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WHY MUNICIPAL BONDS ?

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Why Municipal Bonds ?

I. Introduction

In an era of increasing demand on state and local governments to meet the commercial, industrial and human services needs of increasing populations, it is necessary for local authorities to adequately leverage and manage scarce monetary resources required to pay for needed infrastructure improvements. Meeting these needs translates into capital expenditures on the part of municipalities. The primary question is how does the municipality pay for these services? Here are a few options:

- Citizens can take up a collection.
- The government saves enough money so that it can pay for the construction and maintenance in cash.
- The municipality can take out a loan from a bank.
- The municipality can explore other long-term financing alternatives.

This paper explores the benefits of a municipality issuing long-term municipal bonds and gives the necessary background for understanding these benefits.

Regional and local governments charged with the mission of managing urban services and infrastructure needs must judiciously plan their investments and mobilize needed scarce monetary resources effectively. In the past, the Indian Government's primary contribution to investments in these needed areas has been directed and funded by central and state plans. As local authorities are enabled and empowered with more autonomy in this process, the need to develop a systematic framework to address these urban services and infrastructure needs is apparent. This paper will show that financing these urban services and infrastructure needs through long-term municipal bonds is the most preferable option.

This paper answers the question: **Why Municipal Bonds?** It explores fundamental issues pertaining to municipal bonds. This paper is divided into three sections, (I) a general overview of municipal bonds, (ii) a description of the specific details of municipal bonds, and (iii) a discussion of where the municipality borrows its money and how much the borrowing costs the issuer. Each section explores a different aspect of the mechanics of municipal bonds to give a full picture of the story.

Section A is a general overview of municipal bonds. This section describes the background and history of municipal bonds in the United States. This section discusses how and why a municipality determines what project will be financed.

Section B is a description of the specific details of municipal bonds. Section B answers the question, How does a municipality finance its infrastructure? Moreover, it explains how a municipality is seeking a "loan" from investors when it issues a bond for its infrastructure needs. Further, this section explains how the concept of security relates to the concept of credit and describes the two primary types of security pledge.

Section C answers the questions, (I) How can a municipality finance its infrastructure? (ii) What is a capital market? (iii) From what sources does the municipality borrow its money? and (iv) How much does the borrowing cost the issuer?

Section D gives a practical example that ties all of the paper together.

This paper discusses the manner in which the United States has integrated the issuance of municipal bonds into its industrial, economic and overall development as a paradigm for determining whether there are benefits of using municipal bonds for infrastructure development in India.

A. General Overview

I. Background/History of Municipal Bonds In the United States

In the United States, municipalities have issued municipal bonds to meet their infrastructure needs. A municipal bond is a contract between a municipality and an investor. The investor, in effect, makes a loan to the municipality for its infrastructure needs. These infrastructure "loans" have developed into a municipal bond market.

In the United States, municipal finance serves a significant role in the efforts of state and local governments to develop and maintain a wide variety of essential public services. In fact, many in the public policy arena cite governmental support of infrastructure as a key factor that contributed to the economic development, social development and industrialization in the United States. Since the 1800's, governments have borrowed money to build highways, schools, sewer systems and finance other public works. During recent times municipal finance has been employed to raise money to finance and refinance a host of services including railway systems, student loans, economic development programs, bridges, pollution control facilities, hospitals and housing for families of all incomes.

The United States government supports development of infrastructure through a variety of means. The most effective and long term support has been the tax-exempt status that the federal government has granted to bonds that are issued for the purpose of infrastructure. Local units of government have always had a primary status in the U.S. federal system. As a result, there has been no need to devolve authority from federal to state and local government, and the lack of taxation by the federal government on local bond issues reflects this relationship.

To enhance and maintain the affordability of services relating to social welfare, education, healthcare and public safety delivered by municipalities, state and local governments frequently issue and sell municipal bonds. Such bonds or notes are evidence of an issuer's obligation to repay a specified principal amount on a certain date (the maturity date), together with interest at a stated interest rate. Purchasers of municipal bonds and notes, in essence, lend money to the state or local government issuing the securities for a price (interest rate) set through a public bidding process or private negotiation.

These municipalities enter into contracts with investors. These investors loan money to the municipalities so that the municipalities may meet their infrastructure needs. These contracts with the investors are the municipal bonds. These contracts have terms that include length of time of the loan (how many years the municipality has to pay back the loan), the interest that the municipality must pay for the loan and an agreement as to what happens if the municipality is not able to make payments on the loan.

A. What is infrastructure?

There is a need for investment in public facilities - the physical system of roads and bridges, the water supply, wastewater treatment, and drainage facilities that support economic activity in various communities. By some definitions, infrastructure is assumed to encompass all public capital spending for land, buildings, and equipment and includes such items as sewer systems and water treatment plants.

Municipal infrastructure includes transportation (ports, airports, highways, toll roads, and mass transit) and utilities (water, wastewater, and power).

The following represents some infrastructure shortcomings in the United States in the 1990s that are currently being confronted by the issuance of municipal bonds. While each of these situations appears very desperate - it is not. Each of the mentioned municipalities built the infrastructure to provide these basic services for its citizens with municipal bonds. After World War II, the United States made infrastructure investments so that the country could grow. These infrastructure investments fuelled the tremendous growth that made America the industrial giant that it is. This growth pushed infrastructure to its limits. The United States is now in a position where it must make new investments in its infrastructure.

