A Half-Century of Computing the Cost of Capital for Utilities at NERA

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Introduction

Prices in regulated industries rely on costs, which include the cost of capital as a key component. NERA has been at the forefront of issues concerning the cost of capital for regulated industries for over 50 years—ever since Dr. Alfred Kahn devoted an Appendix in his great work, *The Economics of Regulation*, to NERA Senior Vice President Herman Roseman's cost of capital investigations in the mid-1960s. I have been involved with cost of capital for 35 of those 50 years—thus this short paper is, in a sense, a personal reflection regarding the progress that has been made over the course of 50 years.

During that time, utility businesses have changed considerably in structure and ownership, pricing and competitiveness.

- **Structure and Ownership**: In the US, AT&T was broken up, natural gas was deregulated, interstate gas pipelines dealt with restructuring, and electricity has become commodity supplied by independent generating companies over power pools. Outside the US, a massive restructuring/privatization effort begun in the UK during the 1980s led to the movement of large state-owned energy and telecommunications infrastructures into the hands of investor-owners.

- **Pricing**: In the 1960s, marginal cost pricing was only a theory, and incentive regulation as we know it had not yet been invented (the coining of the term “price cap regulation” was two decades away). Since then, great changes have come about in the structure and efficiency of regulated prices.
• **Competition**: Gas, electricity, and telecommunications services became competitive commodities in the US and in various countries around the world. Advances in regulation have led to the creation of unregulated “secondary markets” for access to regulated infrastructures, as in the case of interstate gas pipeline capacity in the US.

Throughout all of these changes, regulation has continued to play a key role in protecting consumers who buy from the remaining regulated businesses—local distribution in electricity, gas, water, and interstate transmission in both gas and electricity. For such regulated business around the world, the cost of capital remains a basic issue. It is the principle empirical interface between private investors and the public interest, and a continuing subject of debate, concern, and empirical investigation.

**The Institutional Foundation for Cost of Capital in North American Regulation**

Describing the role of the cost of capital in around the world is problematic. While all regulated electricity or gas companies perform similar physical functions for their consumers, the institutions that surround those companies differ from country to country. The institutions that shaped the development of regulated utilities in the US arose more than a century ago in response to highly newsworthy initiatives that are now largely forgotten. The institutions surrounding investor-owned infrastructure businesses in Europe, Australia, Asia, or South America are newer by comparison, as they developed with the privatizations of the late 20th century.

The regulation of utilities in North America faces a special kind of constraint that most other nations do not exhibit. Particularly in the United States, major regulatory statutes do not become settled methods of government control over private businesses until they are tested in the courts. In this respect, the US Supreme Court is the ultimate regulator—what the economist John R. Commons (who was heavily involved in creating the model for US regulatory legislation) called “the first authoritative faculty of political economy in the world’s history.”

The major test for the US Supreme Court revolves around property—that is, whether any regulation somehow deprives investors of the value of their property without due process of law (and due compensation). No other country bases its regulations on questions of constitutionally protected private property in this fashion, though Canada has a practical judicial equivalent.

**Private Property and Judicial Sovereignty in the United States**

Finding the cost of capital in the US and Canada centers on the value of private property that investors commit to public utilities and other public service firms. Commons, who wrote the US’ first regulatory statute in 1906 (for Wisconsin), and taught the world’s first regulatory economics class in 1907, said that “[i]n modern capitalism, the most important stabilized economic relations are those of private property.” Over the course of 100 years of utility regulation, US and Canadian courts have defined private property quite clearly.
As is the case with many legal and institutional issues in regulation, the definitions in the major US Supreme Court decisions that underlie regulation in North America, particularly involving the valuation of capital, do not generalize easily around the world—even to UK or the rest of Europe. In 1934, Commons noted the difficulty faced by US and European economists when dealing with different legal systems, in ways just as relevant in the 21st century, saying:

In America, we think concretely according to the common law method of individual cases and precedents, conformable to our judicial sovereignty; while the Europeans think abstractly in deductive terms handed down from Justinian, Napoleon, Adam Smith and Ricardo. If we generalize… we discuss only general principles, leaving their application to investigations of the particular cases. In this way has arisen the American common law method. This American system of custom, precedent, and assumptions is with difficulty comprehended by European economists and jurists who operate under a system of codes constructed originally … on the model of the perfected Roman law and changeable only by legislatures. It is even understood with difficulty by the British, whose legislature is superior to the judiciary.\(^6\)

For the international community of economists, it is hard to overstate the central relevance of the divergent points of view that Commons pointed out more than 80 years ago. The evolution of US regulatory institutions is fundamentally affected by judicial precedent, which means American regulators work within more tightly defined and longstanding institutional limits than their counterparts in Europe, Australia, South America, and elsewhere.

**More than a Century of Investor Ownership**

A defining foundation of US cost of capital regulation is the large number of investor-owned utilities and the vigorous investment-analysis industry that follows them. Regulation in the US (and to a lesser but important extent Canada) rests heavily on the ability to gauge investor expectations via those companies and that investment-analysis industry. Other parts of the world do not have a history of investor ownership of utilities. The reasons why are rooted in American institutions formed in the 19th century.

In the early 20th century, a newsworthy national task force studied and confirmed the role of private ownership of regulated businesses.\(^7\) The task force’s goal was to determine whether it would be wise to continue using private capital to build and operate regulated utilities. Major players in the development of the future US regulation were part of the study, including Samuel Insull (a protégé of Thomas Edison and the inventor of utility mortgage bonds and holding companies), future Supreme Court Justice Louis Brandeis (who created the theory of “prudent investment” and is credited as the intellectual source of the *Hope* decision), and Commons.\(^8\) Major American newspapers tracked the task group’s progress. The study itself confirmed the role of private capital in regulated US businesses compared to their UK counterparts. Mr. Walton Clark, of the gas utility in Philadelphia and a member of the Committee on Investigation, appeared to summarize the opinion of parties favoring investor ownership with government regulation—instead of government owners—saying:

> [a]ny government that is too feeble or corrupt to control with justice the conduct of a [privately-owned] public service company, has little prospect of being able itself to supply such public service with efficiency and justice.\(^9\)
The longstanding preference of US capital markets for privately owned and regulated enterprises, rather than publicly owned enterprises, rests in the capital market’s suspicion regarding large-scale public borrowing for infrastructure. The first such project was the construction of the Erie Canal to tie the “Northwest Territories” of the early 19th century to East Coast markets. Begun in 1817 and completed in 1825, the canal linked Lake Erie (one of the Great Lakes) to the Hudson River that flowed to New York City. Because of the project’s size and risk and the infant nature of large-scale capital markets at that time, government involvement in finance was a necessity.

