can influence the financial position of the Bank loan projects positively or negatively. FER should be given serious consideration.

Preferential tax treatment

Chinese government encourages the use of foreign capital. Firms that use foreign capital get preferential taxation treatment in varying degrees. The preferential policy can influence the revenue of the firms. For instance, the Zhejiang provincial government approved an 18% income tax credit and 15% income tax rate for the company that operates the Hu-Hang-Yong Expressway based on the a preferential taxation policy. However, the local tax credits accord with macroeconomic policies of the central government and, therefore, there is uncertainty about the preferential treatment's duration. The government of China recently decided to continue preferential tax policy for all foreign road investments in China.

Market

Besides competition between high-class expressways and airlines, railway as well as shipping, there is competition in the road sector itself. For example, traffic demand on an expressway or diversion of traffic from parallel arterials is influenced by access control from the road network. The same holds true for construction of a more extensive local road network and improvement of its level of service, the toll rates, competition from alternative routes, road condition, service facilities, climate, petrol price, traffic regulation, economic situation and so on. In some cases (Zhejiang), the government agreeing not to build parallel roads within 50 miles on either side until certain traffic thresholds have been achieved has mitigated the market risk, but increased other risks caused by a monopoly.

Highway administration

Whether planned or not, the most important impact of the Bank's support for China's road sector has been on road finance, the creation of toll road companies, and its consequent effects on road ownership and the organization and management of the PCDs. The creation of private companies with assets securitized on the markets provides essential financial resources to meet the

demands on highway development but complicates the administration of the sector. The emerging institutional framework poses challenges that have little precedent in other countries. As the country develops economically and socially, the administration of its highway system must necessarily evolve to adapt to the new challenges and requirements. Simply raising some money to build or pave a few roads might have been sufficient in the early stages of road network development. However, the responsibilities, obligations and interests of public road administrations grow increasingly complex as society develops around them, bringing tough policy issues such as economic and land-use development, competition, public participation, resettlement, congestion, the environment, multimodal transport integration, equity, and others.

Under the simpler institutional framework, which is still in effect for the majority of the provinces, significant externalities caused by high-class highways would be worked out at the ministry level based on consideration of the issues from the local level up through the layers of bureaucracy. For example, the MOC spent many years developing and negotiating the NTHS corridors. Using the traditional Chinese bureaucratic hierarchy, the initial priorities were proposed at the local level, with the PCDs responsible for working out the provincial-level highway priorities and making recommendations to the MOC. MOC's responsibility was to ensure that the final NTHS system was compatible with national priorities under the State Planning Commission's Eighth Five-Year Plan.

With the private highway development companies, new regulations and managerial and planning styles are required to ensure consideration of competing proposals, the integrity of the planning process, and transparency in prioritization and construction of the highway network. The challenge is to evolve institutions and management styles to make sure that the private interests in planning for the expansion of the highway network, in operation, in the treatment of externalities and in financing also serve the public interests. If these efforts are successful and responsibly carried out, extremely beneficial outcomes could result: highway development plans and policies, private sector interests, urban development issues, and others can be knowledgeably weighed against financial assessment criteria and an optimal resolution of issues could be achieved.

This may not be the case in China – yet. The emerging privatization of the road sector brings forth several issues not previously confronted anywhere in the world. The institutional framework, the regulations and the organizational dependencies may be clear to those now involved, but to an observer these, and the responsibilities of the private toll road companies, are not transparent. The companies' close relationships to the provincial, municipal and national government authorities are troublesome. What will happen when a choice has to be made between different sponsors' competing expressway

proposals? Who will decide? Will giving 'first rights of refusal' stifle development of ideas and competition? These issues have been decided in the developed countries by giving the road administrations a monopoly over roads. In all countries there are procedures to protect the public interest. But nowhere has the private sector become as integrally involved in developing roads as in China. Clearly, continued observation, study and institutional development effort is indicated.

6. Conclusions and emerging issues

China is in transition from a planned economy to market economy and concurrently decentralizing many decision making functions. As a consequence institutions are changing. This is reflected in the institutional models for managing expressway. China is experimenting with basically three different models of privatizing roads. The models are chosen with regard to the political economy of the region and are functioning successfully.

One impact of creating private toll road companies was the creation of a new, parallel line of authority in financing highways. This parallel line of authority – essentially one in which corporate boards play a key role – has the potential of working with or interfering with the original line of authority. The management of the technical aspects of road management have developed in line with well-thought-out strategies, motivated domestically and assisted by the Bank and foreign engineering consortia. For this, the original lines of authority were well suited. The management of the financial aspects of road management has not benefited from the same level of effort by the World Bank or the financial community consortia. As a result, foreign funding of highways has been implemented without strong foundations in financial, legal, multimodal transport system and land use planning, and other important functional attributes. The adopted way of project financing is an expensive way to build toll roads and may have led to expensive ways of operating them. The current rules for foreign financing have also impacted provincial highway organization, planning and operation: by 'chopping' up toll roads into small pieces and only provincial level approvals required.

Another impact from private toll road companies concerns road operation more directly. To the extent that the private investors' profit motives are incongruent with the public good, significant conflicts between the toll road companies and the PCDs – as civil service organizations – may develop in the future. For example, in the absence of clear policy, it is not difficult to imagine instances where tolls might be raised on certain roads in order to divert traffic to other roads owned by companies whose shareholders are or were in a privileged position within the government. Private motives and public

interests may also clash in the design of the road concession agreements. Without well-defined and well-designed safeguards and competition to secure public service and efficiency in road operations, investors may seek to maximize profits by cutting maintenance expenditures when the concession nears its end, normally 30 years in China, and when the road infrastructure is approaching its useful age limit and would require increased maintenance.

A third impact of toll road companies concerns planning and externalities. The private companies do have influence over the adopted network plan. On the positive side, private companies may be better tuned to traveler and investor needs and propose roads with high benefits. On the negative side, they may favor priorities that serve the 'bottom line' objectives of the company but clash with national, regional or other important objectives. Another conflict of interest arises when a large shareholder of a (joint venture) road company purchases inexpensive property where there is no road access and then attempts to influence the network planning and construction priorities to obtain a highway to serve the property. This highway may serve the development and the developer well. Still, the financial risk will be borne by the road company, currently closely tied with the government, and the risk related to externalities – environment, equity – will be borne by the society.

The institutional developments in China's highway sector are sophisticated and fascinating. The point is not only that the involvement of private investors with ownership interest in the development of key highway segments increase the complexity of road administration or that this development poses institutional and managerial challenges that have little precedent in other countries. Equally to the point is that these trends can – and will – provoke and inspire the kind of fresh, critical thinking needed in 're-engineering government' for any country as it confronts the challenges inherent in development.

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Notes

1. These are: New World Road Infrastructure, Road King Infrastructure, Cheung Kong Infrastructure, Anhui Expressway*, GZI Transport*, Shenzhen Expressway*, Zhejiang Expressway*, China Merchant Hai Hong*. Companies marked * are controlled either by the provincial government or by MOC.
2. The economic rate of return (ERR) was 22% at project appraisal and 29.5% at completion.
3. The bank loans' interest rate is 6–7.5%. The domestic commercial bank rate is 10–11%, or about 4% more.

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