1. Water

The City of New York loses an average of 100 million gallons of water due to leaks in old water mains. Approximately 40% of the City of Boston's purchased water is unaccounted for due to undermetering, pipeline leaks, breaks, and unmetered public uses. The Urban Institute, in a survey of 28 major cities found that over one-third were losing 10 percent or more of their water because of deteriorating pipes.

2. Sewers

About one-half of the nation's communities have wastewater treatment centers that are operating at full capacity and cannot support additional industrial or residential growth. The Environmental Protection Agency ("EPA") has estimated that there are $114 billion in wastewater treatment needs by the year 2000.

3. Highways

The Federal Highway Administration predicts that nearly one-half of the 42,500 mile interstate highway system , if not repaired soon, will have to be replaced. The nation's roads are in even worse shape. According to estimates by the U.S. Department of Transportation (DOT), more than $500 billion will be needed over the next 10 years to maintain existing levels of service on non-urban highways.

4. Bridges

Almost one-half of the nation's 557,516 bridges are considered by the Federal Highway Administration to be functionally obsolete. More than 200,000 of today's bridges are more than 50 years old.

5. Mass Transit

Twenty percent of all subway cars are more than 25 years old, while their design life is estimated to be only 10 years. According to DOT, 67 percent of all mass transit track should be upgraded.

The term infrastructure finance covers the issuance of debt related to **transportation, utilities and general purposes**. In the case of **transportation** infrastructure means ports, highways, toll roads and mass transit. In the case of **utilities** infrastructure means water, wastewater, power, solid waste, natural gas. In the case of **general purposes** infrastructure means school districts, traffic lights and other capital needs of municipalities. Financings for stadiums and convention centers are also included when they are secured by dedicated sales, occupancy or similar taxes. Debt of state entities secured by revenues and dedicated taxes falls into this category as well.

Infrastructure debt can be issued by a municipality or by a duly authorized entity that serves one or more municipalities. As a result, infrastructure financing often covers many different jurisdictions. An example in the first instance is a city that issues school district bonds to improve the physical plant of its schools. An example of the second instance is a regional water authority that issues water revenue bonds that are secured by the payments of municipalities within the region.

Security for this type of debt can vary considerably but is typically a single dedicated revenue stream directly related to the services provided. For example, in the second scenario above, revenues from the sale of water can secure or pay back bonds that were issued to build a water supply system.

It is clear that in any given municipality, the sources of revenue that may be tapped for the purposes of building infrastructure are limited. A population may only be taxed to a certain degree until economic activity flees to another jurisdiction or ceases in the current jurisdiction.

II. Determining What, How and Why a Project Should Be Financed

A. How Infrastructure Is Financed

Generally, infrastructure projects are financed by direct taxes, indirect taxes, or revenues from a particular project.

A. Public Policy

Municipalities have a finite number of income streams that they can package to finance their various infrastructure needs. There are two primary issues here. On the one hand, a municipality cannot over-tax its residents. The second issue arises because once this limitation is in place; a municipality must prioritize how it spends its money.

1. Strategic Planning

A municipality must decide how, when and where it will direct its infrastructure spending. When a municipality's governing body makes the decision to finance and build a wastewater treatment plant it generates a set of possibilities for its population that have consequences for economic development, social development and industrialization. Among these possibilities is that families and businesses will be attracted to the municipality, as safe drinking water and workable sewage will no longer be a concern for the municipality. When a municipality's governing body makes the decision to build a mass transit system, the municipality generates a different set of possibilities for its population that have consequences for economic development, social development and industrialization.

2. State and Local Budgetary Issues

In each instance, the municipality can use combinations of many different types of taxes to finance the construction, maintenance and operation of infrastructure projects. A local municipality may have property taxes, dedicated sales taxes, user fees and other types of taxes. However, there is a limit as to how much in taxes citizens and the local economy can tolerate. The amount of tax that a locality's economy or population may accept must be determined on a case by case basis.

The United States federal government places a cap on certain types of private activity bonds. Private activity bonds are partnerships between private corporations and municipalities for the purpose of economic development. The federal government allows the states to select the types of activity that will be supported by the government's tax-exempt status. The United States government limits the dollar volume that each state can offer municipal bonds because the tax-exemption of municipal bonds costs the United States government lost revenue.

The U. S. federal government gives states a choice in determining what projects will be supported by its tax-exemption. There are numerous other ways that states support infrastructure and economic development.

States set up "bond banks", "bond pools" and "revolving loan funds" for the benefit of local municipalities. With a bond bank, bond pool or revolving loan fund, the state borrows money for infrastructure improvements and the individual municipalities in turn borrow money from the pooled resources. Because investors are much more familiar with states, these bond banks, bond pools and revolving loan funds are guaranteed by the sponsoring states, which assure investors of the repayment of principal and interest. The credit rating obtained by the state may be assigned to the entire bond pool, bond bank or revolving loan fund; however, the rating of these pools is often one rating level less than that assigned to direct issues of the state government.

B. The Mechanics of Bonds

1. What is a Bond?

A bond is an obligation between an entity that is constructing, operating and maintaining a project (the municipality) and the investors (the lenders or purchasers). The obligation is for the municipality to repay the investors for the investment. The municipality typically structures the repayment so that the repayment is level or made up of equal periodic payment. In other words, the repayment schedule is structured so that the municipality repays the bond such that it is repaying some principal and all of the interest owed in each year. The principal is the amount of money received for the project. The municipality must pay the principal back over the term of the loan. This combination of principal and interest is called debt service. The cash flows from municipality's project must be high enough to cover this debt service or repayment of principal and interest.

