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A STRUCTURAL ANALYSIS OF OVERBUILD COMPETITION AND CONVERGENCE IN THE MULTICHANNEL TELEVISION INDUSTRY

By

Hoekyun Ahn

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ABSTRACT

A STRUCTURAL ANALYSIS OF OVERBUILD COMPETITION AND CONVERGENCE IN THE MULTICHANNEL TELEVISION INDUSTRY

By

Hoekyun Ahn

Subsequent to the deregulation of the cable television industry in 1996, a number of questions have begun to surface concerning the extent of competition, the pricing behavior of cable systems, the feasibility of competition in cable television in the long term, the existence of economies of scope, implications of open entry for convergence, and ultimately long term prospects of market structure in telecommunications. Employing a structural analysis of competition and convergence, the present research provides the first systematic study of overbuild competition in the multichannel television industry to answer these questions.

The overbuilding business has always been risky. Changes in technology and public policy notwithstanding, significant obstacles to competition remain today. Most importantly, sharp price reductions in overbuild markets significantly influence entry decisions in the multichannel television industry. Market predation compresses profit margins for the incumbent as well as the entrant. Large MSOs, however, may still enjoy substantial cost advantages and nonnegative profits because of lower input costs, associated with both programming and operating. Thus, an entrant suffers "double squeeze" where predatory pricing pushes post-

entry price down from above, while higher input costs further squeeze profit margins for the entrant from below. Moreover, there are economic forces associated with convergence that may further impede entry into the multichannel television industry. If an entrant is compelled to provide a bundle of services, i.e., not only video but also data and voice, to compete with the incumbent's product space, convergence would mean extra capital requirement for the entrant. Together, the combination of these factors may reduce competition, rather than strengthen it in the multichannel television industry in the near future.

Considering all these factors, overbuild competition may not materialize as expected. Large-scale competition between the two monopolies will take place in the high-speed Internet access service first, rather than in the multichannel television market. Telcos are more likely to focus on data and voice services. Thanks to the extreme difficulties in the overbuild business and cable industry's early lead in the deployment of broadband services, cable operators will be ready more quickly than telcos to provide a "bundle of integrated services". The "joint dominance" in the video and high-speed data markets will be one of the critical factors that confers cable MSOs strategic advantages in the competitive battle in telecommunication. To the extent that consumers would like to get their telecommunications services from a single provider, cable operators will have significant strategic advantages over their telephone competitors in the increasingly converging telecommunications industry.

To Hyunsook

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1

INTRODUCTION

Research Questions

The last mile to the residential consumer, historically served by telephone and cable television incumbents, has generally been the least competitive and most bandwidth-constrained part of the communications network. Compared to a long distance line, a facility serving the last mile is likely to be expensive on a per customer basis to deploy, to have linear rather than exponential growth in use, and to require high maintenance per user. In addition, existing telephone and cable facilities were largely paid for in past decades, when construction costs were lower. They were also paid for by captive ratepayers, under regulatory protection from competition and/or inherent economic conditions that conferred a *de facto* monopoly and ensured recovery of costs, however slowly. The incumbent local exchange carrier (LEC) in each area is also financially strong and well staffed. These factors, among others, have combined to make entry against telephone and cable incumbents very difficult. This has denied residential consumers all the benefits of competition, which lowered prices, increased choices and usage, and sped up innovation in telephones, long distance, and mobile services over the past decades (FCC, 1999a).

Rising public dissatisfaction with cable service rate hikes and the allegedly poor quality of customer service led to the passage of the Cable Television Consumer Protection and Competition Act in 1992. But prior studies show that rate regulation becomes substantially less viable as an instrument to protect consumers from the monopoly market power as the complexity of the regulated product increases. The Cable Act of 1992 was eventually superseded by the Telecommunications Act of 1996, which mandated a sunset of the complex and controversial benchmark price regulation and paved the way for potential entry of telephone companies into the cable television business. Over the last decade, Congress and the FCC tried to constrain cable rates, failed, and then deregulated.

A number of approaches to curing the "government failure" have been proposed, but the most popular and widely accepted approach has been the repeal of the cross-ownership bans that have prohibited LECs since the early 1970s (see Hazlett, 1995b; NTIA, 1988, 1991). This policy would supposedly introduce the new breeze of competition by LECs in the multichannel television distribution market. Certainly, allowing telephone companies to provide cable service would raise the prospect of another effective provider of multichannel video programming to television viewers, thus offering direct competition to incumbent cable system operators. Furthermore, the opportunity to provide programming should increase telephone companies' incentives to construct integrated broadband network facilities to carry that programming to the home. In turn, those facilities could make available a vast array of voice, data, and video services to subscribers. Indeed, there are clear public interest benefits in permitting local exchange carriers (LECs) to provide or package video programming themselves over their own facilities, so long as they also offer video services under FCC safeguards designed to prevent discrimination against competitors and cross-subsidization that could harm ratepayers.

In spite of substantial evidence of welfare enhancement from competition presented in the prior studies, one must distinguish desirability from feasibility. It is one thing that competition is desirable. It is another whether or not overbuild competition in cable television is sustainable over a dynamic long run. The long-term sustainability of overbuild competition would depend not only on the demand and cost conditions for cable services, but also on the possibility of product differentiation and the strategic interaction between competitors in the marketplace (Smiley, 1990). Even though legal barriers to entry in the cable industry have considerably diminished in recent years, other structural entry barriers still remain formidable. Worse yet, even after entry does occur, first-mover advantages and strategic behavior of the incumbent may suffocate the prospects of overbuild competition in cable television, ultimately impeding future entry.

In the early 1990s when LECs were not allowed to own and operate cable services in their own telephone service territory, "video dialtone" was the technological rage. But it went nowhere. Under the "video dial tone" concept, an LEC could construct, operate, and maintain a transport facility within its local service area. The channel capacity of the transport would be leased to unaffiliated programmers on a common carrier basis. Lease rates for channel capacity would be regulated to ensure that they were reasonable and nondiscriminatory (NTIA, 1991). This concept of video dialtone was critically flawed in that it failed to envisage the fundamental mechanism of business operation in the capitalist society. Unless an appropriate level of economic incentives and profitability is ensured, however attractive an idea might be, it would not materialize in the real world.

The incidence of overbuild competition in the U.S. cable television markets has been quite limited. Historically, a small number of communities have issued multiple franchises for cable television service, leading to overbuild competition between operators in the same market. In 1983, only 14 of approximately 5,600 cable operators faced competition over a substantial portion of their service territory. By 1989, the number of competing systems totaled 93 out of 9,050 systems nationwide. (*see Television and Cable Factbook* 1983, 1989). With the enactment of the 1996 Telecommunications Act, however, the landscape of the cable industry has changed substantially in anticipation of LECs entry into the video programming delivery market. To some degree, the hope (or hype) has been realized in some markets across the country, but it is far from what policy makers, economists, and the public have expected.

