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THE DOUBLE LEVERAGE ADJUSTMENT AND THE ALLOWABLE RATE OF RETURN FOR A REGULATED, WHOLLY OWNED SUBSIDIARY

By

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ABSTRACT

THE DOUBLE LEVERAGE ADJUSTMENT AND THE ALLOWABLE RATE OF RETURN FOR A REGULATED, WHOLLY OWNED SUBSIDIARY

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The objective of this study is to examine the various double leverage adjustments which are often used to determine the allowable rate of return for a regulated, wholly owned subsidiary. Regulatory commissions which use a double leverage adjustment argue that a regulated subsidiary's cost of equity should reflect the source and cost of funds issued at the parent level. In contrast, critics believe that the techniques are inappropriate, ignore differences in subsidiary risk, and discourage holding companies from investing in regulated operations. Moveover, critics argue that regulated and nonregulated investments of comparable risk should have equivalent expected rates of return.

A survey of nonregulated companies revealed that the minimum acceptable rate of return for a wholly owned subsidiary is usually computed by adjusting the firm's consolidated weighted average cost of capital to reflect differences in subsidiary risk. To imitate the capital budgeting procedures used by nonregulated firms, regulatory commissions should also adjust the consolidated cost of capital to reflect differences in subsidiary risk.

The results of an event study using four subsidiaries of AT&T which have a publicly traded minority interest are not statistically significant. The event date was the date the regulatory commission signed the rate order. Two samples were constructed: 1) the regulatory commission used the independent company approach, and 2) the regulatory commission used an adjusted capital structure method. The results indicate that investors correctly anticipated the rate relief awarded by the commission regardless of the return method used.

This study also examines the role of the courts in the rate-making process. Although the courts have usually upheld the return awarded by the regulatory commissions, they have not necessarily upheld the double leverage techniques. The courts have stated only that the return awarded, and not the methods employed, should be 1) supported by substantial evidence, 2) based on findings of fact, and 3) not confiscatory. In general, the utility bears the burden of showing that the commission's decision violates these three criteria identified by the U.S. Supreme Court. Because the terms unreasonable, unjust, and confiscatory are not precisely defined, the criticisms against double leverage have been limited to theoretical arguments.

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To my wife, Veronica, and my son, Gregory

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CHAPTER 1

INTRODUCTION

Regulatory commissions attempt to establish rates so that the revenue requirement for a regulated utility is sufficient to cover expected operating costs, depreciation, and taxes, and provide a rate of return on the rate base equal to the utility's weighted average cost of capital. The weighted average cost of capital is usually estimated using the book values for debt, preferred stock, and common equity reported on the company's balance sheet. The cost rates for debt and preferred stock are embedded costs, whereas the cost rate for equity is typically estimated using variants of the Capital Asset Pricing Model (CAPM), a risk premium approach, and/or a discounted cash flow (DCF) model. Critics of the various double leverage approaches argue that the same techniques that are used to estimate the allowable rate of return for an independent company should also be used for a regulated, wholly owned subsidiary.

In contrast, some regulatory commissions believe that the allowable rate of return for a regulated, wholly owned subsidiary should reflect the source and cost of funds at the parent level. If the two-step double leverage approach is used, for example, the parent company's cost of capital

is used as a proxy for the regulated subsidiary's cost of equity. First, the commission estimates the weighted average cost of capital for the parent holding company standing alone. (See Table 1)

TABLE 1

PARENT COMPANY (UNCONSOLIDATED)
WEIGHTED AVERAGE COST OF CAPITAL

Source of Capital	Weight	Cost	Weight* Cost
Debt	.06	8.65%	.51%
Equity	.94	12.20	11.47
Total	1.00		11.98%

In this example the cost rate for equity (12.20%) represents the required rate of return on the parent company's publicly traded common stock.

The parent company's weighted average cost of capital (11.98%) is then used as a proxy for the regulated subsidiary's cost of equity. The capital structure weights for the subsidiary are based on the book values for debt, preferred stock, and common equity as shown on the utility's balance sheet. Using the subsidiary's embedded cost of debt (7.15%) and preferred stock (5.83%), the subsidiary's weighted average cost of capital would be 8.55%. (See Table 2)

TABLE 2

REGULATED, WHOLLY OWNED SUBSIDIARY'S
WEIGHTED AVERAGE COST OF CAPITAL

Source of Capital	Weight	Cost	Weight* Cost
Debt	.537	7.15%	3.84%
Preferred Stock	.138	5.83	.81
Equity	.325	11.98	3.90
Total	1.000		8.55%

The regulatory commission would use 8.55% as the allowable rate of return to compute the utility's revenue requirement. Two other widely used adjusted capital structure techniques include:

1. The Hypothetical Capital Structure Approach. The regulatory commission assigns a target capital structure to the regulated subsidiary for the purpose of determining the subsidiary's rate of return. Because the cost rate for debt is less than the cost rate for equity, the regulatory commission argues that the utility's capital structure should include an appropriate amount of debt financing to reduce the cost of providing service to the ratepayers. As a result, the regulatory commission ignores the subsidiary's actual capital structure and imputes a higher debt ratio for the subsidiary which the commission believes is "more reasonable."

2. The Consolidated Capital Structure Approach. The subsidiary's allowable rate of return is set equal to the consolidated holding company system's weighted average cost of capital. The cost rates for debt and preferred stock represent average cost rates for the entire system. The cost rate for equity is estimated using the required rate of return for the parent company's publicly traded common stock.

In essence, all of the double leverage techniques result in

assigning a hypothetical capital structure to the regulated subsidiary.

The Theoretical Argument for the Double Leverage Adjustments

Advocates of the two-step double leverage adjustment argue that the weighted average cost of capital for a regulated subsidiary should reflect not only the debt and equity shown on the subsidiary's balance sheet, but also account for any debt financing at the parent level. These commissions focus on the consolidated financial statements which portray the holding company as a single economic entity. In the preparation of a consolidated balance sheet, the subsidiary's equity account is offset against the parent's investment-in-subsidiary asset account to prevent double counting. As a result, only the publicly traded equity of the parent appears on a consolidated statement.

Advocates of double leverage claim that it is inappropriate to estimate the subsidiary's cost of equity based on the book value for equity as reported on the subsidiary's balance sheet. They claim that if one uses the common equity of the subsidiary as if the subsidiary were standing alone, it would inevitably result in awarding an excessive rate of return. Because the subsidiary's equity is actually composed of debt and equity that was issued at the parent level, advocates argue that the subsidiary's allowable rate of return should reflect the source and cost of funds provided by the parent.

Advocates argue that the parent company should earn only its cost of capital on its equity investment in a wholly owned subsidiary. If the commission awards a rate of return on the subsidiary's equity which exceeds the parent company's cost of capital, advocates believe that the utility would earn excessive profits at the expense of ratepayers.

In Federal Power Commission v Hope Natural Gas Company (1944), the Supreme Court stated that a public utility should be permitted to earn a return on equity which is not only equal to the return earned on other investments of comparable risk, but also sufficient for the utility to "maintain its credit and attract capital." Backman and Kirsten (1972) argue that the equity for a wholly owned subsidiary does not have to meet the capital attraction standard specified by the Supreme Court because the common stock is not publicly traded.

The Theoretical Arguments Against the Double Leverage Adjustments

The theoretical arguments and models used to refute the double leverage techniques are based on the opportunity cost doctrine. According to this doctrine the required rate of return on an investment should depend on the risk to which the assets are exposed and not on the way the assets are financed. In contrast to the advocates of double leverage, the opponents focus on the subsidiary as if it were standing alone. Critics claim that regulatory

commissions should establish rates so that a regulated, wholly owned subsidiary earns a return on equity that is equal to the expected rate of return being earned by unregulated firms of comparable risk. Comparable risk is often defined as firms which are similar to the regulated subsidiary being analyzed in terms of size, product characteristics, capital structure, earnings variability, and bond ratings.

Objectives of the Research

The objective of this dissertation is to examine the use of a double leverage adjustment to determine the allowable rate of return for a regulated, wholly owned subsidiary of a parent holding company. The major focus of the dissertation will be to:

1) present an overview of the regulatory process,

2) analyze Gordon's, and Elton and Gruber's views regarding the effect of regulation on firm value and cost of capital,

3) review the theoretical arguments which claim to either support or refute the logic underlying the double leverage adjustments,

4) examine court decisions involving double leverage, as well as explain the court's role in the regulatory process, and

5) present evidence which will lend support to either the acceptance or rejection of the double leverage adjustment.

Significance of the Research

Although the rates charged to consumers (and the dividends and interest received by a utility's stockholders

and bondholders) are the end result of the entire rate order, determining the allowable rate of return for each utility is a key element in this process. The determination of a "fair" allowable rate of return is essential. If the commission sets an allowable rate of return that is too high relative to the incurred risk, the utility could earn excessive profits at the expense of the consumer. On the other hand, if the allowable rate of return specified by the commission is too low relative to the risk incurred, companies may be discouraged from investing in regulated operations. This result could have a negative impact on the quality and cost of service.

This study is intended to provide ratepayers, investors, regulatory commissioners, and other interested groups with a framework to assess the impact of the methods used to determine a "fair" rate of return for a regulated, wholly owned subsidiary. This dissertation makes contributions to both theory and practice. It condenses into a single volume the many diverse approaches currently utilized by regulatory commissions, advocated in the literature, and debated in the judicial system for determining the allowable rate of return for a public utility. The remaining portion of the dissertation is organized as follows. Chapter 2 provides an overview of the regulatory process. Chapter 3 evaluates the effect of regulation on firm value and cost of capital, and shows how most of the benefits associated with debt financing accrue

to the ratepayers. Chapter 4 presents the theoretical arguments used to support the double leverage approach. Chapter 5 presents the theoretical arguments used to refute the double leverage techniques. Chapters 4 and 5 not only present the arguments surrounding double leverage, but also critically examine the assumptions as well. Chapter 6 examines judicial reviews of double leverage. Court opinions, commission decisions, and company arguments are also presented. Chapter 7 reports the results of a survey which examines how the hurdle rate (or minimum acceptable rate of return) is determined for a nonregulated, wholly owned subsidiary of a parent holding company. (One approach to analyzing the double leverage controversy is to compare the double leverage techniques used by regulatory commissions with the capital budgeting procedures used by nonregulated firms). Chapter 8 presents the results of an event study which examines the impact of the return method used by a regulatory commission on security prices. Chapter 9 discusses the conclusions.

CHAPTER 2

AN OVERVIEW OF THE REGULATORY PROCESS

The decision to regulate an industry, which may be motivated by economic, political, or social factors, is usually made by either a legislative body or the Supreme Court. Article I, Section 8 of the U.S. Constitution gives Congress the power to regulate all interstate commerce, whereas the Tenth Amendment gives state legislatures the right to regulate intrastate business activities. The Supreme Court reviews legislative decisions to ensure that the state and federal laws do not violate the provisions of the Constitution. Whenever state and federal statutes conflict, the federal laws take precedence.

There are currently four federal commissions which regulate interstate commerce:

1. the Federal Communications Commission (FCC), established in 1934, which regulates radio and television broadcasting, as well as interstate and foreign telephone and telegraph service;

2. the Federal Energy Regulatory Commission (FERC), established in 1977, which regulates the transmission and sale of electricity and natural gas. (Prior to 1977 the FERC was known as the Federal Power Commission);

3. the Nuclear Regulatory Commission (NRC), established in 1974, which regulates the nuclear energy industry; and

4. the Securities and Exchange Commission (SEC),

> established in 1934, which regulates the finances and capital structures of electric and natural gas holding companies, as well as the sale of new securities.

In addition to these federal agencies, state commissions regulate the activities of utilities operating within their respective jurisdictions. These state regulatory commissions control the quantity and quality of service, as well as determine each utility's revenue requirement and rate structure. Because regulatory agencies are given broad powers, the utilities may petition the courts for relief from regulatory decisions the utilities believe are too restrictive.

In Munn v Illinois (1877) the courts upheld the right of state governments to regulate economic activity whenever property is "affected with a public interest."

> Property does become clothed with a public interest when used in a manner to make it of public consequence, and affect the community at large. When, therefore, one devotes his property to a use in which the public has an interest, he, in effect, grants to the public an interest in that use, and must submit to be controlled by the public for the common good, to the extent of the interest he has thus created.

In Nebbia v New York (1934) the courts reaffirmed the right of state legislatures to regulate any business activity provided the laws passed are reasonable and are "neither arbitrary nor discriminatory." As a result, the courts permit states to regulate all intrastate commerce including the activities of public utilities. Each of the fifty states, as well as the District of Columbia, has established an independent regulatory commission to regulate the public

utilities operating within its boundaries.

Although the courts have not defined which business activities should be classified as public utilities, the electric power, natural gas, telecommunications, and water industries generally exhibit the five major characteristics identified by Phillips (1984). First, the market for a public utility's services can usually be served at the lowest average cost by organizing the industry as a monopoly. Natural monopolies, which exhibit declining marginal costs over the relevant range of production, can usually realize economies of scale that would be unattainable if competing firms constructed duplicate facilities. Second, public utilities have a substantial investment in plant and equipment that is usually highly specialized and cannot be adapted for other uses. Third, utilities need sufficient capacity to provide continuous service during peak demand periods. In general, utility services cannot be produced and stored during non-peak hours. Fourth, utilities often build plants with significant excess capacity in the short run, so that the economies of scale associated with operating large plants can be realized when demand increases in the long run. And fifth, the demand for utility services is relatively inelastic in the short run. Demand may be more elastic in the long run, however, if consumers offset price increases by reducing demand through conservation. Because public utilities are typically organized as monopolies, they are

regulated by independent state regulatory commissions to prevent the monopolists from earning excessive profits.

Firms maximize profits by increasing output until marginal revenue is equal to marginal cost. In a perfectly competitive market firms are price takers, marginal revenue is equal to price, and the demand curve is horizontal. In the long run, each firm chooses its output level so that price is equal to long run average total production cost. Because long run average total cost includes a normal return on invested capital, perfectly competitive firms do not earn abnormal profits in the long run. When prices are greater than long run average total cost, firms enter the industry and increase supply. When prices are less than long run average total cost, firms exit the industry. The result is an efficient allocation of resources.

Nicholson (1978) states that "a society with a fixed amount of productive resources will be said to have allocated those resources efficiently in production if no more of one good can be produced without having to cut back on the production of something else." In a perfectly competitive market, prices adjust until the quantities demanded and supplied are equal. If supply exceeds demand, then the price of the good in oversupply would decline and firms would shift resources to increase their production of other goods and services. If demand exceeds supply, then the price of the good would increase and firms would expand production. For resources to be allocated efficiently,

market prices must reflect marginal costs.

Although a monopolist also maximizes profits by increasing output until marginal revenue is equal to marginal cost, a monopolist faces a downward sloping demand curve. As a result, a monopolist can influence the market price for its goods and services. By restricting output and charging a price which exceeds long run average total cost, a monopolist can earn abnormal profits. In contrast to a perfectly competitive market, legal barriers prevent firms from entering the industry and increasing supply. Consequently, the price individuals are willing to pay at the margin is not equal to the cost of producing an additional good. A fundamental objective of the state regulatory commissions is to determine the revenue requirement and rate structure for each public utility so that society receives the full benefit of a utility's potential economies of scale.

Determining the Revenue Requirement

The following formula is used to establish the revenue requirement for a public utility:

RR = O + D + T + (rr * RB), where

RR = revenue requirement,

O = operating costs,

D = depreciation,

T = taxes,

rr = allowable rate of return, and

RB = rate base.

The revenue requirement should be sufficient to cover the utility's operating costs, depreciation, and taxes, and provide an adequate rate of return on the utility's rate base. Howe and Rasmussen (1982) outline the general procedure regulatory commissions use to establish prices for a public utility. The commissions:

1. select a recent test period,
2. calculate the operating expenses (including depreciation and taxes) for the test period,
3. modify the allowable operating expenses for any documented changes in costs (for example, a recent increase in wage rates or fuel costs),
4. determine the value of the utility's rate base,
5. estimate the rate of return to be permitted on the utility's rate base,
6. compare the aftertax earnings for the test period with the utility's estimated return (which is found by multiplying the allowed rate of return by the rate base),
7. adjust the rate levels, if necessary, so that the expected aftertax revenue equals the revenue desired, and
8. determine the prices for individual services.

The regulatory commission conducts a bill frequency analysis to determine the revenues a rate can produce. A separate bill frequency analysis is conducted for each customer class and geographic area served which requires a separate rate structure. The prices established for the utility's services remain in effect until the commission, based on the rate of return the utility subsequently earns, decides to adjust the rates.

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Operating Expenses

The income statement for a public utility is divided into two sections: utility operations and non-utility activities. The income generated by utility operations is shown "above the line", whereas income and expenses produced by non-utility activities are reported "below the line." (See Table 3)

TABLE 3

INCOME STATEMENT

Operating Revenues		XXXX
Less:		
Operating expenses	XXXX	
Depreciation expense	XXXX	
Taxes other than income taxes	XXXX	
Income taxes	XXXX	
Total Operating Deductions		XXXX
Utility Operating Income		XXXX
(above the line)		
(below the line)		
Other income and deductions		
+ Other income	XXXX	
- Miscellaneous income deductions	XXXX	
- Interest Expense		XXXX
Net Income		XXXX

Source: Howe and Rasmussen (1982)

Regulatory commissions permit utilities to recover operating

expenses, depreciation, and taxes recorded "above the line" by including these costs in the revenue requirement formula. Maintenance, fuel, salaries, labor benefits, and administrative costs related to utility operations are reported "above the line". Expenses reported "below the line" are excluded from the utility's revenue requirement and are thus borne by the utility's stockholders.

For an expense to be classified "above the line," the utility must show that the expense is necessary, reasonable in amount, and either was incurred or will be incurred in the future. Utilities may challenge a commission's decision to classify an expense as a "below the line" item. In Central Hudson Gas and Electric v New York Public Services Commission (1980), for example, the Supreme Court reversed a commission's decision which prevented a utility from recovering advertising expenditures that promoted electricity usage. The Supreme Court also reversed a commission's decision which prevented a utility from recovering expenses associated with distributing pamphlets that expressed the utility's views on nuclear power (see Consolidated Edison Company of New York v New York Public Services Commission (1980)). Although most commissions allow utilities to recover a reasonable allowance for charitable contributions, costs related to lobbying activities, as well as unreasonable charges for salaries or fringe benefits, are not included.

The operating expenses included in the revenue

reflect the actual operating costs incurred during the past twelve months. In contrast, some states use a forecasted test period to reduce the problems associated with inflation. A third treatment is to use a combination of historical and forecasted test periods; for example, six months of historical cost and six months of projected cost. Commissions that use an historical test period predominate.

Depreciation

Depreciation, which is included in the revenue requirement as an "above the line" operating expense, is generally computed using the straight-line method for rate making purposes. When depreciation is recorded as an expense on the company's books, a corresponding credit is made to the accumulated depreciation account. Accumulated depreciation reduces the utility's rate base. Although most commissions use the original (historical) cost method to value the rate base, the fair value and reproduction cost methods have also been used. If a regulatory commission uses one of the latter methods, the depreciation expense fluctuates with changes in the price level. Most utilities record depreciation for a total asset account (a group of assets) rather than for individual assets.

Taxes

Public utilities are permitted to recover all taxes related to utility operations. Income, property, social security, unemployment and franchise taxes incurred at the

federal, state, and local level are reported "above the line." Taxes incurred as a result of non-utility operations are excluded from the utility's revenue requirement.

Regulatory commissions may use either the flow-through or normalization method to account for the tax deferrals associated with accelerated depreciation. If the flow-through method is used, the tax expense for rate-making purposes reflects the utility's actual tax liability computed using accelerated depreciation. As a result, the tax deferrals associated with accelerated depreciation accrue to consumers in the form of lower utility rates. If the normalization method is used, on the other hand, the tax expense for rate-making purposes reflects the firm's tax liability based on straight-line depreciation. Because the utility's actual tax liability is computed using accelerated depreciation, a deferred tax account is reported on the balance sheet.

The normalization method results in a tax deferral. If a utility purchases new equipment, then accelerated depreciation would be higher than straight-line depreciation during the first years of operation. Consequently, the tax expense used for rate-making purposes would exceed the actual tax that was paid during the period. During the last years of operation, accelerated depreciation would be lower than the straight-line rate. Consequently, the tax expense for rate-making purposes would be less than the taxes actually paid. Although the total tax paid during the life

of the property is the same for both methods, firms using the normalization method generate higher cash flows when the asset base is expanding. The extent of the tax deferral depends on the firm's asset growth rate.

If a regulatory commission adopts the normalization method, the utility is not permitted to earn a return on the deferred taxes. Instead, the deferred tax account is either deducted from the rate base or included in the capital structure at zero cost.

The Internal Revenue Code of 1954 permitted all taxpayers to adopt accelerated depreciation for tax reporting. As a result, regulatory commissions had to decide whether to use the flow-through or the normalization method. In Re Amere Gas Utilities Co. (FPC 1956) and Re El Paso Natural Gas Co. (FPC 1959) the Federal Power Commission (FPC) adopted the normalization method. Although the U.S. Supreme Court declined to hear the case, the FPC's decision was upheld by the U.S. Court of Appeals, Fifth Circuit (see El Paso Natural Gas Co. v. Federal Power Commission (CA5th 1960). In these two decisions the FPC did not deduct the deferred tax reserve from the rate base nor did it include the reserve in the capital structure.

In Re Northern Natural Gas Co. (FPC 1961) and Re Panhandle Eastern Pipe Line Co. (FPC 1961), the FPC used the normalization method but included the deferred tax account in each company's capital structure at a cost rate of 1.5%. This treatment reduced each company's allowable rate of

return. In Panhandle Eastern Pipe Line Co. v. Federal Power Commission (CA DC 1963), the U.S. Court of Appeals, DC circuit upheld the FPC's decision.

The FPC reversed its decision to use the normalization method, however, in Re Alabama-Tennessee Natural Gas Co. (FPC 1964). The FPC not only eliminated the 1.5% return that was previously allowed on the deferred tax account, but also adopted the flow-through method.

By 1970 twenty-four states used the normalization method, nineteen states and the District of Columbia used the flow-through method, and seven states had not taken any position. The commission decisions for these cases can be found in the Check List on Flow Through versus Normalization (1970). Between 1970 and 1981 most commissions adopted the normalization method for rate-making purposes. As part of the Economic Recovery Act of 1981, firms must use the normalization method to take advantage of the accelerated cost recovery system (ACRS) depreciation schedules.

Consolidated Tax Returns

If a holding company owns at least 80 percent of a subsidiary's voting stock, the company may elect to file a consolidated tax return. One advantage of filing a consolidated return is that the tax liability for the consolidated entity may be lower than the sum of the tax liabilities for each subsidiary calculated on a stand-alone basis. The tax savings usually result because one of the companies has a net operating loss which can be used to

offset the taxable income generated by other subsidiaries. If the companies do not file a consolidated tax return, the net operating loss could only be carried forward or backward and used to offset the taxable income generated by the company incurring the loss. By filing a consolidated tax return, the loss can be used in the current period.

When a regulated utility is part of a holding company system that files a consolidated tax return, the commission must estimate the utility's tax expense for rate-making purposes. If the tax expense is based on the regulated subsidiary's taxable income as if the subsidiary were standing alone, the consolidated tax savings would accrue to the holding company's stockholders. If the commission allocates part of the consolidated tax liability to the regulated utility, on the other hand, the utility's consumers may receive part of the benefit and pay lower rates.

The consolidated tax issue is particularly applicable to the telephone industry because the parent holding companies are often permanent tax loss entities. The parent company receives tax-exempt dividends from its wholly owned subsidiaries and incurs tax-deductible interest and operating expenses. If the consolidated tax liability is allocated to the subsidiaries, the effective income tax rate for each subsidiary is reduced. The Public Utility Holding Company Act of 1935 restricts parent companies from issuing debt to purchase the common stock of electric and

gas utilities.

In Federal Power Commission (FPC) v United Gas Pipeline (1967) the Supreme Court upheld the FPC's method for allocating consolidated tax savings to a regulated utility for rate-making purposes. United Gas Pipeline Company (regulated), Union Producing Company (regulated), and United Overseas Production Company (unregulated) were wholly owned subsidiaries of United Gas Corporation. Because Union Producing and United Overseas had net operating losses, the tax liability for the consolidated entity was lower than the sum of the tax liabilities for each company calculated on a stand-alone basis. The FPC allocated the consolidated tax liability to United Gas Pipeline by: 1) subtracting the net operating loss for the unregulated company from the net taxable income for the regulated companies, and 2) allocating the consolidated tax liability to the regulated companies in proportion to their taxable incomes. Even though the tax savings resulted from the nonjurisdictional activities of the utility's affiliates, the Supreme Court held that the FPC's allocation method was just and reasonable. The Court did not address, however, the question of whether the tax savings should be allocated to regulated utilities.

In FPC v Florida Gas Transmission Company (1972), the FPC reversed its prior decision to allocate the consolidated tax liability to regulated utilities for rate-making purposes. Instead, the FPC estimated the tax liability for

Florida Gas Transmission Company, a regulated gas pipeline company, as if the subsidiary were standing alone. The FPC identified two reasons for using the stand-alone method: 1) the FPC wanted to encourage natural gas exploration and development, and 2) the subsidiary being regulated incurred the loss. In the United Pipeline case a nonregulated subsidiary incurred the net operating loss which generated the consolidated tax savings.

During the 1970's and 1980's the FPC (and later the FERC) generally used the stand-alone method to estimate a utility's tax expense for rate-making purposes. In several court decisions the FERC argued that the ratepayers of a pipeline company should not be charged any costs incurred as a result of nonjurisdictional activities (see Re Columbia Gulf Transmission Company (1983)).

> That diversification causes problems for our regulation is obvious. It may expose the pipeline's ratepayers to a variety of burdens. The diversified activities may incur losses or costs that the company may attempt to pass on to the pipeline's ratepayers. And the riskiness of the activities may impair the company's credit, thereby raising the cost of the capital. The universal response of regulators (at least at this commission) has been to try to isolate the ratepayers from these burdens. The commission's allocation methods, which are designed to segregate the costs of jurisdictional and nonjurisdictional businesses, solve many of the problems. But the commission has gone beyond that to require that the costs of different jurisdictional services, such as gas production, be segregated from the costs of providing transmission services. The commission has also attempted to limit the capitalization and cost of capital used in setting rates to the capitalization and cost associated with the pipeline business. In short, the response has been to try to regulate the pipeline as an

> 'independent entity' so that it is 'considered as nearly as possible on its own merits and not on those of its affiliates.'

In addition, the FERC argued:

> Because deductions are given for expenses incurred in producing income, the necessary causal link between the ratepayers and the deductions is the expense the company incurs in providing service. Accordingly, the proper way to allocate deductions is to match the deductions with the expenses included in the cost of service. Thus, when an expense is included in the cost of service, the corresponding tax deduction is also allocated to the ratepayers. In this way any tax-reducing benefits, or savings, the company realizes in providing the service are recognized in calculating the tax allowance for the benefit of the ratepayers.
>
> The corollary to this is that when an expense is not included in the cost of service (because the company did not incur that expense in providing service), the deduction created by that expense is not allocated to the ratepayers. To do otherwise would result in the tax savings the company realizes from expenses incurred in providing services to other groups and periods or for its own benefit being used to reduce rates for a particular group of ratepayers. The tax allowance would then be lower or higher than is warranted by the profit each group provides the company. Since the amount of profit to be provided is the measure of the tax cost the company will incur in providing service, none of the rates for the groups would be cost justified. Subsidization would inevitably result. One group would bear the burden, but another group would gain the benefit.

The FERC does pass the tax savings resulting from a parent's tax loss to ratepayers. In Re Columbia Gulf Transmission Company (1983) the FERC adjusted the revenue requirement for a regulated pipeline subsidiary to reflect the tax savings resulting from the parent company's interest expense. Moreover, the allowable rate of return for the subsidiary was established using the parent's capital

structure and cost of capital.

In contrast to the FERC's decision to use the stand-alone method, state regulatory commissions generally allocate a holding company's consolidated tax liability to affiliated utilities. (See Table 4) The tax expense for rate-making purposes, however, should not be greater than the tax expense the utility would incur if it were standing alone.

McGilsky (1986) develops a simulation model to analyze the effect of allocating the consolidated tax liability to regulated subsidiaries. She concludes that the rates charged to ratepayers and the dividends paid to stockholders are lower if the commission allocates taxes rather than adopts a stand-alone policy. McGilsky prefers the stand-alone method because the stockholders incur the costs which generate the consolidated tax savings. As a result, the stockholders should receive the tax benefits as compensation for bearing the risk.

TABLE 4

STATE COMMISSIONS AND THE CONSOLIDATED TAX ISSUE

Commissions Using Consolidated-Entity Methods

Alabama	Montana
Alaska	Nebraska
Arkansas	New Jersey
Colorado	North Carolina
Connecticut	North Dakota
District of Columbia	Oregon
Florida	Pennsylvania
Illinois	Rhode Island
Indiana	South Carolina
Iowa	South Dakota
Kansas	Tennessee
Kentucky	Texas
Maine	Vermont
Maryland	Washington
Massachusetts	West Virginia
Michigan	Wisconsin
Minnesota	Wyoming
Mississippi	

Commissions Using the Stand-Alone Method

California	Missouri
Delaware	New York
Hawaii	Ohio
Louisiana	Oklahoma

Method Used By Commission is Unknown

Arizona	New Hampshire
Georgia	New Mexico
Idaho	Utah
Nevada	Virginia

Source: McGilsky (1986)

The Rate Base

The rate base is usually equal to the net value of a utility's assets, including working capital, intangible assets, and property held for future use, which are used and useful in providing service. The rate base is generally computed using one of the following methods:

1. original cost, which is equal to the actual cost that was paid to place the plant and equipment in service (historical cost),

2. reproduction cost, which is equal to the cost of placing the plant and equipment in service at the current price level, and

3. fair value, which gives weight to both the original and reproduction cost valuation methods.