2. Present Value Theory

Perhaps the most important concept underlying the decision process in determining whether or not to issue bonds is the concept of net present value. The net present value takes into account the time value of money. Net present value theory values an investment by compounding the interest. In other words, the money is reinvested into the corporation each year rather than being spent. One rupee received today is worth more than one rupee tomorrow and much more than one rupee received ten years from now. Present value theory allows the municipality to assess what the cost of borrowing is today. Each year's cash flow is multiplied by the present value discounting factor.

The compound interest formula is:

The future value Rs.1 invested today is:

Future value = (1+k)^n

The annual interest rate is k. The number of years the investment is being held is n. The investor would earn 1+k in the first year. That would be reinvested and earn interest in the second year at the same rate. The total at the end of the second year is arrived at by multiplying (1+k) times (1+k). In the third year, the investor has a total of (1+k)^3, fourth year (1+k)^4, fifth year (1+k)^5 sixth year (1+k)^6, seventh year (1+k)^7 and so on. If the interest rate equals 6% and the money has been invested for 10 years then the future value = (1 + .06)^10 = 1.79.

Finding the present value is the reverse of finding the future value. What would an investor pay today for the right to receive Rs. 100 in ten years? What the investor would pay depends

on the rate the money is being invested at. If we assume the interest rate is 6%, then the amount of money that an investor would pay to receive Rs. 100 in ten years is Rs. 56. This is the same thing as saying that if the investor puts Rs. 56 in the bank today, then the investor would receive Rs. 100 in ten years. The equation to calculate present value is the inverse of the compound interest equation,

$$\text{Present Value} = 1/(1+k)^n.$$

For a given interest rate, this equation generates present value factors. These present value factors are used to calculate the cost of borrowing for a project. How this works will be demonstrated in the example below.

3. **Bond Math**

A. Price/Yield/Coupon/Maturity

There are three components used for valuing a bond that are relevant to the decision process for evaluating municipal bonds: price, yield and coupon.

Coupon

The **coupon** is the annual interest payment of a bond. A bond with a Rs. 10,000 face amount with an annual coupon of 10% would pay the holder of the bond or investor Rs. 1000 per year. The **coupon** amount remains the same for the life of the municipal bond.

Maturity

The maturity of the bond is reached when the municipality stops paying principal and interest on the bond. Usually this time period is the "useful life" of the asset that is being financed. For a water supply plant this may be 20-30 years. Bridges, toll roads and electric power plants have similar "useful lives" and, therefore, these bonds are usually outstanding for that period of time.

Price

The price of a bond is dependent on whether or not there is a difference in the current yield and the coupon. The example below under the discussion "yield" gives an illustration of the concept of the price of a bond.

Yield

The yield of a bond is the reward that an investor gets in exchange for making the investment in a bond for a period of time. The yield is usually a percentage that typically increases over a period of time. This works out so that money that is put at risk for a longer period of time requires a higher yield than money that is placed at risk for a short period of time.

The term structure of interest rates is also called the yield curve. The yield required for a bond is equal to the amount of money needed to reward the investor for loaning the money to the municipality for a period of time. The following is an example of this.

Interest Rate Environment I

Year	Yield in percent
1	5.00
2	5.10
3	5.20
4	5.30
5	5.50
6	5.60
7	5.70
8	5.80
9	5.90
10	6.00

As seen from this example of a term structure of interest rates, the longer that an investment is outstanding, the higher yield that is required for the investor. If a bond is outstanding or matures after one year, then the investor would require a yield of 5.00%. A bond that is outstanding or that matures in 5 years would lead the investor to require a yield of 5.60%. A bond that outstanding or maturing in 10 years would require a yield of 6.00% for the investor.

The example above assumes that the municipality issuing the bond has been deemed an investment with a specific risk associated with it. In other words, a rating agency has determined that the municipality has a given likelihood of repayment of its obligation. Chart I-A below demonstrates what the term structure of interest rates would look like in such a situation.

Interest Rate Environment I-A

Year	Yield in percent
1	5.50
2	5.60
3	5.70
4	5.80
5	6.00
6	6.10
7	6.20
8	6.30
9	6.40
10	6.50

In the example of section I-A, it has been determined that the municipality is less likely to repay its obligations than the municipality characterized in example I.

The term structure of interest rates or yield curve changes as various indices in the economy change. For example, if the economy represented by the yield curve above moved into an inflationary period, then the yield curve might change as follows:

Interest Rate Environment II

Year	Yield in percent
1	7.00
2	7.10
3	7.20
4	7.30
5	7.50
6	7.60
7	7.70
8	7.80
9	7.90
10	8.00

The reason that the yields in Interest Rate Environment II increased by 2% points can generally be attributed to the fact that investors believe that inflation will continue at a rate of 2% more than inflation was prior to **Interest Rate Environment I.**

If a municipality sold a bond during **Interest Rate Environment I** and the investor wanted to sell that same bond, the investor would demand a higher price for that bond. The reason is that the investor could purchase a bond with coupons reflected in **Interest Rate Environment II**. Investors account for this by calculating a price for the bond.

If the investor bought a Rs. 10,000 bond in **Interest Rate Environment I** that matured in 5 years, then it would yield the investor 5.50%. If the investor wanted to sell this bond in **Interest Rate Environment II**, then the investor would not be able to sell the bond for the same that he bought it for during **Interest Rate Environment II.**

B. Numerical Examples

An investor purchases a Rs. 10,000 bond that matures in 10 years during **Interest Rate Environment I.** The investor would like to sell that same bond 3 months later when the economy has entered **Interest Rate Environment II.** For what price should the investor sell the bond?