Thus, it is imperative to keep in mind that an idealist view of competition would not produce meaningful consequences in reality. Subsequent to the deregulation of the cable television industry in 1996, a number of questions have begun to surface concerning the extent of competition, the pricing behavior of cable systems, the feasibility of competition in cable television in the long term, the existence of economies of scope, implications of open entry for convergence, and ultimately long term prospects of market structure in telecommunications.

In order to understand the nature of competition currently in place in the telecommunication industries and the evolutionary path to telecommunication convergence, it seems necessary to review key economic models of industrial organization that explain dynamic interaction between incumbent firms and new/potential entrants. Key questions involving competition and convergence in telecommunication include: (1) what kind of competition will there be? (2) how will entry be affected by an incumbent's market position and entry deterrence strategies? and (3) to what extent will entry into the multichannel television industry be viable considering competitive responses by incumbent firms and strategic advantages available to them?

It might be too early to judge the prospects of cable competition. Yet, it is possible to project the future market structure and performance of the cable industry if the observation of overbuild competition currently in place is to provide any helpful guidance to the understanding of factors that might influence entry decisions. Employing a structural view of competition and convergence, the present research provides one of the early systematic studies to answer these questions.

Organization of the Present Research

The present research is organized as follows. Chapter 2 presents the development of overbuild competition. Of all of the competitors that have emerged to challenge incumbent cable operators, perhaps none is making such a serious run as Ameritech Corp., the Midwest regional phone company. But as far as specific incursions into cable's customer base, the impact is far from clear. With the exception of Ameritech and SNET, no LECs have made significant large-scale facilities-based entry into the video industry. Even the relatively visible entry by the two LECs is currently under serious review. More prominent are non-LEC affiliated firms such as RCN and Knology. These relatively unknown firms aggressively pursue the business opportunities in selected markets around country with not only video but also voice and broadband services.

In Chapter 3, an empirical analysis of overbuild entry is presented. The primary goal of Chapter 3 is to investigate competitive effects in cable price and service quality dimensions. Chapter 3 begins with the debates of the efficacy of two distinct policy options that have been adopted and are in place in order to ensure high quality and reasonable price of the multichannel television industry. The discussion of regulation and competition is followed by a literature review of previous studies on competitive effects of overbuild competition in the multichannel television market.

After presenting the famous debate of predatory pricing, first triggered by McGee (1958), the applicability of market predation to the cable industry is discussed. A number of factors associated with the technological and business operation of cable television systems were found to render predatory pricing rational, plausible, and profitable when overbuild competition occurs in a local market.

The effects on the competitive communities and their incumbent operators can be difficult to assess. To be sure, the presence of competition has caused operators to sharpen and improve their offerings, to launch new services and perhaps to speed up plant rebuilds. But the primary focus of the present research is how the market responds to competitive overbuild and how the reaction may influence the entry rate in the multichannel television industry.

A regression analysis of 247 local cable systems provides evidence of welfare-enhancing effects that overbuild competition can generate in two dimensions of cable service: price and quality. The inclusion of competitive markets and municipal cable systems enabled the research to figure out how incumbent cable systems would respond to competitive entry and how post-entry price levels might influence entry decisions, by comparing the price charged by duopoly systems to that of city-owned cable systems. The analysis also attempted to investigate the economic effects of multiproduct offerings as well as "potential competition."

Chapter 4 addresses the implications of horizontal concentration and consolidation in the cable industry for the vigor of overbuild competition. Three ownership issues characterize the cable industry: horizontal concentration and relationships among cable operators; vertical relationships between system operators and program suppliers; and clustered cable systems, whereby cable operators consolidate ownership within geographical areas. More specifically, this chapter examines the status of ownership concentration in markets for the delivery of video programming and discusses how it can erect barriers to competition, affecting the competitive prospects and viability of overbuilds in the multichannel television industry.

In essence, horizontal concentration and the accompanying monopsony power of large MSOs will have a detrimental effect on viability of overbuild competition. However, the financial viability of overbuild entry also depend on other factors such as changes in demand, technological breakthroughs, and potential for market expansion.

Chapter 5 deals with the economic consequences of convergence in the telecommunication industry. Chapter 5 begins with the economic implications and effects of convergence on competition. The economic implications of convergence is analyzed in an attempt to provide explanations as to how it gives rise to a significant shift in economic perspectives of telecommunication services and how the new development in the telecommunication technology may influence the evolution of market structure in the future. The opportunities for changing one's market position are much more limited in a mature industry. The early history of an industry is of interest because it determines the structure of the mature industry and, as a consequence, its long-run performance. In addition, the evolutionary process determines the returns to a variety of kinds of investment, including those in research and development, which have implications for the dynamic aspects of the performance of the economy.

Chapter 5 also presents the current state of integration of voice, data, and video services, followed by an analysis of the significance of broadband services in shaping the future of the telecommunication industry. The emergence of the high-speed Internet access service market is viewed as the bridge of telecommunication convergence, connecting video and voice services that have historically been separated. The chapter also presents the discussion of how firms can take strategic advantage of their multiproduct operations in dealing with increasing threats of competition in the market. In essence, convergence will confer cable MSOs three main strategic advantages: bundling capability, first-mover advantages, and dynamic resource allocation. Chapter 5 concludes with the discussion of why and how cable MSOs will dominate the converging telecommunications market from each of these strategic perspectives.

Based on the major findings of the preceding three chapters, Chapter 6 discusses the sustainability of overbuild competition. In addition to market predation and first mover advantages, the feasibility and sustainability of overbuild competition is further discussed in conjunction with the impact of DBS service on the long term prospect of overbuild entry. The assessment will be checked against the findings of two separate analyses, that is, likelihood of overbuild survival and Tobin's *q*-ratios.

Finally, Chapter 7 summarizes the main findings of the present research. Key policy issues and recommendations are presented in conclusion. They include, among others, discussions of regulation of price and service, program access issues, ownership limits, and cross subsidization in the multichannel television industry.

Chapter 2

THE DEVELOPMENT OF OVERBUILD COMPETITION IN MULTICHANNEL TELEVISION INDUSTRY

Regulations of Entry and the Telecommunication Act of 1996

Prior to the Telecommunications Act of 1996, local exchange carriers (LECs) were prohibited from providing video program services to subscribers located within their designated service areas. The Telecommunications Act of 1996 radically changed the market structures of the traditional electronic media and telecommunications industries. It deregulated the barriers to entry between both the cable and telephone industries and allowed them to enter each other's service areas.

Since the passage of the Telecommunications Act of 1996, the major players in the telephone and cable industries, regional Bell operating companies (RBOCs) and multiple system operators (MSOs), have been expected to invade each other's markets. The result would change the historically distinct markets into a single integrated multimedia industry.

Modified Final Judgement and the Cable Act of 1984

Historically, telephone companies have been barred from the television business due to their proclivity toward anticompetitive conduct. This was one of the main reasons behind the 1984 AT&T breakup. Regulations designed to protect against telephone company anticompetitive conduct often fail because local telephone companies (telcos) are so complex and characterized by such joint and common costs that no set of behavioral regulations could realistically prevent competitive abuses. Because discrimination against competitors and cross-subsidization are very difficult to detect, prevent, and rectify through the behavioral regulations, telcos' entry into video programming has been blocked through such structural regulations as line-of-business restrictions and/or cross-ownership ban.

