

# **The Funding system for Shanghai Metro And The Practical Experiences of Utilizing Foreign Funds**

(Zhou Yao Dong, Assistant of Director,  
Financial Affairs Section, SMC)

**Abstract:** Metro, as a kind of city rail transit, is a modern city passenger transit system with mass transportation and independent special rails. It has become a backbone of the traffic in the metropolis and an important modern symbol of a city. A modern traffic system is indispensable for Shanghai to be an international metropolis of finance, trade and economy. At present, Shanghai metro line No. 1 and its extension have been put into operation, metro line No. 2 will be put into trial operation by the end of 1999, the Pearl Line, an elevated rail transit system is under construction and other lines will be constructed later according to the plan. But the funding of the city rail transit construction (both metro and light rail) is a big difficult problem to the infrastructure construction of the metropolises either at home or abroad, which is also a problem to restrict the development of the city rail transit of Shanghai. We have learned from the internal and external experiences of the rail transit construction that it is an important means to deal with the funds of the city rail transit construction to actively utilize foreign funds. It makes up the shortage of the internal funds on the one hand, the external advanced science and technology and the management experiences can be introduced on the other hand. In order to discuss and study conveniently with you together the new problems appearing in the metro construction and to open up a new train of thought, this article will give out a certain analysis and description to the funding method in the metro construction of Shanghai and the characteristics of utilizing foreign funds in the rail transit construction as well as the problems which we are faced with.

**Key word:** metro, funding system, foreign funds

## **1. A survey of Shanghai City rail transit construction and the conditions of introducing foreign funds**

Shanghai is situated at the middle of the coastal areas. It is the biggest industrial, economical and financial city in China with a population of 13,000,000 and a floating population of 3,000,000. Shanghai, as the earliest developed city in China, is densely populated and with narrow streets and roads in the downtown. Traffic jams always occur, which is one of the main outer factors to hold up the economic development in recent years. Since 80<sup>th</sup>, Shanghai Municipal Government has put forward the demands of equal stress on both the economic construction and the municipal construction, and has set up a set of certain specific investing system in order to speed up the city infrastructure construction with a focal point on road traffic, which guarantees the funding of the metro construction funds. Hereafter, I'll. Make a brief introduction about the metro lines under operation and construction at present and the conditions of utilizing foreign funds.

## 1, Metro Line No. 1 and its Extension (completed in 1994 and 1996)

Shanghai Metro Line No. 1 is a large municipal infrastructure construction project, which is the first city rail transit line constructed in a way of introducing foreign funds and locally funding. The total investment is U.S. \$ 610,000,000, among which the introduced foreign funds is about U.S. \$ 300,000,000. Its total length is 16.1 km from Jinn Jiang Park to Shanghai Railway Station with 13 stations along the line. It runs through the downtown district and the main traffic junctions. The whole line has been put into operation from April 1995. The Line No. 1 Extension Project started to be constructed under a normal approval in Dec. 1994. The Extension runs continuously to the south from Jin Jiang Park and the total length is 5.3 km with 4 ground stations. The total investment is U.S. \$ 580,000,000, among which the introduced foreign funds covers about 40 %. It was completed in 1996 and put into operation. Afterwards, Line no. 1 and the Extension becomes a main uniform rail transit line from north to south.

## 2, Metro Line No. 2 (under construction)

Shanghai Metro Line No. 2 is a west-east direction line in the planned Shanghai metro lines network. It starts from the west, the Hong Qiao Air Port, through the downtown districts, passing through underneath the Huang Pu River at the bond of Nan Jing Road (E), making a junction with the Lu Jia Zui finance & trade area, Pu Dong, to Long Dong Road. According to the plan worked out by the Municipal Government, the phase one project is being carried out at present, which is from the west, the Jing An Temple, to the east, Long Dong Road. The total length is 13.6 km with 10 stations along the line. The total investment is U.S. \$ 1,200,000,000, among which the foreign government loan is U.S. \$ 360,000,000, covering about 30 % of the total investment sum. The phase one project is planned to be completed and put into operation by the end of 1999.