4. **How is the term structure of interest rates determined?**

A. The Rating Agencies

In the United States, United States Treasury Securities are considered the safest securities to purchase. All of the bonds are priced using United States Treasury Securities as a benchmark. They are rated Aaa by the rating agencies. All other bonds in the United States are rated according to how close they are to the ideal of the Aaa rated bonds of the United States Government in terms of likelihood of repayment. There are rating agencies in India that rate investments on a similar basis. The following is an example of how Moody's investor services in the United States examines municipal bonds

Aaa
Bonds rated Aaa are judged to be of the best quality and carry the smallest degree of investment risk. Interest payments are protected by an exceptionally stable margin and principal is secure.

Aa
Bonds rated Aa are judged to be high quality by all standards. They are rated lower than the best bonds because margins of protection may not be as large as in Aaa securities.

A
Bonds rated A possess many favorable investment attributes and are to be considered upper medium grade obligations Elements may be present which suggest a susceptibility to adverse changes in the future.

Baa
Bonds rated Baa are considered medium grade obligations, i.e. they are neither highly protected nor poorly secured. These bonds have speculative characteristics.

Ba
Bonds rated Ba are judged to have speculative elements and uncertainty of position. Often the protection of interest and principal payments may be moderate.

B
Bonds rated B lack the characteristics of a desirable investment. Assurance of interest and principal payments or of maintenance of other terms of the contract over any long period of time may be small.

Caa
Bonds rated Caa are in poor standing. Such issues may be in default or elements of danger may be present with respect to the payment of principal or interest.

Ca
Bonds rated Ca represent obligations that are highly speculative. Such issues are often in default or have other marked shortcomings.

C
Bonds rated C are the lowest rated class of bonds. Issues so rated can be regarded as having extremely poor prospects of ever attaining any real investment standing.

By measuring an issuer's historical fiscal results and the issuer's ability to plan and budget for the future, the rating agencies determine the risk level associated with an issuer's ability to repay debt. This risk level is conveyed to the investors by the ratings assigned to the bond issues. The two most critical elements in the determination of the municipal bond ratings are the economic base and the operating account analysis of the project. When reviewing an issuer's economic base and the factors determining the issuer's ability to repay debt, rating agencies consider the following factors:

- economic diversity in the tax base
- growth in employment opportunities; and
- economic base trends in population, employment and personal income.

The sections below concerning the security pledge for General Obligation and Revenue Bonds give a more detailed discussion of the rating criteria.

B. What does "Credit Analysis" mean?

"Credit Analysis" is the process that assesses the likelihood that a municipality will be able to repay the mix of obligations that it has incurred for the purpose of maintaining its infrastructure. Credit Analysts principally take into account local economic factors including the demographics of the population, the mix in business of the locality and the need of the project being financed.

5. What is a Security

The municipality will typically give the investors an interest in some asset that the municipality has control over. In the instance of a general obligation bond, the investors are granted the right to cause the municipality to raise taxes. In the case of revenue bonds the municipality grants investors the right to seize or capture the user fees of the project being financed. The investors may also have the right to seize certain assets of the municipality or the project. When a municipality grants these rights to an investor they are called security interests.

6. The two major types of Security, General Obligation Bonds and Revenue Bonds

A. General Obligation Bonds

General Obligation Bonds, which are issued by municipalities that have the power to tax, have been regarded by many as the safest possible investment next to United States Treasury Bonds. When a state or local government issues a general obligation bond, that state or local government pledges all of its taxing power to repay these bonds. This pledge of all of the municipalities taxing power is termed a "full faith and credit" pledge. This means that a municipality will raise the taxes on its population to repay the obligation until it has enough money to repay the obligation.

The ability of state and local governments to repay their general obligation debt can be assessed by examining the economic base and debt burden of the municipalities issuing general obligation debt. Generally, these communities with higher income levels and diverse economic bases are deemed by the rating agencies to have higher credit quality and greater likelihood of repayment because such communities are much more likely to be able to repay their debt in times of economic uncertainty.

In making determinations about the economic base of a municipality, the initial focus is on size, structure and diversity of the tax base. The tax base is reviewed to identify proportionate contributions from residential, commercial and industrial tax revenue sources. The leading taxpayers are profiled and assessed for their direct and indirect effects on the

local economy. Diversity and growth of the economy are also key considerations in assessing the repayment ability of a municipal borrower.

Economic factors to be reviewed with respect to this point include: the composition of the employment sector (i.e., manufacturing, trade government, agriculture, trade and services); the concentration of jobs with major employers or reliance on particular industries; employment trends and quality of the labor force; and regional patterns to assess relative gains and income and income growth. Finally, an analysis of whether the municipality is able to repay its existing debt is also a key consideration when assessing the ability of the municipality to repay any new debt. Such analysis would consider debt burden of the issuer as well as the future capital needs of such issuer.

In their financial analysis, rating agencies conduct historical budget and audit report analyses. The rating agencies looks at the issuer's ability to meet its present needs as well as its future needs. For general obligation bonds the rating agencies concentrate on the main operating funds that are basically tax-supported.

B. Revenue Bonds

Unlike general obligation bonds, revenue bonds are not backed by the taxing power or "full faith & credit" of the issuing municipality. In contrast, revenue bonds are bonds that are payable from a specific source of revenue usually generated by the project financed by the revenue bonds. For example, user fees established for a water system can be the sole security for water revenue bonds, while general obligation bond can call on property, income, and sales taxes to meet general obligation bond requirements.

