Comparison of Public and Private Water Utility Financial and Management Strategies

by

Priscilla P. Lee

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Signature of Author __ _____

Department of Civil and Environment Engineering
May 11, 2001

Certified by _____

John B. Miller
Associate Professor of Civil and Environmental Engineering
Thesis Supervisor

Accepted by _____

Oral Buyukozturk
Chairman, Department Committee on Graduate Studies

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Abstract

Recently, there has been a growing trend towards public-private partnerships and privatization in the water supply industry. However, the benefits of public-private partnerships and privatization are not clear. In order to better understand the consequences of the shift towards the private sector, one must recognize the different approaches used by each sector. This study compares the financial and management strategies of the public and private water utilities. The various strategies are presented through six case studies of public and private water utilities in the United States. Each study focuses on the capital investment program, financing sources, and management practices of each utility. A financial analysis of each utility is performed to support the case study. Eight financial ratios are used to evaluate the utilities' financial leverage, efficiency and liquidity. Finally, some general conclusions about the different approaches used by each sector are discussed.

Thesis Supervisor: John B. Miller
Title: Associate Professor of Civil and Environmental Engineering

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 Transition State of the Water Supply Industry

Recently, increasing demands have been placed on the water utility industry. Many water systems in the United States were constructed a century ago and are in need of infrastructure improvements. Water utilities are faced with the problems of water main deterioration and insufficient water storage capacity to meet the demands of the growing population. Water systems in good infrastructure condition are essential to providing the public with clean and reliable water supply. In addition to meeting these infrastructure needs, water suppliers also confront with increasingly stringent water quality regulations. The development of new technology has facilitated the identification of new chemicals and pathogens that can pose health threats to the public. This has led the government to impose stricter water quality requirements on water suppliers. Furthermore, the industry needs to raise sufficient capital to finance the escalating costs associated with infrastructure improvements and compliance with the stringent regulations.

The water supply industry is largely publicly owned and operated; eighty-six percent of community the water systems are publicly owned (EPA, 1997). Many municipalities have deferred infrastructure improvements for years to avoid financing the needed upgrades and rehabilitation through increasing rates. Elected officials under public pressure to minimize rates have tried to stabilize rates despite the growing financial need of aging water system infrastructure. However, the combination of decreased government funding and increased water quality demands from consumers have pushed municipalities to seek various approaches to finance infrastructure improvements and expansions.

Many publicly-owned utilities lack the financial resources and technical expertise to meet the infrastructure and regulatory demands. Some municipalities have turned to public-private partnerships and privatization for financial and operating assistance. Outsourcing has been used by municipalities to contract-out construction projects or the operation and maintenance of systems to private firms through public-private partnerships. A few municipalities have privatized by selling its assets and ownership to private entities which then have full control of

the utility. However, the consequences of such practices are controversial. Many people are resistant to the public-private partnerships and privatization because they believe it will lead to the reduction of staff and increase in rates.

Sound financial and management strategies are essential to a water utility's continual ability to provide clean, reliable water. Utilities need to apply the appropriate financing tools to meet infrastructure and operational needs. In addition, only utilities with good financial and management practices can face unexpected costs and regulatory requirements. While public-private partnerships have become a popular approach towards facing the challenges of the water industry, it is not apparent whether management through private firms is the solution to these problems. The effectiveness of applying the different financial and management strategies of public and private utilities is not clear.

Each sector may have its own effective funding and management strategies. Thus, both private and public utilities may be able to benefit from applying strategies used by the other sector. The entire water supply industry will drastically improve once utilities begin to recognize the various effective financial and management approaches available to them. The first step towards achieving this transparency is to identify and evaluate the different strategies of the public and private sector.

The purpose of this thesis is to compare the financial and management strategies of private and public water utilities through the use of case studies and financial ratios. A total of six water utilities from the public and private sectors are evaluated. This research will serve as a preliminary study of the different financial and management strategies used in the two sectors.

First, the challenges of infrastructure problems, stringent regulations, and decreasing government funding are addressed. Then, the trend towards public-private partnerships and privatization is discussed. This includes a description of the perceived benefits of such arrangements between the two sectors and the regulations regarding these arrangements. The methodology used in the case studies and the application of financial ratios is then presented. Next, the financial and management practices of the six utilities from the public and private sector are presented by the

case studies. Finally, the last section summarizes the findings and discusses the conclusions of the research.

1.1 Challenges Faced by the Water Supply Industry

Since the latter half of the 20th century, the water supply industry has been largely publicly-owned and operated. However, the combination of pressing infrastructure rehabilitation needs, tightening environmental regulations, and limiting government funds is reshaping the water supply industry. More and more municipalities are considering privatization and public-private partnerships to help finance the costs associated with infrastructure improvements and compliance with government regulations.

1.1.1 Aging Infrastructure

The infrastructure of most water distribution systems was constructed from fifty to a hundred years ago. As the state of water systems has a direct impact on the reliability and quality of our water supply, there has been a growing demand for the improvement of water system infrastructure. Four major components of water systems are in need of rehabilitation: transmission and distribution, treatment, storage and water source infrastructure. The improvement of each component is critical to providing safe water supply and leads to high rehabilitation costs. In 1999, the EPA conducted the *Drinking Water Infrastructure Needs Survey Second Report to Congress* which estimates the cost of these projects.

1.1.1.1 Transmission and Distribution

Transmission and distribution problems can greatly impact the delivery of safe drinking water. For instance, the frequent failure of distribution mains would reduce the reliability of water provision while the delivery of water through deteriorating mains would degrade water quality and pose health risks to consumers. To minimize these problems, projects are undertaken to replace aging and deteriorating mains, restore pipes showing signs of mineral deposit and debris accumulation, and install pumping stations. The cost associated with the improvement of transmission and distribution systems is the greatest out of the four categories. According to the EPA survey, $83.2 billion is needed over the next 20 years.

1.1.1.2 Treatment

The effectiveness of treatment facilities and technologies is important for maintaining high water quality. While contaminants that adversely affect the taste, odor and color of drinking water is considered, contaminants that pose acute and chronic health effects are of major concern. To ensure public health, improvements in water treatment facilities are needed. For instance, disinfection, filtration, corrosion control and aeration systems need to be installed or rehabilitated. The EPA survey estimates that $38.0 billion is needed in the next 20 years to rehabilitate water treatment facilities.

1.1.1.3 Storage

In terms of storage, sufficient capacity and structural integrity are essential to safe and reliable drinking water. A water supplier must have sufficient storage to provide clean water during periods of emergencies. Many states require a minimum amount of two-day supply of water storage in the case of emergencies. In addition, sufficient water storage is needed to maintain adequate pressure to prevent contaminant intrusion into the water distribution system. Storage tanks must also be cleaned and rehabilitated to ensure water quality. A total of $18.4 billion is the estimated need over the next 20 years to construct, maintain and rehabilitate water storage tanks (EPA, Feb 2001).

1.1.1.4 Source

Many water utilities also invest in projects aimed at protecting water sources. The construction and rehabilitation of surface water intake structures, raw water pump facilities, drilled wells, and spring collectors are needed to minimize contamination. Furthermore, the expansion of water intake structure capacities is needed to ensure sufficient water supply to maintain the minimum water pressures required to prevent contaminant intrusion. The survey estimate for such projects over the next 20 years is approximately $9.6 billion.

1.1.2 Regulatory Compliance

Federal regulations regarding drinking water have evolved over the century. The first regulation was established in 1914 when the U.S. Public Health Services set standards for controlling pathogens in only the drinking water supplied to interstate carriers, such as bus, ships and trains. Following this first set of standards, the Public Health Services amended them in 1925, 1946,

and 1962. Although the standards established by the Public Health Services were not federally mandated, all states implemented the standards in their state regulations or guidelines for public water systems. Then throughout the late 1960's and early 1970's, anthropogenic chemicals became a great concern as they contaminated water supplies and were suspected of causing various health problems. As study after study revealed problems with water distribution systems and chemical contamination of drinking water, the impetus for the federal government to set stricter water quality regulations increased. Consequently, among other environmental and health laws, the Safe Drinking Water Act of 1974 (SDWA) was enacted. This act and its subsequent amendments place the financial burden on water utilities to ensure clean and safe drinking water for the public, which is usually passed on to users through charges for water (EPA, Dec 1999).

1.1.2.1 Safe Drinking Water Act

SDWA and its amendments promulgated various requirements for the monitoring and analysis of regulated contaminants, documentation and the reporting of analytical results, disinfection, filtration as well as the public notification of violations. Water distributors are obligated to monitor and test their water supply for 76 contaminants, coliform bacteria, and water turbidity. The four basic rules regulating the responsibilities of water suppliers which will be described are the lead and copper rule, the total coliform rule, the surface water treatment rule, and the chemical rules. The following briefly summarizes the four basic rules outlined by the EPA publication entitled *25 Years of the Safe Drinking Water Act: History and Trends.*

The Lead and Copper Rule

As lead and copper can cause severe adverse health effects, the EPA has set action levels for both metals which when exceeded, additional prevention and removal steps must be taken by the water supplier. Water suppliers are required to evaluate the age and condition of their distribution mains as well as the type of housing which are served to determine the appropriate locations throughout the distribution system for collecting water samples. If the lead or copper concentration in 10% or more of the tap water samples exceeds the action level, corrosion control measures must be implemented. Furthermore, the source water of the system must also be assessed for the two metals. Additional water treatment is required if the source water is

found to be contaminated. After the implementation of corrosion control and water treatment measures, water systems that have persistent lead or copper contamination problem must replace the problematic distribution mains. Lastly, water suppliers are also obliged to educate consumers as to the ways in which they can minimize the intake of lead from drinking water (EPA, Dec 1999).

The Total Coliform Rule

Although coliforms bacteria are harmless to health, they are still regulated by the EPA because their presence is a possible indication of pathogens which can cause health problems. The EPA has set a maximum contaminant level goal (MCLG) of zero for total coliform. In terms of the maximum contaminant level (MCL), water suppliers can at most find coliform in 5% of their monthly water samples. If this is exceeded, water suppliers must report the violation as well as improve their distribution system by, for example, rehabilitating disinfection or filtration systems, cleaning or replacing distribution pipes, and protecting source water from contamination.

The Surface Water Treatment Rule

Under the Surface Water Treatment Rule, systems that use surface water as source water must disinfect their supply to minimize pathogens, such as Legionella bacteria and Giardia lamblia. Legionella if aerolized and inhaled can cause a form of pneumonia called Legionnaires' Disease while Giardia if ingested can cause diarrhea, cramps and nausea. The EPA sets the acceptable concentration of Legionella, Giardia, and viruses in drinking water at zero as there are no safe threshold exposure levels. Surface water systems are required to filter and disinfect to a minimum level of 99.9% combined removal and inactivation of both Giardia and viruses. As pathogens can enter a distribution system through cracks and joints of pipes, water systems are required to continuously disinfect water and maintain a certain disinfectant level throughout the distribution mains.

The Chemical Rules

The chemicals mandated by the EPA can pose severe long-term and acute health risks when ingested. For instance, exposure to certain chemicals over long periods of time through ingestion

of drinking water can lead to liver or kidney damage and may even lead to cancer. Children and infants are especially vulnerable to some of the chemicals in drinking water. Thus, water distributors are required to frequently monitor their water supplies to protect consumers. Systems using surface water need to monitor more often than those using groundwater as surface water sources are more susceptible to chemical contamination.