But New York did not borrow funds responsibly. Driven by widespread business failures in the depression of 1839-1842, the New York legislature refused to meet state bond interest obligations for the canal. Surrounding states, suffering from the canal’s financial collapse, responded by prohibiting future public funding for such infrastructure projects. So when the need for even greater aggregations of infrastructure capital arose (e.g., for railroads), developers turned to private, rather than public, capital.

Private capital thus played a key role in the development of US utilities—driving a wedge between the regulatory experience in the United States and almost everywhere else in the world. Outside the United States and Canada, governments financed major public utilities with public funds until the late 20th century. Drawing upon such funds, governments were able do what they wished with public property and the rates charged, since they were not bound (or disciplined) by financing constraints in the same way as investor-owners. Governments can build infrastructure projects that investors would never support, and governments can charge customers either more or less than what those services ultimately cost.

**Transparency in Regulatory Accounting**

Congress had learned that weak accounting regulations enabled abusive practices by regulated companies. In 1912, the US Supreme Court first decided that if a company provides services to the public, then the public in essence owns that company’s operational and financial books and records—that is, that accounting systems for public utilities were public matters. The next year, the Court confirmed that the regulation of accounts by a commission was lawful. These decisions were the legal precursors to the US Uniform System of Accounts that accompanied the 1938 Natural Gas Act and fully institutionalized the open public character of operating and financial information under US regulation. Because of the Court’s 1912 decision, Congress’s direction in 1938 that its Federal Power Commission (the precursor to the FERC) create open regulatory accounts, the well-known FERC Form 1 (for investor-owned electric companies) and FERC Form 2 (for investor-owned interstate gas pipelines) remain the gold standard for utility regulatory accounting around the world. They are also the basis for innumerable economic and financial studies—whether in the US or elsewhere in the world.

Such openness of regulatory accounting practices extends only to the US and Canada. Neither the EU nor any of its member states has imposed an accounting system like the Uniform System of Accounts. And only “competent authorities,” and not the public, are authorized to obtain whatever information regulated companies may maintain. Indeed, the EU warns any national regulatory body against requiring the provision of any “commercially sensitive” information. Taken together, these provisions give regulated companies discretionary control of the kind of operating and financial information that is publicly available in the US.
Settling the Issue of Regulated Property Values

The cost of capital is ultimately about providing investors with a market-based compensatory return on their invested funds. But unless the underlying investment is well defined, the issue of a compensatory return is more or less adrift. And indeed, for almost 50 years after trying to work out those underlying investment values, the entire issue was a muddle in the United States. But then the Supreme Court dealt with the property valuation question by establishing a precedent for all regulated enterprises in the US, a precedent that still holds today.

The Supreme Court’s own 1898 decision (Smyth v. Ames) was the problem. The Court ruled that the valuation of utility property used in ratemaking should be based on “fair value.” Such a term had no objective meaning, for as James C. Bonbright put it in 1937:

…the value of a public utility system depends on earnings anticipated by present or prospective owners…. To attempt, therefore, to fix rates by a valuation of the property, in the strictest sense of the word “valuation” is to put the cart before the horse.

In 1940, the economist Ben W. Lewis of Oberlin College colorfully summed up the era of “fair value” in ratemaking by calling it little short of public scandal.

The “valuation” problem ended when, in 1944, the Supreme Court ruled in Federal Power Commission et al. v. Hope Natural Gas Co. The Hope Natural Gas Company was a Standard Oil Company gas pipeline subsidiary in West Virginia that filed suit against the FPC over its first ruling under the 1938 Natural Gas Act. With the Hope ruling, the US Supreme Court set a new standard for determining “just and reasonable” returns for investor-owned utilities:

The return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and attract capital.

In setting permissible revenues, a utility’s profit (resting on invested capital as reflected in accurate bookkeeping) would be measured by potential earnings for investors based on other enterprises of similar risk. Both in the use of invested capital (as reflected in the books) and in requiring measures of profitability in similarly risky ventures (as reflected by the capital markets), the Hope decision sharply limited regulatory discretion and secured utility companies’ investments from seizure (a “taking” of private property without due process). The Hope decision was otherwise unremarkable in how it progressed through the legal system. It was a typical event in the US common law system, where the Supreme Court took up a case brought by an individual or corporation against the state or federal authorities on the grounds that it conflicted with the Constitution’s protections of property and liberty.
The Hope decision was a landmark event in the history of the economics of utility regulation. It meant that federal tariff regulation was to become a highly reliable and predictable affair. Throughout the 1920s and 1930s, economists and legal scholars had struggled with the question of how to value regulated property—even to the point of speculating that public ownership might be the only way out of the difficulties arising from the lack of any meaningful economic definition of “fair value” for the property of regulated public utilities. When the ink was barely dry on the Hope case, various economists waxed poetic on that decision’s profound effect on rate regulation. Economist Eli Clemens of the University of Maryland described it as a fundamental advance in the theory of administered value in law. James Bonbright called it “one of the most important economic pronouncements in the history of American law.”

**The “Prudence Standard” for Permissible Costs**

Most utility regulation in North America is focused on ensuring that both utility customers and investors are treated fairly. This doctrine of fairness is fundamental to the regulatory process. In a 1923 dissenting opinion, US Supreme Court Justice Louis Brandeis explained that a prudent investment test would be “applied for the purpose of excluding what might be found to be dishonest or obviously wasteful or imprudent expenditures.”