Federal restrictions on telephone company entry into video programming stem from three sources: FCC regulations, the 1984 Cable Act, and the AT&T Consent Decree. In 1970, the FCC adopted rules barring all telcos from providing video programming to subscribers in their local service area, either directly or indirectly through an affiliate. When these rules were adopted, cable was in its infancy. At the time, the FCC was concerned that telcos would, absent such restrictions, be able to engage in improper cross-subsidization, block the development of new broadband cable services, and use their control of telephone poles and conduit space to prevent or hinder competition from independent cable companies (NTIA, 1988).

When Congress enacted the Cable Act in 1984, it codified the FCC's cable-telco crossownership ban. The Cable Act states "it shall be unlawful for any common carrier...to provide video programming directly to subscribers in its telephone service area." These Cable Act provisions generally codified an FCC rule implemented in 1970.

In addition, for a number of years, the BOCs were precluded from diversifying into cable by the terms of the AT&T consent decree. Among other things, that decree barred the BOCs from providing "information services," which were universally assumed to include cable service. This restriction was broader than that contained in the FCC's rules or the 1984 Cable Act, as it barred the BOCs from entering the cable business anywhere in the country, not just within their own service area. However, the court presiding the consent decree lifted this restriction in 1991 so the BOCs now were allowed to own and operate cable systems located outside of their local service areas.

LECs' Challenge to Cross-ownership Bans

These legal barriers appeared to be disintegrating since the early 1990s. Some local authorities see little reason to protect unregulated monopolies, and were quick to issue competing franchises. Even more important, however, are the federal courts which have declared franchise monopolies to be unconstitutional restrictions on the free speech/free press rights of those cable competitors which have been excluded. The clear trend is for increasing market rivalry within the industry.

In 1994, in *Chesapeake & Potomac Telephone Co. of Virginia v. United States* (1994), the Fourth Circuit court ruled that the telco-cable cross-ownership ban imposed by Section 533(b) of the 1984 Cable Act violates the First Amendment rights of the telephone companies. The appeals court upheld a federal district court's decision that the telco-cable crossownership ban violates Bell Atlantic's First Amendment rights to free speech, permitting the regional Bell Operating Company (RBOC) to provide video programming in its own service area. The Ninth Circuit Court of Appeals confirmed the decision in the Bell Atlantic case in favor of another RBOC, U.S. West (*U.S. West Inc. v. United States*, 1994). Since then, three more federal district courts in other states also have given the same rights to the RBOCs including Bell South (*Bellsouth Corp. v. United States*, 1994), NYNEX (*NYNEX Corp. v. United States*, 1994), and Ameritech (*Ameritech Corp. v. United States*, 1994).

A year before these decisions, a federal district court in *The Chesapeake and Potomac Telephone Co. v. U.S.* (1993) held that Section 613(b) of the Communication Act, as amended, 47 U.S.C.A. §533(b), violated the First Amendment because it was not tailored to serve significant government interest in promoting competition in the cable television market. This telco-cable cross-ownership ban prohibits a telephone company from directly providing video programming to subscribers "in its service area." Significantly, the statute has not been interpreted to prohibit a local telephone company from providing video transport services. Thus, a telephone company is permitted to run a cable into a subscriber's home and then to lease channels of communications on that cable to unaffiliated entities, such as cable operators. According to this "video dialtone" concept, the telephone company only runs afoul of the statute by "exercising control or discretion" over the programming transported over its facilities. The court found that §533(b) directly abridges the telephone companies' right to express ideas by means of a particular, and significant, mode of communication—video programming.

The Telecommunications Act of 1996

The Telecommunications Act of 1996 changed the landscape of the telecommunications industry by introducing open entry policy. Most significant and relevant provisions in the Act include:

- Repealing cable-telco crossownership prohibition so that telcos could offer cable services in their service territory
- Prohibiting telco buyouts of cable systems in their service area except in "very limited circumstances"
- Allowing telcos to offer video services through a separate subsidiary

Under these conditions, telcos may choose to be regulated as cable system, common carrier or newly created "open video system." The Act also preempted state and local regulations barring cable operators and others from providing local telephone services. LECs are required to negotiate with new telephone entrants for interconnection, number portability, dialing parity, access to rights-of-way, and reciprocal compensation. Thus, the telecommunications market is opened to competition from each monopoly from now on.

New Entry into the Video Market

Since the passage of the 1996 Telecommunications Act, some industry insiders claim that direct competition between cable systems in the same geographical area is the new reality. The current estimate of overbuilds rivalry finds more than 100 US cable markets. This competition has recently been intensified by a number of factors: deregulation of cable prices and services, vanishing virgin cable territory, lucrative cable investment opportunities, the superiority of newer video technology, the ending of exclusive monopoly franchises by the courts, and new legislation. This section describes how LECs and others responded to such environmental changes surrounding the multichannel television industry.

Ameritech New Media (ANM)

Nearly four years after entering the cable business as an aggressive overbuilder, Ameritech has acquired local franchises in four major Midwestern markets-Chicago, Cleveland, Columbus and Detroit, and extended service to more surrounding communities. Alone among the Baby Bells, Ameritech is broadly fighting cable on cable's battlefield, constructing expensive 750-MHz, hybrid fiber-coaxial (HFC) systems in large, densely populated urban and suburban areas.

ANM has been building major clusters, at least one in each of the 5 midwest states, where it provides telephone service. Its concerted franchising efforts have brought Ameritech's cable arm a total of 107 cable franchises spanning l.5 million homes in Michigan, Illinois and Ohio. It is expected to be among the top 30 MSOs in the country in the year 2000 (Applebaum, 1999). As of November 1999, Ameritech New Media is one of only a handful of cable companies in the country challenging existing cable operators. Approximately 250,000 customers are watching Ameritech's cable TV service americast in Chicago, Detroit, Cleveland and Columbus, OH, and their satellite cities and suburban towns.

Detroit is ANM's largest cluster, with 600,000 households and 1.5 million residents under the franchise, followed by the Columbus, Ohio, area, where it has 530,000 households and 1.15 million residents under contract. According to ANM, 34 out of 40 communities under franchise in the Detroit suburbs are up and running (Multichannel News, Jan. 27, 1999).

Ameritech also services Area 5 in metro Chicago, where 500,000 residents and 185,000 households represent the company's second-largest cluster. Its continued move into the Chicagoland area is setting up a fierce battle against AT&T, which also has been building a huge cluster in the Chicago market through a series of system swaps and acquisitions in the past years (Estrella, 1998e).

The system's general manager is responsible for technical operations only. Marketing, ad-sales and customer-service personnel take their marching orders from Ameritech's headquarters, as do employees with similar roles in the company's other metro markets. That way, ANM gets operating scale and efficiencies. ANM's 120-channel capacity means no rush to push into digital-cable services. Interactive services are under consideration, with a number of vendor and service-provider discussions going on.

