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THE IMPACT OF PRIVATE PUBLIC UTILITY TAX-EXEMPT BOND ISSUANCE

by

Jacob F. Day

A Thesis Submitted in Partial Fulfillment
of the Requirements for a Degree with Honors
(Accounting & Finance)

The Honors College

University of Maine

May 2012

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Abstract

This work presents the current status of Maine's investor-owned electric utilities. In utilizing current financial data, interviewing with individuals from Bangor Hydro Electric, and through research conducted, it was concluded that it should be in society's economic best interest to allow privately-owned electric utilities to issue tax-exempt securities in specific scenarios.

In the long-term, this assessment may be useful in the determination of the most efficient methods for public utility capital taxation. Infrastructure development is critical to the success and sustainability of a developed nation. Through sensitivity and scenario analysis conducted in MS Excel, I concluded that the issuance of tax-exempt bonds by investor-owned utilities will be ideal for those that are poorly structured and overleveraged on a case-by-case basis.

Acknowledgements

Without Dr. Strong's knowledge and guidance, this would not have been possible. I also wish to dedicate this project to my parents for making me the man I am.

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Formulas:

- 1) CAPM (K_e)
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- 3) EAR (Effective Annual Return)
- 4) Revenue Requirements

Introduction

Unless they are designated as private-activity bonds by the state, investor-owned utilities presently are unable to issue tax-exempt securities. Tax-exempt securities are federally subsidized and in many cases on a state basis. The following begins with an explanation as to what a public utility is and why there is a need for this entity's existence. Financing methods with a focus on debt are then explained. A sensitivity analysis follows targeting each factor impacting a customer's average monthly bill. A scenario analysis displays the best, middle, and worst-case scenarios. This portion takes the most beneficial, mid-benefit, and least beneficial sensitivity factors for a public utility, combines them, and presents what the difference is between taxable and tax-exempt securities. The following portion plugs actual data from both Bangor Hydro Electric and Central Maine Power's most recent annual reports to determine whether or not it is in these entities' best interests to issue these securities.

Chapter I: Public Utilities

OVERVIEW

In a free market with public interest in mind, there is an optimal efficiency necessary in the creation of monopolized industries. In private industry, an equilibrium price is continually established through supply and demand theory. In the fulfillment of infrastructure demands, public goods fulfill a particular societal desired need. In most cases, private enterprise is unwilling to participate in these public services. Public utilities fall between these two realms.¹

In terms of intrastate regulation, public utilities are regulated by a state's Public Utility Commission. In terms of interstate regulation, the federal government is involved. The principal issuer of debt for public utility companies is the Public Utility Financing Bank. This work will focus specifically on investor-owned utilities (IOUs) in Maine. Public utilities are comprised of three primary components. These include: production, transmission, and distribution. The production component contains mostly private industry. The transmission and distribution component consists of a mix of both private and government-owned entities.² This work will focus on the transmission and distribution component.

¹ See Beaumont (2004), 11-12 for "Purchasing Power Parity" and "Supply and Demand Theory"

² See Geddes (1999), 1162-1164

PUBLIC UTILITY COMMISSION

A Public Utility Commission serves the sole purpose of regulating the industry.

Nationwide there are variables associated with the election and appointment of Public Utility Commissions. From state to state, they vary in a number of ways. These include:

- Commission size
- Salary
- Length of term in office
- Regulatory budget
- Staff size³

According to the positive theory of economic regulation, interest groups use the political process to affect favorable redistribution of income, and regulators redistribute income among interest groups to maximize their political support. Public Utility Commissions can be either appointed or directly elected officials. Elected officials will work in favor of the consumer, directly impacting social welfare in their policy-making activities. Appointed officials may side more frequently with the utility as a direct result of lobbying. This process effectively increases rates for customers. Direct election is the most efficient method through which consumer opinion can be expressed.⁴

INCENTIVES

In recent years, a push for sustainable energy and evolving more costly current technology developed a significant government incentive to create the most efficient American infrastructure. This continued infrastructure development is most critical to national prosperity. Private entities are constantly provided government incentives and tax credits to drive these organizations to current technologies through tax subsidies. Government-owned utilities, which are also referred to as public power utilities, today

³ See Crew (1991), *Competition and the Regulation of Utilities* for further information.

⁴ Ibid.

serve twenty-five percent of United States electric consumers while for-profit electric utilities (IOUs) serve the remaining seventy-five percent and are offered the ability through tax credit incentive programs to upgrade to clean and renewable technologies.⁵ As a whole, the nation's health relies on continuous improvement. As a result of this necessity, the nation must also realize that with this improvement comes the need for financing. Public power utilities are classified as not-for-profit entities which are operated as units of state and local governments. Public power utilities can issue tax-exempt bonds currently with this form of financing being unavailable to investor-owned utilities.

IOUs vs. GOUs

Public utilities are divided into two primary categories: investor-owned utilities (IOUs) and government-owned utilities (GOUs). GOUs are operated by the state or local municipality in which the entity is situated. Due to their status as distinct units of state and local government bodies, this segment is currently serving forty-six million Americans and has the ability to issue tax-exempt debt. According to the American Public Power Association, "Public power utilities have over \$80 billion in outstanding tax-exempt bonds" consisting of over two-thousand state-held public power entities. These activities are deemed to be in the public interest in the provision of fair electric rates to areas which may not be profitable to investor-owned utilities.⁶

Investor-owned utilities (IOUs) possess the ability to obtain tax-exempt financing strictly through an offering of a government-owned utility. Some government-owned utilities have the ability to generate enough power for the public good while also

⁵ See American Public Power Association "Public Power Facts" published Nov. 2010.

⁶ See American Public Power Association "Tax Issues for Public Power" published Feb. 2011.

maintaining additional supply which could be used in the private market. If tax-exempt securities are issued by a government-owned utility, restrictions exist to ensure that funding was in fact utilized for the public good. These restrictions include:

- The Ten Percent Rule
- \$15 Million Per-Project Rule

The ten percent rule limits publically produced power which is then sold to the private marketplace. As a form of additional revenue, only ten percent of output can be brought back to the municipality in this form. The \$15 million per-project rule limits the amount of capital obtained and used privately to \$15 million per project even if there are multiple bond issues.⁷

MAINE PUBLIC UTILITY COMMISSION

The primary mission of the Maine Public Utility Commission (MPUC) is to “regulate electric, gas, telephone and water utilities to ensure that Maine citizens have access to safe and reliable utility services at rates that are just and reasonable for all ratepayers”. The Maine Public Utility Commission currently consists of three appointed members by the governor. Each participates in staggered six year terms of service with all decisions made by either a public vote or commissioner majority opinion. With an operating staff, the regulatory process is broken down into six unique divisions.⁸

This work will focus on the Electric and Gas Division. In this division, MPUC and staff “conduct financial investigations and analyses of utility operations, analyze applications by utilities to issue securities, advise the Commission on matters of rate base, revenues, expenses, depreciated and cost of capital, engineering, rate design, energy science, statistics and other technical elements of policy analysis for all utility areas”. In

⁷ Ibid.

⁸ See *Maine Public Utility Commission* website.

the regulation of approximately 430 utilities statewide, “the Commission establishes rates, grants utility operating authority, and regulates utility service standards and monitors utility operations for safety and reliability”.⁹

NOTABLE POLICIES

In 1913, the first income tax law came into effect in the United States. Along with this policy, there came tax-exempt debt in the form of excludable taxable income for the interest paid to holders in state and municipal debt obligations. “The Omnibus Budget Reconciliation Act (OBRA) of 1987 restricted the authority of state and local governments to issue tax-exempt bonds to finance the (takeover) of non-governmentally owned output facilities”.¹⁰

The *Federal Power Commission vs. Hope Natural Gas Co.* decision set the precedent for public utility rate of return regulation. It determined that the return must be “just and reasonable”. Prior to the Hope decision, the precedent was set by *Smyth vs. Ames*. The Supreme Court held that a utility is constitutionally entitled to rates calculated to yield a “fair return” on the fair value of “its property used for the convenience of the public” and this return was determined by a number of factors, such as original cost. Public Utility Commissions today set fair equity return rates for these entities. To date, there is no concrete concept of “fair rate of return” and its ultimate determination. Each is regulated by geographic location, though some are interstate and can be regulated federally.¹¹

The Public Utility Holding Company Act of 1935 (PUHCA), which was later repealed by the Environmental Policy Act of 2005, was some of the most substantial

⁹ Ibid.

¹⁰ See Zimmerman (1991), 1

¹¹ See Rose (Feb. 1954), *The Hope Case and Public Utility Valuation in the States*

public utility legislation. This monitored the actions of the holding company by regulating the parent companies of the affiliated in:

- Disallowing the holding company from charging higher rates due to the services provided from other holding company affiliates.
- Disallowing speculation with revenue from the ratepayer (harms credit and increases cost of borrowing which in turn raises customer utility bills)
- Holding companies had to be incorporated in the state in which the utility operates or if an individual utility exists in multiple states the SEC must regulate the utility.
- Non-utilities could not own utilities.
- SEC had to approve any holding company acquisitions to avoid monopolization.¹²

As a direct result of the appeal, the above listed protections were repealed. Some of the most significant changes were that non-utilities could now hold utilities and bill payers were now less protected from trusts that afflicted consumers prior to the Great Depression.

Deregulation has resulted in alterations of previously applied principles. Producers are now able to compete against one another in a competitive marketplace. This raises the issue of sustainability in the cost of capital. Producing utilities are now able to utilize previously monopolized regions to their advantage, offering lower rates than those that previously built and supported a structured utility network.¹³

MAINE ELECTRIC INDUSTRY

According to the Maine Public Utility Commission's annual report, electricity within the state's borders is comprised of two primary components. "Delivery includes transmission, distribution and customer-related functions such as metering and billing, and supply includes the production and provision of electric energy and capacity". Delivery, particularly rate setting, is determined by the commission. At present, Maine is

¹² See Public Citizen (2006), *Public Utility Holding Company Act (PUHCA)*

¹³ See Ceerly, Cole, *Stranded Benefits vs. Stranded Costs in Utility Deregulation*

a net exporter of electric energy. Competitive Electricity Providers (CEPs) partake in the marketplace by granting consumers affordable pricing strategies. With the enactment of Maine's Electric Restructuring Act, deregulation of supply in 1997 gave consumers this right to a competitive marketplace. Prior to this, if an entity or individual elected to forgo the right to participate in a competitive marketplace, a standard offer set forth through a bidding process set rates for this particular entity. The standard offer will only occur if a prior arrangement is not made with a supplier. This reflects commercial and industrial as well as residential consumers. The Maine Public Utility Commission oversees this market and grants permission to new competitors within the marketplace.¹⁴

There is both a wholesale and retail marketplace. Wholesale supply is provided by other regional networks in New England. Though the supply could have potentially come originally through a wholesale marketplace, the retail market will eventually deliver to the ultimate consumer. In terms of the demand function in transportation and distribution (T&D), ninety-five percent of these services are provided by three investor-owned entities comprised of Central Maine Power Company, Bangor Hydro Electric, and Maine Public Service Company, which is a subsidiary of Emera the holding company in control of Bangor Hydro Electric.¹⁵

Through a combination of T&D and CEP services, electricity is provided to the ultimate consumer. In reference to Appendix A, further details are provided for both the supply and demand function in terms of Transportation and Delivery and the Standard Offer Rate. Transportation and delivery services encompass three primary functions.

¹⁴ See *Maine Public Utility Commission* website.

¹⁵ Ibid.

These include:

- Transmission
- Distribution
- Stranded Costs¹⁶

Transmission includes the costs of building and operating the system in Maine.

Distribution serves a similar function to transmission on a local level. It includes costs for metering and billing. “Stranded costs reflect the net, above-market costs for generation obligations that utilities incurred prior to the aforementioned restructuring of the industry”. These stranded costs occur when assumption changes differing from those that were previously established are put into practice. This could include the building of a new production plant under pre-existing conditions with a cost that now exceeds that of investor expected returns under newly established conditions. These benefits are transferred to the ratepayers while negatively impacting investors.¹⁷

Though the actual electric production process is beyond the scope of this project, the capital necessary in the production of the supply may be relative. In reference to Appendix B, this is a portrayal of the actual electric production in Maine. In Maine, half of the plants are fueled by natural gas while a quarter is produced through hydroelectricity. In reference to Appendix C, more than twenty states took part in industry deregulation. As of 2009, those in yellow were suspended, while those in green, predominantly in the Northeast were still actively participating in a deregulated industry.