Estimated Compliance Cost

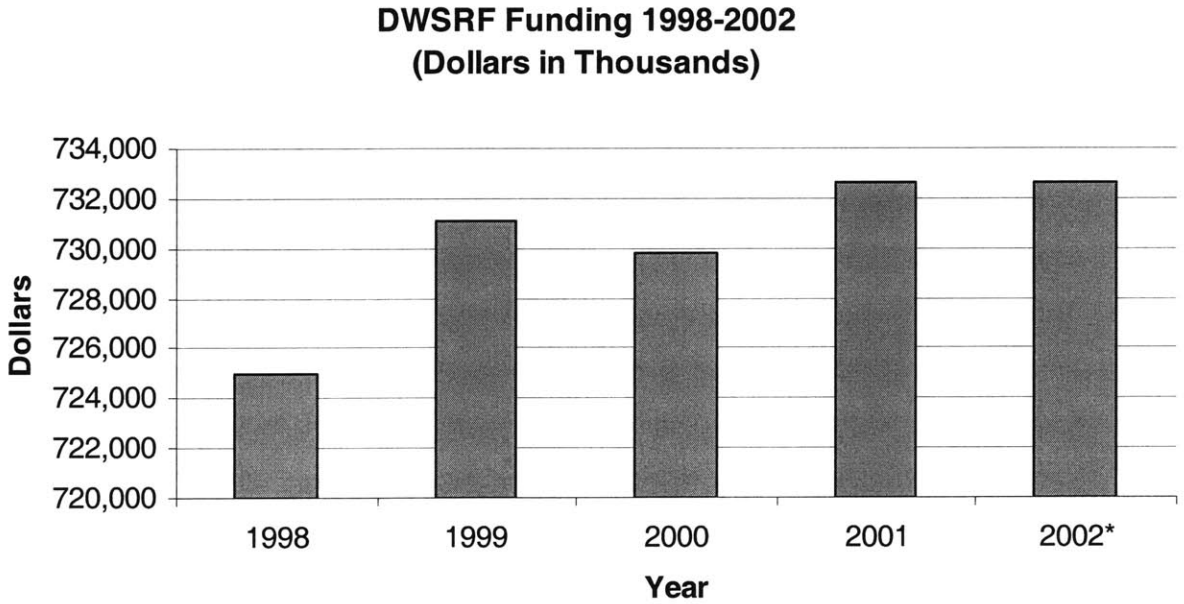
The EPA performed the 1999 Drinking Water Infrastructure Needs Survey to assess the approximate number of infrastructure projects needed in the next 20 years in the water supply industry and its associated costs. This survey only included infrastructure projects required to protect public health and the needs of water systems eligible to receive Drinking Water State Revolving Fund assistance. Based on this survey, the national need for compliance with existing, new, and proposed SDWA regulations is $31.2 billion over the next two decades. However, this approximate cost is likely to be an underestimate of the actual needs due the sample used (EPA, Feb 2001).

1.1.2.2 Limited Government Assistance

Government assistance for publicly-owned water and wastewater facilities has evolved over the years in that the facilities are now expected to be more financially independent. During the 1970's and early 1980's, many wastewater facilities received grants through the Construction Grants program to facilitate their infrastructure projects. However, beginning from the late 1980's, Congress began to encourage assistance recipients to seek for long-term financial resources other than government contributions. In the Clean Water Act Amendments of 1987, Congress enacted the Clean Water State Revolving Fund (CWSRF) to assist wastewater infrastructure projects through loans rather than grants. Rather than directly granting communities for infrastructure projects, CWSRF grants are made to states which in turn provide low-interest loans to selected projects. Reimbursements by the loan recipients are then contributed to the respective state's revolving fund to provide further assistance to other eligible infrastructure projects. In addition, each state is required to contribute a match equal to 20% of the federal grant to its own state revolving fund (EPA, Oct 2000).

The success of the CWSRF program led Congress to establish the Drinking Water State Revolving Fund (DWSRF) program in the 1996 SDWA Amendment. The purpose of the DWSRF program is to provide assistance to eligible drinking water infrastructure projects as well as state and local needs associated with the provision of safe drinking water. The DWSRF program is structured similarly to the CWSRF program in that low-interest loans rather than grants are provided and states are required to provide a match to the revolving fund.

The transfer of funds is allowed between the two SRF programs under certain restrictions. The 1996 SDWA Amendment authorizes the governor of each state to transfer up to 33% of either the CWSRF or DWSRF to the other fund. However, transfers between the two funds can only be made before the fiscal year 2002 and one year after the establishment of the state's DWSRF (EPA, Oct 2000).



*Proposed budget for DWSRF for year 2002 in 1998 dollars.
(Source: http://www.epa.gov/ocfo/budget/budget.htm)

Figure 1. DWSRF funding between 1998-2002.

Although the federal and state governments provide assistance to publicly-owned water suppliers, this financial aid is limited. The average amount contributed to the DWSRF between 1998 and 2001 is approximately $0.79 billion (1998 dollars) per year. Assuming this average is

maintained throughout the next 20 years, only approximately $15.7 billion of the $31.2 billion total SDWA compliance cost would be provided to public facilities by government assistance. This compliance cost does not even take into account the expenses of infrastructure improvements indirectly related to the SDWA. Despite the insufficiency, it is not apparent that the government has the intention of increasing the funding (Figure 1). It is also unlikely that the funding will increase in the next few years due to the Bush Administration's resistance towards environmental advancements, as seen through the administration's recent suspension of the rule to reduce arsenic in drinking water.

1.2 Approaching the Private Sector for Assistance

The combination of antiquated infrastructure, more stringent drinking water regulations and inadequate funding has led an escalating number of publicly-owned water suppliers to turn to the private sector for financial alternatives. The public sector can privatize or enter public-private partnerships to help finance infrastructure projects as there are numerous acclaimed advantages of the private sector over the public sector. Although some regulatory barriers and public perceptions have impeded the growth of privatization and public-private partnerships, recent changes in policies have helped accelerate this growth. The following sections will describe the different ways in which publicly-owned utilities can take advantage of the private sector, the perceived benefits, and the recent policy modifications.

1.2.1 Privatization and Public-Private Partnerships

The term "privatization" has a different meaning to various people. Throughout this document, the definition of privatization will be the selling of assets and transfer of control from a public to a private entity. In privatization, a public water utility agrees to sell all of its assets to a private entity that will have full control of the utility's operations and management. Privatization is differentiated from public-private partnerships which includes several arrangements between public and private entities.

One form of public-private partnerships is contract operations. Many municipalities have contracted out its services to private partners. To face its infrastructure problems, a municipality can enter into a turnkey agreement under which a private partner agrees to construct facilities

and bring them into operation. Some municipalities have been involved with full contract operations in which the private sector manages, operates and maintains the public utility's facilities during a specific period of time. In partial contract operations, the private sector agrees to operate and maintain only specific areas of the municipality's facility. For both full and partial contract operations, the private partner will receive a fixed fee or a fee based on the revenue generated by the operations.

Another type of public-private partnership involves disposition agreements. When a private entity invests in public utility, a privatization or disposition agreement is needed to "partially or totally dispose, encumber or transfer" the public utility's asset title or other interests (EPA, August 2000). Disposition agreements must be reviewed and approved by EPA. Typically, the private entity invests in the publicly owned utility through payment of non-operational revenues and recovers its investment and interest through service fees. Municipalities use this approach as another way of financing its operations.

Some public-private partnerships involve long-term leasing of facilities. A municipality can lease its water system to an investor-owned utility for a specified period of time. The private utility will then be responsible for operating and maintaining the municipal water system as well as managing operating costs, capital costs and capital improvements. All water service payments are received by the private-utility.

1.2.2 Perceived Advantages of Privatization and Public-Private Partnerships

Many municipalities have turned to privatization and public-private partnerships in hopes to achieve various improvements. It is believed that the private sector benefits municipalities by offering technical expertise, improving efficiency, enhancing management flexibility and providing access to financial sources. These perceived advantages of the private sector will be discussed in the following.

1.2.2.1 Greater Technical Expertise

In terms of designing and rehabilitating infrastructure, engineering departments of municipalities sometimes lack the technical experience of private firms. Design and construction projects arise relatively infrequently for municipalities while these projects are handled by consultants and

engineers of private firms all of the time. Thus, private firms are able to build up the technical experience needed to reduce the cost and improve the efficiency of such projects. In addition, private companies may be more knowledgeable of the advanced technology as well as have access to these technologies to help expedite construction projects. The use of effective technology can greatly reduce project costs.

1.2.2.2 Improved Efficiency

The private sector often concurrently manages and operates multiple utilities that can lead to improved efficiency. Not only does the private sector have the technical experience, but it also has the economies of scale from working on multiple projects to increase efficiency. For instance, much of the overhead expenses can be shared among the various projects. Private utilities are also stockholder and profit driven; therefore, they are positioned to improve efficiencies. Furthermore, contracted projects tend to be more defined in scope and less publicly involved so that they can be completed more quickly (Moore, 2000).

1.2.2.3 Increased Management Flexibility

Utility managers can be freed from bureaucratic constraints and have greater opportunity to make independent decisions when municipalities turn to the private sector. The public and government which may not clearly understand the needs of the utilities will no longer influence the managers to make conservative operational, financial and technological decisions. Increased productivity may result from greater management flexibility (AWWA, 1993).

1.2.2.4 Greater Access to Financial Sources

Many believe that the private sector can increase access to the capital market. As many private utilities have stronger credit ratings than small municipalities, they can secure financing more easily than their public partners. In addition, the perceived efficiency, technical expertise, and cost savings of private entities make them more attractive to investors.

1.2.3 Impediments to Privatization and Public-Private Partnerships

Despite the increase of municipalities pursuing privatization and public-private partnerships, there are a few barriers impeding this growth. For instance, only publicly-owned utilities are eligible for the DWSRF to aid infrastructure projects. Public entities entering into partnerships

with the private sector may sometimes have to relinquish their tax-exempt status. Furthermore, public perceptions have hindered the growth of privatization. Communities fear that a reduction in staff and an increase of rates will result as a public utility turns over to private hands even though personnel reductions do not necessary occur.

1.2.4 Recent Changes Accelerating Public-Private Partnerships

Recent changes in policies have lifted some of the impediments associated with public-private arrangements. For instance, Executive Order 12803 of 1992 encourages privatization by directing the granting of exceptions to disposition requirements. The 1997 IRS ruling extended the maximum time period of long-term contracts between public and private sectors from 5 years to 20 years while still allowing the public utilities to continue using tax-exempt debt. The extension offers great incentives for private entities since it provides more time to generate profits after the several years needed to regain the initial costs of contract operations.

2 Methodology

2.1 Sources of Information

The three sources of information used are annual reports, utility websites, and utility brochures. The utility websites and brochures provided information on company background, management practices, and capital investment programs. All financial data were compiled from the 1998 annual report of each utility.

2.2 Case Studies

Case studies on three public and three private water utilities are used in the investigation of the different financial and management strategies applied by the two sectors. Each study presents the background, capital investment programs (CIP), financing sources, management strategies, and general outlook of each water utility.

In the discussion of each utility's CIP, the focus is on the enhancement of system capacity and infrastructure, reliability in delivering safe water and service efficiency. The evaluation of financing sources includes the investigation of each utility's dependency on long-term debt, short-term debt, and equity to finance utility assets as well as the utility's variations on debt instruments. Please refer to Appendix D for the definitions of long-term debt, short-term debt, total equity and an explanation of the differences in terminology between the two sectors. The analysis of management strategies is an evaluation of each utility's financial policies towards servicing debt and financing operations as well as investment strategies. The general outlook summarizes the strengths and weaknesses of each utility and addresses significant issues presented by the financial ratios.

2.3 Financial Analysis

The application of financial ratios is used to support the "General Outlook" section of each case study. Eight financial ratios were chosen to evaluate the utilities' financial leverage, efficiency, management and liquidity (Table 1). Since the published utility information did not offer a

complete picture of how financial resources are managed, the eight financial ratios were applied to assist in the investigation of the financial and management strategies used by the utilities. Appendix A shows the equations used to calculate each ratio.

FINANCIAL RATIO	RATIO TYPE	SIGNIFICANCE	BENCHMARK VALUE
Debt Ratio	*Leverage*	Indicator of the extent to which assets are financed through borrowing.	0.48
Collection Period	*Efficiency*	Indicator of billing collection efficiency.	32.9
Total Operating Expense to Total Operating Revenue	*Efficiency*	Measure of ability to cover operational costs with operating revenue.	0.82
Operating Revenue to Total Assets	*Efficiency*	Indicator management efficiency in utilizing assets to generate revenue.	0.18
Non-Operating Expense to Total Expense	*Management*	Measure of expenses outside of operations.	0.13
Non-Operating Revenue to Total Revenue	*Management*	High ratio suggests over-reliance on non-recurring revenues	0.08
Total Equity to Total Assets	*Management*	Measures degree of reliance the public sector has on contributed capital. Measures degree of dependence on equity financing in private sector.	0.51
Current Ratio	*Liquidity*	Indicator of the extent to which current assets can meet the claims of short-term creditors.	2.7

Table 1. List of financial ratios used in financial analysis.

Benchmark values are used in the financial analysis as a measure of reasonable values for each ratio. The average value for each of the following financial ratios was calculated from the 1998 financial information of 25 water utilities from both the public and private sector: debt ratio, total operating expense to total operating revenue, operating revenue to total assets, non-operating expense to total expense, non-operating revenue to total revenue, and total equity to total assets. Appendix B lists the 25 utilities used in the calculation. Dun & Bradstreet industry norms are used as the benchmark values for the collection period and current ratio.