Typically, revenue bonds are issued for the purpose of constructing, operating and maintaining a project and are generally payable solely from the revenues generated by the project. For example, revenue bonds may be issued to borrow funds to construct a bridge system with the debt service on the bonds to be paid from bridge tolls. In some instances, if revenue bonds are issued in order to finance the cost of supplying a service, such as electrical power, additional security may be provided to investors through long-term contracts. Under these contracts, public private investors agree to purchase power or other services to be provided by the project. At times affected municipalities have agreed to make the required payments even if the actual service has not been provided.
The rating agencies make an economic analysis to evaluate both the demand for the services rendered by the revenue supported, bond-financed project as well as the trends related to the specific revenues pledged to the project. For example, in a proposed electric utility financing, trends in utility connections, annual energy peak sales, peak and average daily demand and demand per capita are examined. The rating agencies must determine whether the general economic activity in the area is stable or declining. If economic activity is decreasing, demand for the service provided by the revenue supported project will most likely decrease. Another

important factor along these lines is the susceptibility of the municipality to competition from the private sector.

The rating agencies also explore the administration of the project in their ratings evaluation. Quality and depth of management are important in the evaluation of administrative factors. Rating agencies examine management's historical records such as policies and operating plans. The agencies also study the budget preparation methods, budget variance monitoring system, receivables management, the rate policies and the ability to make demand projections in terms of the size and structure of the service.

In the financial analysis, the rating agencies focus on the debt service coverage ratio. Rating agencies prefer coverage of more than one times the debt service. This indicates that rates are at a sufficient levels to repay bonds with reasonable margins.

"Double barreled" Bonds. "Double barreled" bonds are bonds that are secured by both project revenues and third party such as a state. Bonds are typically secured by the project revenues, for example water and sewer user charges and the full faith and credit pledge of a state government or locality. This full faith and credit taxing power is only used if project's revenues are insufficient. Depending on the accounting system used, a well run project can enhance the general government's credit by making substantial financial contributions to the general fund. In contrast, a weak project can threaten the creditworthiness of the supporting governmental entity.

Moral Obligation Pledge. A moral obligation pledge occurs when an issuer relies on another entity to make up any deficiency in the debt service reserve fund. The pledge is nonbinding and most often given by a state to the debt of its agencies or authorities. The promise of a state government to appropriate money to the debt service reserve fund is the usual form of this type of guarantee.

C. Why and where does the municipality borrow; and how much does it cost?

Municipalities can either pay for their infrastructure out of current expenditures or somehow finance their capital expenditures.

1. Pay-as-you go vs. Long-term Financing

A. Pay-as-you-go

The term "pay-as-you-go" applies when a municipality pays for an infrastructure project only after it has saved enough money to pay for the asset. "Pay-as-you-go" would be preferable if the municipality had unlimited cash resources. It is obviously better to pay for infrastructure needs directly rather than borrow for them. However, it is unfortunate that most countries and localities are not able to pay for all of their infrastructure needs directly out of their general funds.

B. Finance Issues

When a municipality decides that it is not able to pay for all of its infrastructure needs out of its general funds, then the municipality must determine how to finance its needs out of its available revenue streams. The value of borrowing today is compared with that of paying out of current expenditures on a "pay as you go" basis.

Assume that a municipality has some assets that may be used for the purpose of constructing and maintaining infrastructure. The surplus in the general fund is Rs. 25,000,000. Also assume that a municipality receives a surplus of Rs. 10,000,000 yearly in property and Rs.10,000,000 yearly in sales and miscellaneous taxes that are available for current infrastructure expenditures. The municipality has no debt currently outstanding and has the following infrastructure needs:

(1) a water treatment plant that costs Rs. 60,000,000 and would generate Rs. 7,000,000 yearly in revenues.

(2) a power plant that costs Rs. 85,000,000 and generates Rs. 9,000,000 yearly in revenues.

(3) the local municipality needs Rs. 30,000,000 to provide computer equipment, desks and other types of improvements for the municipality.

"Pay-as-you-go"

It is important to note that, at the outset, this municipality is better off than most municipalities, as **it has a Rs. 45,000,000 surplus.** Under the "Pay-as-you-go" scenario, the municipality can meet limited combinations of its current infrastructure needs but cannot meet **all** of its current needs. For example, in year 1 the municipality can pay for its own capital needs. It has Rs. 25,000,000 in cash to pay for a portion of its local municipal infrastructure needs. The municipality must use a portion of its **surplus** tax receipts for the purpose of paying for these local school district needs. After paying for its local school district requirements, the local municipality can pay for a portion of its needed police cars, street lights, local road improvements, fire trucks. The municipality has a shortfall of Rs. 10,000,000. The municipality must wait until Year 2 to acquire its remaining Rs. 10,000,000 in police cars, street lights, local road improvements and fire trucks. The municipality cannot afford its water treatment plant and must save for 3-5 years before it is able to purchase the water treatment plant outright. The power plant is out of the question in the near term; the municipality might be able to finance the power plant in 10-15 years.

Long-term Financing

With long-term financing, the municipality can meet all of its current infrastructure needs **and** has capacity to meet more infrastructure needs. An attractive alternative for the municipality would be to divide its infrastructure needs into two categories, revenue financed based needs and general obligation financed based needs. The water treatment plant would be met through a water revenue bonds and paid for through the water system's revenues. The power plant can also be paid for with long-term financing. This scenario will be described in detail in **section D.** The result of this analysis is that the municipality can meet all of its infrastructure needs today **and** can address new needs as it grows when the municipality employs long term financing.