Reproduction cost is usually estimated by applying price indices to an asset's original cost (known as trended cost) or by conducting appraisals. The depreciation expense included in the firm's revenue requirement is added to the accumulated depreciation account. Accumulated depreciation is charged as an offset to the firm's rate base.

If a regulatory commission adopts either the reproduction cost or fair value method, the rate base and depreciation expense fluctuate with the price level. For example, assume a utility purchases $1000 of equipment and depreciates this investment over a five-year period to a zero salvage value using the straight-line method. The annual depreciation expense is $200 per year. If inflation is 10 percent per year, however, the value of the depreciation charges is only $834 in constant year one

dollars. (See Table 5)

TABLE 5

ORIGINAL COST VERSUS REPRODUCTION COST

Year	Straight-Line Deprec.	Consumer Price Index (CPI)	Deprec. Expense Based on CPI	Capital Recovery in Terms of Year One Dollars	
				Orig.	Reprod.
1	$200	100	$200	$200	$200
2	200	110	220	182	200
3	200	121	242	165	200
4	200	133	266	150	200
5	200	146	293	137	200
Total	$1,000		$1,221	$834	$1,000

Source: Adapted from Phillips (1984)

If the reproduction cost method is used, the annual depreciation expense reflects changes in the price level. Although $1,221 in depreciation would be recorded over the 5-year period, the value of the capital recovered would be only $1,000 in constant year one dollars. Changes in the price level are usually measured by either the Consumer Price Index (CPI) or a construction cost index.

Most regulatory commissions used either the reproduction cost or fair value method to determine the value of a rate base prior to the Supreme Court's decision to use an original cost rate base (see Federal Power Commission v Hope Natural Gas (1944)). In the Hope decision the Supreme Court concluded:

> We held in Federal Power Commission v. Natural Gas Pipeline Company ... that the

> Commission was not bound to the use of any single formula or combination of formulae in determining rates. Its rate-making function, moreover, involves the making of 'pragmatic adjustments.' And when the Commission's order is challenged in the courts, the question is whether that order 'viewed in its entirety' meets the requirements of the Act. Under the statutory standard of 'just and reasonable' it is the result reached not the method employed which is controlling.... It is not theory but the impact of the rate order which counts. If the total effect of the rate order cannot be said to be unjust and unreasonable, judicial inquiry under the Act is at an end. The fact that the method employed to reach that result may contain infirmities is not then important. Moreover, the Commission's order does not become suspect by reason of the fact that it is challenged. It is the product of expert judgment which carries a presumption of validity. And he who would upset the rate order under the Act carries the heavy burden of making a convincing showing that it is invalid because it is unjust and unreasonable in its consequences....

In addition, the Supreme Court stated:

> Rates which enable the company to operate successfully, to maintain its financial integrity, to attract capital, and to compensate its investors for the risks assumed certainly cannot be condemned as invalid, even though they might produce only a meager return on the so-called 'fair value' rate base....

Although the Hope decision does not preclude commissions from using the fair value or reproduction cost methods, most state commissions have adopted the original cost method. (See Table 6)

TABLE 6

STATE COMMISSIONS AND RATE BASE VALUATION METHODS

Commissions Using Fair Value

Arizona	Missouri
* Illinois	* New Mexico
Maryland	Texas

* State commissions use both fair value and original cost

Commissions Using Original Cost

All other states generally apply original cost

Source: Annual Report on Utility and Carrier Regulation (1984)

The Allowable Rate of Return

Regulatory commissions usually set the allowable rate of return equal to a utility's weighted average cost of capital. The weighted average cost of capital is typically estimated using the book values for debt, preferred stock, and common equity reported on the utility's balance sheet. The cost rates for debt and preferred stock are embedded costs, whereas the cost rate for equity is generally estimated using the comparable earnings standard, the Capital Asset Pricing Model (CAPM), the Arbitrage Pricing Theory, a risk premium approach, and/or a discounted cash flow model. (See Table 7)

TABLE 7

COMPUTING THE WEIGHTED AVERAGE COST OF CAPITAL

Source of Capital	Percent of Total Capital (a)	Rate of Return	Weighted Rate of Return
Debt	40%	9% (b)	3.60%
Pref. Stock	15	10 (c)	1.50
Common Stock	35	15 (d)	5.25
Deferred Federal Income Tax Credits	10	0	0.00
Total	100%		10.35% (e)

(a) Based on the book value for each source of capital at the time of the rate proceeding.

(b) The annual interest expense divided by the book value for debt at the time of the rate proceeding.

(c) The annual preferred dividend requirement divided by the book value for preferred stock at the time of the rate proceeding.

(d) The utility's estimated cost of equity.

(e) The allowable rate of return used in the revenue requirement formula.

The Supreme Court has not specified which methods or formulas regulatory commissions should use to determine a utility's cost of equity. In Federal Power Commission v Natural Gas Pipeline Company (1942) the U.S. Supreme Court stated that "the Constitution does not bind rate-making bodies to the service of any single formula or combination of formulas." Instead, the Supreme Court concluded only that the Commission should determine "just and reasonable rates." If a utility's allowable rate of return is (1) based on findings of fact, (2) supported by substantial

evidence, and (3) not confiscatory, the Supreme Court argued that the Commission's finding "shall be conclusive." Moreover, the Supreme Court defined its role in the rate-making process:

> Once a fair hearing has been given, proper findings made and other statutory requirements satisfied, the courts cannot intervene in the absence of a clear showing that the limits of due process have been overstepped. If the Commission's order, as applied to the facts before it and viewed in its entirety, produces no arbitrary result, our inquiry is at an end.

In Permian Basin Area Rate Cases (1968) the U.S. Supreme Court reiterated its position to uphold a commission's decision unless the utility can demonstrate that the rate order is unlawful, unreasonable, or improper.

> It follows that the responsibilities of a reviewing court are essentially three. First, it must determine whether the Commission's order, viewed in light of the relevant facts and of the Commission's broad regulatory duties, abused or exceeded its authority. Second, the court must examine the manner in which the Commission has employed the methods of regulation which it has itself selected, and must decide whether each of the order's essential elements is supported by substantial evidence. Third, the court must determine whether the order may reasonably be expected to maintain financial integrity, attract necessary capital, and fairly compensate investors for the risks they have assumed, and yet provide appropriate protection to the relevant public interests, both existing and foreseeable. The court's responsibility is not to supplant the Commission's balance of these interests with one more nearly to its liking, but instead to assure itself that the Commission has given reasoned consideration to each of the pertinent factors. Judicial review of the Commission's orders will therefore function accurately and efficaciously only if the Commission indicates fully and carefully the methods by which, and the purposes for which, it has chosen to act, as well as its assessment of the consequences of its orders for the character and future development of the

industry.

Although the Supreme Court has not specified which methods or formulas regulatory commissions should use to determine a utility's rate of return, the Supreme Court has established several guidelines. In Bluefield Water Works & Imp. Co. v West Virginia Public Service Commission (1923), the Supreme Court concluded that:

> A public utility is entitled to such rates as will permit it to earn a rate of return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures. The return should be reasonably sufficient to assure confidence in the financial soundness of the utility, and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties. A rate of return may be reasonable at one time, and become too high or too low by changes affecting opportunities for investment, the money market, and business conditions generally.

In Federal Power Commission v Hope Natural Gas (1944), the Supreme Court reiterated its position in the Bluefield case and concluded that the return on equity should not only be equal to the returns earned on other investments of comparable risk, but also sufficient for the utility to "maintain its credit and attract capital."

The Zone of Reasonableness

The Bluefield and Hope decisions have established a zone of reasonableness for a utility's cost of equity. The

zone's upper boundary is equal to the returns which are earned by very profitable industries or speculative ventures, whereas the lower boundary is equal to the return which results in the confiscation of shareholder property.

In order to make the lower boundary operational, Morin (1984) illustrates how the wealth of existing shareholders is diluted if a utility sells new common stock at a price which is less than the equity's book value. Assume the existence of a public utility which earns a 15% return on equity. In addition, assume the utility's book value is $25 per share and there are 20 shares outstanding. Before the new common stock is issued, the utility's stockholders earn $3.75 per share. If the firm issues 5 new shares of common stock at a price of $20 per share (or 80% of the book value of the existing shares), the company's earnings would decline to $3.60 per share. (See Table 8)

TABLE 8

THE SALE OF COMMON STOCK BELOW BOOK VALUE:
A DILUTION OF EXISTING STOCKHOLDER'S WEALTH

	Before	After	
Book Value per Share (New Issue)	NA	$ 20	(a)
New Shares Issued	NA	5	
Book Value (New Shares)	NA	$ 100	
Book Value per Share (Existing Shares)	$ 25	$ 25	
Number of Shares	20	20	
Book Value of Equity	$ 500	$ 500	
Total Book Value of Equity	$ 500	$ 600	
Return on Equity	.15	.15	
Earnings	$ 75	$ 90	
Earnings per Share	$3.75	$3.60	
Number of Shares Outstanding	20	25	

(a) The new shares are sold for $20 per share (80% of an existing share's $25 book value).

Because the issuance of new common stock at a price below book value dilutes the equity of the existing stockholders, rates of return which result in a market-to-book ratio less than one restrict the utility's ability to raise additional capital. Rates which do not permit a utility to "maintain credit and attract capital" violate the lower boundary specified by the Supreme Court in the Bluefield and Hope decisions.

Using the data from the prior example, assume the market's required rate of return on equity is 18.75% for firms in this risk class. Since the firm's book value is $25 per share, shareholders would expect to earn $4.6875 per share if the commission awards an 18.75% return on equity

(.1875 x $25 = $4.6875 per share). If the commission does award an 18.75% return, then the firm's market price would equal $25 per share, investors would expect to earn the market's required rate of return, and the utility's market-to-book ratio would equal one. If, on the other hand, the commission allows the utility to earn only a 15% return on equity, expected earnings would decline to $3.75 per share (.15 x $25 = $3.75 per share). In order for investors to earn the 18.75% return required for firms in this risk class, the market price would have to decline to $20 per share ($3.75 per share / $20 = 18.75%). Regardless of the return allowed by the commission, the firm's market price will always adjust to reflect the market-determined required rate of return. Therefore, the firm's market-to-book ratio will equal one only if the allowable rate of return is equal to the required rate of return.

Trout (1974) examines market-to-book ratios to evaluate the allowable rates of return awarded to utilities. He concludes that commissions may have allowed returns in excess of the cost of capital between 1963 and 1965 (market-to-book ratios were well in excess of one), whereas market-to-book ratios declined from 1966 to 1972 (the last year of the study). It should be noted that a market-to-book ratio equal to one is only a lower boundary and not necessarily the desired objective of regulation. A market-to-book ratio in excess of one may be desired to reflect the flotation costs and market pressure associated with issuing new common

stock.

Morin (1984) argues that regulatory commissions should establish rates so that a utility's Q-ratio, the ratio of the market value of a firm's securities to the replacement cost of its assets, is equal to or greater than one. If the Q-ratio is less than one, the firm has a disinclination to invest in new plant and equipment.

Estimating the Cost of Equity

Morin (1984) describes five methods that are commonly used to estimate the cost of equity for a regulated utility: the comparable earnings standard, the risk premium approach, the discounted cash flow (DCF) model, the CAPM, and the APT.

The Comparable Earnings Standard

According to the comparable earnings standard the cost of equity should equal the average rate of return being earned on investments of comparable risk. Specifically, the cost of equity should equal the average rate of return being earned on the book equity of nonregulated firms that exhibit the same risk as the utility being analyzed.

Myers (1972) argues that the comparable earnings standard is erroneous because the cost of equity should be an opportunity cost concept. Regulators should establish utility rates so that investors expect to earn the same rate of return on regulated and nonregulated investments of comparable risk. As a result, the expected rate of return should reflect anticipated dividends and capital gains.

Book rates of return measure only the actual rate of return being earned on historical investments. Historical rates of return may or may not reflect current opportunity costs.

Myers (1972) identifies two other problems with the comparable earnings standard. First, the book rates of return for the nonregulated firms may not be comparable to the regulated firms if the nonregulated firms use different accounting rules. And second, the sample of nonregulated firms may not exhibit the same risk as the utility being analyzed.

The Risk Premium Approach

If regulators adopt the risk premium approach, the utility's cost of equity is estimated using the current yield on intermediate or long-term government bonds plus an historical risk premium. The risk premium is usually defined as the difference between the rate of return earned on common stocks (usually measured by a stock index) and the rate of return earned on government bonds for the same period. Determining the appropriate time period to compute the risk premium is a fundamental problem with this approach, because the risk premium is usually not stable over time. Brigham, Shome, and Vinson (1985) conclude that the risk premium increased from the mid-1960s to the mid-1970s and then decreased from 1980 to 1984. Fluctuations in the risk premium are related to changes in inflation and interest rates.

The Discounted Cash Flow Model

According to the DCF model the expected rate of return on equity is given by:

$K = D_1 / P_0 + G$, where

K = the expected rate of return,

D_1 / P_0 = the expected dividend yield, and

G = the expected dividend per share growth rate.

To estimate the cost of equity using the DCF model, a sample of either regulated or nonregulated firms which have the same risk as the utility being analyzed is constructed. The cost of equity is estimated for each firm in the sample using the DCF model. The growth rate is usually based on analyst forecasts or the firm's historical dividend or earnings growth rate. The average cost of equity for the firms in the sample is then used as a proxy for the utility's cost of equity.

Using the market data for the utility being regulated would involve circular reasoning. Because the market price for the regulated utility reflects, in part, investors expectations regarding the outcome of the regulatory process, the cost of equity would not reflect the true opportunity cost. Myers (1972) believes the result would be a "very complicated game" as investors try to anticipate the return regulators will permit.

The Capital Asset Pricing Model

According to the CAPM the return investors expect to earn on a security is linearly related to the security's systematic risk.

$K = Rf + \beta(Km - Rf)$, where

K = the expected rate of return,

Rf = the riskfree rate of return (usually estimated as the current rate of return on intermediate-term government bonds),

Km = the expected rate of return on the market portfolio (usually estimated as the yield on long-term government bonds plus an historical risk premium), and

β = a measure of systematic risk (beta).

The beta coefficient measures the covariance between the return on the security and the return on the market portfolio. In practice, beta coefficients are usually estimated using 60 monthly observations. One drawback of the CAPM is that the beta coefficient is not stable over time. In addition, a different beta can be calculated for the same security by computing the covariance for different holding periods (for example, using weekly data rather than monthly data).

Hyman and Egan (1980) argue that the CAPM may give unreliable estimates for the cost of equity. The authors indicate that the beta coefficients for electric, gas, and telephone utilities have declined from the mid-1960s to the late-1970s. A decline in systematic risk would suggest that these investments have become less risky. By most other measures, however, utilities have become more risky. For

example, the market-to-book and interest coverage ratios have exhibited a downward trend throughout the 1970s.

The Arbitrage Pricing Model

In contrast to the CAPM in which only one systematic factor affects stock returns, the APT permits several systematic factors to impact security returns.

$K = Rf + \beta_1 [F_1 - Rf] + \beta_2 [F_2 - Rf] + . . . + \beta_k [F_k - Rf]$,

where

K = the expected rate of return,

Rf = the riskfree rate of return,

β_i = the sensitivity of the security to factor i, and

$[F_i - Rf]$ = the risk premium for a stock with a unit sensitivity to unanticipated changes in factor i.

Although the APT does not specify which factors are priced, Roll and Ross (1983) argue that the most important factors appear to be unanticipated changes in inflation, industrial production, and the general cost of bearing risk. Because the risk premiums associated with each factor apply to all stocks, a utility's cost of equity can be estimated by computing the utility's individual sensitivity to each of the three factors.

The APT suffers from some of the same problems as the CAPM. The factor sensitivities are based on historical data and may change over time. Furthermore, the three or four systematic factors that appear to impact security returns may change over time.

The Relationship Between the Allowable Rate of Return and the Rate Base

The Hope (1944) decision does not require commissions to use a particular method or formula to determine utility rates. Instead, the Supreme Court has specified only that utility rates should "assure the confidence in the financial integrity of the enterprise, so as to maintain its credit and attract capital." Because asset reproduction costs exceed their original cost when prices are rising, several empirical studies have analyzed whether original cost jurisdictions award higher rates of return than fair value or reproduction cost jurisdictions to offset the use of the lower rate base valuation method.

Eiteman (1962) analyzes sixty rate cases pertaining to fifteen Bell operating companies. The rate cases were decided between 1945 and 1959. Thirty-four cases use original cost, six cases use reproduction cost, and twenty cases use fair value to determine the rate base. Eiteman develops a trend line to eliminate the effect of awarding higher allowable rates of return over time.

$Y = C + \beta X$, where

Y = the rate of return permitted by the regulatory commission,

C = a constant term,

β = a coefficient measuring the effect of time on the allowed rate of return, and

X = the month associated with each rate case (X = 1 for Dec. 1945).

Eiteman measures the difference between the allowable rate

of return permitted in each rate case and the estimated return using the trend line. An analysis of variance is conducted to compare the average difference between the allowable rate of return and the trend line for the original cost, fair value, and reproduction cost jurisdictions. The null hypothesis that the average difference between the allowed return and the trend line is the same for each valuation method is rejected at the 5% level of significance. The rates of return permitted in original cost jurisdictions are, on average, above the trend line, whereas the allowed rates of return in reproduction cost and fair value jurisdictions are, on average, below the trend line. As a result, jurisdictions using original cost do compensate for using a lower rate base valuation method by awarding higher rates of return.

To determine if the higher returns completely compensate for the lower rate base, Eiteman converts the rates of return permitted on the reproduction cost and fair value rate bases to an equivalent rate of return on an original cost rate base.

$$\text{Allowed rate of return on fair value rate base} \times \frac{\text{Fair Value rate base}}{\text{Original Cost rate base}} = \text{Equivalent allowed rate of return on an original cost rate base}$$

Even though the fair value and reproduction cost jurisdictions award lower rates of return than the original cost jurisdictions, Eiteman found that the fair value and reproduction cost valuation methods more than compensate for

the lower return. The average equivalent allowed rate of return is highest for the reproduction cost jurisdictions and lowest for the original cost jurisdictions. Furthermore, the average rate of return that was actually earned over the 1950 - 1959 period is highest for the companies operating in reproduction cost jurisdictions and lowest for the companies operating in the original cost jurisdictions.

Stuart (1962) replicates Eiteman's study using eighty-five electric utility rate cases. The cases were decided between 1944 and 1960. Fifty cases use original cost, thirty-three cases use fair value, and two cases use reproduction cost to the determine rate base. In contrast to Eiteman's results, the null hypothesis that the average difference between the allowed return and the trend line is the same for each valuation method could not be rejected at the 5% level of significance.

Pike (1967) conducts a regression analysis using electric utilities to determine what effect the rate base valuation method, population density, the proportion of revenues derived from residential customers, the proportion of power supplied by investor-owned utilities, the proportion of power generated by hydroelectric power plants, and fuel costs have on the monthly electric bills for residential consumers. Pike uses a dummy variable to analyze the effect of the rate base valuation method on monthly electric bills. The dummy variable has a value of

one for original cost jurisdictions and a value of zero for fair value jurisdictions. Although the coefficient pertaining to the original cost variable is negative, the coefficient is not significant at the 5% level of significance. A statistically significant negative coefficient would support the hypothesis that residential electric bills are lower in original cost jurisdictions.

Stitch (1973) argues that the fair value method reduces the adverse effect of inflation, which reduces the purchasing power of the funds recovered through depreciation. Stich compares the average financial results for eleven firms operating in fair value jurisdictions with thirteen firms operating in original cost jurisdictions between 1962 and 1971. The average rates of return on book equity, the price-earnings ratios, the market-to-book ratios, and the post-tax interest coverage ratios are higher for firms operating in fair value jurisdictions than they are for firms operating in original cost jurisdictions. Stich argues that the average market-to-book and price-earnings ratios for the fair value firms are comparable to the average ratios for Moody's 125 Industrials. As a result, Stich argues that the use of the fair value method in regulatory proceedings does not result in windfall profits to shareholders.

Petersen (1976) analyzes fifty electric utility rate cases that were decided between January 1969 and December 1971. Thirty-two cases use the original cost method and

eighteen cases use the fair value method to determine the rate base. Petersen conducts the following regression:

$$ROR = C + \beta_1(FVOC) + \beta_2(COC) + \beta_3(GROWTH), \text{ where}$$

ROR = the allowed rate of return adjusted to an original cost basis,

FVOC = the fair value rate base divided by the original cost rate base (expressed as a percent),

COC = the firm's weighted average cost of capital, which is estimated using the embedded cost of debt and the firm's earnings-price ratio as a proxy for the cost of equity, and

GROWTH = the percentage increase in population between 1960 and 1970 in the state in which the rate case took place.

The estimated coefficients for each variable are significant at the 95% level. Petersen concludes that jurisdictions using fair value award higher equivalent rates of return than original cost jurisdictions. The coefficient for FVOC is also positive and statistically significant at the 95% level when the actual return earned in the first year following a rate decision is substituted for the allowable rate of return specified in the rate case.

Edleman (1982) replicates Petersen's study using 251 rate cases decided between January 1972 and December 1977. Edleman's findings are similar to Petersen's results. Jurisdictions using fair value rate bases award higher equivalent rates of return than original cost jurisdictions.

The Market Response to Utility Rate Cases

Davidson (1984) investigates the effect that above average, average, and below average settlements have on

utility common stock prices. If a utility receives 65% of the amount requested, the rate case is defined as an average settlement. If the utility receives less than 42% of the amount requested (one standard deviation below the mean), the rate case is below average. If the utility receives more than 88% of the amount requested (one standard deviation above the mean), the rate case is above average.

An event study methodology is employed to determine the effect that each settlement has on utility common stock prices. Davidson concludes that the cumulative average residuals are positive for above average settlements, negative for below average settlements, and approximately zero for average settlements. Although a negative price reaction does not necessarily indicate that the rate relief awarded by the commission is inadequate, Davidson argues that the results do demonstrate the relationship between the outcome of rate decisions and the market price for a utility's securities.

Ferris, Johnson, and Shone (1986) analyze the impact of rate cases on utilities operating in favorable and unfavorable regulatory environments. For each environment, rate cases are categorized as above average, average, or below average. The settlements are defined using the mean and standard deviation for the amount received in each regulatory environment. The cumulative average residuals are not significantly different from zero for the average settlements even though the average settlements for

utilities operating in favorable jurisdictions are higher than the settlements for utilities operating in unfavorable jurisdictions. In contrast, cumulative average residuals are positive and negative for above average and below average settlements, respectively.

Conclusion

Determining the revenue requirement for a regulated public utility involves financial, political, and judicial considerations. Independent state regulatory commissions control the quantity and quality of service, as well as determine each utility's revenue requirement and rate structure. In general, the revenue requirement should be sufficient to cover the utility's operating costs, depreciation, and taxes, and provide a reasonable rate of return on the utility's rate base. Although the courts do not specify which methods or formulas commissions should use to establish utility rates, the courts do review rate orders to ensure that the rates charged to consumers are just and reasonable.

The rates charged to consumers, and the dividends and interest received by a utility's stockholders and bondholders, are the end result of the entire rate order. Regardless of the methods used, the objective of each regulatory commission is to keep rates as low as possible and still permit utilities to "maintain credit and attract capital."

CHAPTER 3

THE EFFECT OF REGULATION ON FIRM VALUE AND COST OF CAPITAL: A ONE-PERIOD MODEL

The controversy surrounding the effect of regulation on firm value and cost of capital can be traced to a sequence of articles written by Modigliani and Miller (MM). In one of these articles, MM (1966) derive and test a theoretical relationship in which the firm's market value is a function of size, asset growth, capitalized "tax-adjusted" earnings, and debt tax shield. MM include the effect of corporate taxes on firm valuation but ignore personal taxes.

Gordon (1967) argues that MM's test formulation and conclusions are incorrect because MM conducted their study using a sample of regulated electric utilities. As a result, the tax-adjusted earnings variable is misspecified. Elton and Gruber (1971), on the other hand, believe MM's test equations are correct and apply to both regulated and nonregulated companies. Although these arguments depend on one's view regarding the major risks facing regulated utilities, the effect of leverage on firm value is significantly less for regulated firms than it is for comparable nonregulated firms.

The objective of this chapter is to use a one-period Capital Asset Pricing Model (CAPM) to analyze Gordon's, and

Elton and Gruber's views regarding the effect of regulation on firm value and cost of capital. This chapter concludes with a review of other empirical studies.

The Modigliani and Miller Studies

Modigliani and Miller (1958) present three propositions regarding the effect of leverage on firm value and cost of capital. They develop these propositions under the following set of assumptions:

1) investors and corporations may borrow or lend at 'r', the riskfree rate of interest,

2) there are no bankruptcy or financial distress costs,

3) capital markets are perfect,

4) profits are taxed only at the corporate level (there are no personal taxes),

5) all cash flow streams are perpetuities with expected value X_j, where X_j is equal to expected earnings before interest and taxes (EBIT) for firm 'j', and

6) firms can be divided into risk classes such that firms in the same risk class have the same expected rate of return.

Given these assumptions, MM conclude:

I) the market value of the firm is independent of its capital structure and is given by capitalizing its expected return at the rate Γ_k appropriate to its risk class.

In the absence of corporate taxes,

(1) $V_j = (S_j + D_j) = \bar{X}_j / \Gamma_k$, where

V_j = the market value of firm j,

S_j = the market value of firm j's equity,

D_j = the market value of firm j's debt,

$\bar{X}_j$ = the expected EBIT for firm j, and

Γ_k = the expected rate of return for securities belonging to risk class k.

II) The expected yield of a share of stock is equal to the appropriate capitalization rate Γ_k for a pure equity stream in the class, plus a premium related to financial risk equal to the debt-to-equity ratio times the spread between Γ_k and r.

In the absence of corporate taxes,

(2) $\bar{I}_j = \Gamma_k + (\Gamma_k - r)\ D_j / S_j$, where

$\bar{I}_j$ = the expected rate of return on the common equity for stock j.

III) The cut-off point for investment in the firm will in all cases be Γ_k and will be completely unaffected by the type of security used to finance the investment.

According to MM, the firm's market value and average cost of capital are unaffected by the use of riskless debt financing. Any decrease in the average cost of capital due to the use of debt, which has a lower cost than equity, is exactly offset by an increase in the required rate of return on the firm's equity. In contrast, the traditional view believes that the weighted average cost of capital curve is U-shaped. As the firm's debt ratio is increased, the weighted average cost of capital declines to a minimum value and then increases. The firm's optimal capital structure is defined as the debt ratio which maximizes firm value. This debt ratio corresponds to the firm's minimum weighted average cost of capital.

To empirically test Propositions I and II, MM analyzed a sample of 43 electric utilities (1947-48) and a sample of

42 oil companies (1953). For both samples MM conducted the following regression analysis:

(3) $\bar{X}^t/V = C + \beta\ (D/V)$, where

$\bar{X}^t$ = expected interest plus preferred dividends plus net income after taxes (actual values were used as a proxy for expected values),

V = the market value of all securities,

$\bar{X}^t/V$ = the firm's average cost of capital,

C = a constant term equal to the average cost of capital for an unlevered firm,

D = the market value of the company's bonds and preferred stock, and

β = a coefficient measuring the correlation between the average cost of capital, $\bar{X}^t/V$, and leverage D/V.

According to the traditional view β should be negative, which would indicate that the cost of capital declines with greater leverage (at least through most of the relevant range). In contrast, MM hypothesize that β should not be significantly different from zero.

The results of the test support the MM hypothesis. The correlation coefficients for both samples are close to zero and are not statistically significant. As a result, MM conclude that the presence of debt in the firm's capital structure has no effect on the average cost of capital through most of the relevant range.

MM also test Proposition II using the same two samples of regulated and nonregulated firms. According to Proposition II, the expected yield on common stock $\bar{i}_j$, should increase linearly through most of the relevant range

as the debt ratio increases. According to the traditional view, on the other hand, the expected return on common stock should remain constant through most of the relevant range.

MM test:

(4) $\bar{i}_j = C + \beta\ (D_j / S_j)$, where

$\bar{i}_j$ = the expected return for security j (MM use stockholder's net income divided by the market value of the firm's common stock as a proxy for $\bar{i}_j$),

C = an intercept term which measures the expected return on the common stock of an all-equity firm in risk class k, and

β = a coefficient which measures the correlation between the expected return on the common stock and the firm's debt ratio.

A statistically significant positive correlation coefficient would support MM's Proposition II, whereas a zero correlation coefficient would support the traditional view. Although the theoretical relationships are derived using expected values for the return on common equity, MM use actual data as a proxy for investor expectations. The results of the empirical test, which indicate that the correlation coefficient is positive and statistically significant, support the MM hypothesis that the expected cost of equity increases with higher debt ratios.

Several researchers have criticized MM's statistical tests. Because the market value of the firm's equity appears on both sides of equation (4), Barges (1963) argues that the correlation coefficient has a positive bias. Therefore, Barges concludes that the theoretical correlation

coefficient in equation (4) may actually be equal to zero. Weston (1963) believes MM's test equation is not appropriate because the use of an earnings-to-price ratio to estimate the required return on equity ($\bar{I}_j$) is valid only when the firm exhibits no growth or the firm's reinvestment rate is equal to $\bar{I}_j$. Therefore, MM's empirical test equation is misspecified if the sample contains firms with positive growth. Brigham and Gordon (1968) test a sample of 69 electric utility companies in which the dividend yield is a function of size, growth, leverage, earnings instability, and from electricity revenue as a percentage of total revenue. Their results indicate that dividend yield is not related to any of these variables. As a result, Brigham and Gordon argue that their results contradict MM's hypothesis that the required return on equity is linearly related to leverage.