Deregulation offers the possibility to create massive uncompetitive monopolized trusts, which directly impact the consumer in premium-priced rate fixing. Stranded costs are those that are created as a direct result of the deregulation of the industry. It is

¹⁶ See Ceerly, Cole, *Stranded Benefits vs. Stranded Costs in Utility Deregulation*

¹⁷ Ibid.

estimated nationwide, due to the erosion of public utility assets, that \$100 billion in stranded costs could be a direct result of deregulation. As utilities were often regulated in the public interest, investments in various alternative sources of renewable and sustainable energies may not have been made in a competitive marketplace. The question arises whether or not the public utility should be compensated for these stranded costs. The public utilities believe so, while consumers on the other hand believe that these costs should not be reflected in rates. States, as intrastate commerce is within their jurisdiction, could compensate the utilities. It can be argued that public utility management could have factored these costs in when industry deregulation speculation occurred. Regulation could create a lump-sum payment by the entire industry or impose a fee to individuals who switch from their previous supplier. This could lead to inefficiency in the market as these stranded costs are attributed to inefficient power supplies that are kept in operation to continue payment to producers for these extraneous costs.

AVERAGE MONTHLY BILL

An average rate per kilowatt hour in the United States as of 2010 was \$.1548 for residential consumers, \$.1238 for commercial, \$.0915 for industrial, and on average \$.1263 for all sectors. An American home on average uses 958 kilowatt hours per month totaling 11,496 per year.¹⁸

Maine vs. U.S. Average Monthly Bill

Census Division State	Number of Consumers	Average Monthly Consumption (kWh)	Average Retail Price (Cents per Kilowatthour)	Average Monthly Bill (Dollar and cents)
Maine	699,625	521	15.71	\$81.83
U.S. Total	125,717,935	958	11.54	\$110.55

¹⁸ See ElectricChoice.com, *Electricity Rates by State – National Electric Rate* for further information.

As described above, the state of Maine falls well below the national average in all categories except average retail price. The expensive retail price is caused by increasing prices in the wholesale market stemming from fuel price volatility. Factors impacting the Average Retail Price include: differences in fuel availability, higher transportation costs, higher labor costs, and higher construction costs compared to other states. The lower average monthly bill can be attributed to the landscape as well as the fact that Maine is a net electric exporter. In taking note of the average monthly bill, the United States average totals \$110.55, while the state of Maine totals \$81.83. In the following sensitivity analysis, an average of \$100 to align closer to the national average was utilized.¹⁹

¹⁹ Ibid.

Chapter II: Financing Methods

OVERVIEW

There are three fundamental methods through which a for-profit firm maintains the ability to raise capital. It is no different for a public utility. These financing methods include:

- Equity
- Debt
 - A “Hybrid” of both equity and debt which falls into the same category
- Earnings retention²⁰

There are several critical characteristics differentiating equity and debt securities. Equity securities entitle a holder to vote, has a price, may increase in value, and may pay a dividend. Debt securities have a preferable ranking in default repayment, contain a predetermined lifespan, have a price, have a yield, and may pay a coupon. (Appendix G)

BONDS

As stated in Financial Engineering Principles, “the most basic definition of a bond is that it is a financial instrument with a predetermined life span that embodies a promise to provide one or more cash flows. The life span of the security is generally announced at the time it is first launched into the market, and the longest maturities tend to be limited to about 30 years”. When issued, a bond commonly is between ten and thirty years to maturity with notes being less than ten years. There are periodic coupon payments with a final payment of the principal received in the initial investment at maturity. A bond issuer, in this case the public utility company or the Public Utility Financing Bank, is the entity selling the bond to investors. The financing received is then utilized in various projects and in generating capital for business operations. The investor

²⁰ See Beaumont (1994), 3-5 for capital structure information.

anticipates earning a rate of return on the debt issued to them. Bond investors will have priority over equity investors. In the case of public utilities, we will leave out preferred shareholders and other investors. If a business were not to honor its outstanding debt, this specific entity would be deemed distressed (in serious financial difficulty) or in the case of a default the company is unable to honor its financial obligations. The creditors have the right to seize specific tangible company assets to regain some of their initial investment.²¹

In regard to a bond's return, risk determines how high the coupon payment will be on the bond. The principle of uncertainty of price states that there is not one-hundred percent certainty that at a particular point in the future the investor will retain the value that an investment currently holds today. An investor is one-hundred percent certain at this finite point in the present how much their investment is worth, but its future value will remain uncertain until that finite point in time. The principle of reinvestment must also be taken into account. This is the uncertainty at maturity of knowing the coupon payment and going rate. A primary assumption to the Time Value of Money model is the fact that all coupon payments are reinvested at the same rate for the duration of the bond's existence. These four assumptions can be made about a bond:

1. Reinvested.
2. Reinvested for a term equal to the remaining life of the underlying bond.
3. Reinvested in an identical security type.
4. Reinvested at a yield equal to the yield of the underlying security at the time it was originally purchased.²²

The uncertainty of credit quality is another factor that must be taken into account.

A greater risk is expected to command a greater reward, in a higher return, for the

²¹ Ibid. 3-5

²² Ibid. 19

investor. Bonds in the current market after issuance can be sold for either a premium or discount. The spot rate of a bond will be its current effective yield if it is close to par.

BOND TYPES

Specific types of bonds include: corporate bonds, United States treasury securities, municipal bonds, callable bonds, mortgage-backed securities, convertible bonds, and zero-coupon bonds. Corporate bonds are issued by both private and public corporations. Appendix E displays specifically how these are rated by the major rating agencies S&P, Moody's, and Fitch. Lower rated securities will be cheaper and command a higher return on investment and vice-versa.²³

CONDUIT FINANCING

Conduit financing entails the utilization of publically generated funding for private usage. In the late 1960's, there was limitless ability to conduct this form of financing. The primary purpose of tax-exempt debt is in the provision of public capital infrastructure. Over the course of the next thirty years, this form of financing was reduced and restricted. These bonds must serve some form of "broad" public purpose concluding in eventual substantial benefits for taxpayers. If a fixed income security fails both of these tests, then it is deemed a private-activity bond. An additional stipulation which will cause a bond to be classified as a private-activity security is the use of more than five percent of the proceeds to finance loans to individuals.²⁴

There must be a need in existence that could not be fulfilled in private business practice and will have debilitating effects on a specific area's surroundings. For example, if there were a town with a struggling privately-owned business in need of a loan or loan

²³ See Strong (2007), 63-90

²⁴ See Zimmerman (1991), 1

assistance to remain afloat, conduit financing could be used in this scenario. The negative impact on the town would be devastating if some sort of additional financing is not provided to this entity. Similarly, if sustainable energy production is not visible in the United States for the long-term, conduit financing may be a viable solution to resolve this issue.

CONDUIT FINANCING: HISTORICAL PERSPECTIVE

As cited in The Private Use of Tax-Exempt Bonds by Dennis Zimmerman, “the vast majority of outstanding state and local debt was issued for internal improvements”.

The four critical reasons necessitating this form of financing include:

- Population growth.
- Population shift from farms to cities.
- Education requirements.
- Constantly changing transportation services. (Most Relevant)²⁵

Some of the earliest examples of conduit financing included a state or local guarantee of railroad securities or issuing municipal bonds and using the proceeds to purchase stock in a specific railroad company in the mid-1800s. In the mid-1800s, cases in both the Tennessee Supreme Court and in Alabama ruled in favor of “tax-supported bond financing”. In the Alabama case and Tennessee case respectively, it was ruled that it “extends to the employment of all those means and appliances ordinarily adopted, or which may be calculated, to develop the resources of the state and add to the agrarian wealth and prosperity of the citizens; such, for example, as providing outlets for commerce, and opening up channels of intercommunication between different parts of the State” and “support for conduit bonds based on the indirect benefits that enhance the

²⁵ Ibid. 19-20

commercial interest of a town”. In 1859 in the case of *Oelrich v. Pittsburgh*, Fed. Case No. 10442, “The state being unwilling to involve herself in further debt, and risk a second insolvency, the scheme of city, county, and borough subscriptions was invented and put in practice. This had the appearance, if not the reality, of greater justice and fairness than the original plan of state subscriptions; for the distant counties and boroughs, whose people were not benefited by a particular road, were not compelled to pay for making it, and only those who partook of the expected benefit would have to pledge their credit for the cost of its erection”. Though initially many private-activity bonds were issued for a public good in transportation advancement, further disadvantages occurred in their misuse. In the early 1900s, it was found that “a large portion of all municipal debt difficulties could be summed up under the caption ‘real estate bond defaults’”. States and municipalities would issue bonds beyond what the district could reasonably support.²⁶

MUNICIPAL BONDS

Both state and local governments must have the ability to obtain funding to develop public infrastructure. Municipal bonds are the primary method for this process. As these securities are distinguished by repayment funding, the security is divided into general obligation and revenue bonds. There are hybrid securities of the two referred to as double-barreled bonds. General obligation bonds are backed by the full taxing power of the issuing government entity. Revenue bonds are backed by generated revenues from financed projects which generally come from user fees and service charges.²⁷ With varying maturities, a typical municipal bond is serial. Many issues have a call provision

²⁶ Ibid. 20-21

²⁷ See O’Hara (2012), 35-36

which can be utilized in the security's early retirement. These particular securities typically have semi-annual interest payments.

As of the end of 2010, municipal debt totaled \$2.9 trillion.²⁸ When there is a need for financing, such as the building of the transcontinental railroad in the late 1800's, sharp increases in municipal outstanding debt occur. In periods of war, investment sources tend to trend elsewhere. Throughout the course of the twentieth century, the market grew rapidly.²⁹ In recent years, there has been a trend towards revenue bonds. According to Appendix E, municipal bonds are rated by Fitch, Moody's, and Standard and Poor's.³⁰ Due to a variety of risk factors, highly rated debt produces a lower yield. Lower risks produce lower returns.

Issuers of municipal debt include some 89,500 state and local governing bodies along with various authorities. "An authority is a separate state or local governmental issuer expressly created to issue bonds or to run an enterprise, or both".³¹ Municipalities rely on property taxes, and states rely on income and sales taxes to raise sufficient funds for the public good. Municipal bonds are not issued to fund the operations of the state and local governing bodies but are used for projects encompassing "counties, municipalities, courthouses, and schools".³²

After being underwritten and issued into primary and secondary markets, there are three primary investors. These include: "households, consisting of individuals acting directly or through investment advisors; household proxies, that is, bond funds such as open-end mutual funds, managed closed-end funds, and money market funds; and

²⁸ Ibid. 1

²⁹ Ibid. 55-56

³⁰ Ibid. 12-13

³¹ Ibid. 4

³² Ibid. 5

institutions, particularly commercial banks and property and casualty insurance companies”.³³ In a combination of nine numbers and letters, all bonds are identified by a Committee on Uniform Security Identification Procedures (CUSIP). Critical regulating bodies include: the Securities and Exchange Commission (SEC) which regulates federal securities laws, the Municipal Securities Rulemaking Board which is composed of 21 members from various backgrounds and works to establish both ethical and fair municipal security standards for the public, financial advisors, and institutions, and the Financial Industry Regulatory Authority (FINRA) which covers the rules and regulations governing securities firms doing business in the United States.³⁴

Though municipal bonds are given the label as a tax-exempt investment, this is not always the case. “Issuance of traditional, fully tax-exempt bonds in 2010 was only 63.6 percent of all municipal issuance as municipalities and investors embraced Build America Bonds and similar bonds, resulting in the further development of an already existing modest market for taxable municipal bonds that do not receive a federal subsidy on interest payments”.³⁵ As more stringent government regulations have been put into practice, there is a growing trend toward taxable municipal bond issuances.

TAX-EQUIVALENT YIELD

In reference to Appendix D, investors are offered the ability to weigh tax alternatives.³⁶ Tax-exempt status investments are particularly lucrative to highly-taxed investors. If there was an opportunity to yield a six percent return on a taxable security and a 4.2 percent return on a similar tax-exempt bond, the ability to earn an optimal

³³ Ibid. 17-18

³⁴ Ibid. 19-21

³⁵ Ibid. 34

³⁶ Ibid. 31-32

return must take into consideration the taxable equivalent yield. If a wage earner in the top tax bracket invested in this taxable security, their after-tax yield is 3.9 percent. A top wage earner's ideal investment in this instance is a municipal security yielding 4.2 percent. As this debt is considered safer than similar corporate debt, high income investors gravitate to municipal securities. Between 1940 and 1999, municipal default rates totaled 1.1 percent.³⁷ According to Moody's, historical corporate default rates are around two percent.³⁸ In most cases, lower marginal tax bracket investors will not gain significant benefits from this particular security.

BOND RATING IMPACTS

In a July 1995 article entitled "Public Utility Regulation and Bond Ratings" by John P. Formby, Banamber Mishra, and Paul Thistle, it was stated that "When you buy the securities of a utility, you are buying the Public Utility Commission".³⁹

- Producer (Business Friendly): High Bond Rating
- Consumer Friendly: Lower bond ratings.