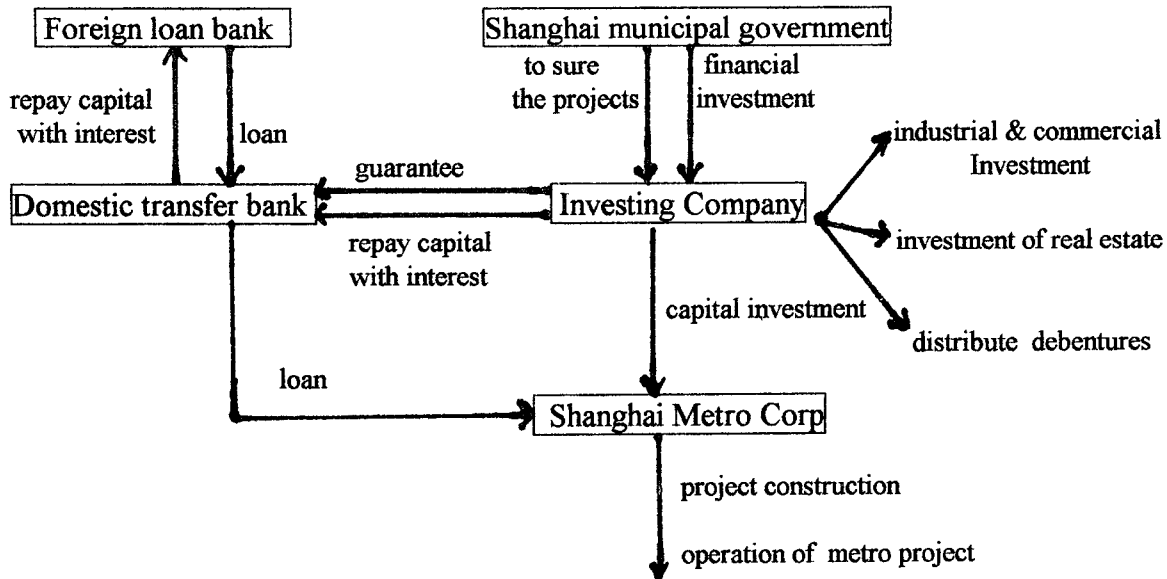
## **2 The funding way and the funding system of Shanghai metro construction**

The guideline and principle of the funding for Shanghai city rail transit construction is according to the international practice to use the internal and external experiences of rail transit construction for reference, to absorb the funding methods of the infrastructure construction from the developing countries in the world, to win over actively the internal and external funds and to carry out a multi-channel funding measures from society, market and the world in order to open up the funding channels required by developing rail transit construction. Under the guidance of such guideline and principle, Shanghai metro builders continuously seek out the funding ways of “ multiplicity “ and have set up a set of specific funding system, which, thereby, resolves the problems on funding and the management for risks of foreign debt.

The plan of Shanghai Metro Line No. 1 started normally from the middle period of the 80<sup>th</sup> when shanghai was at the initial stage of developing economic construction. At that time, the former Shanghai Mayor, Mr. Jiang Zemin, put forward a plan to borrow foreign loans about U.S.\$ 3,000,000,000, part of which would be put into the industrial investment, part of which would be used for municipal construction, such as metro, air port, bridge, etc. The repayment will be performed from the profit gained from the industrial investment. Thus, the shortage of funds for metro construction is resolved practically. A set of simple, but

effective funding system for city infrastructure construction was formed under specific economic developing circumstances at that time, among which the funding structure for Shanghai Metro Line No. 1 is of certain typicality. Figure I show a simple description about it.

**Figure I, The funding system for Metro Line No. 1**



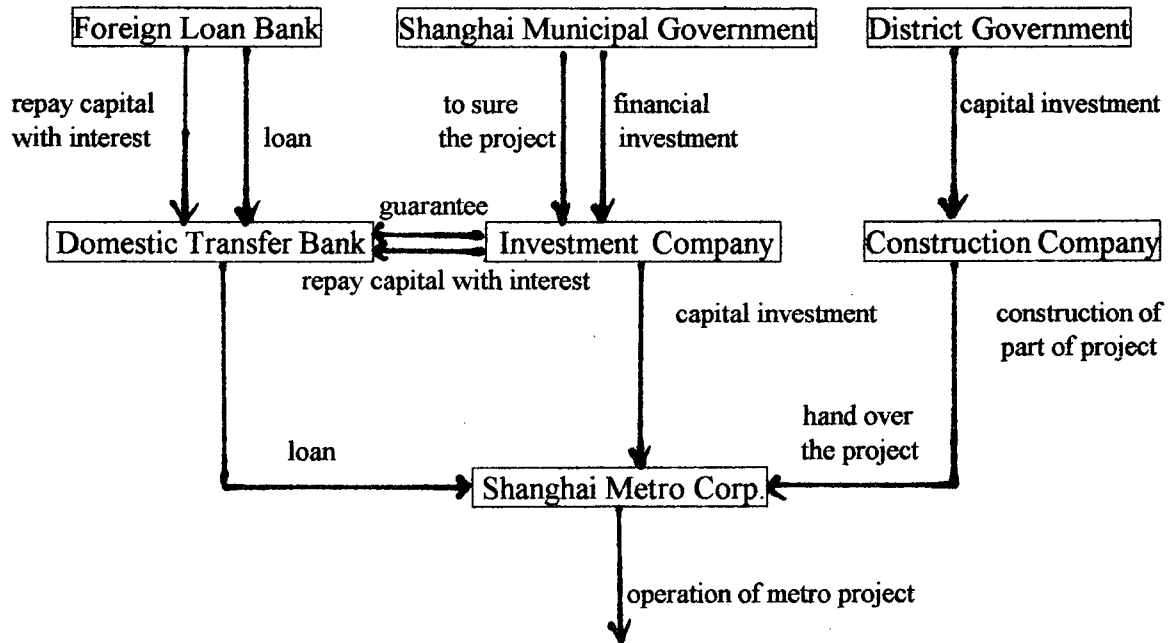
The features of the funding system for Metro Line No. 1 are as follows:

- 1, An investment company with abundant funds established with the support of the municipal government is taken as the investor of the metro construction who is responsible for the funding of the metro construction funds. Shanghai Metro Corp. only undertakes the construction tasks.
- 2, The investment company has a complete company system and strong investment substances. It can gain the stable profit from the investment and distribute the debentures to meet the requirements of metro construction funds.
- 3, The work of introducing foreign funds is carried out practically by Shanghai Metro Corp. and the Investment Company will be responsible for repaying capital with interest.

With an obvious strengthening of Shanghai comprehensive economic strength for recent years, a principle of utilizing foreign funds has been determined on overhead crossing traffic systems such as city rail transit system, viaduct, etc. Meanwhile, we have done a lot on the reformation of the investing system and taken the Line No.1 Extension as a test , a funding system of common construction is put into practice by the two grades of governments between city and districts. On the basis of achieving successful experiences, the two grades of the governments of city and districts /counties are brought further their positive factors into play and the funding channels are opened up in the metro line No. 2 project. A “Three to Three System “ of funding for metro line No. 2 is carried out, i.e., the three administrative districts where the first phase project of line No. 2 will pass through will commonly bear about one thirds of the construction funds and will be responsible for the demolition and rebuilding and the construction of stations, the investment company entrusted by the

Municipal Government, as the borrower of metro line No. 2 and the investment substance, will bear one thirds of the construction funds and will be responsible for the construction of tunnels and the depot, another one thirds of the construction funds is from the foreign government loan which the Municipal Government is responsible for repayment and will be mainly used to buy rolling stocks and various kinds of E&M equipment. Figure II shows a multi-channel funding system.

**Figure II the funding system of Metro Line No. 2**



From Figure II above, we can see that the main features of the funding system of metro line No. 2 reserve those of the funding system of metro line No. 1 and open up further the funding channels and reduce the burden of the municipal government in the infrastructure construction.

### **3 The characteristics of utilizing foreign funds in metro construction of Shanghai**

Since the early 80<sup>th</sup>, China has carried out actively the reform and open policy and introduces foreign funds with great efforts. The actually introduced foreign funds increase annually by an average of 30%. To the end of Oct. 1996, an accumulated sum of utilizing foreign funds in China reached U.S. \$ 268,500,000,000, among which the utilized sum of direct foreign investment reached U.S. \$ 165,700,000,000, and the actual utilized sum of loans reached 97,900,000,000. Under such situation, at the middle of 80<sup>th</sup>, Shanghai metro line No. 1 project started to be constructed in a way of foreign loan. On this basis, we further broadened the strength of introducing foreign funds and metro line No.2 project was put into construction in raising a loan. Because metro project is a special large-scale municipal construction one, there are some differences on the foreign funds structure and key points. They are as follows:

1), The introduced funds for metro construction mainly are foreign government loans, including soft government loans with a low interest rate and mixed loans (commercial loans and contributions).

The principle of utilizing foreign funds for Shanghai metro is to get foreign government loans and the loans with low interest of the international financial institutions, such as the government loans of the developed countries, the loans on favorable terms of the World Bank and IMF, etc. This principle not only shows the strong support of the municipal government to the metro construction projects, but also is determined by the publicity of the metro projects. Generally, government loans are of a large of sum, long term and favorable interest rate, which meets the features of a long construction period and a large sum of investment and also resolves practically the conflicts of a large sum of funds for constructing and developing metro lines under a comparative low level of economic development of Shanghai.

2), To introduce actively a competitive system in financing for metro projects, thereby to decrease the cost

To the foreign contractors, to undertake Shanghai metro project is an “Epochal Contract”, which not only opens the Chinese markets, but races to control stably the advance position for future competitions. It is a competition of politics, technology and economy among countries. For example, 60 companies from 12 countries were attracted during introducing foreign funds for Shanghai metro line No. 1. Because metro is a project of public welfare, its construction cost will directly affect the operation cost. Therefore, to decrease the investment is taken as an important task in the metro construction of Shanghai. Generally, if a construction project adopts government loans with low interest rate or mixed loans, it is required to purchase products from the loan countries and to employ foreign consultants. Thereby, it is unavoidable that the suppliers’ prices will go up higher, the result is an increase of investment cost. When facing such situation, the builders of Shanghai metro determined to take a method of open international tendering to the import equipment meeting the needs for Shanghai Metro Line No. 2 before determining loan countries, which decreases greatly the equipment costs of various systems while we introduce foreign funds.