Although MM's theoretical equations are correct when taxes are ignored, MM (1963) demonstrate that their formulations are incorrect when corporate taxes are included in the model. Instead, the tax-corrected equations are:

(5) $V_u = \bar{X} (1-t) / \Gamma_t$,

(6) $V_l = V_u + tD$, and

(7) $\bar{I}_j = \Gamma^t + (1-t) (\Gamma^t - r) D/S$, where

V_u = the market value of the unlevered firm,

V_l = the market value of the levered firm,

t = the corporate tax rate,

tD = the present value of the firm's tax shield, and

ρ^t = the discount rate that is appropriate for capitalizing aftertax earnings for an unlevered firm in risk class k.

In the absence of market imperfections, such as bankruptcy costs, personal income taxes, and financial distress costs, the value of the firm would be maximized when the firm is one hundred percent financed with debt. The value of the firm increases with debt financing due to the tax deductibility of the interest expense.

MM (1966) use a sample of 63 electric utility holding companies to test the effect of leverage on firm value and average cost of capital. Beginning with their tax-corrected equations:

(5) $V_u = \bar{X}\ (1-t) \ / \ \rho^t$, and

(6) $V_l = V_u + tD = \bar{X}\ (1-t) \ / \ \rho^t + tD$,

MM hypothesize that the value of the firm is a function of size, capitalized tax-adjusted earnings [$\bar{X}\ (1-t) \ / \ \rho^t$], asset growth, and tax shield (tD). Because the tax shield has a coefficient equal to one according to the theory, this term is shifted to the left-hand side of the equation. MM test:

(8) $(V_l - tD)/A = a_0(1/A) + a_1[\bar{X}(1-t)/A] + a_2(\delta A/A) + U/A$,

where A = the book value of total assets,

a_0 = an intercept term which measures the effect of firm size on valuation,

a_1 = an estimate of $1/\rho^t$, the expected rate of return for an unlevered firm,

a_2 = a measure showing the relationship between growth opportunities and firm value,

$\bar{X}(1-t)$ = expected tax adjusted earnings, or

EBIT*(1-t),

δA = the expected growth rate for the firm's investment opportunities which is equal to the historical 5-year average total asset growth rate,

D = the market value of the firm's long-term debt plus the book value of the firm's short-term liabilities, and

U = a random disturbance term.

MM divide each variable in the test equation by the book value of total assets (A) to avoid the statistical problems associated with heteroscedasticity. Heteroscedasticity occurs because the standard deviation of the error term (U) is approximately proportional to firm size.

MM use the actual value of $X^t - tR$ as an estimate for each firm's $\bar{X}(1-t)$, where X^t is equal to the firm's net income after tax plus preferred dividends plus interest expense (R). Theoretically, $X^t = (X-R)(1-t)+R = X(1-t)+tR$, so that $X^t - tR = X(1-t)$. Because $X^t - tR$ is not an unbiased estimate of long-run expected tax adjusted earnings $[\bar{X}(1-t)]$, MM use a two-stage least squares regression model. In the first regression, MM specify $X^t - tR$ as a function of firm size, asset growth, debt, preferred stock, and dividend payout:

$$(9) \quad (X^t - tR)/A = \beta_0 + \beta_1(1/A) + \beta_2(\delta A/A) + \beta_3(D/A) + \beta_4(P/A) + \beta_5(div/A) + U/A, \text{ where}$$

β_0 = a constant,

β_1 = a measure showing the relationship between tax-adjusted earnings and size,

β_2 = a measure showing the relationship between earnings and asset growth,

β_3, β_4, and β_5 = coefficients relating-tax adjusted earnings to the level of debt, preferred stock, and dividends, respectively,

P = the market value of preferred stock, and

div = common dividends.

The coefficients derived from this first regression are used to estimate the unbiased expected tax-adjusted earnings for each of the sixty-three regulated utilities in the sample. These estimates are then used in the second regression (equation 8) to obtain estimates for the unlevered cost of equity for firms in this risk class.

MM also use the two-step regression approach to test whether there are non-tax advantages associated with leverage. Using the estimates of expected tax-adjusted earnings based on the regression coefficients obtained from equation (9), MM conduct the following regression:

$$(10)\quad (V-tD)/A = a_0(1/A) + a_1(X^t-tR)/A + a_2(\delta A/A) + a_3(D/A) + a_4(P/A) + U/A.$$

Because the coefficients for the debt and preferred stock variables (a_3 and a_4) are not statistically different from zero, MM conclude that the empirical test supports their assertion that the only advantages which result from debt financing are tax related. The tax shield associated with debt financing (tD) appears on the left-hand side of the equation.

Gordon's Interpretation of MM's Results

Gordon (1967) believes MM's conclusions are incorrect, because MM test equation (10) using a sample of regulated utilities. In their empirical test, MM use X^t-tR as a proxy for expected tax adjusted earnings, $\bar{X}(1-t)$. In the theoretical derivation of equation (10), however, $\bar{X}$ is independent of the firm's capital structure. As a result, increases in the debt ratio increase the value of the firm because $\bar{X}^t = \bar{X}(1-t)+tR$, so that increases in R increase $\bar{X}^t$. $\bar{X}^t$, the expected level of earnings after taxes and before interest, represents the total cash flow to the firm's bondholders and common stockholders.

Gordon believes equation (10) does not apply to regulated firms, because $\bar{X}$ does depend on the capital structure for regulated utilities. According to Gordon's view of the regulatory process, the allowable rate of return established by the regulatory commission is independent of the firm's debt-to-equity ratio. If the utility changes its capital structure by increasing the debt ratio, for example, the regulatory commission would pass the tax savings associated with the higher interest expense to the ratepayer in the form of lower utility rates. Therefore, regulators would adjust $\bar{X}$ so that $\bar{X}^t = \bar{X}(1-t) + tR$ is not changed. If a utility reports higher interest expenses associated with a higher debt ratio, the regulatory commission would decrease $\bar{X}$.

Gordon contends that MM should have used the following

equation to test their sample of electric utility holding companies:

(11) $V/A = a_0 + a_1(\bar{X}^t/A) + a_2(\delta A/A) + a_3(D/A) + a_4(P/A) + U/A.$

In the MM study using equation (10), the correlation coefficients for the debt and preferred stock variables (a_3 and a_4) were not statistically different from zero. Gordon believes the correlation coefficients may be positive and significant, however, if MM's regulated sample is tested using equation (11). Contrary to the conclusions reached by MM, Gordon argues that MM's empirical test suggests there may be non-tax advantages associated with debt financing at the corporate level.

Elton and Gruber's Interpretation of MM's Results

Elton and Gruber (1971) believe that MM were correct in using equation (10) to test the effect of leverage on a sample of regulated utilities. In contrast to Gordon, Elton and Gruber argue that regulation does not completely eliminate the tax shield associated with debt financing even if the regulatory commission establishes rates so that $\bar{X}^t$ is independent of leverage. The proof, which is outlined in their 1971 article, shows that the distribution of $X/\bar{X}$ is independent of firm leverage, whereas the distribution of $X^t/\bar{X}^t$ depends on leverage. As a result, Elton and Gruber believe that the value of a regulated utility can be found by capitalizing $\bar{X}(1-t)$, as suggested by MM, and not $\bar{X}^t$, as suggested by Gordon.

Elton and Gruber acknowledge, however, that regulation

does shift most of the advantage of using debt financing to the ratepayer. According to MM, the value of either a regulated or nonregulated firm is given by:

$$(6) \quad V = \bar{X}(1-t)/\Gamma^t + tD.$$

Using Gordon's view of regulation, $\bar{X}$ is changed so that $\bar{X}^t$ is constant regardless of the amount of leverage the firm uses. Therefore,

$$(12) \quad \bar{X} - (\bar{X} - rD)t = \bar{X}^t = \bar{X}_{nl}\ (1-t)\ , \text{ where}$$

$\bar{X}_{nl}$ = expected EBIT for an unlevered firm.

This equation may be re-written:

$$\bar{X} - \bar{X}t + rtD = \bar{X}_{nl}\ (1-t)$$

$$\bar{X}(1-t) = \bar{X}_{nl}\ (1-t) - rtD$$

$$\bar{X} = [\bar{X}_{nl}\ (1-t) - rtD]/(1-t)$$

By substituting $\bar{X}$ into equation (6):

$$(13) \quad V = \frac{[\bar{X}_{nl} - rtD\ /\ (1-t)]\ (1-t)}{\Gamma} + tD, \text{ and}$$

$$(14) \quad V = \frac{[\bar{X}_{nl}\ (1-t)]}{\Gamma} + \frac{(\Gamma - r)tD}{\Gamma}$$

According to Elton and Gruber, the market capitalizes

$$[\bar{X}_{nl} - rtD\ /\ (1-t)]\ (1-t)$$

by Γ so that MM's tax-corrected equations hold for both regulated and nonregulated firms.

The Theoretical Model

A one-period CAPM will be used to compare Gordon's, and Elton and Gruber's views regarding the effect of regulation on firm value and cost of capital. The model has been

described in various textbooks and articles [e.g. Haley and Schall (1979) and Weston and Copeland (1986)]. In a one-period context, the value of a financial security (P_0) is given by:

$$(15) \quad P_0 = \frac{[D_1 - \text{Lambda} * \text{cov}(D_1, \text{Km})]}{(1 + \text{Rf})}, \text{ where}$$

D_1 = the expected liquidating dividend at time 1,

Lambda = (Km - Rf) / var(m),

Rf = the riskfree rate,

Km = the expected return on the market portfolio, and

var(m) = variance of the market portfolio.

Although equation (15) has been derived for common stocks, the equation can also be used to value bonds, preferred stocks, and other financial securities. Equation (16), for example, applies to bond prices, B_0:

$$(16) \quad B_0 = \frac{[Y - \text{Lambda} * \text{cov}(Y, \text{Km})]}{(1 + \text{Rf})}, \text{ where}$$

Y = the expected amount of interest and principal to be paid to the bondholders at the end of the period.

Three major assumptions are made to facilitate the calculations and make the model operational: 1) a joint probability distribution is specified between demand and the return on the market so that the covariances can be calculated, 2) depreciation is not a tax deductible expense, and 3) both principal repayment and interest are treated as tax deductible expenses so that the numerical examples can be written in terms of MM's valuation and cost

of capital equations. Recall that equation (15) is a one-period model, whereas equations (1), (2), (6), (7), and (14) are derived using perpetual cash flows.

A Regulated Utility: The Unlevered Case

Assume the existence of a regulated, unlevered utility which has an unlevered beta equal to .3346. In addition, assume the utility's rate base equals $3,000 and expected demand equals 4000 units. If the expected return on the market is 10% and the riskfree rate is 5%, the allowable rate of return (rr) for the unlevered firm is:

$$rr = Rf + \beta_u * (Km - Rf)$$

$$rr = .05 + .3346 * (.10 - .05) = 6.673\%.$$

β_u = the unlevered beta.

In general, regulatory commissions set the allowable rate of return on the rate base equal to a utility's weighted average cost of capital (see Chapter 2). To evaluate the effect of leverage on firm value using Gordon's definition of the regulatory process, however, assume the regulatory commission uses the opportunity cost doctrine and sets the allowable rate of return equal to 6.673% regardless of the firm's leverage ratio. Using the opportunity cost doctrine, the regulatory commission would establish the revenue requirement based on 4000 expected units so that the utility expects to earn 6.673% on the rate base.

(17) $RR = O + D + t + rr(RB)$, where

RR = the revenue requirement,

O = expected operating costs ($1/ unit),

D = depreciation (assume the entire rate base is depreciated in one period),

t = estimated taxes = (RR - O - interest)*.5,

rr = allowable rate of return = 6.673%, and

RB = rate base = $3,000.

As a result,

RR = $4,000 + $3,000 + (RR - $4,000).5 + $3,000 * (.06673)

RR = $10,400 and M = $10,400 / 4000 units = $2.60 / unit.

The regulatory commission establishes a price of $2.60 per unit for the utility's service. If VC equals $1 per unit, and demand, which follows a discrete probability distribution, varies between 3600 units and 4400 units, the income statement for the project is:

Probability	25%	50%	25%
Demand (units)	3,600	4,000	4,400
M ($/unit)	2.60	2.60	2.60
Revenue	$ 9,360	$10,400	$11,440
VC	3,600	4,000	4,400
EBIT	$ 5,760	$ 6,400	$ 7,040
Interest	-	-	-
Pretax	$ 5,760	$ 6,400	$ 7,040
Tax @ 50%	2,880	3,200	3,520
Net Income	$ 2,880	$ 3,200	$ 3,520

Based on these expected cash flows and the joint probability distribution shown below (see Haley/Schall (1979)), the market value for the stock is $3,000.

		EBIT * (1-t)		
		$ 2,880	$ 3,200	$ 3,520
Return	-.05	.10	-	-
on	.00	.10	.10	.05
the	.10	.05	.30	.10
Market	.30	-	.10	.10

Note: the cov[X(1-t),Km] = 12.80, the var(m) = .01275, and the unlevered beta = [(12.8)/3000] / .01275 = .3346.

$$P = \frac{\$3,200 - (.05)*(12.8)*(1/.01275)}{(1 + .05)} = \$3,000.$$

Therefore, the firm's market-to-book ratio is equal to one.

A Regulated Firm: Elton and Gruber's Levered Case

Because investors can accurately forecast the allowable rate of return permitted by regulators, Elton and Gruber (1972) argue that the major risk facing utilities is uncertain demand. As a result, Elton and Gruber assume that the allowable rate of return is known, whereas the actual rate of return is variable and depends on demand.

If the regulated firm shown above has $1,000 of debt outstanding with a 5% coupon rate, the revenue requirement would be reduced to reflect the tax savings associated with the interest expense. In this example both the interest and principal repayment are tax deductible expenses. As a result, the interest expense is $1,000 (1.05) = $1,050. If the regulatory commission applies the opportunity cost doctrine and sets the allowable rate of return equal to 6.673% regardless of the firm's debt-to-equity ratio, the firm's revenue requirement is $9,350:

RR = $4,000+$3,000+(RR - $4,000 - $1,050)t + $3,000*(.06673)

RR = $9,350.

The cost per unit (M) for the levered firm equals $9,350 / 4000 units or $2.3375 / unit.

Probability	25%	50%	25%
Demand (units)	3,600	4,000	4,400
M ($/unit)	2.3375	2.3375	2.3375
Revenue	$ 8,415	$ 9,350	$10,285
VC ($1/unit)	3,600	4,000	4,400
EBIT	$ 4,815	$ 5,350	$ 5,885
Interest	1,050	1,050	1,050
Pretax Income	$ 3,765	$ 4,300	$ 4,835
Taxes @ 50%	1,883	2,150	2,418
NIAT	$ 1,882	$ 2,150	$ 2,417

Given the joint probability distribution shown above, the covariance between the liquidating dividend and the return on the market is 10.70. Using equations (15) and (16), the value of the equity is $2,008 and the value of the debt, which is riskless, is $1,000. Consequently, the value of the levered firm is $3,008. This value may also be obtained from equation (14):

$$V_1 = \bar{X}_{n1} (1-t) / \Gamma + (\Gamma - r) * tD / \Gamma$$

$$V_1 = \$6,400(1-.5)/1.06673 + [(1.06673-1.05)(.5)1000]/1.06673$$

$$V_1 = \$3,008$$

Similarly, $\beta_1 = \text{cov}(i_j,Km)/\text{var}(m) = .4179$ so that $\bar{i}_j = Rf + \beta\ (Km - Rf) = .05 + .4179(.10 - .05) = 7.0896\%$. Alternatively, $\bar{i}_j = \Gamma + (1-t)(\Gamma-r)D/S = 7.0896\%$. According to Elton and Gruber, MM's tax-corrected equations are correct. Regulators set the allowable rate of return on the rate base equal to 6.673% and reduce the revenue

requirement to reflect the tax savings associated with debt financing. The sales price is $2.60 per unit for the unlevered firm and $2.3375 per unit for the levered firm. The market values of the unlevered and levered firm are $3,000 and $3,008, respectively.

Jaffe and Mandelker (1976) argue that both Gordon's (following section), and Elton and Gruber's valuation formulas ignore the firm's supply and demand curves. In the example shown above the unlevered firm charges $2.60 per unit and the levered firm charges approximately $2.34 per unit. If the firm faces a downward sloping demand curve, however, lower prices should result in higher demand. The model ignores the effect of a downward sloping demand curve because demand is assumed to have the same probability distribution regardless of the cost to the ratepayer.

A Regulated Firm: Gordon's Levered Case

Because the tax rate, cost per unit, and quantity demanded can be predicted with a high degree of accuracy, Gordon (1972) believes that the major source of uncertainty facing regulated firms is the allowable rate of return established by the regulatory agency. Once the allowable rate of return is determined, the actual return that is earned is equal to the rate of return established by the regulatory commission.

Assume the existence of a regulated utility which has $1,000 of debt outstanding with a coupon rate of 5%. In addition, assume the demand is 4000 units, variable costs

are $1/unit, and the allowable rate of return follows a discrete probability distribution which varies from -4.0% to 17.33% with an expected value of 6.673%. The example has been constructed so that the unlevered beta is .3346.

Probability	25.0%	50.0%	25.0%
Return Allowed	-4.0	6.673	17.33
M ($/unit)	2.1775	2.3375	2.4975
Demand (units)	4,000	4,000	4,000
Revenue	$ 8,710	$ 9,350	$ 9,990
VC ($1/unit)	4,000	4,000	4,000
EBIT	$ 4,710	$ 5,350	$ 5,990
Interest	1,050	1,050	1,050
Pretax Income	$ 3,660	$ 4,300	$ 4,940
Taxes @ 50%	1,830	2,150	2,470
NIAT	$ 1,830	$ 2,150	$ 2,470

Given these cash flows and the joint probability distribution shown for the unlevered case, the value of the equity is $2,000 and the value of the debt, which is riskless, is $1,000. As a result, the value of the firm is $3,000. This result can also be obtained using equation (5) $V_1 = \bar{X}_{n1} (1-t) / \Gamma = \$6,400 (1-.5) / 1.06673 = \$3,000$. Similarly,

$$\bar{i}_j = \Gamma + (\Gamma - r) D/S = .06673 + (.06673 - .05) * 1000/2000$$

$$\bar{i}_j = 7.51\%.$$

According to Gordon, demand is known and prices depend on the allowable rate of return. For example, if the regulatory commission specifies a return of 6.673%, the utility charges $2.3375 per unit, sells 4,000 units, and earns the allowed rate of return (6.673%). If the regulatory commission specifies a return of 17.33%, on the

other hand, the utility charges approximately $2.50 per unit, sells 4,000 units, and earns 17.33%. Again the model ignores the firm's downward sloping demand curve (see Jaffe and Mandelker (1976)).

Regardless of whether Gordon's or Elton and Gruber's view of the regulatory process is accepted, the theoretical model indicates that regulation shifts most of the benefit from using leverage to consumers in the form of lower utility rates. Because the firm's revenue requirement is a function of the estimated tax liability, an increase in the interest expense associated with higher leverage reduces the utility's revenue requirement.

One objective of this chapter is to use a one-period CAPM to analyze Gordon's, and Elton and Gruber's views regarding the effect of regulation on firm value and cost of capital. According to Elton and Gruber, MM's tax-corrected equations apply to both regulated and nonregulated firms. In contrast, Gordon believes that MM's pretax equations apply to regulated firms. The following table summarizes each author's major points using the values computed from the one-period model.

TABLE 9

VALUATION AND COST OF CAPITAL EQUATIONS:
ELTON AND GRUBER VERSUS GORDON

	Elton and Gruber	Gordon
Value of Levered Firm	$V_l = \frac{\bar{X}_{nl}(1-t)}{\Gamma} + \frac{tD(\Gamma-r)}{\Gamma}$	$V_l = \frac{\bar{X}_{nl}(1-t)}{\Gamma}$
	V_l = \$3,008	V_l= \$3,000
Value of Unlevered Firm	V_u = 3,000	V_u= \$3,000
Cost of Equity	$\bar{i}_j = \Gamma + (1-t)(\Gamma-r)\ D/S$	$\bar{i}_j = \Gamma + (\Gamma-r)D/S$
Risk	Demand is variable	The allowable rate of return is variable

Other Empirical Studies

In an attempt to correct the statistical problems associated with the MM studies, other researchers have conducted empirical tests to determine the effect of leverage on the value and cost of equity for regulated firms. Robichek, Higgins, and Kinsman (RHK) (1973), for example, test the following regression equation using a sample of 86 electric utilities for 1962 and 114 utilities for 1963 to 1970.

(18) $k = a_0 + a_1(D/S) + a_2$(Flow-Through Dummy), where

k = the cost of equity capital,

a_0 = the cost of equity for an unlevered firm,

a_1 = a coefficient measuring the effect of leverage on the firm's cost of equity,

a_2 = a coefficient measuring the effect of operating in a flow-through jurisdiction on the cost of equity, and

(D/S) = the firm's debt (plus preferred stock) to equity ratio.

RHK conduct a total of eight regressions using four definitions for the cost of equity and two definitions for leverage. The leverage variable is defined using both book and market values.

The results of the statistical tests, which generally show a statistically significant positive value for a_1 if the leverage variable is computed using book values, support MM's hypothesis that the cost of equity increases with leverage. The correlation coefficient is generally not significantly different from zero, however, if the leverage variable is computed using market values. RHK are not able to provide a satisfactory explanation for this result.

RHK are also unable to explain why the flow-through variable is generally negative. A negative value for a_2 indicates that the cost of equity for firms using the flow-through method is lower than the cost of equity for firms using the normalization method. If the flow-through method is used, the utility's revenue requirement reflects the firm's actual tax liability based on accelerated depreciation. If the normalization method is used, on the other hand, the utility's tax expense for rate-making purposes is based on the straight-line depreciation method. The normalization method usually results in a higher cash flow than the flow-through method.

RHK argue that the cost of equity should be higher for firm's operating in flow-through rather than normalizing jurisdictions, because the flow-through method increases investment risk. The results of RHK's statistical tests do not corroborate this hypothesis, however, because the correlation coefficient for the dummy variable (a_2) is negative.

O'Donnell and Lampe (1973) provide statistical evidence which casts doubt on the accuracy of RHK's empirical tests. O'Donnell and Lampe construct a sample of 24 electric utilities using the flow-through method and another sample of 30 electric utilities using the normalization method. The results of their statistical tests show that the flow-through firms issue more bonds, have lower coverage ratios, lower bond ratings, and higher market yields than the normalizing firms. If the cost of debt is higher for flow-through firms, the cost of equity should also be higher. These results suggest RHK's test equations may be misspecified.

Finnerty (1982) examines the stock prices of 24 electric utilities that switched from the flow-through method to the normalization method between June 1970 and January 1979. Although the stock market reacts favorably to the change in methods, the results were not statistically significant at the 10% level. Even so, this study casts additional doubt on RHK's test. If RHK's empirical test is correct, the switch from flow-through to normalization

should have caused an unfavorable stock market reaction.

Patterson (1983) conducts two regressions using the test equations specified by Gordon (1967) and MM (1966). To each test equation, Patterson adds an additional term to check if the equation is non-linear, $(Debt/Asset)^2$. Patterson concludes that:

1) there is a positive relationship between firm value and the use of leverage over the lower portion of the sample range, and

2) there is a concave relationship between leverage and firm value. The coefficient on the leverage variable is generally positive and statistically significant, whereas the coefficient on the $(Debt/Asset)^2$ variable is generally negative and statistically significant.

Patterson concludes that there may be an optimal debt level for regulated firms. In addition, the results suggest that both consumers and stockholders gain from leverage.

Brigham, Gapenski, and Aberwald (1987) construct a computer model to analyze the effect of leverage on the revenue requirement for utilities. If a utility's capital structure is within a reasonable range, the model indicates that the revenue requirement is virtually unaffected by a change in the use of leverage. Even though a change in the capital structure does affect the cost rates for debt and equity, the effect is partially offset because the component weights also change.

Summary

The empirical and theoretical research regarding the effect of leverage on the value and cost of capital for regulated firms is inconclusive. Although the empirical

studies generally show a weak relationship between firm value and leverage, the results are usually not statistically significant for alternative definitions of the variables. In addition, the test equations may be misspecified and yield erroneous results.

The one-period CAPM indicates that regardless of which view of the regulatory process is accepted, most of the benefit from using leverage accrues to the ratepayer. This statement is also true for a regulated subsidiary which is part of a holding company system, because the tax expense permitted in a utility's revenue requirement reflects the tax savings associated with leverage at both the parent and the subsidiary levels.

Although critics of double leverage agree that a judicious use of leverage may be desireable, they argue that regulation validates MM's pretax valuation and cost of capital equations. In the absence of taxes and bankruptcy costs, a firm's value and cost of capital are unaffected by the use of debt financing. If the firm increases its debt-equity ratio, the cost rate for equity increases and the firm's WACC is unchanged. As a result, the location of debt financing at either the parent or subsidiary level is irrelevant.

CHAPTER 4

THE THEORETICAL ARGUMENT FOR THE DOUBLE LEVERAGE ADJUSTMENT

Each state has an independent regulatory commission which determines the revenue requirements for the public utilities operating within its jurisdiction. In addition, these commissions establish prices for utility services so that each utility expects to generate its revenue requirement. The revenue requirement that is established for a particular utility should be sufficient to cover the utility's expected operating costs, depreciation, and taxes, and provide a rate of return on the rate base equal to the utility's weighted average cost of capital.

If the regulated utility is an independent operating company, the regulatory commission usually estimates the weighted average cost of capital using the book values for debt, preferred stock, and common equity reported on the company's balance sheet. The cost rates for debt and preferred stock are embedded costs, whereas the cost rate for equity is usually estimated using the comparable earnings standard, the risk premium approach, the discounted cash flow model, or the capital asset pricing model.

The double leverage issue arises when regulatory commissions try to determine the weighted average cost of

capital for a regulated, wholly owned subsidiary of a parent holding company. Double leverage is said to exist when a regulated subsidiary and its parent company both use debt financing. Although there are several double leverage techniques regulatory commissions may use to determine the allowable rate of return for a regulated subsidiary, each method generally involves using the parent company's cost of capital as an estimate for the subsidiary's cost of equity. In contrast to the independent company approach, the subsidiary's cost of equity is not estimated directly.

Advocates of the double leverage adjustments argue that the weighted average cost of capital for a regulated subsidiary should reflect not only the debt and equity shown on the subsidiary's balance sheet, but also account for any debt financing at the parent level. The advocates focus on the consolidated financial statements which portray the holding company as a single economic entity. On a consolidated balance sheet only the publicly traded equity of the parent company is reported. Because the equity for the subsidiaries is not shown, the advocates of double leverage argue that the equity for each subsidiary is actually composed of debt and equity that was issued at the parent level. Backman and Kirsten (1972), for example, argue that regulatory commissions should not ignore the "source of capital for the equity portion of the subsidiary's capital when, in fact, the funds are derived from the sale of both equity and debt of a holding company,

whose primary investments are in utility operating companies." They claim that if the parent company's leverage is ignored, the true cost of equity for the subsidiary will be misstated.

The objective of this chapter is to present the theoretical arguments which support the various double leverage techniques. First, consolidated financial statements are reviewed to illustrate the claim that a wholly owned subsidiary's equity is actually composed of debt and equity that was issued at the parent level. Second, the independent company approach, which is advocated by the critics of double leverage, is described. And third, six adjusted capital structure techniques are presented:

1. the Two-Step Double Leverage adjustment,
2. Seeds' approach,
3. Modified Double Leverage,
4. the Consolidated Capital Structure approach,
5. the Aggregate Cost of Debt method, and
6. the Hypothetical Capital Structure approach.

If a double leverage technique has been used in an actual rate case, the mechanics for that approach are illustrated using the testimony presented. Otherwise, an artificial example is constructed.

In general, the independent company approach results in a higher allowable rate of return for a regulated subsidiary than any of the double leverage methods. Because the required rate of return for the double leverage methods depends on the assumed cost rates for debt, preferred stock, and equity, no attempt has been made to rank the various double leverage techniques.

Consolidated Financial Statements

If a corporation (parent) purchases the common stock of another corporation (subsidiary) for $550, an investment-in-subsidiary asset account is created and the following transaction is recorded:

	Debit	Credit
Investment in Subsidiary	$550	
Cash		$550

Assume the book values for the parent's debt and equity are $100 and $450, respectively, and the book values for the subsidiary's debt and equity are $450 and $550, respectively. (See Table 10)

TABLE 10

PARENT AND SUBSIDIARY BALANCE SHEETS

	Parent		
Investment in Sub	$ 550	Debt (p)	$ 100
		Equity (p)	450
Total Assets	$ 550	Total Liab.	$ 550
	Subsidiary		
Plant and Equipment	$1,000	Debt (s)	$ 450
		Equity (s)	550
Total Assets	$1,000	Total Liab.	$1,000

In the preparation of a consolidated balance sheet, the subsidiary's equity account is offset against the parent's investment-in-subsidiary asset account to prevent double counting. As a result, the consolidated financial statement shows only the debt and equity of the parent, and the debt of the subsidiary. (See Table 11)

TABLE 11

A CONSOLIDATED BALANCE SHEET

	Consolidated		
Plant and Equipment	$1,000	Debt (s)	$ 450
		Debt (p)	100
		Equity (p)	450
Total Assets	$1,000	Total Liabilities	$1,000

The consolidated balance sheet records the liabilities and assets of the subsidiary and parent as if they were a single economic entity. Since all intercompany transactions are eliminated to avoid double counting, the consolidated financial statement shows only $450 of equity. The parent's investment-in-subsidiary asset account and the subsidiary's equity account are not shown. On a consolidated basis the subsidiary's assets ($1,000) are financed by $450 of debt at the subsidiary level, and $100 of debt and $450 of equity at the parent level. The advocates of double leverage believe that the consolidated balance sheet reflects the true economic relationship between the parent company and its wholly owned subsidiaries.

The holding company system's consolidated net income is equal to the net income generated by the parent plus the net income generated by the subsidiaries minus the profit on intercompany transactions. The consolidated net income reflects only the transactions between the holding company system and nonaffiliated companies and individuals.