Any new construction will have an overall negative impact on bond ratings. If any new construction projects are accounted for utilizing Construction in Progress (CIP), a transfer of risks will be from investors to consumers. This will in turn lead to higher bond ratings. In terms of debt, the only financially significant variable is the Debt-Asset Ratio. Political variables are as important as financial variables in the determination of utility rates. An elected PUC will have a direct negative impact to the utility in higher debt costs.

³⁷ See Fahim, (2010), para. 19

³⁸ See Maurer, Nguyen, Sarkar, Wei (2007), 322

³⁹ See Formby, Mishra, Thistle, (Jul.1995), 119

Public utility rates are determined by the lowest rate of return while keeping in mind the public interest and social welfare. “Given the allowed rate of return, the rational utility management represents the interest group it is supposed to serve by selecting the investment rate and financing mix in stock price maximization. The rational regulatory agency represents the interest group it is supposed to serve by selecting the lowest rate of return which realizes the desired investment rate. Both take as given how investors value the utility’s stock”.⁴⁰ While taking into account the dividend rates and implications as determined by equity capital, a fair rate of return and target price can be determined.

The firm tends to decrease in value under an elected body through reducing the firm’s net cash flows and also by directly increasing the variability of the cash flows. In the Public Utility’s debt, bond ratings will be lower for elected PUC’s. The commissioner’s behaviors must be monitored as the regulatory process is impacted by the:

- Number of commissioners
- Commissioners’ terms in office
- Conditions of the commissioners’ employment salaries
- Resources allocated to the PUC (size of staff and budget)⁴¹

If one were to monitor a Public Utility Commission’s funding seeing that its size was increasing, the marginal cost per dollar of support would decrease as the size of the commission increases if they were to be appointed. There is no direct correlation between the size of an elected PUC and support from consumers. In increasing the size of a commission, this should lead to lower bond ratings.

⁴⁰ See Gordon (1974), 4

⁴¹ Ibid. 126

COST OF CAPITAL

Cost of capital is defined as “the aggregate return required to investors”. An opportunity cost is defined as “the loss of the possibility for investors to place resources into other potential investments”.⁴² In weighing the previous three methods of obtaining capital, the following formula is utilized to determine the most cost-efficient method through which it may be obtained. In the utilization of the Capital Asset Pricing Model (CAPM), a risk premium can be assessed to value an investor’s required rate of return on common shares. This particular method assesses an investor’s required rate of return according to the following formula:

Formula 1: CAPM

$$K_e = K_{rf} + B(K_{mp} - K_{rf})$$

K_e : Cost of Equity Capital

K_e : Required rate of return on equity

K_{rf} : Risk free interest rate normally assessed in treasury notes

B : Equity’s current market beta

K_{mp} : Required rate of return in terms of market premium (can be assessed by the performance of an index (S&P 500)).⁴³

Throughout the study, this relationship will be implied but not necessarily utilized.

After establishing the cost of equity utilizing the Capital Asset Pricing Model, the Weighted Average Cost of Capital can be established with K_e as a plug into the following formula. This takes into account the weight of debt multiplied by the cost of the debt less tax plus the weighted average cost of equity capital plus its costs to maintain.

⁴² See Morin (1994), 20, 409

⁴³ Ibid. 301-303.

Formula 2: WACC

$$WACC = W_d K_d (1-T) + W_e K_e$$

- WACC: Weighted Average Cost of Capital
- W_d : Weighting of debt compared to other forms of capital
- K_d : Investors' required rate of return
- W_e : Weight of equity compared to that of the other forms of capital utilized
- K_e : Established by CAPM
- T: Tax Rate⁴⁴

An opportunity cost in the investment in this particular company presents itself to the investor. Investors typically anticipate comparable earnings to that of the industry reaping a similar benefit and reward. As public utility companies must establish a Fair Rate of Return, this variable K can fluctuate dependent on the variables mentioned. In the prediction of future output as a direct result of this particular investment, a discounted cash flow model must be used. This will make assumptions about cash flows due to the investment in a particular project.

Fixed income securities' costs of capital are fixed at the stated interest rate for that security. If at issuance the bond's interest rate is five percent, the cost of interest for this debt will be five percent. If debt grows to be overweight in comparison to equity capital, this will create an overleveraged and riskier enterprise with fixed interest payments jeopardizing an organization's going concern. In the utilization of the principles of the Time Value of Money, a Net Present Value (NPV) and Yield to Maturity (YTM) can be established. Once the Yield to Maturity is calculated, the Effective Annual Return (EAR) can be plugged into the WACC formula. For the purposes of this project, a fixed rate is used to test sensitivity, representing EAR as K_d .

⁴⁴ Ibid. 23-27,409-411

Formula 3: EAR

$$EAR = (1 + (i/n))^n - 1$$

Through these means, an organization is capable of assessing the various methods of capital attainment. Equity securities cost of capital includes long-term dividend yield and price appreciation. The primary decision maker is the utility's management team, though stockholders contain the ultimate authority as the utility's primary ownership.

"The rationale for private ownership of property is that its use in the interest of its owners, subject to whatever constraints society imposes by law, serves society better than charging the managers with serving the public interest".⁴⁵ A firm can be appropriately valued by the current market value of its common stock, which in turn represents the primary goal of management in the production of a maximization of the market value.

In a stereotypical public utility establishment, three assumptions must be made, which include:

- Management will work to produce output at the lowest possible cost.
- Investment and financing decisions are made with the objective of maximizing the market value of the outstanding common equity.
- One undifferentiated product is being sold or the relative structure of different products has been fixed.⁴⁶

CAPITAL STRUCTURE

An organization's capital structure is broken down into specific debt and equity weightings. Particular variations can be most beneficial to a firm. Greater debt will result in a greater expected return for equity investors. The debt ratio is measured by a company's total debt divided by its total assets. If a company were overleveraged, this would present a scenario in which the cost of equity capital to investors would be

⁴⁵ See Gordon (1974), 3

⁴⁶ Ibid.

positively correlated to a company's leverage. The interest coverage ratio measures how many times over a company would be capable of debt interest repayment. "The greater the debt ratio, the greater the return required by equity investors".⁴⁷ In the case of public utilities, Public Utility Commissions can and do have the authority in some cases to require a particular optimal capital structure. There is an optimal capital structure at an equilibrium point. The "regulatory climate" is a key determinant in a public utility's cost of capital. An unfavorable regulatory climate will produce a higher cost of capital and vice-versa.⁴⁸

⁴⁷ See Morin (1994), 439 for further information on debt/equity ratio implications.

⁴⁸ Ibid. "Optimal Capital Structure" 457-468

Chapter III: Sensitivity Analysis

OVERVIEW

The analysis performed entails a simplified version of the income statement. The sensitivity analysis performed takes Morin's Revenue Requirement formula and applies it to a standard Income Statement. Revenue requirements dictate a firm's cost of energy service. These revenue requirements "must be sufficient to cover the costs of service, which are comprised of operating expenses, taxes, depreciation, and a fair return on the net plant employed by the utility". In the application of the prior revenue determination reference, the following assumption follows:

Formula 4: Revenue Requirements

Revenue Requirements = Cost of Service

$$R = O + D + T + K(B)$$

R: Revenue Requirements

O: Operating Expenses

D: Depreciation Allowance

T: Taxes

K: a Fair Rate of Return

B: Rate Base (All Assets that are Used and Useful)⁴⁹

This model was applied to a standard Income statement. The taxable version is as follows:

⁴⁹ Ibid. 4

Base Model

Base			
R O I T K(B)	Sales	40000000	
	Expenses	$=(E5*J5)*(1-0.05)$	
	EBIT	$=E5-E6$	
	INT	$=J6*H6$	
	EBT	$=E7-E8$	
	Tax	$=E9*J8$	
	NIAT	$=E9-E10$	
		Population	400000
		Fixed and Variables Expenses	0.78
		Current Notes Payable	5000000 0.06
		Common Shares Outstanding (Assume Total Value PV \$5 avg.)	5000000 0.12
		Tax	0.25
		W_d	0.5
		W_e	$=1-J9$

Output	
Monthly Bill	$=(E5/H4)-(G15/H4)$
Equity Surplus (Deficit)	$=E11-G18$
K_d (\$)	$=J6*H6$
K_d	$=J6$
K_e (\$)	$=J7*H7$
K_e	$=J7$
Cost of Capital (\$)	$=(J6*H6)+(J7*H7)$
WACC	$=(J6*J9)*(1-J8)+(J10*J7)$

Dividends are ignored in the completion of this project. Both sales and operating expenses were held constant to hold a base rate of one-hundred dollars per customer as a round number prior to testing the model's sensitivity. The model assumes that revenue bonds are being issued by the Public Utility Financing Bank. For each incremental increase in population, an equivalent level of sales was established through a similar multiple. Fixed and variable expenses were a percentage of total sales. In using a simple income statement, a rate was eventually established by determining whether or not the utility performed well enough to ensure expected investor returns. In adjusting the variables in the top right box, varying rates were established dependent on variable sensitivity. The model also assumes that all returns are given back to the shareholder in earnings retention and not reinvested by the firm in other capital.

MONTHLY BILL

The monthly bill is the focus of this project. By dividing sales by the total population, a base monthly bill is established. For the purposes of this project, the base always equals \$100. The equity surplus or deficit is then accounted for either by decreasing or increasing the final monthly bill paid by the consumer respectively. The factors in the top-right box impact the income statement. Population will impact sales, fixed and variable expenses will impact expenses, current notes payable will directly impact interest, and the tax rate will have a direct impact on tax. The other figures displayed in the simple income statement are totals. The weights of debt and equity are applied to the output box to eventually find the weighted average cost of capital. Though it was believed originally that the weighted average cost of capital would be a significant figure, for the purposes of this project it ends up irrelevant. Debt cost of capital in interest payments are accounted for in the simple income statement. The equity cost of capital is noted in the top-right box next to the common shares outstanding. In the base example, this figure is twelve percent. This goes up to fifteen percent when the firm is overleveraged. For the purposes of this project, overleveraging occurs at seventy percent debt and it is assumed that at this point cost of equity capital will increase by three percentage points. A similar dollar value is found by multiplying the common shares outstanding, which are assumed to be at market value, by this required rate of return. The dollar value for the cost of equity capital is subtracted from the net income after taxes figure. After dividing this figure by the population, this amount is then subtracted from the rate which creates the current monthly bill paid by the customer. As it is critical for

investor-owned utilities to keep shareholders content, this is the most critical performance figure though it does not necessarily have to be paid.

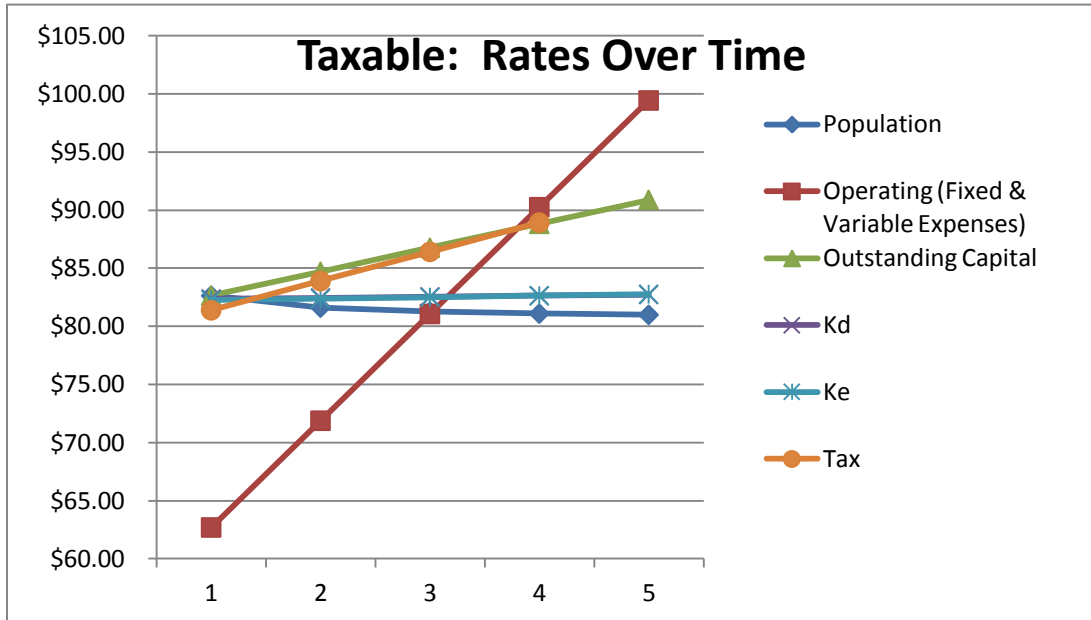
TAX-EXEMPT

Tax-exempt status removes $(1-T)$ from the WACC formula. This removes the tax-break given to a firm on taxable debt. The deduction was shifted directly to the interest paid on taxable debt, adjusting the model accordingly. This shift eliminated a change in WACC but is reflected in cheaper interest payments. The deduction is in theory passed directly onto the interest rate paid on fixed income capital. The federal government compensates for the equivalent taxable interest. There will be variations in the current market interest rate of municipal debt. It may not necessarily be equivalent, but for these purposes, this is an assumption.