2. **Where does the municipality "borrow" money from?**

A. The Capital Market vs. Bank Borrowing

One basic question is why should a municipality go through all of the problems associated with issuing municipal bonds? Why doesn't a municipality simply borrow from a bank?

B. What is the Capital Market?

The capital market is where institutional investors and retail investors invest money into public and private ventures by purchasing debt or equity securities. Institutional Investors are typically thought of as Banks, Insurance Companies, Corporations, Mutual Funds and Public

and Private Pension Funds. Retail investors are individuals who purchase these securities. These investments are then listed on an exchange where they are priced and traded.

When corporations or municipalities access the capital market, the securities they sell to the institutional or retail investors create a relationship between the investors and the corporation or municipality. The investors become partners of the corporation or municipality.

The facilitators of the capital market include Underwriters, Rating Agencies, the municipalities and the investors. The **underwriters** broker the relationship between the **municipalities** and the **investors** (both institutional and retail). The **Rating Agencies** provide an objective ranking of the issuer and its ability to repay the obligation. The investors, both institutional and retail, provide the money necessary for funding the infrastructure projects.

D. A Practical Example

Assume that a municipality has some assets that may be used for the purpose of constructing and maintaining infrastructure. Further assume that the surplus in the general fund is Rs. 40,000,000. The municipality receives a **surplus** of Rs. 10,000,000 yearly in property and Rs. 10,000,000 yearly in sales and miscellaneous taxes that are available for current infrastructure expenditures. The municipality has no debt currently outstanding and no history of borrowing or issuing debt. Assume further that the municipality has the following infrastructure needs:

(1) A water treatment plant that costs Rs. 55,000,000, and would generate Rs. 7,000,000 yearly in revenues growing at a rate of 10% per year.

(2) A power plant that costs Rs. 80,000,000, and generates Rs. 9,000,000 yearly in revenues growing at a rate of 10% per year.

(3) The local municipality needs Rs. 30,000,000 to provide computer equipment, desks and other types of improvements for the municipality.

In Exhibit I, the cash requirements for each project is modeled.

Water Treatment Plant

This is a typical **revenue** bond project. The cost of the water treatment plant is Rs. 55,000,000. In a water treatment plant, investors typically sometimes require an equity investment in the form of a payment for a portion of the cost of the project. The example has modeled an equity investment of Rs. 15,000,000 and a Debt Service Reserve Fund of Rs. 5,000,000. Investors and rating agencies usually require a Debt Service Reserve Fund that is equal to one full year of principal and interest payments. This "Debt Service Reserve" is a reserve that the municipality keeps in an escrow fund. The reason for the municipality's equity investment **and** Debt Service Reserve Fund is that, in this example, the municipality has no history of accessing the capital market. The Debt Service Reserve Fund is used in the case where the municipality has a problem with collections for its revenue stream.

A water treatment engineer would visit the municipality to determine how much in revenues can be generated by the project. Typically the water treatment engineer's report reflects growth in revenues. This growth in revenues takes into account the period of time necessary to increase the capacity of the water treatment plant and growth in the service area that derives from the economic growth in the region. In this case, the water treatment engineer has projected the revenues at Rs. 5,000,000 per year with a growth rate of 10% per year for the first ten years and 1% growth for the remaining ten years.

The earnings from the Debt Service Reserve Fund usually assist in paying debt service. This is illustrated by the columns "Debt Service Reserve Fund Earnings" and "Payments Debt (-) DSRF Earnings. Finally, in the last year of the financing, the debt service reserve fund is liquidated for the purpose of paying debt service and the municipality has a surplus in its revenues for the project.

The debt service reserve fund is typically invested in very safe short term securities. The reason it is invested in short term securities is so that funds can easily be liquidated in the event that there is a shortfall in the municipality's ability to repay debt service.

The coverage ratio divides the Projected Revenues by the Debt Service. The coverage ratio is a ratio that calculates the number of times that the projected revenues cover the debt service. Investors and rating agencies typically require a coverage ratio greater than 150% of annual debt service in order to rate the bonds. In this instance, the coverage ratio is 156% of the debt service.

The present value factor calculates how many rupees must be invested today in order to yield the amount necessary to pay debt service in any given year. The interest rate on the bonds is 9%. The present value factor selected on this transaction is 9%. This present value factor represents the growth factor today for the amount of money necessary to pay debt service on the bonds. Each year's discounted present value for the debt service represents how much money would have to be set aside today at a rate of 9% in order to make the necessary debt service payment.

Since the present value factor is equivalent to the interest rate on the bonds, the borrowing cost is in effect zero (0). The present value of the payments is less than the amount of the borrowing because the earnings from the debt service reserve fund are subtracted from the amount of debt service owed by the municipality and the debt service reserve fund is subtracted from the payment owed in the last year.

Public Power Plant

This is a typical **revenue** bond offering. The cost of the public power plant is Rs. 55,000,000. In a public power plant, investors typically sometimes require an equity investment in the form of a payment for a portion of the cost of the project. In this case, there is an equity investment of Rs. 15,000,000 and a Debt Service Reserve Fund of Rs. 5,000,000. Investors and rating agencies usually require a Debt Service Reserve Fund that is one full year of principal and interest payments. This "Debt Service Reserve" is a reserve that the municipality keeps in an escrow account. The reason for the municipality's equity investment **and** Debt Service Reserve Fund is that in this example the Municipality has no history of

accessing the capital market. The Debt Service Reserve Fund is used in the case where the municipality has a problem with collections for its revenue stream.

