



CIRF

**Converging Industries Research
Foundation**

Practical Solutions for Communications Policy

**Regulatory Wild Cards: Unforeseen Impacts
on Investment Decisions in Regulated
Companies**

July 15, 1996

*Presentation at the July 1996 NARUC Meeting,
Los Angeles, CA*

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Telecommunications Industries Analysis Project:

Regulatory Wild Cards:

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Carol Weinhaus, Paul Vasington, Sanford Berg, et al.
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The Telecommunications Industries Analysis Project is associated with the Public Utility Research Center at the University of Florida College of Business Administration.

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Graphics were produced by Erika Jobson, Cedar Designs.

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Project Information

1996 Participants in the Telecommunications Industries Analysis Project

State Regulators	NARUC representatives from: Florida Public Service Commission Illinois Commerce Commission Iowa Utilities Board Massachusetts Department of Public New York Public Service Commission Washington Utilities and Transportation Commission
Regional Holding Companies	Bell Atlantic BellSouth NYNEX SBC Communications US WEST
Independents	GTE Kalona Cooperative Telephone Sprint Local Telecom Division
Interexchange Carriers	AT&T Sprint
Cellular and Wireless Carriers	360E Communications
Foreign Domestic	InfoCom Research NTT America
International Government Representatives	France
Local, National, and International Services	BT France Telecom North America
Materials Manufacturers	Corning
Academic	University of Florida

Sponsors:

Corporation for Public Broadcasting

Assisting with *public* data:

Bellcore
Federal Communications Commission
National Exchange Carrier Association
National Telecommunications and Information Administration

Project Information, cont.

Background on the Telecommunications Industries Analysis Project

The goal of the Telecommunications Industries Analysis Project is to provide information to support the development of alternative communications policies to meet the needs of stakeholders in an environment that includes competitive and non-competitive markets, federal and state regulatory jurisdictions, and a proliferation of new services made possible by technological advances. The purpose of the project is to produce research and analysis which will assist policy makers in making informed decisions.

The project is a neutral forum of communications industry stakeholders exploring multiple viewpoints of selected issues. This forum incorporates the following elements:

- **Broad representation:** The current forum includes foreign and domestic local exchange carriers (LECs), interexchange carriers (IXCs), materials and equipment manufacturers, and federal and state regulators. The project actively seeks expansion of this forum to include other communications industry representatives such as competitive access providers, cable television companies, computer companies, electric power utilities, or publishers.
- **Multiple viewpoints:** Participants are required to play an active role in the research and analysis, to represent their own interests, to understand and to assist in developing others' perspectives, and to work toward the common goal of representing multiple views. Since papers reflect multiple viewpoints and ideas, authors and reviewers may not agree with particular views or approaches expressed in the papers. The objective is to lay out ideas and options to assist policy makers in their decisions.
- **Analysis and results of alternative policies:** Research tools, including a jointly produced data base and computer software models, and data analysis developed by this forum create a common language for examining issues. The common language allows the participants to focus on underlying issues. Appropriate computer software tools, including modifications to existing tools, are developed.
- **All data, analysis methods, and results are public:** Data used by this project must be publicly available on a nationwide basis. Research products become public domain information.
- **Neutral setting:** The project resides in a neutral setting, free of partiality, thereby ensuring objective and independent research.

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List of Acronyms

List of Acronyms

FCC	Federal Communications Commission
ILEC	Incumbent Local Exchange Carrier
LEC	Local Exchange Carrier
NTIA	National Telecommunications and Information Administration

I. Introduction

Introduction

The objective of this paper is to show how different approaches to financial decision-making for regulated and nonregulated companies affect the companies' incentives to invest in new technologies. Just as in a card game where a wild card introduces an unforeseen or unpredictable outcome, some regulatory tools may introduce an unforeseen or unpredictable impact on investment decisions.

The identification of an impact on investment decisions does not provide sufficient justification for deregulation or elimination of regulatory tools. In carrying out their useful and necessary functions, however, regulators and policy makers should be aware of the impact their rules may have on the investment decisions of regulated companies.

Some of these impacts may be unavoidable consequences of pursuing traditional and necessary regulatory goals. In this case, the impacts on investment decisions must be accepted. However, this acceptance should come only after alternative regulatory tools that have less of an impact on companies' investment decisions have been considered.

The *Telecommunications Act of 1996* gives the Federal Communications Commission (FCC) and state regulatory commissions authority to consider certain policies and regulatory methods in order to encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans.¹ Furthermore, prior to deploying a specific technology, a company needs to determine whether the deployment is financially attractive compared to other investment opportunities.

Because the Act encourages investment in an advanced infrastructure, investment incentives may now play a role in the regulatory forum. In addition to promoting traditional policy goals, such as just and reasonable rates, universal service, and service quality, regulators may be asked to consider how regulation affects investment decisions and technology deployment. These issues are important not only in the context of bringing new technologies to schools and libraries; these issues are also important to the economic development of the community, state, and nation. However, there are approaches that may encourage new investments without using regulatory tools that have been developed for other purposes. This paper shows three points:

- Regulation can increase the level of uncertainty associated with investment, without providing a corresponding increase in potential returns.
- Regulatory tools developed for other purposes may affect investment decisions.
- There are existing approaches available to regulators that may encourage market-based

¹*Telecommunications Act of 1996*, Pub. L. No. 104-104, February 8, 1996. For more details, see U.S. Congress, House of Representatives, 104th Congress, 2d Session, Report 104-458, *Telecommunications Act of 1996, Conference Report to Accompany S. 652* [hereinafter referred to as *Conference Report to Accompany S. 652*].

I. Introduction, cont.

investment in the transition from monopoly to competitive markets.

This paper also illustrates differences in investment decisions of regulated and competitive companies. This illustration may be helpful to the FCC and to state utility commissions in implementing their new authority to consider regulatory changes to remove barriers to telecommunications infrastructure investment.

Telecommunications industry regulation is currently in transition from regulated monopoly to competitive markets. New problems arise in the transition period when an industry moves from being fully-regulated to being deregulated. In order to remove barriers to telecommunications infrastructure investment, policy makers must understand financial decision-making for regulated and nonregulated companies during this transition period.

The sections in this paper cover the following items:

- **Section II, Transition to Competitive Market:** Describes the starting and ending points for the transition from a regulated monopoly to a competitive market.
- **Section III, Legislative Authority for Promoting Investment:** Provides background on legislative authority for promoting investment in new technology.
- **Section IV, What are the Financial Variables?:** Compares financial variables for competitive and regulated markets.
- **Section V, How are Investment Decisions Made in Competitive Markets?:** Describes the investment decision process (including risk management) in competitive markets and explains the sample model used in the paper.
- **Section VI, How are Investment Decisions Made in Regulated Markets?:** Describes the investment decision process in regulated markets.
- **Section VII, Regulated Investment Decision Factors:** Uses the sample investment to model the potential impact of three regulatory tools on investment decisions.
- **Section VIII, What Tools Reduce the Impact of Regulation on Investment Decisions?:** Discusses tools that reduce the impact of regulation on investment decisions.
- **Section IX, Summary:** Summarizes the results of modeling based on the sample investment and the regulatory tools discussed in earlier sections.
- **Section X, Appendix A: Telecommunications Act of 1996, Section 706:** Provides the text of Section 706 and the comments on this section from the accompanying Congressional report.
- **Section XI, Appendix B: Definition for Cost of Capital:** Defines cost of capital.
- **Section XII, Appendix C: Derivation of Present Value:** Provides a formula for the derivation of present value and includes the calculations for the sample investment used to model the impact of the regulatory tools.
- **Section XIII, Appendix D: Calculations for Modeling Investments:** Provides calculations for the impact of the regulatory tools on the sample calculation.