After nearly four years of relentless video expansion, Ameritech now faces a crossroad. SBC Communications Inc., new parent company of Ameritech has strongly opposed constructing or operating costly wireline and wireless cable systems, even on its home turf. SBC's track record suggests that it may not have the stomach for Ameritech's aggressive cable expansion over time, particularly as the bills pile up and profits still seem a distant prospect (Breznick, 1999b). Thus, industry observers have shown suspicion that Ameritech's long-term standing in the wireline cable business is somewhat in doubt, given the fact that it has been acquired by SBC, which scrapped Pacific Telesis Group's nascent cable build-out after buying PacTel (Gibbons, 1998b).

Indeed, in October 1999, as long-rumored, hopeful expectation in the cable industry, SBC determined to put a hold on all of Ameritech New Media's expansion plans. Ameritech suspended deployment of new cable operations and suspended negotiation of new franchise agreements. SBC announced that the operations would be suspended until a "deep review" of all business operations was completed. As a result, Ameritech has notified some communities that it is stopping negotiations on new cable franchises, at least until the end of the year (Jones, 1999). The decision by SBC would have a direct impact on cable competition in the Midwest. The future of Ameritech's cable operation has been in doubt since SBC announced plans to buy the LEC in May 1998. Ameritech continued its aggressive cable overbuilds throughout the lengthy consideration of the merger, but that has abruptly come to a halt.

SNET Personal Vision

SNET Personal Vision holds a statewide cable franchise in Connecticut, and currently offers service to 20 localities. The video arm of Southern New England Telephone began its video operations in September 1996, when the Connecticut Department of Public Utility Control granted SNET the first statewide cable TV franchise in the U.S. In March 1997, Southern New England Telecommunications Corp. (SNET) launched its newest line of business, SNET Personal Vision, and began signing its first cable TV customers. With this milestone, SNET became the first company to compete in the cable TV market in Connecticut, adding yet another dimension to SNET's menu of information, communication and entertainment services.

On August 25, 1999, however, SNET applied for and received permission from the Connecticut Department of Public Utility Control (DPUC) to suspend construction of its statewide Hybrid Fiber-Coaxial (HFC) network while it considers alternative technologies for video deployment, such as digital subscriber line (DSL) technology. SNET maintains that HFC is not an efficient technology for deployment of video services. The DPUC required SNET to continue video service where it has already begun to do so, and declined to relieve SNET of any of its statewide construction obligations. SNET is required to file a proposal on new technologies and for statewide construction by October 1, 2000 (FCC, 2000).

FCC reported on concerns that SBC, then in the process of purchasing Ameritech, might sell or abandon Ameritech's cable overbuild efforts, given that SBC previously sold or abandoned PacBell multichannel television services. In addition, SBC's Chairman Edward Whitacre, on May 19, 1998, declined to commit to maintaining SBC's video efforts. SNET and SBC said they will continue to operate SNET's current video service in 20 towns and will make it available to six more communities where the plant has already been built

(Breznick, 1999b). But as of this writing, SBC is focusing on evaluating alternative technologies for delivering cable service.

GTE Media Ventures

GTE Americast is providing cable television service to customers in California, Florida, and Hawaii. GTE is franchised to serve pockets of unincorporated Ventura County and the cities of Oxnard, Thousand Oaks, Newbury Park and Camarillo.

GTE uses both wireline and wireless technology. GTE provides cable TV service using high-speed, high-capacity fiber optic in: Cerritos, California; Ventura County, California; Tampa Bay area, Florida. Those hardwire networks have about 90,000 subscribers (Farrell, 1998b). GTE's cable presence in St. Petersburg is part of a Pinellas County-wide buildout that began in 1996. More than one-half of St. Petersburg has been built out since the franchise agreement took effect in the fall of 1996.

In addition, the LEC deployed wireless network technology in Oahu, Hawaii (MMDS system). GTE entered wireless cable through acquisition, purchasing Oahu Wireless Cable, in May 1997 and commercially launched a new wireless-cable service in April 1998. GTE competes with entrenched incumbent Oceanic Cable, the Hawaii division of Time Warner Entertainment, in the most cabled state in the United States. In Hawaii, cable penetration on Oahu is about 74 percent. Cable has been successful on Oahu, at least in part, because the island's mountainous terrain does not lend itself to off-air broadcast reception. But that same terrain poses challenges for wireless cable (Hogan, 1998b).

BellSouth Interactive Media

BellSouth Corp. launched its first digital wireless cable service in November 1997 in New Orleans. Cox Communications Inc. is the New Orleans cable incumbent, with some 270,000 subscribers in the region (Gibbons, 1997). BellSouth has about 20,000 to 30,000 subscribers in New Orleans and its service is priced about the same as that of the incumbent cable operator (Farrell, 1998b).

BellSouth Corp. began its initial rollout of digital-wireless cable service in the LEC's home market of Atlanta in June 1998 (Farrell, 1998b). BellSouth service was not universally available to everyone in the Atlanta market because not everyone will have a good line of sight. But BellSouth is rolling out service in phases in Atlanta, initially targeting more than 700,000 households, or about one-half of the local market. To reach additional homes, the company will strengthen its system with signal repeaters (Hogan, 1998c).

BellSouth Corp. launched its digital-wireless-television service in its third market, in October 1998, competing with Time Warner Cable in Orlando, Fla. BellSouth plans on passing between 500,000 and 600,000 homes in the Orlando area, and 75 percent to 80 percent of them are within the line of sight of the service (Farrell, 1998a). The Orlando launch is one of four markets in south Florida where the Atlanta-based telco plans to provide wireless video service—

Jacksonville, Daytona Beach and Miami are expected to be added as of this writing (Haugsted, 1998).

SBC and Pacific Bell Video

Although SBC was the first telco to show interest in launching video by acquiring two cable systems in 1992, they have since been soured on the business. In recent years, SBC has acquired telcos and promptly jettisoned their video plans. In California, for instance, SBC shut down or sold off Pacific Telesis' fledgling wireline and wireless cable systems in the San Jose, Los Angeles and San Diego areas after buying the West Coast regional Bell in 1997. Similarly, in Connecticut, SBC recently halted construction of SNET's ambitious alternative cable plant across the state after taking over the telco. Besides the California and Connecticut video operations, SBC sold off cable systems that it owned in the Washington, D.C., area and suspended its own fledgling video efforts in Texas in recent years (Breznick, 1999b).

The Pacific Bell Digital TV launched a service with limited distribution in Los Angeles in 1996. Pacific Bell service launched commercially May 28, 1997, in parts of Los Angeles and Orange counties. With MMDS platform, PacBell chose the Los Angeles areas partly because the city is a very attractive market for wireless cable thanks to good line-of-sight. PacBell estimated that 85 percent of the LA markets were within the line of sight of the company's two digital towers (Hogan, 1998g).