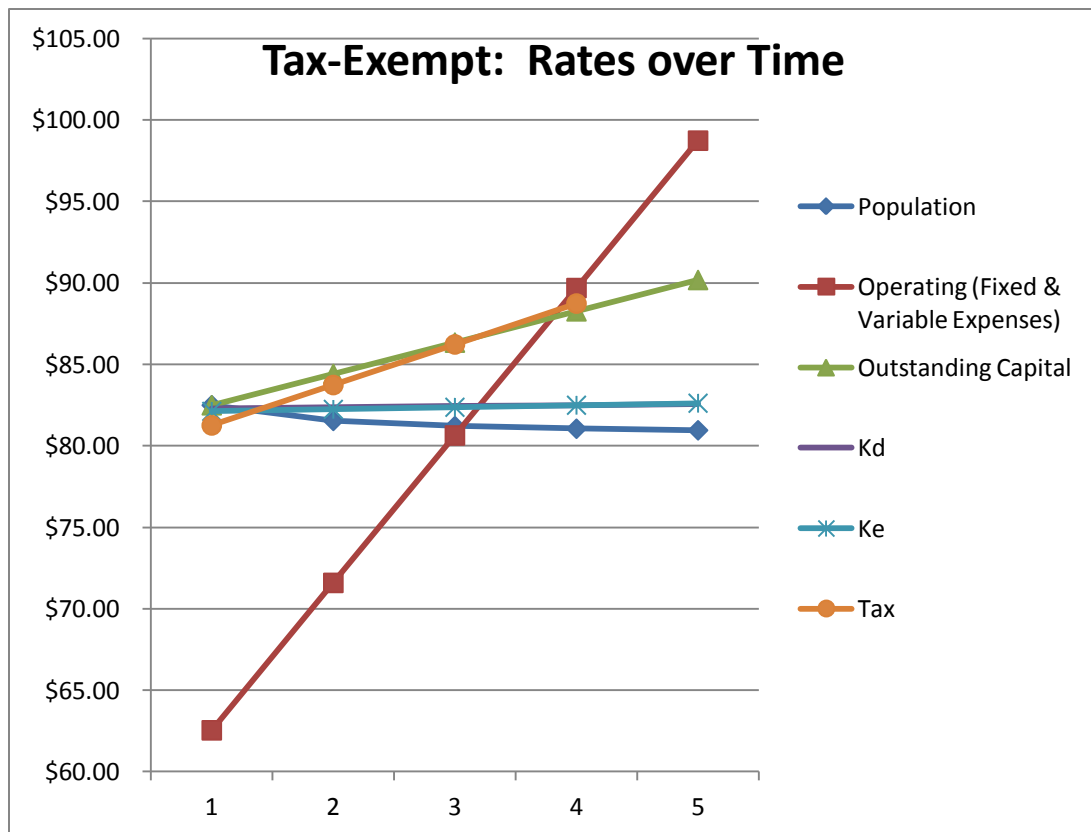
APPENDIX I

Appendix I displays the monthly bills established in the sensitivity analysis for both taxable and tax-exempt securities. The following column shows changes from one period to the next (Ex. $T-T_1$, T_1-T_2) in terms of monthly bills paid. If the number is positive, this represents an increase in monthly bills and vice-versa. The final two columns describe whether or not this is a constant change over periods and ranking implies which variables have the most negative and positive impacts on a scale from one to seven respectively. The following charts display taxable and tax-exempt rates over time:

Taxable Rates over Time



Tax-Exempt Rates over Time



Taxable vs. Tax-Exempt over Time

Variable	Taxable-Tax-Exempt							
Population	\$	0.14	\$	0.07	\$	0.04	\$	0.03
Operating (Fixed & Variable Expenses)	\$	0.14	\$	0.28	\$	0.42	\$	0.56
Outstanding Capital	\$	0.14	\$	0.28	\$	0.42	\$	0.56
K _d	\$	0.07	\$	0.09	\$	0.12	\$	0.14
K _e	\$	0.14	\$	0.14	\$	0.14	\$	0.14
Tax	\$	0.12	\$	0.16	\$	0.18	\$	0.19

Weights over Time

	Taxable - Tax-Exempt	
1	\$	0.03
2	\$	0.06
3	\$	0.08
4	\$	0.11
5	\$	0.14
6	\$	0.17
7	\$	0.20
8	\$	0.22
9	\$	0.25

Varying Weights

POPULATION (Appendix I)

With all other variables held constant, a population increase will result in a monthly bill decrease. The population was increased in 400,000 person increments from 400,000 to 2,000,000. Over time with all other variables held constant and population continually increasing, there will come a point in time when a population increase is insignificant in both the taxable and tax-exempt models. In following the model, tax-exempt bond issuance will make monthly bills cheaper at a decreasing monthly bill. The issuance of tax-exempt bonds opposed to taxable securities will be insignificant in time with population increasing and all other variables held constant.

FIXED AND VARIABLE EXPENSES (Appendix I)

Fixed and variable expenses were increased in ten percent increments from fifty percent to ninety percent as a percentage of sales. Organizational efficiency and minimization of these expenses will be of the utmost benefit to the organization as these expenses are a significant contributor to overall profit levels. The monthly bill will increase at a constant of \$9.19 for taxable securities and \$9.05 for tax-exempt securities with all other variables held constant and a population of 400,000 bill payers according to the model. In any form, this has the most significant negative impact on monthly bills. There will consistently be a fourteen cent difference between taxable and tax-exempt securities in this scenario.

OUTSTANDING CAPITAL (Appendix I)

Increases in outstanding capital will significantly impact debt coverage. Debt and equity were both increased in \$5,000,000 increments. With all other factors held constant, increases of \$5,000,000 for both debt and equity will create a two dollar monthly bill increase for monthly bill payers with all other variables held constant. This indicates that increasing capital structure will not create drastically negative impacts for the entity and will ensure positive infrastructure development with an increase. The difference between taxable and tax-exempt securities is a consistent fourteen cents. This variable will be critical in infrastructure development and in theory tax-exempt debt would allow for a greater debt capital position.

K_d (Appendix I)

Interest rate increases will marginally increase monthly bills. In the model used, monthly bills increased with each increment of one percent by nine cents. For similar tax-

exempt debt, monthly bills increased by seven cents when one percent increments were added. With interest rate growth, the spread between taxable and tax exempt securities widened due to a growing deduction from increasing monthly bills. For the purposes of the tax-exempt model opposed to the taxable model, this would imply that the use of tax-exempt debt under higher interest rates would be of the most benefit to the entity.

K_e (Appendix I)

Increases in the cost of equity (K_e) increased the model marginally. The spread between taxable and tax-exempt debt remained consistent when sensitivity was tested in five scenarios with K_e increasing by one percent in each. Between both models, the cost of equity increased at a constant rate of fourteen cents with all other variables held similar.

TAX (Appendix I)

Tax increases will increase monthly bills. The tax rate was increased in ten percent increments from twenty to fifty percent with all other variables held constant. An increase in tax rates will have the second most negative impact on monthly bill payers. For taxable securities, a consistent monthly bill increase of \$2.52 occurred with each ten percent increase. In this case for tax-exempt securities, the monthly bill will increase marginally between periods. The discrepancy is caused by the model and is due to the growing deduction in debt interest payments. With increases in the tax rate with all other variables held constant, the spread between taxable and tax-exempt debt will grow continually over time due to the structure of this model.

WEIGHTS (Appendix I)

The weight adjustments tested varying debt and equity capital monthly bill structures. The formula $(1-W_d)$ was applied to ensure that this was carried forward into customer monthly bills with equivalent equity totaling one-hundred percent. Outstanding capital in total was \$10,000,000 ranging from ten percent debt and ninety percent equity to ninety percent debt and ten percent equity. Shifts in debt structure marginally impact customer monthly bills. When W_d was greater than or equal to seventy percent in ten percent increments, it was determined that the overleveraged firm would require a higher return on equity capital due to excess risk involved in the investment. Besides this increase in k_e , taxable and tax-exempt debt decreased at constant rates and was the second most positive factor in both models. For taxable securities, the difference between time periods was nineteen cents and jumped to twenty-six cents with a K_e increase in positive benefits for the firm. For tax-exempt securities, the monthly bill between time periods decreased from twenty-two to twenty-nine cents with increasing leverage. If the firm becomes overweight in debt capital, a greater savings due to the weight of debt capital and the model will positively impact the issuance of tax-exempt securities at an increasing rate.

Chapter IV: Scenario Analysis

OVERVIEW

In combining the results found in the sensitivity analysis conducted, worst, middle, and best scenarios were produced. In combining these factors, the following is presented:

Key Factors

Taxable

	WORST	MIDDLE	BEST
Sales	10,000,000	40,000,000	70,000,000
Population	100,000	400,000	700,000
Operating	80%	70%	60%
Capital Outstanding (Debt & Equity)	15,000,000	10,000,000	5,000,000
K_d	15%	10%	5%
K_e	20%	12%	7%
Tax	40%	30%	20%
W_d	70%	50%	30%
W_e	30%	50%	70%
WACC	12.30%	9.50%	6.10%

Tax-Exempt

	WORST	MIDDLE	BEST
Sales	10,000,000	40,000,000	70,000,000
Population	100,000	400,000	700,000
Operating	80%	70%	60%
Capital Outstanding (Debt & Equity)	15,000,000	10,000,000	5,000,000
K_d	9%	7%	4%
K_e	20%	12%	7%
Tax	40%	30%	20%
W_d	70%	50%	30%
W_e	30%	50%	70%
WACC	12.30%	9.50%	6.10%

WORST

This highly taxed, under populated, and inefficiently-operated establishment creates a scenario in which there is an equity deficit to shareholders. This is reflected in monthly bills over the \$100 established base. Due to additional tax paid and the relative decrease in interest rates paid on tax-exempt financing, the spread between taxable and tax-exempt securities is widest in this scenario. With above-average risks, monthly bill payers will anticipate a greater yield, but with this yield, the interest is equivalently reduced in this model. This creates an opportunity for poorly performing utilities to reduce monthly bills for what should be unsatisfied customers.

Worst-Case Scenario

Taxable

WORST			
R O I T K(B)	Sales	10,000,000	Population 100,000
	Expenses	7,600,000	Fixed and Variables Expenses 80%
	EBIT	2,400,000	Current Notes Payable 15,000,000 15%
	INT	2,250,000	Common Shares Outstanding (Assur 15,000,000 20%
	EBT	150,000	Tax 40%
T K(B)	Tax	60,000	W_d 70%
	NIAT	90,000	W_e 30%

Output	
Monthly Bill	\$ 129.10
Equity Surplus (Deficit)	(2,910,000)
K_d (\$)	2,250,000
K_d	15.00%
K_e (\$)	3,000,000
K_e	20%
Cost of Capital (\$)	5,250,000
WACC	12.30%

Tax-Exempt

WORST			
R O I T K(B)	Sales	10,000,000	Population 100,000
	Expenses	7,600,000	Fixed and Variables Expenses 80%
	EBIT	2,400,000	Current Notes Payable 15,000,000 9.00%
	INT	1,350,000	Common Shares Outstanding 15,000,000 20%
	EBT	1,050,000	Tax 40%
T K(B)	Tax	420,000	W_d 70%
	NIAT	630,000	W_e 30%

Output	
Monthly Bill	\$ 123.70
Equity Surplus (Deficit)	(2,370,000)
K_d (\$)	1,350,000
K_d	9.00%
K_e (\$)	3,000,000
K_e	20%
Cost of Capital (\$)	4,350,000
WACC	12.30%

(5.40) Delta

MIDDLE

In 2010 in Maine, the average monthly bill was \$81.83 in total. This model reflects what the average consumer would pay for an average performing firm. Due to a reduction in interest monthly bills, a reduction in outstanding debt and equity capital, a mid-range tax monthly bill, and equal debt and equity outstanding, the spread between taxable and tax-exempt securities caused a reduction in monthly bills but not significantly in comparison to the worst-case scenario.