II. Transition to Competitive Market

Transition to Competitive Market

The transition to a competitive market begins with the local exchange telecommunications monopoly, and ends with an effectively competitive local exchange market. This section compares the starting point and the ending point.

Starting Point: Regulated Monopoly

The use of the term Aregulated monopoly≡ here refers to the Incumbent Local Exchange Carriers (ILECs). Other carriers, such as non-dominant and wireless, are regulated to some extent in the U.S., but not to the same degree as ILECs, whose rates and earnings generally are controlled by rate-base, rate-of-return regulation, or price caps. In the telecommunications industry, only ILECs are currently subject to traditional utility regulation.

At the starting point for the local exchange transition, full regulation protects ILECs from new market entrants, facilitates vertical integration, and reflects a "bottom up" approach to pricing (and thus cost-recovery). Costs are added up to determine the appropriate price for a standardized service. Cost allocations across services (*i.e.*, local/long distance, high density/low density, basic/enhanced), customer-types (residential/business, wholesale/retail), and geographic areas (urban/ rural) often determine prices. Unlike competitive markets, where prices reflect incremental costs, fully regulated markets set prices that incorporate additional factors, such as subsidies and social incentives.

Ending Point: Competitive Market

Market-driven competition minimizes the need for government intervention. There is no regulation of prices or allocation of operating and capital costs. In this case, explicit tax and transfer mechanisms are used to promote other social objectives (including income distributional goals and universal service) that might not be achieved via the competitive marketplace.

Investment Process Comparison

Figure 1 compares the investment process for regulated and competitive companies. The column on the left shows the five steps used by competitive companies in evaluating whether or not to roll out a new product. In order to decide whether to dedicate resources and capital for a new product, the company first dreams up a new product, then it figures out whether it can make one. The third and fourth steps are to produce the product or service and to determine through market research and trials whether it is financially beneficial to offer the product. The last step is production and roll-out of the product.

II. Transition to Competitive Market, cont.

Figure 1: Comparison of Steps for Product/Service Development: Competitive Company and Traditional Regulated Telephone Company

	Competitive Company:	Traditional Regulated Telephone Company:	
<i>Approach to Overheads:</i>			
	Overhead assignment is an internal company decision. Generally, some overheads are assigned in Steps 3 and 4; full overheads are assigned in Step 5. These assignments are always subject to revision due to changes in competitive conditions.	Full overheads are assigned from Step 1 onward	

<i>Steps:</i>	<i>Competitive Company:</i>	<i>Traditional Regulated Telephone Company:</i>	<i>Steps:</i>
		Determine whether service/product is regulated or non-regulated. (If non-regulated, set up as separate subsidiary that follows competitive steps).	Step 1
Step 1	Dream up service/product.		Step 2
Step 2	Design and produce one that works.		Step 3
Step 3	Ability to produce many within financial constraints.		Step 4
		Obtain regulatory approval: tariffs, waivers, etc.	Step 5
Step 4	Market trial.		Step 6
		Obtain regulatory approval: Tariffs, waivers, etc.	Step 7
Step 5	Product roll out.		Step 8

II. Transition to Competitive Market, cont.

The column on the right shows that the investment process for regulated companies requires certain steps in addition to the five described above for competitive companies. Regulated companies also must comply with cost allocation, service classification, and tariffing requirements imposed by state and federal regulators. In addition, regulation introduces a degree of uncertainty about the outcomes in these additional steps that are required in the regulated investment process. This degree of uncertainty also adds to the uncertainties of the marketplace faced by competitive companies producing complementary or substitute services.

It should be noted that the additional steps required for regulation are based on other policy goals, such as safeguards against the abuse of monopoly power. However, these regulatory tools have an impact on the investment decisions even though they arose for other purposes.

III. Legislative Authority for Promoting Investment

Legislative Authority for Promoting Investment

The *Telecommunications Act of 1996* encourages the deployment of advanced technologies through removal of barriers to infrastructure investment and through universal service subsidies. The Act states:

The Commission [FCC] and each State commission with regulatory jurisdiction over telecommunications services shall encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans...by utilizing...price cap regulation, regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment □ *Telecommunications Act of 1996, Section 706(a)*.

See **Section X, Appendix A**, for the full text of Section 706 of the Act.

Section 706 authorizes regulators and policy makers to remove regulatory barriers impeding the deployment of new technologies in order to meet the Act's objective of "ensur[ing] that advanced telecommunications capability is promptly deployed."² The Act encourages deployment of new technologies but specifically refrains from advocating any one technology over another:

ADVANCED TELECOMMUNICATIONS CAPABILITY. □

The term "advanced telecommunications capability" is defined, without regard to any transmission media or technology, as high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology - *Telecommunications Act of 1996, Section 706(c)(1)*.

Congress recognized that regulatory policies can impede deployment of telecommunications infrastructure. Congress also recognized that it could not determine what barriers would prove the most difficult to reduce or eliminate. Therefore, Congress provided federal and state regulators with the authority to ensure that regulatory practices impeding deployment of new technologies would be eliminated. During the transition to competitive markets, it is important to understand which practices, if any, most inhibit or encourage such deployment.

Regarding universal service subsidies for the deployment of advanced technologies, the Act states:

Consumers in all regions of the Nation, including low-income consumers and those in rural, insular, and high cost areas, should have access to telecommunications and

² *Conference Report to Accompany S. 652*, page 210.

III. Legislative Authority for Promoting Investment

information services, including interexchange services and advanced telecommunications and information services, that are

III. Legislative Authority for Promoting Investment, cont.

reasonably comparable to those services provided in urban areas and that are available at rates that are reasonably comparable to rates charged for similar services in urban areas X *Telecommunications Act of 1996*, Section 254(b)(3).

IV. What are the Financial Variables?

Financial Variables: Competitive Markets

Managers of a competitive company attempt to maximize the value of the company through their investment decisions. One indicator of the value of the company is the stock price, which reflects the financial markets' evaluation of expected corporate performance. Current financial statements (income statement, balance sheet, and cash flows) serve as report cards on the company's financial condition. Investment analysts evaluate such statements, contrast them with comparable companies, and make predictions regarding likely future conditions. The analysts' buy/sell recommendations influence the stock price. In addition, financial statements serve a diagnostic function for corporate decision-makers. The key feature of companies in competitive markets is that stocks and bonds are valued on the basis of earnings and earnings growth compared to the expected corporate cost of capital. For a more detailed description and definition of cost of capital, see **Section XI, Appendix B**.

Financial Variables: Regulated Markets

Regulation has historically influenced key financial variables. Managers in regulated companies maximize the value of the company under strict regulatory constraints which tend to limit managerial discretion. The result is that regulated companies are able to use greater leverage and higher dividend levels relative to cash flows than competitive industries.³

³ Reinforcing this tendency is the way cost of capital is calculated (see **Section XI, Appendix B**). When regulators set allowed returns utilizing cost of capital estimation procedures based on the dividend growth model, higher dividends promote higher allowed returns. In telecommunications, both leverage ratios and dividend yields fell after the AT&T divestiture. Leverage ratios for the Regional Bell Operating Companies fell from almost 45% prior to 1980 to under 25% after 1985, and dividend yields have dropped from over 5% to less than 2%. (A leverage ratio shows how much of a company's capital is debt and how much is equity. The ratio itself is expressed as the percentage of debt to the total capital. Higher leverage ratios imply a more debt-laden company.) Michael J. Barclay, Clifford W. Smith and Ross L. Watts, "The Determinants of Corporate Leverage and Dividend Policies," *Journal of Applied Corporate Finance*, Winter 1995, Volume 7, Number 4, p. 16.

