



Research on Investment and Financing Mode of Urban Infrastructure under Perspective of Cost Management

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Abstract. In the wave of globalization, central parts of large cities are growing exponentially. As the phenomenon is expected to continue, the city and the state are expected to compete with each other in the future. However, the main factor that influences urban competitiveness, construction of infrastructure, continues to put decision-makers in cities in a dilemma. This paper uses data from the national bureau of economic analysis, the World Bank and the OECD to analyse the relationship between urban infrastructure investment and GDP, infrastructure investment as the proportion of real estate investment, the relationship between urban infrastructure construction investment and urbanization rate and per capita GDP. The above analysis leads to the finding that the channels match with all kinds of urban infrastructure investment and financing. Moreover, under perspective of cost management, the choice of investment and financing channels is analyzed. Simultaneously, the corresponding processes, principles and requirements in cost management are elaborated. This paper provides references for countries choosing different investment and financing channels.

1. Introduction

A city relies, for survival and development, on the efficacy of its infrastructure which is directly determined by the magnitude of investment in construction. Currently the growth of national urban infrastructure supply has been relatively lagging behind the pace of urbanization which expands the new demand for urban infrastructure. The primary cause of this kind of situation is inadequate availability of monetary resources. Data from China's Ministry of Construction show that in recent years, China's urban construction demand has been to the tune of 500–600 billion Yuan a year, while the actual urban construction in 2004 was estimated at only 475.4 billion Yuan. Thus there is a huge gap. A shortage of funds has become the biggest and the most direct obstacle to the development of urbanization (JiaXiao Li, 2008). The basic

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financing system has generally evolved in two stages. The first stage was in the 1970s, when it mainly relied upon one single fiscal financing channel. The second stage was after the 1980s when because of the changes in the way economic entities function, infrastructure development began to use bank financing (Yun Chen, 2009). The traditional model of development of urbanization has made way for a new national urbanization and development strategy. The report of the eighteenth CPC National Congress clearly put forward that China will adhere to the new industrialization with Chinese characteristics, informatization, urbanization and agricultural modernization. The core of the new approach towards urbanization is that it should be “people-oriented”; accelerated urbanization releases huge demand for space, providing powerful impetus to economic growth and strong support to the transformation of economic structure. Finance has become the core of the modern economy and urbanization and the incumbent construction can't be pursued without it. Especially the new urbanization construction not only needs a lot of money, but also brings new changes in structure of the demand for financial resources (Ke Ma, Qian Chen, 2015).

E.S. Savvas (2002) pointed out that in foreign cities a structure for funding of infrastructure and other public expenditure exists but apparently there is a looming financial crisis. Richard (2000), using data from major cities in the United States and Britain, established a regression model for describing the role of investment, economic development and other economic factors on urbanization in the United States and Britain. Results show that capital investment is the most important factor that influences urbanization. Teranishi (1997) argued that there are a large number of urban infrastructure and urban housing financing activities that meet the demand of project financing effectively and support the growth of urbanization.

Shulian Deng (2003) pointed out the disadvantages [inadequacy?] of infrastructure investment and financing system in China which is neglecting the effects of the market [THIS IS NOT VERY CLEAR. SUGGEST REWRITE]. Jianhua Luo (2013) pointed out that one single urban infrastructure financing channel constitutes an imperfect platform and leads to lack of management and guidance. Many scholars have studied the problems in infrastructure financing system. Hong Qin (2003) pointed out that the current government-led infrastructure financing model is overly dependent on government guarantees to credit funds, which is not conducive to the establishment of a modern investment and financing system. BaiZhou He and BianJiang Zheng (2005) pointed out that China's infrastructure investment and financing system faces institutional and legal barriers. The flaws of the urban infrastructure finance in China have been described and discussed by Huang Ting Wang and RuBao Huang (2006). RuBao Huang and Ting Wang (2006) proposed some innovative investment and financing modes, suggesting gradual establishment of a diversified, multi-level system for urban infrastructure investment and financing. ChengLing In (2007) compared the traditional pattern and the emerging city investment and financing mode and confirmed the new mode of project financing. YuanJing Wang and XiaoWen Zhang (2013) put forward the main body, channels and other diversified ways to construct an urban infrastructure financing model and suggested money supply be taken into account. HongLei Nie (2000) studied the basic work of project cost control, the procedures of cost control and the key measures of cost control.

This paper reviews the research status at home and abroad for reference. It establishes a relationship with the various aspects of infrastructure construction on the basis of analysis of each country, city data and curve regression. The paper examines infrastructure aspects from the perspective of the relationship between urbanization rate and per capita GDP. And on the basis of the above analysis, we get all kinds of matching of urban infrastructure and the channels of investment and financing.

2. Infrastructure Construction as a Proportion of GDP in Different Stages of Urbanization of the Developed Countries

2.1. Infrastructure Construction and GDP Proportion Relations

This article uses the infrastructure statistics that mainly refer to electric power, gas and water supply, besides sewage treatment facilities.

Data sources: GDP comes from the National Bureau of Economic Analysis, statistics or the World Bank. The urbanization rate is derived from the World Bank. The data about infrastructure investment is from the OECD database.

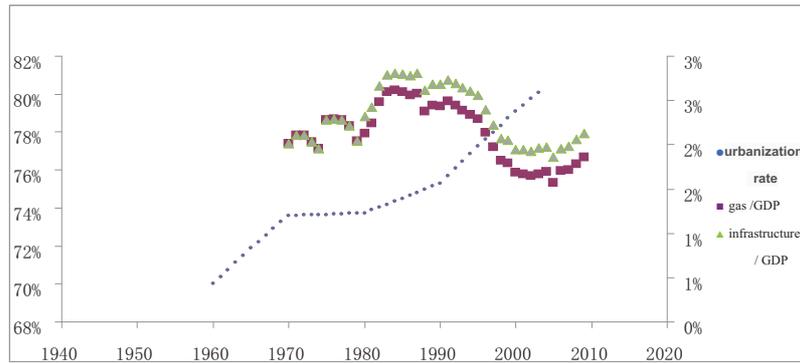


Figure 1: Urbanization rate, gas/GDP, infrastructure/GDP trend of change over time of America

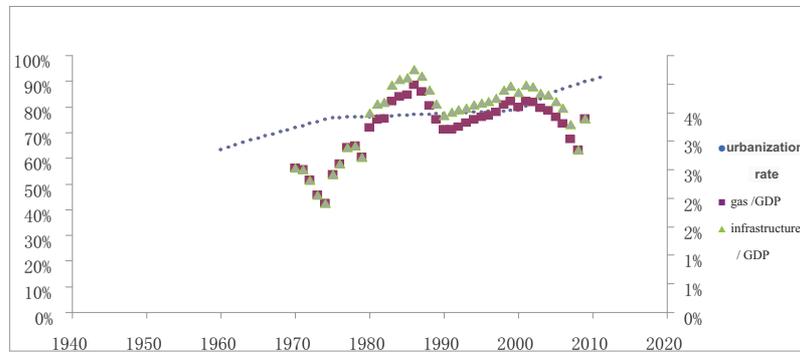


Figure 2: Urbanization rate, gas/GDP, infrastructure/GDP trend of change over time of Japan

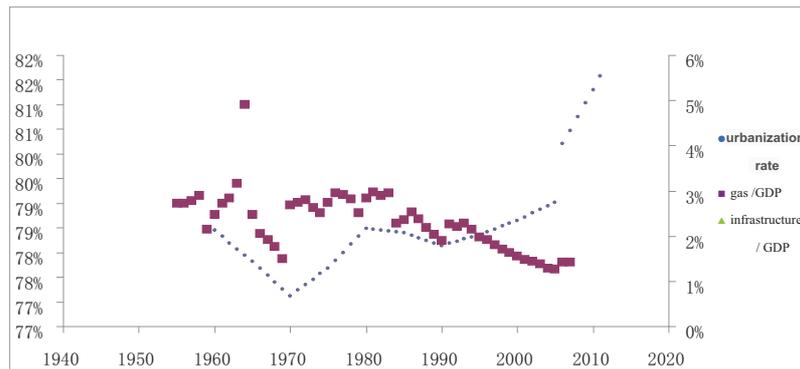


Figure 3: Urbanization rate, gas/GDP, infrastructure/GDP trend of change over time of England

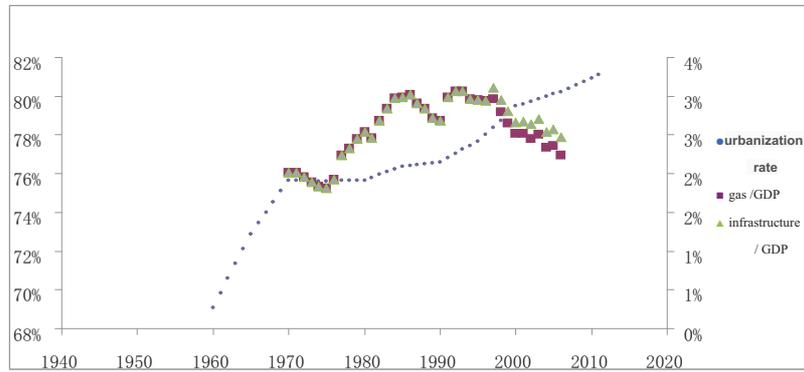


Figure 4: Urbanization rate, gas/GDP, infrastructure/GDP trend of change over time of Canada

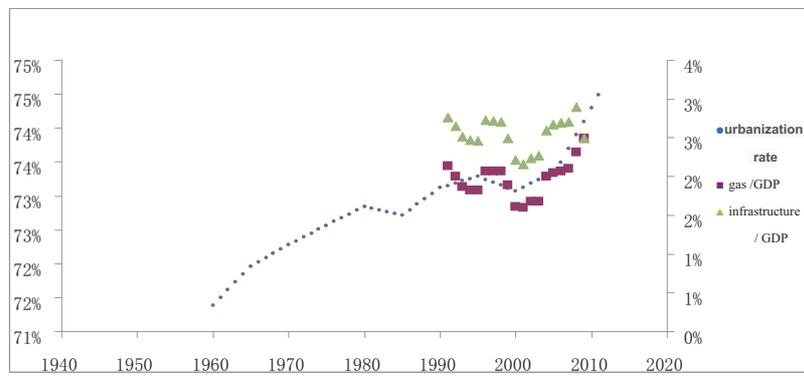


Figure 5: Urbanization rate, gas/GDP, infrastructure/GDP trend of change over time of Germany

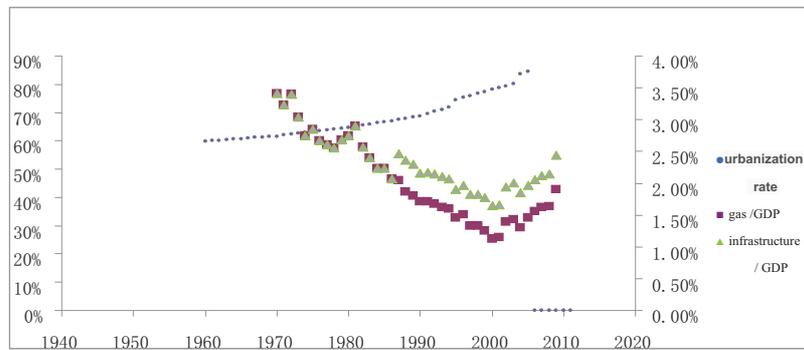


Figure 6: Urbanization rate, gas/GDP, infrastructure/GDP trend of change over time of Netherlands

Figures 1 to 6 show the urbanization rate, gas ratio [pl explain what gas ratio means] of GDP and infrastructure as a proportion of GDP of six major developed countries. The United States, Japan and Britain show that there are three indicative trends over time. As can be seen from the graphs, Britain’s urbanization does not change significantly over time while in other major developed countries urbanization level has risen significantly from 1960 to 2010. UK has a longer history and it achieved a high level of urbanization earlier and, therefore, there are small changes in the rate of urbanization.