The Independent Company Approach

In contrast to the advocates of double leverage, critics argue that the allowable rate of return for a regulated subsidiary should be estimated using the independent company approach. If a regulatory commission uses the independent company approach, the weighted average cost of capital is calculated using the book values for debt, preferred stock, and common stock reported on the subsidiary's balance sheet. In Re Narragansett Electric Company (1978), for example, the utility used the independent company approach and argued that its weighted average cost of capital was 9.36%. (See Table 12)

TABLE 12

NARRAGANSETT ELECTRIC COMPANY
WEIGHTED AVERAGE COST OF CAPITAL:
INDEPENDENT COMPANY APPROACH

Source of Capital	Amount ($mil)	Weight	Cost	Weight* Cost
Debt	$103.5	.537	7.15%	3.84%
Pref. Stock	26.5	.138	5.83	.81
Common Eq.	62.7	.325	14.50	4.71
Total	$192.7			9.36%

At the time of the rate hearing, the embedded costs for the subsidiary's debt and preferred stock were 7.15% and 5.83%, respectively. The weights for debt, preferred stock and common equity were computed using each component's book value as reported on the subsidiary's Dec. 31, 1976 balance sheet. The cost of equity (14.50%) was estimated using the

discounted cash flow model, and the utility's growth rate was estimated using the historical growth in earnings and dividends for the New England Electric System (the parent company), Moody's 24 electric utilities, and a sample of comparable risk firms.

Jones and O'Donnell (1978) argue that the independent company approach is consistent with modern financial theory. According to modern financial theory, there is a linear relationship between an asset's risk and its required rate of return. Moreover, a security's price is in equilibrium only when it lies on the capital market line (CML). If a security's expected rate of return is greater than the required rate of return being earned on alternative investments of comparable risk (the asset lies above the CML), then demand for the security increases, its price increases, and its expected rate of return decreases. The converse is true for assets below the CML.

Critics of double leverage believe that regulatory commissions should establish rates so that the regulated subsidiary's cost of equity is equal to the expected rate of return being earned on unregulated firms of comparable risk. The fact that a holding company owns the utility's common stock is irrelevant. Because the parent company's cost of capital does not necessarily reflect the utility's risk, critics claim that the double leverage techniques do not compensate the holding company for the risk incurred on its equity investment in the operating company.

Advocates of double leverage claim that it is inappropriate to use the independent company approach to estimate the subsidiary's weighted average cost of capital. They claim that if one uses the book values for debt, preferred stock, and equity as reported on the subsidiary's balance sheet, it will inevitably result in awarding excessive rates of return. Instead, the advocates believe that the double leverage techniques accurately reflect the fact that the subsidiary's equity is actually composed of debt and equity that was issued at the parent level.

Double Leverage Adjustments

The Two-Step Double Leverage Adjustment

Because the Narragansett Electric Company was a wholly owned subsidiary of the New England Electric System (NEES), the regulatory commission used a double leverage adjustment to compute the subsidiary's weighted average cost of capital. The court upheld the double leverage adjustment because a "portion of the equity is supported by lower cost debt capital issued by a parent corporation."

To determine the allowable rate of return for Narragansett Electric Company, the court first computed the weighted average cost of capital for the parent holding company (NEES) standing alone. Using the testimony presented by the commission and the utility, the court decided that the appropriate cost of equity for the parent holding company was 12.2%. The parent company's cost of equity was estimated using data for the consolidated holding

company system.

The capital structure weights for debt and equity were based on their respective book values as shown on the parent company's unconsolidated balance sheet, and the embedded cost for New England Electric System's debt was 8.65%. As a result, the court concluded that the weighted average cost of capital for New England Electric System was approximately 11.98%. (See Table 13)

TABLE 13

NEW ENGLAND ELECTRIC SYSTEM (UNCONSOLIDATED)
WEIGHTED AVERAGE COST OF CAPITAL

Source of Capital	Weight	Cost	Weight* Cost
Debt	.06	8.65%	.51%
Equity	.94	12.20%	11.47
Total	1.00		11.98%

The parent company's weighted average cost of capital (11.98%) was then used as a proxy for Narragansett Electric Company's cost of equity. The capital structure weights for Narragansett were based on the book values for debt, preferred stock, and common equity as shown on the utility's balance sheet. Using Narragansett's embedded cost of debt (7.15%) and preferred stock (5.83%), the court concluded that the subsidiary's weighted average cost of capital was 8.55%. (See Table 14)

TABLE 14

NARRAGANSETT ELECTRIC COMPANY
WEIGHTED AVERAGE COST OF CAPITAL:
DOUBLE LEVERAGE APPROACH

Source of Capital	Amount	Weight	Cost	Weight* Cost
Debt	$103.5	.537	7.15%	3.84%
Pref. stock	26.5	.138	5.83	.81
Equity	62.7	.325	11.98	3.90
Total	$192.7			8.55%

The regulatory commission used 8.55% as the allowable rate of return to compute the utility's revenue requirement.

If all of a utility's common stock is owned by a parent holding company, Backman and Kirsten (1972) argue that the common stock of the operating company does not have to meet the capital attraction standard specified by the Supreme Court in the Hope decision (1944). Because the common stock of the operating company is not publicly traded, they claim that it is inappropriate for the regulatory commission to determine the utility's cost of equity based on the estimated required rate of return for alternative investments of comparable risk. Instead, the regulatory commission should establish rates so that the parent company expects to earn its cost of capital on its equity investment in the regulated subsidiary. Advocates believe that the double leverage adjustments are consistent with the capital budgeting procedures used by nonregulated firms.

Nonregulated firms increase stockholder's wealth by accepting capital budgeting projects which yield a positive

net present value (NPV). A project's NPV is equal to the present value of the expected cash inflows minus the present value of the expected cash outflows. The cash flows are discounted at a rate which reflects the project's systematic risk. If a proposed project has the same risk as the company's existing assets, the discount rate should equal the firm's weighted average cost of capital. For projects which exhibit average risk, the NPV method is equivalent to accepting only those projects whose internal rates of return are greater than or equal to the firm's weighted average cost of capital.

The optimal capital budget is defined as the point where the marginal return on the last dollar invested is equal to the marginal cost of the last dollar raised. As a result, the marginal dollar invested has a zero net present value. If the firm accepts a zero-NPV project, the firm's asset base increases but stockholder's wealth is not changed.

Copeland (1977) argues that the double leverage adjustment emulates the capital budgeting decision criteria used by competitive firms. Because competitive firms increase their capital expenditures until the marginal project has a zero net present value, Copeland believes that investments in utility plant and equipment should represent zero-NPV projects. If regulators use a double leverage adjustment, the subsidiary's cost of equity is set equal to the parent company's weighted average cost of capital.

Therefore, the parent company earns a zero net present value on its equity investment in the regulated subsidiary. If a double leverage adjustment is not made, Copeland believes that the holding company would earn a rate of return in excess of its cost of capital, and the holding company's stockholders would earn abnormal profits at the expense of the ratepayer.

Seeds' Approach

If a regulatory commission adopts the conventional double leverage adjustment, the parent company's cost of capital is used as an estimate for the regulated subsidiary's cost of equity. Because this method ignores the individual risk of the subsidiary being regulated, Seeds (1978) advocates a double leverage adjustment which reflects the utility's specific cost of equity.

Seeds assumes that the common equity for the regulated subsidiary has been raised in the proportions of debt, preferred stock, and common equity shown on the parent company's balance sheet. (See Table 15)

TABLE 15

FINANCIAL STATEMENTS:
SEEDS' APPROACH

Source of Capital	Weight	Cost
Parent (Unconsolidated)		
Debt	.30%	7.0%
Preferred Stock	.10	8.0
Common Equity	.60	Not Required
Total	1.00%	
Subsidiary		
Debt	.40%	7.5%
Preferred Stock	.10	8.5
Common Equity	.50	14.0
Total	1.00%	

In Seeds' example, the common equity for the subsidiary (50% of total capitalization) is composed of 30% debt, 10% preferred stock, and 60% common equity raised at the parent level. According to Seeds, the subsidiary's required rate of return should reflect the embedded costs for debt and preferred stock issued by the parent company. The parent's cost of equity is not estimated; instead, the allowable rate of return reflects the subsidiary's cost of equity (14%).

Using Seeds' method, the required rate of return for the regulated subsidiary is 9.50%. (See Table 16)

TABLE 16

DOUBLE LEVERAGE ADJUSTMENT:
SEEDS' APPROACH

Source of Capital	Subsidiary Weight	Cost	Weight* Cost
Debt	.40%	7.5%	3.00%
Preferred Stock	.10	8.5	.85
Common Equity (Subsidiary)			
parent debt	.15	7.0	1.05
parent preferred stock	.05	8.0	.40
parent common stock	.30	14.0	4.20
Total	1.00%		9.50%

The conventional double leverage approach ignores the utility's individual risk, because the subsidiary's specific cost of equity is not estimated using the standard methods described in Chapter 2. If Seeds' method is adopted, on the other hand, the subsidiary's weighted average cost of capital depends on the parent company's cost of debt and preferred stock, and the subsidiary's cost of debt, preferred stock, and common equity. The cost rate for equity is estimated as if the subsidiary were standing alone.

Modified Double Leverage

The modified double leverage approach distinguishes between the cost rates for the subsidiary's common stock and retained earnings. Although the parent's weighted average cost of capital is used as an estimate for the subsidiary's cost of common stock, the cost rate for the subsidiary's

retained earnings is estimated as if the subsidiary were standing alone. The modified double leverage approach results in two cost rates for the subsidiary's equity.

The Rhode Island Public Utilities Commission used a modified double leverage approach to establish the allowable rate of return in Re Blackstone Valley Electric Company (1978). Blackstone Valley Electric Company (Blackstone) was a wholly owned subsidiary of Eastern Utilities Associates (EUA). In addition to Blackstone, EUA owned two other electric utilities: Brockton Edison Company and Fall River Electric Company.

The capital structure for Blackstone consisted of 51.8% debt, 12.7% preferred stock, and 35.5% common equity. These component weights were based on the book values of debt, preferred stock, and equity as reported on the subsidiary's December 31, 1976 balance sheet. To estimate the cost of Blackstone's equity, the court distinguished between the capital contributed by EUA (20.3% of Blackstone's total capitalization) and Blackstone's retained earnings (15.2% of Blackstone's total capitalization). Based on a 9.5% embedded cost for debt, a 4.85% embedded cost for preferred stock, and a 13.5% cost for equity, the court decided that 10.16% was a fair rate of return for Blackstone.
(See Table 17)

TABLE 17

BLACKSTONE VALLEY ELECTRIC COMPANY
WEIGHTED AVERAGE COST OF CAPITAL:
MODIFIED DOUBLE LEVERAGE APPROACH

Source of Capital	Weight	Cost	Weight* Cost
Common Stock (Blackstone)			
EUA common stock	.1216	13.50%	1.64%
EUA retained earnings	.0393	13.50	.53
EUA long-term debt	.0424	9.50	.40
Capital supplied by EUA	.2033		2.57%
Retained Earnings	.1516	13.50	2.05
Total Equity (Blackstone)	.3549		4.62%
Preferred Stock	.1270	4.85	.62
Debt	.5181	9.50	4.92
Total	1.0000		10.16%

The court argued that "the concept of double leverage is required to properly account for the ultimate cost of the capital employed by the company." Furthermore, the court concluded that the cost of capital supplied by EUA was approximately 12.67% (12.67% x .2033 = 2.57%), whereas the appropriate cost rate for Blackstone's retained earnings was 13.50%. The subsidiary's retained earnings, which did not represent capital supplied by the parent, received a different cost rate than the subsidiary's common stock. In this example the court used the same cost rate for the parent company's common equity and the subsidiary's retained earnings (13.50%). In other decisions the courts have used different cost rates for these two sources of capital.

The Consolidated Capital Structure Approach

The Ohio Public Services Commission used the consolidated capital structure approach to determine the allowable rate of return for a regulated utility in Re Ohio Edison Company (1980). The Ohio Edison Company, which provided electric power to customers in Ohio, owned all of the common stock of Pennsylvania Power Company. The Pennsylvania Power Company provided electric power to customers in western Pennsylvania. Although witnesses for the Ohio Edison Company argued that the allowable rate of return should be computed using Ohio Edison's capital structure, the commission used a consolidated capital structure because investors "would not segregate the risks in deciding to invest in the parent corporation and, in effect, both the subsidiary and parent company competed for funds in the money market."

The embedded costs for debt and preferred stock were 8.01% and 8.58%, respectively. These embedded costs represented the weighted average costs for the bonds and preferred stock issued by Ohio Edison and Pennsylvania Power. The court used the discounted cash flow model and decided that 13.86% was the appropriate cost of equity for the consolidated system. Using these component costs and the proportion of debt, preferred stock, and common stock reported on the consolidated balance sheet for October 1979, a 10.12% rate of return was applied to Ohio Edison's rate base. (See Table 18)

TABLE 18

OHIO EDISON COMPANY
WEIGHTED AVERAGE COST OF CAPITAL:
CONSOLIDATED CAPITAL STRUCTURE APPROACH

Source of Capital	Weight	Cost	Weight* Cost
Long-term debt	.4915	8.01%	3.93%
Pref. stock	.1631	8.58	1.40
Equity	.3454	13.86	4.79
Total	1.0000		10.12%

Commissions often use the consolidated capital structure method to estimate the allowable rate of return for a regulated utility when the holding company and operating subsidiaries are financed as an integrated unit. The method assumes not only that subsidiaries have the same cost of capital, but also that cost rates for debt differ only as a result of differences in timing. If this method is used, the costs for debt and preferred stock are weighted average cost rates for the holding company system. In contrast, only the embedded costs for the debt and preferred stock of the utility being regulated are considered if the double leverage approach is used. The embedded costs for debt and preferred stock issued by other subsidiaries are ignored.

Morton (1973) advocates using the consolidated capital structure approach when a holding company operates utility subsidiaries that have similar business risk. He argues that the method accounts for the leverage at both the parent and the subsidiary level. The consolidated capital

structure approach may not be appropriate, however, if the subsidiaries exhibit different business risk. Morton argues that if

> the overall rate of return of any subsidiary is based on the consolidated capital structure and the consolidated cost of capital, then the cost of capital to each of the associated companies of the system will be similar and no one company will have a different cost of capital than the other by reason of its own different debt-equity ratio, unless such a difference is deliberately conceived to be necessary on other grounds.

Aggregate Cost of Debt Method

Marx (1978) argues that the consolidated capital structure method ignores the fact that subsidiaries may have different cost rates for debt. Therefore, Marx proposes a double leverage adjustment which utilizes the holding company system's consolidated capital structure and gives primary emphasis to each subsidiary's cost of debt. Using Marx's example, assume the existence of two regulated subsidiaries and a parent holding company. (See Table 19)

TABLE 19

FINANCIAL STATEMENTS:
AGGREGATE COST OF DEBT METHOD

Subsidiary 1			Subsidiary 2		
	Amount	Cost		Amount	Cost
Debt (s1)	$ 40	7%	Debt (s2)	$ 40	8%
Equity (s1)	60	Unknown	Equity (s2)	40	Unknown
Total	$100		Total	$100	

Parent (Unconsolidated)		
Debt (p)	$ 20	6%
Equity (p)	80	12
Total	$100	

If the consolidated capital structure approach is used, the allowable rate of return for Subsidiary 1 and Subsidiary 2 would be 9.33%. The consolidated capital structure approach, however, ignores the fact that Subsidiary 2's embedded cost of debt (8%) is higher than Subsidiary 1's embedded cost of debt (7%). As a result, the ratepayer for Subsidiary 1 would subsidize the ratepayer for Subsidiary 2.

To account for this difference in the cost of debt, Marx advocates an approach which uses each subsidiary's aggregate cost of debt. The aggregate cost of debt is equal to the cost of the subsidiary's outstanding debt plus the cost of the parent's debt in the subsidiary's equity. (See Table 20)

TABLE 20

AGGREGATE COST OF DEBT

Subsidiary 1

Source of Capital	Amount	Weight	Cost	Weight* Cost
Debt (s1)	$40	.769	7%	5.38%
Parent's Debt in equity of Sub. 1 (.2x60)	12	.231	6%	1.39
Total	$52	1.000		6.77%

The aggregate cost of debt for Subsidiary 1 is 6.77%. Likewise, the aggregate cost of debt for Subsidiary 2 is 7.66%.

The allowable rate of return for Subsidiary 1 is estimated using the holding company system's consolidated

capital structure, the parent company's cost of equity, and Subsidiary 1's aggregate cost of debt. (See Table 21)

TABLE 21

WEIGHTED AVERAGE COST OF CAPITAL:
AGGREGATE COST OF DEBT METHOD

Subsidiary 1

Source of Capital	Amount	Weight	Cost	Weight* Cost
Debt (a)	$100	.556	6.77%	3.76%
Equity	80	.444	12.00	5.33
Total	$180	1.000		9.09%

(a) Represents the debt for subsidiary 1, subsidiary 2, and the parent company.

Similarly, the allowable rate of return for Subsidiary 2 is equal to 9.59%.

Marx concludes that this method reflects each subsidiary's embedded cost of debt. Since the cost of debt for Subsidiary 2 is higher than the cost of debt for Subsidiary 1, the allowable rate of return for Subsidiary 2 should be greater.

The Hypothetical Capital Structure Method

The regulatory commission adopted a hypothetical capital structure to determine the allowable rate of return in Washington Utilities and Transportation Commission v. Pacific Northwest Bell Telephone Company (1976). In adopting a hypothetical capital structure consisting of fifty percent debt and fifty percent equity for Pacific

Northwest Bell (PNB), the commission concluded that

> A capital structure with a minority of debt is unreasonable to the ratepayer in that over reliance on higher cost equity will result in unnecessarily high rates to the consumer... An equal ratio of 50 per cent debt is the most appropriate and reasonable structure for this rate-making proceeding, a ratio which based upon the evidence before us does not suffer the consumer to pay higher rates than necessary in order to provide the company the margin of safety necessary to prudent financial management. A lower debt ratio is unreasonable: it is unreasonable because it requires higher subscriber rates and is not justified from any valid consideration of safety.

Miscellaneous Methods

Rozeff (1983) proposes a double leverage technique that allows for differences in subsidiary risk. Rozeff assumes the existence of two subsidiaries: A and B, such that Subsidiary A and Subsidiary B represent 40% and 60% of the holding company system's consolidated assets, respectively. In addition, Rozeff assumes that the cost of equity for Subsidiary B can be estimated directly.

Rozeff states that the weighted average rate of return on the assets for Subsidiaries A and B should equal the consolidated holding company system's weighted average cost of capital.

Consol. Holding
Company's WACC = .4 x A's asset ret.+.6 x B's asset ret.

The consolidated system's weighted average cost of capital is calculated using the cost of Subsidiary A's debt, the cost of Subsidiary B's debt, and the cost of the parent's debt and equity. Since Subsidiary B's asset return can be

estimated using its cost of debt and equity, Subsidiary A's weighted average cost of capital can be obtained using the above equation.

Sweeny (1985) observes that Rozeff's method is contingent on being able to estimate Subsidiary B's cost of equity. If Subsidiary B's cost of equity can be estimated directly, however, then Subsidiary A's cost of equity should be estimated using the same method. Estimating Subsidiary A's cost of equity by another method obviates Rozeff's technique.

Beedles (1985) advocates a technique which allocates the parent company's debt to each subsidiary so that the debt/total asset ratio for each subsidiary offsets their differences in operating risk. The objective is to equate the total risk (operating risk plus financial risk) for each subsidiary. The subsidiary which is exposed to greater operating risk is allocated a smaller portion of the parent company's debt. If the total risk facing each subsidiary is the same, then Beedles argues that the parent company's cost of equity can be used to estimate each subsidiary's cost of equity.

To use Beedles' method the appropriate capital structure for each subsidiary must be determined so that each subsidiary has the same total risk. Beedles acknowledges that "while the technique lacks the precision that may be sought by economic theorists, it is more nearly consistent with standard finance principles than any other

method widely used today."

Summary

The objective of this chapter is to discuss the logic underlying the various double leverage adjustments. In addition, seven methods for determining a regulated subsidiary's weighted average cost of capital are discussed.

1. The Independent Company Approach. The regulated subsidiary's cost of capital is estimated using the book values and cost rates for the subsidiary's debt, preferred stock, and common equity as if the utility were standing alone.

2. The Two-Step Double Leverage Adjustment. The parent holding company's cost of capital is used as an estimate for the regulated subsidiary's cost of equity. The advocates of double leverage argue that the subsidiary's equity is actually composed of debt, preferred stock, and common stock issued at the parent level.

3. Seeds' Approach. Seeds (1978) argues that the cost of capital for a regulated subsidiary should reflect the parent company's cost of debt and preferred stock, as well as the subsidiary's cost of debt, preferred stock and common equity. The cost rate for the subsidiary's equity is estimated as if the subsidiary were standing alone.

4. Modified Double Leverage. The subsidiary's common equity is divided into two categories: a) capital supplied by the parent, which is equal to the sum of the subsidiary's common stock and paid-in-capital accounts, and b) capital generated internally, which is equal to the subsidiary's retained earnings. The parent company's weighted average cost of capital is used to estimate the cost of funds supplied by the parent. The cost rate for retained earnings, on the other hand, is estimated as if the subsidiary were standing alone.

5. The Consolidated Capital Structure Approach. The subsidiary's allowable rate of return is set equal to the consolidated holding company

system's weighted average cost of capital. The costs for debt and preferred stock represent average cost rates for the entire system. The cost of equity is the estimated required rate of return for the parent company's publicly traded common stock.

6. Aggregate Cost of Debt Method. Marx (1978) proposes a method which utilizes the holding company system's consolidated capital structure, the parent company's cost of equity, and the regulated subsidiary's aggregate cost of debt. The subsidiary's aggregate cost of debt is equal to the subsidiary's cost of debt plus the cost of the parent's debt in the subsidiary's equity.

7. The Hypothetical Capital Structure Approach. The regulatory commission assigns a target capital structure to the regulated subsidiary for the purpose of determining the subsidiary's rate of return. Because the cost rate for debt is less than the cost rate for equity, the regulatory commission argues that the utility's capital structure should include an appropriate amount of debt financing to reduce the cost of providing service to ratepayers. As a result, the regulatory commission ignores the subsidiary's actual capital structure and imputes a higher debt ratio for the subsidiary which the commission believes is "more reasonable."

Although the two-step double leverage and consolidated capital structure methods reflect the cost of funds supplied by the parent, they ignore differences in subsidiary risk. The remaining double leverage techniques attempt to reflect differences in subsidiary risk.

The advocates of double leverage argue that a wholly owned subsidiary's equity does not have to meet the capital attraction standard because its common stock is not publicly traded. In addition, the advocates claim that the parent company should be permitted to earn only its cost of capital

on its equity investment in the regulated subsidiary. If the parent earns its weighted average cost of capital, then the investment in the utility represents a zero-NPV project. If the subsidiary's allowable rate of return exceeds the parent's cost of capital, then the parent earns abnormal profits at the expense of the ratepayer. In contrast, critics argue that the double leverage techniques discriminate against the holding company and violate the principles of modern financial theory.

CHAPTER 5

THE THEORETICAL ARGUMENTS AGAINST THE DOUBLE LEVERAGE ADJUSTMENTS

Critics of double leverage argue that the required rate of return for a regulated subsidiary should be based on the opportunity cost doctrine. According to this doctrine, the required rate of return should depend on the risk to which the assets are exposed and not on the way the assets are financed. Therefore, a regulated, wholly owned subsidiary's cost of equity should be estimated by determining the expected rate of return for alternative investments of comparable risk. Critics claim that any adjustment which uses the parent's cost of capital as a proxy for the subsidiary's cost of equity is fallacious.

The objective of this chapter is to present the theoretical arguments and models used to refute the logic underlying the double leverage techniques. First, critics claim that the double leverage methods are based on the following erroneous assumptions:

1. double leverage assumes that the subsidiary's equity represents capital supplied by the parent in the exact proportions of debt, preferred stock, and equity shown on the parent's unconsolidated balance sheet,

2. double leverage assumes that the common stock of the wholly owned subsidiary does not have to meet the capital attraction standard, and

3. double leverage assumes that two cost rates exist for the subsidiary's equity: one rate for common stock and another rate for retained earnings (see Modified Double Leverage Approach - Chapter 4).

Second, O'Donnell (1985) claims that double leverage is contrary to the basic principles of modern financial theory because the double leverage techniques ignore the regulated subsidiary's systematic risk. Third, Pettway and Jordan (1983) argue that whereas double leverage results in an appropriate rate of return only in special circumstances, the independent company approach always results in a rate of return which reflects the subsidiary's systematic risk. And fourth, Beranek and Miles (1986) argue that examples which advocate the double leverage adjustment usually assign a target cost of equity to the parent holding company. Beranek and Miles claim that these models are incorrect because the parent company's cost of equity is a function of the parent's cost of debt, and each subsidiary's cost of equity. As a result, the parent's cost of equity cannot be selected at random.

Critics of double leverage also argue that it is irrelevant whether leverage is located at the parent or the subsidiary level. Because holding companies usually file consolidated tax returns, even the tax savings associated with debt financing at the parent level accrues to the ratepayer. As a result, critics believe that the regulatory process validates MM's no-tax equations. The effect of regulation on firm value and cost of capital is examined in Chapter 3.

Erroneous Assumptions

Source of Funds

Brennan and Humphreys (1973) believe that it is invalid to assume that a wholly owned subsidiary's common equity capital is raised by the parent holding company in the exact proportions of debt, preferred stock, and common equity shown on the parent holding company's balance sheet. This assumption implies that funds can be traced from source to application. Moreover, the implied traceability of funds may be contrary to known facts. For example, the operating company may have issued stock as an independent company and been acquired by the holding company years later.

In Re General Telephone Company of the Southeast (1976), the court argued that

> While the relationship between the company and its parent firm (and the attendant benefits) should be considered in determining the fair rate of return, the attempt to absolutely quantify the effect of affiliation through application of the double leverage theory is inappropriate. In order to adopt the concept of double leverage, it is necessary to assume, for the strictly limited purpose of determining cost of equity capital, that the equity of a subsidiary is provided by its parent from the parent's permanent capital in the same proportion that the parent has historically developed its own capital structure. . . . The evidence in this case shows that the acquisition of the North Carolina operating division of GTSE (General Telephone Company of the Southeast) was accomplished by the issuance of equity of GTE. And subsequent additions to the equity of GTSE in the form of retained earnings have no basis for being attributed in any way to the capital structure of the parent. If the concept of assigning the parent company's overall cost of permanent capital as the cost of equity to the subsidiary were followed, then a cost of capital rate would have to be assigned to part of the operating company's equity based on the cost of

> capital of a parent whose attendant risks may be different from the regulated operating company. And that part of the operating subsidiary's equity arising from its own retained earnings, with its attendant risk, would have the possibility of having a different cost rate.

The court also stated that state law

> requires the commission to allow an operating utility the opportunity to produce a fair profit for its stockholders. A basic premise to application of the double leverage theory is to determine who the stockholder is, because it only applies to the parent-subsidiary structure, and only when the stockholder-parent's ownership reaches a certain unspecified percentage. Then an assumption must be made as to the source and costs of the stockholder-parent's funds in arriving at a determination of what profit is 'fair' for that particular stockholder. In our opinion, such is not the intention of the statue. Whether a profit is 'fair' is not related to the number of investors, the legal nature of investors, or the source and costs of the investor's funds. If such were the case, this commission would be obligated to ascertain the source and costs of investment capital for every investor in every utility in this state and award such utility a composite return appropriate to the individual circumstances of each shareholder. Such a procedure would appear unreasonable at best.

The court adopted the independent company approach and concluded that the allowable rate of return should be based on GTSE's capital structure. The court decided that GTSE's capital structure, which consisted of approximately 46% debt, 47% equity, and 7% cost-free capital, was reasonable. The court indicated, however, that it would not hesitate to pierce "the corporate veil in this area as we have in other areas of corporate affiliation relating to this company" if the court believed that GTSE's capital structure were unreasonable.

Similarly, the Michigan Supreme Court rejected a double

leverage adjustment in Re Michigan Bell Telephone Company (1970).

> While the double leverage concept is interesting and it has been set forth in rate proceedings before other agencies, we believe it contains some serious problems. To assign AT&T debt as the principal or exclusive source of the company's common stock investment, implies a rigid, clearly traceable flow of funds which is not possible of accomplishment. The funds which AT&T obtains from outside sources are fully commingled in AT&T as a corporation. As a stockholder in the company, AT&T may use many sources of funds both internal and external for its subsequent investment in the company's stock. We have serious reservations about the valid application of the double leverage concept in this situation and it is, therefore, rejected for use in determining a proper rate of return for the company.

The court used Michigan Bell's actual capital structure to determine the allowable rate of return. The court noted that this capital structure was similar to the consolidated capital structure for the Bell system.

Capital Attraction Standard

Lerner (1973) argues that the operating company's common stock must meet the same capital attraction standard that applies to alternative investment opportunities. Otherwise, there would be no incentive for the parent holding company to retain its shares in the operating company. Similarly, Brown (1974) argues that it would be unreasonable for a holding company to invest in an operating company if the regulatory commission prevents the parent company from earning the market rate of return. Instead, the holding company has the opportunity to invest in unregulated firms

and earn the market rate of return commensurate with the risk incurred. These critics believe that double leverage discriminates against the holding company form of organization.

Brennan and Humphreys (1973) also believe that the operating company's common stock must meet the capital attraction standard. They argue that the double leverage adjustments ignore the separate legal status of the parent company and each of its subsidiaries. Because the creditors of one subsidiary cannot proceed against the assets of the parent company or another subsidiary in a bankruptcy proceeding, the bondholders must evaluate the earning power and risk of the subsidiary which issued the debt securities. (An exception may occur when either the assets of the parent and the subsidiary have been extensively commingled or the parent corporation has essentially taken over the management of the subsidiary and operates the subsidiary as a department of its own business.) In general, however, the bondholders must evaluate the unique risk of the subsidiary which issued the bonds.