Middle Scenario

Taxable

MIDDLE				
R O I T K(B)	Sales	40,000,000	Population	400,000
	Expenses	26,600,000	Fixed and Variables Expenses	70%
	EBIT	13,400,000	Current Notes Payable	10,000,000 10%
	INT	1,000,000	Common Shares Outstanding (Assur	10,000,000 12%
	EBT	12,400,000	Tax	30%
	Tax	3,720,000	W_d	50%
	NIAT	8,680,000	W_e	50%
Output				
Monthly Bill		\$	81.30	
Equity Surplus (Deficit)			7,480,000	
K_d (\$)			1,000,000	
K_d			10.00%	
K_e (\$)			1,200,000	
K_e			12%	
Cost of Capital (\$)			2,200,000	
WACC			9.50%	

Tax-Exempt

MIDDLE				
R O I T K(B)	Sales	40,000,000	Population	400,000
	Expenses	26,600,000	Fixed and Variables Expenses	70%
	EBIT	13,400,000	Current Notes Payable	10,000,000 7.00%
	INT	700,000	Common Shares Outstanding	10,000,000 12%
	EBT	12,700,000	Tax	30%
	Tax	3,810,000	W_d	50%
	NIAT	8,890,000	W_e	50%
Output				
Monthly Bill		\$	80.78	
Equity Surplus (Deficit)			7,690,000	
K_d (\$)			700,000	
K_d			7.00%	
K_e (\$)			1,200,000	
K_e			12%	
Cost of Capital (\$)			1,900,000	
WACC			9.50%	

BEST

The best case scenario with the lowest monthly bills presents a large population, minimal capital structure, a reduction in cost of capital, low interest rates, and minimal debt structure. In this scenario, tax-exempt debt will be cheaper but the benefits will be too insignificant for issuance. A well-structured and developed entity will not necessarily require this form of financing.

Best-Case Scenario

Taxable

BEST			
R O I T K(B)	Sales	70,000,000	Population 700,000
	Expenses	39,900,000	Fixed and Variables Expenses 60%
	EBIT	30,100,000	Current Notes Payable 5,000,000 5%
	INT	250,000	Common Shares Outstanding (Assur 5,000,000 7%
	EBT	29,850,000	Tax 20%
	Tax	5,970,000	W_d 30%
	NIAT	23,880,000	W_e 70%
Output			
Monthly Bill		\$	66.39
Equity Surplus (Deficit)			23,530,000
K_d (\$)			250,000
K_d			5.00%
K_e (\$)			350,000
K_e			7%
Cost of Capital (\$)			600,000
WACC			6.10%

Tax-Exempt

BEST			
R O I T K(B)	Sales	70,000,000	Population 700,000
	Expenses	39,900,000	Fixed and Variables Expenses 60%
	EBIT	30,100,000	Current Notes Payable 5,000,000 4.00%
	INT	200,000	Common Shares Outstanding 5,000,000 7%
	EBT	29,900,000	Tax 20%
	Tax	5,980,000	W_d 30%
	NIAT	23,920,000	W_e 70%
Output			
Monthly Bill		\$	66.33
Equity Surplus (Deficit)			23,570,000
K_d (\$)			200,000
K_d			4.00%
K_e (\$)			350,000
K_e			7%
Cost of Capital (\$)			550,000
WACC			6.10%

BANGOR HYDRO ELECTRIC

After extrapolating the necessary data for the model from Bangor Hydro Electric's 2011 financial statements, it was found that average taxable rates using this model are \$78.82 (my last bill was for \$83.00). This company is a wholly-owned subsidiary of Emera, Inc through BHE Holdings, Inc. After an acquisition of Maine & Maritime Corporation which is Maine Public Service Company's parent, the company became a subsidiary of BHE Holdings, Inc and will not be reviewed in this study. The company serves 118,000 customers in Penobscot, Hancock, Washington, Waldo, Piscataquis, and Aroostook counties. The company is focused purely on transmission and delivery services and is restricted due to industry deregulation from becoming a supplier. They charge customers for Transmission and Delivery services, receive supply from the wholesale or retail market, and act as a collection agent for Competitive Energy Providers and standard offer providers.⁵⁰

Before, the model was on a monthly basis. For Bangor Hydro's 2011 financial data, it was annualized by multiplying the population by the twelve months of the year. As this project is focused primarily on monthly bill setting, I adjusted total revenues to solely reflect Electric Operating Revenue. After applying relevant information, the taxable monthly bill totaled \$78.82, which is displayed in the model below. The tax-exempt monthly bill totaled \$77.06. An average expense rate and average interest rate of debt were found using excel's goal-seek function setting the simple income statement equal to the data listed in Bangor Hydro's income statement and finding the necessary percentage. The equity cost of capital was set at the firm's fair rate of return extracted

⁵⁰ See 10K, *Bangor Hydro Electric* Consolidated Financial Statements For the Years Ended December 31, 2011 and 2010

from the 2011 annual report. This would be deemed a mid-ranged scenario if using the scale from above. If the company were to issue tax-exempt bonds with an equivalent federal deduction in tax-exempt interest, a savings for monthly bill payers of \$1.76 would occur.

Bangor Hydro Electric

Bangor Hydro Electric				
R	Sales	109,199,000	Population Annualized (x12)	1,416,000
O	Expenses	94,000,000	Fixed and Variables Expenses	66%
	EBIT	15,199,000	Total Debt	213,877,000
I	INT	10,576,000	Common Shares Outstanding (Assume Total Value PV \$5 avg.)	48,000,000
	EBT	4,623,000	Tax	38%
T	Tax	1,753,919	W_d	65%
K(B)	NIAT	2,869,081	W_e	35%

Output	
Monthly Bill	78.82
Equity Surplus (Deficit)	(2,410,919)
K_d (\$)	10,576,000
K_d	5%
K_e (\$)	5,280,000
K_e	11%
Cost of Capital (\$)	15,856,000
WACC	5.88%

Tax-Exempt Savings **1.76** These numbers are adjusted due to revenues unrelated to rates.

Bangor Hydro Electric				
R	Sales	109,199,000	Population Annualized (x12)	1,416,000
O	Expenses	94,000,000	Fixed and Variables Expenses	66%
	EBIT	15,199,000	Total Debt	213,877,000
I	INT	6,563,573	Common Shares Outstanding (Assume Total Value PV \$5 avg.)	48,000,000
	EBT	8,635,427	Tax	38%
T	Tax	3,276,193	W_d	65%
K(B)	NIAT	5,359,234	W_e	35%

Output	
Monthly Bill	77.06
Equity Surplus (Deficit)	79,234
K_d (\$)	6,563,573
K_d	3%
K_e (\$)	5,280,000
K_e	11%
Cost of Capital (\$)	11,843,573
WACC	5.84%

CENTRAL MAINE POWER

Central Maine Power “conducts regulated electricity transmission and distribution operations in Maine serving approximately 607,000 customers in a service territory of approximately 11,000 square miles with approximately a population of one million people. The service territory is located in the southern and central areas of Maine and contains most of Maine’s industrial and commercial centers, including the city of Portland and the Lewiston-Auburn, Augusta-Waterville, Saco-Biddeford and Bath-Brunswick Areas. CMP is the principal operating utility of CMP Group, Inc. (CMP Group), a wholly-owned subsidiary of Iberdrola USA, Inc. (Iberdrola USA)”.⁵¹

The model was again annualized by multiplying the population by twelve. Equivalent percentages were established in the top-right box for simple income statement purposes. K_e was established by the company’s fair rate of return. Business operations are similar to Bangor Hydro in that the firm acts as a collection agent for Competitive Energy and standard offer providers. The taxable model produces a monthly bill of \$71.17 while the tax-exempt model produces a monthly bill of \$70.04. This represents a difference with rounding of \$1.12. In this mid-ranged scenario, the issuance of tax-exempt bonds will have a positive impact on the entity.

⁵¹ See *Central Maine Power Company and Subsidiaries Consolidated Financial Statements* For the Years Ended December 31, 2011 and 2010

Central Maine Power

Central Maine Power				
R	Sales	606,904,000	Population Annualized (x12)	7,284,000
O	Expenses	413,529,000	Fixed and Variables Expenses	68%
	EBIT	193,375,000	Long-Term Debt	629,660,000 6%
I	INT	31,741,000 *Adj	Common Shares Outstanding (Assume Total Value PV \$5 avg.)	156,057,000 13%
	EBT	161,634,000	Tax	33%
T	Tax	53,001,000	W _d	62%
K(B)	NIAT	108,633,000	W _e	38%

Output	
Monthly Bill	71.17
Equity Surplus (Deficit)	88,517,253
Kd (\$)	37,180,000
Kd	6%
Ke (\$)	20,115,747
Ke	13%
Cost of Capital (\$)	57,295,747
WACC	7.34%

**Preferred Dividends were not material for the functions of this project.

**CMP is the principal operating utility of CMP Group, Inc., a wholly-owned subsidiary of Iberdrola USA, Inc.

Tax-Exempt Savings	1.12
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Central Maine Power				
R	Sales	606,904,000	Population Annualized (x12)	7,284,000
O	Expenses	413,529,000	Fixed and Variables Expenses	68%
	EBIT	193,375,000	Long-Term Debt	629,660,000 3.97%
I	INT	19,549,399 *Adj	Common Shares Outstanding (Assume Total Value PV \$5 avg.)	156,057,000 13%
	EBT	173,825,601	Tax	33%
T	Tax	56,998,717	W _d	62%
K(B)	NIAT	116,826,883	W _e	38%

Output	
Monthly Bill	70.04
Equity Surplus (Deficit)	96,711,136
Kd (\$)	24,988,399
Kd	4%
Ke (\$)	20,115,747
Ke	13%
Cost of Capital (\$)	45,104,147
WACC	7.34%

Chapter V: Conclusion

FIRM PERSPECTIVE

From a firm's perspective, tax-exempt debt is cheaper. The long-term goal is to maximize profits for the firm. In shifting the tax deduction from the WACC formula to K_d , the resulting WACC remains the same. Market interest must remain consistent to the tax-equivalent formula for this assumption to hold true. With fluctuations in bond interest rates, it may not always be of the most benefit to issue. Market conditions and infrastructure demands are both critical. In almost all cases, this method reduces interest liability, in theory allowing for the firm to acquire more capital if need be, solidifying the interest coverage ratio.

GOVERNMENT PERSPECTIVE

When tax-exempt debt is issued, the federal government must compensate for lost revenue. In theory, a dollar is maximized when it is placed in the government's hand for the public benefit. This is not always the case as inefficiencies are evident throughout the system. Due to the subsidy in decreased revenues for the federal government, they may not support this.

MONTHLY BILL PAYER'S PERSPECTIVE

The monthly bill payer's primary goal is to receive the electric supply at the least cost to them. The monthly bill payer will always support lower prices. The monthly bill payer will ultimately support this form of financing.

ADDITIONAL LITERATURE

Additional relevant reading exists on the subject matter. Two works on the private use of tax-exempt bonds and the private activity-bond volume cap allocation were

relevant. Two small issues of private-activity bonds were issued in Maine in 1996 and 2000.

THE PRIVATE USE OF TAX-EXEMPT BONDS

In his work entitled, “The Private Use of Tax-Exempt Bonds”, Dennis Zimmerman found that the “primary benefits to be gained are that the private sector may be able to produce the service at least cost”. Due to the necessity for less capital because of efficiency, “fewer federal dollars will be required to achieve any given change in output”. In a seven percent taxable bond issuance, the business is liable to pay cash to its debt holders. These investors are then liable to pay this debt in taxes to the federal government generating tax revenues and contributing to overall deficit reduction. In a tax-exempt bond issuance where the investor maintains a thirty-five percent marginal tax rate, the state will pay 4.55 percent of this cash, while the federal government will in essence pay the remaining 2.45 percent. Though this is not always the case, it must be assumed that each dollar paid in taxes is optimized for the public good.⁵² States and municipalities generally desire to maximize economic output. In utilizing federally funded subsidies, these entities acquire the ability to: “obtain capital funding at the lowest cost possible, promote economic development, reap benefits to constituencies, provide general societal benefits, and advance other worthy objectives”.⁵³ Some of the critical issues impacting federal support of tax-exempt debt include: “income tax base erosions, misallocation of scarce resources, a distortion of equity in the income tax system, and

⁵² See Zimmerman (1991), 1

⁵³ Ibid. 1

involving the federal government unnecessarily in projects which should be specifically funded by the states”.⁵⁴

Current legislation favors the rejection of private participation in systems which serve primarily a public purpose. In terms of the electric industry, it is widely believed that restrictions on the issuance of tax-exempt debt were caused by the desire to reduce the federal deficit and revenue losses.