Bonbright commented on the perspective from which such fairness to the investor and ratepayer should be viewed:

> The meaning of “fairness” in business transactions is most clearly definable when referring to a moral obligation, which may also be a legal obligation to avoid deception and to live up to previous commitments, express or implied. If judged by this test alone, any rule of rate making would be fair to investors, whatever its merits or demerits on other grounds, if it conforms to the terms, on the faith of which the investment was originally made—fair no matter how onerous or how profitable these terms may prove to be in the light of hindsight.

The “prudent investment standard” has a reasonable and common-sense application. Utilities are expected to act prudently, efficiently, and honestly when making investments and operating their systems, and they are presumed to have done so unless credible evidence of imprudence is produced in a regulatory proceeding. In the context of a prudence review, no disallowance is permissible under the prudent investment standard unless there clear evidence showing that the utility has acted in an imprudent manner that resulted in unjust and unreasonable costs.

Fairness requires that imprudence be demonstrated objectively—evidence of failure to act prudently must be grounded in common sense. Rather than focusing on hindsight, the prudence standard is based on whether the decisions were reasonable at the time they were made. Bonbright suggests that the term “prudent” in relation to rate base “imports the requirement that the investment, in order to gain recognition in the rate base, must have been prudently incurred in the light of foresight rather than of hindsight.” Results-oriented analyses or hypothetical ideals are impermissible under this standard. Honest disagreement in principle is not considered evidence of imprudence. The method for analyzing prudence has to recognize both costs and benefits of particular actions, as well as actions not taken, to obtain a “net” cost (or benefit) of actions actually taken. A proper alternative analysis compares the outcomes of the decision the party did make with the results of options that the party might otherwise have chosen.
The prudent investment standard, as defined by Brandeis, sets a high evidentiary bar for disallowances of utility costs, and thus significant imprudence disallowances of costs are comparatively uncommon for North American utilities.

**Dealing with Inflation in the Cost of Capital (rather than in the Asset Base)**

The cost of capital awarded by US and Canadian regulators is a *nominal* figure (with inflation included).27 In the UK, Australia, the EU, and many other regions, the cost of capital awarded by regulators is a *real* figure (with inflation excluded). Those non-North American jurisdictions do deal with inflation, but they add a measure of inflation to the capital base. *Why that difference?* It comes mainly down to an expediency regarding the privatization of British Gas.

Owing to the press of time for the privatization of British Gas in 1986, Margaret Thatcher’s government used recently formed accounting rules—in the well-known “Byatt Report”—designed for valuing investments in publicly owned enterprises.28 Coming during the 1980s, when inflationary expectations were worrisome, the Byatt rules emphasized the role of inflating the original cost of utility property to reflect the incremental public borrowing cost of state-owned enterprises, in an approach called current cost accounting (CCA). Inflationary accounting of capital values then became a part of privatizations in New Zealand in 1993, and Australia in 1994.29 Other countries followed suit, regulating their publicly owned and privatized utilities, despite the fact that by the 1990s, inflationary worries were less of a concern in the developed world.

Following a period of unexpected inflation in the 1970s, the US performed its own broad experiment in CCA accounting. In 1979, the Federal Accounting Standards Board (FASB) began a five-year experiment that required large companies to disclose supplemental price-adjusted information (in addition to historical cost data) about inventories and property, plant, and equipment.30 In 1983, the FASB requested comments on the utility of FAS 33.31 Responders included institutional investors, market analysts, rating agencies, retailers, suppliers, manufacturers, and others. The FASB received approximately 400 industry comments.

The comments made it clear that US industry hated the CCA experiment. Comments held the experiment as: (1) too simplistic to represent actual ongoing cost or entry cost; (2) not reflective of price changes of specific assets; (3) not reflective of changes in technology and preferences; (4) not a useful indicator of future spending or cash requirements; and (5) not useful to managers, market analysts, industry experts, and shareholders.32 Overall, US industry complained that CCA books were expensive to maintain, were inaccurate, and failed to reflect the more nuanced ways that managers dealt with inflation in their own businesses. The FASB subsequently dropped the experiment and stopped pursuing inflation-adjusted accounting for American industry—utilities included.

Despite the fact that the criticism of CCA accounting is equally applicable to investor-owned utilities, whether in the US or elsewhere, inflationary accounting for the capital stock of utilities is still nearly-standard practice outside of North America (a troublesome situation often-enough, but not for this North American retrospective).
Fixing the Meaning and Computation of Depreciation

Depreciation accounting for ratemaking purposes follows a defined set of rules laid down in the 1940s by the National Association of Regulatory Utility Commissioners (NARUC)—the trade group of American regulators. For the purpose of computing reasonable rates of return on equity for US utilities, depreciation never rises above the straight-line booking of engineering-based asset lives. Depreciation in the US is not about funding replacements, as such, but serves to maintain the integrity of utility investments by recording the cost of property consumed in providing service. In that way, depreciation is a method of safeguarding the capital devoted to providing service until it can be returned to investors as a component of consumer charges.

There has always been some tension between economists’ and accountants’ views of depreciation. Unlike most other business enterprises, the periodic charges for the use of utility services do not reflect the current value of the property, but rather an allocation of the costs for supply decisions already made. Economists have long recognized that such charges:

… refer to an expenditure that has already taken place, and are merely a special method of writing history. Depreciation accounting enables the business firm to make several ledger entries, instead of one, when a capital expenditure occurs.

That is, revenues received recoup the costs of the utility property in place according to the methods that accountants use to spread out the ledger entries over the life of the assets. If utilities invest in new assets, new revenues (or revenue increments) will cover the costs of those assets, as the revenues are booked over time in depreciation charges.