3), To pay fully attention to the funding risks and avoiding risks while utilizing foreign funds  
The practical methods are as follows:

A), To discard a concept of “The more loans, the better”, to use funds reasonably and to decrease the losses of risks.

Middle and long terms of loans shall be fundamental during introducing foreign funds. Thus, the pressure of repayment can be decreased. For example, the longest term of the loan for metro lines No. 1 and No. 2 is 40 years; the shortest term of the loan is 8.5 years. Such foreign funds structure based on introducing long term of loans is beneficial to preventing from the lash of speculative capital.

B), The risk sources for funding shall be fully considered while introducing foreign funds so as to reduce funding risks.

The main sources of funding risks come from the following 4 aspects:

(1), The uncertainty of fund sources,

During the planning period of the metro project, the builders shall set up a funding group and a purchasing company for import equipment to make clear the sources of foreign funds and reduce funding risks.

(2), Multi-channel of funding,

The funding shall be concentrated on government loan and foreign government loan or the international financial institution loan with low interest rate, such as the loan from the World Bank, IMF and the developed countries to simplify multi-channel of funding to the utmost.

(3) A high growth of funding cost,

Because the metro construction is supported by the Municipal government, we have the advantageous rights to select foreign funds, the funding risks coming from a high growth of funding cost can be reduced to a low level.

(4), The change-ability of the exchange rate of foreign exchanges,

A set of effective dodgy system of foreign debt risks is set up in the Investment Company. We can see from the funding system for metro construction that Shanghai Metro Corp. only undertakes the construction tasks and the Investment Company shall be responsible for repaying capital with interest of the foreign debt. The investment company, who relies on its strong capital strength to combine with practical experiences in dodging foreign debt risks, can effectively dodge the risks occurring utilizing foreign funds and repaying capital with interest to reduce the unnecessary risks on the foreign funds of metro because of the tangibility of the exchange rate of the exchange market.

Besides the above mentioned 4 risks in introducing foreign funds for metro construction, there are other direct or indirect risks, such as from politics, society, nature, etc. Therefore, during funding for metro construction, the management focal point of the Financial Department of Shanghai Metro Corp. is to evaluate correctly the funding risks and to make a good management of foreign debt risks in a way of coordinating with the Investment Company and the Policy Control Department. Thus, we scientifically forecast the index of funding risks, reasonably avoid and reduce the funding risks.

#### **4 to introduce foreign funds either are an important financing method of key projects, or play certain promotion to the technology and quality of engineering in the metro construction of Shanghai.**

It is either an important financing method of key projects or an important way of introducing advanced technology for the metro construction of Shanghai to introduce foreign funds, which plays a great promotion to the technology and quality of engineering in the metro construction of country. While we pay more attention to introducing technology, we carry out the localization to the key equipment on a basis of digesting and absorbing foreign advanced technology, thereby we free from a situation of relying on foreign countries in technology. During developing rail transit, the demands of localization to the import equipment are deepened step by step. 100% of loan for metro line No. 1 is completely used for foreign equipment and consultants' cost, while a certain proportion of localization is put forward in the construction of metro line No. 2 and is as an important condition of selecting foreign funds. The following are several examples of localization items to be carried out step by step on a basis of digesting and absorbing foreign advanced technology:

Rolling stock: the light welded carbide of monocoque self-supporting constructed of alluminium alloy by using large extrusions and planks; the control of frequency modulation and voltage regulation (VVVF); analogue braking device; emergency braking inspection; displaying device; fabricated bogie bolsterless.

Power supply: rectifier transformer and silicon control rectifier used in the traction substation of 1500 DC V system.

Signaling system: digital track circuits; interlock of computers in ATC system (including ATP, ATO, and ATS).

Automatic fare collector system: IC card will be used in Shanghai metro lines.

We are learned from the experiences of Shanghai metro construction that utilizing government loans to carry out metro construction can introduce world advanced technologies to speed up construction, meanwhile, a localization proportion after digesting and absorbing them can be increased, and the development of the city rail transit can free from relying on foreign technologies in the future.

## **5 Concluding remarks**

Recent years, Shanghai metro construction has developed rapidly, which is a result from the strong support of the Municipal Government on the one hand and an obvious increase of comprehensive strength of Shanghai and a stable economic operation on the other hand. Under such situation, we shall actively seek for new funding methods and financing channels to open up new routes of developing city rail transit construction of Shanghai. We shall conscientiously sum up the experiences of funding and financing systems and will actively introduce foreign funds to improve greatly the traffic status of Shanghai.