V. How are Investment Decisions Made in Competitive Markets?

Investment Decisions: Competitive Markets

Companies seek to increase shareholder value by maximizing returns from the company's investments in different risk categories. Whether a company seeks to determine the best mix from a pool of investment options or to determine the merits of a particular investment, the same analytic tool typically is used — present value. Normally an investment is judged according to whether the revenues exceed the costs associated with that investment, i.e., whether there is a positive net benefit. However, when the costs and revenues occur over a period of time, the net benefit must be calculated based on the "present value" of future cash flows.

In order to determine the present value of future financial outcomes, those future outcomes must be discounted. Discounting is necessary because, all else equal, receiving the same amount of money today is preferable to receiving it at any point in the future. For example, if someone offers you the choice of receiving a dollar today or a dollar one year from now, you will choose to receive the dollar today since, among other things, you can deposit that dollar in a bank to receive interest. Therefore, the present value of receiving a dollar one year from now is somewhat less than a dollar — it must be discounted. Similarly, in making investment decisions where the costs and revenues (i.e., cash flow) occur over a period of time, the cash flow in future years must be discounted to determine the present value of the investment. See **Section XII, Appendix C**, for the derivation of present value.

Sample Investment

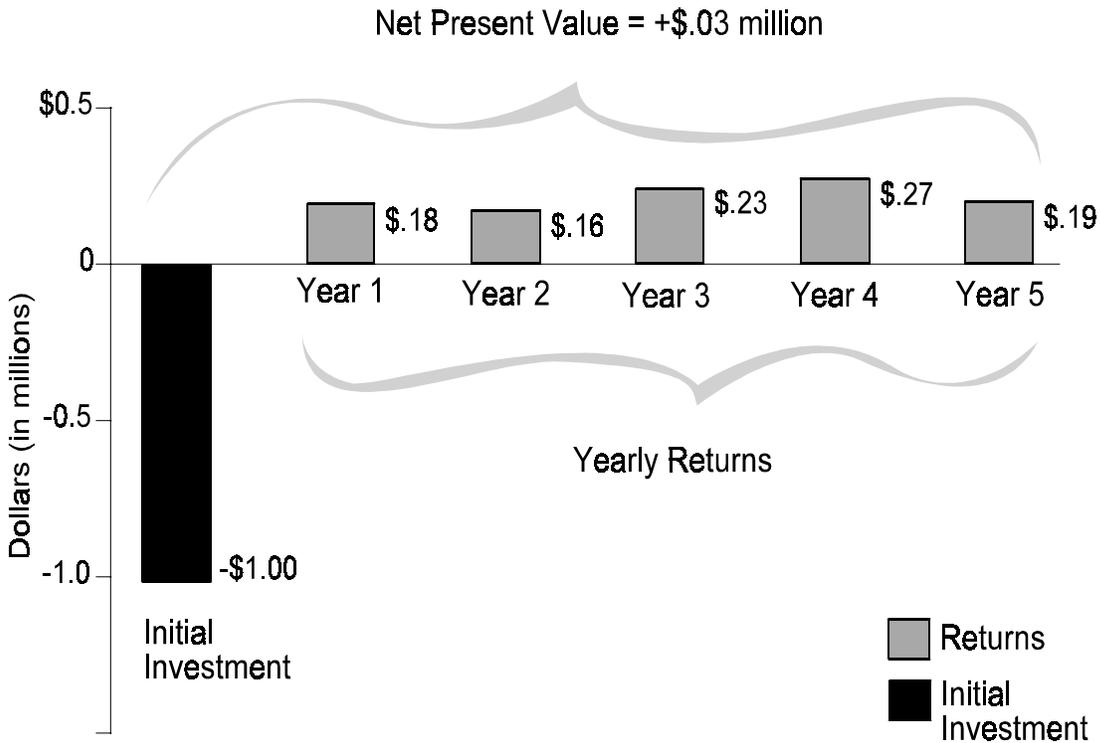
Figure 2 shows how present value analysis is used to judge the feasibility of a sample investment (explained in more detail in **Section XII, Appendix C**). The objective is to ensure that the sum of the company's returns is enough to recover its initial investment. The first column under the heading "Initial Investment" represents the initial capital investment made in order to provide the service. The other five columns show the present value of the expected returns for each of the five years in the assumed planning horizon. The sample also assumes a 10% discount rate. The net present value of the investment is the sum of the present value of the expected returns, minus the initial investment.

Accounting rules influencing depreciation and taxes also have a significant impact on cash flows. For simplicity, the example shown in **Figure 2** ignores the impact of these issues. This paper will not incorporate all the complexities of financial decision-making. It is enough to recognize some fundamental differences between financial decision-making in regulated and in competitive environments. These fundamental differences are illustrated in **Section VII**.

V. How are Investment Decisions Made in Competitive Markets?

V. How are Investment Decisions Made in Competitive Markets?, cont.

Figure 2: Present Value of Investment over 5 Years: Sample Investment



Note: The initial investment is an outflow of capital to provide a service and therefore has a negative present value.

Assumptions: 5-year planning horizon and 10% discount rate.

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V. How are Investment Decisions Made in Competitive Markets?, cont.

Risk Management

Shareholders of competitive companies bear the full consequences of investments, both good and bad. Above-normal returns from good investments are possible until competitors are able to enter the profitable markets or to offer substitute services. On the other hand, investments that turn out to be unprofitable (due to poor forecasting and decision-making or bad luck) reduce the value of companies.

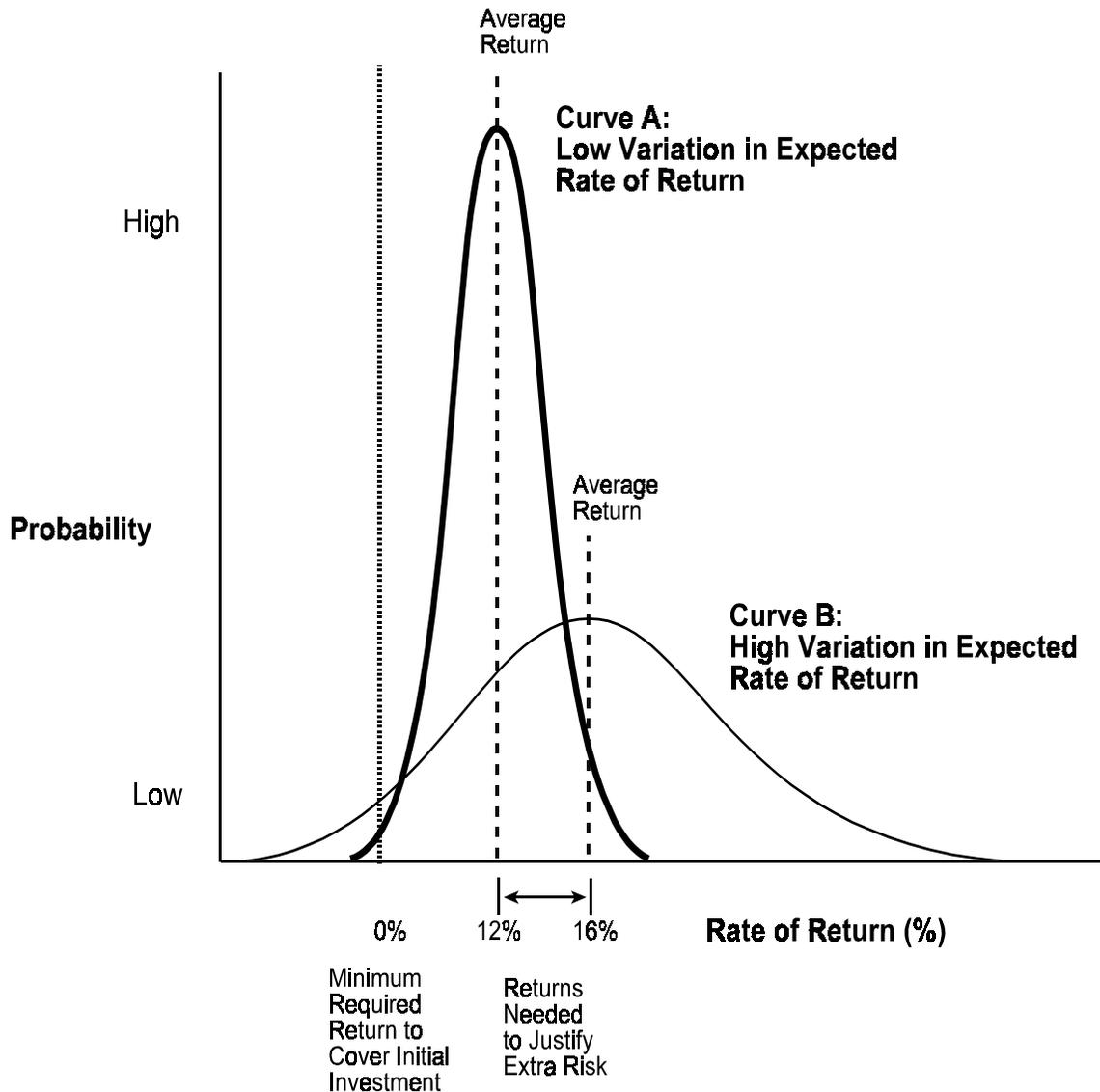
Figure 3 compares two investment scenarios: one with relatively high risk, and one with relatively low risk. The investor's risk is represented here in two ways: (1) the chance that the returns from the investment will not be sufficient to cover the initial investment (*i.e.*, a negative rate of return); and (2) the chance that the actual results will be significantly different from the predicted results.