The view that revenues for regulated companies reflect the recoupment costs, not prospective value, has long been accepted by American economists and regulators. Outside the United States, however, particularly in the UK and other new regulatory jurisdictions that looked to the UK for guidance, the rules are not so defined, and depreciation becomes a point of contention relating to current regulated rates. An example occurred in 1995, when British Gas’s regulator, Ofgas, published a draft series of proposals for a five-year price control period for BG that effectively abandoned a 1993 decision by the U.K. Monopolies and Mergers Commission on a matter involving depreciation accounting. The decision removed approximately £3 billion from the company’s asset base. As a result, the stock price of British Gas fell approximately 24 percent in two days and its debt securities were downgraded three steps by Standard & Poor’s, the debt rating agency.
Similarity of US and Canadian Regulatory Institutions

While Canada and the US share a credible regulatory environment, the exact regulatory foundations are not identical. However, the differences that do exist are more procedural than fundamental. The two jurisdictions engage in roughly the same practices, although they may go by slightly different names or receive differing levels of attention. This does not imply that some practices are superior to others; rather, these differences arise from the dates the practices were implemented, the procedures used to handle the practices, and the emphasis placed on various practices in regulatory proceedings.

These principles are generally true of all Canadian and US regulatory jurisdictions. Both equity investors and lenders give funds to utilities with the reasonable expectation that the principle of a fair return will be honored. Even though the particular utility statutes may vary from jurisdiction to jurisdiction, and even though regulatory commissions may have different policies and precedents in different jurisdictions, investors anticipate that the basic bargain between them and their regulator (which represents the public) will apply to their investments.

From the Constitutional foundation to administrative practices, accounting practices, and judicial review, Canada and the US have virtually indistinguishable regulatory environments—so much so that the US Hope and Bluefield decisions are even cited in Canadian rate cases. Figure 1 illustrates the regulatory pyramid in Canada and the US.

**Figure 1. Elements of Recent ROE Regulation in the US and Canada**

Regulation in both countries is founded on strong primary legislation that protects the rights of citizens. The constitution of Canada is an amalgam of codified acts and un-codified traditions and conventions. The Constitutions Act of 1982 established a Charter of Rights and Freedoms, which is the Canadian equivalent to the US Bill of Rights. While the Charter extends many protections to Canadian citizens, including the right to "foundational justice," this Charter does not explicitly include the protection of property rights. A significant difference in the regulatory foundations of the two countries is the 5th and 14th amendments in the US Constitution, which set out strong constitutional protection of property rights.
The regulatory compact in both countries is shaped by judicial decisions and includes the right to earn a “fair return” on investment, as determined by the opportunity cost of capital, which is termed the “comparable investment” standard. While the phrase “regulatory compact” is not used as often in Canada as it is in the US, the concept is there. Indeed, the decisions that shape the US compact are cited in Canadian rate cases, and the Canadian decisions established an effective compact that is almost identical to that of the US.40

While Canada does not have a single, federal administrative practices statute, these practices are highly refined and afford at least as much protection to investors as the practices in the US. The Canadian common law protection—enhanced by the introduction of foundation justice in the Charter of Rights and Freedoms and provincial administrative procedures acts—equals the US standard of due process and the Administrative Procedures Act of 1946 in its protection of investors’ rights.

In both countries, regulatory accounting is sufficiently refined that actual accounts are used for ratemaking without contention, avoiding the regulatory conflicts that surround benchmarked costs or replacement value accounting. The right to use actual costs for intra-provincial/intrastate regulation comes from provincial and state statutes. Some provinces have “fair value” mandates, similar to the US (where five states have “fair value” statutes) but have defined fair value to be the book value, so it is a difference without a distinction (as in the US).41

There is a perception that Canadian judiciaries are reluctant to interfere with the decisions of utility regulators. However, US judiciaries do not overturn regulatory decisions without a clear reason to do so, and judicial rebuke is the exception rather than the rule in the US. Most important is that clear pathways for appeal exist in both countries, and appeals are conducted in a manner such that, should major grievances be raised, the judiciaries are capable of reaching a reasonable decision.

Canada and the US share similarly mature regulatory compacts, supported by well-established accounting, administrative, and appellate procedures. They are unique in their advanced regulatory environment, which is based on credible, actual accounts. The greatest risk determinant for utilities—regulatory risk—is comparable in Canada and the US.

Perhaps the most important difference between the two jurisdictions is size—the US has many more regulated companies, which are widely dispersed and reflect all types of structures, and a longstanding investment analysis industry to inform investors about the risks of such companies. In that respect, it is not surprising that Canadian regulators regularly turn to US precedent on cost, competition, productivity, and investor compensation in their decisions on how to regulate Canadian companies.
Performance-Based Regulations (PBR) in North America

The institutions that define US and Canadian rate regulation, including the cost of capital, are quite old in relation to the institutions that developed in the UK and elsewhere following the privatization wave of the 1980s and 1990s. As is the case with a number of accounting, legal, and administrative institutions, these new post-privatization regulatory jurisdictions have strived to find a way to cut through perceived inefficiencies of “traditional regulation”—which, outside of North America, is generally a reference to regulation in the US. The result is known as performance-based regulation (PBR), an approach that developed following utility privatizations in the UK during the 1980s. Following PBR’s popularity in the UK, AT&T adopted the practice in the US in 1989. With some limited exceptions, PBR has never been a significant player in US and Canadian energy utility rate cases.

Even where PBR is practiced in North America, the somewhat similar PBR pricing formulae often mask considerable underlying institutional differences. Neither the UK nor the other jurisdictions that began regulation with the UK-inspired privatization efforts have the constitutional, accounting, and administrative institutions that define regulation in the US and Canada. Probably the most useful way to highlight the institutional differences is to look at the source of the X-factor. In the UK and Australia, the X-factor does not represent an empirically measured growth in expected industry productivity. Rather, it is a way to synchronize current prices (or revenues) with long-term forecasts of what the regulator imagines are the capital and operating costs for an “efficient” firm in the future. Such forecasts of long-term costs are contrary to the “known and measurable” standard that forms the foundation of utility regulation in North America. In a recent price review, Ofgem, (the UK regulator), backed-out the X-factor as the value that would permit current prices to trend toward the forecast costs for electricity distributors ending in 2015. Similarly, Australia defines its X-factor as the method of truing up projected costs with projected revenues during the formula period.