PRIORITIZATION IN PRIVATE-ACTIVITY-BOND VOLUME CAP ALLOCATIONS

“This paper proposes and tests a structural model reflecting the process of authorizing private-activity municipal bond issuance. Private-activity municipal bonds offer tax-exempt financing for programs including industrial development, utilities, low-income housing, and student loans. The Federal tax code sets annual caps on the total tax-exempt issuance within each state, so authorization becomes a scarce resource distributed via a political process. Interviews with program administrators in several states suggested the authorization process involves prioritizing categories of use, authorizing bonds for high-priority uses first, and then authorizing bonds for lower-priority uses until the cap is exhausted. A model representing this process suggests variables to include in reduced-form estimations and an alternative interpretation of the coefficients. The fit of the model can be improved by adding measures of political influence and imposing a structure that reflects the political prioritization process. In general, industrial development and utilities appear to be the highest priority uses of private-activity municipal bonds. Mortgage revenue bonds are the residual category most frequently”.⁵⁵

Private-activity tax-exempt financing is scarce in most circumstances. State and local officials distribute this resource often to those with a vested interest in their administration. There are five uses through which this form of financing can be used including: “industrial development, utilities, mortgage revenue bonds, multifamily

⁵⁴ Ibid. 1

⁵⁵ See Whitaker, (2011). *Prioritization in Private-Activity-Bond Volume Cap Allocation*. Abstract

housing bonds, and student loan bonds”.⁵⁶ The public officials are able to give a hand out to a vested local interest.

Historically, “the local governments issued tax exempt municipal bonds and transferred the proceeds to a private entity. The company or non-profit repaid the bonds at the lower interest rate. While this made no direct claims on the local taxpayers, it did lead to lost income tax revenue for the Federal government. The volume of this type of borrowing grew rapidly until Congress set a limit in the Tax Reform Act of 1986”.⁵⁷

PRIVATE-ACTIVITY BONDS IN MAINE

Two small private-activity bonds were issued by the Maine & Maritimes Corporation in 1996 and 2000 with a 25-year life. This is the holding company for Maine Public Service. The debt was issued at a variable rate. Due to volatility, it was decided to fix interest rates with an interest rate swap. As a result, a net comprehensive loss was produced. In 2004, rates were fixed at 4.57% and 4.68% for the 1996 and 2000 series notes respectively. “For both tax-exempt bond series, a long-term note was issued under a loan agreement between MPS and the MPUFB with MPS agreeing to make payments to the MPUFB for the principal and interest on the bonds”.⁵⁸

ECONOMIC IMPACTS

From an economic perspective, federally subsidized municipal bonds result in a loss in federal revenues. If these securities were taxed, this revenue could have been used to lower taxes and make after-tax disposable income higher, or the federal government could have used the funding to subsidize some other program. If not in the electric industry, the subsidized benefits would have occurred elsewhere. Public power through

⁵⁶Ibid. 3

⁵⁷ Ibid. 3

⁵⁸ See Form 10-Q, Maine and Maritime Corporation

government influence presents an opportunity to regulate the industry according to sustainability standards. Pollution control and conservation can be evident in a GOU opposed to an IOU which would not have sustainability in mind.

FURTHER REVIEW

Further review and an actual test issuance will be critical in learning more about the impact of tax-exempt bond issuance in the private IOU industry. Though government incentives in tax credits are currently available, actual issuance of tax-exempt private bonds will further ensure investment into new and sustainable capital.

In raising the volume-cap limitations on private-activity bonds and specifically stating that they must be used for public utility development, governing bodies will provide further incentive to develop up-to-date and efficient infrastructure. Though the federal government will forgo some budget revenues, direct development of these resources would be far more expensive and less efficient than privately funded activity. Through an efficient supply chain, for-profit firms have an incentive to continually improve profit margins. The taxpayer's dollar will make a greater impact in subsidizing the tax-exempt debt industry. It was found that a firm's WACC is equivalent whether the firm issues taxable or tax-exempt debt. Due to less interest expense, the firm and monthly bill payer are able to maintain cheaper capital and lower rates. With infrastructure sustainability as a primary going concern, the private use of tax-exempt debt on a larger scale is a feasible option for long-term American prosperity.

RESULTS

In keeping the best interest of the monthly bill payers in mind, it must be ensured by the utility that these individuals are provided the cheapest utility monthly bills possible. The definition of a conduit is “a means by which something is transmitted”. A conduit also is a channel through which two independent agents are capable of meeting. The conduit in the case of tax-exempt debt securities will be the state. The state will issue a tax-exempt security as a form of municipal debt for the private enterprise connecting the public utility with investors. Investor-owned utilities function to produce the greatest return on the bottom line. With little motivation to do the same in a government-owned utility, inefficiency often presents itself. Investor-owned utilities are at a disadvantage in obtaining cheaper debt financing. If the bottom line is maximized in the long-term for an independently operated business without significant infrastructure upgrades, the operation will possess little incentive to upgrade to more sustainable, technologically advanced, and efficient energy services. When the railroad system came into existence, the nation saw a need for government assistance in the creation of an efficient transportation system.⁵⁹ There is a similar need today in sustainable energy.

In continuing this study, further research should be conducted on the highly sensitive variables and their impact. This study is conclusive to the point where it displays what the impact will be with interest rates held constant and equally applied to a deduction in the cost of debt in the most negative, median, and positive scenarios. The data may be biased to allow for a produced monthly bill in the average range for Maine of \$81.83. Maine was used as an example to build the overview, but in theory this could be applied nationally. If a business were to enter their financial data into the model, they

⁵⁹ See Zimmerman (1991), 19-20

should be able to determine whether or not tax-exempt financing would be of benefit to them. Fees for issuance, lobbying within the state for issuance, and other costs may also be relevant. Varying interest rates and tax rates will ultimately determine whether or not this will be beneficial to a utility or any general business. Tax-exempt debt going forward is a viable option for sustainable federally supported infrastructure development.

FINAL REMARKS

Based on the model used in each scenario, the issuance of tax-exempt debt was cheaper. Well-structured utilities saw little difference in customer monthly bills between taxable and tax-exempt securities. Overleveraged and overtaxed entities saw much greater differentials between the two. On a case-by-case basis, issuing tax-exempt securities should be in the best interests of the customer and entity.

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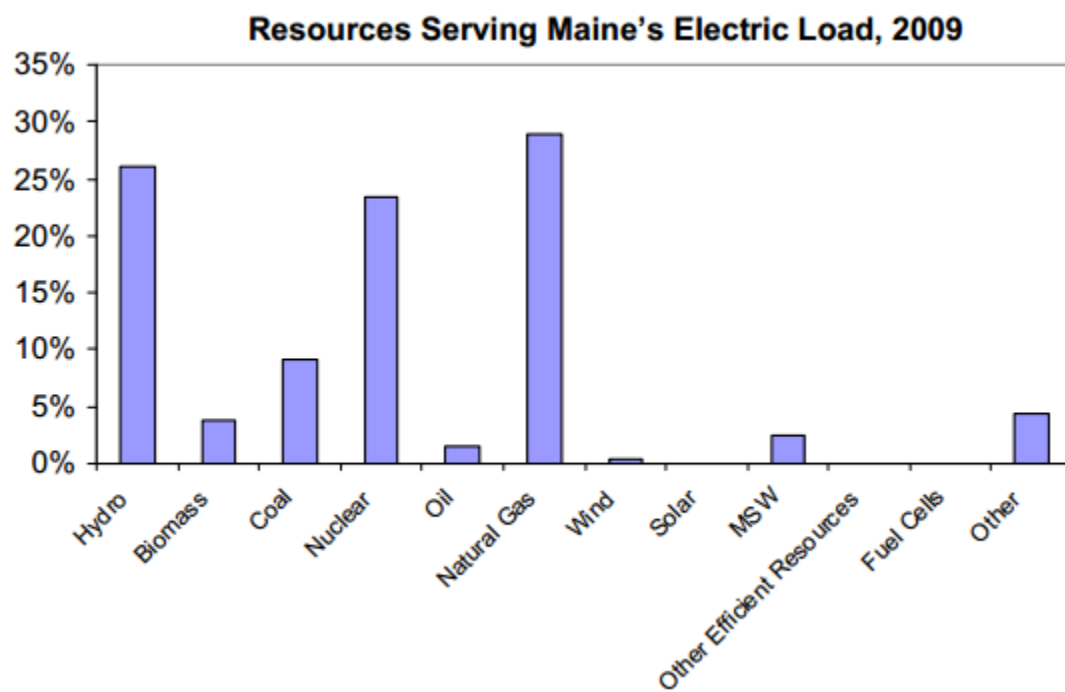
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Appendix A: Maine Residential Rates⁶⁰

2009 RESIDENTIAL RATES IN MAINE*					
	% of State Residential Load	kWh	T&D Delivery Rate ¢/kWh	Standard Offer Rate ¢/kWh	Total Rate ¢/kWh
<u>INVESTOR-OWNED UTILITIES</u>					
CMP	78.6%	3,422,941,000	6.21	8.92	15.14 ¢/kWh
BHE	13.6%	592,985,000	8.17	9.00	17.17 ¢/kWh
MPS	4.1%	180,065,000	8.38	8.33	16.71 ¢/kWh
<u>COOPERATIVES & MUNICIPAL-OWNED UTILITIES</u>					
Eastern Maine Electric Coop.	1.2%	53,636,557	9.09	9.15	18.24 ¢/kWh
Houlton	0.7%	29,027,240	3.14	8.60	11.74 ¢/kWh
Van Buren	0.2%	7,378,167	3.85	8.325	12.17 ¢/kWh
Kennebunk Light & Power	1.0%	44,162,724	2.21	11.00	13.21 ¢/kWh
Madison Electric Works	0.4%	17,309,986	3.55	10.54	14.09 ¢/kWh
Matinicus	0.0%	255,486	Exempt from Standard Offer Requirements		40.44 ¢/kWh
Monhegan	0.0%	118,406	Exempt from Standard Offer Requirements		70.00 ¢/kWh
Fox Island	0.1%	6,149,523	17.15	8.82	25.97 ¢/kWh
Isle au Haut	0.0%	174,290	36.84	7.53	44.37 ¢/kWh
Swans Island	0.0%	2,163,430	19.21	10.74	29.95 ¢/kWh
STATE AVERAGE		4,356,366,809	6.55	8.94	15.49 ¢/kWh
<i>* Rates based on 2009 annual reports and 3/1/2009 standard offer rates.</i>					

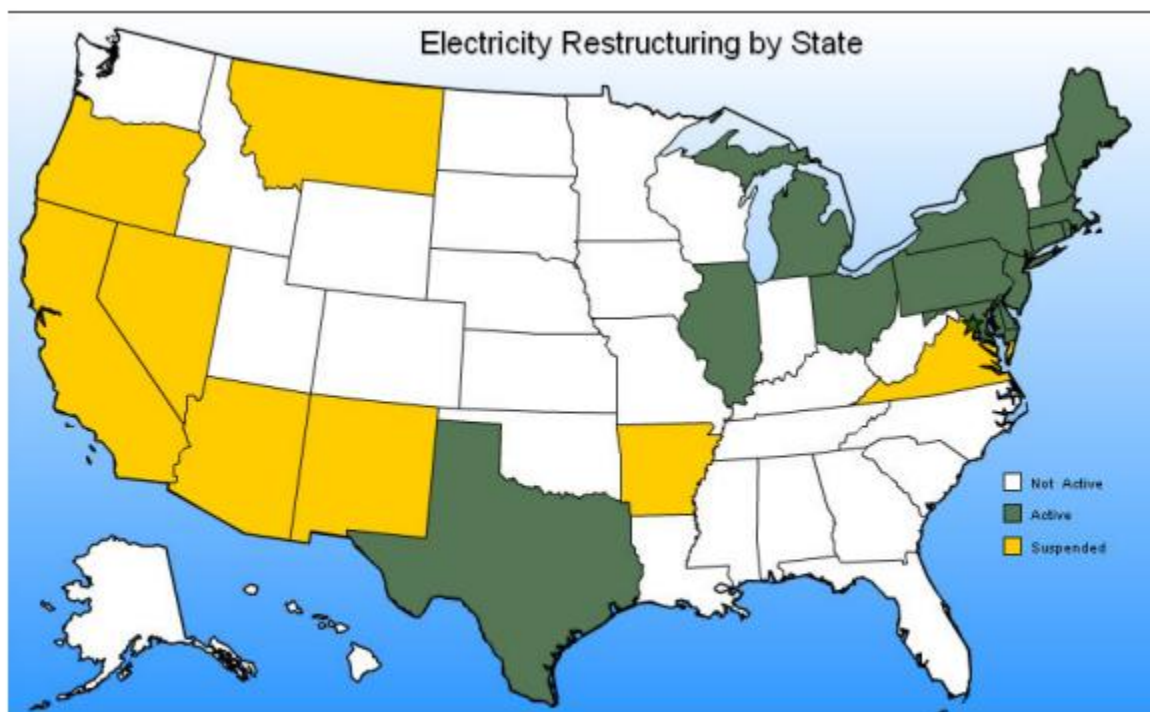
⁶⁰ See State of Maine Public Utilities Commission, 22

Appendix B: Resources Serving Maine's Electric Load, 2009⁶¹



⁶¹ Ibid. 36

Appendix C: Electricity Restructuring by State⁶²



Source: Energy Information Administration
Data as of September 2009

⁶² Ibid. 40

Appendix D: Sample Taxable Equivalent Yield

Taxable Yield Equivalent = Tax-Exempt Yield / (1 – Tax Rate)

Taxable Equivalent Yield Comparison

Taxable Equivalent Yield Tax-Exempt Invest In	Maximum Individual Tax Rate			35%
	Taxable Yield			6%
	Income			
	Low	Middle	High	
	4.7	5.6	6.5	
	4.2	4.2	4.2	
	Taxable	Taxable	Municipal	

2011 Marginal Income Tax Brackets

Schedule X—If your filing status is Single

If your taxable income is:		The tax is:	
Over—	But not over—		of the amount over—
\$0	\$8,375 10%	\$0
8,375	34,000	\$837.50 + 15%	8,375
34,000	82,400	4,681.25 + 25%	34,000
82,400	171,850	16,781.25 + 28%	82,400
171,850	373,650	41,827.25 + 33%	171,850
373,650	108,421.25 + 35%	373,650

**With an increase in income, the likelihood of municipal bond investment increases due to the retention of investment returns.