Because the subsidiaries usually have different cost rates for debt, Brennan and Humphrey believe they should also have different cost rates for equity. The conventional double leverage adjustment, however, uses the parent company's weighted average cost of capital as an estimate for each subsidiary's cost of equity. As a result, the adjustment ignores each subsidiary's unique risk. If each

subsidiary's risk and separate legal status is ignored, Brennan and Humphreys believe that the subsidiary's interest coverage ratio may be impaired. This may prevent the utility from attracting additional debt financing.

Brennan and Humphreys also believe that an asset's required rate of return should depend on the asset's earning power and risk. They claim that "nowhere is it proven nor can it be established that the cost rate applicable to the parent company's composite capitalization is the same risk rate to which the common equity at the operating utility company is exposed." Ownership is not a consideration in the market place. If ownership were considered, Brennan and Humphreys claim that consistency would require that the return for a regulated utility depend on how each individual investor financed his purchase of the utility's common stock. If an individual inherited stock, for example, the appropriate cost rate would be zero according to the double leverage adjustment. Critics of double leverage claim that regulators would have to include this zero cost of capital in the determination of the utility's allowable rate of return. Estimating the utility's cost of capital based on the cost of funds to each individual investor is, of course, ludicrous.

The critics of double leverage cite the Bluefield and Hope decisions as proof that the equity of a wholly owned subsidiary must meet the same capital attraction standard as publicly held stocks. According to the Hope decision, "the

return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks." Moreover, the return should "assure confidence in the financial integrity of the enterprise so as to maintain its credit and attract capital." The court's decision did not differentiate between individual and corporate investors.

The use of a double leverage adjustment implies that the expected rate of return for a regulated subsidiary can be less than the subsidiary's cost of capital. As discussed in Chapter 2, however, the market value of a firm's equity will equal its book value only if the firm expects to earn its cost of capital. Therefore, a double leverage adjustment suggests that a regulated subsidiary's implied market-to-book ratio may be less than one. (Because a wholly-owned subsidiary's stock is not publicly traded, its market value cannot be observed.) However, a market-to-book ratio which is less than one results in a confiscation of shareholder's property. In the case of a holding company, the regulated subsidiary cannot issue new common stock without diluting the wealth of the existing shareholder (the parent company). Critics argue that double leverage inhibits the subsidiary's ability to attract capital, confiscates shareholder's property, and violates the provisions of the Constitution as well as prior rulings of the U. S. Supreme Court.

Two Cost Rates for Equity

If a regulatory commission adopts the modified double leverage approach, two cost rates are applied to the subsidiary's common equity. The cost rate for the subsidiary's common stock is estimated using the parent's weighted average cost of capital, whereas the cost rate for the subsidiary's retained earnings is computed as if the utility were standing alone. As a result, the cost of equity depends on whether the capital is supplied by the parent company or generated internally.

Stich (1985) argues that if a commission adopts the modified double leverage method, the cost of equity is a function of the utility's payout ratio. A utility which follows a low payout policy would be allowed to earn a higher rate of return than an identical subsidiary with a higher payout policy. Retained earnings, which represent internally generated funds, are permitted to earn a higher rate of return than funds supplied by the parent.

Stich argues that "dividend policy should not be used as a prime variable in determining the overall rate of return of a regulated company, but should instead, reflect both the requirements of the investing public and the growth requirements of the company." Moreover, modified double leverage "violates the economic requirement that the earnings requirement of an asset be a function of its business risk."

Opportunity Cost Doctrine

According to the opportunity cost doctrine, the required rate of return on an investment should depend on the risk to which the assets are exposed and not on the way the assets are financed. In contrast to the advocates of double leverage, the opponents of double leverage focus on the subsidiary as if it were standing alone. Critics claim that regulatory commissions should establish rates so that a regulated, wholly owned subsidiary earns a return on equity that is equal to the expected rate of return being earned by unregulated firms of comparable risk. Comparable risk is often defined as firms which are similar to the regulated subsidiary in terms of size, product characteristics, capital structure, earnings variability, and systematic risk.

O'Donnell (1985) claims that the various double leverage techniques are contrary to the basic principles of modern financial theory. According to the Capital Asset Pricing Model (CAPM), the return investors expect to earn on a security is linearly related to the security's beta coefficient (B) or systematic risk.

(1) $K_i = Rf + \beta_i * (Km - Rf)$, where

K_i = the expected rate of return on risky asset i,

Rf = the riskfree rate of return,

β_i = a measure of security i's systematic risk, and

Km = the expected return on the market portfolio.

Let 'x' and 'y' be two independent, regulated utilities such that V_x, K_x, V_y, and K_y represent the value and cost of equity for utilities 'x' and 'y', respectively. Using the CAPM,

(2) $K_x = Rf + \beta_x * (Km - Rf)$,

(3) $K_y = Rf + \beta_y * (Km - Rf)$, and

the expected return on each utility's common equity reflects the systematic risk associated with each investment. For purposes of this discussion assume $\beta_x > \beta_y$; therefore, utility 'x' is riskier than utility 'y'.

Assume a parent company, which is financed entirely by common stock, purchases the outstanding equity of both utilities. The parent's beta coefficient equity (β_p) is a weighted average of the beta coefficients for each subsidiary:

(4) $\beta_p = [V_x * \beta_x + V_y * \beta_y] / [V_x + V_y]$.

Similarly, the expected rate of return on the parent company's common stock (Kp) is given by:

(5) $K_p = Rf + \beta_p * (Km - Rf)$.

In accordance with financial theory, the expected rate of return on the parent's equity is linearly related to systematic risk. Because the common stock of the parent company represents an investment in a portfolio of two projects (utility 'x' and utility 'y'), the expected rate of return on the parent's equity reflects the expected cash flow from both utilities.

If a regulatory commission uses the parent company's

cost of capital, K_p in this example (since the parent company is unlevered), the allowable rates of return on the equity for subsidiaries 'x' and 'y' would not equal the required rates of return K_x and K_y as specified by the CAPM. Instead,

(6) $K_x = K_p = Rf + \beta_p * (Km - Rf)$,

(7) $K_y = K_p = Rf + \beta_p * (Km - Rf)$, and

the regulatory commission would establish a rate of return on each subsidiary's equity that does not reflect each subsidiary's systematic risk. O'Donnell argues that any method which computes the allowable rate of return for a subsidiary's equity based on the parent company's cost of capital is without merit (unless the parent and the subsidiary face the same business risk).

Critics of double leverage argue that the allowable rate of return on the equity for subsidiary 'x' should be higher than the return permitted for subsidiary 'y', because subsidiary 'x' is exposed to a greater degree of systematic risk. Using the parent company's cost of capital to compute the cost of equity for each subsidiary, however, would result in the same cost of equity for each subsidiary. This is contrary to the fundamental principle of financial theory which states that riskier securities should, in equilibrium, earn higher expected rates of return. In this example, the rates would be too high for utility y's consumers and too low for utility x's consumers relative to the risks facing each subsidiary. Therefore, subsidiary's y's consumers

would subsidize subsidiary x's ratepayers.

O'Donnell's example is intended to refute Copeland's (1977) argument that the parent company should be allowed to earn only its cost of capital on its equity investment in each subsidiary. As discussed in Chapter 4, Copeland argues that investments in utility plant and equipment should represent zero-NPV projects. As a result, Copeland believes that the holding company would earn a rate of return in excess of its cost of capital (and the holding company's stockholders would earn abnormal profits at the expense of the ratepayers) if a double leverage adjustment were not made.

O'Donnell argues that Copeland's argument is fallacious. Allowing the parent company to earn its cost of capital on its equity investment in each subsidiary does not ensure that each subsidiary will earn its cost of capital. Because the parent's cost of capital reflects an investment in a portfolio of projects, the parent's cost of capital will equal an individual subsidiary's cost of equity only in a few special cases.

Pettway and Jordan (1983) argue that regardless of whether the independent company approach or double leverage method is adopted, the required rate of return on the parent's common stock will reflect the parent's systematic risk. As a result, Pettway and Jordan derive an algebraic relationship to show when the independent company and double leverage approaches yield the same result.

Regardless of whether the independent company approach or double leverage approach is adopted, the required rate of return on the parent's equity should be a function of its systematic risk:

(8) $K_e^p = Rf + \beta_p^l * (Km - Rf)$, where

K_e^p = the parent's overall cost of equity,

Rf = the riskfree rate of return,

Km = the expected rate of return on the market portfolio, and

β_p^l = the parent's levered beta.

According to the double leverage approach the parent company's weighted average cost of capital is used as a proxy for the subsidiary's cost of equity. The required rate of return on the parent company's equity, however, reflects the parent company's investment in a portfolio of projects, where each subsidiary represents an individual project. As a result, the return on the subsidiary's equity may not reflect the subsidiary's systematic risk.

According to the independent company approach, a subsidiary's required rate of return should be a function of the its systematic risk:

(9) $K_e^s = Rf + \beta_s^l * (Km - Rf)$, where

K_e^s = the subsidiary's required rate of return, and

β_s^l = the subsidiary's levered beta.

Using a procedure described by Fuller and Kerr (1981), the subsidiary's unlevered beta is estimated by calculating the unlevered beta coefficients for alternative investments of

comparable risk. The estimated unlevered beta for the subsidiary is then adjusted to reflect the regulated subsidiary's actual capital structure.

(10) $\beta_s^l = \beta_s^u * [1 + (DS / ES) * T]$, where

DS = the subsidiary's debt,

ES = the subsidiary's equity,

β_s^u = the subsidiary's unlevered beta, and

T = 1 (no tax case),

T = (1 - tc) (corporate tax case), or

T = (1 - tc) * (1 - te) / (1 - tp) (corporate and personal tax case)

Pettway and Jordan argue that the required rate of return on the parent holding company's equity, as a result of its equity investment in the subsidiary, is a function of the subsidiary's systematic risk and the parent's leverage:

(11) $K_e^p = Rf + \beta_s^l * [1 + (DP/EP) * T] * (Km - Rf)$, where

DP = the debt of the parent, and

EP = the equity of the parent.

Since $\beta_p^l = \beta_p^u * [1 + (DP/EP) * T]$, the required rate of return on the holding company's equity is:

(12) $K_e^p = Rf + \beta_p^l * (Km - Rf) * \beta_s^l / \beta_p^u$.

The double leverage and independent company approaches result in the same required rate of return for the parent's equity when $\beta_s^l = \beta_p^u$. As a result, Pettway and Jordan conclude that double leverage is correct only if (1) the parent has only one subsidiary, (2) all subsidiaries have equal systematic risk, or (3) the particular subsidiary

being regulated exhibits the average systematic risk of all the holding company's subsidiaries. If the subsidiary's risk is greater than average ($\beta_s^1 / \beta_u^D > 1$), then the double leverage adjustment will underestimate the subsidiary's required rate of return. If the subsidiary exhibits below average systematic risk ($\beta_s^1 / \beta_u^D < 1$), then double leverage will overestimate the subsidiary's required rate of return. The levered beta coefficient measures both operating and financial risk.

The critics of double leverage claim that the three conditions presented by Pettway and Jordan are usually absent in rate cases involving double leverage. For example, commissions often apply a double leverage adjustment to a subsidiary of a parent holding company that owns the common stock of both regulated and nonregulated companies. Because these other subsidiaries usually operate in areas outside of the commission's jurisdiction, critics claim that double leverage results in illegal regulation of the parent holding company. Even if the parent company only invests in operating companies with similar business risk, double leverage will underestimate the cost of equity for the subsidiaries with above average debt levels. Moreover, critics argue that double leverage has never been applied when it would result in a higher allowable rate of return than other methods.

The Excess Return Argument

The advocates of double leverage claim that if a regulatory commission adopts the independent company approach to determine a wholly owned subsidiary's allowable rate of return, the stockholders of the parent company would earn abnormal profits. Beranek and Miles (1986) construct a model to demonstrate this argument. Using their example, assume the existence of two subsidiaries and a parent holding company. (See Table 22)

TABLE 22

WEIGHTED AVERAGE COST OF CAPITAL:
INDEPENDENT COMPANY APPROACH

Source of Capital	Amount	Weight	Cost	Weight* Cost
Parent				
Debt (p)	$ 220	.20	8%	1.60%
Equity (p)	880	.80	15	12.00
Total	$1,100	1.00		13.60%
Subsidiary A				
Debt (SA)	$ 450	.45	6%	2.70%
Equity (SA)	550	.55	14	7.70
Total	$1,000	1.00		10.40%
Subsidiary B				
Debt (SB)	$ 450	.45	6%	2.70%
Equity (SB)	550	.55	14	7.70
Total	$1,000	1.00		10.40%

The cost rate for each subsidiary's debt and equity is 6% and 14% respectively, whereas the cost rate for the parent's debt and equity is 8% and 15%, respectively. As shown in

Table 1, the allowable rate of return for each subsidiary is 10.4% if the independent company approach is used. Based on a rate base of $1000, Subsidiaries A and B are permitted to earn $104. As a result, the return on the parent company's equity is 15.5%.

Earnings from Subsidiary A (.104 * $1,000)	= $104.00
Earnings from Subsidiary B (.104 * $1,000)	= 104.00
Interest on subsidiary debt (.06 * (450+450))	= (54.00)
Earnings to parent company	= $154.00
Interest on parent debt (.08 * 220)	= (17.60)
Earnings to parent stockholders	= $136.40
Return on parent's equity $136.40/$880	= 15.5%

In this example the required rate of return on the parent company's equity is assumed to be 15%. Therefore, advocates of double leverage argue that the stockholders of the parent company earn an excessive rate of return (15.5%) if the independent company approach is used.

Advocates claim that the double leverage adjustment constrains the return on the parent company's equity to the desired 15%. If the parent company's weighted average cost of capital (13.6%) were used as an estimate for each subsidiary's cost of equity, the allowable rate of return for each subsidiary is only 10.18%. (See Table 23)

TABLE 23

WEIGHTED AVERAGE COST OF CAPITAL:
DOUBLE LEVERAGE ADJUSTMENT

Source of Capital	Amount	Weight	Cost	Weight* Cost
Parent				
Debt (p)	$ 220	.20	8%	1.60%
Equity (p)	880	.80	15	12.00
Total	$1,100	1.00		13.60%
Subsidiary A or B				
Debt	$ 450	.45	6.0%	2.70%
Equity	550	.55	13.6	7.48
Total	$1,000	1.00		10.18%

If each subsidiary is permitted to earn 10.18%, the parent company's stockholders would earn the desired 15% return.

Earnings from Subsidiary A (.1018 * $1,000)	= $101.80
Earnings from Subsidiary B (.1018 * $1,000)	= 101.80
Interest on subsidiary debt (.06 * (450+450))	= (54.00)
Earnings to parent company	= $149.60
Interest on parent debt (.08 * 220)	= (17.60)
Earnings to parent stockholders	= $132.00
Return on parent's equity $132/880	= 15%

Advocates claim that double leverage produces the desired result.

Beranek and Miles believe this argument is false because the parent's cost of equity cannot be chosen at random. Instead, the parent's cost of equity is a function of the parent company's cost of debt, and each subsidiary's cost of equity.

$\bar{r}_p S_p + \bar{r}_B B_p = S_1(Rf + \beta_1(Km - Rf)) + .. + S_n(Rf + \beta_n(Km - Rf))$, where,

$\bar{r}_p$ = expected rate of return on parent's stock,

S_p = value of parent's equity,

$\bar{r}_B$ = expected rate of return on parent's debt,

B_p = value of parent's debt,

S_k = value of subsidiary K's equity, K = 1,2,...N,

β_k = beta for subsidiary K's equity, K = 1,2,...N,

Rf = riskfree rate of return, and

Km = expected rate of return on the market portfolio.

According to Beranek and Miles, the expected cash flow to the parent company's bondholders and stockholders must equal the expected cash flow the parent receives from its equity investment in each subsidiary. Therefore, the expected rate of return on the parent's common stock should be 15.5%:

$$\bar{r}_p \ (\$880) + .08(\$220) = \$550(.14) + \$550(.14)$$

$$\bar{r}_p = 15.5\%$$

This result is consistent with the independent company approach.

Summary

The double leverage controversy focuses on whether the parent's weighted average cost of capital is an appropriate proxy for a regulated, wholly owned subsidiary's cost of equity. The advocates of double leverage claim that the adjustment reflects the fact that the subsidiary's equity is composed of debt and equity that was issued at the parent level. The advocates also argue that the subsidiary's equity does not have to meet the capital attraction standard

specified by the Supreme Court because the subsidiary's common stock is not publicly traded. As a result, advocates believe that if the capital structure of the parent company is ignored, the regulatory commission would permit the parent company's stockholders to earn an excessive rate of return.

The opponents of double leverage believe that the individual risk facing each subsidiary should be the major factor in determining the required rate of return. According to modern financial theory, a security's required rate of return should be a function of its systematic risk. Because the parent's weighted average cost of capital does not necessarily reflect the subsidiary's systematic risk, critics argue that double leverage violates the principles of financial theory and discriminates against the holding company form of organization. If the cost rates for debt vary among the subsidiaries, critics believe that the cost rates for equity are also different.

Although critics of double leverage often cite the Supreme Court's decision in the Hope (1944) case as support for their position, the courts have tended to uphold the return awarded by regulatory commissions which use the double leverage techniques. Opponents believe that this is surprising, since modern financial theory clearly demonstrates the superiority of the independent company approach over the double leverage methods.

CHAPTER 6

JUDICIAL REVIEWS OF DOUBLE LEVERAGE

In Federal Power Commission v. Natural Gas Pipeline Company (1942), the U.S. Supreme Court argued that if the allowable rate of return awarded by the Commission is 1) based on findings of fact, 2) supported by substantial evidence, and 3) not confiscatory, the Commission's decision "shall be conclusive". The U.S. Supreme Court also indicated that the courts should not prescribe the methods used to determine a utility's allowable rate of return. As a result, the regulatory commission for each state has the option of adopting or rejecting the various double leverage adjustments. Because the regulatory commissions are given broad powers, utilities may appeal rate decisions that the utilities believe are too restrictive.

Nineteen state supreme court rulings involving double leverage adjustments were discovered by searching the Ninth Decennial Digest 1976-1981 and West's General Digest. The cases are listed under the telecommunications heading:

Section 314. Financing costs; capital structure and interest.
316. Rate of return.
317. Relations with other companies; affiliates.
330. Sufficiency in general.
331. Value and Depreciation.
341. Scope of inquiry and powers of the court.

The nineteen rate cases are listed in Table 24.

TABLE 24

RATE CASES INVOLVING A DOUBLE LEVERAGE ADJUSTMENT: 1976 - PRESENT

	Company	Citation	Rate of Return Method
1)	South Central Bell Telephone Co. (1977)	La., 352 So.2d 964	Consolidated
2)	South Central Bell Telephone Co. (1979)	La., 373 So.2d 478	Hypothetical
3)	Mountain States Tel. & Teleg. (1981)	Mont., 624 P.2d 481	Two-Step
4)	New England Tel. & Teleg. (1978)	Me., 390 A.2d 8	Remand*
5)	New England Tel. & Teleg. (1982)	Me., 448 A.2d 272	Two-Step
6)	New England Tel. & Teleg. (1983)	R.I., 459 A.2d 1381	Two-Step
7)	Southwestern Bell Telephone Co. (1980)	Ark., 593 S.W.2d 434	Two-Step
8)	Northwestern Bell Telephone Co. (1984)	Iowa, 359 N.W.2d 491	Hypothetical
9)	General Tel. Co. of the Midwest (1979)	Iowa, 275 N.W.2d 364	Two-Step
10)	General Tel. Co. of the Southeast (1979)	Va., 259 S.E.2d 826	Consolidated
11)	General Tel. Co. of the Southwest (1981)	Ark., 616 S.W.2d 1	Two-Step
12)	General Tel. Co. of the Southwest (1982)	Tex., 628 S.W.2d 832	Two-Step
13)	General Tel. Co. of the Southwest (1982)	N.M., 652 S.W.2d 1200	Two-Step
14)	General Tel. Co. of the Northwest (1986)	Idaho, 712 P.2d 643	Two-Step
15)	United Telephone Co. of Iowa (1977)	257 N.W.2d 466	Two-Step
16)	Central Tel. Co. of Virginia (1979)	252 S.E.2d 575	Consolidated
17)	Central Telephone Company (1984)	Minn., 356 N.W.2d 696	Remand**
18)	Lincoln-Desha Telephone Co. (1980)	Ark., 609 S.W.2d 20	Two-Step
19)	Continental Tel. Co. of the South (1982)	Ala., 427 So.2d 981	Remand*

* The court rejected the two-step double leverage method.
** The court rejected the consolidated capital structure method.

The court upheld the rate of return awarded by the commission in sixteen of the nineteen cases. In New England Telephone & Telegraph v Public Utilities Commission, 390 A.2d 8 (Me. 1978), the court rejected the use of a two-step double leverage adjustment because the commission did not give proper consideration to the 14% minority interest. The court upheld the commission's use of the two-step double leverage adjustment, however, once the minority interest no longer existed (New England Telephone & Telegraph v Public Utilities Commission, 448 A.2d 272 (Me. 1982)).

Arguments Supporting Double Leverage

In Mountain States Telephone and Telegraph v The Department of Public Service Regulation (1981), the Montana Supreme Court upheld the Public Service Commission's (PSC) decision to use a double leverage adjustment to determine the allowable rate of return for Mountain Bell. First, the commission estimated AT&T's unconsolidated cost of capital using AT&T's embedded cost rates for debt (6.47%) and preferred stock (7.82%). Based on an 11.25% cost for AT&T's equity, the commission concluded that AT&T's (unconsolidated) weighted average cost of capital was 9.86%. (See Table 25)

TABLE 25

WEIGHTED AVERAGE COST OF CAPITAL:
AT&T (UNCONSOLIDATED)

Source:	Weight	Cost	Weight* Cost
Debt	.231	6.47%	1.49%
Preferred Stock	.080	7.82	.63
Common Stock	.689	11.25	7.74
Total	1.000		9.86%

Because AT&T owned 88.55% of Mountain Bell's common equity, the commission permitted AT&T to earn 9.86% on its ownership percentage. In contrast, the PSC permitted the minority stockholders to earn an 11.25% return on their 11.45% share of Mountain Bell's equity. The PSC determined that Mountain Bell's allowable rate of return should be 8.78%. Mountain Bell's capital structure consisted of 44.65% debt and 55.35% equity. (See Table 26)

TABLE 26

MOUNTAIN BELL TELEPHONE & TELEGRAPH COMPANY
WEIGHTED AVERAGE COST OF CAPITAL:
DOUBLE LEVERAGE APPROACH

Source:	Weight	Cost	Weight* Cost
Debt	.4465	7.26%	3.24%
Equity			
Supplied by AT&T (.8855 x .5535)	.4901	9.86	4.83
Supplied by Min. Shareholders (.1145 x .5535)	.0634	11.25	.71
Total	1.0000		8.78%

The commission used 8.78% as the allowable rate of return to compute Mountain Bell's revenue requirement.

The regulatory commission also computed Mountain Bell's allowable rate of return using the independent company approach. (See Table 27)

TABLE 27

MOUNTAIN BELL TELEPHONE AND TELEGRAPH COMPANY
WEIGHTED AVERAGE COST OF CAPITAL:
INDEPENDENT COMPANY APPROACH

Source:	Weight	Cost	Weight* Cost
Debt	.4465	7.26%	3.24%
Equity	.5535	11.25	6.23
Total	1.0000		9.47%

The commission concluded that "if Mountain Bell had been funded in the open market, the weighted cost of Mountain Bell's capital would have been 9.47%."

The PSC used a double leverage adjustment to compute Mountain Bell's allowable rate of return because the capital structures for both Mountain Bell and AT&T contained debt financing. The Montana Supreme Court described the presence of double leverage:

> Because Mountain Bell is partially financed by debt and partially financed by equity, Mountain Bell's common stockholders are said to be 'leveraged' to the extent that the cost of its debt is less than the (weighted) cost of its capital. In other words, Mountain Bell's common stockholders are 'leveraged' because Mountain Bell is paying less interest on its borrowed funds than the return it makes on the use of its borrowed funds. This is leverage #1.

> But in this case there is a second or 'double leverage' enjoyed by the common stockholders of AT&T arising out of the parent-subsidiary relationship between AT&T and Mountain Bell. When this case was heard by the PSC, AT&T owned 88.55% of the common stock of Mountain Bell, with the balance being held by minority stockholders. Thus the common stockholders of AT&T are 'double leveraged': first, because the cost of debt in AT&T's capital structure is less than the return it makes on the use of its borrowed funds; and second because it derives the benefit of similar leverage in Mountain Bell's own capital structure by reason of its 88.55% ownership of Mountain Bell's common stock.

The PSC claimed that if the allowable rate of return for Mountain Bell were estimated using the independent company approach, "it would result in an excessive return to AT&T's common stockholders at the expense of Montana utility ratepayers. To correct this inequity, the PSC applied a 'double leverage' adjustment in determining the 'cost of capital' in Mountain Bell's rate base."

Mountain Bell advanced three arguments for rejecting the regulatory commission's double leverage adjustment:

1) the adjustment is not supported by substantial evidence,

2) the adjustment is inconsistent with itself and ignores the principles on which it is based, and

3) the adjustment is invalid because the minority stockholders would not receive the return on their investment which was found to be fair and reasonable by the PSC.

Argument #1: Double Leverage is Not Supported By Substantial Evidence

Mountain Bell argued that the double leverage adjustment was unsupported by substantial evidence because Mountain Bell's capital structure was known to consist of

44.65% debt and 55.35% equity. In contrast, the double leverage adjustment resulted in a capital structure for Mountain Bell which consisted of approximately 56% debt, 4% preferred stock, and 40% common equity. (See Table 28)

TABLE 28

MOUNTAIN STATES TELEPHONE & TELEGRAPH COMPANY:
ADJUSTED CAPITAL STRUCTURE

Source:	Weight	Cost	Weight* Cost
Debt	.4465	7.26%	3.24%
Debt From AT&T (.231 x .8855 x .5535)	.1132	6.47	.73
Total Debt	.5597		3.97%
Pref. Stock (AT&T) (.080 x .8855 x .5535)	.0392	7.82	.31
Equity From AT&T (.688 x .8855 x .5535)	.3373	11.25	3.79
Equity From Minority Shareholders (.1135 x .5535)	.0628	11.25	.71
Total	1.0000		8.78%

Mountain Bell argued that the commission increased Mountain Bell's debt ratio but failed to raise its cost of equity to reflect the additional financial risk. As a result, Mountain Bell claimed that the double leverage adjustment understated its required rate of return.

As discussed in Chapter 3, the tax expense for each regulated subsidiary reflects the holding company's consolidated tax liability. As a result, the revenue requirement for each regulated subsidiary reflects the tax savings associated with debt financing at both the parent and subsidiary levels. Critics of double leverage argue

that passing the tax savings associated with debt financing to the ratepayers validates MM's pretax valuation and cost of capital equations. In the absence of taxes and bankruptcy costs, firm value and cost of capital are unaffected by the use of debt. If the firm increases its debt-equity ratio, the cost rate for equity increases and the firm's WACC is unchanged. The presence of debt at either the parent or subsidiary level is irrelevant. In the rate case pertaining to Mountain Bell, the company argued that the commission imputed a higher debt ratio for the company without increasing the cost of equity to reflect the increase in financial risk.

The Montana Supreme Court agreed with the District Court's ruling that the double leverage adjustment was based on substantial evidence because

> the double leverage adjustment simply established the true cost of that portion of Mountain Bell's equity (common stock) attributable to AT&T's financing (88.55%). The PSC established 9.86% as the true cost by weighting the three associated costs making up AT&T's capital structure - debt, preferred stock and common stock. Contrary to what Mountain Bell asserted, this adjustment did not infuse additional debt into Mountain Bell's capital structure. The earnings of Mountain Bell will be subject to the same debt obligations regardless of the source of the equity investment. There is no increase in the financial risk nor any change in the priority of the Mountain Bell stockholders' claim to the assets or income of Mountain Bell. Therefore, the Mountain Bell stockholders are not entitled to a greater rate of return because the risk of the stockholders has not been increased. Here the return to the stockholders of Mountain Bell capital is influenced because the capital structure of the consolidated Bell System has varying amounts of debt in the capital structure of both AT&T and Mountain Bell, not because the

'double leverage' adjustment has increased the risk to stockholders in Mountain Bell.

The court's decision is based on the premise that the holding company should earn only its cost of capital on its equity investment in the regulated subsidiary. Copeland (1977) argues that the two-step double leverage adjustment emulates the capital budgeting procedures used by nonregulated firms. Because nonregulated firms accept projects which have a net present value (NPV) that is greater or equal to zero, Copeland believes that the equity investments in regulated subsidiaries should also represent zero-NPV projects.

Even though the parent company earns its cost of capital on its equity investment in the regulated subsidiary, critics argue that the subsidiary may not earn its cost of capital. As stated in Chapter 5, critics believe that this result violates the capital attraction standard specified by the U.S. Supreme Court.

Argument #2: Double Leverage As Applied By the Commission is Inconsistent With Itself

Because double leverage is based on the principle that the source of funds determines the cost of those funds, Mountain Bell argued that the regulatory commission incorrectly applied AT&T's overall cost of capital to Mountain Bell's retained earnings. Mountain Bell claimed that if AT&T's weighted average cost of capital is used to estimate the cost of funds supplied by AT&T, this same cost should not be used to estimate the cost of Mountain Bell's

retained earnings. Mountain Bell's retained earnings are not supplied by AT&T; instead, they are the result of the "assets, income, and capital structure of Mountain Bell." As a result, Mountain Bell claimed that applying AT&T's overall cost of capital to Mountain Bell's retained earnings is inconsistent with the double leverage principle that the source of funds determines their cost.