In neither the UK or Australia does the X-factor relate to a measure of industry productivity growth, and in both cases the transition of regulated prices over the formula period follows forecasts of the type that no regulator of energy utilities in the US or Canada has ever permitted. Quite apart from the merits of the way regulators in the UK and Australia control utility prices, regulators in these jurisdictions respond to substantially different regulatory institutions that argue against direct comparison to themselves in a PBR case. In any event, there are sufficient North American examples of precedent and practices regarding the application of PBR for energy companies. The purpose of PBR in Canada and the US is to permit regulated prices to change to reflect general price and industry productivity movements without the need for a base rate case, thus lengthening “regulatory lag” and better exposing regulated utilities to the type of incentives facing competitive firms. But the rate case that starts PBR, and updates the rates on schedule, looks like the traditional sort of rate determination that has been going on for decades in the US and Canada—including the traditional determination of the cost of capital.
Measuring the Cost of Capital

Following the Hope decision, which settled the issues of property values and focused attention on the cost of capital, the measurement of cost of capital for US public utilities was defined during three time periods. These progressions generally followed theoretical developments in the scholarly literature. The first was the “Financial Ratio” era up until the 1960s. The second, following theoretical advances in corporate valuation, is the “DCF Era” starting in the late 1960s. The third, the “CAPM Period,” included the development of more theoretical advances in valuation corporations, and heralded the integration of CAPM into cost of capital analyses in the 1980s.

The Financial Ratio Era (1950s to the mid-1960s)

From where we are now, in an era of intense interest and research into stock valuation models and methods, and highly sophisticated derivative markets and hedge funds, it is interesting to look back to the actual business of determining the cost of capital in the post-war 1950s. Two things stand out. First, there is a lack of a theoretical anchor in the cost of capital analyses at the time. Second, the rate cases themselves were relatively uncommon—both energy and telephone utilities were still in an era of declining costs and (comparatively) rarely asked for rate adjustments.

The economist James Bonbright—the witness for the Federal Power Commission in the case that led to the Hope decision—provides the best, most compact summary of the Financial Ratio era in his 1961 book. The most commonly used metric at the time was the earnings-price ratio, which could be measured for any group of similarly situated utilities over a number of years. Thus, using observed stock prices, utility rates could be set to produce a level of utility earnings consistent with the stock prices. Bonbright recognized that these types of methods are inherently backward-looking and that they do not necessarily reflect the anticipated rates of earnings—dividend payments—which affect stock prices traded between forward-looking investors. Nevertheless, he says, “especially when averaged over a period of several years, they are counted on to give some indication of a capital-attracting anticipated rate of earnings.”

It was simple enough, in an era of low inflation, economic growth, continued productivity improvements, and relatively rare rate cases. All of that changed in the 1970s, when electricity utility productivity slowed, inflation rose, and the OPEC oil embargo upended fuel markets.

The Discounted Cash Flow (DCF) Era (mid-1960s until today)

In 1962, Professor Myron Gordon produced a pioneering analysis of the value of the corporation. As he noted, with only highly abstract theoretical models of firm investment flowing from Keynesian theories of income determination, economists relied on more practical and less theoretical “business practices” to investigate problems of investment and financing. Gordon wanted something better: a solid theoretical foundation for explaining the value of a corporation that could in turn be used to find the cost of capital without resorting to the ad hoc business methods of the 1950s.
Gordon succeeded to the extent that his name and the “Gordon growth model” is part of all modern finance courses. The model defines the price of stock as the ratio of the expected dividend divided by required investor return rate on equity minus the expected growth rate in dividends. Simple manipulation of Gordon’s original model and a form of the equation that looks at discrete yearly periods results in the following expression:\textsuperscript{51}

\[ k_e = \frac{D_0 \times (1 + g)}{P_0} + g \]

Where:
\[ P_0 = \text{price of stock} \]
\[ D_0 = \text{previous dividend paid} \]
\[ k_e = \text{cost of equity} \]
\[ g = \text{expected dividend growth rate} \]

This model—the discounted cash flow (DCF) model—has dominated rate proceedings in the US and Canada since its introduction in the late 1960s and early 1970s. Gordon himself describes how he was retained in 1966 to provide evidence before the Federal Communications Commission (FCC) on the cost of capital of AT&T. As he stated, the FCC was highly complementary regarding his analysis—encouraging further study of the model—and made a finding consistent with it.\textsuperscript{52}

Since then, the DCF model, which benchmarks both yield and prospective growth measures, has dominated US cost of capital findings—mainly because its straightforward “yield plus growth” simplicity appeals to practical-minded judges and commissions. In a large capital market with many similar utility companies, Gordon’s DCF model narrows the range of contention and gives commissions the confidence that their decisions reflects the verdict of those markets.

**The CAPM Era (1980s-present)**

The practical simplicity of the DCF model stands in contrast to the capital asset pricing model (CAPM), derived from Gordon’s contemporaries, Franco Modigliani and Merton Miller. This model began to appear in US rate cases in the late 1970s and early 1980s.\textsuperscript{53}

The CAPM formula itself is straightforward. Its components are: (1) the risk free rate of return; (2) the market rate of return; and (3) the $\beta$. These inputs are combined to estimate the ROE.

\[ \text{ROE} = \text{Risk-Free Rate} + \beta(\text{Market Return}) \quad (1) \]

Despite this algebraic simplicity, there are very different methods to obtain each of these comparatively abstract components, and to compute the required rate of return. That is to say, the practical “yield plus growth” simplicity of the DCF does not apply to the CAPM formula (even besides the Greek letter). Choosing one method over another can substantially change the computed cost of capital. The CAPM employs common parameters for all companies, with the exception of the $\beta$ term. It thus does not have the DCF model’s “law of large numbers” properties in a comparable group. As a result, there is less reason to place primary focus on a comparable group rather than the utility in question, especially when the $\beta$ is significantly different from that of a proxy group of companies.
The practical elements of the CAPM formula invite contention. For example, the beta term relates the movement in an individual company stock price compared with that of the entire market for stocks. Greater relative movement vis-à-vis the market means a higher beta. The betas published by investment analyst houses (such as Value Line, Merrill Lynch, or others) use different historical time periods for analysis and also use an adjustment procedure that moves “raw” betas toward 1.0. Such ad hoc or theoretical choices, all of which affect computations and implied capital costs, provide a steady and source of argument for those participating in contested regulatory proceedings.