3 Case Studies of Financial and Management Strategies

3.1 Public Sector

3.1.1 Boston Water and Sewer Commission

Background

The Boston Water and Sewer Commission (BWSC) was created under the Boston Water and Sewer Reorganization Act of 1977, or the "Enabling Act", by the Massachusetts Legislature as a subdivision of the Commonwealth and separate from the City of Boston. The BWSC was promulgated to operate and maintain Boston's water distribution system, wastewater collection system, and stormwater drainage systems.

Capital Investment Programs

Under the Enabling Act and the Commission's General Revenue Bond Resolution, the BWSC must develop a 3-year CIP annually. The CIP has three basic areas of focus: water distribution system, sewer system, and support projects. Over the three-year period of 2000-2002, BWSC will spend a total of $166.1 million on CIP. About 28% will be spent on the water distribution system, 37% on the sewer system, and 35% on support projects.

Water Distribution System

The Water Distribution System program mainly involves the relining and relaying of water mains as well as the replacement of defective hydrants and old water mains. The greater bulk of the cost will be concentrated on the relaying and relining of pipes. The Water Distribution Study performed in 1987 evaluated the infrastructure needs of the 100 year-old system and recommended the BWSC to embark on relaying and relining projects through the year 2010. Thus, the BWSC has committed itself to annually relay or reline about 12 miles of mains until the year 2010. This program should strengthen BWSC's ability to provide reliable water supply.

Sewer System

The Sewer System program includes various projects. For instance, deteriorated and collapsed sewer and storm drains will be repaired. In addition, work has been done to separate combined

sewers and to reduce infiltration and inflow (I/I) into the sanitary system. The reduction of I/I will not only increase the transport capacity of the system, but will also decrease transportation and wastewater treatment cost.

Support Projects

In its effort to improve overall efficiency, the BWSC has committed itself to a number of support projects. The BWSC has begun the construction of a new headquarters facility to consolidate its different departments into one location. It also has invested in a metering and leak detection program to reduce the amount of unaccounted-for water. The implementation of a Geographical Information System is underway while the Management Information System, which includes the Customer Information/ Billing System, has recently been enhanced.

Financing Sources

Through the evaluation of the BWSC's financing strategy, it can be concluded that the Commission relies mostly on long-term debt to finance its operations and CIP. The percentage of total financing from long-term debt, total equity and short-term debt is 81.4%, 15.3%, and 3.3% respectively.

The BWSC uses two types of long-term debt: General Revenue Bonds and loans. The Commission has issued General Revenue Bonds with a wide range of maturity dates extending to year 2028. Fixed rate bonds are primarily used. As of December 31, 1998, the Commission's total General Revenue Bonds is about $350 million.

The BWSC has entered loan agreementS with the Commonwealth of Massachusetts and the Massachusetts Water and Resources Authority (MWRA). The Commonwealth of Massachusetts established the Massachusetts Water Pollution Abatement Trust (MWPAT) to administer the SRF. The low-interest loans from the trust are used to fund water pollution abatement projects. The long-term portion of the loans is about $27 million as of the end of 1998.

The MWRA has established two assistance programs from which the BWSC can receive interest-free loans. The Authority's Infiltration/Inflow Local Financial Assistance Program has

provided interest-free loans, in combination with grants, to the Commission for Infiltration and Inflow reduction projects. A grant is provided to fund 25% of the total cost of an eligible project while a five-year zero interest loan is provided to fund the remaining cost. Similarly, the Authority's Local Water Infrastructure Rehabilitation Assistance Program provides the same types of grant and loan for water pipeline rehabilitation projects. The BWSC's long-term portion of loans from the Authority's programs is about $8.6 million as of the end of 1998.

Management Strategies

A three-member Board of Commissioners regulates BWSC's rates as mandated by the Enabling Act. The regulated water and sewer rates are based on the funds BWSC needs to support operations, debt service, and reserve contributions. However, there is no legally adopted budget by which the BWSC must follow.

Under the Act, the BWSC is also required to use any excess revenue towards offsetting water and sewer rates for the next year or to contribute it to the City of Boston. The water and sewer rates have been stable for the past six years partially due to this use of net surplus to offset rates.

The BWSC has used internally generated capital from the Commission's Revenue and Stabilization Funds, and issued General Revenue Bonds to reduce or refinance its debt. In 1998, through the issuance of General Revenue Bonds, 1998 Series C, the Commission refunded in advance a part of its General Revenue Bonds, 1991 Series A. Then the proceeds from the newly issued bonds were used in conjunction with BWSC funds to reinvest in government securities that will in turn be used to pay the principal and interest on the advanced refunded bonds. The BWSC also reduced $6.4 million per year over the subsequent 10 years of debt service payment through the use of funds from the Commission's Revenue and Stabilization Funds. Under the Commission's Bond Resolution, this fund was established to mitigate the impact of unexpected costs. The BWSC is required to contribute to the fund a minimum amount equal to 4% of the total outstanding variable rate bond principal. During this same year, the BWSC issued $12,960,000 of General Revenue Bonds, 1998 Series A, and used some of its available funds to refund $13,165,000 of General Revenue Bonds, 1986 Series A.

Tax lien programs have been established to guarantee the Commission in receiving its bills. The Commission under an agreement with the City can collect water and sewer bills unpaid for more than two years from the City's property tax bills. However, the City charges the Commission an administrative fee for the collection of these water and sewer bills. The Commission established its own tax lien program in 1995 that transfers accounts unpaid for over two years to this program for collection. However, the outstanding balance of the Commission's tax lien program was about $3.4 million dollars as of the end of 1998. This can potentially result in bad debt owed to the Commission by its customers.

In order to minimize the financial risks assumed by BWSC, the Commission's General Revenue Bond Resolution has set restrictions on the type of deposits and investments the BWSC can own. For instance, the BWSC can only place demand deposits and term deposits with financial entities fulfilling certain requirements unless collateralized. In addition, only certificates of deposit fully collateralized and issued by FDIC insured banks can be held. The basic types of investment that can be held are the following: securities issued by or guaranteed by the U.S. Government or its Agencies, obligations of public agencies, municipalities, or states with the highest bond rating, commercial paper rated A-1, P-1, A-rated money market funds, stocks, corporate bonds, and fully collateralized investment instruments. The income from these investments constitutes the total non-operating revenue of the BWSC. The revenue gained from these investments is restricted to fund certain liabilities, capital projects or other operation costs.

General Outlook

The BWSC appears to have good prospects. The mandate requiring an annual development of a 3-year CIP has instituted a strong program that provides the Commission with good disposition to face not only current but also future stringent water quality regulations. Its collection period of 42.8 days does not deviate drastically from the Dun & Bradstreet industry norm of 32.9 days; this indicates reasonable billing efficiency. The investment in upgrading its management information system and billing system should further improve the billing efficiency. Furthermore, its operating revenue to total assets ratio is close to the benchmark value of 0.18.

In addition, the Commission does not seem to over rely on contributed capital for financing operations. Less than 15% of its total assets is financed by equity; all of BWSC's equity is contributed capital.

The Commission finances its assets mostly through debt; its debt ratio is 0.85. It is currently undergoing rigorous infrastructure improvements financed mostly through borrowing. Although the Commission has raised a large debt, it should be able to refund it in a timely manner. The bonds it issues have variations in amortization schedules making the debt service payments more time favorable. Also, its S&P bond rating is A+, stable. Lastly, the establishment of the Commission's Revenue and Stabilization Funds is a good means of providing a portion of the debt service payment.

The Commission appears to have a sound management of its expenses. The non-operating expense to total operating expense is close to the benchmark value. Its operating expense to operating revenue is also relatively close to the benchmark value which indicates the ability of the Commission to cover operating expense through operating revenue.

The current ratio for 1998 of 6.2 was quite high compared to the Dun & Bradstreet industry norm of 2.7. The Commission's current asset in 1998 primarily consisted of bond proceeds receivable, or about $130 million out of a total of $160 million in total current assets. This represents proceeds received in January 1999 from the General Revenue bonds issued in December of 1998. Once these proceeds were received, they were used to fund capital improvement projects. Therefore, the high current ratio in 1998 does not reflect the Commission's inefficient use of its current assets.

3.1.2 Seattle Public Utilities

Background

Seattle Public Utilities (SPU) was established to assume the water supply, solid waste, drainage, wastewater and engineering services traditionally undertaken by separate departments. It provides water to retail and wholesale customers. Its retail customers comprise of approximately

600,000 customers in the City of Seattle, City of Shoreline, and some areas of Lake Forest Park and King County. SPU is a wholesale provider for municipalities.

Capital Investment Program

SPU focuses on five main areas in its CIP: water quality enhancements, infrastructure rehabilitation, water supply, projects assumed on behalf of other agencies, and development of new projects for future implementation. The total budget allocated to the CIP for 1998-2003 was $571 million.

SPU has been involved with various projects. One project is the construction of a new ozonation and filtration facility to treat the water supply from the South Fork Tolt River source. The implementation of the new facility should enhance system reliability and water quality.

Another project is the rehabilitation of the mains distributing the Tolt River water source. The rehabilitation of the 30-year old mains will increase system capacity and reliability.

The utility has also invested in the development of an ozone treatment facility to treat the water supply from the Cedar River source. SPU's exceedence of the fecal coliform limit in 1992 led the utility to perform water quality studies and implement the ozone treatment facility. The application of ozone treatment will help SPU comply with current as well as anticipated water quality regulations.

SPU's open distribution reservoirs are under rehabilitation. SPU will replace or rehabilitate and cover the utility's nine reservoirs over the next two decades. In addition, hypochlorite treatment of the reservoir water supplies will be enhanced.

A watershed management program has been implemented to protect the quality of the source water from the Cedar River Watershed through habitat protection. This program focuses on fisheries enhancement, the protection of stream banks, and watershed restoration.

Financing Sources

SPU relies mostly on long-term debt and equity for financing. The percentages of total assets financed through long-term debt, equity, and short-term debt are 59%, 36%, and 5%, respectively.

The utility's long-term debt consists of Water System Revenue Bonds and loans. The maturity dates of the bonds extend to year 2025. The total amount of bonds issued in 1998 was $80 million.

SPU has borrowed loans from the Public Works Trust Loan Program established by the Washington State Department of Community Development. As of the end of 1998, the amount owed was about $1.8 million.

Management Strategies

The water rates have been increased for the years 2000, 2001, and 2002 to fund the costs of infrastructure rehabilitation and improvements. SPU's rates need to be authorized by the City Council of Seattle.

SPU has turned to the private sector for assistance in various projects through the use of a design-build-operate (DBO) procurement approach. For instance, this approach was used for constructing the Tolt Treatment Facility. The success of the DBO approach to building the Tolt Treatment Facility prompted SPU to also use this approach for the construction of the Cedar River Treatment Facilities.

One advantage to using this approach is the result in cost savings. SPU estimated the cost savings of using the DBO procurement process to build the Tolt Treatment Facility to be about $70 million.

In addition, SPU can use the technological expertise of the private sector to implement advanced technology in its facilities. The Azurix CDM consortium implemented leading edge technology such as ozonation and high rate filtration to the Tolt Treatment Facility.

Furthermore, the procurement allows SPU to shift the risks associated with the construction and operation of new facilities to its private partner. The private partner is responsible for completing the construction and beginning the operation of the facilities in a timely manner with the fixed amount of capital paid by SPU. Any unexpected costs or problems will be resolved by the private entity rather than by SPU.

The DBO approach also allows SPU to avoid the variability in operational costs. SPU pays its private partner a fixed amount to operate the facilities for the duration of time specified under the contract. Consequently, the increase in certainty of future expenses can help SPU better manage its financial resources.

General Outlook

SPU seems to have a stable outlook. Its CIP invests in infrastructure rehabilitation and system capacity enhancements, but does not focus on technological improvements. It takes advantage of the private sector's experience and expertise to integrate advanced technology into facilities constructed through public-private partnerships. The water quality problems with fecal coliform were resolved through the implementation of new treatment methods introduced by the private sector.

The utility seems to be reasonably financing and managing its operations. Its low non-operating revenue to total revenue indicates that most of the revenue is generated by utility operations. In addition, its total operating expense to total operating revenue is relatively low. However, its non-operating expense to total expense of 0.28 exceeds the benchmark value; SPU has more interest expense than the average utility.

SPU appears to have reasonable efficiency. Its collection period is slightly greater than Dun & Bradstreet's industry average while its operating revenue to total assets ratio is close to 0.18.