**If a municipal security is yielding 4.2%, it would be of the most benefit to invest in this compared to a taxable similar security currently yielding 6% if you were situated in the top tax bracket(s).

Appendix E: Bond Ratings⁶³

Bond Rate Scale			
Moody's	S&P	Fitch	
Aaa	AAA	AAA	
Aa1	AA+	AA+	
Aa2	AA	AA	
Aa3	AA-	AA-	Investment Grade
A1	A+	A+	
A2	A	A	
A3	A-	A-	
Baa1	BBB+	BBB+	
Baa2	BBB	BBB	
Baa3	BBB-	BBB-	
Ba1	BB+	BB+	
Ba2	BB	BB	
Ba3	BB-	BB-	
B1	B+	B+	Moody's also includes B, Caa, Ca, and C
B2	B	B	S&P and Fitch Ratings also include: B, CCC, CC, C, D
B3	B-	B-	Also Denoted With: Moody's 1,2,3 and S&P and Fitch with +/-

⁶³ See Beaumont (2004), 74 “Credit Ratings across Rating Agencies”

Appendix F: Variables and Measurement⁶⁴

Political variables

ELECT	= Commissioner selection procedure [= 1 if elected, = 0 if appointed]
COMM	= Number of Commissioners serving on state PUC
TERM	= Length of Commissioner's term in office
SALARY	= Commissioner's annual salary
STAFF	= Size of PUC's support staff
BUDGET	= Size of PUC's annual budget

Financial variables

TA	= Total assets
DA	= Capitalization ratio [Debt/Total Assets]
NITA	= Profitability [Net Income/Total Assets]
VNITA	= Stability of profits [Variance of NITA]
NII	= Interest coverage ratio [Net Income + Interest/Interest]

Other variables

AFA	= Firm operates under PUC approved Automatic Fuel Adjustment clause [= 1 if yes, = 0 if no]
AFUDC	= PUC permits firm to charge Allowance for Funds Used During Construction [= 1 if yes, = 0 if no]
CWIP	= PUC allows Construction Work In Progress in the rate base [= 1 if yes, = 0 if no]

⁶⁴ See Formby, Mishra, and Thistle, (Jul.1995), 126

Appendix G: Similarities and Differences of Equities and Bonds ⁶⁵

Similarities & Differences in Equities & Bonds		
	Equities	Bonds
Entitles holder to vote	x	
Entitles holder to a preferable ranking in default		x
Predetermined life span		x
Has a price	x	x
Has a yield	x	x
May pay a coupon		x
May pay a dividend	x	

⁶⁵ See Beaumont (2004), 7

Appendix H: Sensitivity Rates

Taxable

Variable	Rate (T)	Rate (T1)	Rate (T2)	Rate (T3)	Rate (T4)	Delta	Delta I	Delta II	Delta III	Constant?	Negative Impact (1: Highest - 7: Lowest)
Population	\$ 82.64	\$ 81.61	\$ 81.26	\$ 81.09	\$ 80.99	\$ (1.03)	\$ (0.34)	\$ (0.17)	\$ (0.10)		7
Operating (Fixed & Variable Expenses)	\$ 62.69	\$ 71.88	\$ 81.06	\$ 90.25	\$ 99.44	\$ 9.19	\$ 9.19	\$ 9.19	\$ 9.19	Yes	1
Outstanding Capital	\$ 82.64	\$ 84.70	\$ 86.76	\$ 88.83	\$ 90.89	\$ 2.06	\$ 2.06	\$ 2.06	\$ 2.06	Yes	3
K_d	\$ 82.36	\$ 82.45	\$ 82.54	\$ 82.64	\$ 82.73	\$ 0.09	\$ 0.09	\$ 0.09	\$ 0.09	Yes	5
K_e	\$ 82.26	\$ 82.39	\$ 82.51	\$ 82.64	\$ 82.76	\$ 0.13	\$ 0.13	\$ 0.13	\$ 0.13	Yes	4
Tax	\$ 81.38	\$ 83.90	\$ 86.41	\$ 88.93		\$ 2.52	\$ 2.52	\$ 2.52			2
Weights	See Below					See Below				Yes	6

Tax-Exempt

Variable	Rate (T)	Rate (T1)	Rate (T2)	Rate (T3)	Rate (T4)	Delta	Delta I	Delta II	Delta III	Constant?	Negative Impact (1: Highest - 7: Lowest)
Population	\$ 82.50	\$ 81.54	\$ 81.22	\$ 81.06	\$ 80.96	\$ (0.96)	\$ (0.32)	\$ (0.16)	\$ (0.10)		7
Operating (Fixed & Variable Expenses)	\$ 62.55	\$ 71.59	\$ 80.64	\$ 89.69	\$ 98.73	\$ 9.05	\$ 9.05	\$ 9.05	\$ 9.05	Yes	1
Outstanding Capital	\$ 82.50	\$ 84.42	\$ 86.34	\$ 88.26	\$ 90.18	\$ 1.92	\$ 1.92	\$ 1.92	\$ 1.92	Yes	3
K_d	\$ 82.29	\$ 82.36	\$ 82.43	\$ 82.50	\$ 82.57	\$ 0.07	\$ 0.07	\$ 0.07	\$ 0.07	Yes	5
K_e	\$ 82.12	\$ 82.25	\$ 82.37	\$ 82.50	\$ 82.62	\$ 0.13	\$ 0.13	\$ 0.13	\$ 0.13	Yes	4
Tax	\$ 81.26	\$ 83.74	\$ 86.23	\$ 88.74		\$ 2.48	\$ 2.49	\$ 2.51			2
Weights	See Below					See Below				Yes	6

Displays Difference Between Taxable and Tax-Exempt Debt for All Sensitivity Analysis

Variable	Taxable-Tax-Exempt					
Population	\$ 0.14	\$ 0.07	\$ 0.05	\$ 0.04	\$ 0.03	
Operating (Fixed & Variable Expenses)	\$ 0.14	\$ 0.28	\$ 0.42	\$ 0.56	\$ 0.70	
Outstanding Capital	\$ 0.14	\$ 0.28	\$ 0.42	\$ 0.56	\$ 0.70	
K_d	\$ 0.07	\$ 0.09	\$ 0.12	\$ 0.14	\$ 0.16	
K_e	\$ 0.14	\$ 0.14	\$ 0.14	\$ 0.14	\$ 0.14	
Tax	\$ 0.12	\$ 0.16	\$ 0.18	\$ 0.19		

Taxable Weights			
W_d	Rate	Change (Ex. W_d2-W_d1)	
10%	\$ 83.39		
20%	\$ 83.20	\$ (0.19)	
30%	\$ 83.01	\$ (0.19)	
40%	\$ 82.83	\$ (0.19)	
50%	\$ 82.64	\$ (0.19)	
60%	\$ 82.45	\$ (0.19)	
70%	\$ 82.49	\$ 0.04	
80%	\$ 82.23	\$ (0.26)	
90%	\$ 81.96	\$ (0.26)	

Taxable - Tax-Exempt	
1	\$ 0.03
2	\$ 0.06
3	\$ 0.08
4	\$ 0.11
5	\$ 0.14
6	\$ 0.17
7	\$ 0.20
8	\$ 0.22
9	\$ 0.25

Tax-Exempt Weights			
W_d	Rate	Change (Ex. W_d2-W_d1)	
1	10%	\$ 83.36	
2	20%	\$ 83.14	\$ (0.22)
3	30%	\$ 82.93	\$ (0.22)
4	40%	\$ 82.71	\$ (0.22)
5	50%	\$ 82.50	\$ (0.22)
6	60%	\$ 82.28	\$ (0.22)
7	70%	\$ 82.29	\$ 0.01
8	80%	\$ 82.00	\$ (0.29)
9	90%	\$ 81.71	\$ (0.29)

Constant until Cost of Equity Increase Due to Overleveraging

Appendix I: Sensitivity Additional Information

Population

Population			
R	Sales	80,000,000	Population 800,000
O	Expenses	59,280,000	Fixed and Variables Expenses 78%
I	EBIT	20,720,000	Current Notes Payable 5,000,000 6%
I	INT	300,000	Common Shares Outstanding 5,000,000 12%
E	EBT	20,420,000	Tax 25%
T	Tax	5,105,000	W_d 50%
K(B)	NIAT	15,315,000	W_e 50%

Rate	Output	\$	81.63
Equity Surplus (Deficit)			14,715,250
K_d (\$)			300,000
K_d			6%
K_e (\$)			600,000
K_e			12%
Cost of Capital (\$)			900,000
WACC			8.25%

Population			
R	Sales	80,000,000	Population 800,000
O	Expenses	59,280,000	Fixed and Variables Expenses 78%
I	EBIT	20,720,000	Current Notes Payable 5,000,000 4.50%
I	INT	225,000	Common Shares Outstanding 5,000,000 12%
E	EBT	20,495,000	Tax 25%
T	Tax	5,123,750	W_d 50%
K(B)	NIAT	15,371,250	W_e 50%

Rate	Output	\$	81.54
Equity Surplus (Deficit)			14,771,250
K_d (\$)			225,000
K_d			5%
K_e (\$)			600,000
K_e			12%
Cost of Capital (\$)			825,000
WACC			8.25%

Population			
R	Sales	120,000,000	Population 1,200,000
O	Expenses	88,520,000	Fixed and Variables Expenses 78%
I	EBIT	31,080,000	Current Notes Payable 5,000,000 6%
I	INT	300,000	Common Shares Outstanding 5,000,000 12%
E	EBT	30,780,000	Tax 25%
T	Tax	7,695,000	W_d 50%
K(B)	NIAT	23,085,000	W_e 50%

Rate	Output	\$	81.28
Equity Surplus (Deficit)			22,485,000
K_d (\$)			300,000
K_d			6%
K_e (\$)			600,000
K_e			12%
Cost of Capital (\$)			900,000
WACC			8.25%

Population			
R	Sales	120,000,000	Population 1,200,000
O	Expenses	88,520,000	Fixed and Variables Expenses 78%
I	EBIT	31,080,000	Current Notes Payable 5,000,000 4.50%
I	INT	225,000	Common Shares Outstanding 5,000,000 12%
E	EBT	30,855,000	Tax 25%
T	Tax	7,713,750	W_d 50%
K(B)	NIAT	23,141,250	W_e 50%

Rate	Output	\$	81.22
Equity Surplus (Deficit)			22,541,250
K_d (\$)			225,000
K_d			5%
K_e (\$)			600,000
K_e			12%
Cost of Capital (\$)			825,000
WACC			8.25%

Operating Expenses

Fixed and Variable Expenses			
R	Sales	40,000,000	Population 400,000
O	Expenses	22,800,000	Fixed and Variables Expenses 60%
I	EBIT	17,200,000	Current Notes Payable 10,000,000 6%
I	INT	600,000	Common Shares Outstanding 10,000,000 12%
E	EBT	16,600,000	Tax 25%
T	Tax	4,150,000	W_d 50%
K(B)	NIAT	12,450,000	W_e 50%