A large area of contention is the market return, which is defined as the premium demanded by the market for equities in addition to the risk-free rate. Market risk premiums are not published (like inflation indexes), but they have to be derived. Some are based on historical achieved returns and others try to gauge investor expectations on future equity returns similar to those who perform a DCF analysis. In rate case applications of the CAPM, there is always dissension among interested parties regarding the size of the market risk premium, as its choice directly affects the level of “just and reasonable” rates. Practical-minded regulators wrestle with this issue.

**Attempts to Mechanize Cost of Capital**

In the 1980s and 1990s, US regulators made two attempts at instituting generic, formula-based approaches to setting the cost of capital (one at the federal level and one in the state of New York). In the end, however, the federal and state jurisdictions did not abandon their longstanding, case-by-case methods that rested on two existing and long-accepted financial theories. In an effort to improve regulatory efficiency, Canadian regulators—first in British Columbia, then more widely—moved away from the case-by-case approach to determining the cost of capital, adopting a generic, formula-based approach. That approach was also abandoned after a few years.

**The Two “Generic” US Cost of Capital Investigations**

In 1985, the FERC began a “generic” investigation into the cost of capital. During an extensive proceeding, it received many comments from different parties on models, methods, and sources of data that could constitute a generic formula for deriving the cost of capital. As might have been expected, however, in the search for a “just and reasonable” outcome under the law, the FERC’s generic methods ultimately ended in a fog of adjustment for a seemingly endless array of special cases. The FERC today does have what it considers a generally preferred method for measuring the cost of equity, which uses a variant of Gordon’s DCF model with two different growth rates combined with a particular method of drawing from DCF computation for a sample group of companies. Although it has almost risen to the level of a customary regulatory approach, there remain theoretical and practical empirical problems with the FERC’s current preferred method.
In 1991-1993, the New York Public Service Commission (NYPSC) attempted its own “generic” investigation that was designed to produce an objective standard for setting the cost of capital. The outcome, which cost New York ratepayers millions of dollars, was never adopted by the NYPSC—although for years afterward it served as a touchstone for the NYPSC staff. The methods chosen were ad hoc, overly complex, and led to expensive litigation in subsequent New York rate cases.

Neither the FERC nor the NYPSC methods ultimately resulted in abandoning or materially shortening the case-by-case cost of capital analyses that they had been intended to replace. The FERC methods have streamlined the construction of the “proxy groups” for gathering market information on similarly situated regulated firms, and have basically set the form of the theoretical formula for combining stock yields plus analyst growth rates. This streamlining aside, by 1992 the FERC stopped pursuing a generic formula over legal concerns that a company-specific record must support the finding of a fair return.  

**Canada’s “Formula” Cost of Capital Determinations**

Beginning in 1994, Canadian regulators began to adopt automatic adjustment mechanisms for setting the cost of capital in utility rates based on a fixed spread with observed movements in yields on Canadian long-term bonds:

\[
\text{Cost of Equity}_t = \text{Cost of Equity}_{t-1} + 0.75(\text{Yield}_t - \text{Yield}_{t-1})
\]  

The formula was first introduced in British Columbia in 1994 before being adopted by Manitoba and the NEB in 1995. Ontario adopted the NEB approach in 1997, followed by Quebec in 1999. Finally, Alberta adopted formula adjustments in 2004. Not all major Canadian jurisdictions implemented formula-based cost of equity computations. However, the jurisdictions retaining case-by-case analyses seemed to set the cost of equity in a manner that was highly sensitive to changes in the bond markets. One could therefore view the “formula” jurisdictions as price leaders which set the standard for following the decline in bond prices in the setting of returns. Ontario, Quebec, Alberta, and the National Energy Board (NEB) established a “benchmark” cost of capital with this formula that it applied to all utilities, with individual business risks taken into account with a “deemed” capital structure.

The use of the bond-yield-based formula resulted in driving the allowed cost of capital in Canada well below that observed in the United States, resulting in widespread objection by the subject Canadian utilities.
Since then, Canadian regulators have slowly abandoned the use of the formula, resulting in a narrowing of the spread between US and Canadian cost of capital awards.
Conclusion:
The Cost of Capital Cases in North America Today

Economists in the tradition of NERA’s Alfred Kahn have a tendency to view economically efficient pricing as a complicated, scholarly pursuit rivaling any complication and scholarship surrounding the cost of capital. This is not the case for those who prosecute rate cases in North America. Many years ago, the general counsel of a gas utility told me that the company considered cost of capital testimony to be the result of “deep and esoteric financial theories upon which an expert is required,” whereas rate design testimony “is just long division, which we can do ourselves.” That view continues to prevail. It is often the case (perhaps more often than not) that the cost of capital expert is the only outside witness in utility rate cases. Everything else (accounting, depreciation, rate design, etc.) is more often than not conducted by a company witness reflecting the fact that the legal, accounting and procedural boundaries of those costing and ratemaking investigations are long established.

Despite efforts to find new ways to avoid the case-by-case expert determination of the cost of capital, the role and form of cost of capital investigations in North America have changed very little in the 50 years since Myron Gordon’s work on the DCF method created a theoretical anchor for empirical analysis. There are two reasons why this is so—one empirical, and the other deeply institutional and unique to North America.

As an empirical matter, the cost of capital exists in the heads of investors in the capital markets. There are simply very few ways to find out what investors think. We have two basic theoretical windows into investor thinking: the DCF and the CAPM. Both have their limitations. Although both the DCF and CAPM methods can be usefully applied, it remains true that what equity investors think is hard to determine, even after the fact.

Institutionally, cost of capital occupies a special place in North America. Everything else about regulating investor-owned utilities—accounting, depreciation, rates, “known and measurable” costs, etc.—draws from a long history of development and precedent, as well as in historically determined methods refined over the course of decades. But the cost of capital stands apart as the spotlighted single point of contact between the private interests of utility shareholders and the public interest that motivated the development of legislation that regulates those utilities. The cost of capital is the single subject that made the Hope decision lastingly famous. The reasoning in that decision carries huge legal weight. In the North American common law tradition, there is simply no practical way to formulize that point of contact between private and public interests.