The utility's current engagement in DBO contracts seems to yield promising results in cost savings and system enhancement. If the DBO partnerships prove to be successful, SPU will be able to further strengthen its ability to provide clean and reliable water.

3.1.3 The New York City Water and Sewer System

Background

The New York City Municipal Water Finance Authority Act of 1984 passed by the New York State Legislature established 3 entities for managing the operations and finance of the New York City Water and Sewer System (the "System"). The New York City Department of Environmental Protection ("DEP") operates the water and sewer system. The New York City Municipal Water Finance Authority (the "Authority") is responsible for providing financial resources through the use of bonds and other methods for improvements of the System. It is also authorized to refund the City's bonds used to finance water and sewer projects. The New York City Water Board (the "Board") is authorized to financially manage the System. It is authorized to set the rates and to allocate the revenue for fulfilling debt service, operation and maintenance expenses, and rental fees for the operating system which is leased from the City.

Capital Investment Program

The System's CIP 2000-2009 is aimed at maintaining and improving the infrastructure of the water and sewer facilities. The CIP is divided into 5 categories: water supply and transmission, water distribution, water pollution control, sewers, and equipment. Figure 2 illustrates the allocation of the CIP budget for this ten-year period.

Water Supply and Transmission

The goal of the water supply and transmission projects is to improve the capacity and infrastructure of the System. This includes the rehabilitation of the two existing tunnels that provide water distribution to the City. The construction of a third tunnel is underway to increase the System's transmission capacity. The inspection and rehabilitation of the existing tunnels

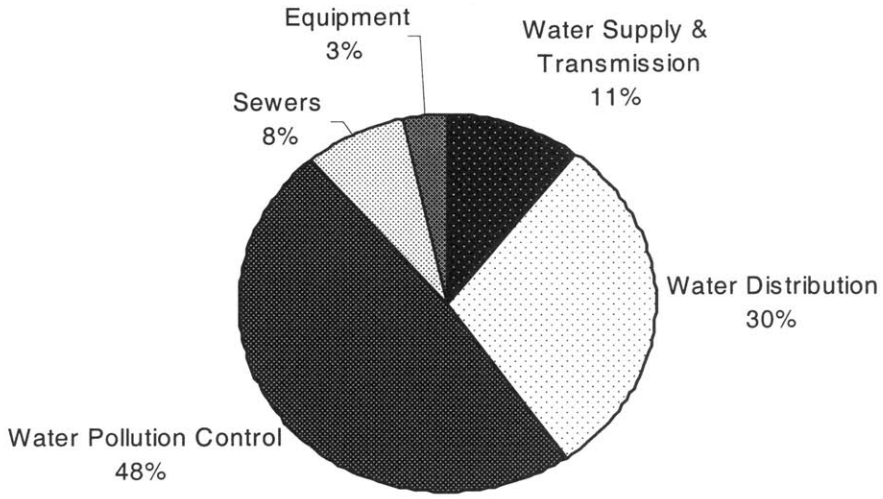


Figure 2. New York City Municipal Water Finance Authority's CIP budget allocation.

cannot be performed until the completion of the third tunnel which is expected to be ready for operations by 2008.

Water Distribution

The DEP has committed to ensure a high quality water supply for the residents of New York City. It has invested in a full-scale filtration plant for treating water from the Croton watershed. After the completion of reconstructing seven plants in the Croton watershed area, the water pollution control plant in the watershed will now also be reconstructed to comply with the proposed watershed regulations. Another step taken to protect the quality of the water supply is the purchase of susceptible watershed areas.

Water Pollution Control

The two goals of the water pollution control program are to reduce Combined Sewer Overflow (CSO) pollution and to develop efficient methods of disposing sludge. For instance, the DEP has invested in research to develop alternatives to the construction of retention tanks to abate CSO's. It has also allocated funds to design and construct docking facilities to transport de-watered sludge.

Sewers

The DEP has been rehabilitating sewers and increasing sewer capacity. Funding has been allocated to replace deteriorated or collapsed sewers and expand the sewer system to areas that are underserved or not currently served.

Equipment

Several projects have been implemented by the DEP in this category. For instance, new water meters have been installed and existing ones replaced to promote water conservation and enhance efficiency. Other projects include the implementation of management information systems, and utility relocation.

Financing Sources

The Authority finances the operations and CIP mostly through long-term debt and contributed capital. From the 1998 financial data, it was determined that the Authority finances 56%, 37%, and 8% of its operations through long-term debt, equity, and short-term debt, respectively.

The Authority's long-term debt consists of various revenue bonds. The different types of bonds issued include: Serial Bonds, Term Bonds, Adjustable Rate Term Bonds, Inverse Rate Bonds, Capital Appreciation Bonds, and Adjustable, Auction and Leveraged Reverse Rate Bonds. The maturity dates of the bonds vary widely and extend to year 2030. In addition, the Authority has issued in conjunction with the New York State Environmental Facilities Corporation (EFC) some Clean and Drinking Water Revolving Fund bonds. The total long-term debt as of June 30, 1998 was about $8.2 million.

Management Strategies

The Authority has used user payments and issued General Revenue Bonds to reduce or refinance its debt. The issuance of new refunding bonds in conjunction with the sale of EFC bonds is sometimes used by the Authority to refund outstanding higher interest bonds. This allows the Authority to achieve savings through the mixing of high interest rate bonds with low-yield EFC bonds. Proceeds from newly issued bonds have also been used to invest in U.S. Government

Securities. The earnings from the securities were then used to finance defeased debt until maturity.

Several reserve funds held by the Board and Authority have been established to meet specific obligations. The operation and maintenance reserve fund is required by the General Bond Resolution to retain one-sixth of the amount of operating expenses allocated in the annual budget from the Board's cash receipts. The operation and maintenance reserve general account holds excess funds of the Board and can be used to finance debt service and capital expenditures. The Authority holds the revenue fund which uses cash transfers from the Water Board to finance the debt service, Authority expense, debt service reserve and arbitrage funds. The debt service reserve fund is supported by revenue bond proceeds and the revenue fund and was established to maintain an amount sufficient to pay the maximum annual debt service obligation for the current or any future fiscal year. The arbitrage rebate fund financed by the revenue fund was established to provide arbitrage rebate payments to the U.S. Department of Treasury.

Both the Authority and the Commission make a variety of investments: U.S. Treasury securities, federal agency issues, commercial paper, and repurchase agreements. The Authority's Investment Guidelines restricts the types of investment which the Authority can hold to minimize the Authority's investment risks. For instance, the Authority can invest in bonds or other obligations that are either direct obligations of or guaranteed by the United States. It can also invest in direct obligations of any public authority rated in the two highest rating categories by a Rating Agency. The Board uses the City Comptroller's investment group to make investments under restrictions established by the General Bond Resolution. The income from these investments is the total non-operating revenue.

General Outlook

Overall, the New York City Municipal Water Finance Authority's outlook is stable. Its investment in various infrastructure projects should ensure its continual ability to provide clean and reliable water to the consumers of New York City. The purchase of susceptible watershed areas is an important step towards strengthening this ability.

The collection period of 93.8 days is significantly above the Dun & Bradstreet industry norm of 32.9 days which indicates inefficiency in billing collection. As one can see from the CIP budget allocation, the program does not seem to focus much attention on improving its management information system or billing system. The lack of efficient management technology can be a major factor contributing to this problem. The utility needs to evaluate its own management practices to determine the various causes of this inefficiency.

As indicated by its debt ratio, 63% of the total assets is financed through debt. The debt has been raised to finance the DEP's capital investment program. The variation of bonds issued to finance its debt service, CIP, and operations is favorable towards enhancing the marketability of its debt issues. In addition, its S&P rating is A minus positive, stable. Lastly, sufficient reserve funds have been established to ensure the fulfillment of at least a portion of its debt obligations and expenses. Thus, the Authority should not have problems refunding the debt.

The current ratio of 1.89 is lower than the Dun & Bradstreet industry norm of 2.7. Over 60% of the total current assets is accounts receivable which has accumulated from 1997. Although the slightly lower current ratio by itself may not indicate a liquidity problem, the combination of a relatively low current ratio with a high collection period does suggests that the Authority may have problems satisfying short-term debts. More financial data from various years are needed to clarify this finding.

3.2 Private Sector

3.2.1 San Jose Water Company

Background

San Jose Water Company (SJWC) is the main subsidiary of SJW Corporation. It supplies water to about one million people in the San Jose, Cupertino, and other cities in Santa Clara County. In 1985, SJW Corporation was established through an agreement of merger with San Jose Water Company. The SJW Corporation also owns SJW Land Company, a real estate development company.

Capital Investment Program

SJWC invests in projects to improve system infrastructure, water quality, and equipment. The costs of the investments were not clear from the company's annual report. However, it appears from examining the general capital expenditure budget that the main focus is on rehabilitating infrastructure.

Infrastructure

The company's distribution system infrastructure dates back to 40 years ago and many of its components are in need of rehabilitation. SJWC has been vigorously involved with its infrastructure rehabilitation projects to ensure continual ability to provide clean and reliable water supply. In 1999, about 12 miles of its mains have been replaced and more than seven miles of new mains were installed. Projects have also been launched to improve raw water intake structures and enhance parts of the Montevina Water Treatment Plant. These projects will help SJWC comply with future regulations.

Water Quality

SJWC has initiated the water flavor profile project to help improve the aesthetic quality of the drinking water. The company in conjunction with the Santa Clara Valley Water District is performing a Flavor Profile Analyses on its water supply to characterize the aroma and flavor. The results of the July 2000 flavor profile report indicated that all the treated water has some chlorinous taste and odor while water from the San Luis source has some swampy and marshy aroma. However, these tastes and aromas do not affect the safety of the drinking water.

To improve the taste, odor, and quality of its water supply, SJWC has invested in a main flushing program. This includes the removal of accumulated sediments from valves, hydrants, and mains. The program began in 1996 with the goal of completely flushing the whole system in five to ten years. At the end of 1997, 31% of the entire system was cleaned and the completion of cleaning the whole system is now expected to take a total of seven years. The flushing program and the introduction of a new groundwater disinfection system has improved the aesthetic quality of the drinking water.

The company also launched the Crystal Choice Water Service to provide interested customers with a home water management program for an additional fee. SJWC has entered a joint venture with Kinetico Incorporated, a manufacturer of water treatment products, to provide customers a chlorine removal, water softener and reverse osmosis drinking water system which can be installed in homes to improve the aesthetic quality of the water supply.

Equipment

The company's Customer Information System was upgraded in 1999 to improve management efficiency. The upgraded system enhanced record-keeping capabilities to expedite customer service representatives' responses to customer requests.

A Supervisory Control And Data Acquisition (SCADA) system was purchased in 1999 to improve efficiency in monitoring and controlling the distribution system pumping equipment and instrumentation. The implementation of SCADA has helped expedite the replacement of obsolete remote telemetry units (RTUs). Furthermore, this system includes an energy management software which helps increase energy conservation.

Other improvements have also been implemented to assist operations. For instance, a computer-assisted design and drafting (CADD) system has been integrated to allow mapping, engineering, and surveying data be managed electronically. A mobile computing pilot project was established to allow field personnel to remotely retrieve data from the Geographical Information and SCADA system. Efforts have also been made to improve leak detection methods and reduce unaccounted for water.

Financing Sources

The analysis of SJWC's financing sources shows the company relies mostly on long-term debt and retained earnings. The 1998 percentages of total financing from long-term debt, equity, and short-term debt are 46%, 50%, and 4%, respectively.

The company's long-term debt consists of unsecured senior notes. The senior notes issued have maturity dates extending to year 2028. Prior to 1997, first mortgage bonds were issued as well

but these were redeemed at maturity. The total long-term debt as of the end of 1998 was $90 million. The company intends to finance its future long-term debt with only senior notes.

SJWC's unsecured bank line of credit consists of short-term bank loan bearing a variable interest rate. This is used to partly fund working capital requirements. The company had $20 million of unused line of credit as of the end of 1998.

Management Strategies

SJWC's rates are controlled by the California Public Utilities Commission (CPUC). In 1999, SJW was authorized by the CPUC a $3.3 million rate increase to adjust for the increases in purchased water and pump tax costs.

SJW Corporation has investments in California Water Service Group and real estate. Its investment in California Water Service Group was expected to produce 2000 pre-tax dividend income and cash flow of about $1.2 million in total. The SJW Land Company owns property, some of which is adjacent to SJWC's general office facilities. It has leased some of the property to SJWC as office space under a 10-year contract.