Pacific Bell Digital TV competed with MediaOne in several markets within the MSO's Greater Los Angeles cluster and Charter Communications Inc. in Southern California. Pacific Bell Digital TV took a targeted marketing approach, going after higher-end cable customers. PacBell was focusing its efforts on Orange County and in MediaOne markets that had not yet been completely rebuilt.

However, after an 18-month long operation, SBC sold a majority ownership of Pacific Bell Video Services to Prime Cable, an Austin, Texas-based MSO with about 530,000 subscribers (Hogan, 1998h). As part of the assets in the transaction, PrimeOne acquired the rights to market the Tele-TV brand and renamed PrimeOne Tele-TV. Pacific Bell remains a minority partner in Tele-TV (Haugsted, 1999a). The name was created several years ago as a joint venture by three local telephone companies—including Pacific Bell, Nynex Corp. and Bell Atlantic Corp.—which were looking to expand into video services. In 1997, however, PacBell became the only telco to actually launch a Tele-TV-branded service, using digital MMDS boxes. Bell Atlantic Corp. and Nynex Corp. shelved plans for digital MMDS in 1997 (Gibbons, 1997). After SBC bought PacBell, it was widely believed that SBC would seek to sell off its wireless cable assets (Hogan, 1998h). At the same time, SBC withdrew from the Americast consortium in 1997 after its merger with Pacific Telesis Group. It also decided to back away from video-network deployments, shutting down PacTel's cable construction in California. SBC converted its own cable system in Richardson, Texas, into a data test (Multichannel News, November 24, 1997).

Bell Atlantic

Bell Atlantic has struggled to find a video strategy. The telco initially thought the answer was to buy its way in and made headlines in 1992 when it announced it was acquiring Tele-Communications Inc. But the deal was not consummated. In the mid-1990s, Bell Atlantic aggressively invested in wireless cable systems but technological glitches with digital transmissions gave the company serious competitive problems and the MMDS investments turned out to be unattractive quickly (Neel, 1999a).

After passage of the 1996 Telecommunications Act, Bell Atlantic created FutureVision as its video unit. Since then, FutureVision spent $70 million to build the video delivery network in New Jersey. The LEC eventually shut down its wireline operations at the end of 1998, after three years of delivering service to some 2,600 customers in Toms River, NJ. When the service was launched, it was hailed as a high-tech alternative to existing video providers. Regulators hoped it would spur the kind of competition that would benefit consumers. But it soon became apparent that the network was too expensive to deploy beyond the small confines of its beta test area in Dover Township.

Stepping up its competition to cable in the Northeast, Bell Atlantic Video, now new-born video arm, began selling the DIRECTV service in Boston and Pittsburgh in May 1999 and plans to expand to New York City. Bell Atlantic rolled out service in New York in 1999 in conjunction with DIRECTV's planned debut of local broadcast signals. Assuming that Congress completes passage of favorable "local-into-local" legislation sometime soon, DIRECTV intends to start beaming local stations to the New York and Los Angeles markets and then extend service to up to 20 other major markets.

More of Bell Atlantic's existing DBS subscribers are renting hardware than buying it. That makes Bell Atlantic's economic model more like the leasing one followed by Primestar Inc., which DIRECTV recently purchased, than DIRECTV's standard puchase model. Bell Atlantic is now heavily promoting DIRECTV's hardware and programming packages in most major markets outside New York. Since introducing DBS service in the Washington, D.C., and New Jersey areas in 1998, the regional Bell has expanded to Baltimore, Philadelphia, Boston, Pittsburgh, northern Delaware and most of central Maryland. Plans call for extending service to Richmond and Norfolk, Va., Providence, R.I., and other secondary markets in the year 2000 (Breznick, 1999c).

US West

US West has operated a cable system in Omaha, Nebraska since 1994, competing the incumbent cable operator Cox with an overbuild of the existing telephone network. The LEC's Scottsdale system represents US West's first foray into switched digital networks since the telco withdrew applications to build SDV networks in five cities in mid-1995. US West has been delivering video services over a hybrid fiber/coax network in Omaha since September 1995. As far as US West is concerned, its decision to build a fiber-to-the-curb, switched digital video network in a planned community in Scottsdale, Ariz., represents an opportunity for the telco to test the architecture's economic and technical viability. (Levine, 1997b).

US West has gotten its broadband digital-TV and data service under way in Phoenix, amid signs that the telephone industry is finally getting serious about moving to a full-service-network platform. After years of trial and error in US West's and other telcos' territories that largely led to dead ends, the Phoenix launch represents the first large-scale commercial deployment of a U.S. telco network suited to delivering an integrated package of voice, data and TV services over a single line (Dawson, 1999a).

In Phoenix, US West uses very high speed digital subscriber line ("VDSL") for distribution of video, high-speed Internet access, and telephone service over existing copper telephone lines, and is still the only company in the country using this distribution technology. In addition, US West announced that it has begun trials of an interactive service that integrates customers' telephone, Internet access, and existing television service. This service, delivered over dial-up or DSL connections to television sets, allows customers to switch between Web surfing and television watching, to do both simultaneously, to view caller ID information on their television screens, to answer the telephone via a speakerphone on a set-top box, and to check e-mail. Full-scale deployment of this service was expected in the fall of 1999, but has not yet occurred (FCC, 2000).

Broadband Service Operators (BSOs)

RCN Corp.

RCN was spun off from former MSO C-TEC Corp. in 1997 to create a competitive local exchange carrier (CLEC). RCN offers bundled phone, video and Internet services in several Northeast cities including New York, Boston, and Washington D.C. and Northern California. RCN has service operations in the Northeast corridor, which spans from Boston to Washington, D.C. (Haugsted, 1999c).

RCN already serves about 80,000 customers total in Manhattan, where the company has activated more than 500 buildings for its bundled services (Hogan, 1998d). RCN's aggressive marketing campaigns have already attracted "significant interest" in the company among residents in New York's outer boroughs. RCN Corp. expanded its New York City customer base beyond the island of Manhattan and into Queens with fiber optic network in 1998. The company started offering its dial-up phone and Internet services there in April 1998. In Queens, RCN offers a full complement of telecommunications services including phone and Internet services over its own fiber optic network (Hogan, 1998d).

RCN Corp. also started delivering cable-television, high-speed Internet and telephone service in Gaithersburg, Md., a Washington, D.C., suburb. In the District of Columbia, its cable-television product has achieved 30 percent penetration, according to the company's press release. It also said that 80 percent of RCN's facilities-based customers in Washington subscribe to more than one service. All of RCN's Washington customers to date are multiple-dwelling unit residents (Multichannel News, July 26, 1999).

In June 1998, the FCC approved RCN Corp.'s application to provide open-video-system (OVS) service in 109 Philadelphia-area communities, as well as in 33 communities in the San Francisco area. RCN's plans are ambitious: In its FCC applications, RCN revealed that it will provide 330 analog video-programming channels, keeping 110 for itself and 220 for unaffiliated programmers. Ordinarily, OVS operators are not obliged to obtain local franchises, although they must comply with the same must-carry, retransmission-consent and PEG-access (public, educational and government) requirements as incumbent cable operators. (Hearn, 1998a).