The regulatory commission, however, argued that

> the true source and ultimate destination of 88.55% of Mountain Bell's retained earnings is AT&T. The cost of capital associated with 88.55% of Mountain Bell's retained earnings is 9.86% (the cost of capital to AT&T) because that is the cost of capital associated with that portion of Mountain Bell's operating assets that generated those retained earnings. If Mountain Bell retains a portion of its earnings these are no less the capital of AT&T than paid-in capital. PSC further emphasized that no court or commission has accepted Mountain Bell's argument that the source of retained earnings is the subsidiary and not the parent which controls its stock, or that a distinction should be made between cost of capital attributable to paid-in capital and that attributable to retained earnings.

The District Court agreed with the regulatory commission and held that

> because retained earnings are the property of the equity owner (AT&T to the extent of its 88.55% ownership of Mountain Bell's common stock) it had a claim against 88.55% of Mountain Bell's retained earnings. Therefore the PSC correctly applied its 'double leverage' adjustment in order to reflect the true cost of capital associated with that portion of Mountain Bell's retained earnings attributable to the parent AT&T.

The Montana Supreme Court agreed with the District Court and PSC's argument that Mountain Bell's retained earnings are the property of the equity owner. As a result,

the court argued that the return on 88.55% of Mountain Bell's retained earnings should be determined by AT&T's cost of capital.

The court's decision ignores the separate legal status of AT&T and Mountain Bell. As stated in Chapter 5, the bondholders of one subsidiary cannot proceed against the assets of the parent company or another subsidiary in a bankruptcy proceeding. Therefore, the risk facing the bondholders is determined by the earning power and risk of the subsidiary which issued the bonds. The equity shown on the subsidiary's balance sheet is one factor which determines the financial risk facing the bondholders.

Argument #3. Double Leverage Prevents the Minority Stockholders From Earning a Fair Rate of Return

Mountain Bell argued that the regulatory commission wanted to establish rates so that the minority stockholders would earn an 11.25% rate of return. If a double leverage adjustment is made, however, 88.55% of Mountain Bell's equity is allowed to earn 9.86% and the remaining 11.45% is permitted to earn 11.25%. Therefore, the double leverage adjustment results in a 10.02% (.8855 x 9.86% + .1145 x 11.25%) average rate of return on Mountain Bell's equity. This return is below the 11.25% return the commission stipulated for the minority stockholders.

The Montana Supreme Court upheld the District Court and PSC's decision to use double leverage. The Supreme Court stated that

> It would appear that the PSC applied the 'double leverage' adjustment in order to protect Montana ratepayers from paying excessive utility rates. A fair overall rate of return to all stockholders on their investment was fixed and determined, but because the capital structure of AT&T afforded double leverage to the common stockholders of AT&T their rate of return on their investment in Mountain Bell would always be greater than the minority stockholders in Mountain Bell regardless of what rate of return might be adopted by the PSC. This discrepancy is inherent in the capital structure of the parent AT&T vis-a-vis the capital structure of the subsidiary Mountain Bell. This capital structure was determined by the management of the two companies, not by the rate order of the PSC. The PSC's function was fulfilled when it established a fair and reasonable return on Mountain Bell's investment in plant and equipment used and useful in furnishing its services to the public. It is a function of management to distribute that return to its stockholders and if Mountain Bell's capital structure prevents an equitable distribution, this is not the fault of the PSC. To guarantee the minority stockholders the 11.25% return found to be fair and reasonable by the PSC would result in an unconscionable and excessive return of 14.26% to AT&T common stockholders at the expense of Montana ratepayers, all because of the capital structure of the two companies. This inequity will not recur in the future as Mountain Bell is now a wholly-owned subsidiary of AT&T with no minority stockholders in Mountain Bell.

Because AT&T acquired the outstanding minority interest prior to the Montana Supreme Court's decision, the court believed that this third argument would not be valid in the future.

The Montana Supreme Court stated that its role in utility rate cases is to determine

> whether the PSC order (1) exceeds the constitutional or statutory powers of the PSC or (2) is based upon a mistake of law. [Citation Omitted] The Commission is the judge of facts and the court only decides questions of law. [Citation Omitted] In deciding questions of law, this Court may determine whether the PSC acted

> arbitrarily and unreasonably without sufficient evidence to support its findings, or exercised its authority unreasonably, or set the utility rates so low that they are confiscatory and deprive the utility of its property without due process of law.

Moveover, the Montana Supreme Court indicated that

> It is a basic principle of utility regulation that a utility is entitled to receive a fair and reasonable rate of return on its investment in plant and equipment used to provide its services to the public. In determining a fair and reasonable rate of return, it is necessary to determine what it costs the utility to secure the required capital to finance its operations. This 'cost of capital' approach to utility ratemaking involves determining the composite cost of the several types of the utility's capital, properly weighted on the basis of an appropriate capital structure. [Citation Omitted] The 'cost of capital' involves not only the interest the utility must pay on its borrowed capital (debt), but also the cost of attracting purchasers of its common stock (equity). A regulatory commission such as the PSC must authorize utility rates sufficient to cover the utility's cost of debt and cost of equity, but no more, or the utility's customers will be paying excessive rates for the services the utility provides.

Based on this criteria, the Montana Supreme Court concluded that the PSC's order was "lawful and supported by substantial evidence."

Court Decisions Rejecting Double Leverage

In New England Telephone & Telegraph v Public Utilities Commission (1978), the Maine Supreme Court rejected the use of a double leverage adjustment because "the commission failed to give adequate consideration to the effect of its double leveraging adjustment upon the 14% of New England's stock" that was not owned by AT&T. At the time of the rate case, AT&T owned 86% of New England's (NET) common stock.

The regulatory commission argued that AT&T should earn 9.92% (AT&T's unconsolidated cost of capital) on its equity investment in New England Telephone & Telegraph. (See Table 29)

TABLE 29

WEIGHTED AVERAGE COST OF CAPITAL:
AT&T (UNCONSOLIDATED)

Source:	Weight	Cost	Weight* Cost
Debt	.25	6.5%	1.63%
Preferred Stock	.09	7.8	.70
Common Stock	.66	11.5	7.59
Total	1.00		9.86%

The commission argued that the minority stockholders should earn an 11.5% rate of return. As a result, the regulatory commission concluded that New England's allowable rate of return should be 8.73%. (See Table 30)

TABLE 30

NEW ENGLAND TELEPHONE & TELEGRAPH COMPANY
WEIGHTED AVERAGE COST OF CAPITAL:
DOUBLE LEVERAGE APPROACH

Source:	Weight	Cost	Weight* Cost
Debt	.450	6.99%	3.15%
Equity			
Supplied by AT&T (.86 x .55)	.473	9.92	4.69
Supplied by Min. Shareholders (.14 x .55)	.077	11.50	.71
Total	1.000		8.73%

The Maine Supreme Court argued that the use of double leverage in this case should be rejected because

> the effect of the decree is to allow an average rate of return to all of New England's common equity of 10.14% [(.86 x 9.92%) + (.14 x 11.5%)]. Thus, the overall effect of the Commission's decree is to allow AT&T a higher rate of return than the 9.92% deemed to be the proper cost of 86% of New England's common equity, which would appear on its face, to be unfair to the ratepayers. On the other hand, the average return of 10.14% is below the 11.5% found to be reasonable for the 45,000 members of the investing public making up the 14% minority, which New England claims constitutes confiscation.
>
> We need not reach these questions at this time because we find that the Commission has not given the adequate consideration of the minority issue necessary for us to determine the reasonableness of the result. Moreover, we find that its method of applying double leveraging in this case is not supported by substantial evidence in the record and appears inconsistent with the Commission's own declarations concerning the theory. Therefore, we cannot approve the Commission's use of a double leveraging adjustment upon the facts of this case.

The court rejected the commission's double leverage

adjustment because the adjustment failed to give "adequate consideration to the existence of the 14% minority."

In contrast to the 1978 decision, the court upheld the commission's use of a two-step double leverage adjustment in a 1982 case when the minority interest was no longer present (New England Telephone & Telegraph v Public Utilities Commission, Me. 448 A.2d 272). Even though the company argued that the court had rejected the method in the 1978 case, the court stated that the prior decision did not "universally condemn" the approach. Since the minority interest was no longer present, the court concluded that the double leverage adjustment was reasonable and supported by substantial evidence.

In Continental Telephone Company of the South v Alabama Public Service Commission, 427 So.2d 981 (Ala. 1982), the court rejected the two-step double leverage adjustment proposed by the commission. The court argued that the adjustment assumes the subsidiary's equity has been raised in the proportions of debt, preferred stock, and common equity shown on the parent company's balance sheet. The court noted, however, that

> Continental has not clearly shown the Court the amount of, if any, capital, infused from the parent corporation into Continental-Alabama. The record indicates, without contradiction, that Continental generates its own retained earnings. Likewise, the record establishes that Continental merged with a number of operating telephone companies which had their own established and existing equity capital which became a part of Continental's equity. Thus, the Commission's utilization of double leverage lacks the evidentiary basis for its application in this

case.

The court rejected the two-step double leverage adjustment because the technique implied a traceability of funds which was not supported by the facts.

In Central Telephone Company v. Minnesota Public Utilities Commission, 356 N.W.2d 696 (Minn.App. 1984), the court rejected the consolidated capital structure approach advocated by the commission. In its decision the court argued that the commission could not "substitute its judgment for that of the company management on the issue of appropriate capital structure." In order for the commission to adjust the company's capital structure, the commission had to show that the existing structure was "unreasonable or imprudent." In this case the court concluded that the commission's decision was "arbitrary and capricious."

The Role of the Court in the Rate-Making Process

In contrast to the decisions in Alabama and Minnesota, the courts have generally upheld the rate of return that is suggested by the regulatory commission. In their decisions the courts have not always evaluated the underlying economics of the double leverage techniques. Instead, the courts have deferred to the expertise of the regulatory commission and concluded only that the utility was unable to show that the commission's rate order was unreasonable or unjust.

In Southwestern Bell Telephone Company v Arkansas Public Service Commission, Ark., 593 S.W.2d 434, for

example, the court upheld the commission's use of a double leverage adjustment. In its decision, the court noted that

> the courts can only determine whether: (1) the commission's finding as to the facts are supported by substantial evidence; (2) the commission has regularly pursued its authority; and (2a) the order or decision under review violated any right of the petitioner under the laws or Constitution of the United States or the State of Arkansas. It is only the finding of fact that are tested by the standard of substantial evidence, which is a question of law. [Citation omitted] All of the question to be determined, then, are questions of law. In answering these questions, the court may not pass upon the wisdom of the commission's actions or say whether the commission has appropriately exercised its discretion. [Citation omitted] The judicial branch of the government must defer to the expertise of the commission.

Even though a witness for the company argued that the commission's allowable rate of return (8.28%) was less than the current 8.31% AAA utility bond rate, the court upheld the commission's double leverage adjustment. The court stated

> We are not possessed of the expertise necessary to evaluate the testimony of the experts in the field of economics. Evaluation of the testimony was for the commission, not the courts. [Citation omitted] We are in no position to say that the testimony of (the commission) had no reasonable basis. This we would have to do, in order to hold that it did not constitute substantial evidence. [Citation omitted]
>
> The question, according to Bluefield, is whether the rates fixed are confiscatory. A utility which would upset a rate order on the constitutional grounds asserted by Bell carries the heavy burden of showing that it is invalid because it is unjust and unreasonable in its consequences. . . . . When we give appropriate deference to the expertise of PSC, and view the PSC order as having the same force as a legislative enactment, we must say that Bell has failed to meet its heavy burden of showing that the rate order was confiscatory and Bell's

constitutional rights violated.

The court's decision did not resolve the question of whether the double leverage adjustment is appropriate. Instead, the court indicated only that the company could not demonstrate that the return awarded was unreasonable or unjust.

In Central Telephone Company of Virginia v State Corporation Commission of Virginia, 252 S.E.2d 575, the court suggested that it did not agree with the regulatory commission's decision to use the consolidated capital structure approach rather than the independent company approach advocated by the company. Centel, a telephone subsidiary, was 100% owned by Central Telephone and Utilities Company, the parent company. The parent company also owned electric, telephone, and water subsidiaries.

A witness for the company argued that Centel's capital structure should be used to determine the allowable rate of return because the consolidated cost of capital did not reflect the risk facing Centel. Moreover, the commission had consistently used Centel's actual capital structure to determine the rate of return in the past. The court, which upheld the commission's decision, concluded that

> We are not persuaded in this instance of either the necessity or the desirability of this change in method made by the Commission or of the soundness of the reasons assigned for the change. However, we cannot say that the method adopted by the Commission is in violation of the Constitution of Virginia or of any statute, or that the rate allowed is confiscatory or unreasonable and unjust. Whether or not the Commission has acted wisely is open to question, but that it acted

> within its discretion is not. We say again, 'We do not sit as a board of revision to substitute our judgment for that of the legislature, or of the Commission lawfully constituted by it, as to matters within the province of either.'[Citation omitted]

Even though the court did not agree with the commission's use of the consolidated capital structure method to determine the allowable rate of return in this case, the court argued that the company was not able to show that the commission's decision was confiscatory or unreasonable.

Summary

The U.S. Supreme Court has not issued an opinion on the appropriateness of using a double leverage adjustment. As a result, this issue lies within the jurisdiction of the state courts. In sixteen cases in which the court upheld a double leverage adjustment (see Table 24), the court stated that it would defer to the expertise of the commission and look only at the return awarded, and not at the methods employed, in deciding whether the commission's decision was unreasonable or unjust. The courts have not stated that the double leverage methodology is correct. Instead, the courts have indicated only that the utility bears the burden of demonstrating that the return awarded by the commission is inadequate.

The various theoretical arguments for rejecting the double leverage adjustments, which are presented in Chapter 5, have been reviewed by the courts. Even though these

theoretical arguments seem persuasive, the courts have generally upheld the rate of return awarded by the regulatory commission. Because the terms confiscatory, unreasonable, and unjust are not precisely defined, the utilities have not been successful in persuading the courts that the double leverage techniques are inappropriate.

CHAPTER 7

CORPORATE STRUCTURE AND THE COST OF CAPITAL: A SURVEY

An increasing number of regulated and nonregulated corporations are organized as holding companies. Moreover, these parent holding companies and their wholly owned subsidiaries both issue long-term debt. As a result, financial executives and regulatory commissioners are faced with the following question: how (if at all) does this type of corporate structure affect the method used to estimate the cost of common equity capital for each subsidiary?

The objective of this chapter is to report the results of a survey which examines how the hurdle rate (or minimum acceptable rate of return) is determined for a nonregulated, wholly owned subsidiary of a parent holding company. Because the expected rate of return on an investment in the regulated sector should equal the expected rate of return on an investment of comparable risk in the nonregulated sector, one approach to analyzing the double leverage controversy is to compare the double leverage techniques used by regulatory commissions with the capital budgeting procedures used by nonregulated firms. Specifically, does a parent company base the hurdle rate for a nonregulated subsidiary on the subsidiary's weighted average cost of capital (WACC), the

consolidated firm's weighted average cost of capital, or some other weighting technique? This question has not been addressed in previous studies.

Several surveys in the financial literature have analyzed the capital budgeting practices of large U.S. corporations. (See Table 31)

The results of these surveys indicate that most companies use the internal rate of return (IRR) and/or the payback method to evaluate the profitability of a proposed capital budgeting project. (See Table 32)

TABLE 31

CAPITAL BUDGETING SURVEYS

Authors	Year Pub.	Sample	Responses	Response Rate (%)
Petty, Scott, and Bird	1975	Fortune 500(a)	109	22%
Petry	1975	550 Firms(b)	284	52
Gitman and Forrester	1977	268 Firms(c)	103	38
Schall, Sundem, and Geijsbeek	1978	407 Firms(d)	189	46
Gitman and Mercurio	1982	Fortune 1000(e)	177	18

(a) Based on 1971 sales dollars.

(b) The Fortune 50 Retailing, the Fortune 50 Transportation, the Fortune 50 Utility, and the top 400 of the Fortune 500 Industrial Corporations.

(c) The sample consists of firms which appeared on two lists compiled by Forbes: 1) a list of 600 companies which experienced the greatest stock price appreciation between 1971 and 1976, and 2) a list of 500 companies which had the largest capital expenditures for 1969.

(d) The sample includes all firms on the Compustat tape with either 1) net plant assets greater than $200 million, 2) capital expenditures greater than $20 million, or 3) net plant assets greater than $150 million and capital expenditures exceeding $10 million.

(e) Based on 1979 sales dollars.

TABLE 32

METHODS FIRMS USE TO EVALUATE CAPITAL BUDGETING PROPOSALS (a)

Method	Petty et al.(b)	Petry(c)	Gitman & Forrester(c)	Schall et al.(c)
Payback period	11%	58%	50%	73%
Accounting Rate of Return	31	60(d)	40	58
Net Present Value	15	33	34	56
Internal Rate of Return	41	61	71	64
Profitability Index	2		5	
Percent Using a Discount Rate	84	66	92	74

(a) Gitman & Mercurio (1982) do not investigate the methods firms use to evaluate capital budgeting expenditures.

(b) Responses represent the percentage of firms which identified each technique as being the most important in their firm's investment decision process when evaluating new product lines. (The rankings are similar for the primary techniques used to evaluate projects for existing product lines.)

(c) Percentages do not add to 100% because some respondents selected more than one technique.

(d) Includes both the rate of return on initial investment and the rate of return on average investment.

Scott and Petty (1984) synthesize these studies and conclude that most firms evaluate a proposed capital budgeting project by comparing the project's internal rate of return with an appropriate hurdle rate. Although the hurdle rate is usually based on a weighted average cost of capital, firms also use other methods to compute the discount rate. (See Table 33)

TABLE 33

METHODS FIRMS USE TO DETERMINE THE DISCOUNT RATE (a)

Method	Petty et al.	Petry(b)	Schall et al.(b)	Gitman & Mercurio(b)
WACC	30%	27%	46%	87%
Risk		20		
Specific Source of Funds	17		26	17
Historical Rate of Return (ROR)	13	20	20	
Target ROR (Mgmt)	40	14	17	
Risk Premium			8	

(a) Gitman and Forrester (1977) do not investigate the methods firms use to determine the discount rate.

(b) Percentages do not add to 100% because some respondents selected more than one technique.

These studies have not examined how (if at all) corporate structure affects the method firms use to compute the weighted average cost of capital.

Survey

A questionnaire was sent to 161 U.S. companies selected from the Fortune (April 27, 1987) ranking of companies by sales for 1986. The survey was sent to those parent companies in the top 200 ranking which have at least one wholly owned subsidiary. The survey was addressed to the company's chief financial officer or the highest ranking corporate officer identified in the Directory of Corporate Affiliations, 1988.

The survey consisted of seven multiple choice questions, and the participants were asked to circle the answer that applies to their company. Some responses warranted further written explanation by the respondent (questions 3, 6, and 7). Dr. Lloyd M. Rinehart, Assistant Professor of Marketing and Logistics at Michigan State University, assisted with the design of the survey. The survey was reviewed for conceptual validity by Dr. John O'Donnell, Chairman of the Department of Finance and Insurance at Michigan State University. Graduate students in the Department of Finance and Insurance reviewed the survey for clarity.

A cover letter and a list of definitions were enclosed with the survey. Participants were advised that their answers would remain confidential with regard to their company's identity. In addition, participants were able to request a copy of the survey results.

The survey was also sent to one or two subsidiaries for

each parent company as available. A total of 296 subsidiaries were selected to receive the survey. The subsidiary results, which are similar to the results for the parent companies, are included in Appendix A.

Survey Results

Eighty-three usable responses were received from the parent companies (a 52% response rate). The survey results are shown in Table 34.

TABLE 34

SURVEY RESULTS: PARENT COMPANY SAMPLE

Q-1. Which of the following evaluation techniques does your company use to analyze capital budgeting proposals? (please circle each method your company uses) (a)

		Responses	Percent
1)	Payback period	50	60%
2)	Accounting Rate of Return	16	19
3)	Net Present Value	54	65
4)	Internal Rate of Return	74	89
5)	Profitability Index	6	7
6)	Other	5	6

(a) Percentages do not add to 100% because some respondents use more than one technique.

Q-2. Does your company identify minimum acceptable rates of return (or hurdle rates) to evaluate capital budgeting proposals? (circle number)

1)	Yes	73	88%
2)	No	10	12
	TOTAL	83	100%

Q-3. How does your company compute the hurdle rate for a particular subsidiary? (please circle each method your company frequently uses) (a)

1)	Weighted Average Cost of Capital	62	85%
2)	Subsidiary's Cost of Debt	2	3
3)	Subsidiary's Cost of Equity	2	3
4)	Subsidiary's Historical ROR	1	1
5)	Specific Source of Financing	6	8
6)	Other	5	7

(a) Percentages do not add to 100% because some respondents use more than one method. Percentages are based on the seventy-three firms which use hurdle rates.

Table 34 (cont'd.).

Q-4. Please complete the following statement. The hurdle rate used to evaluate a project proposed by a particular subsidiary is based on the (circle number)

1)	book values for debt, preferred stock, and common equity reported on the subsidiary's individual balance sheet.	6	8%
2)	market values for the subsidiary's debt, and preferred stock, and the book value for the subsidiary's common equity.	5	7
3)	subsidiary's capital structure using some other weighting technique.	6	8
4)	is not based on the subsidiary's capital structure.	55	77
	TOTAL	72	100%

Q-5. Please complete the following statement. The hurdle rate used to evaluate a project proposed by a particular subsidiary is based on the (circle number)

1)	book values for debt, preferred stock, and common equity reported on the firm's consolidated balance sheet.	24	33%
2)	market values for debt, preferred stock, and common equity reported on the firm's consolidated balance sheet.	25	35
3)	firm's consolidated capital structure using some other weighting technique.	13	18
4)	not based on the firm's consolidated capital structure.	10	14
	TOTAL	72	100%

Table 34 (cont'd.).

Q-6. Is the method the parent company uses to finance its acquisition of a particular subsidiary relevant for evaluating capital budgeting projects proposed by that subsidiary? (For example, if the parent company issues debt, is the issuance of debt by the parent company relevant for evaluating capital budgeting projects proposed by that subsidiary?) (circle number)

1)	Yes	4	5%
2)	No	79	95
	TOTAL	83	100%

Q-7. Is the parent company's capital structure and cost of funds relevant for evaluating capital budgeting projects at the subsidiary level? (circle number)

1)	Yes	55	67%
2)	No	27	33
	TOTAL	82	100%

Eighty-nine percent of the parent companies who responded to the survey evaluate a proposed capital budgeting project by computing the project's internal rate of return. The parent companies also mention the net present value (65%) and payback (60%) methods as techniques they frequently use to evaluate project profitability. Although the results for the IRR and payback methods are consistent with the findings of earlier studies, the results for this study suggest that more firms are now using the net present value method.

Eighty-eight percent of the respondents indicate that their companies use hurdle rates to evaluate capital budgeting proposals. Eighty-five percent of the firms which use hurdle rates determine the hurdle rate for a particular subsidiary by computing a weighted average cost of capital. Most firms do not base the hurdle rate for a particular subsidiary on the subsidiary's capital structure. Instead, companies usually compute the weighted average cost of capital using the firm's consolidated capital structure. In general, the method the parent company uses to finance its acquisition of a particular subsidiary is irrelevant for evaluating capital budgeting projects proposed by the acquired subsidiary.

The results for question 7 are ambiguous. Some parent companies that use the firm's consolidated capital structure to compute the WACC answered 'YES' to question 7, whereas some parent companies answered 'NO'. The ambiguity arises

because it is not clear whether the question refers to the parent's capital structure on an unconsolidated basis (a separate technique), or whether the question refers to the impact of the parent's capital structure as it affects the firm's consolidated capital structure. The main purpose of this question is to determine if the parent's source and cost of funds is relevant for evaluating projects at companies which do not identify hurdle rates. Of the ten respondents who answered 'NO' to Q-2, seven answered 'NO' to Q-7.

Risk Adjustment

Although several respondents indicated that their companies adjust the WACC to reflect differences in subsidiary risk, the majority of respondents were silent on this point. From the sample of 73 firms which use hurdle rates, 11 respondents indicated that their companies use the subsidiary's actual cost of capital or cost of equity to determine the hurdle rate for that subsidiary. The remaining sixty-two firms base the hurdle rate for a particular subsidiary on the firm's consolidated WACC. Of these 62 firms, twenty-two respondents indicated that the consolidated WACC is adjusted to reflect differences in subsidiary risk. A telephone survey was conducted to investigate how (if at all) the remaining forty firms which compute a consolidated WACC account for differences in subsidiary risk.

Twenty-nine firms responded to the telephone survey

(one firm did not to participate). The remaining eleven firms were sent a follow-up letter and a question regarding the risk adjustment procedures used by their firm. The results are presented in Table 35.

TABLE 35

RISK ADJUSTMENT PROCEDURES AND THE CONSOLIDATED WEIGHTED AVERAGE COST OF CAPITAL: PARENT COMPANIES

		Responses	Percent
1)	Risk-adjust the consolidated weighted average cost of capital	28	45%
2)	Risk is determined subjectively	22	36
3)	No adjustment is made for risk	7	11
4)	No response available from either the telephone or letter follow-up	5	8
	Total	62	100%

Of the 73 firms which use hurdle rates, 68 respondents provided information on the risk-adjustment procedures used by their firm. Sixty-one firms (90%) account for differences in risk either subjectively or quantitatively.

The results for this study are similar to the results obtained by other studies. (See Table 36)

TABLE 36

METHODS FIRMS USE TO ADJUST FOR RISK (a)

Survey:	Petty, Scott & Bird(b)	Petry	Gitman & Forrester	Schall et al.	Gitman & Mercurio(c)
Percent Considering Risk		71%	71%	92%	68%
Risk Adj. Discount Rate	37%	35	44	81	
Adj. Cash Flows - Quantitative	27	30	27		
Adj. Cash Flows - Subjective		24	19		
Change Payback	61	16	13	32	

(a) Percentages do not add to 100% because some respondents use more than one technique.

(b) Petty, Scott and Bird do not report the percentage of respondents which consider risk. Percentages refer to companies which frequently or always use a method to account for risk.

(c) Thirty-nine percent of the sample firms risk adjust the cash flows for each project, 32% risk adjust the cost of capital, and 20% risk adjust both the cash flows and the cost of capital.

The results for these surveys indicate that between 68% and 92% of the respondent firms gave "explicit consideration to risk and uncertainty." The remaining respondents for each survey indicated that either risk "is not assessed" or that project risk is not "specifically differentiated."

Conclusions

The results of this study indicate that most parent companies compute the hurdle rate for a particular subsidiary in two steps. First, the weighted average cost of capital is calculated using the firm's consolidated capital structure. The consolidated capital structure is composed of the parent company's long-term debt, preferred stock, and common equity, and each consolidated subsidiary's long-term debt and preferred stock. Second, most parent companies adjust the consolidated cost of capital to reflect differences in subsidiary risk. The adjustment for risk is made either quantitatively or subjectively.

The required rate of return for each subsidiary is a function of its risk. Subsidiaries which exhibit greater than average risk, for example, have above average required rates of return. Stated differently, the results of this survey support the conclusion that holding companies estimate the cost of common equity and the weighted average cost of capital for their wholly owned subsidiaries in accordance with the principles of modern financial theory.

What are the implications for regulated firms? As discussed in Chapter 5, the consolidated capital structure

approach is appropriate only if (1) the parent has only one subsidiary, (2) all subsidiaries have equal systematic risk, or (3) the subsidiary being regulated exhibits average risk. Nonregulated firms usually compute the firm's consolidated WACC and adjust the discount rate or subjectively account for differences in risk. To imitate the capital budgeting procedures used by nonregulated firms, regulatory commissions should also adjust the firm's consolidated weighted average cost of capital to reflect differences in subsidiary risk.

CHAPTER 8

EVENT STUDY

Many articles in the financial literature present theoretical arguments which claim to either support or refute the logic underlying the various double leverage adjustments. However, no empirical evidence has been cited to defend either position. As a result, one objective of this dissertation is to present statistical evidence which will lend support to either the acceptance or rejection of the double leverage techniques.

Critics claim that the various double leverage adjustments are inappropriate, because the techniques often result in awarding a rate of return which is less than the utility's cost of capital. If a regulatory commission awards a rate of return which is less than the cost of capital, the utility's market value would decrease until the expected rate of return on the utility's common stock equals the market required rate of return for investments in the same risk class. Critics believe that methods which result in awarding a rate of return which is less than the utility's cost of capital violate the capital attraction standard specified by the U.S. Supreme Court. As discussed in Chapter 2, the wealth of existing shareholders is diluted

if a utility issues new common stock at a price which is less than the book value of the existing equity. Moreover, it can be argued that commissions should establish rates so that a utility's Q-ratio, the ratio of the market value of a firm's securities to the replacement cost of its assets, is equal to or greater than one. Morin (1984) argues that if the Q-ratio is less than one, the firm has a disinclination to invest in new plant and equipment.

Backman and Kirsten (1972) argue that the capital attraction standard does not apply to a regulated utility that is controlled by a parent holding company. Instead, advocates believe that the allowable rate of return on the equity of a wholly owned subsidiary should reflect the source and cost of funds issued at the parent level.

Since the double leverage adjustments are generally applied only to regulated subsidiaries which are wholly owned by a parent holding company, the effect of using a double leverage adjustment on a subsidiary's market value cannot be directly observed. A case can be made, however, by examining four subsidiaries of AT&T which have had a publicly traded minority interest. (See Table 37)

TABLE 37

SUBSIDIARIES OF AT&T WITH A MINORITY INTEREST (1968-1980)

Subsidiary	AT&T Ownership Percentage	Principal Jurisdictions
1) New England Tel & Teleg	70% - 86%	Maine Massachusetts New Hampshire Vermont Rhode Island
2) Mountain State Telephone & Telegraph	87 - 89	Montana Wyoming Colorado New Mexico Utah
3) Pacific Northwest Bell	89	Washington
4) Pacific Tel & Teleg	90	California

Each of these states has a regulatory commission which establishes the allowable rate of return the utility may earn on its intrastate rate base.

Because AT&T owned a large percentage of these subsidiaries' common stock, several regulatory commissions used either the hypothetical capital structure method, the consolidated capital structure approach, or the two-step double leverage adjustment to determine the allowable rate of return.