One of SJWC's growth strategies is the expansion of services through public-private partnerships. SJWC entered into a 25-year lease agreement with the City of Cupertino in 1997. Under the agreement, SJWC will operate the City's water system and manage its maintenance, operating and capital costs. Entrance into public-private partnerships expands the company's business scope.

SJWC also seeks to increase growth through mergers and acquisitions. SJW Corporation was established through a merger agreement with SJWC in 1995. Furthermore, it proposed to enter into a merger with American Water Works Company, Inc. in 1999. However, the agreement was terminated in 2000 as a result of a delay in obtaining regulatory approval. American Water Works, the largest investor-owned utility in the U.S. which provides water utility service in 23 states, would have been able to provide SJWC the capital and geographic diversity to increase growth.

General Outlook

SJWC appears to have favorable prospects. It has a good CIP which focuses on infrastructure, water quality and technology. SJWC does not only care about supplying clean water, but it also aims to improve the aesthetic quality of the drinking water which is of great concern to customers. In addition, it invests in advanced technology that can help improve the efficiency of system rehabilitation and management. Its relatively low collection period of less than 20 days is a good indicator of this management efficiency.

The company's operations seem to be financed and managed well. Both its non-operating revenue to total revenue and non-operating expense to total expense ratios are relatively low while the total operating expense to total operating revenue is close to the benchmark value. Almost all of the revenues generated by the company are from utility operations. The low non-operating expense to total expense ratio is probably due to the practice of using a good mix of debt and equity to finance operations. SJWC finances half of its assets through debt and half through equity. Furthermore, its operating revenue to total assets ratio of 0.29 is well above the calculated average.

3.2.2 E'Town Corporation

E'town Corporation (E'town) is the parent company of Elizabethtown Water Company, Edison Water Company, Liberty Water Company, E'town Properties, Applied Water Management, Inc. (AWM), and Applied Wastewater Management, Inc. (AWWM). Elizabethtown Water Company is E'town's main subsidiary which provides water service to half a million people in New Jersey and wholesale water supply to municipal systems as well as private utilities. E'town provides contract operations through its two subsidiaries Edison Water Company and Liberty Water Company. AWM and AWWM design, build, operate and owns over 60 water and wastewater facilities.

Capital Investment Program

E'town focuses on both infrastructure and technological improvements. The company's budget allocation for these two types of projects is not clear from the company's published information.

The company's subsidiary Elizabethtown has a three-year capital investment program. The 1998 budget allocation was $50.6 million for projects such as hydrant and main extensions and $56.9 million for transmission system upgrades. Elizabethtown completed the construction of a new water treatment plant in 1998.

Liberty engages in hydrant flushing annually. This process is used to remove rust and sediment from the mains. The annual hydrant flushing program is an example of the company's commitment to maintain its water systems.

The company has implemented various technologies to improve efficiencies in its management and operations. It has applied technology developed by SAP, a global leader in resource planning software. In 1998, E'town implemented financial accounting, controlling, and asset management systems as well as materials management applications. E'town has even earned an award from the Computer World Smithsonian Awards Program for innovatively applying such technology to its business.

AWM and AWWM have expertise in developing engineering systems. Community On-site Wastewater/Water Systems (COWS) are "small, decentralized wastewater and water systems that serve small developments and existing community centers" (E'town, 1998). Although COWS are separate systems, they can be consolidated into a large utility for management. It allows the company to provide water and wastewater services to many small communities while maintaining management efficiency.

Financing Sources

E'town finances its assets mostly through the use of long-term debt and equity. The percentage of total asset financed by long-term debt, equity, and short-term debt are 52%, 35%, and 13%, respectively.

The company's long-term debt consists of debentures, senior notes, obligations of contract with the city of Elizabeth, loans, and notes payable. The long-term debt is mostly debentures which

have maturity dates extending to year 2028. The company's 1998 long-term from these obligations is about $270 million.

The company is financed through two types of loans. One loan is from the New Jersey Environmental Infrastructure Trust and the other from the State of New Jersey. The total debt from loans is $13.2 million. The effective interest rate of the two loans is about 2.60%.

Its short-term debt consists of uncommitted lines of credit with several banks. As of the end of 1998, the company's short-term debt is about $44 million. The 1998 weighted average interest rate is 6.0%.

Management Strategies

The company strategy is to expand and develop a strong foundation in New England. The acquisition of companies with expertise in various areas is part of this strategy. Edison and Liberty enter into contract operations with many municipalities. For instance, Liberty is under a 40-year contract with Elizabeth, New Jersey to operate the city's water system. AWM and AWWM specialize in the designing, constructing, and operating of decentralized water and wastewater systems. They are also experts in developing innovative engineering solutions. These acquisitions have helped E'town increase its customer base and financial resources.

In October of year 2000, Thames Water, the third largest global water service provider, acquired E'town through a merger agreement. E'town can take advantage of Thames Water's expertise and financial resources to strengthen the company's position in the U.S. water market.

E'town has decided to gradually end its real estate business to increase earnings per share. The sales of the real estate under contract in Green Brook, New Jersey yielded a gain of $0.25 per share. The proceeds from the real estate sales will be used to finance its water and wastewater services.

Elizabethtown and AWWM have an "Allowance for Funds Used During Construction" (AFUDC). Under AFUDC, funds used during construction can be recovered through rates after

the completion of the construction. AFUDC is used by regulators to compensate utilities that engage in the construction of new facilities.

E'town does not have any reserve funds set up to help refund its debt. Debt is sometimes refinanced by the issuance of new debentures or refunded through user payments.

General Outlook

E'town appears to have an overall stable outlook. It not only invests in infrastructure enhancements but also has set up programs to regularly maintain its system. For instance, Liberty's annual flushing program ensures the provision of high quality water. The implementation of advanced technology also seems to be the company's focus.

The company seems to have sound management practices. Almost all of the revenues generated are from operations and operating expenses are sufficiently covered by the operating revenue. In addition, the operating revenue to total assets ratio of 0.19 suggests adequate use of assets to generate revenue.

The financial ratios indicate two areas of potential problems: billing efficiency and liquidity. The company's collection period is close to twice as long as the industry norm collection period. In addition, the current ratio of 0.56 is much lower than the 2.7 industry norm.

The company's structure is favorable for growth and expansion. Its subsidiary Elizabethtown focuses on providing retail and wholesale water services while other subsidiaries have expertise in contract operations and technology. This structure allows the company to establish a strong foundation in each specialty area which helps position the company for rapid growth in the water market.

3.2.3 United Water

Background

United Water is the second largest investor-owned water services company in the United States. It provides water and wastewater services to more than 400 communities in 19 states. This includes operations of more than 30 regulated water and wastewater utilities in 13 states. In addition, the company and its United Water Services affiliate manage water and wastewater systems under private contracts. United Water Services is a joint venture between United Water and Suez Lyonnaise des Eaux which provides contract operations and maintenance services for municipal water and wastewater systems.

Over the years, United Water has won many major contracts. For instance, the company won the nation's largest public-private partnership agreement in 1998 to provide Atlanta various water services. Under the 20-year term contract, United Water manages the city's water-treatment facilities, zone-transfer pumping stations, storage tanks, distribution system, billing, collection and customer service.

Capital Investment Program

United Water has invested in infrastructure improvements as well as various technological research and development. The total cost of capital expenditure in 1999 was $88.6 million. The specific budget allocation towards these projects was not described in the annual report.

Capital expenditures are generally used for upgrading and expanding the water and wastewater facilities of the company's subsidiaries. The company focuses on infrastructure improvements to comply with regulations and to satisfy growth requirements through the increase of system capacity. The capital expenditure associated with regulatory compliance is expected to be about 11% of the total projected capital expenditures over the years of 2000-2004.

United Water also invests in innovative water treatment technologies. For instance, ozone treatment is used as the water purification process and ultraviolet disinfection is used instead of chlorination for bacteria removal. In 1999, the company set up a water treatment facility that uses advanced membrane ultrafiltration technology to improve water quality. In addition, the

company has invested in Virtual Plant, a computer modeling application used to simulate the entire water treatment cycle. It allows designers to analyze the effects of water flow changes on the water treatment process through plant operation simulations. The Virtual Plant will enhance the efficiency of the applied treatment process and plant rehabilitation.

The company has invested in various management systems. In 1998, a new integrated financial management system was implemented to increase efficiency and cost savings. An activity-based costing system was launched to analyze and control costs while a new customer information system was implemented to improve management efficiency.

Financing Sources

The evaluation of the company's financial sources shows a reliance on mostly long-term debt and contributed capital. United Water's financial sources consist of the following: 52% long-term debt, 39% equity and 9% short-term debt.

Long-term debt includes first mortgage bonds, unsecured promissory notes, mortgage notes, Water Facilities Revenue Bonds and General Revenue Bonds. The Water Facilities Revenue Bonds are issued through the New Jersey Economic Development Authority. The total long-term debt as of the end of 1998 was about $653 million.

Short-term debt includes $93 million of used bank lines of credit that bear variable interest rates. The weighted average interest rate of 1998 was 5.5%.

Management Strategy

The rates of the company's subsidiaries are regulated by the public utility commission of the state in which the subsidiaries operate. Costs associated with construction projects are recorded as an AFUDC and will be recovered after construction completion.

United Water seeks to strengthen its growth through utility acquisitions. The company service population grew significantly during the 1990's through the acquisition of over 20 water-related businesses. The service population in the U.S. grew from about 1.5 million to 7.5 million from 1990 to 1999. The acquisition of GWC Corporation in 1994 doubled the size of United Water

through the addition of water and wastewater utilities in 14 states. Two acquisitions were completed in 1996 when United Water bought a utility and wholesale water supplier in New Jersey. The company aims to expand its water services to rapidly-growing areas and increase its customer base. In addition, United Water wants to strengthen its foundation and resources to continue its leadership in contract operations.

Suez Lyonnaise des Eaux, the world's largest water services company, agreed to acquire United Water. Prior to the acquisition, the two companies were strategic allies. Suez Lyonnaise des Eaux is a world leader in water and wastewater research. United Water can draw on Suez Lyonnaise technological and international expertise to further enhance its own resources.

The company is focused on developing in areas of rapid growth. In 1999, it decided to sell two small utilities United Water Indiana and United Water Virginia to American Water Works Company for $30.4 million. These two subsidiaries constituted less than 4% of United Water's regulated assets and less than 2% of the company's service population. The sales yielded an after-tax gain of $4.1 million.

United Water has established favorable relations with its employees through fair labor agreements to ensure successful public-private partnerships. For instance, the company entered into a public-private partnership with Hoboken, New Jersey to operate the municipality's water department. All of the city's employees were offered positions with the company with no reduction in compensation, benefits or pensions. Similarly, when the company entered into contract operations with Jersey City, the employees were offered full salaries, benefits and pensions.

General Outlook

United Water has promising prospects. Not only does it invest in infrastructure improvements and advanced technology, but it also invests in technological research to maintain at the frontier of innovative technology. The acquisition by the world leader of water and wastewater research Suez Lyonnaise des Eaux will strengthen United Water's technological research as well as increase its financial resources.

United Water generates most of its revenue through operations rather than through investments. In addition, it appears to be generating sufficient revenues to cover its operating expenses.

The company's debt ratio and total equity to total assets ratio indicates a good mix of financing through borrowing and equity. The interest expense which makes up 96% of the non-operating expense does not pose excessive burden on the company as indicated by the reasonable non-operating expense to total expense ratio.

United Water's presence in 19 different states gives the company geographic diversity. Adverse weather has little impact on the company's cash flow since the effects of drought, for example, in one state should not greatly affect the operations of the company as a whole. Similarly, any unfavorable rate regulations in a few states should not greatly impact the company's ability to raise revenue through rates.

Its good labor relationship will help the company in making prospective acquisitions and entering future partnerships. The public in general is resistant to privatization and partnerships due to the fear of staff attrition and rate increase. However, United Water's reputation for good employee relations should diminish such fears.

Although United Water has a good overall outlook, there may be some problems with the company's billing efficiency and liquidity. Its collection period of 61.2 days is almost twice as long as the industry norm of 32.9 days. In addition, it has a current ratio of 0.76 which is well below the 2.7 industry norm. The company may not be able to meet its short-term liabilities, however, more financial data from different years are needed to clarify verify this implication.

4 Discussion

The case studies presented some of the various financial and management strategies used by the public and private sector. This section discusses these differences and evaluates the strengths and weaknesses of the strategies used by the two sectors.