Ultimately, investor-owners of infrastructure businesses have particularly well-defined and longstanding rights regarding the property that they devote to providing electricity, gas, and water services, among others. Those rights boil down to obtaining reasonable compensation. Those practical and politically minded regulators who judge such reasonableness in North America will always wish to be convinced that the particular cost of capital—given the company, the place, and the time—is the right one.
J. Makholm Cost of Capital Papers and Publications


- “Rate of Return in a More Progressive Environment—or Can We Untie the Gordian Knot?” *NERA Working Paper*, March 1994


J. Makholm Cost of Capital Clients in North America

**Electric Companies**

American Electric Power Texas Companies:
- Central Power & Light Company
- Southwest Electric Power Company
- West Texas Utilities Company

Atlantic City Electric Company

Commonwealth Edison Company

Duquesne Light Company

Entergy Gulf States, Inc.

Florida Power and Light Company

Florida Power Corporation

New York State Electric and Gas Corporation

Pennsylvania Power and Light Company

Pennsylvania Power Company

Philadelphia Electric Company

Portland General Electric Company

Reliant Energy HLBP
Rochester Gas and Electric Corporation
Sierra Pacific Power Company
Southwestern Public Service Company
Texas-New Mexico Power Company
United Illuminating Company
Wallingford Energy LLC

**Gas Companies**
Brooklyn Union Gas Company
Canadian Western Gas Company
Canadian Gas Association
Consolidated Gas Supply Corporation
Elizabethtown Gas Company
Kansas Pipeline Partnership and Kansas Natural Partnership
Philadelphia Electric Company - Gas Division
Southwestern Virginia Gas Company
Valley Resources, Inc.
Wisconsin Gas Company

**Telecommunications and Water Companies**
China Telephone Company
Maine Telephone Company
Northland Telephone Company
Sidney Telephone Company
Standish Telephone Company
Kearsarge Telephone Company
Tipton Telephone Company
Community Service Telephone Company
Kearsarge, Chichester and Meriden Telephone Companies
General Telephone Company of Ohio
General Telephone Company of Pennsylvania

**Law Firms**
Bennett Jones
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Cullen & Dykman
Faruki, Ireland & Cox
Foley & Lardner
Huber, Lawrence and Abell
Latham, Watkins
Preston, Gates & Ellis
Preti Flaherty Beliveau Pachios & Haley
Skadden, Arps, Meagher & Flom LLP
Tonkon Torp, LLP
Van Ness, Feldman
Notes


2 Commons, J.R., *Legal Foundations of Capitalism*, p. 7. This volume is remembered more by legal than economic scholars, as evidenced by it being the only one of Commons’ 10 books still in print—by a publisher of legal reference texts.

3 See: *Federal Power Commission v. Hope Natural Gas*, 320 US 591 (1944), which I will discuss in this paper. Canada has its own version of the Hope decision (which rests not on constitutional principles, as such, but on legal precedent): *Northwest Utilities v. City of Edmonton*, S.C.R. 186 (N.U. 1929).

4 Canada, whose federal and provincial regulatory statues and practices are very similar to those in the US, rests its regulatory property issues on legal precedent rather than Constitutional guarantees.


6 Commons, J.R., *Institutional Economics*, p. 713, as re-stated later by Kenneth Parsons in Commons, J.R., *The Economics of Collective Action*, Appendix iii, p. 341. Of course, the “superiority” of the Supreme Court is still constrained by the US Constitution’s checks and balances. The justices themselves are appointed by the President and confirmed by the Senate. The Constitution itself can be amended by three-fourths of the legislatures of the 50 states. And the Supreme Court itself may come to a new view of the facts of a particular kind of case and change its mind. These checks, balances, and constraints notwithstanding, the Supreme Court at any particular time is the final authority in the US of what is constitutional and what is not.

7 The task force was the Committee on Investigation, Commission on Public Ownership and Operation, National Civic Federation. The National Civic Federation (NCF) was a New York-based think-tank and reform alliance, founded in 1900 by the journalist, editor, and economist Ralph Easley (1867-1939) and others. The aim of the NCF was to bolster public confidence in the free enterprise system by initiating moderate social and industrial welfare programs, such as advocating restrained government involvement in business affairs.


9 *Municipal and Private Operation of Public Utilities*, Volume 1, p. 443

10 Davis L.E., and North, D.C., *Institutional Change and American Economic Growth*, pp. 77-79, 139-143. Even the state of New York had trouble raising the $7 million for a canal that was 363 miles long, 20 feet wide, and 4 feet deep, with a rise of 630 feet and a drop of 62 feet from the Hudson River to Lake Erie.

11 In the UK, there were many private utility companies through the 1940s, but these were generally, as in the case of British Gas, nationalized under the Clement Atlee government in the late 1940s.

12 See: Troxel, E, *Economics of Public Utilities*, p. 120, citing Interstate Commerce Com. V. Goodrich Transit Co., 224 U.S. 194, 211 (1912)


14 Indeed, when the Alberta, Canada, utilities commission (the AUC) implemented a new performance-based regulatory plan in 2012, it adopted a standard for measuring total factor productivity (TFP) that I recommended, based on a long time-series of electric utility (and combination electric/gas utility) data from the FERC Form 1. See: AUC Decision 2012-237, p. 79.

15 Third Legislative Package, Articles 10 and 16.

16 Daron Acemoglu of MIT, a prominent researcher on how constitutions and property rights affect economic growth, writes that there are “many reasons to expect societies that have better property rights institutions to also have better contracting institutions.” Acemoglu, D., “Constitutions, Politics, and Economics: A Review Essay on Persson and Tabellini’s *The Economic Effects of Constitutions*,” *Journal of Economic Literature*, Vol. 47, No. 4, (December 2005), pp. 1025-1048.

17 Smyth v. Ames, 169 U.S. 466, 546-547 (1898). Commons, writing in 1934, said that in Smyth, the Supreme Court gave a “perplexing definition of Reasonable Value.” Perplexing or not, however, “[w]hen once the Court, by this process of due evaluating, has finally decided a dispute, then that decision, under the institutional set-up of America, is the final word, for the time being, on Reasonable Value.” Commons, *Institutional Economics*, p. 683.