The above six figures also show that the gas construction investment and infrastructure investment in the United States present an obvious inverted u-shaped curve. This shows that the urbanization level has continuously improved over time. After a peak period of urban infrastructure construction, all kinds of urban infrastructure investment levels have reached a turning point. Then to further improve the level of urbanization, urban infrastructure investment shows a declining trend. Japan and Canada’s infrastructure investment levels show a significant W shape, suggesting that the two countries have reached the height of urban infrastructure investment during two cycles and after reaching a high level of urbanization, eventually investment presents a downward trend.

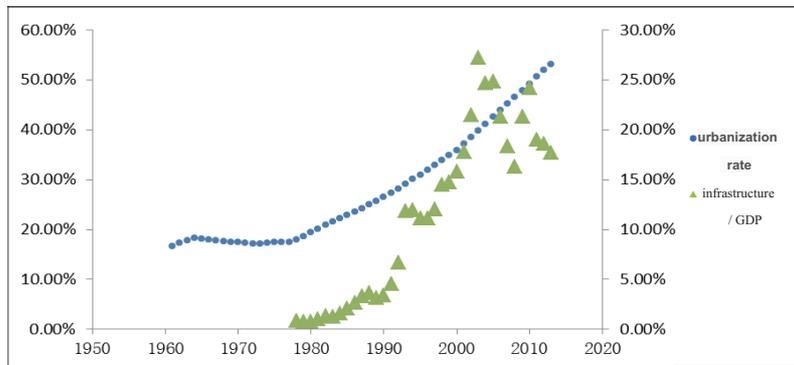


Figure 7: Urbanization rate, infrastructure/GDP trend of change over time of China

Figure 7 shows the urbanization rate and the trend of composition of GDP in China since the 1960s. The picture shows that since 1960, China’s urbanization rate has risen rapidly, going up from less than 20% to more than 50% in 2013. This is evidently in contrast with developed countries. Since 1975, the index of infrastructure/GDP has been rising fast; it climaxed in 2000 and 2010, but there is a trend of decline since 2010.

2.2. Proportion Relationship between Construction of Infrastructure and Fixed Capital Formation

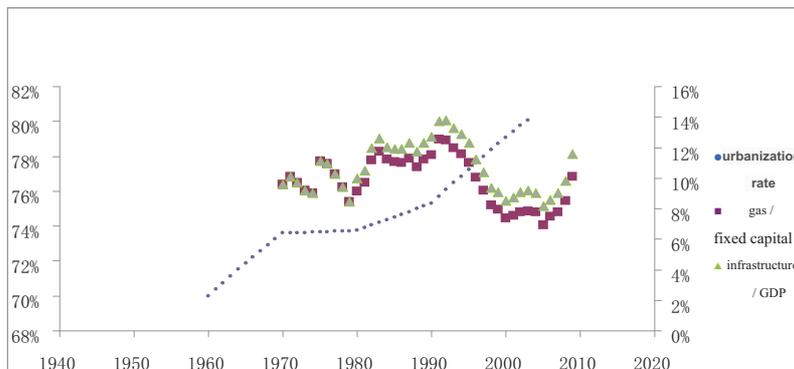


Figure 8: Urbanization rate, gas/fixed capital, infrastructure/fixed capital change over time of America

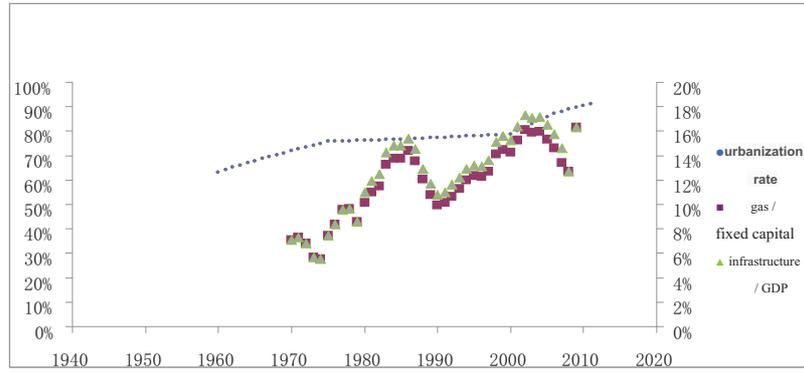


Figure 9: Urbanization rate, gas/fixed capital, infrastructure/fixed capital change over time of Japan

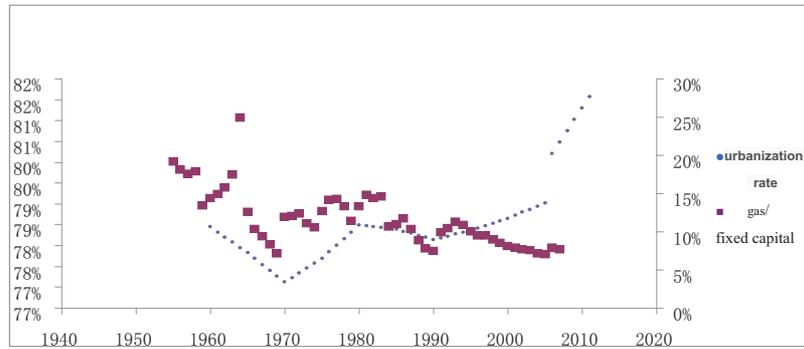


Figure 10: Urbanization rate, gas/fixed capital change over time of England

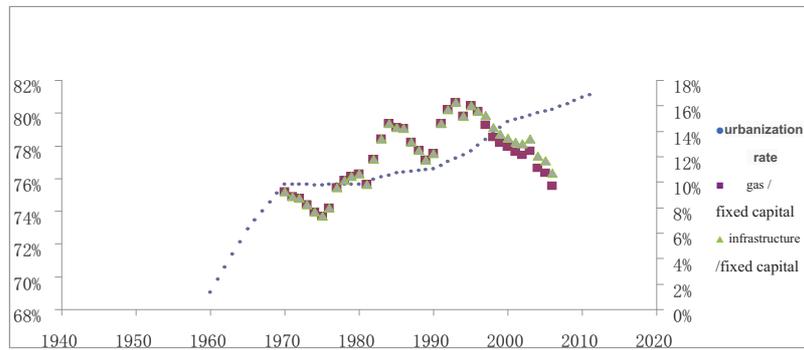


Figure 11: Urbanization rate, gas/fixed capital, infrastructure/fixed capital change over time of Canada

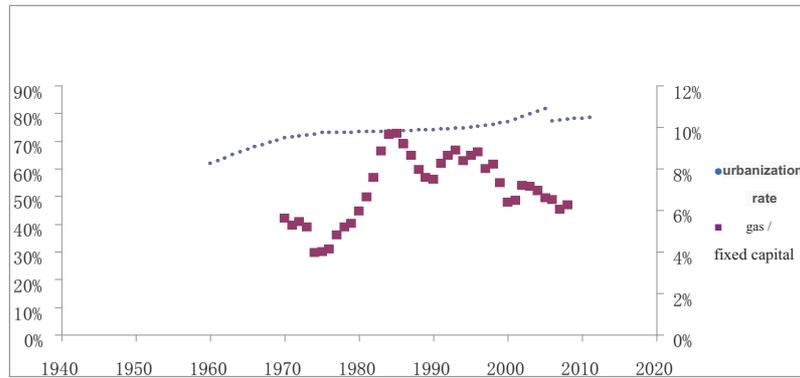


Figure 12: Urbanization rate, gas/fixed capital, infrastructure/fixed capital change over time of France

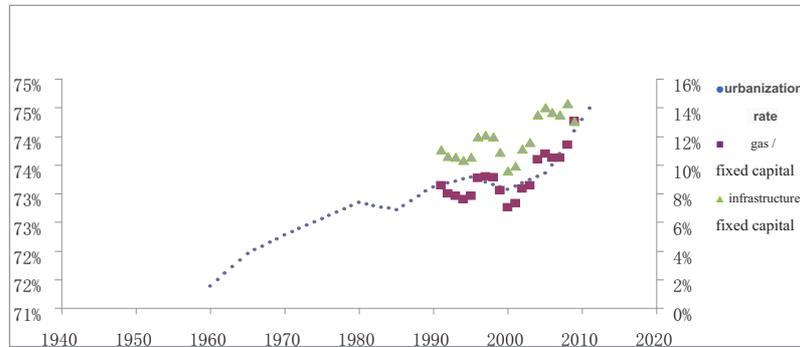


Figure 13: Urbanization rate, gas/fixed capital, infrastructure/fixed capital change over time of Germany

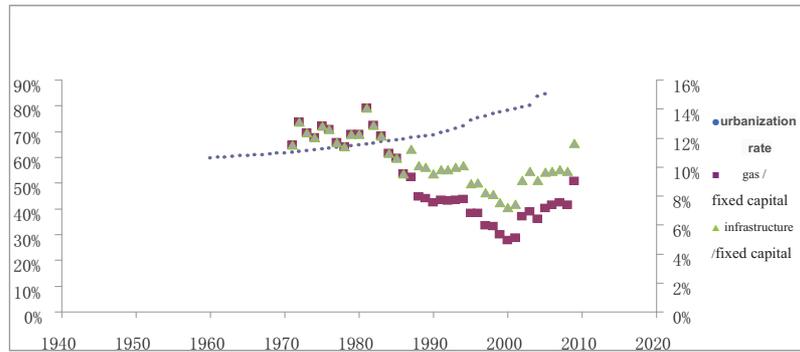


Figure 14: Urbanization rate, gas/fixed capital, infrastructure/fixed capital change over time of Netherlands

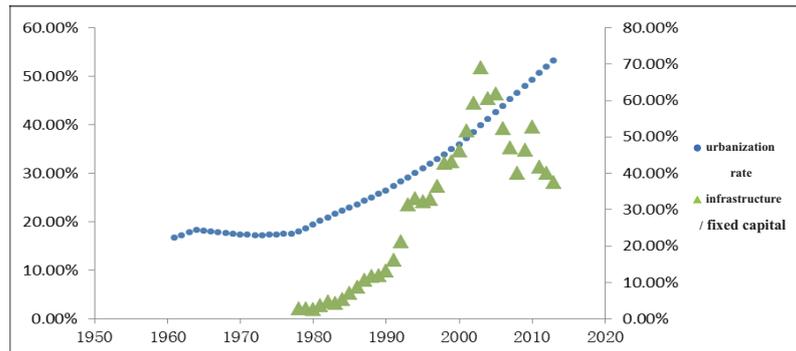


Figure 15: Urbanization rate, infrastructure/fixed capital change over time of China

Figure 8 to Figure 14 shows urbanization rate, proportion of gas in fixed capital investment and infrastructure investment in the United States, Japan, Britain, France and other major developed countries. It can be seen from the diagram that indexes of the United States, Japan and Canada (Figures 8 to 14) present a more pronounced form of W-shaped graphs than in Figures 1 to 7. It is further confirmed that with the passage of time, as the national urbanization level continuously improves, countries in the process of urbanization have doubled urban infrastructure investment and after reaching a higher level of urbanization, eventually there is a downward trend.