The shape of **Curve A** in **Figure 3** shows an investment with relatively low variation in the expected returns and a lower probability of not covering the initial investment (low risk). The shape of **Curve B** in **Figure 3** shows an investment with relatively high variation in the expected returns and a higher probability of not covering the initial investment (high risk). The variation in expected return differs between the two projects.

The shapes of the curves signify that the project represented in **Curve B** has a greater chance that the investment will lose money and also that the actual return will differ significantly from the average return. Therefore, the investment shown in **Curve B** must have a higher average return in order for the investor to take on the additional variation in return and the additional chance of losing money on the project. The difference in average returns necessary to make the **Curve B** investment as attractive as the **Curve A** investment is indicated in **Figure 3** by the label, Δ Returns Needed to Justify Extra Risk. \cong

V. How are Investment Decisions Made in Competitive Markets?, cont.

Figure 3: Comparison of Low-Risk and High-Risk Investment Scenarios



At zero percent return, the company recovers its initial investment but earns no return on the investment.

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VI. How are Investment Decisions Made in Regulated Markets?

Investment Decisions: Regulated Markets

In regulated markets as in competitive markets, companies seek to increase shareholder value by maximizing returns, within the range of their authorized rates of return. However, the present value of an investment by a regulated company can be affected by the decisions of the regulator, as well as by market demand and other financial variables that nonregulated companies must take into account. For regulated companies, the decision whether to make a particular investment is driven to some extent by the rules of regulation, rather than by the fundamental economic conditions affecting the financial outcomes.

In addition, regulated companies do not face the same risk management variables faced by competitive companies. To the extent that the additional rewards from good investments exceed the company's authorized cost of capital, the regulator will seek to capture those excess rewards for ratepayers by lowering prices. On the other hand, the "cost plus" nature of regulation often allows the company to recover expenses and investments associated with bad investments. However, the regulated company cannot count on this downside protection because bad investments are subject to regulatory disallowances, which preclude recovery through higher prices. As a consequence, uncertain or highly variable investments pose difficulties for the regulated company. Investments with highly variable returns, regardless of the potential profit, may be discouraged by regulation. Savings from successful innovation are likely to be passed on to customers, while the costs of unsuccessful initiatives are borne by the company's investors.

Regulatory findings about pricing, cost allocation, and service deployment can have a significant impact on the expected present value of an investment. These three factors are not the only regulatory factors that influence investment decisions, but they are significant. The following section describes how these three regulatory factors impact the investment decisions of regulated companies.

VII. Regulated Investment Decision Factors

Regulated Investment Decision Factors

This section describes some potential impacts on investment decisions of three regulatory tools used for oversight of fully regulated companies:

- Pricing
- Cost Allocation
- Service Deployment

These regulatory tools can change the returns for investments. Changing returns in turn will affect the expected present value of the investment.

The following sections will use the sample investment shown in **Figure 2** as a model for demonstrating how regulation can impact the financial decision making variables and process.

Impact of Pricing Decision on Sample Investment

Regulation influences industry behavior via pricing procedures. Regulatory control of pricing can change the variables in a present value analysis. **Figure 4** shows the impact of lowering prices on the sample investment for new services in **Figure 2**. In **Figure 4**, all of the assumptions are the same, except the illustration assumes that regulation has lowered prices by twenty percent. The lower prices reduce the expected revenues, and, consequently, the expected returns.⁴ If the returns are reduced significantly, the company may not recover the initial investment, and the investment may result in a negative present value.

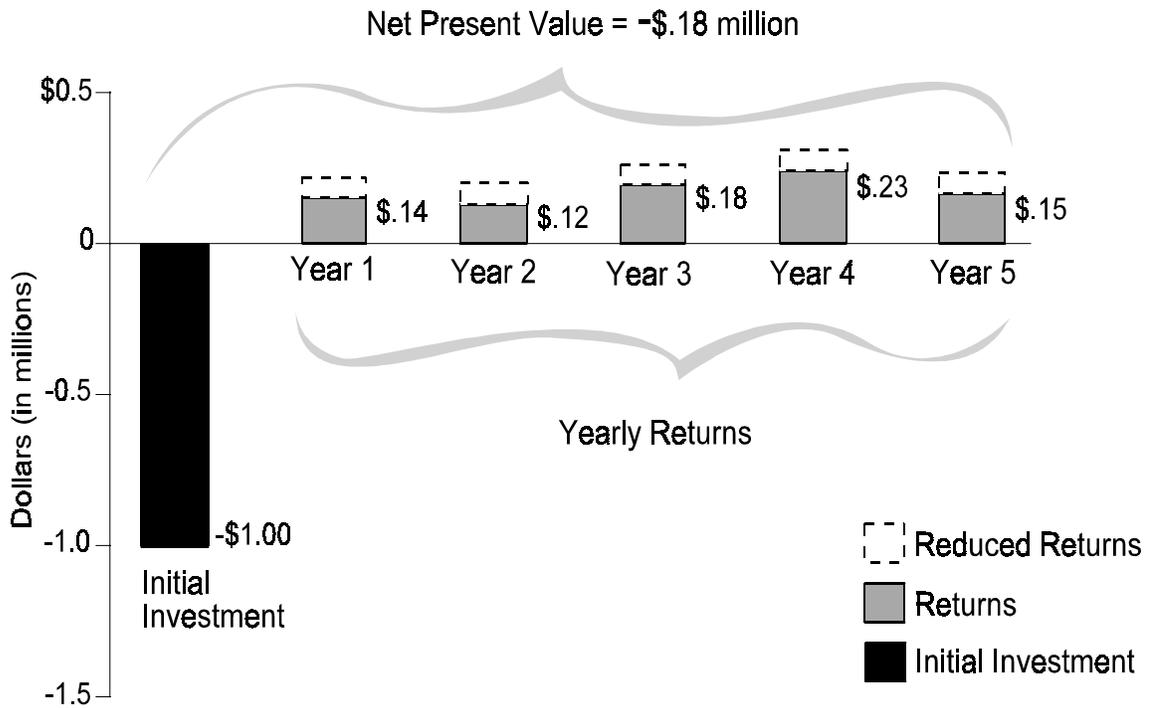
For a company to accept an investment with highly variable returns, the investment must have considerable upside potential returns. In competitive markets, this high potential return is the reward that a company receives for accepting the risk of the investment.