22 “John R. Commons gained much of his fame by his great book, *The Legal Foundations of Capitalism*, in which he traced the development of the theory of administered value in the courts. Today a new chapter must be added, as new accounting methods and new law change the entire nature of public utility values and the means by which they are determined. … The substitution of adequate and accurate book records for the tedious and expensive appraisal process cannot help but be a gain for regulation.” Clemens, E.W., *Economics of Public Utilities*, pp. 187-188.


Notes

27 An exception in the US is for interstate oil pipelines regulated by the Federal Energy Regulatory Commission (the FERC). There, owing to highly unique circumstances when it inherited jurisdiction from the Interstate Commerce Commission (the ICC), adopted “trended original cost” (TOC), which includes half of the inflationary adjustment in the rate base.

28 See: Accounting for Economic Costs and Changing Prices, A Report to HM Treasury by an Advisory Group, Her Majesty’s Stationery Office, London (1986) (the “Byatt Report”), Vol. 1, p. 5. “… accounting for changing prices is especially important in nationalised industries. … Nationalised industries … differ from most of the private sector … [in that among other things] there is no competitive market in the capital of the industries.” (emphasis in original)


31 Invitation to Comment: Supplementary Disclosures about the Effects of Changing Prices, December 1983

32 NERA has obtained the complete responses to the FASB questions, and has compiled an associated database that NERA will share upon request.

33 Report of the Committee on Depreciation, 1943, NARUC. The NARUC Staff Subcommittee on Depreciation describes the history of American regulatory depreciation practices in its Manual on Public Utility Depreciation Practices, which is publicly available.


37 See, for example, Alberta’s Generic Cost of Capital decision, where the EUB stated, “[t]he Board concurs that the above decisions [Northwestern, Hope, and Bluefield] are the most relevant judicial authorities with respect to the establishment of a fair return for regulated utilities.” Alberta Energy and Utilities Board, Generic Cost of Capital Decision 2004-052 (2005), p. 13.

38 This chart was made when Canada was still using the formula for cost of capital—which it has subsequently abandoned.

39 The Preamble to the Constitution Act, 1867 states that the provinces shall have, “a Constitution similar in Principle to that of the United Kingdom.” This has been interpreted as stating that the practices of the United Kingdom that were common before the creation of the constitution form part of the Canadian constitution—for example, the practice of an independent judiciary has been constitutionally guaranteed under this argument. See Provincial Judges Reference [1997] 3 S.C.R. 3.


41 The use of actual accounts in Canada was upheld in B.C. Electric Co., where the court established that the book value of prudently incurred costs could be used to provide a fair return, despite a statute requiring that appraisal value be used. B.C. Electric Co. Ltd. v. Public Utilities Commission et al. (1957) 13 D.L.R. (2d) 589 (BCCA).

42 PBR in the UK is also called “RPI-X” or “price cap” regulation.

43 The biggest exceptions are Alberta and Ontario, which have somewhat formalized PBR for the energy companies in those provinces.


45 Ofgem (2009) on the electricity distribution price control for April 2010 to March 2015 (Distribution Price Control Review 5). Reference 149/09, 7 December 2009. Starting on page 57 of that report, which is available online, are the tables for each electricity distribution business, showing how the $X-factor$ in its regulatory formula is calculated. It shows a forecast of costs in prices of 07/08, and the $X-factor$ that achieves the same revenue as costs with a smoothly rising trend (“profiled”) from year to year. See: ttp://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=371&refer=Networks/ElecDist/ PriceCtrl/DPCR5

46 “[t]he X-factor must be designed to equalise (in terms of net present value) the revenue to be earned by the Distribution Network Service Provider from the provision of standard control services over the regulatory control period with the provider’s total revenue requirement for the regulatory control period.” See Australian national rules for electricity distribution (Chapter 6, National Electricity Rules), clause 6.5.9 of Chapter 6, entitled “The X-factor.” The report can be found on the Australian regulator’s website: www.aemc.gov.au

47 Bonbright, 1961, pp. 246-56.

48 Bonbright, p. 251.


50 Gordon, p. ix.

51 Alfred Kahn gives the derivation of this model. See: Kahn, Alfred E., The Economics of Regulation; Principles and Institutions, John Wiley & Sons, Inc., New York (1970), Volume 1, Appendix A, pages 58-60.


54 See Docket No RM85-19-000 (Order No. 442), issued December 26, 1985.

55 See FERC’ Opinion No. 532-B, issued March 3, 2015 (150 FERC ¶ 61,165). The FERC affirmed its reliance on DCF analysis to determine the ROE, its decision to calculate the dividend growth component of the DCF formula in part based on projections of growth in the gross national product, the use of the midpoint rather than the median of the zone of reasonableness when determining the ROE for a large group of utilities, and various other aspects of its DCF application.

56 For example, there are theoretical grounds to object to using projected GDP growth, as decades-long studies of US utility productivity show industry productivity growth (and hence financial performance growth) exceeding that of the US economy by over 100 basis points. See my “Price Cap Plans for Electricity Distribution Companies Using TFP Analysis,” (with M. Quinn), NERA Working Paper, July 23, 1997. Also, the FERC has departed from the mean or median as a measure for drawing a conclusion from the sample group of companies, and thus the result tends to be quixotic and unreliable.


59 See, Alberta Energy and Utilities Board (EUB), Canadian Western Natural Gas Co. Ltd. 1997 Return on Common Equity and Capital Structure and 1998 General Rate Application, Decision 2000-9 (2000). On page 65, the EUB states, “[t]he Board notes that interest rates and bond yields have significantly declined during the time frame… Consequently, this significant reduction in interest rates will have a major impact on the determination of a fair return for a utility.”

60 Capital structures were “deemed” in Canada based on relative business risk. A utility with more business risk would be deemed to have a higher equity ratio in its capital structure to raise the overall weighted average cost of capital. This contrasts with the US, where utilities are predominantly allowed to choose their capital structure within a band of reasonableness.

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