Although both public and private utilities rely considerably on equity financing, the nature of the equity differs in the two sectors. The public sector's equity is mostly contributed capital in the form of government grants while private sector's equity is in the form of shareholder's equity. The private sector has relatively more control over the availability of equity financing than the public sector as private utilities can control the amount of stock made available to stockholders. Although it needs to pay reasonable dividends to shareholders, investor-owned entities can in times of need decide to pay less dividend and allocate the capital towards capital investments, debt servicing or other needs of the firm. On the other hand, public utilities cannot directly control the availability of government grants. As the trend in decreasing government grants and funding continues, the public sector needs to depend more on other financing techniques.

There are more regulatory restrictions imposed on the activities of private utilities than public utilities. The water rates of the public utilities are set by they utilities themselves while those of the private sector are regulated by state public utility commissions. Private utilities must apply for rate increases which may not necessarily be approved by the commissions. Public utilities have more flexibility in generating revenue through rates, although private utilities can now recover some construction costs through the use of an AFUDC. Furthermore, regulatory approvals are needed before private utilities can complete acquisitions and mergers. For instance, SJWC merger with American Water Works Company was unsuccessful due to regulatory barriers. The growth of private utilities can be greatly hampered by government regulations.

The two sectors also differ in financial management. Public utilities tend to make more investments, for instance, in securities and commercial paper than private utilities. Restrictions on the type of investments that can be made is a good measure used the public utilities to

minimize the risk of these investments. The proceeds from these investments are generally used to refund and refinance long-term debt. In addition, surpluses are allocated to various reserves set up to ensure the public utilities' ability to refund certain obligations. Private utilities make little investment outside of its operations and use its surpluses towards utility growth and expansion. Many private utilities focus on increasing customer base and expanding nationally or regionally through mergers and acquisitions which are capital intensive. Private utilities invest more in technology and research to improve water treatment techniques as well as efficiency of operations and management. The acquisition of entities that have special technological expertise is an example of private utilities' focus on improving technologically to strengthen the ability to efficiently provide water services.

The establishment of various reserve funds is a good way to guarantee the financing of capital expenditure and refunding of a portion of obligations. Although private utilities might be reluctant to allocate money into a reserve fund when the money can be used, for instance, dividend payments and investments, private utilities should consider using reserve funds as a way of enforcing sound financial and management practices to yield long-term financial stability. Reserve funds can also help build creditworthiness as they can provide investors assurance of a utility's stability and growth.

Private utilities actively involved with expansion of water systems through acquisitions and mergers have greater economies of scale than municipalities. The average cost of water production generally decreases as the volume of water production increases so that utilities with larger systems that produce greater volumes of water tend to increase cost savings in operations. In addition, systems serving relatively large regions are more efficient than those serving localized areas. Thus, private utilities that continually expand through acquisitions and mergers may be more efficient and have greater cost savings than municipalities which only serve regionalized areas. Public utilities should consider consolidating small systems to increase economies of scale.

5 Conclusion

As water supply industry faces escalating capital expenditures for infrastructure rehabilitation and increasing costs to comply with stringent regulations, more municipalities may consider privatization and public partnerships for assistance. The private sector uses financial and management strategies different from the public sector which can sometimes lead to greater efficiency and cost savings. For instance, Seattle Public Utilities appears to be benefiting from shifting the tasks of designing, building and operating to its private partner. However, not all public utilities may need assistance or can benefit from the private sector since the public sector also has some sound strategies. The question of whether public utilities should turn to public-private partnerships can only be answered through the investigation of individual utility needs. Public utilities need to evaluate the different strategies used by private utilities and decide whether these strategies are applicable and beneficial to them.

If an increasing number of municipalities discover public-private partnerships and privatization to be advantageous, then regulatory impediments need to be overcome and public perceptions need to be changed. Existing regulations greatly hamper the growth of public-private partnerships through, for instance, the withdrawal of the tax-exempt status of municipalities that enter such partnerships. Private firms need to develop good labor relations to diminish public resistance towards the outsourcing and privatizing of water services. Without changes in regulations and public attitude, the growth of public-private partnerships and privatization will remain greatly hindered.

Additional research should be performed to further analyze the different financial and management strategies used by the two sectors. More case studies should be performed with information provided by the utilities as well as other sources. Financial information can be gathered from several years to perform trend analyses to give a better picture of each utility's financial and management practices.

Another area of interest would be to compare the effectiveness of the consolidation of small systems through acquisitions by private utilities with the consolidation through the public sector.

Many small systems have problems complying with stringent regulations and generating sufficient revenue to cover escalating operating costs. Through further analysis of the management and financial strategies used by the two sectors, research can be performed to evaluate the strengths and weaknesses of consolidating small systems through the private and public sector.

Appendix A: Financial Ratio Equations

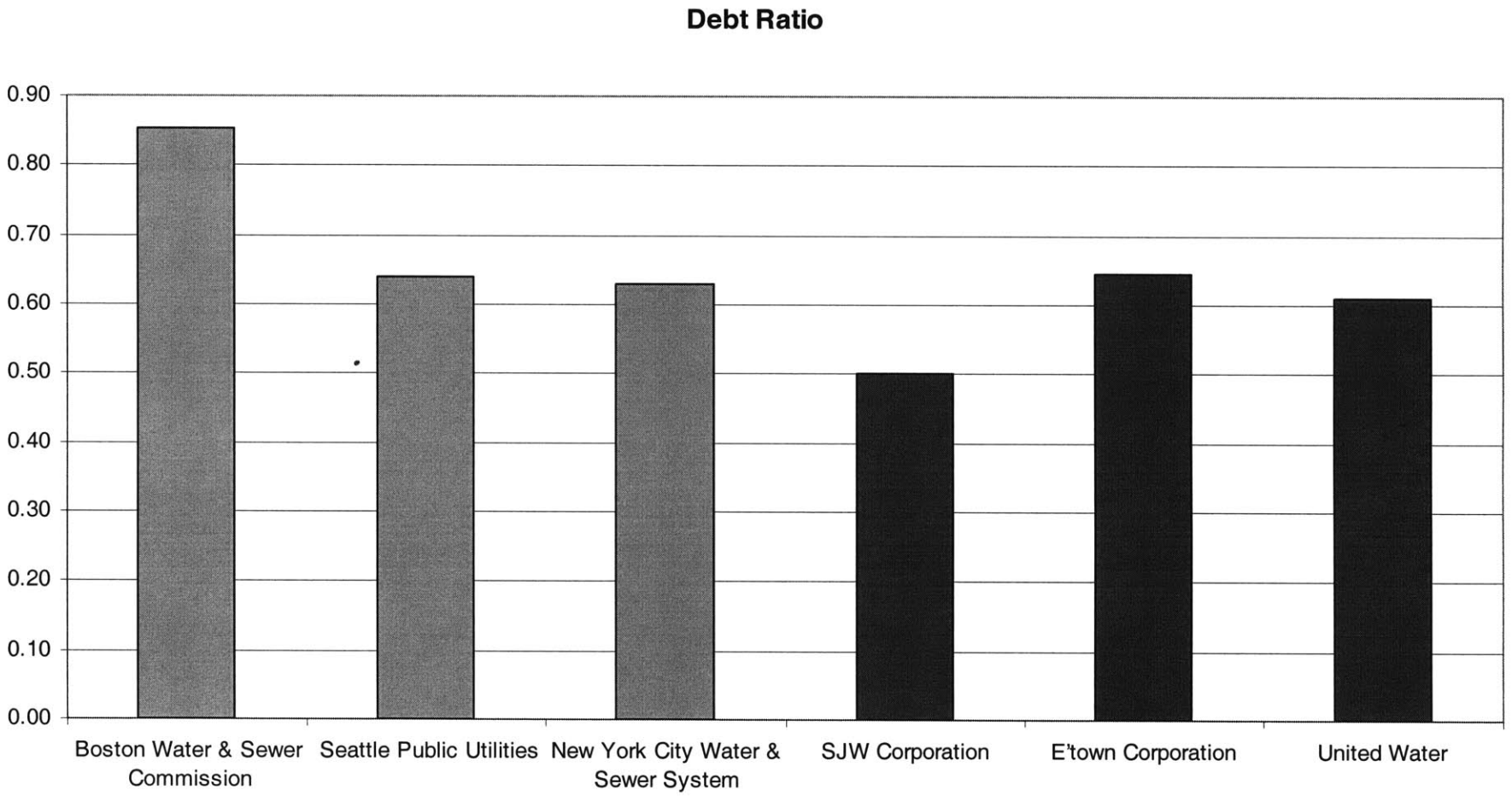
FINANCIAL RATIO	EQUATION	FINANCIAL RATIO	EQUATION
Debt Ratio	$\frac{\text{Total Liability}}{\text{Total Assets}}$	***Total Equity to Total Assets***	$\frac{\text{Contributed Capital + Retained Earnings}}{\text{Total Assets}}$
Collection Period	$\frac{\text{Accounts Receivable * 365}}{\text{Total Operating Revenue}}$	***Non-Operating Expense to Total Expense***	$\frac{\text{Non-Operating Expense}}{\text{Total Expense}}$
Total Operating Expense to Total Operating Revenue	$\frac{\text{Total Operating Expense}}{\text{Total Operating Revenue}}$	***Non-Operating Revenue to Total Revenue***	$\frac{\text{Non-Operating Revenue}}{\text{Total Revenue}}$
Current Ratio	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	***Total Operating Revenue to Total Assets***	$\frac{\text{Total Operating Revenue}}{\text{Total Assets}}$

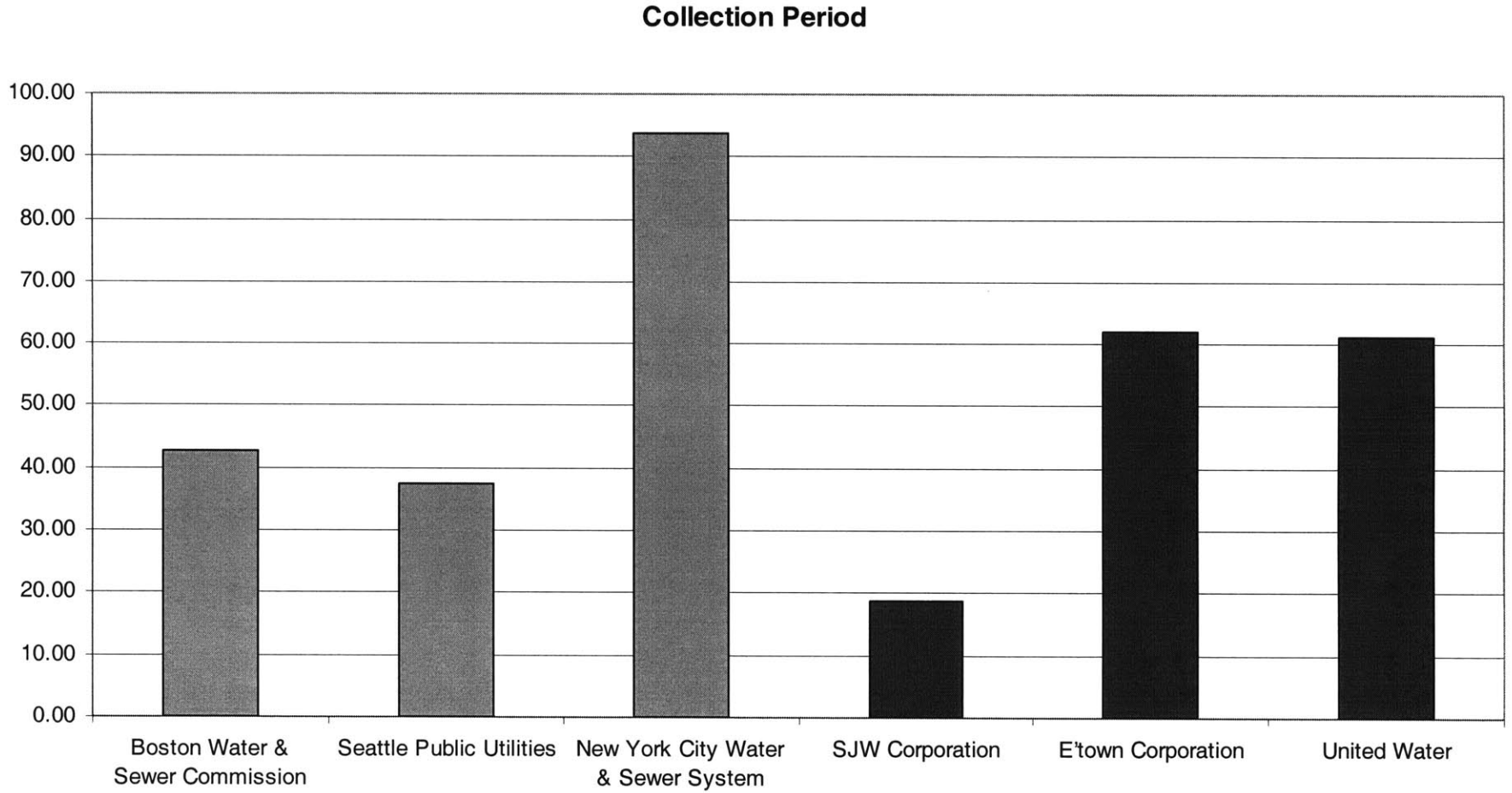
Appendix B: List of Utilities

Public
Anaheim Public Utilities
Baltimore Bureau of Water & Wastewater
Boston Water & Sewer Commission
Chester Water Authority
Cleveland Division of Water
Detroit Water & Sewerage Department
JEA
Knoxville Utilities Board
Los Angeles Department of Water & Power
Massachusetts Water Resources Authority
Maui Department of Water Supply
Memphis Light, Gas, Water
Metropolitan Water District of Southern California
Minneapolis Water Works
New York City Water & Sewer System
Philadelphia Water Department
S Central CT Regional Water Authority
San Diego County Water Authority
Seattle Public Utilities
Valley Center Municipal Water District