Regulated companies, however, face an additional uncertainty in justifying the investment. In the case where the investment proves to be more profitable than expected, a regulatory review could determine that such "excess earnings" should be returned to ratepayers in the form of lower prices. In essence, the regulated company finds it more difficult to receive a reward comparable to the risk taken.

⁴ The assumption here is that a twenty percent price reduction will translate into a ten percent reduction in revenues. We assume that revenues are not reduced by twenty percent because a price reduction is likely to increase the quantity demanded. However, increased production (to meet the higher consumption) also would increase the total variable operating costs. In this case, it is assumed that variable operating costs increase by five percent.

VII. Regulated Investment Decision Factors, cont.

Figure 4: Present Value of Investment over 5 Years: Regulated Price Reduction



Assumptions: 5-year planning horizon; 10% discount rate; 20% price reduction due to regulatory decisions; and 5% increase in total costs due to increased production (to meet greater quantity demanded).

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VII. Regulated Investment Decision Factors, cont.

In addition, the low level of certainty associated with regulatory approval of new service prices acts as a disincentive for the company to develop new services. A company may be confident that it has developed a good service at a certain price, but its analysis of the product's potential may hinge upon offering the service at that price. If the regulator or others using the regulatory process to their own advantage change the price or rate structure of the service, it may no longer be a financially viable option for the company. Even the possibility of such an outcome could slow the development of new services.

Impact of Cost Allocations on Sample Investment

Regulated industries face arbitrary cost allocation rules that were designed to protect against the subsidization of competitive services by regulated monopoly services. These rules influence allowed prices. They constrain managers who face competitors in some markets and face high allocated costs in other markets.

These procedures can have a major impact on telecommunications pricing, infrastructure investment, service quality, and other decisions with financial implications. These cost allocation procedures worked in a monopoly environment, but in a competitive market, arbitrary cost allocations can significantly distort prices and influence investment decisions.

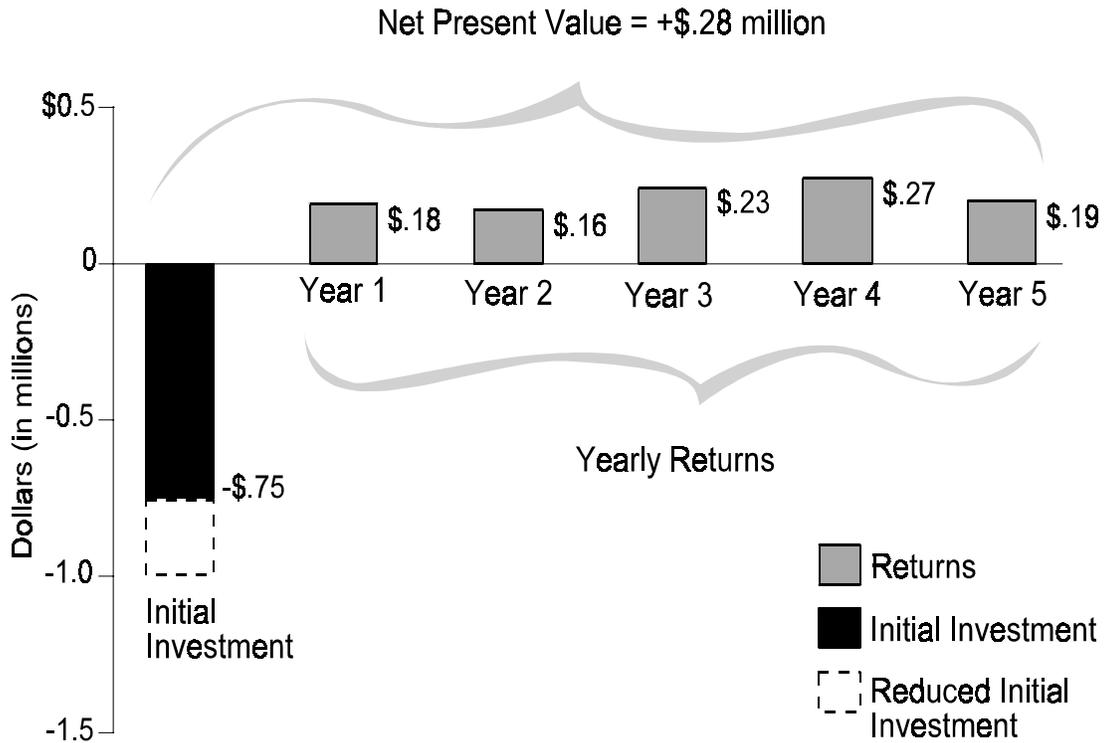
Figures 5 and 6 show the impact of cost allocations on the sample investment. Cost allocation is a method used by regulators to assign costs, such as common costs or overhead costs, among several services or products.

In **Figure 5**, the cost allocation reduces the amount of the initial investment. Here it is assumed that the amount of investment that needs to be recovered over the next five years is reduced. In this case, the investment, which originally showed a present value of \$0.03 million, now shows a larger present value of \$0.28 million. If the investment had originally shown a negative present value, such an allocation of costs away from the investment could have caused the present value analysis to result in a positive number. In that case, the company would be making an investment that it may not have considered prudent if it was not able to allocate costs associated with the investment to another jurisdiction or service.

Figure 6 shows the opposite pattern. Here cost allocation increases the amount of the initial investment. The result is that the amount of investment that needs to be recovered over the next five years is increased. In this case, a company might not make an efficient investment that should be made. In such situations, competitive suppliers not subject to regulatory cost allocation rules may be discouraged or encouraged to enter the market. These rules may distort the types of services offered to customers and the types of companies offering these services. In practice, cost allocations may or may not affect a company's investment decision, depending on whether or not allocated costs are used as the basis for pricing.

VII. Regulated Investment Decision Factors, cont.

Figure 5: Present Value of Investment over 5 Years: Cost Allocation Reduces Initial Investment