Figure 15 shows the rate of China’s urbanization and proportion of infrastructure in the total fixed capital investment over time. The results agree with the first part of infrastructure/GDP. The above two corroborate each other.

2.3. Proportional Relationship of Infrastructure Construction and Real Estate Investment

The Power 6 polynomial regression method was used for analysis of investments in America on city infrastructure and real estate.

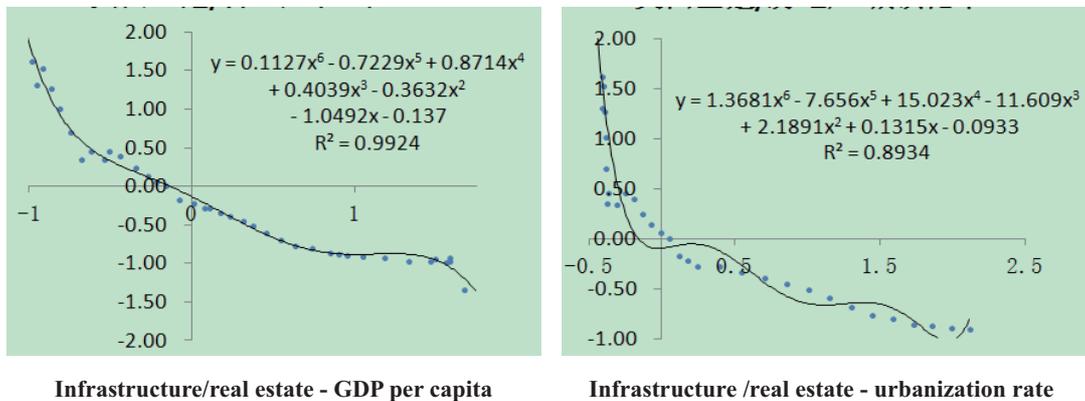


Figure 16: Proportional relationship between urban infrastructure construction and real estate investment of America

As can be seen from Figure 16, infrastructure as proportion of real estate investment and the growth of per capita GDP and urbanization rate present a significant declining trend and the regression relationship has explains a relatively high part of this, 99.24% and 89.34%, respectively.

2.4. Relationship between Construction of Infrastructure Investment Situation and Urbanization Rate.

According to the relevant literature, the relationship between urbanization rate and the proportion of infrastructure investment in GDP, fixed capital formation generally shows a trend of inverted U type and pour W type.

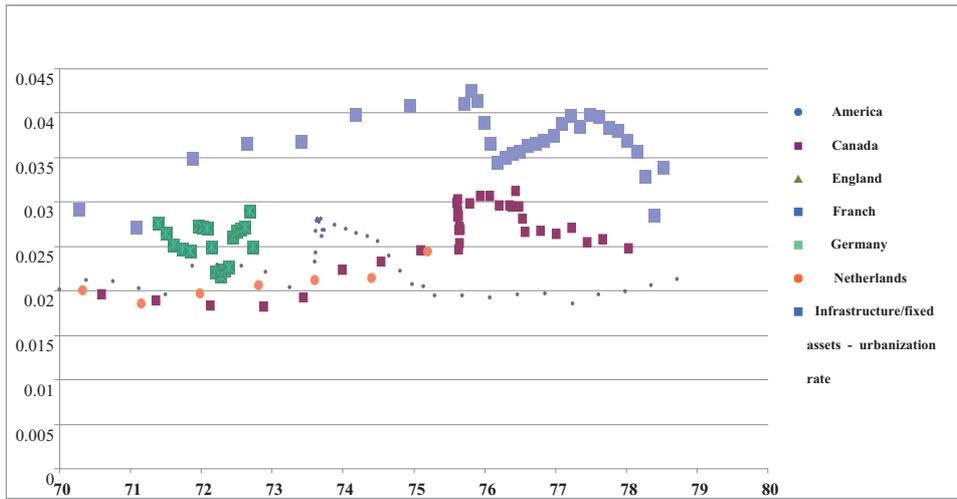


Figure 17: Infrastructure/GDP, urbanization rate

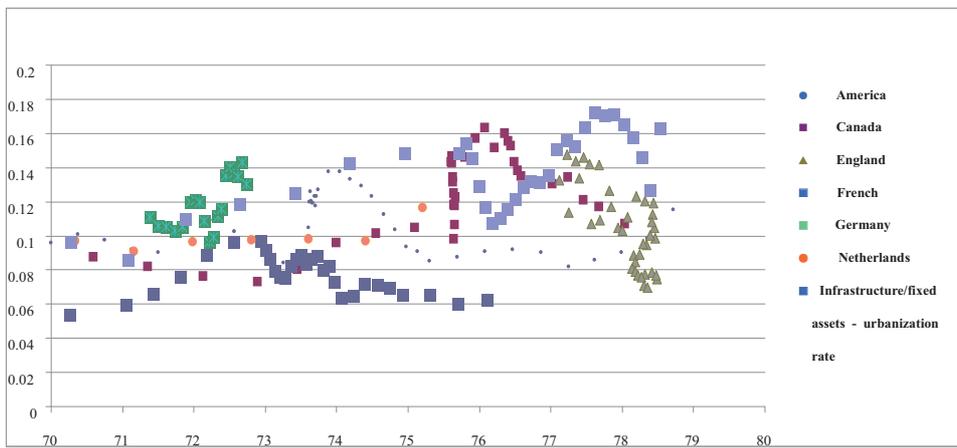


Figure 18: Relationship between total urban infrastructure in developed countries as a share of GDP and urbanization rate

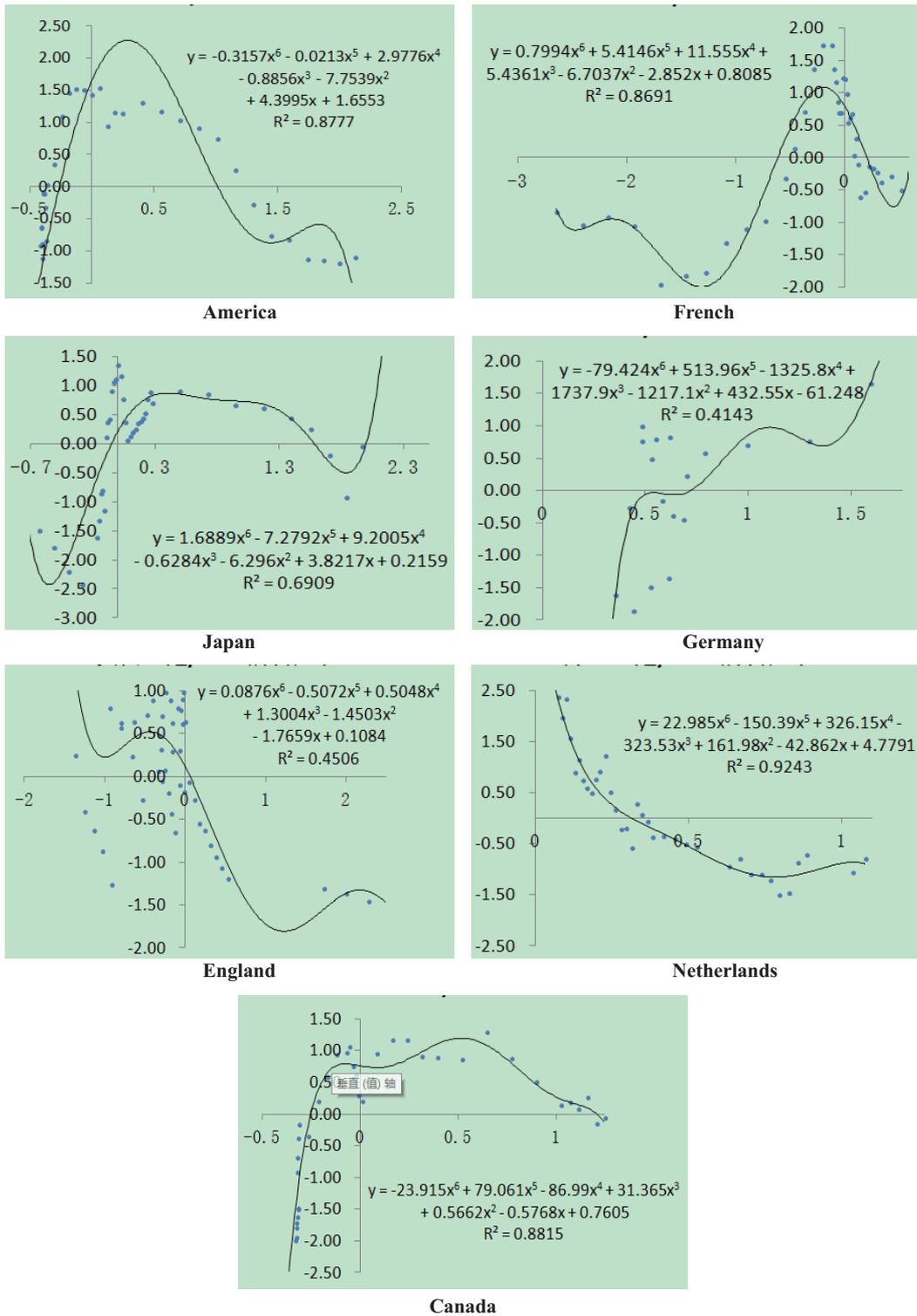


Figure 19: Relationship between urban infrastructure construction and GDP and urbanization rate from country to country