As recently as 1999, RCN entered in the Chicago market by purchasing the 21st Century Telecommunications Group, an overbuilder already operating in one of the densest areas in the country. With a vision of a facilities-based provider supplying a bundle of communications products over cable, including video, high-speed Internet and telephony, 21st Century Telecom Group acquired the franchise to provide bundled service in Area 1 of Chicago. The BSO applied for franchises to serve three more of the five areas (Estrella & Haugsted, 1999d).

Knology Holdings Co.

While RCN Corp. has been grabbing headlines with its bundled-telecommunications forays into big Northeastern markets, another company has been quietly following a similar approach in smaller Southeastern cities.

Knology—according to its Web site (*www.knology.com*), the name comes from "combining knowledge with technology"—is branching out from that initial base. The West Point, Ga.-based firm has targeted Southeastern cities with population bases of more than 100,000 for new digital overbuilds. So far, Knology has purchased overbuilt systems in Columbus, Ga., Panama City, Fla., and Huntsville and Montgomery, Ala. It has obtained 28 other franchises to overbuild markets in Alabama, Florida, Georgia and South Carolina. Its current systems and franchise areas pass 246,575 homes. As of July 1999, Knology has 91,838 households for its bundled offerings, 80,068 of which are specifically for video services (Grebb, 1999).

The list of other companies in which Knology's original backer, ITC Holding Co. Inc., owns equity indicates a track record in data and telephony. They include MindSpring Enterprises Inc., an Internet-service provider with about 340,000 subscribers; DeltaCom Inc., a long-distance reseller now in 14 Southeast markets; Interstate/Valley Telephone Co., a local telephone company in parts of Georgia and Alabama; and PowerTel Inc., a wireless phone operator in 25 Southeast markets (Gibbons, 1998a). Knology's sister companies provide it with a variety of services. Knology uses DeltaCom's fiber network to provide long-distance service and an Internet link. Knology and DeltaCom jointly run a network-operations center in West Point. Also, MindSpring provides Internet content and customer support to Knology. Like RCN, which has forged links with electric utilities in several markets, Knology reached a strategic partnership with South Carolina utility Scana Communications Inc., which owns 7 percent of

Knology. Other Knology equity-holders include AT&T Corp.—its AT&T Venture Funds owns 14 percent of Knology (Gibbons, 1998a).

LyncStar Integrated Communications

LyncStar Integrated Communications LLC, offers cable to multiple-dwelling units via open-video systems in 15 states. The OVS operator competes with Time Warner in Austin, Texas. LyncStar also serves Houston, where its 20 properties served constitute its largest cluster. It has already secured a traditional cable franchise in the west Texas community of Midland and another in Little Rock, Ark. With some 15,000 customers over OVS systems already up and running in 15 states, LyncStar recently received its third OVS license in Colorado when the FCC approved its application to serve Fort Collins, a college town north of Denver. The company also has OVS licenses to serve portions of Denver and Aurora, Colorado (Estrella, 1998a).

Entry Strategies

The telcos can provide multichannel television service in one of four ways. One option is to transmit programming over the upgraded, broadband networks currently under development. Telephone calls, interactive services, and cable offerings would all be sent over the same network. A second option is to build an entirely separate network only to provide cable services. A third alternative is wireless cable, whereby signals are broadcast over the airwaves to a receiver installed at each subscriber's house. The technology used for wireless cable is known as a multipoint, multichannel distribution system (MMDS). The fourth option for telcos is to use the direct broadcast satellite (DBS) method.

System Topology

Bell Atlantic and Pacific Telesis have used the first method, while Ameritech employs the second approach. Bell South, Bell Atlantic, Pacific Telesis, and NYNEX have also tried the third option, because the first two involve technological and regulatory hurdles (Gooley, 1996).

Ameritech Corp., GTE Corp. and Southern New England Telecommunications Corp. have used cable-network technology overlaid on existing copper plant, and BellSouth Corp. is widely offering TV over wireless cable, as well as preparing to experiment with a fiber-to-the-home delivery system in Atlanta (Dawson, 1999a). Both SNET and Ameritech are building their own fiber optic cable systems in their respective territories. Separate from their telephone network, Ameritech and SNET deliver cable TV programming with their hybrid fiber-and-coaxial-cable system. From a reliability standpoint, a wireline system is superior because of the possibility of weather problems with the wireless technology.

Ameritech has been constructing its HFC network for cable service in the LEC's biggest markets and surrounding areas in an attempt to achieve economies of scale. Ameritech New Media offers a package of video programming that it delivers via a new, two-way, hybrid fiber/coaxial-cable system, separate from Ameritech's telephone network. SNET, too, was granted state-wide cable franchises.

On the other hand, BellSouth and GTE's overall video strategy includes both wireless and wireline technology, depending on the logistics of the particular market (Hogan, 1998c). BellSouth has taken a cautious approach to wireless video, launching the service in a few markets where the technology's line-of-sight constraints do not present a major problem. In the areas where the telco cannot reach customers with its digital-wireless signal, traditional coaxial cable is being used.

In using wireless cable, the telcos are making a tradeoff. MMDS lets them provide only a limited number of channels and service offerings, not the full range of interactive services they envision. This approach has two distinct advantages, however. One of the benefits of entering a new market with MMDS technology is that the company can blanket a city with the technical ability to serve the market much quicker than would be possible with wireline technology. MMDS lets them provide video services more quickly than if they had to wait for completion of their broadband networks. This gives them a new revenue source—and a higher profile—much sooner. Clearly, the speed is very attractive with MMDS and the operator only need invest in subscriber homes, not in every home passed (Hogan, 1998c). Second, MMDS is less costly than building a new network.

Despite these advantages, though, most telcos are still building broadband networks. Once those broadband networks are completed, the telcos will simply use wireless cable as a complementary business to the full range of interactive services that broadband networks will allow. BellSouth has embraced wireless technology for this reason. Deploying a wireless-video network is cheaper and, with new digital technology, it is possible to offer as many channels as a conventional hardwire system. GTE, too, decided to go with MMDS because it provided a low-cost alternative to building a hardwire network. MMDS also offers some advantages over direct-broadcast satellite. It has the capability of delivering local signals (Farrell, 1998b).

Even though MMDS costs less to launch than deploying a hardwire cable network, it is not cheap enough to offer a significant discount to consumers. Wireless cable offerings are priced between 10 percent and 15 percent lower than the incumbent cable provider's service. At that marginal discount, wireless cable subscribers tend to be budget-minded individuals who will drop the service the minute that they get a better deal from DBS.

The BellSouth and GTE wireless systems is digital, meaning that it has better picture quality and channel capacity than analog MMDS. GTE has also added enhanced services to its MMDS system, like near-video-on-demand and time-shifted television programming. And the company is investigating Internet data services over wireless.