A public power engineer would visit the municipality to determine how much in revenues can be generated by the project. Typically the public power engineer's report reflects growth in revenues. This growth in revenues takes into account the period of time necessary to increase the capacity of the public power plant and growth in the service area that derives from the economic growth in the region. In this case, the public power engineer has projected the revenues at Rs. 9,000,000 per year with a growth rate of 10% per year for the first ten years and 1% growth for the remaining ten years.

The earnings from the Debt Service Reserve Fund usually assist in paying debt service. This is illustrated by the columns "Debt Service Reserve Fund Earnings" and "Payments Debt (-) DSRF Earnings. Finally, in the last year of the financing, the debt service reserve fund is liquidated for the purpose of paying debt service and the municipality has a surplus in its revenues for the project.

The debt service reserve fund is typically invested in very safe short term securities. The reason is so that funds can easily be liquidated in the event that there is a shortfall in the municipality's ability to repay debt service.

The coverage ratio divides the Projected Revenues by the Debt Service. The coverage ratio is a ratio that calculates the number of times that the projected revenues cover the debt service. Investors and rating agencies typically require a coverage ratio greater than 1.5 times the annual debt service in order to rate the bonds. In this instance, the coverage ratio is 1.51 times the debt service.

The present value factor calculates how many rupees must be invested today in order to yield the amount of rupees necessary to pay debt service in any given year. The interest rate on the bonds is 9%. The present value factor selected on this transaction is 9%. This present value factor represents the growth factor today for the amount of money necessary to pay debt service on the bonds. Each year's discounted present value for the debt service represents how much money would have to be set aside today at a rate of 9% in order to make the necessary debt service payment.

Since the present value factor is equivalent to the interest rate on the bonds, the borrowing cost is in effect zero (0). The present value of the payments is less than the amount of the borrowing because the earnings from the debt service reserve fund are subtracted from the amount of debt service owed by the municipality, and the debt service reserve fund is subtracted from the payment owed in the last year.

Municipal Improvements

Municipal improvements are generally paid out of the general fund. The assumption is that the municipality will have sufficient revenues to pay for the improvements out of its general revenues. There is typically no debt service reserve fund because these bonds are **general obligation bonds** for which investors may require the municipality to tax the residents until the debt service is met. For simplification purposes, the example illustrates a transaction so that the municipality has Rs. 4,000,000 in revenues that grow at a rate of 10% per year. This 10% growth per year reflects the economic growth associated with a municipality that makes such infrastructure improvements.

Summary

Municipal bonds offer an alternative resource for local governments whose needs exceed their ability to pay on a "pay-as-you-go" basis and which have sufficient cash flows to pay off project debt service in addition to operating and maintenance costs. Their long-term nature makes them suitable for financing projects such as infrastructure, whose operating and revenue-generating capacity also take place over a long period of time. An additional advantage of municipal bonds to municipal government is that they enable officials to create alternative resources and to reduce reliance on central government transfers. Well-managed municipalities with solid control over their revenue and expenditures and with the ability to introduce and sustain cost-recovery pricing for urban services will benefit from exploring this new resource for financing infrastructure development and improvement.

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Water Treatment Plant

1	2	3	Debt Service Reserve	Earning on Debt Service Reserve 9%	Payment From Project Revenues	Present Value of Payments	Coverage	Factor 9%
YEAR	Debt Service	Revenues						
1	4,929,591	7,808,000	5,000,000	450,000	4,479,591	4,109,717	1.56	0.917
2	4,929,591	7,708,000	5,000,000	450,000	4,479,591	3,770,382	1.72	0.842
3	4,929,591	8,478,000	5,000,000	450,000	4,479,591	3,459,866	1.89	0.772
4	4,929,591	9,317,000	5,000,000	450,000	4,479,591	3,173,455	2.08	0.708
5	4,929,591	10,248,700	5,000,000	450,000	4,479,591	2,911,027	2.29	0.650
6	4,929,591	11,273,570	5,000,000	450,000	4,479,591	2,671,804	2.52	0.596
7	4,929,591	12,400,927	5,000,000	450,000	4,479,591	2,450,090	2.77	0.547
8	4,929,591	13,641,020	5,000,000	450,000	4,479,591	2,248,156	3.05	0.502
9	4,929,591	15,005,122	5,000,000	450,000	4,479,591	2,062,528	3.35	0.460
10	4,929,591	16,505,634	5,000,000	450,000	4,479,591	1,892,228	3.68	0.422
11	4,929,591	16,678,690	5,000,000	450,000	4,479,591	1,735,909	3.72	0.388
12	4,929,591	16,837,397	5,000,000	450,000	4,479,591	1,592,650	3.76	0.356
13	4,929,591	17,005,771	5,000,000	450,000	4,479,591	1,461,147	3.80	0.326
14	4,929,591	17,175,829	5,000,000	450,000	4,479,591	1,340,502	3.83	0.299
15	4,929,591	17,347,587	5,000,000	450,000	4,479,591	1,229,818	3.87	0.275
16	4,929,591	17,521,063	5,000,000	450,000	4,479,591	1,128,274	3.91	0.252
17	4,929,591	17,696,274	5,000,000	450,000	4,479,591	1,035,113	3.95	0.231
18	4,929,591	17,873,236	5,000,000	450,000	4,479,591	949,645	3.99	0.212
19	4,929,591	18,051,969	5,000,000	450,000	4,479,591	871,234	4.03	0.194
20	4,929,591	18,232,488	520,409	46,837		101,214		0.178
						60,194,071		