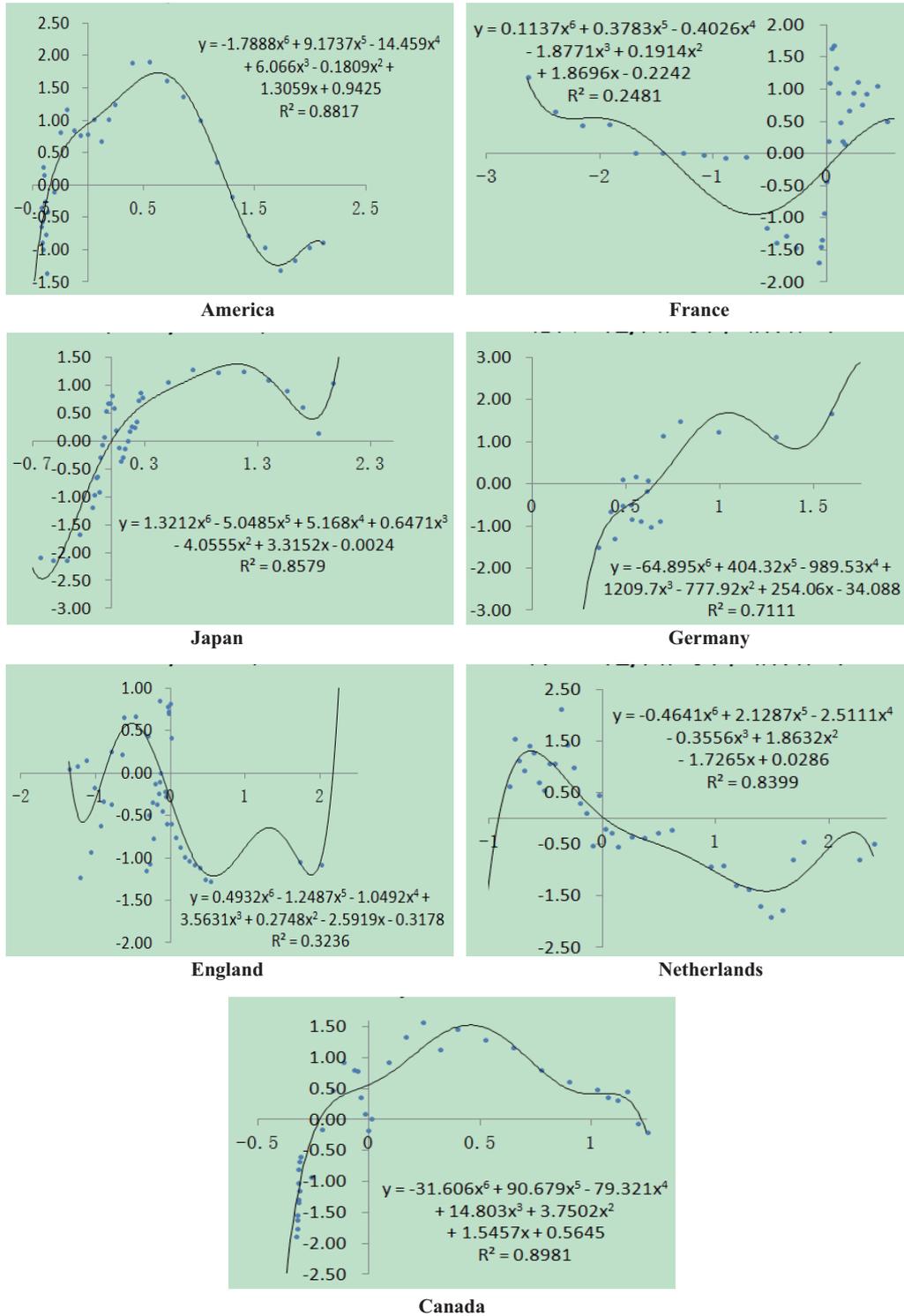


Figure 20: Total amount of investment in fixed assets as proportion of urban infrastructure construction and urbanization rate of return from country to country

Figures 17, 18 show the relationship between the total city construction in developed countries as a share of GDP and the urbanization rate. From Figure 17, we can find that six countries, the United States, Canada, Britain, France, Germany and Japan have reached a high level and the total urban infrastructure as a share of GDP increased with the increase of urbanization rate and then the ratio declines. The relationship between the two is in line with the theory of an inverted u-shaped curve.

Figure 19 shows data from 1960 to 2013 for 7 developed countries' urban infrastructure as the proportion of GDP and urbanization rate's polynomial regression called the curve regression. It can be found from Figure 19 that in the Netherlands, the United States, Japan, Britain, France and Germany urban infrastructure as a share of GDP and urbanization rate is extremely remarkable between the inverted U type or inverted W type which explains the high degree of indexes. This suggests that as the urbanization level continuously improves, urban infrastructure usually peaks once or twice. After the urban infrastructure investment levels reach a turning point, infrastructure investment increases along with the urbanization level further, and then shows a declining trend. The results accord with the above time trend diagram and validate the correctness of this relationship.

Figure 20 shows the relationship between urbanization rate and urban construction as proportion of fixed capital investment. The result is consistent with the basic Figure 19, and further confirms the correctness of the above conclusion.

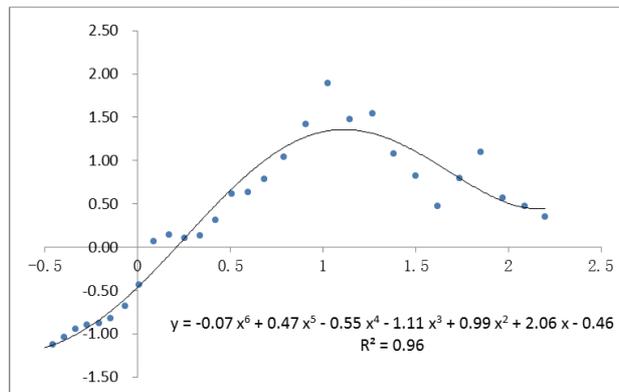


Figure 21: Infrastructure/fixed capital - the urbanization rate of China

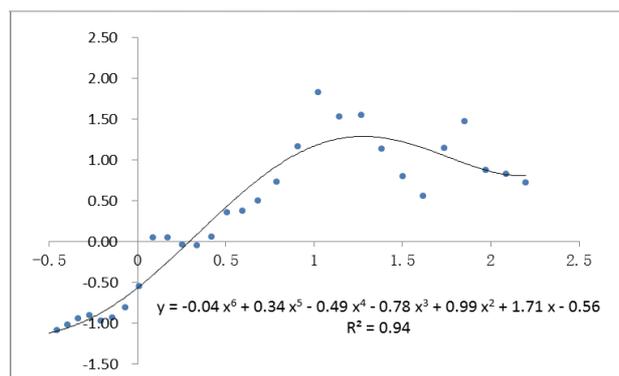


Figure 22: Infrastructure/GDP, urbanization rate of China

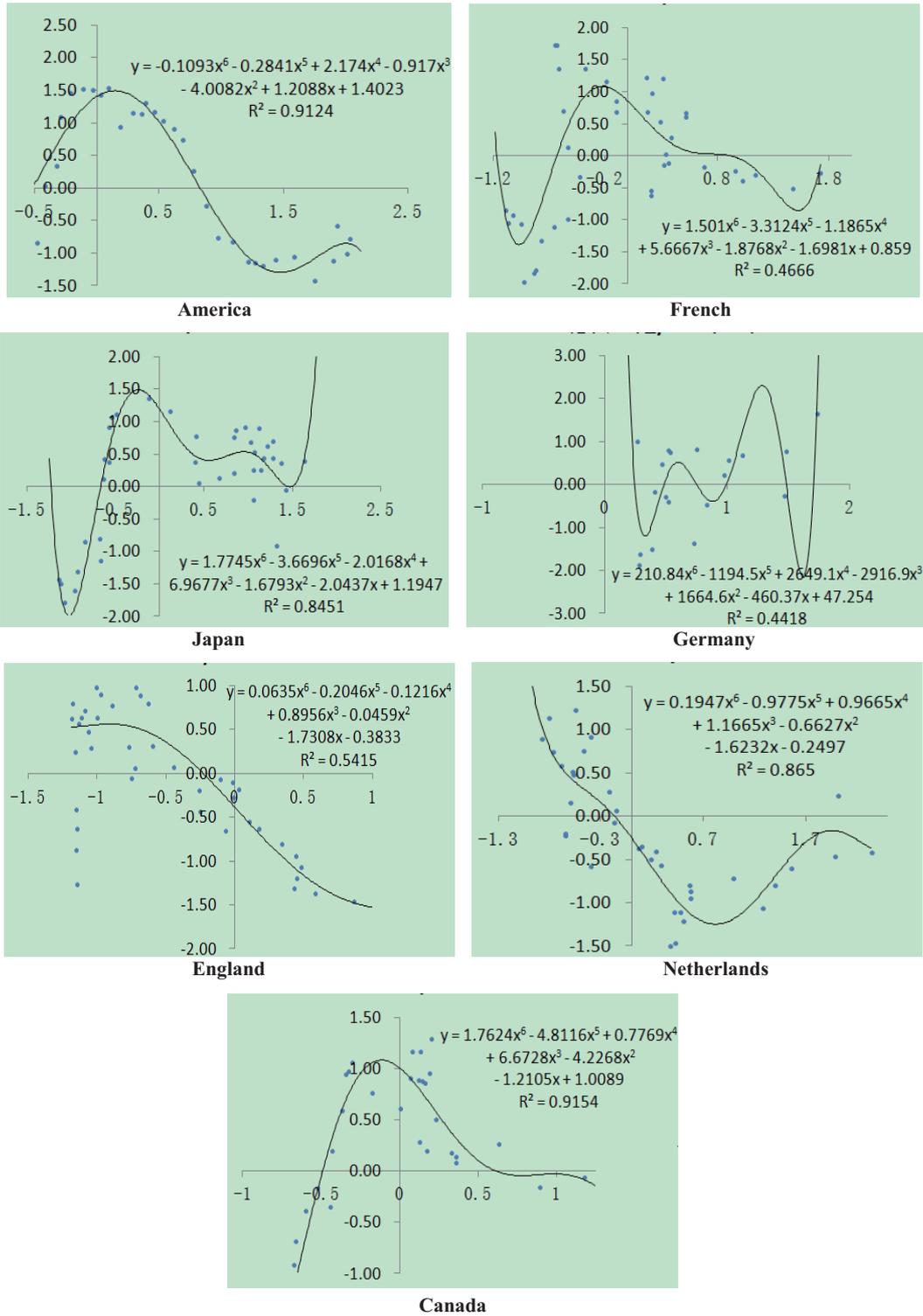


Figure 23: Urban infrastructure construction relation between total amount of GDP - per capita GDP from country to country

Figures 21, 22 show the relationship between urbanization rate and China’s infrastructure/fixed capital investment and infrastructure/GDP, respectively; both are consistent and explains the degree of both types where all are inverted U type. But the curve is relatively flattening, which is related to the historical development stage that our country is in the urbanization rate from 20% to 50%. Compared with advanced countries, China may be in the first half of the inverted W period.