Nevertheless, MMDS has suffered over the years with a critical problem vis-à-vis wireline cable service: LOS characteristics. They prohibit transmission of signals through obstacles like buildings or trees. MMDS is a way into the market, but "it's a desperate way in" (Farrell, 1998b). In fact, telephone companies have been burned by wireless video in the past: Bell Atlantic's plans for a nationwide wireless video service based on CAI Wireless Systems Inc.'s network were scrapped in 1996, after the telco could not overcome LOS problems. If the technology is so bad, why are GTE and BellSouth embracing it? Both companies jumped into wireless believing that their significant resources and marketing know-how were enough to make it a success (Farrell, 1998b).

BellSouth and the others are not hinging all of their bets on wireless. In fact, BellSouth is using wireless video only in markets where it has at least 70 percent LOS. For those homes that cannot be reached via MMDS, the telco is using a traditional hardwire strategy.

Some Bell companies are exploring yet another approach to offering cable television, reasoning that no single technology may be entirely appropriate for all local markets. This alternative technology is asymmetric digital subscriber line (ADSL), which allows transmission of video signals over existing copper telephone lines through the use of equipment installed at both ends of the line. As a result, the telcos have become increasingly interested in ADSL since early 1996. Like MMDS, ADSL is not a long-term solution for providing a full array of interactive services to customers, but it does give telcos faster entry into the cable television market, while taking advantage of their existing copper lines.

At a time when telcos are scrambling to upgrade their plants to create one homogenous system, BellSouth is instead opting for a "mosaic" approach, knitting together telephone, wireless, fiber optic and conventional copper cable lines to bring high-demand data and Internet products into its territory. The mosaic is part of a BellSouth strategy to shift emphasis from technology to delivering service, even as the telco goes through a hefty fiber optic upgrade in its Atlanta and South Florida markets. GTE also uses a mix of solutions as they make sense with each particular market.

By strategically selecting combinations of telephone, wireless, fiber optic and cable lines, BellSouth is opening up its menu of high-speed data, voice and entertainment services for more customers than if it had waited for the whole-system upgrades. The system involves making an economic study of the various service options to decide the best means of transportation and the best combination of services.

That mix of technology may be a challenge to manage, but it gives BellSouth a natural progression for upgrades and new service offerings. BellSouth also provides the high-speed data service, which uses traditional copper telephone wire or fiber-optics. For areas where fiber-optic lines are wired to the curb, there is even a plan to experiment with fiber-optic lines wired into the homes (Brown, 1999b).

AT&T once adopted the fourth method, DBS, for their video services. In early 1996, AT&T acquired a small interest in Hughes Electronics' DIRECTV, and it plans to market the popular service to its customers. MCI also has bid successfully in an FCC auction for its own DBS license. Currently, Bell Atlantic, SBC, Cincinnati Bell, and GTE have an agreement with DBS providers.

GTE Corp. signed a multiyear agreement with DIRECTV Inc. to market and distribute the direct-broadcast satellite company's digital-video service.

DIRECTV also signed with Bell Atlantic Corp. and SBC Communications Inc. to offer its service in the regional Bell operating companies' service territories. Unlike DIRECTV's earlier pact with AT&T, no money changed hands in these deals.

As part of its one-stop-shopping telecommunications plan, LECs allow consumers to purchase or lease the Digital Satellite System hardware and order DIRECTV programming with one telephone call. GTE's deal with DIRECTV does not mean the company is pulling back on its other video ventures, which include wireline and wireless-cable service in California, Florida and Hawaii. But it does allow GTE to offer video as part of its bundled telecommunication offer in more markets sooner. Currently, GTE is marketing DIRECTV in areas where it does not offer a competing video service. But over the next several years, GTE plans to offer both DIRECTV and GTE's own video services in some of the same markets.

GTE had also announced recently that it "will write down investments in hybrid fiber-coax (HFC) technology associated with its video trial markets because of advances in new technologies that will eliminate the need for duplicate networks." GTE plans a move to VDSL (very high-speed digital subscriber line), a wire that can integrate voice, data and video on twisted copper.

Programming

Americast is the national consortium created by Ameritech Corp., BellSouth Corp., GTE Corp., SBC Communications Inc. and Disney TeleVentures — a wholly-owned subsidiary of the Walt Disney Company — to develop, produce, and market video programming for its telco members. The telcos realized that developing entertainment content for their future cable ventures would be risky, so they joined together to spread the financial risk. In addition, they recognized they know little about the business, so they aligned themselves with one of the world's premier entertainment providers in Disney. The Americast consortium hopes to combine Disney's creative and marketing excellence with the communications and service expertise of the communication partners to provide quality cable programming and services.

Americast offers customers over 90 channels of cable television entertainment, including local broadcast, expanded basic, premium and Pay-Per-View. With Americast's interactive program guide, StarSight, users can navigate through up to four days of television scheduling. There is no more watching and waiting for a scrolling list of programs. As viewers flip through the channels, at each stop, a message on the screen will indicate which show is currently in progress and the length of the show, even if a commercial is showing. StarSight also offers a parental control feature to help parents make educated decisions on appropriate programming for kids (SNET, 1997).

Americast has been scaling back, scrapping its plans to create original programming and handing over other marketing and programming tasks to

Disney. SBC has dropped out, although Southern New England Telecommunications Corp. signed on, and it is selling Americast-branded cable service in Connecticut. Americast claims 235,000 video subscribers in 80 communities.

Americast offers consumers several packages of programming, including local broadcast stations, today's cable TV favorites such as ESPN, CNN and Nickelodeon, and newer channels such as The Sci-Fi Channel, The History Channel, ESPN2, and Toon Disney. Americast's "Premiercast" includes premium channels. Its "Express Cinema," the in-home movie service, is comparable to PPV programming. It is fed on a near-video-on-demand basis. Customers get access to up to 30 hit movies every month, starting as often as every 30 minutes. Viewers use their universal remote control, R.E.D., to select movies, as well as special events such as concerts and boxing matches, via the service's Interactive Program Guide.

"Local Connections" provides up-to-date community information 24 hours a day. It allows Americast customers to access dozens of community information channels to learn local movie theatre show times, concerts and plays, plus library and community events. And customers with expanded basic cable service can find information including local restaurants that deliver, phone numbers for schools, clubs and community services, and a five-day weather forecast.

Chapter 3

OVERBUILD COMPETITION AND MARKET PREDATION

Search for Competition in Cable Television: Theory and Evidence

Even though substantial inroads into the cable industry are evident in recent years, they exhibit little impression that overbuild competition will flourish in the near future in terms of entry rates and scales. Since entry decisions and post-entry equilibrium will heavily depend not only on demand levels, market growth, and revenue potential, but also incumbents' strategies and competitive reactions—particularly price reduction and product differentiation—it is necessary to take these factors into consideration in the assessment of overbuild competition. Among these factors, market growth potential will be discussed in Chapter 5 in conjunction with new service offerings such as Internet access service. The primary goal of the present chapter is to investigate competitive effects in the cable price and service quality dimensions. This chapter presents theoretical discussion of price response with particular emphasis in the possibility and rationale of market predation by an incumbent firm, followed by model specification, major procedures of data collection, and summary findings of the empirical investigation of a sample of 247 observations.