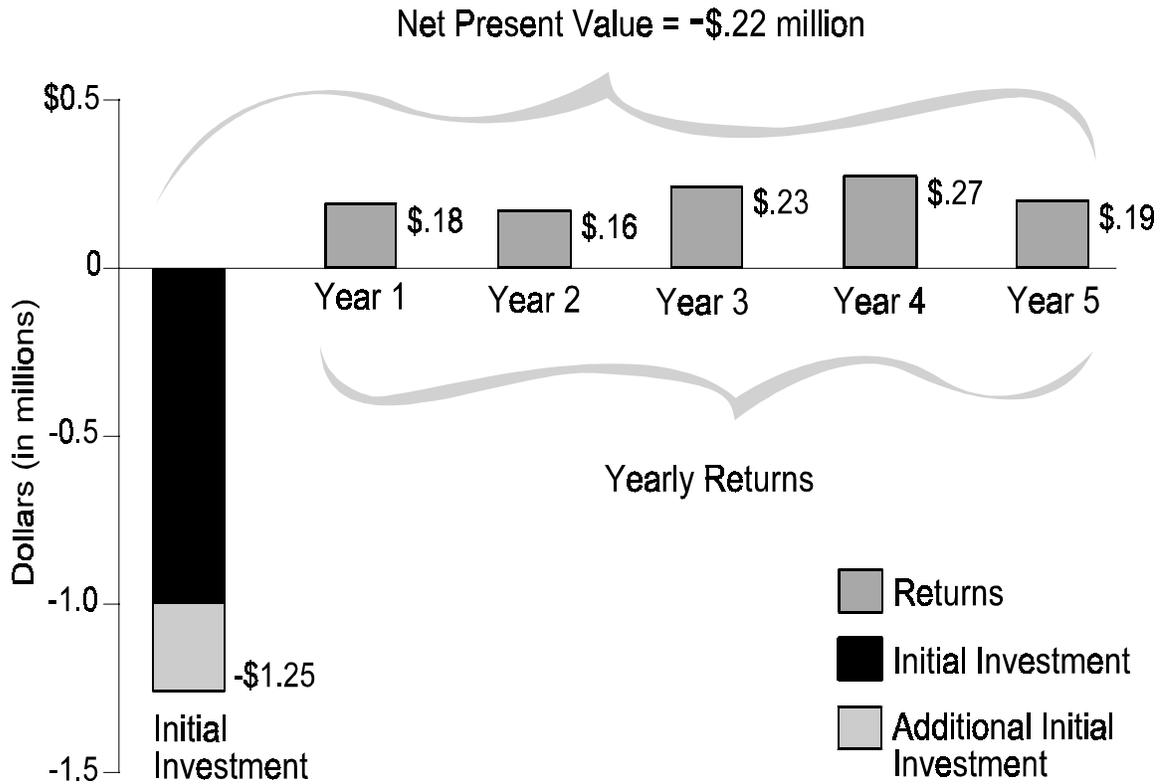


Assumption: 5-year planning horizon; 10% discount rate; and cost allocation reduces amount of initial investment by 25%.

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VII. Regulated Investment Decision Factors, cont.

Figure 6: Present Value of Investment over 5 Years: Cost Allocation Increases Initial Investment



Assumptions: 5-year planning horizon; 10% discount rate; and cost allocation increases amount of initial investment by 25%.

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VII. Regulated Investment Decision Factors, cont.

Impact of Service Deployment

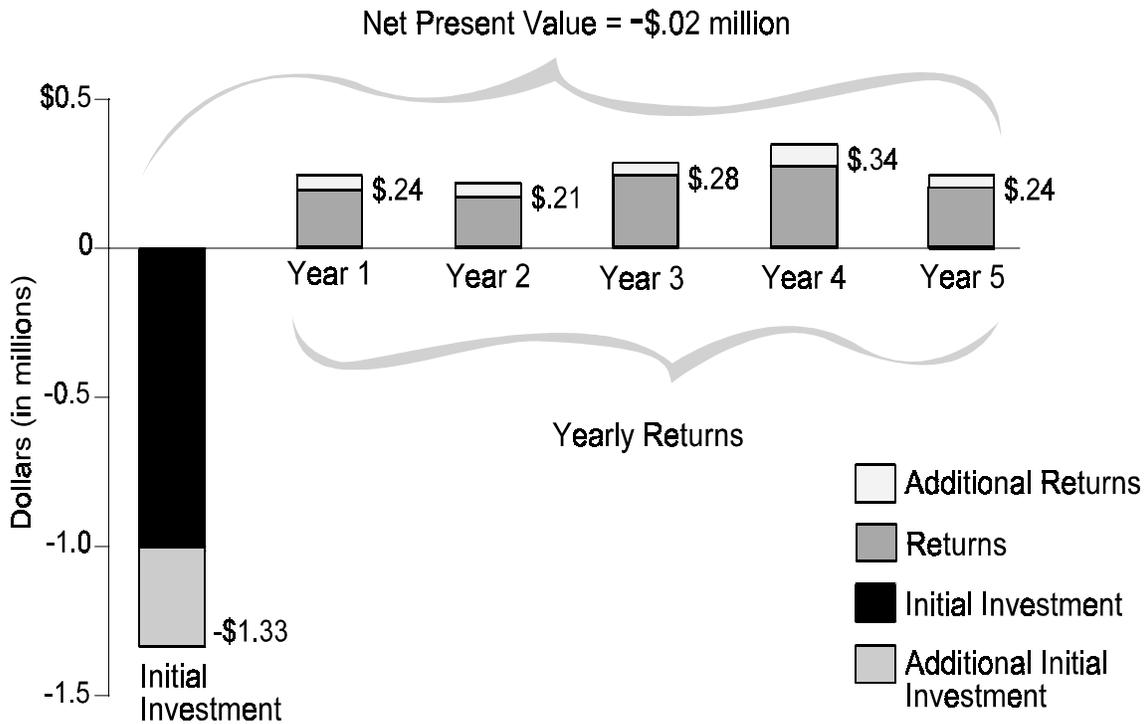
In competitive markets, the introduction of new services is driven by commercial opportunities created, in part, by new technology. The introduction of a new product or service is an inherently uncertain venture; technologies may not meet expectations, or customers may not value the product. Regulation adds a further complication to risk-taking. **Figure 7** shows the impact of mandating the deployment of a technology or service.

If regulators mandate a deployment schedule for a new service beyond that which is contemplated by the company, the present value of the investment may be reduced significantly. **Figure 2** described an investment with a positive present value. In **Figure 7**, however, using that same example as a base, the policy maker now has mandated that the new technology be deployed ubiquitously, which serves to increase the initial investment disproportionately to the increased revenues, since the company is now investing in an area where demand is not as strong. Because of the additional deployment, it is assumed in **Figure 7** that there is a one-third increase in the initial investment, a ten percent increase in variable operating costs, and a twenty percent increase in revenues. The initial investment is increased to account for the additional deployment. The operating costs and revenues are increased to account for the additional demand in the added service areas, but, because the mandated deployment is for service areas where demand is weaker, the cash flow increases are less than those associated with the initial investment.

As demonstrated in **Figure 7**, mandated deployment schedules, absent other funding, may result in an investment not being made at all. While the social investment may be one that makes a new technology or service available to everyone at once, often this is not an option. More realistically, the choice is between a good investment with a reasonable deployment schedule, or no investment at all.

VII. Regulated Investment Decision Factors, cont.

Figure 7: Present Value of Investment over 5 Years: Regulated Service Deployment



Assumptions: 5-year planning horizon; 10% discount rate; mandated deployment increases the initial investment 33%; 10% increase in variable operating costs; and 20% increase in revenues. Also assumes market or territory is increased by demand is weaker in these areas.

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VIII. What Tools Reduce the Impact of Regulation in Investment Decisions, cont.

What Tools Reduce the Impact of Regulation on Investment Decisions?

Market-based companies have developed strategies for dealing with the new product process that are difficult to execute in a regulated environment. For example, competitive companies use demand-driven approaches to introducing new products. Competition results in the lowest cost markets being served first. When a product is first introduced, suppliers and demanders gain economies of learning; companies discover ways to lower the costs of the production process. Similarly, prospective consumers learn how new products and services meet the needs of friends and neighbors, who have first purchased the product, leading to more rapid diffusion of the goods in later periods. Over time, thanks to these evolutionary processes, services become available to additional markets.

For example, initially desktop computers were used primarily in businesses. Production economies for microprocessors and memory storage devices brought down costs and prices, leading to differentiated offerings for homes and other markets.

Promoting Competition in the Local Telecommunications Market

Promoting competition is the simplest and most effective way of reducing the unintended impact of regulation on investment decisions, since there is no need for regulation once adequate competition is in place. In the absence of a natural monopoly, competitive markets promote efficient infrastructure investment because companies that do not make efficient investments will not stay in business in the long-term, and those that are successful will be rewarded commensurate with the risks that their investors accepted.

Absent the introduction of efficient competition, however, regulatory policies can be adapted in order to make the investment decisions of a regulated company more like those of a competitive company.

Price Cap Regulation

Price cap regulation helps to reduce the impact of regulation on investment decisions in several ways: first, price caps help to align risks, rewards, and penalties; and second, price regulation does not rely on cost allocations for the pricing of services.