2.5. Urban Infrastructure Investment’s relationship with Per Capita GDP

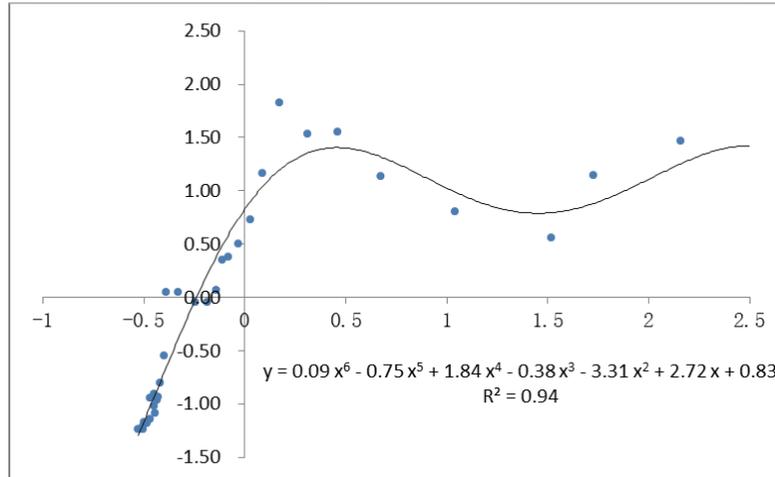


Figure 24: Infrastructure/GDP - per capita GDP of China

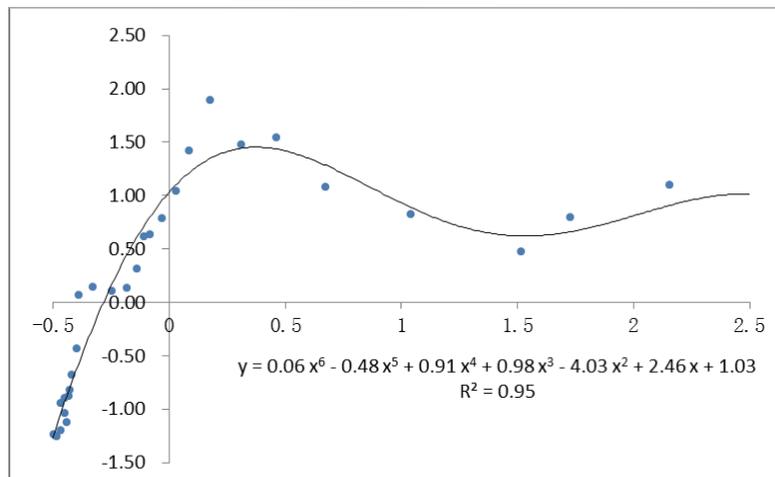


Figure 25: Infrastructure/fixed capital - GDP per capita of China

Figure 23 shows the curve of the regression relationship between the total urban infrastructure construction as proportion of GDP and per capita GDP, respectively, from 1960 to 2013 for the countries covered by this study. It can be seen that except the Netherlands, in all the six developed countries, the total urban infrastructure investment as a proportion of GDP increases with the increase of per capita GDP and present the trend of an inverted U type and pour W type. America, Britain and Canada present a significant inverted u-shaped curve. Since Britain had urbanization earlier than the others, the u-shaped curve is in the second half of the period. Japan, France and Germany show a significant W-shaped curve. Thus the

inverted U-shaped relationship is consistent. With the advancement of urbanization and increasing per capita GDP, the total urban infrastructure investment to GDP ratio first presents a growth trend. Then with expansion of the national urban construction, the total urban infrastructure to GDP ratio grows and reaches the maximum. Seven countries' returns to explain degree is extremely high. The four countries' explaining regression were above 85% like U.S, Japan, Netherlands, Canada's. According to Figures 24, 25 in the seven countries proportion of urban infrastructure investment in total fixed assets changes with the increase of per capita GDP. This is consistent with Figure 23. The results of Figure 23 support the conclusion.

The two indexes of Chinese infrastructure/GDP ratio and infrastructure construction investment are consistent with the curve of the regression relationship with per capita GDP. This conclusion confirms the relationship between the two infrastructure indexes' regression and urbanization rate. It can be seen from the diagram that sometime before the urbanization rate reaches 50%, a urban infrastructure investment peaks. By comparison of domestic and international data it can be concluded that the country may have experienced the first half of the W stage.

3. Investment and Financing Channels and Financial Product Innovation

3.1. Matching of all Kinds of Urban Infrastructure and Investment and Financing Channels

Patterns of growth of urbanization in America, Japan, Britain, France, Germany, the Netherlands and other developed countries show diversified models of urban infrastructure financing. Its main forms are: policy bank loans, loans to commercial Banks, local government bonds, corporate bonds, preferred stock, asset securitization and trust products, etc.

According to the product properties, urban infrastructure can be divided into pure public goods, quasi public goods, private products and so on. All kinds of different characteristics of urban infrastructure financing models and the matching degree are different (Table 1).

Table 1: All kinds of urban infrastructure and matching of investment and financing channels

Urban infrastructure Product attributes	Corresponding operation properties	Corresponding financing model
Pure public goods	Public goods (non-operating)	Local government bonds Policy bank loans
Quasi public goods	Prospective business	Enterprise bond Corporate bonds Preferred stock Asset securitization
Private products	Pure profit-making	Commercial bank loans Short-term financing bonds Medium-term notes

Local governments issue local government bonds and policy bank loans. These two kinds of financing mechanisms incorporate a strong public property, characteristics of long maturity, low servicing cost and match with the pure public goods very good. The continental law system prevails in Japan, France, Germany and the Netherlands and the financial system gives priority to indirect financing and policy loans. The Anglo-American law system is followed in United States, Britain and other countries where direct financing is given priority; the local government bonds in urban infrastructure construction have played a more important role.

In the United States, Britain, Japan and other developed countries asset securitization is used to form tradable securities. Other means include corporate bonds, preferred stock and the benefits for specific issues of securities. This system of asset securitization has a good match with quasi public goods. This kind of urban infrastructure usually has a business perspective.

In major developed countries the commercial bank loans (in our country include that dominated by central Banks is the inter-bank market short-term and medium-term notes) , new trust products and the emerging Internet financial financing tools NOT CLEAR usually require issuers having good credit rating with strong profitability, but the market trading characteristics is obvious. Therefore with pure profit-making private product has high suitability.

3.2. Developed Countries Use Main Financial Instruments at All Stages of Urbanization

In developed countries like America, Japan, Britain, France, Germany and Canada and so on, different modes of financing have been used in different stages of urbanization.

Table 2: Financing modes used at various stages of urbanization in the developed countries financial instrument

Country	Urbanization rate				
	50%–60%	60%–70%	70%–80%	80%–90%	>90%
America	Municipal bonds	Municipal bonds	Municipal bonds, Asset securitization, and preferred stock	Municipal bonds, Asset securitization, and preferred stock	
Japan	Municipal bonds, Policy-based lending	Municipal bonds, Policy-based lending	Municipal bonds, Policy loans, corporate bonds	Corporate bonds, Asset securitization, policy loan	Corporate bonds, Asset securitization, policy loans,
England	Public project loan committee, the commercial bank loans	Public project loan committee, the commercial bank loans	Asset securitization, corporate bonds, Preferred stock	Asset securitization, corporate bonds, Preferred stock	
Germany	Municipal bonds, Policy-based lending	Municipal bonds, Policy-based lending	Municipal bonds, Corporate bonds, Preferred stock		
French	Commercial bank loans, policy loans	Commercial bank loans, policy loans	Commercial bank loans, asset securitization, corporate bonds		
Canada	Commercial bank loans, corporate bonds	Commercial bank loans, corporate bonds	Commercial bank loans, corporate bonds	Commercial bank loans, corporate bonds	

When the urbanization rate is 50% to 70%, the United States, Japan and Germany mainly use local (municipal) government debt financing for infrastructure construction. England mainly used public project loan committees for infrastructure construction, France and Canada have relied mainly on commercial bank loans.

At the urbanization rate of 70%–80% stage, due to innovation in financial tools, the United States, Britain, France and Germany and other countries began to widely use asset securitization for financing the construction of infrastructure. At the same time, in this phase which is the beginning of the business and operational infrastructure privatization, France, Germany and Japan began to adopt preferred shares and corporate bonds to finance infrastructure.

At the urbanization rate of 80%–90% phase, most countries in the way of financing are basic to carry on the policy of the period. Because of the economic recession in Japan, the government can't afford high infrastructure spending and for the original project maintenance also the government needs a lot of money. So Japan has introduced corporate bonds and asset securitization with plenty of private capital.

When the urbanization rate is 90% and above, which only Japan has reached at present, the policy mainly includes corporate bonds, asset securitization and policy loans.

3.3. Description of Main Financial Instruments about Urban Infrastructure Financing

3.3.1. Local government bonds

Local government bond is one of the important financing channels for funding of infrastructure. Local economic development often needs funds that are far in excess of local financial revenue and expenditure,

especially in the construction stage which is very long. Because of the large investments required, payback periods are long and yields are low.

As early as the 19th century, local government bonds were used as financing tools in the United States and other developed countries. The United States still uses the local government bonds the most. Municipal bonds emerged as early as in the 1820's but because the federal budget and local budget are compiled independently, local governments have to arrange financing on their own. New York State issued bonds to raise money for the first time in 1817, to fund the digging of the Erie Canal. Subsequently, other states followed New York state and local government bonds became a routine means of financing.

After World War II, with the increase of the population of the United States and other developed countries and the continuous expansion of their cities, there was a boom in city infrastructure construction. Demand for urban public infrastructure construction increased dramatically and the scale of local government debt issuance expanded hugely. The scale of issuance of municipal bonds has grown sharply in recent decades; the aggregate value of outstanding municipal bonds is estimated to be \$2.8 trillion. In response to the financial crisis of 2009, local government bonds were issued for raising a total of \$409.6 billion. At the end of 2013 outstanding local government bonds were \$3.7 trillion. Outstanding bonds issued by Japanese local governments amounted to 141 trillion yen at the end of 2010. So far, the local government bond issuers have up to 50 thousand in America. At the same time, the composition of investors is changing. From 1996 to 2009 (third quarter), individual investors held directly or indirectly through mutual funds and closed-end funds about 72% of the stock market.

At present, local government bonds have reached every aspect of social life in the United States. From gas supply, road bridges, airport terminals, buses, subways, government buildings and other infrastructure to hospitals, nursing homes, schools, institutions of higher education, social basic services and other cultural sites, there are local government bonds providing cheap capital.

Local government bonds have been hailed as a relatively safe investment but still have the possibility of default. Since 1999 of the USD 3.4 trillion worth of municipal bonds there have been defaults on \$24 billion. In 2008 alone, there were 140 municipal debt defaults and the amount was \$8 billion. Three times in the history of American local government debt solvency crisis has been experienced.

The first time in the 19th century, in 1830s, many states raised a lot of debt for internal development and outstanding debt peaked for the first time. As the recession after 1837, the state debt crisis, Florida, Mississippi, Indiana, Maryland, Michigan, Pennsylvania, Louisiana and other nine states is unable to repay debt on schedule. The default debt reaches up to \$122 million, accounting for half of the total amount of debt. Among them, four states including Mississippi completely failed to honour \$13.77 million of debt. Congress thought providing financial assistance will only encourage local government deficits and more defaults and rejected the state aid request for the first time. It was also decided not to provide full guarantees to local government debt repayments. Since then, local government debt defaults have declined gradually. However, the federal government continues to be reluctant to aid deficit states.

The second was the mid-1870s [1870 or 1870?], the state after the debt crisis, government debt has rapidly become a main body of local government, began to lots of debt. With the recession in 1873, the local government debt defaults. NOT CLEAR During 1873 to 1879, the state and state the following local government debt default of \$245 million, nearly a quarter of all debt.

The third was in the 1930s, during the recession when states followed local government debt default phenomenon. From 1929 to 1937, debt delinquencies by states were about \$2.85 billion, default rate of 15.4%.

The occurrence of the above three serious government debt crises is related to the historical background, but the deeper reason lies in state and local governments' debt impulse, excessively fast growth of outstanding. Many states blindly borrow money for building canals, causing a rapid increase in the short term debt. Local governments also have had a similar experience. Also, before the 1930s debt crisis, states experienced rapid debt growth.

After three local government debt crises, the United States established a series of systems to manage the risk of local government bonds. Regulatory practices in the United States mainly focus on hard budget constraints, budget management, issuance examination and approval, scale control, risk early warning, debt service reserve funds, government debt guarantees, the local government bond insurance, credit

rating, transparency and market constraints. Risk management is focused on regulation in advance.