Rate	Output	\$	71.88
Equity Surplus (Deficit)			11,250,000
K_d (\$)			600,000
K_d			6%
K_e (\$)			1,200,000
K_e			12%
Cost of Capital (\$)			1,800,000
WACC			8.25%

Fixed and Variable Expenses			
R	Sales	40,000,000	Population 400,000
O	Expenses	22,800,000	Fixed and Variables Expenses 60%
I	EBIT	17,200,000	Current Notes Payable 10,000,000 4.50%
I	INT	450,000	Common Shares Outstanding 10,000,000 12%
E	EBT	16,750,000	Tax 25%
T	Tax	4,187,500	W_d 50%
K(B)	NIAT	12,562,500	W_e 50%

Rate	Output	\$	71.99
Equity Surplus (Deficit)			11,362,500
K_d (\$)			450,000
K_d			5%
K_e (\$)			1,200,000
K_e			12%
Cost of Capital (\$)			1,650,000
WACC			8.25%

Fixed and Variable Expenses			
R	Sales	40,000,000	Population 400,000
O	Expenses	26,400,000	Fixed and Variables Expenses 70%
I	EBIT	13,600,000	Current Notes Payable 15,000,000 6%
I	INT	900,000	Common Shares Outstanding 15,000,000 12%
E	EBT	12,500,000	Tax 25%
T	Tax	3,125,000	W_d 50%
K(B)	NIAT	9,375,000	W_e 50%

Rate	Output	\$	81.06
Equity Surplus (Deficit)			7,575,000
K_d (\$)			900,000
K_d			6%
K_e (\$)			1,800,000
K_e			12%
Cost of Capital (\$)			2,700,000
WACC			8.25%

Fixed and Variable Expenses			
R	Sales	40,000,000	Population 400,000
O	Expenses	26,400,000	Fixed and Variables Expenses 70%
I	EBIT	13,600,000	Current Notes Payable 15,000,000 4.50%
I	INT	675,000	Common Shares Outstanding 15,000,000 12%
E	EBT	12,925,000	Tax 25%
T	Tax	3,181,250	W_d 50%
K(B)	NIAT	9,543,750	W_e 50%

Rate	Output	\$	80.64
Equity Surplus (Deficit)			7,743,750
K_d (\$)			675,000
K_d			5%
K_e (\$)			1,800,000
K_e			12%
Cost of Capital (\$)			2,475,000
WACC			8.25%

Outstanding Capital Increase

Outstanding Capital Increase					
R	Sales	40,000,000	Population	400,000	
O	Expenses	29,640,000	Fixed and Variables Expenses		78%
	EBIT	10,360,000	Current Notes Payable	10,000,000	6%
I	INT	500,000	Common Shares Outstanding	10,000,000	12%
	EBT	9,860,000	Tax		25%
T	Tax	2,440,000	W_d		50%
K(B)	NIAT	7,420,000	W_e		50%

Output	
Rate	\$ 84.70
Equity Surplus (Deficit)	6,120,000
K_d (\$)	600,000
K_d	6%
K_e (\$)	1,200,000
K_e	12%
Cost of Capital (\$)	1,800,000
WACC	8.25%

Outstanding Capital Increase					
R	Sales	40,000,000	Population	400,000	
O	Expenses	29,640,000	Fixed and Variables Expenses		78%
	EBIT	10,360,000	Current Notes Payable	15,000,000	4.50%
I	INT	500,000	Common Shares Outstanding	15,000,000	12%
	EBT	9,860,000	Tax		25%
T	Tax	2,465,000	W_d		50%
K(B)	NIAT	7,095,000	W_e		50%

Output	
Rate	\$ 86.76
Equity Surplus (Deficit)	5,295,000
K_d (\$)	900,000
K_d	6%
K_e (\$)	1,800,000
K_e	12%
Cost of Capital (\$)	2,700,000
WACC	8.20%

Outstanding Capital Increase					
R	Sales	40,000,000	Population	400,000	
O	Expenses	29,640,000	Fixed and Variables Expenses		78%
	EBIT	10,360,000	Current Notes Payable	15,000,000	4.50%
I	INT	675,000	Common Shares Outstanding	15,000,000	12%
	EBT	9,685,000	Tax		25%
T	Tax	2,421,250	W_d		50%
K(B)	NIAT	7,263,750	W_e		50%

Output	
Rate	\$ 86.34
Equity Surplus (Deficit)	5,463,750
K_d (\$)	675,000
K_d	5%
K_e (\$)	1,800,000
K_e	12%
Cost of Capital (\$)	2,552,500
WACC	8.25%

K_d

K_d					
R	Sales	40,000,000	Population	400,000	
O	Expenses	29,640,000	Fixed and Variables Expenses		78%
	EBIT	10,360,000	Current Notes Payable	5,000,000	4%
I	INT	200,000	Common Shares Outstanding	5,000,000	12%
	EBT	10,160,000	Tax		25%
T	Tax	2,540,000	W_d		50%
K(B)	NIAT	7,620,000	W_e		50%

Output	
Rate	\$ 82.45
Equity Surplus (Deficit)	7,020,000
K_d (\$)	200,000
K_d	4%
K_e (\$)	600,000
K_e	12%
Cost of Capital (\$)	800,000
WACC	7.50%

K_d					
R	Sales	40,000,000	Population	400,000	
O	Expenses	29,640,000	Fixed and Variables Expenses		78%
	EBIT	10,360,000	Current Notes Payable	5,000,000	3.00%
I	INT	150,000	Common Shares Outstanding	5,000,000	12%
	EBT	10,210,000	Tax		25%
T	Tax	2,552,500	W_d		50%
K(B)	NIAT	7,657,500	W_e		50%

Output	
Rate	\$ 82.36
Equity Surplus (Deficit)	7,057,500
K_d (\$)	150,000
K_d	3%
K_e (\$)	600,000
K_e	12%
Cost of Capital (\$)	750,000
WACC	7.50%

K_d					
R	Sales	40,000,000	Population	400,000	
O	Expenses	29,640,000	Fixed and Variables Expenses		78%
	EBIT	10,360,000	Current Notes Payable	5,000,000	3.75%
I	INT	250,000	Common Shares Outstanding	5,000,000	12%
	EBT	10,110,000	Tax		25%
T	Tax	2,527,500	W_d		50%
K(B)	NIAT	7,582,500	W_e		50%

Output	
Rate	\$ 82.54
Equity Surplus (Deficit)	6,982,500
K_d (\$)	250,000
K_d	5%
K_e (\$)	600,000
K_e	12%
Cost of Capital (\$)	850,000
WACC	7.88%

K_d					
R	Sales	40,000,000	Population	400,000	
O	Expenses	29,640,000	Fixed and Variables Expenses		78%
	EBIT	10,360,000	Current Notes Payable	5,000,000	3.75%
I	INT	187,500	Common Shares Outstanding	5,000,000	12%
	EBT	10,172,500	Tax		25%
T	Tax	2,543,125	W_d		50%
K(B)	NIAT	7,629,375	W_e		50%

Output	
Rate	\$ 82.43
Equity Surplus (Deficit)	7,029,375
K_d (\$)	187,500
K_d	4%
K_e (\$)	600,000
K_e	12%
Cost of Capital (\$)	787,500
WACC	7.88%

K_e

K _e					
R	Sales	40,000,000	Population	400,000	
O	Expenses	29,640,000	Fixed and Variables Expenses		78%
	EBIT	10,360,000	Current Notes Payable	5,000,000	6%
I	INT	300,000	Common Shares Outstanding	5,000,000	10%
	EBT	10,060,000	Tax		25%
T	Tax	2,515,000	W _d		50%
K(B)	NIAT	7,545,000	W _e		50%

Output	
Rate	\$ 82.39
Equity Surplus (Deficit)	7,045,000
K _e (\$)	300,000
K _d	6%
K _e (\$)	500,000
K _e	10%
Cost of Capital (\$)	800,000
WACC	7.25%

Tax

Tax					
R	Sales	40,000,000	Population	400,000	
O	Expenses	29,640,000	Fixed and Variables Expenses		78%
	EBIT	10,360,000	Current Notes Payable	5,000,000	4.50%
I	INT	300,000	Common Shares Outstanding	5,000,000	11%
	EBT	10,060,000	Tax		25%
T	Tax	3,018,000	W _d		50%
K(B)	NIAT	7,042,000	W _e		50%

Output	
Rate	\$ 83.90
Equity Surplus (Deficit)	6,995,000
K _e (\$)	300,000
K _d	6%
K _e (\$)	600,000
K _e	12%
Cost of Capital (\$)	900,000
WACC	8.10%

Weights

Weights				
R	Sales	40,000,000	Population	400,000
O	Expenses	29,640,000	Fixed and Variables Expenses	78%
	EBIT	10,360,000	Current Notes Payable	4.50%
I	INT	120,000	Common Shares Outstanding	12%
	EBT	10,240,000	Tax	25%
T	Tax	2,560,000	W_d	20%
K(B)	NIAT	7,680,000	W_e	80%
Output				
Rate		\$	83.20	
Equity Surplus (Deficit)			6,720,000	
K_e (\$)			120,000	
K_d			6%	
K_e (\$)			960,000	
K_d			12%	
Cost of Capital (\$)			1,080,000	
WACC			10.10%	

Weights				
R	Sales	40,000,000	Population	400,000
O	Expenses	29,640,000	Fixed and Variables Expenses	78%
	EBIT	10,360,000	Current Notes Payable	4.50%
I	INT	90,000	Common Shares Outstanding	12%
	EBT	10,270,000	Tax	25%
T	Tax	2,567,500	W_d	20%
K(B)	NIAT	7,702,500	W_e	80%
Output				
Rate		\$	82.14	
Equity Surplus (Deficit)			6,742,500	
K_e (\$)			90,000	
K_d			5%	
K_e (\$)			960,000	
K_d			12%	
Cost of Capital (\$)			1,050,000	
WACC			10.16%	

Weights				
R	Sales	40,000,000	Population	400,000
O	Expenses	29,640,000	Fixed and Variables Expenses	78%
	EBIT	10,360,000	Current Notes Payable	4.50%
I	INT	180,000	Common Shares Outstanding	12%
	EBT	10,180,000	Tax	25%
T	Tax	2,545,000	W_d	30%
K(B)	NIAT	7,635,000	W_e	70%
Output				
Rate		\$	83.01	
Equity Surplus (Deficit)			6,795,000	
K_e (\$)			180,000	
K_d			6%	
K_e (\$)			840,000	
K_d			12%	
Cost of Capital (\$)			1,020,000	
WACC			9.75%	

Weights				
R	Sales	40,000,000	Population	400,000
O	Expenses	29,640,000	Fixed and Variables Expenses	78%
	EBIT	10,360,000	Current Notes Payable	4.50%
I	INT	135,000	Common Shares Outstanding	12%
	EBT	10,225,000	Tax	25%
T	Tax	2,556,250	W_d	30%
K(B)	NIAT	7,668,750	W_e	70%
Output				
Rate		\$	82.93	
Equity Surplus (Deficit)			6,828,750	
K_e (\$)			135,000	
K_d			9%	
K_e (\$)			840,000	
K_d			12%	
Cost of Capital (\$)			975,000	
WACC			9.75%	

AUTHOR'S BIOGRAPHY

Jake was born and raised in Byram, New Jersey. His principles are founded on being a well-balanced and modest individual. He enjoys working hard, remaining active, and ultimately pursuing a comfortable lifestyle. When he was a child, he began collecting coins and selling golfballs and from then on he knew that he had a passion for money and business. After taking two Accounting courses and other business classes in high school and achieving the highest academic average in business, he knew that he wanted to pursue this further, double majoring in both Finance and Accounting. While enrolled at the university, Jake was inducted into the Senior Skulls Honor Society, the top recognition an undergraduate male can achieve identifying the top one percent of students on campus in terms of scholarship, leadership, campus and community service, commitment to the university, and role model effectiveness for other students. As a Co-President of the Student Portfolio Investment Fund (SPIFFY), Jake actively managed with his peers ~\$1.7 million of the university's endowment, the highest mark for the fund to date. In moving through the ranks from analyst, sector head, VP of Public Relations, VP of Equity, and eventually to the Co-President of the group, this organization was the highlight of Jake's academic career. As a senior, Jake served as a Maine Business School student ambassador and as the Treasurer of both the Skulls and the student chapter of the Institute of Management Accountants. In the summers and occasionally during the school year, Jake interned in a variety of roles including: Fairchild Semiconductor International, Thomas Tax & Financial Services, AFLAC, and Source 4. After graduation, Jake will begin working for Baker Newman Noyes residing in Portland, Maine, while pursuing his CPA certification.