Under a price cap, a company that makes a successful investment is rewarded with increased profits, unlike under traditional rate-of-return regulation where a firm reaps the rewards of a successful investment only until the next rate case proceeding. On the other hand, if a company under a price cap makes a poor investment, the company may not seek to increase rates to recover such costs X either revenues are sufficient to cover costs, or the company eats the losses. Therefore, companies under a price cap are rewarded or penalized in relation to the investment risk. Also, price caps generally allow companies to price services without regard to fully-distributed costs. A company under a price cap has no

VIII. What Tools Reduce the Impact of Regulation in Investment Decisions, cont.

incentive to allocate costs to other services since it cannot increase the rates of these other services to compensate for the added expenses. Profit sharing rules and other forms of incentive regulation can improve decision-making during the transition to more competitive markets.

Regulatory Forbearance

Regulatory forbearance means that regulators forbear from applying certain regulatory requirements in markets where competitive forces are sufficient to prevent the use of market power. The *Telecommunications Act of 1996*, in its section on regulatory forbearance, authorizes the FCC to forbear from applying any regulation that is not necessary (1) to ensure that rates are reasonable and nondiscriminatory; (2) to protect consumers; and (3) to protect the public interest. Examples of regulatory forbearance include the following approaches:

- Remove tariffing requirements for competitive services, thereby avoiding regulatory review of market prices.
- Remove regulatory review of new service deployment schedules.

IX. Summary

Summary

Figure 8 compares the net present value (the return on the investment) for the sample model and variations from **Figures 2, 4, 5, 6, and 7**. This figure shows that regulatory tools introduced and used for other purposes may affect investment decisions. These regulatory tools are often important for promoting public policy goals. It may be that other regulatory tools, such as forbearance or explicit subsidies for universal service, might be able to serve some of these policy goals with less of an impact on investment decisions.

The *Telecommunications Act of 1996* provides a road map for the introduction of competition in the local exchange market and encourages deployment of advanced technologies. Therefore, it is important for policy makers to understand the financial decision-making process in both regulated and nonregulated companies since these processes determine whether an investment is made.

This paper indicates the following points:

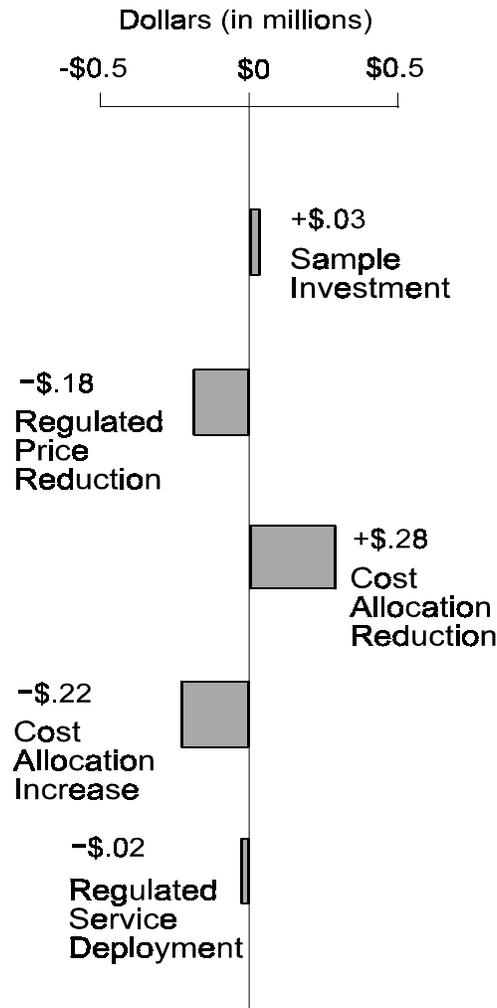
- *Regulation increases the level of uncertainty associated with investment, without a corresponding increase in potential returns.*
Compared to competitive companies, traditional regulated telephone companies have additional requirements associated with the roll-out of new products. The extra steps involved can increase the uncertainty in the investment process.

The investment with less variation (low risk) is better than one with more variation (high risk), if each investment has the same expected return, and the investment with more risk needs to generate a higher return to make it attractive.

- *Regulatory tools developed for other purposes may affect investment decisions.*
Pricing, cost allocation, and service deployment are three significant regulatory tools that affect investment decisions.
- *There are existing approaches available to regulators that may encourage market-based investment in the transition from monopoly to competitive markets.*
Some tools that can reduce the impact of regulation on investment decisions include promoting competition, introducing price cap regulation, and practicing regulatory forbearance.

IX. Summary, cont.

Figure 8: Sample Investment and Modeling Results: Net Present Value over 5 Years



General Assumptions: 5-year planning horizon and 10% discount rate.

Regulated Price Reduction: 20% price reduction due to regulatory decisions.

Cost Allocation: reduces or increases amount of initial investment by 25%.

Regulated Service Deployment: mandated deployment increases the initial investment 33%.; 10% increase in variable operating costs; and 20% increase in revenues. Also assumes that market or territory is increased, but that demand is weaker in these areas.

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X. Appendix A: Telecommunications Act of 1996, Section 706

Telecommunications Act of 1996, Section 706

SECTION 706: ADVANCED TELECOMMUNICATIONS INCENTIVES

(a) IN GENERAL - The Commission and each state commission with regulatory jurisdiction over telecommunications services shall encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans (including, in particular, elementary and secondary schools and classrooms) by utilizing, in a manner consistent with the public interest, convenience, and necessity, price cap regulation, regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment.

(b) INQUIRY - The Commission shall, within 30 months after the date of enactment of this Act, and regularly thereafter, initiate a notice of inquiry concerning the availability of advanced telecommunications capability to all Americans (including, in particular, elementary and secondary schools and classrooms) and shall complete the inquiry within 180 days after its initiation. In the inquiry, the Commission shall determine whether advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion. If the Commission's determination is negative, it shall take immediate action to accelerate deployment of such capability by removing barriers to infrastructure investment and by promoting competition in the telecommunications market.

(c) DEFINITIONS - For purposes of this subsection:

(1) ADVANCED TELECOMMUNICATIONS CAPABILITY - The term 'advanced telecommunications capability' is defined, without regard to any transmission media or technology, as high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology.

(2) ELEMENTARY AND SECONDARY SCHOOLS - The term 'elementary and secondary schools' means elementary and secondary schools, as defined in paragraphs (14) and (25), respectively, of section 14101 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 8801).

Conference Report to Accompany S. 652

The Conference Report that accompanied the Act, as it applies to Section 706, page 210, provides the following background:

Section 706 - Advanced Telecommunications Incentives

Senate bill

Section 304 of the Senate bill ensures that advanced telecommunications capability is promptly deployed by requiring the Commission to initiate and complete regular inquiries to determine whether advanced telecommunications capability, particularly to schools and classrooms, is being deployed in a reasonable and timely fashion. Such determinations shall include an assessment by the Commission of the availability, at reasonable cost, of equipment needed to deliver advanced broadband

X. Appendix A: Telecommunications Act of 1996, Section 706, cont.

capability. If the Commission makes a negative determination, it is required to take immediate action to accelerate deployment. Measures to be used include: price cap regulation, regulatory forbearance, and other methods that remove barriers and provide the proper incentives for infrastructure investment. The Commission may preempt State commissions if they fail to act to ensure reasonable and timely access.

House amendment

No provision.

Conference agreement

The conference agreement adopts the Senate provisions with a modification.

XI. Appendix B: Definition of Cost of Capital

Definition of Cost of Capital

In order to operate, companies need to raise money. They raise this money by selling equity in the firm and by selling debt. Equity usually is sold in the form of stocks, and debt usually is sold in the form of bonds. Investors earn money from stocks through increases in the price of the stock and through dividend payments. Because stock prices and dividend payments are not fixed, are set by market conditions, and are set by the company's performance, stocks generally are considered a relatively risky investment. Bonds represent a promise by the firm to pay a fixed percentage of interest on the purchase price of the bond, so bonds are generally less risky for investors than equity.