Despite the perfect supervision beforehand, local government bond default cases happen in the United States. In the case of local government bonds failure to pay on schedule, the United States federal government does not generally carry out rescue operations. Defaulting local governments often solve the crisis by debt restructuring. Local government debt restructuring is usually through the extension of the debt maturity, to reduce the principal or interest, or refinancing to get new loans, etc. Many states are reluctant to implement extensive tax increases during periods of recession. Most offer tax incentives, fill tax loopholes, punish tax evaders and raise taxes on products like tobacco, alcohol, gambling, even soda and candy.

When Harrisburg (capital of Pennsylvania) filed for bankruptcy, a consulting firm advised it to freeze wages and levy property tax on city landmark buildings, cultural relics and museums, etc. In 2008, Jefferson county fired part of civil servants, followed by compression of investment in fixed assets and cuts in public services. In the end, the county government and the debtors negotiated longer maturities, after commitment by Jefferson county government to repay the debt in the future.

The major developed countries have adopted local government bonds for urban infrastructure financing and this is mainly related to ensuring public good in the face of market inefficiencies. In the United States, Britain, France, Germany, the Netherlands and other major western developed countries, the government allocated by the market generally not in the dominant areas, but the high degree of government intervention in the field of market failure. Urban infrastructure construction is the important condition for urban survival and development and it plays a decisive role in protecting city's operations. But due to its relatively low yields and long construction period, private capital is reluctant to enter the field, so the developed countries governments undertake the construction and maintenance of the related responsibility.

The United States, Japan, Germany and other developed countries have adopted local government bonds for urban infrastructure financing, mainly with the following features: first, a longer period. Bonds issued for financing urban infrastructure construction are mostly for more than one year (one year is generally considered short maturity period.) Second, special funds are set up for specific projects. Local taxes are raised as the guarantee for the bonds and the raised money must be used for specific projects. For example, for the purpose of construction of underground pipeline if local government bonds are issued, the money can only be used for urban water supply and other municipal engineering construction of underground pipeline, not for other purposes. Especially the money shall not be used to make up for the local fiscal deficits. Third, give priority to raising funds from the public. Fourth, have high credit rating. The United States, for example, states and state the following local government set up the debt service reserve. In Japan there is a double assurance of local governments and the central government.

3.3.2. *Policy bank loans*

The Policy Bank loans are provided by policy banks to carry out national economic policies and policies such as public infrastructure projects bank lending.

Among major developed countries only Japan uses policy bank loans for urban infrastructure financing. Japan's development bank was set up in 1951 by the Japanese government, to provide low interest loans for domestic urban infrastructure construction. It provided guarantee of government office and at a relatively low risk and low cost of capital absorbing public savings, such as pension funds and shift to domestic urban infrastructure construction. This not only promoted the rapid growth of urban infrastructure construction, but also provided the inductive effect of private capital. As complementary policy financial institutions, such as housing finance and library, northeast of Hokkaido development and revitalization of the development of public libraries and other libraries, Okinawa, also make up for the lack of private financial institutions funds from different angles.

In addition, some supranational financial institutions (such as the World Bank, Asian Development Bank, etc.) also provide policy bank loans for developing countries.

Using the policy bank loans for infrastructure benefits in mainly two aspects: one is to handle the huge investment with long payback periods. And profitability is difficult to guarantee while the prospects are uncertain and there is investment risk and yet the country needs the project. In public infrastructure, railways, highways and other "bottleneck" electric power industry and energy industry, etc. commercial banks are not willing to enter, particularly in the initial stages. Policy-based lending has long maturity and

preferential interest rates which agree with requirements of the construction of the infrastructure for a long time.

Policy Banks need to repay the loans on maturity which implies a certain financial pressure on the government, especially after a significant decline in revenue. Japan in the last century 1950-90s, used policy loans as an important channel for its infrastructure construction. But as it went into recession in the 1990s, government's fiscal revenues declined sharply and on the other hand it needed huge amounts of money to repay loans and maintain the original infrastructure. Therefore, the use of policy loans also need to consider the future of the reach of the government.

3.3.3. *Corporate bonds*

Is closely related to the urban infrastructure construction of the corporate bonds is to point to corporate bonds by taking on urban infrastructure construction NOT CLEAR and operation of quasi operational infrastructure company through underwriting and other programs to social public issuance.

The Japanese government engaged in urban infrastructure services provided by state-owned enterprises and restructured them into new units, which are supposed to be financially self-sufficient. In order to enhance their competitiveness and improve the work efficiency, for example, the Japanese government divided the railways into 11 companies. Part of the company issued shares in the capital market and raised large amounts of money by issuing corporate bonds.

European developed countries such as France, Germany and the Netherlands are one step ahead in construction urban infrastructure since the construction was under the overall planning of future urban development, with strong government role. But in the late 1970s to 80s, the western developed countries represented by France and Germany gradually found that only government investment, construction and operational management of urban infrastructure investment implied much waste, inefficiency and poor quality of service. To solve this problem, France and Germany began partial privatization of operational infrastructure public enterprises. At the same time, investment and commercial banks provided underwriting of a large number of corporate bonds.

West Germany in the early 1970s began partial privatization of coal, water and electricity, natural gas, short-distance transport, urban trash pickup and quasi operational infrastructure by setting up the corresponding companies. In 1994 after the reunification, share of private companies in Germany in operational infrastructure and enterprises reached 60%.

Similarly, France's Jacques Chirac government which came to power in 1986 formulated the relevant policies. Because of clear property rights of private enterprises, risk under the pressure of market competition, privatization not only reduces the operating costs but also ensures the quality of service, improves the efficiency of infrastructure investment and financing, and attracts a lot of public investors.

The biggest benefit of issuing corporate bonds is that it constitutes direct financing from within the financial system and can obtain more favorable terms than commercial bank loans, which means a lower cost of money. But using massive corporate debt financing implies the needs for a developed financial market. If the financial market is not mature, funding of urban infrastructure becomes difficult, through the issuance of corporate bonds only. Therefore, the use of corporate bonds for large-scale infrastructure construction needs a complete set of relevant policies, and through tax cuts and other measures to attract social and public investors into the infrastructure construction field.

3.3.4. *Preferred stock*

Preferred stock is also issued by joint-stock companies, and it is superior to the common shareholders divide earnings. Preferred stock is a kind of hybrid securities that is somewhere between stocks and bonds. From the basic nature of the contract, the preferred stock is between common stock and bond securities.

In developed countries, preferred stock has a long history as a financing tool and is widely used at present for funding urban infrastructure construction.

Preferred shares issued in the United States sometimes offer higher yield due to tax rates and relatively special reasons such as control. Utilities companies operating in areas such as water, electricity and gas and those relating to underground pipelines often issue preferred stock. Before 1985, in the United States capital market, utilities accounted for more than 50% of outstanding preferred shares.

Britain has also had considerable issuance of preferred stock by public utility companies after partial or complete privatization since the purpose is to ensure control over such companies. Though preferred shares are different from common stock they have certain restrictions on privileges. For example, restrictions on certain individuals to hold shares, limit of group assets, limit the company to shut down or dissolved, spontaneously restricted stock have voting rights or restrict foreigners holding, specify the British director, etc.

Germany has also introduced preferred shares in urban infrastructure, for purposes similar to the UK. Most German cities underground pipeline systems are jointly owned by companies participating by way of marketization operations. Investment enterprises building underground pipelines and facilities enjoy the right to management for a fixed number of years. In case of difficulty of investment enterprise own capital to issue preferred stock, or guide the social capital by the government, enterprises and individuals idle capital commitment. However, Germany's federal government regulations specify that the property right of underground pipeline system must belong to the state, which is conducive to unified planning, coordinated management and avoidance of loss of underground resources or redundant construction. This can not only solve the "zipper path" problem, but can also make up for a lack of government investment in urban construction. So Germany uses preferred stock rather than common stock financing, mainly for control of the urban infrastructure concerns.

Going by the practices in the western countries, preferred stock has the natural attributes and features suitable for infrastructure financing in particular:

First of all, the non-voting attribute determines that while the urban infrastructure construction enterprise can borrow large sums of money at the same time, and yet firmly grasp the enterprise control. The practices of the United States, Britain, Germany and other developed countries reflect the state of urban infrastructure construction and operation of enterprises control.

Second, the long life span of preferred stock makes its characteristics ideal for funding urban infrastructure construction and operational periods since infrastructure complexity is higher, there are long maturities, after the completion of the operations and these are sustainable features.

Preferred shares issued by a third of urban infrastructure construction enterprises may have some breakthroughs in terms of duty-free policy. Urban infrastructure companies issuing preference shares in the United States are allowed by the government to adjust dividend tax losses on to the water, electricity, gas consumers. Because the infrastructure business has very strong public welfare at its core, such a systemic arrangement is very reasonable.

In addition, the preferred stock dividend is generally stable, which requires infrastructure companies to earn good profits, or else it will be difficult to attract the social capital investment. Therefore, the use of preferred stock financing of infrastructure is generally in countries that want to keep control of industries such as government regulated utilities like water, electricity and gas companies.

3.3.5. *Asset securitization*

Asset securitization means a portfolio of specific assets with a specific cash flow to support, offering tradable securities financing form.

In North America, Europe and other mature financial markets, asset securitization in the field of urban infrastructure construction mainly depends on accounts receivable, rental income, fees, natural resources and so on being converted into securities in circulation. Through this kind of "securitization" channel social capital is more convenient to raise and quick to flow to the field of urban infrastructure construction and operation.

Asset securitization began in the United States, and its application in the field of urban infrastructure construction is also the highest in the country.

In the field of urban infrastructure asset securitization practices were introduced in America in the 1970s. The direct reason was that the US government did not allow banks and thrifts interstate business which resulted in the developed eastern region having a large surplus of money. The massive demand for funds required for urban infrastructure construction in western and southern regions was faced with financing difficulties. The existence of this kind of situation has restricted the development of city construction in the United States. This contradiction has greatly promoted the development of the mortgage-backed

securities market. At present, in the United States, securitization market has become second to the federal government bonds in financial markets.

Successful securitization of urban infrastructure assets has prompted many developed countries to develop asset securities into an infrastructure financing mode. Since the late 1990s, asset securitization financing has become a mainstream financing mode even in Britain, France, Germany and other developed countries. This mode has grown in Latin America, central and eastern Europe and southeast Asia and other emerging markets also. For these countries it helps overcome the relatively low credit ratings of local governments and the financing of urban infrastructure enterprises with low cost.

Advantages of financing infrastructure by assets securitization are mainly reflected in:

First, this reduces the cost of financing. Using asset securitization financing costs less than commercial bank loans and other financing instruments.

Second, this helps assets and liabilities management. At present, the scale of local governments' debt implies a heavy burden. Local governments, by using asset securitization transactions, can not only get their money back in advance but can also transfer the securitized assets and liabilities off-balance sheet, and reduce the debt.

However, asset securitization only transfers the relevant financial risk to other investors, it does not eliminate the risk. Therefore, a complete set of relevant policies is required for regulation and oversight. First, there is need to develop and perfect the relevant legal framework for asset securitization, such as an act of asset securitization. SPVs in asset securitization transactions, true sale and bankruptcy isolation and other legal constraints and security need to be defined. Second, improved rules of credit ratings and the corresponding rating agencies are required. One reason why asset securitization developed in the United States is that the United States launched fair credit reporting act and a series of laws and norms. Its three globally known rating agencies, Standard & Poor's, Moody's and Fitch have helped expand asset securitization as a financing mode.