Assumptions

Water Treatment Plant

Cost of Project	55,000,000
Debt Service Reserve Fund	5,000,000
Municipality Equity Investment	15,000,000
Amount to be Financed	45,000,000
Interest Rate	9%
Present Value Factor	9%
Present Value of Payments	60,194,071

Municipal Improvements

Cost of Improvements	25,000,000
Amount to be Financed	25,000,000
Interest Rate	9%
Present Value Factor	9%
Present Value of Payments	25,000,000

Totals

Cost of Projects and Improvements	160,000,000
Debt Service Reserve Fund	#REF
Equity Investment by Municipality	#REF
Amount to be Financed	130,000,000

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Public Power Plant

Year	Debt Service	Revenues	Debt Service Reserve Fund	Debt Service Reserve Fund Earnings @9%	Payments Debt Service (+) DSRF Earnings	Coverage	Present Value Factor @9%	Present Value of Payments
1	6,572,789	9,888,000	6,600,000	594,000	5,978,789	1.51	0.92	5,605,127
2	6,572,789	9,988,000	6,600,000	594,000	5,978,789	1.66	0.84	5,052,227
3	6,572,789	10,898,000	6,600,000	594,000	5,978,789	1.82	0.77	4,636,722
4	6,572,789	11,979,000	6,600,000	594,000	5,978,789	2.00	0.71	4,235,525
5	6,572,789	13,176,900	6,600,000	594,000	5,978,789	2.20	0.65	3,885,882
6	6,572,789	14,494,590	6,600,000	594,000	5,978,789	2.42	0.60	3,564,956
7	6,572,789	15,944,049	6,600,000	594,000	5,978,789	2.67	0.55	3,270,682
8	6,572,789	17,538,454	6,600,000	594,000	5,978,789	2.93	0.50	3,000,552
9	6,572,789	19,292,299	6,600,000	594,000	5,978,789	3.23	0.46	2,752,800
10	6,572,789	21,221,529	6,600,000	594,000	5,978,789	3.55	0.42	2,525,505
11	6,572,789	21,633,745	6,600,000	594,000	5,978,789	3.58	0.39	2,316,977
12	6,572,789	21,648,882	6,600,000	594,000	5,978,789	3.62	0.36	2,125,667
13	6,572,789	21,864,563	6,600,000	594,000	5,978,789	3.66	0.33	1,950,153
14	6,572,789	22,083,208	6,600,000	594,000	5,978,789	3.69	0.30	1,789,131
15	6,572,789	22,304,040	6,600,000	594,000	5,978,789	3.73	0.27	1,641,605
16	6,572,789	22,527,081	6,600,000	594,000	5,978,789	3.77	0.25	1,505,876
17	6,572,789	22,752,352	6,600,000	594,000	5,978,789	3.81	0.23	1,381,538
18	6,572,789	22,979,875	6,600,000	594,000	5,978,789	3.84	0.21	1,267,466
19	6,572,789	23,209,674	6,600,000	594,000	5,978,789	3.88	0.19	1,162,813
20	6,572,789	23,441,771	6,600,000	594,000	5,978,789	3.92	0.18	1,066,801
								54,577,644

Power Plant Treatment

Cost of Project	80,000,000
Debt Service Reserve Fund	6,600,000
Municipality Equity Investment	26,600,000
Amount to be Financed	60,000,000
Interest Rate	9%
Present Value Factor	9%
Present Value of Payments	54,577,644

10% per year for first ten years; 1% per year thereafter

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Municipal Improvements

Year	Debt Service	Revenues	Coverage	Present Value Factor @9%	
1	2,738,662	4,000,000	1.46	0.92	2,512,534
2	2,738,662	4,400,000	1.61	0.84	2,305,077
3	2,738,662	4,840,000	1.77	0.77	2,114,749
4	2,738,662	5,324,000	1.94	0.71	1,940,137
5	2,738,662	5,856,400	2.14	0.65	1,779,942
6	2,738,662	6,442,040	2.35	0.60	1,632,975
7	2,738,662	7,086,244	2.59	0.55	1,498,142
8	2,738,662	7,794,868	2.85	0.50	1,374,442
9	2,738,662	8,574,355	3.13	0.46	1,260,956
10	2,738,662	9,431,791	3.44	0.42	1,156,840
11	2,738,662	10,374,970	3.79	0.39	1,061,321
12	2,738,662	11,412,467	4.17	0.36	973,689
13	2,738,662	12,553,714	4.58	0.33	893,293
14	2,738,662	13,809,085	5.04	0.30	819,535
15	2,738,662	15,189,993	5.55	0.27	751,867
16	2,738,662	16,708,993	6.10	0.25	689,786
17	2,738,662	18,379,892	6.71	0.23	632,831
18	2,738,662	20,217,881	7.38	0.21	580,579
19	2,738,662	22,239,669	8.12	0.19	532,641
20	2,738,662	24,463,636	8.93	0.18	488,662
					25,000,000

Municipal Improvements

Cost of Improvements	25,000,000
Amount to be Financed	25,000,000
Interest Rate	9%
Present Value Factor	9%
Present Value of Payments	25,000,000

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96