1. The Hypothetical Capital Structure Approach. The regulatory commission assigns a target capital structure to the regulated subsidiary for the purpose of determining the subsidiary's rate of return. Because the cost rate for debt is less than the cost rate for equity, the regulatory commission argues that the utility's capital

structure should include an appropriate amount of debt financing to reduce the cost of providing service to the ratepayers. As a result, the regulatory commission ignores the subsidiary's actual capital structure and imputes a higher debt ratio which the commission believes is more "reasonable."

2. The Consolidated Capital Structure Approach. The subsidiary's allowable rate of return is set equal to the consolidated holding company system's weighted average cost of capital. The cost rates for debt and preferred stock represent average cost rates for the entire system. The cost rate for equity is the estimated required rate of return for the parent company's publicly-traded common stock.

3. The Two-Step Double Leverage Adjustment. The parent holding company's cost of capital is used as an estimate for the regulated subsidiary's cost of equity. The advocates of double leverage argue that the subsidiary's equity is actually composed of debt, preferred stock, and common stock issued at the parent level.

In essence, all of these adjusted capital structure methods result in assigning a hypothetical capital structure to the regulated subsidiary.

An event study is conducted to compare the effect on the subsidiary's stock price of using either the actual or an adjusted capital structure method to determine the allowable rate of return. The stock prices for the subsidiaries are observable because a minority interest is publicly traded. The event date ($t = 0$) is the date the regulatory commission signed the rate order as identified in the Public Utility Reports. Two samples are constructed: (1) the commission computed the allowable rate of return using the subsidiary's actual capital structure (20 cases), and (2) the commission computed the allowable rate of

return using either the two-step double leverage adjustment (2 cases), the consolidated capital structure method (1 case), or the hypothetical capital structure approach (7 cases). (See Table 38)

TABLE 38

RATE CASES USING EITHER THE ACTUAL OR AN ADJUSTED CAPITAL STRUCTURE METHOD (1968-1980)

Actual Capital Structure Method

Jurisdiction	Year	Rate Base	Return on Base Rate	Return on Com. Equity
Mountain States Telephone & Telegraph				
Colorado	(1971)	$405.4 mil	8.900%	10.8 %
	(1972)	484.2	8.625	11.4
	(1974)	636.7	9.200	12.04
	(1975)	697.9	9.455	12.04
	(1977)	795.3	9.400	11.50
New Mexico	(1973)	194.7	7.760	11.7
Wyoming	(1975)	74.8	9.000	10.4
	(Jul 1976)	85.0	9.000	10.4
	(Dec 1976)	102.8	9.000	10.4
New England Telephone & Telegraph				
Maine	(1974)	151.7	8.780	11.0
Massachusetts	(1972)	NS	8.820	11.0
	(1975)	NS	9.000	13.0
	(1977)	NS	9.280	13.0
New Hampshire	(1974)	155.8	9.070	11.0
Rhode Island	(1972)	148.1	8.380	10.5
	(1975)	184.6	9.020	11.25
	(1977)	210.9	8.600	11.52
Pacific Telephone & Telegraph				
California	(1971)	NS	7.850	9.5
	(1972)	NS	7.850	9.5
	(1979)	6,759.8	9.730	12.25
	(1979)	NS	10.250	12.25

Table 38 (cont'd.).

Adjusted Capital Structure Methods

Jurisdiction	Year	Rate Base	Return on Base Rate	Return on Com. Equity
Mountain States Telephone & Telegraph				
Montana	(1978)	$130.5 mil	8.780%	10.01%*
	(1980)	155.6	9.700	11.23*
Utah	(1969)	124.4	7.250	NS**
New England Telephone & Telegraph				
Maine	(1978)	NS	9.240	11.5**
	(1979)	248.7	9.240	11.5**
Massachusetts	(1970)	894.5	7.800	9.9**
Pacific Telephone & Telegraph				
California	(1968)	2,893.8	6.900	NS**
Pacific Northwest Bell				
Washington	(1976)	609.9	9.500	12.0**
	(1978)	738.9	9.700	12.0**
	(1980)	907.4	10.830	13.71***

NS = Not Stated in the Public Utilities Reports
* = Two-Step Double Leverage Method
** = Hypothetical Capital Structure Method
*** = Consolidated Capital Structure Method

The study period is from 1968 to 1980. Because AT&T announced on August 20, 1980 that it would purchase the remaining minority interest of each subsidiary as part of a major restructuring, rate cases signed after this date are excluded from the two samples. In addition, Washington (1980) and Montana (1980) are excluded from the adjusted capital structure sample after this date.

Rate cases that have overlapping event periods are excluded if the rate cases pertain to the same subsidiary. The one exception involves the rate cases for Massachusetts (1975) and Rhode Island (1975) which were signed on consecutive trading days and are treated as one event.

Methodology

The two samples are analyzed using the Mean Adjusted Returns, Market Adjusted Returns, and OLS Market Model techniques. For each method the estimation period is 105 days (from t = -135 to t = -31), and the observation period is 61 days (from t = -30 to t = +30). Daily stock prices are obtained from the Standard and Poor's New York Stock Exchange and American Stock Exchange Daily Stock Price Record. Mountain States, New England, and Pacific Telephone and Telegraph are listed on the New York Stock Exchange. Pacific Northwest Bell is listed on both the American Stock Exchange (1968-1978) and the New York Stock Exchange (1978-1980).

The estimation period for each rate case excludes the event periods for other rate cases. For example, the

estimation period for Wyoming (1975) is from August 8, 1974 to November 6, 1975 (64 trading days) and February 5, 1975 to April 4, 1975 (41 trading days). This estimation period excludes the event period for Colorado (1974) which consists of the sixty-one trading days from November 7, 1974 to February 4, 1975.

Mean Adjusted Returns

The excess return for security i at day t ($A_{i,t}$) is given by

$$A_{i,t} = R_{i,t} - \bar{R}_i \quad \text{, where}$$

$$\bar{R}_i = (1/105) \sum_{t=-135}^{t=-31} R_{i,t} \quad \text{, and}$$

$R_{i,t}$ = the observed arithmetic return for security i at day t.

The expected daily return for security i during the event period (in the absence of abnormal returns) is equal to the average daily return observed during the estimation period. The major assumption of this method is that the daily stock returns follow a stationary process during the event period in the absence of abnormal price performance.

Market Adjusted Returns

The excess return for security i at day t is equal to

$$A_{i,t} = R_{i,t} - R_{m,t} \quad \text{, where}$$

$R_{m,t}$ = the return on the Center for Research in Security Prices at the University of Chicago (CRSP) equally weighted index for day t.

OLS Market Model

The excess return for security i at day t is given by

$A_{i,t} = R_{i,t} - \alpha_i - \beta_i * R_{m,t}$, where

α_i and β_i are the OLS values obtained from the estimation period.

Scholes and Williams (1977) and Dimson (1979) have shown that the OLS estimates for beta are biased and inconsistent when non-synchronous trading is present. For example, shares traded relatively infrequently have downward biased estimates of beta, whereas shares traded relatively frequently have upward biased estimates of beta. Brown and Warner (1985) conclude that the Scholes-Williams and Dimson adjustments to the OLS estimates of beta do not improve the power of the statistical tests in event studies. As a result, no adjustment is made to the OLS beta estimates.

Brown and Warner also conduct simulations using actual daily stock price data to compare the three excess return methodologies. They conclude that there is no significant difference in the power of the alternative test methodologies. The three methodologies correctly reject the null hypothesis of no abnormal performance (when the authors simulate a positive abnormal performance at day '0') with the same relative frequency.

Test Statistics

The test statistic for a particular day is given by:

$$\sum_{i=1}^{N_t} A_{i,t} \; / \; \sqrt{N_t} \quad , \quad \text{where}$$

$A^{!}_{i,t} = A_{i,t} / S(A_{i,t})$, the standardized excess return for security i at day t,

$$S(A_{i,t}) = \sqrt{\sum_{t=-135}^{-31} (A_{i,t} - A^{*})^2 / 104} \quad ,$$

$$A^{*} = (1/105) \sum_{t=-135}^{-31} A_{i,t} \quad , \text{ and}$$

N_t = the number of rate cases in the sample at day t. Because the event date (t = 0) for each security corresponds to a different calendar day, the standardized excess returns are assumed to be cross-sectionally independent. If the standardized excess returns are independent and identically distributed with finite variance, the test statistic will be distributed unit normal for large sample sizes.

Brown and Warner (1985) argue that the distribution of the excess returns for small sample sizes (5 or 20 securities) departs more from normality than the distribution for large sample sizes (50 or more securities). Although event studies using small sample sizes do not result in a misspecification of the test statistics, Brown and Warner believe that the stated significance levels should not be taken literally.

The test statistic for a multi-day interval (for example, t = -5 to t = +30) is given by:

$$\sum_{t=-5}^{30} \bar{A}_t \; / \; \left(\sum_{t=-5}^{30} S^2 (\bar{A}_t) \right)^{1/2} \quad , \text{ where}$$

$$\bar{A}_t = (1/N_t) \sum_{i=1}^{N_t} A_{i,t} \quad ,$$

$$S(\bar{A}_t) = \sqrt{\left(\sum_{t=-135}^{-31} (\bar{A} - \bar{\bar{A}})^2 \right) / 104} \quad , \text{ and}$$

$$\bar{\bar{A}} = (1/N_t) \sum_{t=-135}^{-31} \bar{A}_t \ .$$

The test statistic is assumed to follow a unit normal distribution in the absence of abnormal performance.

Results

The average abnormal returns (AAR) and the cumulative average abnormal returns (CAAR) for the twenty rate cases that use the utility's actual capital structure to determine the allowable rate of return are shown in Table 39.

TABLE 39

ABNORMAL RETURNS FOR RATE CASES
USING THE ACTUAL CAPITAL STRUCTURE METHOD
(MEAN ADJUSTED RETURNS)

Day	AAR	Test Statistic	CAAR	Events >0
- 30	- .0039	- 1.389	- .0039	5
- 25	- .0005	- .420	- .0032	12
- 20	.0007	.023	- .0054	10
- 15	.0048	1.160	.0019	13
- 10	- .0012	- .253	- .0028	5
- 9	- .0020	- .777	- .0048	10
- 8	.0028	.997	- .0020	13
- 7	- .0001	- .129	- .0021	10
- 6	.0026	1.415	.0005	10
- 5	.0001	- .245	.0006	9
- 4	- .0001	.006	.0005	10
- 3	.0043	1.851*	.0048	12
- 2	- .0011	- .645	.0037	8
- 1	- .0004	- .331	.0033	9
0	.0021	1.559	.0054	10
1	- .0011	- .473	.0043	10
2	.0002	- .380	.0045	9
3	- .0013	- .601	.0032	11
4	- .0022	- .694	.0010	9
5	- .0044	- 1.453	- .0034	6
6	.0019	.137	- .0015	12
7	- .0031	- 1.385	- .0046	8
8	.0027	1.507	- .0019	12
9	.0031	.792	.0012	8
10	.0044	2.002**	.0056	12
15	- .0002	- .151	.0148	9
20	.0020	.499	.0213	12
25	.0007	.336	.0235	9
30	- .0002	- .104	.0258	10

* Significant at the 0.10 level.
** Significant at the 0.05 level.

Over the 61-day event period the cumulative average residuals increase 2.58%. Only two trading days (t = -3 and t = +10) are statistically significant at either the .05 or .10 levels.

Table 40 shows the AAR and CAAR for the ten rate cases that use an adjusted capital structure method to determine the allowable rate of return.

TABLE 40

ABNORMAL RETURNS FOR RATE CASES
USING AN ADJUSTED CAPITAL STRUCTURE METHOD
(MEAN ADJUSTED RETURNS)

Day	AAR	Test Statistic	CAAR	Events <0
- 30	.0024	.183	.0024	6
- 25	.0024	.674	.0022	4
- 20	- .0035	- .844	- .0043	7
- 15	- .0044	- 1.335	- .0022	7
- 10	- .0015	- .153	- .0035	5
- 9	- .0002	- .105	- .0037	6
- 8	- .0004	- .119	- .0041	7
- 7	.0019	.319	- .0022	6
- 6	- .0012	- .166	- .0034	3
- 5	.0010	.084	- .0024	5
- 4	- .0056	- 1.458	- .0080	8
- 3	- .0006	.150	- .0086	5
- 2	.0055	1.528	- .0031	3
- 1	- .0027	- .932	- .0058	7
0	- .0000	.061	- .0058	6
1	- .0044	- 1.359	- .0102	6
2	- .0045	- .857	- .0147	7
3	- .0038	- 1.378	- .0185	5
4	.0025	.888	- .0160	4
5	.0000	.185	- .0160	5
6	- .0021	- .100	- .0181	6
7	.0019	.894	- .0162	6
8	.0032	.598	- .0130	4
9	.0006	- .099	- .0124	8
10	.0039	1.378	- .0085	4*
15	- .0030	- .741	- .0245	7*
20	.0017	.470	- .0305	5*
25	- .0008	.175	- .0398	5**
30	.0011	.120	- .0356	5**

* Based on 9 events.
** Based on 8 events.

Over the 61-day event period the cumulative average residuals decrease 3.56%. The daily returns are not statistically significant at either the .05 or .10 levels.

The results show that investors react differently to telephone rate cases which use the actual capital structure method as opposed to cases which use an adjusted capital structure method to determine allowable rate of return. Although the results are generally not statistically significant, the cumulative average residuals are positive for rate cases using the subsidiary's actual capital structure and negative for rate cases using an adjusted capital structure method. (See Table 41)

TABLE 41

COMPARISON OF CUMULATIVE AVERAGE RESIDUALS OVER SELECTED INTERVALS

	Actual Capital Structure Method		Adjusted Capital Structure Method	
Period	CAAR	Test Statistic	CAAR	Test Statistic
-30, - 5	.0006	.040	- .0023	- .114
- 4, + 5	-.0040	-.432	- .0136	-1.087
+ 6, +30	.0292	2.000**	- .0196	- .990

** Significant at the .05 level.

Although the cumulative average residuals are statistically significant for the actual capital structure sample at the .05 level, the results are not significant for the t = -4 to t = +5 period. Instead, the positive stock price reaction

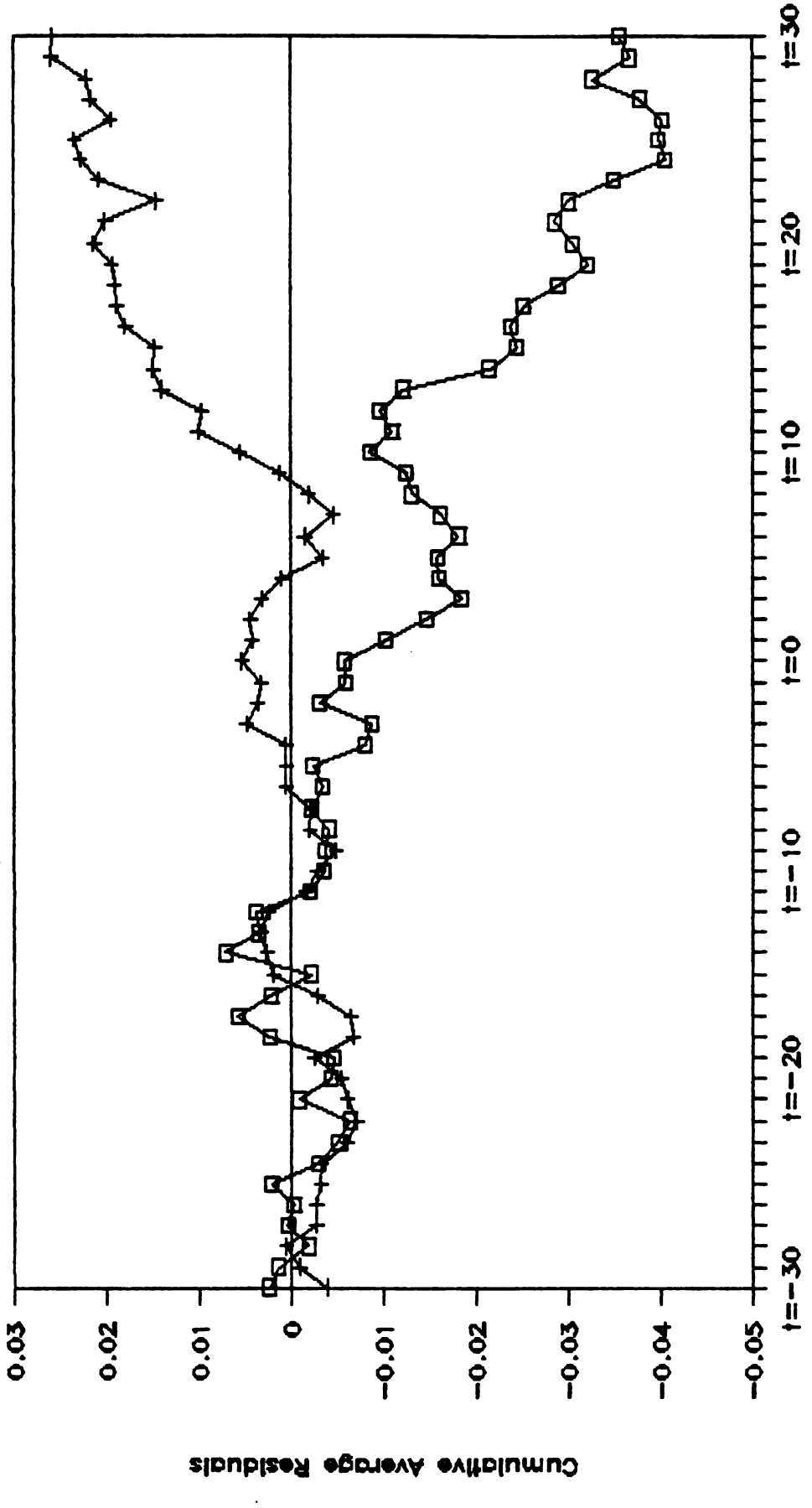
occurs more than seven trading days following the signing of the rate orders.

Because the largest jurisdictions for Mountain States (Colorado) and New England Telephone and Telegraph (Massachusetts) use the actual capital structure method to determine the allowable rate of return, the adverse effect of using an adjusted capital structure method may be even more severe than shown by this study. The results for the Market Adjusted and OLS Market Model techniques, which are similar to the results reported for the Mean Adjusted Returns Methodology, are shown in the Appendix B. The results for the mean adjusted returns approach are shown graphically in Figure 1.

FIGURE 1

ACTUAL VS ADJUSTED

MEAN ADJUSTED RETURNS



The Effect of Adopting the Two-Step Double Leverage Adjustment on Security Prices

Event studies are commonly used in financial research to analyze stock price reaction to a particular event. If the cumulative average residuals are statistically different from zero, the researcher concludes that investors revised their expectations based on the new information disclosed by the event. If the event has no economic impact, or if the information were anticipated prior to the announcement, then one would not expect the cumulative average residuals to be statistically different from zero.

Using the event study methodology to test double leverage involves a test of two inseparable hypotheses:

1. the double leverage approaches are invalid because they result in awarding a rate of return which is less than the subsidiary's cost of capital, and

2. the outcome of a rate case, regardless of how the rate of return is computed, is correctly anticipated by investors prior to the signing of the rate order.

For example, if the cumulative average residuals for the event study were statistically less than zero, one could argue only that investors received less than they expected. This result would not prove that double leverage is invalid. Conversely, the fact that the test is not statistically different from zero does not prove that double leverage is valid. Instead, it demonstrates only that investors correctly anticipated the outcome of rate cases using an adjusted capital structure method to determine the allowable rate of return.

Critics often argue that the two-step double leverage adjustment is the most restrictive approach. As a result, two tests are conducted to analyze the reaction of security prices to rate cases in which a regulatory commission adopts the two-step double leverage adjustment for the first time. If investors do not anticipate the adoption of this method, critics of double leverage would argue that a negative price reaction should result. The only applicable rate case pertaining to a subsidiary of AT&T with a publicly traded minority interest is Montana (1978). Prior to this rate case the Montana Public Service Commission used the hypothetical capital structure method to compute Mountain Bell's allowable rate of return. Although the cumulative average residuals for this rate case are equal to -.0055 for the 10-day period surrounding the event date (t = -4 to t = +5), the test statistics are not statistically significant at the .10 level (the test statistic equals -.160).

A final test examines the reaction of bond returns to rate cases in which the regulatory commission uses the two-step double leverage method for the first time. Five subsidiaries of AT&T are identified. (See Table 42)

TABLE 42

RATE CASES USING THE TWO-STEP DOUBLE LEVERAGE ADJUSTMENT: BOND ANALYSIS

Jurisdiction		Rate Base	Return on Rate Base	Return on Com. Equity
Mountain States Telephone and Telegraph				
Montana	(1978)	$130.5 mil	8.78%	10.01%
New England Telephone and Telegraph				
Rhode Island	(1981)	NS	11.48	13.78
Southwestern Bell Telephone Company				
Texas	(1976)	NS	9.50	11.42
Arkansas	(1977)	350.6	8.31	10.20
Kansas	(1981)	631.6	9.68	12.49

NS = not stated in the Public Utilities Reports

Although several rate cases pertaining to the subsidiaries of the General Telephone Company (GTE) and the United Telephone Company were also identified, the bonds for these subsidiaries were either not listed on the New York or American Bond Exchanges, or do not trade frequently.

The six bonds with the largest amount outstanding were selected for each of the five AT&T subsidiaries. Bonds were eliminated from the sample if they traded fewer than six days in the 11-day period following the signing of the rate order (from t = 0 to t = +10). The final sample includes four bonds for Montana (1978), five bonds for Rhode Island (1981), six bonds for Kansas (1981), five bonds for Arkansas (1977), and five bonds for Texas (1976). Each bond has at

least fifteen years to maturity. Prices for each bond are obtained from the Wall Street Journal. Information on bond issues and maturities is obtained from Moody's Bond Survey and Moody's Public Utility Manual.

The daily return for each bond includes accrued interest. If a bond did not trade on a particular day, the next trade represents a multi-day return. The daily returns are then averaged to construct a bond portfolio for each rate case. The cumulative average residuals for the five portfolios are estimated using the mean adjusted returns approach. For each rate case the estimation period contains 40 days (from t = -30 to t = -11 and t = +11 to t = +40). The estimation period for Rhode Island (1981) excludes the returns for September 29 and September 30, 1981, because the commission adopted a statewide rate structure on September 29, 1981. The commission adopted the two-step double leverage adjustment in a separate decision signed on October 20, 1981. The event period for each rate case is 21 days (from t = -10 to t = +10).

Although the average return is negative and significant at the .05 level for t = +3, the cumulative average residuals are equal to +.0086 (test statistic equals .642) over the 21-day event period. The negative return for t = +3 is caused by a -.018 return for Montana (1978). (See Table 43) The results are shown graphically in Figure 2.

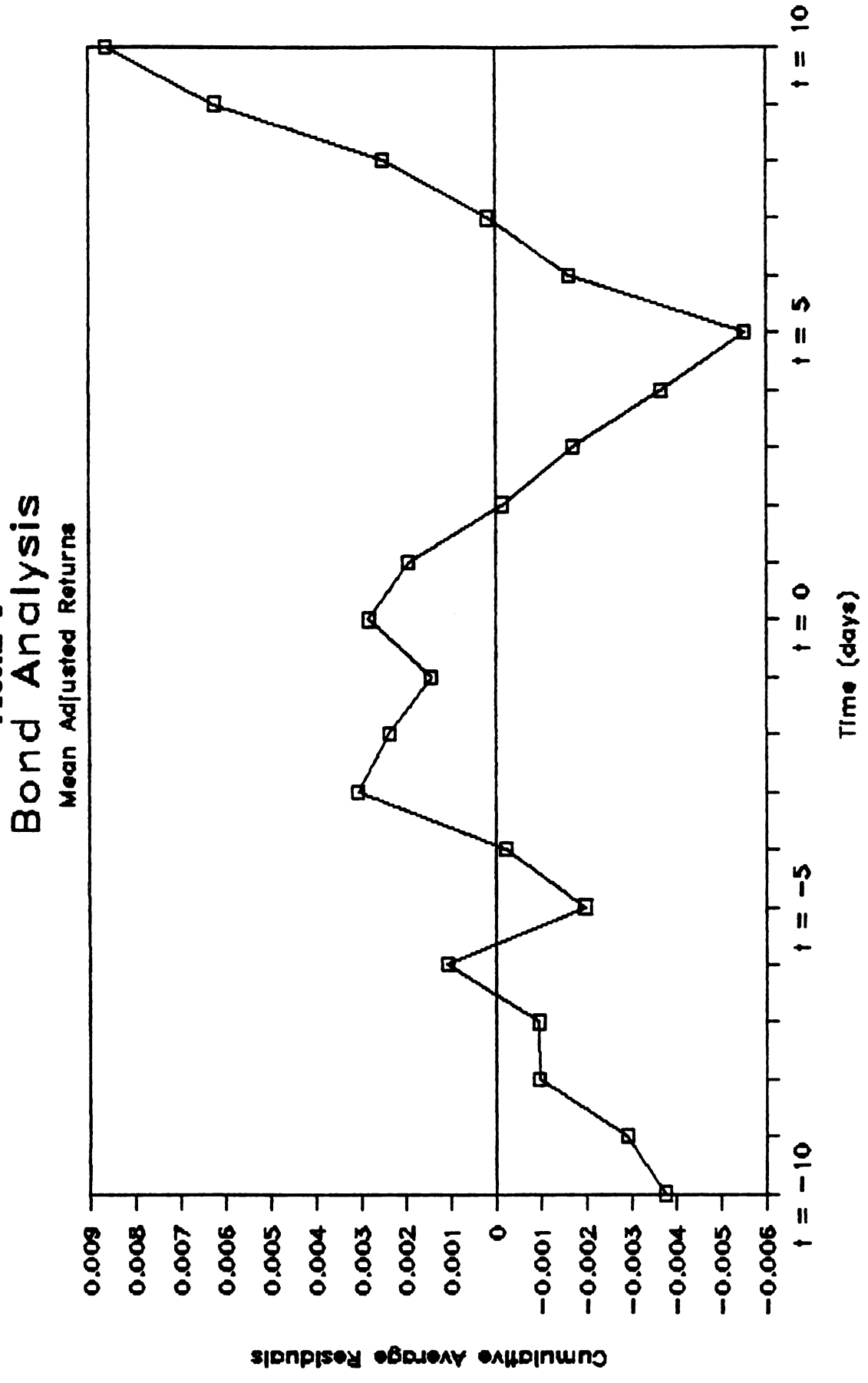
TABLE 43

ABNORMAL RETURNS FOR RATE CASES
USING A TWO-STEP DOUBLE LEVERAGE METHOD:
BOND ANALYSIS

Day	AAR	Test Statistic	CAAR	Events <0
-10	-.0038	- .746	-.0038	3
- 9	.0009	- .165	-.0029	3
- 8	.0019	.673	-.0010	2
- 7	.0001	- .015	-.0009	1
- 6	.0019	.589	.0010	1
- 5	-.0030	- .531	-.0020	3
- 4	.0018	.954	-.0002	2
- 3	.0033	.859	.0031	2
- 2	-.0007	.528	.0024	3
- 1	-.0010	- .340	.0014	4
0	.0014	.381	.0028	1
1	-.0009	.815	.0019	2
2	-.0020	.052	-.0001	3
3	-.0016	-2.267**	-.0017	2
4	-.0020	.347	-.0037	2
5	-.0018	- .642	-.0055	3
6	.0039	.438	-.0016	3
7	.0018	.524	.0002	1
8	.0023	.025	.0025	2
9	.0037	1.658*	.0062	0
10	.0024	.706	.0086	2

* Significant at the .10 level.
** Significant at the .05 level.

FIGURE 2


Bond Analysis
Mean Adjusted Returns
Cumulative Average Residuals
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
-0.001
-0.002
-0.003
-0.004
-0.005
-0.006
t = -10
t = -5
t = 0
t = 5
t = 10
Time (days)

The results of the event study using bond prices do not support the hypothesis that the adoption of the two-step double leverage adjustment for the first time will have an adverse effect on bond prices. Because all of AT&T's subsidiaries (except Pacific Telephone and Telegraph) had Aaa bond ratings throughout the study period, the bond prices for each subsidiary may have reflected the financial strength of the AT&T system rather than the outcome of rate cases affecting individual subsidiaries. After the breakup of the AT&T system, the bond ratings for Southwestern Bell were usually below the ratings of the other Bell operating companies.

Summary

The objective of this chapter is to analyze how rate cases which use various methods to compute the allowable rate of return impact security prices. An event study methodology is employed. First, the stock prices for subsidiaries of AT&T which have a publicly traded minority interest are analyzed. The cumulative average residuals are lower for rate cases using an adjusted capital structure method. Although the cumulative average residuals are positive and statistically significant for rate cases using an actual capital structure method, most of the positive price reaction occurs more than 7 trading days after the rate order is signed.

Because regulatory commissions tend to use the same rate of return method for subsequent rate cases, investors

may have correctly anticipated the outcome of these rate cases regardless of which rate of return method is used. As a result, bond returns are analyzed for rate cases in which the regulatory commission adopts the two-step double leverage adjustment for the first time. The results for this test are also not statistically significant. These results indicate that investors were not surprised by the outcome of these rate cases.

CHAPTER 9

CONCLUSIONS

Although the utility rates charged to consumers are the end result of the entire rate order, determining the allowable rate of return is a key element in this process. The determination of a "fair" rate of return is essential because it not only affects the rates consumers pay, but also the ability of the utility to attract capital. The ability to attract capital is reflected in the company's stock and bond prices.

Regulatory commissions attempt to establish prices for utility services so that the revenue requirement for a regulated utility is sufficient to cover expected operating costs, depreciation, and taxes, and provide a rate of return on the rate base equal to the utility's weighted average cost of capital. If the commission adopts the independent company approach, the weighted average cost of capital is estimated using the book values for debt, preferred stock, and common equity reported on the company's balance sheet. The cost rate for equity is typically estimated using a variant of the Capital Asset Pricing Model, a risk premium approach, and/or a discounted cash flow model.