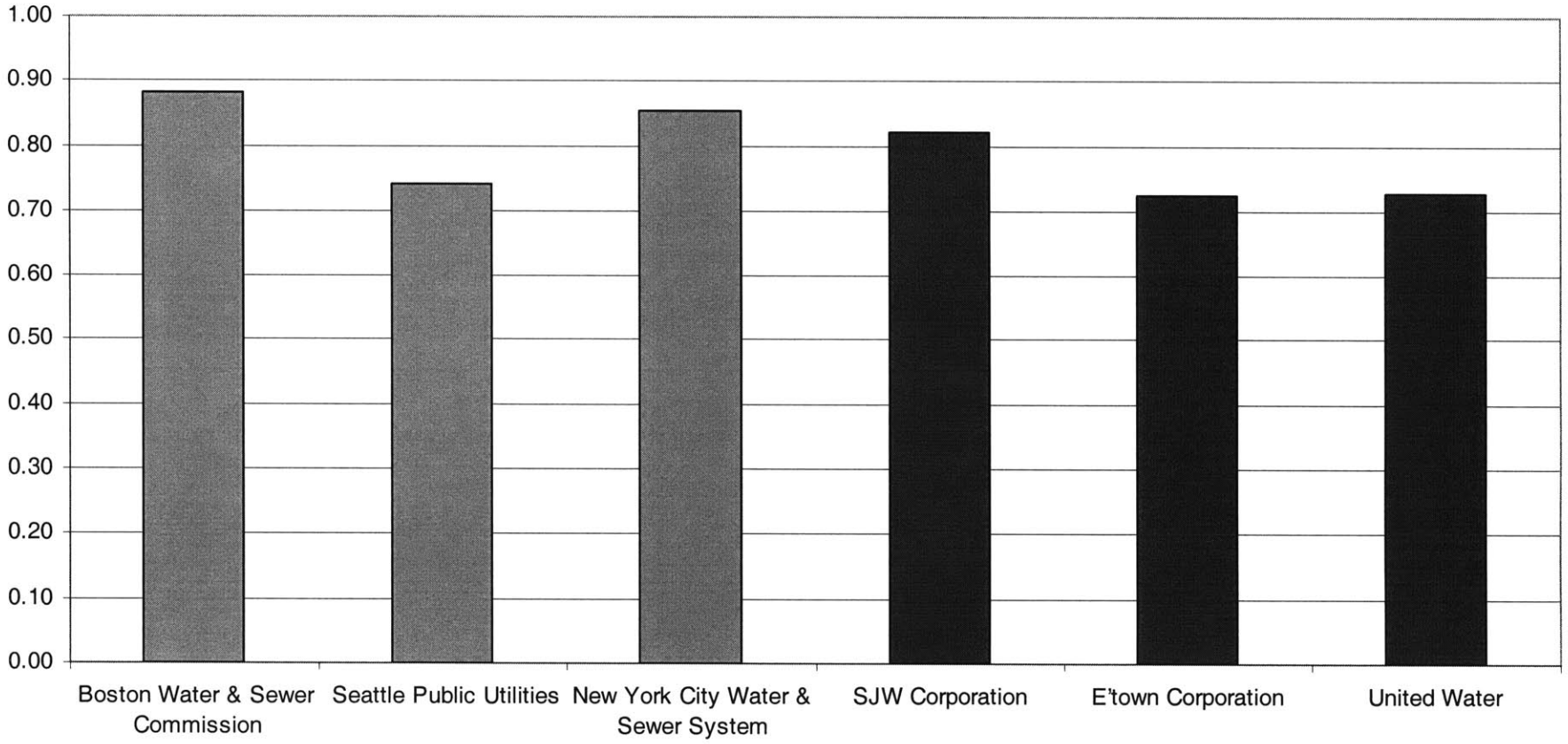
Private
California Water Services
E'town Corporation
Philadelphia Suburban Corporation
SJW Corporation
United Water

Appendix C: Graphs of Financial Ratios

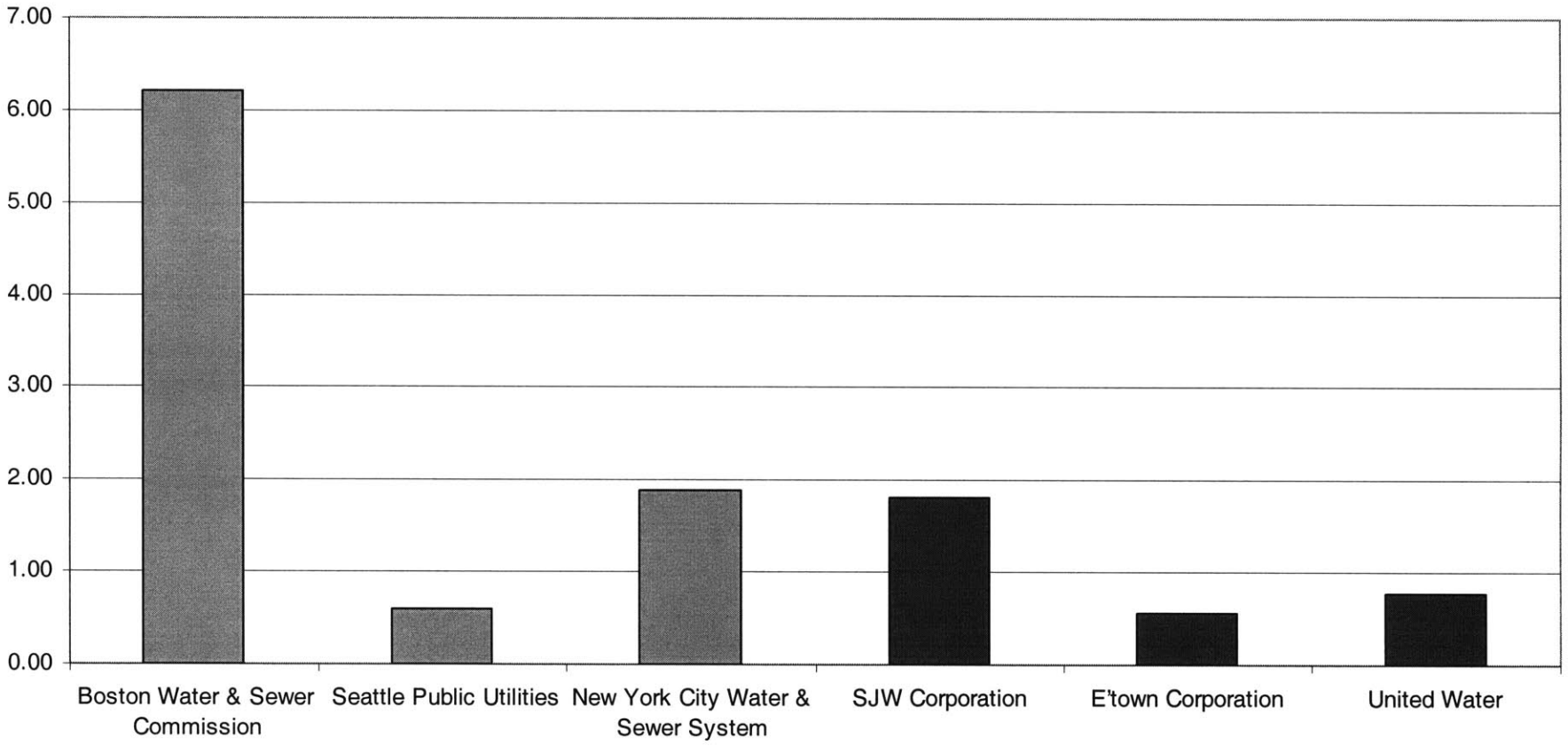



Collection Period
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Boston Water & Sewer Commission
Seattle Public Utilities
New York City Water & Sewer System
SJW Corporation
E'town Corporation
United Water

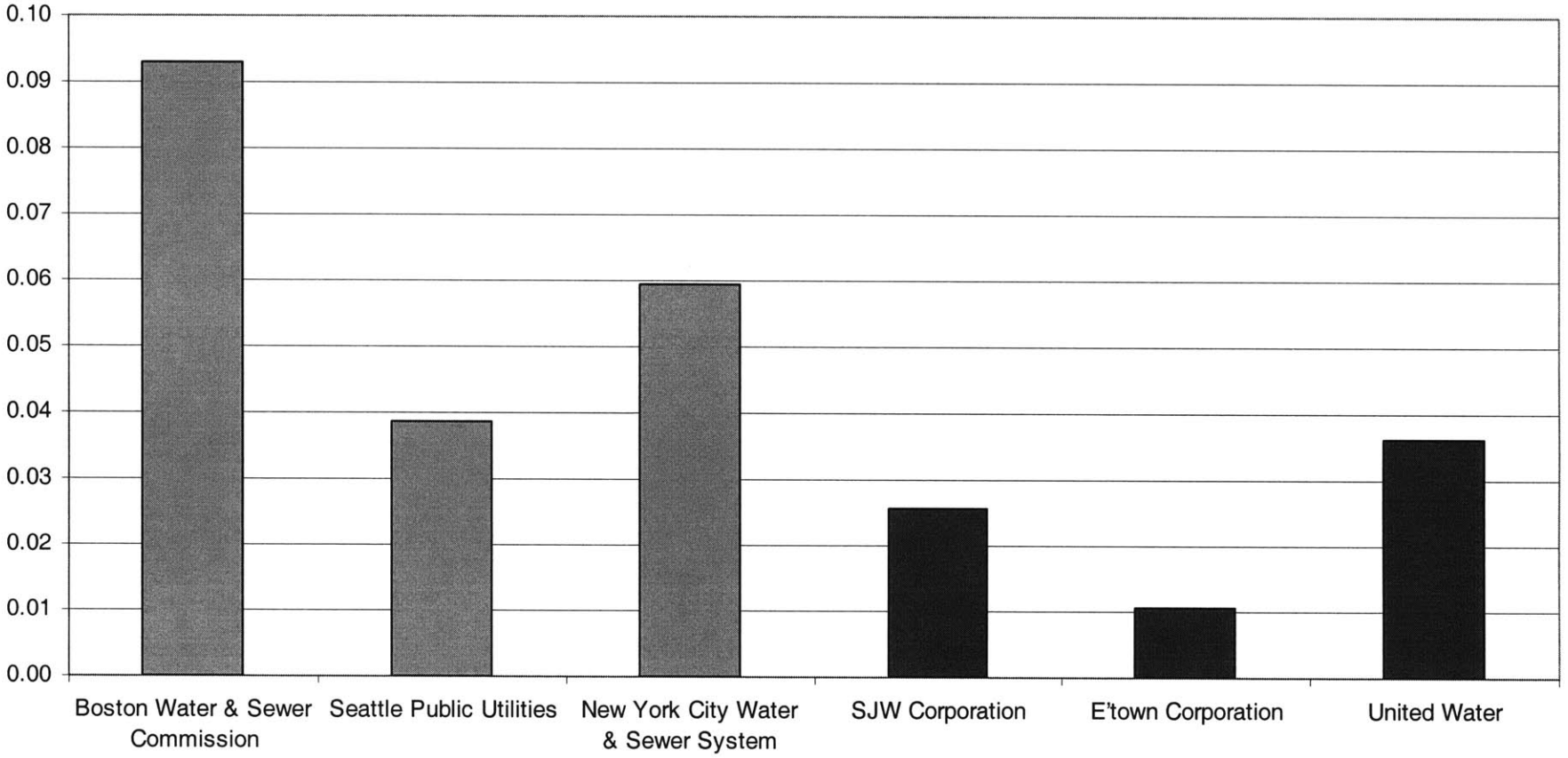
Total Operating Expense to Total Operating Revenue