Capital structure is based on the percentage of a company's total invested capital that is debt (alternatively calculated as the ratio of the percent debt to the percent equity). A company's cost of capital is the company's aggregate cost of raising funds from all sources. It is composed of the after-tax cost of debt and an estimate of the desired return to shareholders of common equity. These separate costs are weighted by the amount of the total capital provided from each source, i.e., the percentage of a company's total capital that is debt-financed and the percentage that is equity-financed.⁵ A company can manage its cost of capital in two ways: (1) by adjusting the level of debt, and (2) by adjusting dividend policy.

A company can choose to accept or to avoid debt. A company with high debt levels is referred to as "leveraged." As noted above, companies pay a fixed percentage of interest on debt, and interest expenses are tax-deductible, so accepting more debt in the capital structure can lower the company's cost of capital. In this way, a relatively high level of debt provides a means to improve rate of return up to the point where the additional risk associated with greater leverage offsets the tax advantages.

Alternatively, a company can adjust its dividend policy. Limiting or eliminating dividends lowers the cost of capital because dividend payments come from after-tax earnings of the company. However, such a strategy puts a major emphasis on earnings growth, since the stockholder has little or no immediate return from owning the stock. Having no fixed obligations for their after-tax earnings, companies that pay little or no dividends have relatively high levels of flexibility to respond to events in the market, such as increasing investment in research and development.

⁵ For example, if a company's cost of debt is eight percent, its cost of equity is twelve percent, and its capital structure is fifty percent debt and fifty percent equity, the company's aggregate cost of capital is ten percent.

	Cost		% of Capital		Weighted Cost
Debt:	8%	*	50%	=	4%
Equity:	12%	*	50%	=	6%
			Total Cost of Capital		10%

XII. Appendix C: Derivation of Present Value

Derivation of Present Value

Present value is derived by using the following formula, where F = future sum of money, n = number of years from now, and r = the discount rate:

$$\text{Present value} = F_n / (1 + r)^n$$

For example: If you are trying to determine the present value of being given \$100 two years from now, at a discount rate of 10 percent, you would calculate it as follows:

$$100 / (1.10)^2 = 100 / 1.21 = \$82.64$$

\$82.64 is the present value of \$100 two years from now, discounted at 10 percent, which means that you would be indifferent to receiving \$100 two years from now, or \$82.64 right now.

The future sum of money is often expressed as future cash flow, which simply means the revenues minus expenses during a given period of time. For example, if a product is expected to generate \$400,000 in revenues in a twelve-month period ending two years from today, and the expenses for that product during the same time period are expected to be \$200,000, that product has a positive \$200,000 cash flow during that time period. The next step would be to determine the present value of that future \$200,000 cash flow.

The key factor in a present value analysis is the discount rate. Use of a higher discount rate makes it less likely that future cash flows for a project will have a sufficient present value to offset the investment costs. Use of a lower discount rate makes it more likely that future cash flows will be sufficient to justify investing in the project.

XII. Appendix C: Derivation of Present Value, cont

Calculations for Figure 2: Present Value of Investment - Sample Investment

The following table is a detailed description of the calculations used to generate **Figure 2** in the preceding text:

	Year					
	0	1	2	3	4	5
Revenues	-	\$400,000	\$400,000	\$500,000	\$600,000	\$500,000
Costs	\$1,000,000	200,000	200,000	200,000	200,000	200,000
Cash Flow	-1,000,000	200,000	200,000	300,000	400,000	300,000

Present Value (Equation)	-	$200000/1.1$	$200,000/1.1^2$	$300,000/1.1^3$	$400,000/1.1^4$	$300,000/1.1^5$
Present Value	-1,000,000	181,818	165,289	225,394	273,205	186,276

Net Present Value of Investment = \$31,983.66

Assumptions: 5-Year planning horizon and 10% discount rate.

XIII. Appendix D: Calculations for Modeling Investments

Calculations for Figure 4: Present Value of Investment - Regulated Price Reduction

	Year					
	0	1	2	3	4	5
Revenues	-	\$360,000	\$360,000	\$450,000	\$540,000	\$450,000
Costs	\$1,000,000	210,000	210,000	210,000	210,000	210,000
Cash Flow	-1,000,000	150,000	150,000	240,000	330,000	240,000

Present Value (Equation)	-	$150,000/1.1$	$150,000/1.1^2$	$240,000/1.1^3$	$330,000/1.1^4$	$240,000/1.1^5$
Present Value	-1,000,000	136,364	123,967	180,316	225,394	149,021

Net Present Value of Investment - **\$184,938.31**

Assumptions: 5-year planning horizon; 10% discount rate; 20% price reduction due to regulatory decisions; and 5% increase in total costs due to increased production (to meet greater quantity demanded).

Calculations for Figure 5: Present Value of Investment - Cost Allocation Reduces Initial Investment

	Year					
	0	1	2	3	4	5
Revenues	-	\$400,000	\$500,000	\$450,000	\$600,000	\$500,000
Costs	\$750,000	200,000	200,000	210,000	200,000	200,000
Cash Flow	-750,000	200,000	150,000	300,000	400,000	300,000

Present Value (Equation)	-	$200,000/1.1$	$200,000/1.1^2$	$300,000/1.1^3$	$400,000/1.1^4$	$300,000/1.1^5$
Present Value	-750,000	181,818	165,289	225,394	273,205	186,276

Net Present Value of Investment = **\$281,983.66**

Assumptions: 5-year planning horizon; 10% discount rate; and cost allocation reduces amount of initial investment by 25%.

XIII. Appendix D: Calculations for Modeling Investments, cont.

Calculations for Figure 6: Present Value of Investment - Cost Allocation Increases Initial Investment

	Year					
	0	1	2	3	4	5
Revenues	-	\$400,000	\$400,000	\$500,000	\$600,000	\$500,000
Costs	\$1,250,000	200,000	200,000	200,000	200,000	200,000
Cash Flow	-1,250,000	200,000	200,000	300,000	400,000	300,000

Present Value (Equation)	-	$200,000/1.1$	$200,000/1.1^2$	$300,000/1.1^3$	$400,000/1.1^4$	$300,000/1.1^5$
Present Value	-1,250,000	181,818	165,289	225,394	273,205	186,276

Net Present Value of Investment = - **\$218,016.34**

Assumptions: 5-year planning horizon; 10% discount rate; and cost allocation increases amount of initial investment by 25%.

Calculations for Figure 7: Present Value of Investment - Regulated Service Deployment

	Year					
	0	1	2	3	4	5
Revenues	-	\$480,000	\$480,000	\$600,000	\$720,000	\$600,000
Costs	\$1,330,000	220,000	220,000	220,000	220,000	220,000
Cash Flow	-1,330,000	260,000	260,000	380,000	500,000	380,000

Present Value (Equation)	-	$260,000/1.1$	$260,000/1.1^2$	$380,000/1.1^3$	$500,000/1.1^4$	$380,000/1.1^5$
Present Value	-1,333,000	236,364	214,876	285,500	341,507	235,950

Net Present Value of Investment = - **\$18,803.88**

Assumptions: 5-year planning horizon; 10% discount rate; mandated deployment increases the initial investment 33%; 10% increase in variable operating costs; and 20% increase in revenues. Also assumes market or territory is increased but demand is weaker in these areas.

XIII. Appendix D: Calculations for Modeling Investments, cont.

Net Present Values for Figure 8: Sample Investment and Modeling Results

	Net Present Value from Calculations	Net Present Value (in Millions)
Sample Investment (Figure 2)	+\$31,983.66	+ \$.03
Regulated Price Reduction (Figure 4)	-184,938.31	-.18
Cost Allocation Reduces Initial Investment (Figure 5)	+ 281,983.66	+ .28
Cost Allocation Increases Initial Investment (Figure 6)	-218,016.34	-.22
Regulated Service Deployment (Figure 7)	-18,803.88	-.02