3.3.6. *Commercial bank loans*

Commercial bank loans are also a form of urban infrastructure construction financing. Because of commercial Banks being typical non-profit financial enterprises, its loans typically require issuers have good credit rating with strong profitability, its market features more obvious, therefore with pure profit-making private product class urban infrastructure construction has high suitability.

Commercial banks, if there is no government endorsement, lend only to operating urban infrastructure construction enterprises, and these companies are usually very dependent on commercial credit. In France, for instance, operating urban infrastructure construction companies are almost entirely funded by commercial Banks. British companies operating in the field of urban infrastructure construction are funded mainly by commercial bank loans and public works committee. Infrastructure bonds are issued in Japan but they are also financed by banks and other institutions.

It is important to note that most of the commercial bank loans are for short to medium term, therefore, compared with policy loans, short-term commercial bank loans repayment pressure is greater.

3.4. *Security Policies and Mechanisms*

3.4.1. *Security Policies and Mechanisms in Japan*

Japan actively explored diversified financing channels, and at the same time formulated policies for all kinds of urban infrastructure construction and operations of the financing channels for support.

Policy banks absorb people's savings, pensions, etc. and provide long-term low-interest loans to domestic infrastructure construction, to promote growth at the same time. Due to low risk because of government guarantee for private capital induction results in much folk capital competing to offer loans to policy banks. At the same time, the Japanese government established residential financial public library, northeast of Hokkaido development and revitalization of the development of public libraries and other libraries, Okinawa complementary government financial institutions, make up for the inadequacy of private financial institutions funds.

On the other hand, in the field of electric power, railway and other large infrastructure construction, in addition to the Japanese government financial institutions issue financial bonds with long maturities for infrastructure financing. Financial and policy financial institutions also provide guarantee for private capital, up to 80%. For financing investment in telecommunications, the Japanese government has mandated that every telephone user must subscribe for a certain amount of government debt. The Japanese government financial institutions fund the telecommunications industry by issuing special bonds.

3.4.2. *Security Policies and Mechanisms in United States*

The United States is a typical market economy. Its urban infrastructure construction is based on private funding and the government does not intervene. Companies are controlled by private investors and are independent in pricing of services. These are fully market-oriented ways to keep private capital investment rate at a high level.

The U.S. government is not the main body of investment and financing of urban infrastructure construction. It only guides and functions as the regulator. It mainly provides market incentives, tax exemption, franchises and management to attract private sector investment, rather than being a direct investor or direct borrower to intervene.

At the same time the United States has established a strict regulatory system of local government bonds; local government bonds must be backed by legal opinions issued by lawyers, confirm the legitimacy of the bonds and debt binding, with local government borrowing subjected to strict supervision and constraints. In this way it ensures the stability of the bond market and equity, and thus attracts a lot of social capital into the corporate bond market in the field of urban infrastructure construction.

In the U.S. local governments have the right to borrow, subject to market supervision and risk control. There are budget constraints as local government budgets are generally divided into regular budget and capital budget management. Debt can be used to raise money for capital budget and the regular budget is generally required to be balanced. At present, almost all state and local government must follow the prescribed laws to balance their budgets. U.S. census in 2002 showed that Indiana, Texas, Vermont, Virginia, and West Virginia, five states, such as other 45 states of the constitution or laws require the governor to parliament to balance the budget, there are 41 states law parliament only through a balanced budget.

Second aspect is the budget management. In order to ensure government project funding and reasonable arrangement of debt financing, regular and capital budget need to be managed properly. Budget preparation involves a very long and the strict process, including the preparation and approval through various inquiries and hearings. The budget process is very transparent, objective, fair and scientific, so as to ensure timely supply of project funds, guarantee for the use of funds, clarity on benefits of projects and full consideration to the economic development needs and debt servicing capacity. When making project financing arrangements, local governments have to consider the project in detail and gains or losses of the project have to be discussed with stakeholders. Local and state governments have to consider if the project is to increase the value of assets within their respective jurisdictions and the capital, operational and maintenance costs have to be examined to ensure efficiency of economic operations and the local government's ability to pay. Most local governments prepare a capital project for maximal improvement plans, so that voters can know about the built facilities. Budget analysis and planners have to undertake careful review of project planning and bonds can be issued only when the debt payback period is in close proximity to project cycle. Finally, the local government policy formulation department has to decide capital projects. When it comes to bond financing there is the need for a referendum, to make sure that future taxpayers can benefit from this project loan financing decision, to enhance the political arguments of the debt.

Third is examination and approval for issuance of bonds. Part of the American states require local governments to have higher levels of examination and approval. In North Carolina all local government bond issuance requests have to undergo higher levels of examination and approval. Before the referendum, "committee" of the local government must obtain approval of the state government for all capital and school funding projects, in addition to analyzing the feasibility of the project, the main debt and income index. The debt management agency does not provide guarantees for municipal debt; the state provides assistance and, if necessary, have the right to manage local governments.

Fourth, the scale control. The limited size of local government bond issuance has mostly aimed at general obligation bonds, for which control indicators mainly include: debt, debt ratios and the asset-liability ratio, etc. According to the national association of state budget officers (NASBO) survey in 2002, the state constitutions and the laws allow issuance of general obligation bonds in 47 states. In 37 states the constitution and the law on general liability prescribe limitations, to check liabilities and repayment capacity of local governments. In addition, some areas have also set up their own size control indicators. North Carolina state law mandates that the asset-liability ratio should be less than 8% for local governments. Massachusetts law says the state's general obligation debt servicing expenses shall not exceed 10% of the fiscal expenditure. Two-thirds of voters in the jurisdiction of the California constitution, unless agreed otherwise in any year in the county, city and district borrowing amount shall not exceed the annual income.

Fifth, there are provision for early risk warnings. The local government debt risk early warning methods are stipulated in Ohio financial monitoring plan and the local fiscal emergency law. In the 1970s and the 1980s, there were several important default events in the United States, such as the 1975 New York local government debt default, (time) default in Cleveland in 1978 and in 1983 Washington power supply system faced a breach of contract. For this purpose, the relationship between the United States government has carried out a series of research works and has suggested that state governments improve local fiscal health surveillance, to prevent crises from happening again.

Sixth, debt service reserve funds have to be set up to ensure debt servicing. The amount of debt service reserve may equal the total annual requirement for repaying principal and interest. As debt is paid in installments, the relative size of debt service reserves is also decreased. Debt service reserve is usually based on issuance of premium income, capital contribution and investment projects provided by the issuers earnings, gains or l/c. Debt service reserve can invest only in low risk federal government support bonds, and maturities cannot be longer than the debt maturity. Debt service reserve term cannot be longer than the duration of the bond, and sometimes requires at least half of the reserve period be shorter than 10 years.

Seventh, the government debt guarantees. Many states have formulated laws and regulations that limit guarantees for local government debt. Some provide guarantee only for debt raised for waste disposal facilities, local storage facilities, underground oil, etc.

Eighth, the local government bond insurance. In the United States, the local government bonds credit risk is higher than only the federal government bonds since it is a kind of quasi public debt. In recent years, about half of American local government bonds have received bond insurance, to reduce the investment risk. Local government bond insurance began in the 1970s, providing that if bond issuers fail to pay the principal or interest, the insurer has the obligation to pay. To sum up, the local government bond insurance has three functions: first, strengthening security bond in compensation; Second, the rating agencies can give higher bond rating accordingly; Third, to make the local government bonds and other securities have equal market attributes, expanding the ability to trade bonds held by the bondholders. At present, the local government bond markets in the United States, there are more than a dozen professional local government bond insurance companies which have also set up a trade association "financial guarantee insurance association" (AFGI) - in every link of local government bond market these companies can provide insurance services.

Ninth is the credit rating. Local government bond credit risk also materialized during the financial crisis in the United States and other events, such as the 1975 financial crisis in New York City, which have shaken investor confidence in local government bonds. To ensure that local governments can issue bonds at a lower cost and raise funds for construction projects, governments at all levels attach great importance to debt management. So they are conscious of the need for strict monitoring and management and at the same time, consciously accept credit ratings by Fitch, Moody's and S&P. Due to the particularity of local government bonds using direction, the issuer is often not for-profit institutions, thus to evaluate corporate bonds of profitability, financial leverage, not suitable for evaluation of local government bonds, thus formed the unique local government bond credit rating method. Such as when evaluating general obligation bonds, commercial agencies usually evaluation four aspects of information: first, the information about the issuer of debt structure, in order to determine its overall debt burden. Second, the ability to issuer prudent budget policy and administrative discipline, here, the focus of the attention is usually on the issuer's total working capital and whether it is 3~5 years in a row do budget balance the two. Third, involves identifying the

issuer available local taxes and government indirect income payments, and collect relevant tax the consent of the rate and the local budget of the recorded history of the degree of dependence on a particular source of income, including taxes in examining the consent of the rate when the property tax levy is crucial. Fourth is the overall social and economic environment of the issuer of the assessment. For yield, the rating is the fundamental principle of the project financing will generate the bonds payable to bondholders' amount sufficient cash flow. In this regard, rating method and the method adopted by the commercial project is the same.

Tenth are the transparency requirements. U.S. state and local governments must follow the government accounting standards for auditing and financial reporting (1983) which stipulate the basic principles for recording and reporting government debt. After the financial crisis in the 1970s in New York, the city bureau of the Finance Association (Municipal Financial Officers Association) and Public Securities Association jointly formulate and implement the resource information disclosure rules. Any major changes are required to be disclosed by the municipal authorities in a timely manner. Public disclosure of the information has been greatly improved as it is the basis of the local government bond credit risk judgment. Local government bond issuers have the obligation to provide investors with information and ensure that the investors are able to reasonably understand and evaluate the terms of the bonds. In 1989, the SEC revised the "securities law" and the relevant rules and regulations, public offering of local government bonds typically through an official statement. It was made obligatory on part of local governments to get opinions of qualified auditors about the financial position of the issuer, before and after the issue. At the same time, all public offerings of local government bonds need to hire a national recognition of bonds "lawyer" or "independent lawyers", issued by its legitimacy, duty-free treatment, such as legal opinions issued by, to ensure that the local government bonds on the enforceability of the contract. In order to prevent any fraud in the local government bonds market, the Securities and Exchange Commission in 1990 and in 1995 adopted the new market transaction disclosure principle, stipulating local governments have to regularly update and disclose information in a timely manner. Public offering of local government bonds is typically announced through an official statement released to outline local government responsibilities and obligations. Local government bonds listed before and after the qualified auditors of the financial situation of the issuer, opinions issued debt burden, solvency, etc. In addition, some industry organizations have developed a lot of guidance information disclosure regulatory documents, such as the United States Government Financial Association (Government Finance Officers Association and the American local Government bond analyst at Association, the National Federation of Municipal Analysts) on voluntary disclosure rules, these rules are in fact has become an issue local Government bonds shall abide by the rules of information disclosure.