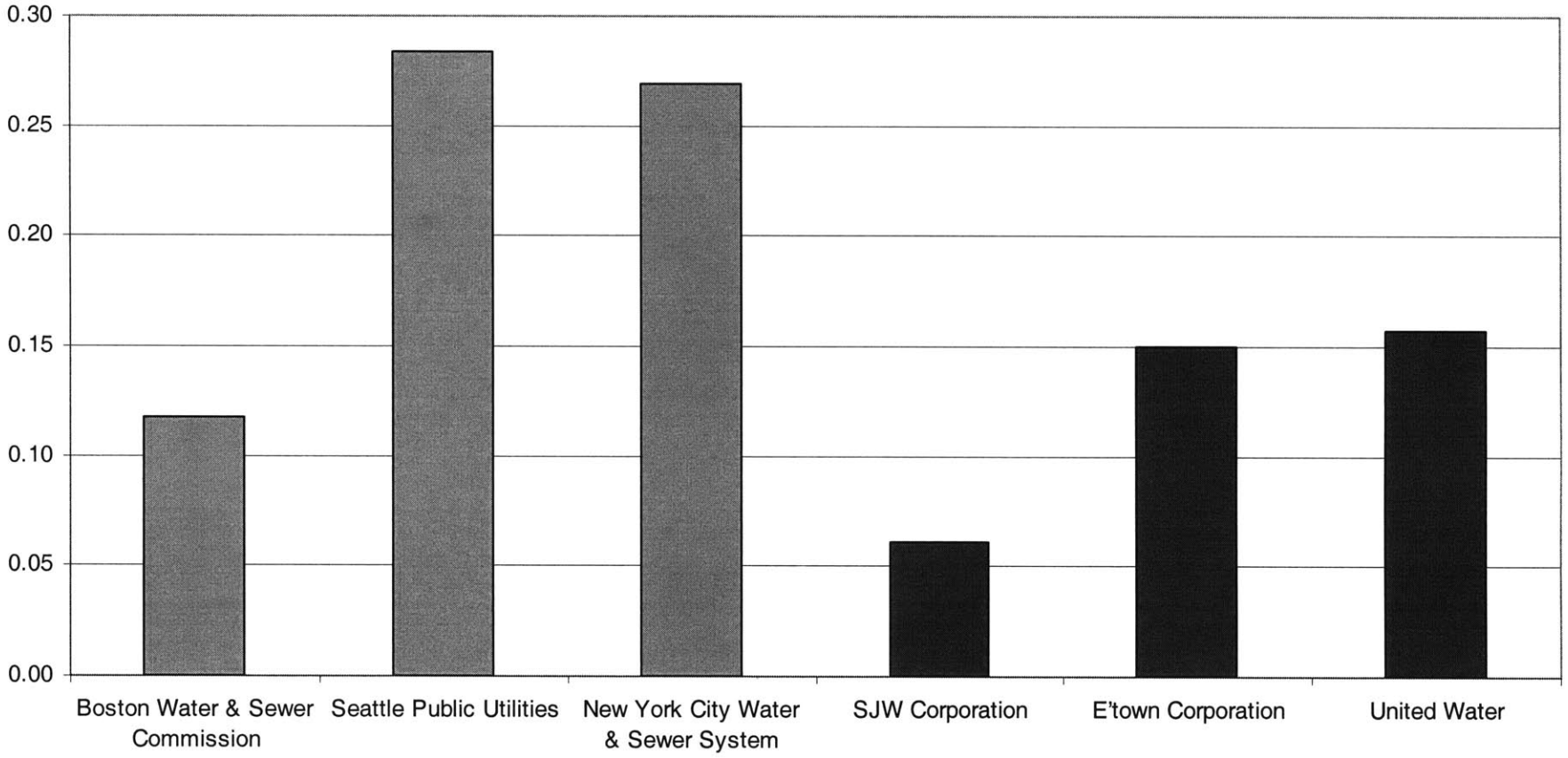
Current Ratio



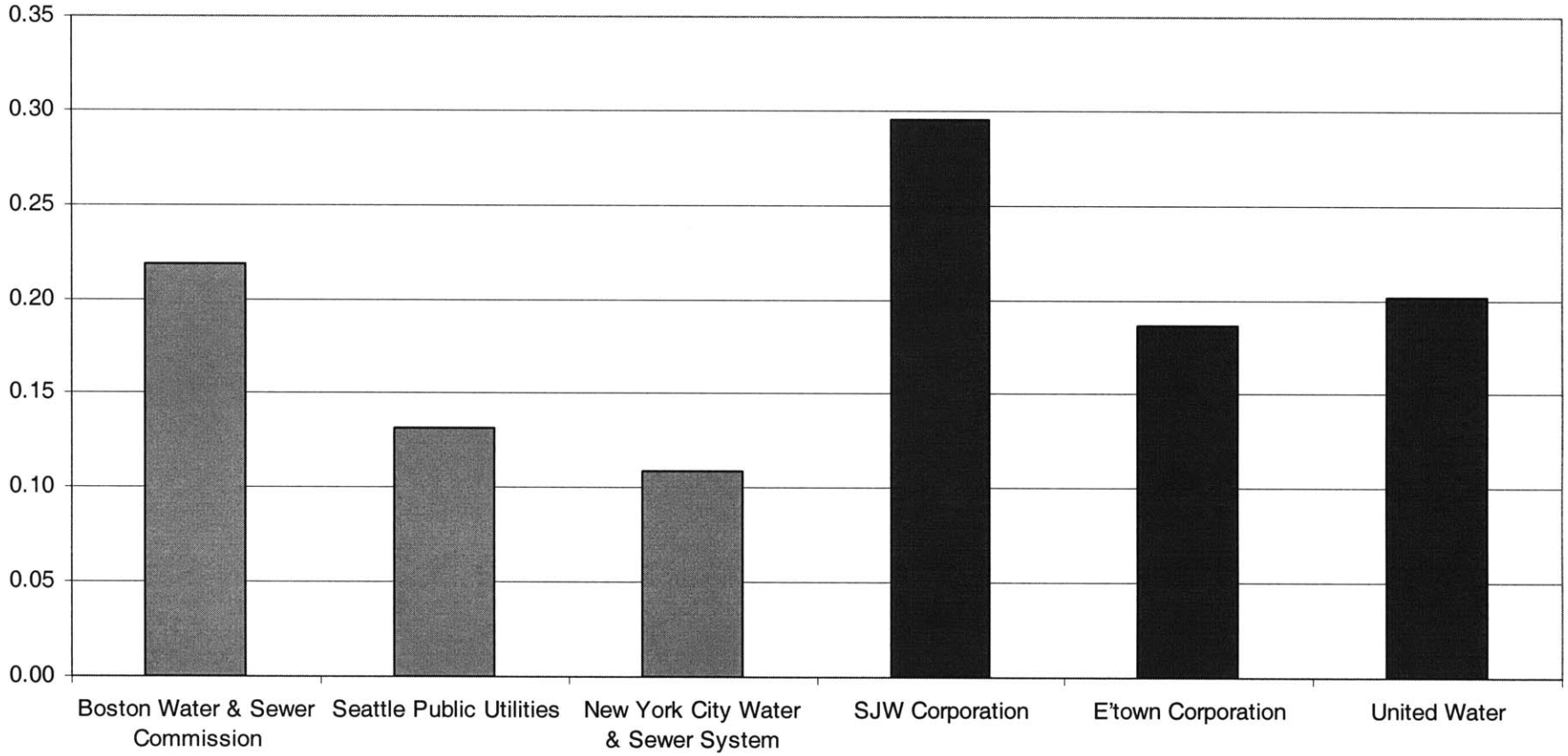
Non-Operating Revenue to Total Revenue



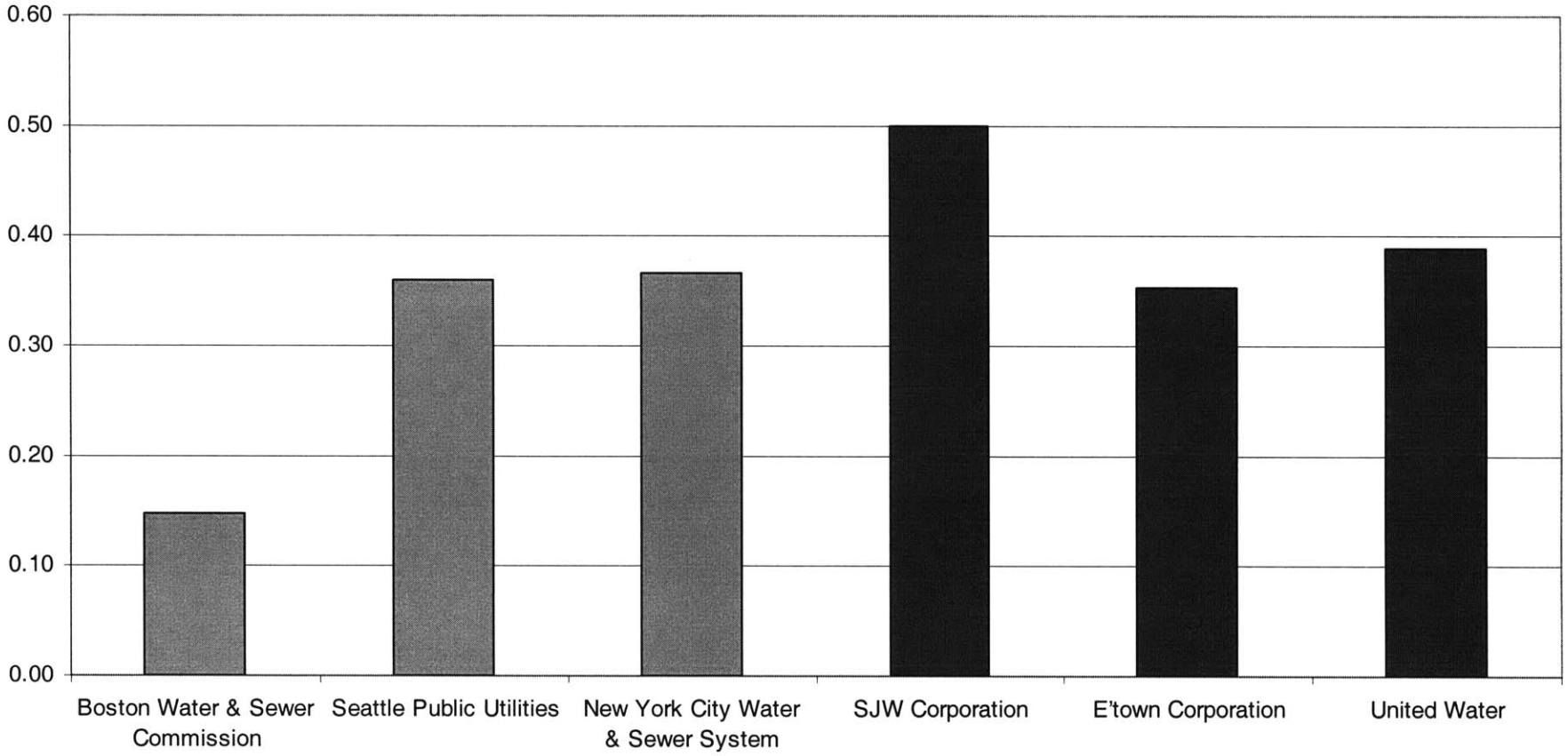
Non-Operating Expense to Total Expense



Total Operating Revenue to Total Assets



Total Equity to Total Assets



Appendix D: Definition of Financing Sources

FINANCING SOURCE	EQUATION
Long-term Debt	$\frac{\text{(Total Liability – Current Liability)}}{\text{Total Assets}}$
Short-term Debt	$\frac{\text{Current Liability}}{\text{Total Assets}}$
Total Equity	$\frac{\text{(Contributed Capital* + Retained Earnings)}}{\text{Total Assets}}$

* **Contributed Capital**: For the public sector, it is equivalent to the contributions received from government agencies, individuals and the utility's city for the aid of specific construction projects that are not refundable. For the private sector, it is equivalent to shareholder's equity.

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