Most regulatory commissions believe that the

independent company approach should not be used to determine the allowable rate of return for a regulated, wholly owned subsidiary. Instead, the commissions argue that the cost rate for the subsidiary's equity should reflect the source and cost of funds at the parent level. If the two-step double leverage adjustment is used, for example, the parent company's unconsolidated cost of capital is used as a proxy for the regulated subsidiary's cost of equity. The parent company is allowed to earn only its cost of capital on its equity investment in the subsidiary. If the independent company approach were used, on the other hand, the commissions believe that the parent holding company's stockholders would earn an excessive rate of return at the expense of the utility's ratepayers.

The hypothetical capital structure approach, the consolidated capital structure approach, and the two-step double leverage adjustment are the three double leverage techniques that are most widely used in practice. In essence, the commissions use these adjustments to impute a higher debt ratio for the subsidiary and award a lower rate of return than would be permitted if the independent company approach were used.

Although critics agree that a judicious use of leverage by a utility may be desireable, they argue that the double leverage adjustments are biased against the holding company form of organization. Because most holding companies file consolidated tax returns, regulatory commissions usually

allocate a portion of the consolidated tax liability to each subsidiary for rate-making purposes. As a result, the revenue requirement for each regulated subsidiary reflects the tax savings associated with debt financing at both the parent and subsidiary levels. Critics argue that regulation validates MM's pretax equations so that the subsidiary's value and cost of capital are not affected by the location of debt financing at either the parent or the subsidiary level. Consequently, the argument that the equity at the subsidiary level is supported by lower cost debt issued by the parent is fallacious.

Critics argue that the double leverage adjustments are appropriate only if 1) the parent company has only one subsidiary, 2) all subsidiaries have equal systematic risk, or 3) the subsidiary being regulated exhibits the average systematic risk of all the holding company's subsidiaries. Because these three conditions are usually absent, critics argue that the rate of return that is computed using a double leverage technique violates the criteria specified by the U.S. Supreme Court. In Bluefield Water Works & Imp. Co. v West Virginia Public Service Commission (1923), the Supreme Court stated that a public utility is entitled to earn the same rate of return as investments of comparable risk. Critics argue that this objective can be accomplished only if the independent company approach is used.

The U.S. Supreme Court has not issued an opinion on the appropriateness of using a double leverage adjustment. As a

result, this issue lies within the jurisdiction of the state courts. The state courts have generally upheld the rate of return awarded by the regulatory commissions. In their decisions the courts have stated that they will defer to the expertise of the commission and look only at the return awarded, and not the methods employed, in deciding whether the commission's decision is unreasonable or unjust. The courts have not stated that the double leverage techniques are correct; instead, the courts have indicated only that the utility bears the burden of showing that the return awarded by the commission is inadequate.

Given the role of the courts in the rate-making process, the critics must show that the double leverage adjustments are 1) theoretically incorrect and 2) result in a return that is confiscatory, unreasonable, and not supported by substantial evidence. In general, the utility companies have not been able to convince the courts that the double leverage adjustments violate the criteria specified by the U.S. Supreme Court.

Critics of the double leverage adjustments argue that the expected rate of return on an investment in the regulated sector should equal the expected rate of return on an investment of comparable risk in the nonregulated sector. As a result, one approach to analyzing the double leverage controversy is to compare the double leverage techniques used by regulatory commissions with the capital budgeting procedures used by nonregulated firms. A survey of

nonregulated parent companies indicates that most firms compare the internal rate of return for a project proposed by a particular subsidiary with a hurdle rate based on the firm's consolidated cost of capital. Approximately ninety percent of the firms account for differences in subsidiary risk. The adjustment for risk is made by either adjusting the consolidated weighted average cost of capital or by making a subjective assessment. The results of the survey support the conclusion that holding companies estimate the cost of common equity and the weighted average cost of capital for their wholly owned subsidiaries in accordance with the principles of modern financial theory. To imitate the capital budgeting procedures used by nonregulated firms, regulatory commissions should also adjust the consolidated weighted average cost of capital to reflect differences in subsidiary risk.

Critics contend that the double leverage techniques impair the market value of the firm's securities and discourage investment in regulated subsidiaries. An event study methodology was employed to analyze the reaction of stock and bond prices to the signing of rate orders. Two samples were constructed using the subsidiaries of AT&T which had a publicly traded minority interest between 1968 and 1980: 1) the commission computed the allowable rate of return using the subsidiary's actual capital structure (20 cases), and 2) the commission computed the allowable rate of return using either the two-step double leverage

adjustment (2 cases), the consolidated capital structure approach (1 case), or the hypothetical capital structure approach (7 cases).

As hypothesized, rate cases using an adjusted capital structure technique resulted in lower stock returns following the signing of the rate order compared to rate cases using the independent company approach. Based on the mean adjusted returns approach, the cumulative average residuals are positive for rate cases using the subsidiary's actual capital structure and negative for rate cases using an adjusted capital structure method. Although the test statistics are not significant for firms using an adjusted method, the test statistics for t = -3 and t = +10 are statistically significant for rate cases using the subsidiary's actual capital structure. Most of the positive price reaction, however, occurs more than six trading days after the rate order is signed. These results suggest that investors may have correctly anticipated the rate relief from rate cases regardless of the method the regulatory commission used to compute the utility's allowable rate of return. Because the largest jurisdictions for Mountain States (Colorado) and New England Telephone and Telegraph (Massachusetts) use the actual capital structure method to determine the allowable rate of return, the adverse effect of using an adjusted capital structure approach may be even more severe than shown by this study.

The results of the event study using bond prices do not

support the hypothesis that the adoption of the two-step double leverage adjustment for the first time will have an adverse effect on bond prices. The cumulative average residuals, which are not statistically significant, are positive over the twenty-one day event period. Because all of the bonds issued by AT&T's subsidiaries had Aaa bond ratings throughout the study period (except Pacific Telephone and Telegraph), the bond prices for these subsidiaries may have reflected the financial strength of the AT&T system rather than the outcome of individual rate cases.

The theoretical arguments for not using the double leverage adjustments are persuasive. Given the role of the courts in the rate-making process, however, the burden remains on the utility companies to demonstrate how the double leverage adjustments violate the capital attraction standard specified by the U.S. Supreme Court. Because the terms confiscatory, unreasonable, and unjust are not precisely defined, criticism of the double leverage adjustments have generally been restricted to theoretical arguments.

APPENDIX A

APPENDIX A

SURVEY RESULTS FOR SUBSIDIARIES

Fifty-eight usable responses were received from the subsidiaries (a 20% response rate). There are twenty-nine cases in which a parent company and at least one of its subsidiaries both completed the survey. In general, the responses for the subsidiary are consistent with the responses given by the parent company. (See Table 44)

TABLE 44

A COMPARISON OF PARENT COMPANY AND SUBSIDIARY RESPONSES

Question	Same Answer	Different Answer	Total	% Same
Q-2	22	7	29	76%
Q-3	15	5	20	75
Q-4	18	2	20	90
Q-5	15	5	20	75

The responses for Q-3 are treated as being the same if the parent and the subsidiary both indicated that the subsidiary's capital structure was relevant (or irrelevant). The responses for Q-4 are treated as being the same if the parent and the subsidiary both indicated that the consolidated capital structure was relevant (or irrelevant).

The survey results for the subsidiaries, which are

similar to the results for the parent companies, are reported in Table 45. A list of definitions that was enclosed with the survey is also included in this appendix.

TABLE 45

SURVEY RESULTS: SUBSIDIARY SAMPLE

Q-1. Which of the following evaluation techniques does your company use to analyze capital budgeting proposals? (please circle each method your company uses) (a)

		Responses	Percent
1)	Payback period	37	64%
2)	Accounting Rate of Return	17	29
3)	Net Present Value	43	74
4)	Internal Rate of Return	45	78
5)	Profitability Index	5	9
6)	Other	6	10

(a) Percentages do not add to 100% because some respondents use more than one technique.

Q-2. Does your company identify minimum acceptable rates of return (or hurdle rates) to evaluate capital budgeting proposals? (circle number)

		Responses	Percent
1)	Yes	45	78%
2)	No	13	22
	TOTAL	58	100%

Q-3. How does your company compute the hurdle rate for a particular subsidiary? (please circle each method your company frequently uses) (a)

		Responses	Percent
1)	Weighted Average Cost of Capital	35	78%
2)	Subsidiary's Cost of Debt	1	2
3)	Subsidiary's Cost of Equity	3	7
4)	Subsidiary's Historical ROR	6	13
5)	Specific Source of Financing	3	7
6)	Other	3	7

(a) Percentages do not add to 100% because some respondents use more than one method. Percentages are based on the 45 firms which use hurdle rates.

Table 45 (cont'd.).

Q-4. Please complete the following statement. The hurdle rate used to evaluate a project proposed by a particular subsidiary is based on the (circle number)

	Responses	Percent
1) book values for debt, preferred stock, and common equity reported on the subsidiary's individual balance sheet.	5	11%
2) market values for the subsidiary's debt, and preferred stock, and the book value for the subsidiary's common equity.	2	4
3) subsidiary's capital structure using some other weighting technique.	3	7
4) is not based on the subsidiary's capital structure.	35	78
TOTAL	45	100%

Q-5. Please complete the following statement. The hurdle rate used to evaluate a project proposed by a particular subsidiary is based on the (circle number)

	Responses	Percent
1) book values for debt, preferred stock, and common equity reported on the firm's consolidated balance sheet.	15	33%
2) market values for debt, preferred stock, and common equity reported on the firm's consolidated balance sheet.	12	27
3) the firm's consolidated capital structure using some other weighting technique.	4	9
4) is not based on the firm's consolidated capital structure	14	31
TOTAL	45	100%

Table 45 (cont'd.).

Q-6. Is the method the parent company uses to finance its acquisition of a particular subsidiary relevant for evaluating capital budgeting projects proposed by that subsidiary? (For example, if the parent company issues debt, is the issuance of debt by the parent company relevant for evaluating capital budgeting projects proposed by that subsidiary?) (circle number)

	Responses	Percent
1) Yes	3	5%
2) No	55	95
TOTAL	58	100%

Q-7. Is the parent company's capital structure and cost of funds relevant for evaluating capital budgeting projects at the subsidiary level? (circle number)

	Responses	Percent
1) Yes	31	53%
2) No	27	47
TOTAL	58	100.%

Of the 13 respondents who answered 'No' to Q-2, 7 answered 'No' to Q-7, and 6 answered 'Yes'.

Q-8. Risk adjustment procedures and the consolidated weighted average cost of capital: Subsidiary Sample

	Responses	Percent
1) Risk-adjust the consolidated weighted average cost of capital	8	26%
2) Risk is determined subjectively	9	29
3) No adjustment is made for risk	3	10
4) No response available from the letter follow-up	11	35
Total	31	100%

Definitions

Parent Company - a company which operates and controls other separately chartered businesses (subsidiaries) through equity ownership.

Subsidiary - a chartered business whose common stock is owned, in whole or in part, by another company. The level of ownership is generally greater than 50%.

Consolidated Financial Statements - accounting statements which show the financial position and income for the parent company and each of its consolidated subsidiaries as if they were a single economic entity.

Consolidated Capital Structure - the permanent financing for the parent company and each of its consolidated subsidiaries as shown on the firm's consolidated financial statements. The consolidated capital structure is composed of the parent company's long-term debt, preferred stock, and common equity, and each consolidated subsidiary's long-term debt and preferred stock.

Subsidiary's Capital Structure - the permanent financing for a particular subsidiary, which is composed of the subsidiary's long-term debt, preferred stock and common equity.

Weighted Average Cost of Capital - the return that the firm must earn on proposed capital budgeting projects of average risk in order to increase shareholder's wealth. As an example calculation, the weighted average cost of capital for an independent company might be 12.5% as shown below:

	Weight in Capital Structure	Required Return	Weight * Required Return
Long-term Debt	.5	10%	5.0%
Common Equity	.5	15	7.5
Total	1.0		12.5%

Hurdle Rate - the minimum acceptable rate of return used to evaluate a proposed capital budgeting project.

APPENDIX B

APPENDIX B

ABNORMAL RETURNS

The abnormal returns for the actual and adjusted capital structure methods estimated using the Market Adjusted Returns technique are shown in Tables 46 and 47. The results are shown graphically in Figure 3.

The abnormal returns for the OLS Market Model technique are shown in Tables 48 and 49. The results are shown graphically in Figure 4.

The results for these alternative methodologies are similar to the results obtained using the Mean Adjusted Returns approach. The cumulative average residuals are higher for the sample using the actual capital structure method than for the sample using an adjusted capital structure method. Although the cumulative average residuals computed using the market adjusted returns approach are less than zero for rate cases using the actual capital structure, the cumulative average residuals computed using the OLS market model are positive.

TABLE 46

ABNORMAL RETURNS FOR RATE CASES
USING THE ACTUAL CAPITAL STRUCTURE METHOD
(MARKET ADJUSTED RETURNS)

Day	AAR	Test Statistic	CAAR
- 30	- .0024	- .696	- .0024
- 25	- .0003	- .033	- .0049
- 20	.0018	.724	- .0053
- 15	.0044	1.284	.0004
- 10	.0012	.425	- .0064
- 9	.0010	.395	- .0054
- 8	.0015	.626	- .0039
- 7	- .0008	- .061	- .0047
- 6	.0036	1.831*	- .0011
- 5	- .0001	- .157	- .0012
- 4	- .0028	- 1.321	- .0040
- 3	.0035	1.324	- .0005
- 2	- .0006	- .346	- .0011
- 1	.0022	.703	.0011
0	.0029	1.339	.0040
1	.0005	.101	.0045
2	.0019	.739	.0064
3	.0003	.153	.0067
4	- .0019	- .618	.0048
5	- .0066	- 2.473**	- .0018
6	- .0029	- 1.448	- .0047
7	- .0053	- 2.050**	- .0100
8	- .0018	- .344	- .0118
9	- .0005	- .112	- .0123
10	.0007	.348	- .0116
15	- .0014	- .632	- .0081
20	.0030	.871	.0017
25	.0020	1.026	.0004
30	.0007	.258	- .0026

* Significant at the 0.10 level
** Significant at the 0.05 level

TABLE 47

ABNORMAL RETURNS FOR RATE CASES
USING AN ADJUSTED CAPITAL STRUCTURE METHOD
(MARKET ADJUSTED RETURNS)

Day	AAR	Test Statistic	CAAR
- 30	- .0014	- .606	- .0014
- 25	- .0013	- .298	- .0051
- 20	- .0001	.155	- .0070
- 15	- .0033	- 1.153	- .0040
- 10	- .0080	- 1.966**	- .0069
- 9	- .0041	- .980	- .0110
- 8	- .0026	- .515	- .0136
- 7	- .0020	- .700	- .0156
- 6	- .0024	- .551	- .0180
- 5	- .0020	- .506	- .0200
- 4	- .0032	- .945	- .0232
- 3	- .0005	.134	- .0237
- 2	.0054	1.670*	- .0183
- 1	- .0010	- .264	- .0193
0	.0006	.179	- .0187
1	- .0040	- 1.193	- .0227
2	- .0012	.175	- .0239
3	- .0043	- 1.342	- .0282
4	- .0002	.087	- .0284
5	- .0010	- .212	- .0294
6	- .0005	.325	- .0299
7	.0036	1.336	- .0263
8	.0073	1.662*	- .0190
9	.0043	.989	- .0147
10	- .0006	- .220	- .0153
15	- .0024	- .587	- .0205
20	.0013	.292	- .0203
25	- .0032	- .885	- .0416
30	.0021	.303	- .0378

* Significant at the 0.10 level
** Significant at the 0.05 level

FIGURE 3

ACTUAL VS ADJUSTED

MARKET ADJUSTED RETURNS

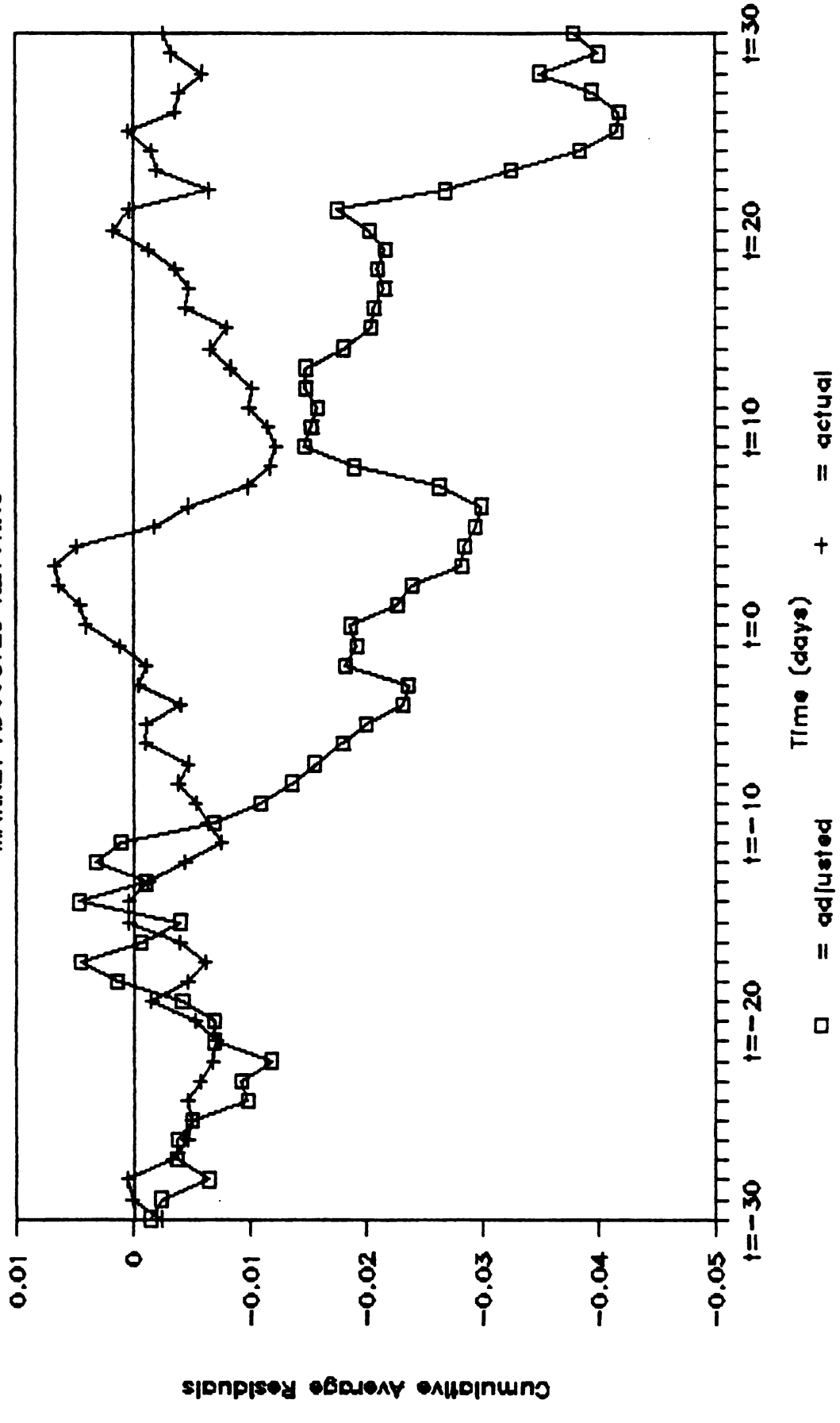


FIGURE 3

ACTUAL VS ADJUSTED

MARKET ADJUSTED RETURNS

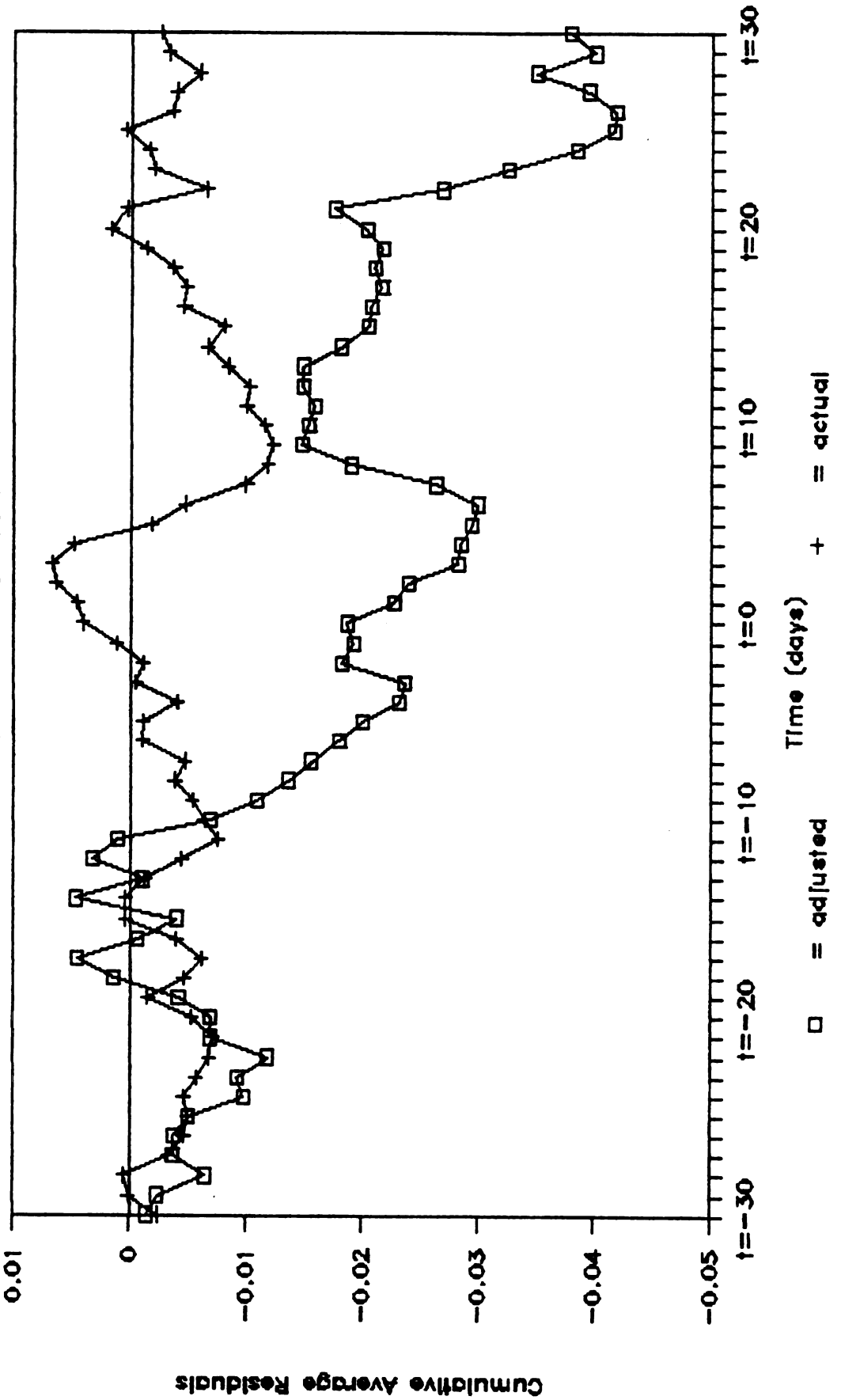


TABLE 48

ABNORMAL RETURNS FOR RATE CASES
USING THE ACTUAL CAPITAL STRUCTURE METHOD
(OLS MARKET MODEL)

Day	AAR	Test Statistic	CAAR
- 30	- .0031	- 1.192	- .0031
- 25	- .0000	- .061	- .0018
- 20	.0010	.299	- .0022
- 15	.0047	1.260	.0054
- 10	- .0004	- .065	.0017
- 9	- .0010	- .472	.0007
- 8	.0026	1.005	.0033
- 7	.0001	.232	.0034
- 6	.0033	1.872*	.0067
- 5	.0004	- .158	.0071
- 4	- .0001	- .129	.0070
- 3	.0045	2.088**	.0115
- 2	- .0008	- .369	.0107
- 1	.0006	- .060	.0113
0	.0027	1.812*	.0140
1	- .0002	- .096	.0138
2	.0012	.185	.0150
3	- .0008	- .214	.0142
4	- .0019	- .576	.0123
5	- .0049	- 1.823*	.0074
6	.0001	- .578	.0075
7	- .0038	- 1.594	.0037
8	.0016	1.211	.0053
9	.0019	.637	.0072
10	.0028	1.461	.0100
15	- .0007	- .287	.0173
20	.0026	.623	.0260
25	.0014	.583	.0265
30	.0004	.277	.0281

* Significant at the 0.10 level.
** Significant at the 0.05 level.

TABLE 49

ABNORMAL RETURNS FOR RATE CASES
USING AN ADJUSTED CAPITAL STRUCTURE METHOD
(OLS MARKET MODEL)

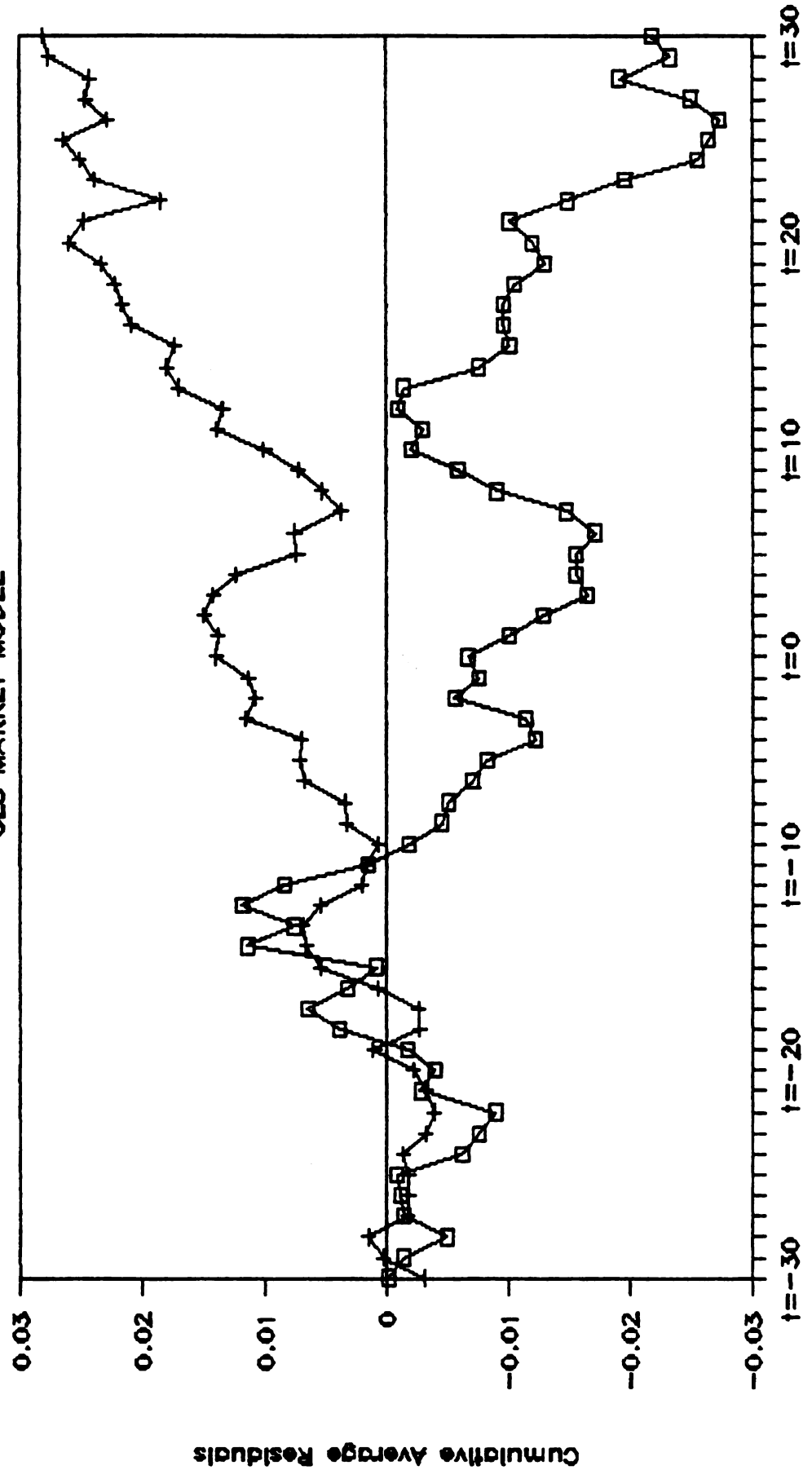
Day	AAR	Test Statistic	CAAR
- 30	- .0001	- .385	- .0001
- 25	.0003	.205	.0009
- 20	- .0012	- .218	- .0039
- 15	- .0023	- .899	.0009
- 10	- .0068	- 1.436	.0015
- 9	- .0034	- .733	- .0019
- 8	- .0027	- .598	- .0046
- 7	- .0005	- .228	- .0051
- 6	- .0019	- .340	- .0070
- 5	- .0012	- .415	- .0082
- 4	- .0040	- 1.155	- .0122
- 3	.0008	.551	- .0114
- 2	.0058	1.780*	- .0056
- 1	- .0019	- .578	- .0075
0	.0008	- .282	- .0067
1	- .0033	- 1.068	- .0100
2	- .0028	- .348	- .0128
3	- .0036	- 1.174	- .0164
4	.0009	.589	- .0155
5	- .0000	.190	- .0155
6	- .0016	.063	- .0171
7	.0024	1.205	- .0147
8	.0056	1.346	- .0091
9	.0032	.631	- .0059
10	.0039	1.157	- .0020
15	- .0025	- .606	- .0101
20	.0010	.375	- .0119
25	- .0009	- .201	- .0264
30	.0014	.555	- .021

* Significant at the .10 level.

FIGURE 4

ACTUAL VS ADJUSTED

OLS MARKET MODEL



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