Eleventh is the market constraints. Local government debt limits are determined bond supply and demand and interest rate. It is the investors who decide whether to buy, how much to buy and what to buy. If investors think the bond quality is low, bond issuance becomes difficult. Borrowing difficulties phenomenon is not uncommon in the United States, especially after a massive debt default. At the same time, bond prices and interest rates are completely determined by the market; bond interest rates of different local government bonds vary. Even bonds issued by the same local government carry different interest rates for different projects in different periods, which provides more choices for investors.

3.4.3. *Security Policies and Mechanisms in France, Germany and other European developed countries*

There is a certain degree of similarity between policies and mechanisms followed in France, Germany and other European countries for managing urban infrastructure financing in the following three aspects:

First, emphasis is upon strong planning.

Second, in France, Germany and other developed countries, governments have the power to assign master franchise after determining the city infrastructure construction plan.

Third, the future users (including residents and enterprises) share the cost. It is the equivalent of indirect financing to the future users. Residents to use gas, for example, which need to bear the cost of connected to the network. Follow "who use, multi-purpose pay more, need not don't hand over" principle. The pay system is mainly used in waste treatment, waste water, sewage treatment, recreational facilities, parks, and other areas of the city infrastructure. Not only reduces the running cost of the public utilities, but also in

imperceptible to improve people's environmental protection consciousness; improve the soft environment of the city.

4. Cost management of the investment and financing mode

The basic social infrastructure as a project, money is indispensable blood to the project's operation. So there should be a corresponding choose to the investment and financing mode. The cost management is a corresponding part of choosing the investment and financing mode in the complicated system engineering. While strengthening the cost management of project investment control is the basic guarantee to realize maximum benefits of project.

4.1. Cost management procedure of construction project

The working process of infrastructure projects can be divided into the initiating, planning, executing, monitoring and closing. The characteristics of construction engineering project determine the methods and contents of the construction project. The cost management is a process of dynamic management. It is must according to the different stages of the project using different methods of management, beforehand on the influencing factors, matter controls, afterwards feedback. In order to prevent the deviation of the cost target and ensure the realization of the target cost.

4.2. Principles of project cost management

4.2.1. Financing risk is moderate principle

The risk in the process of project financing is inevitable in the process of development of market economy. The accountable and dispersive risk is one of the key to the success of project, and also is an important aspect of project risk in the process of financing. Due to the different project financing model financial risk is the owner's equity and even may be the risk of loss. The project in financing should be in the tradeoff between the income from financial leverage and the financial risk. According to the specific situation of the enterprise, it obtains the most profit under proper risk.

4.2.2. Principle of the lowest cost of capital

The cost of capital is the price of the enterprise in order to raise money and using all kinds of funds. The cost of capital includes the two parts of financing cost and capital cost. Fund-raising fee refers to pay fees in the process of funding.

4.2.3. Principle of capital structure optimization

The capital structure is financial structure. The enterprise shells, according to their own operating conditions, find out a most proper debt ratio, making the enterprise minimum average cost of capital rate in the future.

4.3. Allocate reasonably capital based on cost management

Money is the basic condition for normal operation of the project, mainly used in fixed assets, intangible assets, accounts receivable, foreign investment and related taxes and fees, etc. But at present, many problems of projects in capital allocation: One is the blind investment. The money make ends meet. The gap is big; Second, the distribution of each link is not scientific, diverted. The squeezes phenomenon is common. Reasonably to solve these problems in cost management, the scientific and rationally allocating and using of funds should accelerate the capital turnover, increasing the service efficiency of funds.

4.3.1. The cost of capital management in the process of operation

Cost management is mainly evaluation materials, products and low-value goods such as inventory purchasing and inventory occupied capital position. And the influence on purchasing decisions and benefit, developing the most economical purchase batch. It should maximize the saving and reduce procurement costs and the effect of the cost of capital. The evaluation of finished product drives project management to shorten the production cycle and reduces the occupation of capital in the process of production capital footprint. It also accelerates the capital turnover and concerns about the market.

4.3.2. *Basic requirement of allocating funds reasonable*

The implementation of the project finance department is usually the cost of capital management unit. For saving money to use, it reduces the cost of capital, aspects and so on. Do the following as it must be used in the allocation of funds: the first one is according to each department capital demand and order of priority, timely and reasonably allocating funds. And it must be distribution of science, interlocking. Prevent the randomly misappropriation of funds. The second one is ensuring the best possible to avoid idle funds. To temporarily idle funds, it should timely adjust into higher-yielding projects, or return the bank loan interest ahead of time.

4.3.3. *Management of capital cost in the process of investment*

The relationship between investment and the cost of capital management mainly is to analyze the evaluation of investment decision-making which is correct or not. Yield high and low cost is the good staff for the enterprise and the project of investment. Return on the cost of capital is the main criteria to choose the best investment scheme which demonstrate and evaluate the feasibility of investment projects. Projects for investment shall be in accordance with the principle of caution, predict and analysis the breakeven levels of investment yield.

5. Conclusion

Based on the data from the National Bureau of Economic Analysis and Statistics, the World Bank and the OECD database, this paper studies the domestic and foreign urban infrastructure investment ratio to GDP, real estate investment, per capita GDP, urbanization rate and based on the above analysis finds a match with all kinds of urban infrastructure and the channels of investment and financing.

Japan, France, Germany, the Netherlands and other countries assign priority to indirect financing and policy loans. United States and Britain and other countries having the Anglo-American law system prefer direct financing.

Financing modes used in different countries in different stages of urbanization vary. When the urbanization rate is 50% to 70%, the United States, Japan and Germany mainly use local (municipal) government debt financing for infrastructure construction. The English mainly use public project loan committee for infrastructure construction, while France and Canada prefer commercial bank loans. In the urbanization rate of 70% to 80%, due to the innovation of financial tools, the United States, Britain, France and Germany and other countries began to widely use asset securitization for the construction of infrastructure. At the same time, in this phase, operational infrastructure privatization began and France, Germany and Japan started using preferred shares and corporate bonds for financing infrastructure. In the phase of urbanization rate of 80% to 90%, most countries in the way of financing basic to carry on the policy of the period. Because of the economic recession in Japan, the government can't afford the high infrastructure spending. So Japan too has started introducing private capital through corporate bonds and asset securitization. The urbanization rate is above 90% in Japan at present; the policy mainly includes corporate bonds, asset securitization and policy loans.

As the global economic integration and the rapid development of the high and new technology, the remarkable changes society, economy and enterprise organization have taken place accordingly. Even it promotes the development of growth management theory and practice. The infrastructure construction, as a result of the choice of different investment and financing channels cost management. This paper argues that it needs to accelerate the pace of training advanced talents, attach great importance to the sustainability of the infrastructure project post-evaluation.

To sum up, as the demand for funding of urban infrastructure construction is growing, higher levels of financing are required for further development of urban infrastructure, creating a broader space. Only a clear understanding of the challenges and opportunities in urban infrastructure financing can facilitate reasonable and effective measures. In order to fundamentally eliminate the existing series of restricting factors, it builds favorable environment of urban infrastructure financing, gradually perfecting the multi-level financing system to realize the diversification of financing models.

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References

- [1] BOKANG DING. The government investment and financing platform for the development of new urbanization transformation. *China Commercial Press*, 2014.
- [2] CHUNJIE LIU. Urban infrastructure construction financing at home and abroad experience learning. *Zhejiang Economy*, v.10, p.25-27, 2005.
- [3] ESTHER CHEUNG.; ALBERT P.C. CHAN. Is BOT the best financing model to procure infrastructure projects?: A case study of the Hong Kong-Zhuhai-Macau Bridge. *Journal of Property Investment & Finance*, v.27, n.3, p.290-302, 2009.
- [4] FANG ZHANG. Several problems concerning urban infrastructure financing. *Economic Aspect*, v.8, p.22-24, 2001.
- [5] FRANK R. BRUINSMA; SYTZE A. RIENSTRA. Piet Rietveld. *Regional Studies*. v.31, n.4, 1997.
- [6] HIREN MANIAR. Scenario of Viability Gap Funding (VGF) Concept in Indian Infrastructure Projects. *Journal of Infrastructure Development*, v.5, n.1, p.33-65, 2013.
- [7] IKECHUKWU IKEA; CHINYERE; XIAOLI XU. Public-Private Partnerships: The Underlining Principles of Infrastructure Investment, Finance and Development Projects. *International Journal of Business and Management*, 2011.
- [8] JOHN BRISCOE. The Changing Face of Water Infrastructure Financing in Developing Countries. *International Journal of Water Resources Development*, v.15, n.3, p.53-61, 1999.
- [9] JUNWEI ZHANG. Perfecting the financing mechanism to promote the healthy development of urbanization. *China Economic Times*, 2013.
- [10] KE MA; QIAN CHEN. A new financing mechanism of urbanization and the innovation. *Observation*, v.1, p.15-22, 2015.
- [11] KONARD FINKENZELLER; TOBIAS DECHANT; Wolfgang Schäfers. Infrastructure: a new dimension of real estate? An asset allocation analysis. *Journal of Property Investment & Finance*, 2010.
- [12] RICHARD B.; ANDREWS. The mechanics of the urban economic base. *Land Econo.*
- [13] RU BAO HUANG; TING WANG. Urban infrastructure construction investment and financing mode in our country present situation and innovation research. *Architectural Technology*, v.10, p.5-8, 2006.
- [14] RUITERS; CORNELIUS. Funding models for financing water infrastructure in South Africa: framework and critical analysis of alternatives. *Water SA*, v.39, n.2, p. 313-326, 2013.
- [15] SHAN ZHU; YAN LIU; AIYING CHEN. Our country city infrastructure construction funding sources analysis. *Theory of Tribune*, v.8, p.22-23, 2004.
- [16] TERANISHI, J. Interdepartmental transfer of resources, conflicts and macrostability in economic development. In *Economic Development and Roles of Government in the East Asian Region*, Aoki, Kim and Okuno-Fujiwara, eds. Nihon Keizai Shimbun, Inc, 1997.
- [17] WEIXIA GONG; XIAOJIAN ZHONG. To adapt to the new urbanization the diversification of investment and financing pattern innovation exploration. *Proceedings of China Urban Planning Conference*, 2013
- [18] WEN MO. The cost management of project. *Economic Management Press*, Beijing v.3, p.19-21, 2008.
- [19] XIAOHANG ZHAO. Urban infrastructure financing model. *The Choice of Accounting BBS*, v.3, p.14-16, 2007.
- [20] YANLONG WU. Operating cost management norms. *China Economic Times Press*, 2005.
- [21] YU MING LIU; SHENG YUE HAO. Widen the channel of the urban infrastructure financing research. *Technical Economics*, v.9, p.47-48, 2002.
- [22] YUE ZHANG. Urban infrastructure financing abroad comparative analysis. *New West*, v.35, p.245-246, 2011.
- [23] YUNXIANG ZHAO; GUOHUA CAO; XIAO YANG. Chinese and foreign contrast research infrastructure financing model. *Water Conservancy And Hydropower Letters*, v.18, p.26-32, 2005.
- [24] YUN ZHANG. Build a diversified financing model of urbanization. *China's financial*, 2013.
- [25] ZHAOYUAN ZHANG; LAN KUANG; JINXUAN YU. Capital operation of China's urbanization construction-urban management of local government to explore. *China Financial Publishing House*, 2013.