The chapter begins with the debate surrounding the efficacy of regulation and competition. A review of previous studies is also provided to start discussion of competitive effects of overbuilds. The primary findings of this chapter are presented in an analysis that was designed to provide empirical evidence of the effects of competition in cable television.

Efficacy of Regulation and Competition

A number of regulatory regimes have existed over the brief history of cable television in the United States. Since its inception, the U.S. cable industry has been subjected to virtually every conceivable regulatory regime from unregulation through tight rate regulation to deregulation and *re*regulation, and now deregulation again under open entry policy. These swings may indicate that government authorities and cable consumers have continuously been bewildered by the surprisingly myopic regulatory plans for cable services as well as the opportunistic behavior of the cable television industry.

These shifts in regulation and policy prompted academic researchers to begin investigating the very fundamental assumptions that have been taken for granted heretofore in cable television. They investigated, among others, such issues as economies of scale (Noam, 1985; Owen & Gottlieb, 1986; Owen & Greenhalgh, 1986), exclusive franchising policy (Hazlett, 1986, 1987, 1991), the effects of rate regulation (Hazlett, 1996, 1997; Mayo & Otsuka, 1991; Otsuka, 1997), and the effects of competition (Beil, Dazzio, Ekelund, & Jackson, 1993; Emmons & Prager, 1997; FCC, 1994b, 1999b, Jayaratne, 1996).

In the early years, the provision of cable television service in the U.S. was regarded as a natural monopoly due to the underlying technology. Until recently, it has been assumed that a single firm can serve the market at lower average cost than two or more firms. Johnson and Blau (1974), for example, argued that municipal cable franchises that allow only one system to serve the entire market at any given time are efficient because "if a second firm is built alongside the first, an unnecessary duplication of resources is accomplished" (p.325). Due to the economies of scale in cable television, they viewed that "such competition would be wasteful" (p.325). The natural outcome of this view meant an exclusive franchise in the local cable market. In the absence of regulation, however, the single franchisee would charge the profit-maximizing monopoly price. This behavior will result in a misallocation of resources and a reduction in social welfare relative to the competitive ideal. The traditional solution to the natural monopoly problem is to impose some form of rate regulation, granting the franchising government the authority to approve or deny proposed rate increases.

Ideally, rate regulation can be designed to promote cost minimization while effectively restraining the market power of monopolists that might lead to monopoly prices. By squeezing price-marginal costs margins, rate regulation can increase supply toward the optimal level of output, preventing social losses due to monopoly pricing behavior. In theory, the efficacy of regulation has been challenged from many perspectives, notably by Stigler (1971) and Peltzman (1976). In the Stiglerian view of "capture theory", "regulation is acquired by the industry and is designed and operated primarily for its benefit" (Stigler, 1971, p.3). In the Peltzmanian perspective of regulation, the regulator would maximize political support from both consumers and producers in establishing an optimal regulated price (Peltzman, 1976). In practice, municipal rate regulation is not always effective. Particularly, its effects on cost, price, and quality were ambiguous. Thus, the efficacy of rate regulation is an empirical question.

Early academic studies of cable television (Comanor & Mitchell, 1971; Noll, Peck, & McGowan, 1973; Park, 1972) suggested that the relaxation of FCC rules was necessary to help stimulate cable growth in urban areas. These studies and a landmark decision by the U.S. Supreme Court in the HBO case precipitated the rather dramatic deregulation of cable television in the early 1980s. Since the Cable Communications Policy Act of 1984 ended local regulation of basic cable rates in all but a few markets by 1987, basic cable rates rose rapidly. Nevertheless, it was also apparent that the number of channels included in the typical basic service package increased significantly at the same time.

The price hikes of cable television service in the 1980s have led to some empirical research on the relationship between cable price and rate regulation. For example, Mayo and Otsuka (1991) investigated the effects of various regulatory forms on cable price, using a simultaneous equations model that was designed to reflect the relationship between demand and price. Their analysis of 1,300 cable systems revealed that while regulation did not lead to economically efficient (marginal cost) prices for basic service, it did act to keep prices considerably below monopoly levels. In addition, there were some significant differences in the effectiveness of the various types of regulation practiced in the pre-deregulation period in the 1980s. While ROR regulation or state-level *de*regulation had no effects on price, common tariff regulation led to significantly lower basic cable prices than local franchise regulation. Interestingly, Mayo and Otsuka also found that where regulation had the effect of constraining basic prices, cable firms responded by charging higher prices for premium services.

While the Mayo and Otsuka study attempted to find the price-restraining effects of rate regulation, Rubinovitz (1993) investigated the effect of deregulation on price increases in cable television. An increased exercise of market power, due to the change from a regulated to an unregulated environment, enabled cable operators to increase cable price by 18 percent since deregulation, holding quality improvements and other cost changes constant (Rubinovitz, 1993). Thus, these two studies reveal that rate regulation has been effective, to a certain degree, in controlling the price of cable television services. In contrast to these findings, however, Prager (1990) found no evidence to support the view that regulation effectively constrains the rates charged for basic cable television service.

With respect to output, Hazlett (1997) analyzed key market evidence to observe consumer reaction to the rate regulation imposed under the 1992 Cable Act. Contrary to the stated goals of rate regulation, Hazlett found that basic cable output, as measured in penetration, did not positively deviate from trend during the period of rate reductions. A number of subscribership measures exhibited statistically significant declines in growth, in fact, during the two-year window in which rate reregulation under the 1992 Act lowered cable subscription prices.

In the matter of quality, Otsuka (1997) discovered that franchise regulation has produced higher service quality than does unconstrained monopoly. However, this does not necessarily mean the successful accomplishment of the stated goals by the regulators. These performance levels are far from the public's expectations, not to mention economists', because the findings simply suggest the service quality under rate regulation is better than that of a "monopoly". Indeed, Prager (1990) found that rate regulation in cable television significantly reduced both service quality and firm responsiveness to community needs and interests.

An alternative solution to rate regulation is competitive bidding for a franchise, proposed first by Demsetz (1968). He argues that competitive bidding for the right to become the sole producer in a naturally monopolistic industry would yield the same benefits as rate regulation at a lower cost to society. Other economists have challenged Demsetzian approach to controlling monopoly behavior, however. Most notably, this approach may lead to cost inefficiences and allow cable operators to engage in *ex post* opportunistic behavior (Williamson, 1976). This may involve raising prices above the agreed-upon level or shirking with respect to other product characteristics, such as the quality of service. On the other, reputational concerns can limit the extent of such opportunistic behavior (Prager, 1990; Zupan, 1989b).

Despite the deregulation of cable television, the typical local government issues an exclusive franchise as an efficient and necessary regulation of a "natural monopoly". Beginning in the mid-1980s, however, this practice was seriously challenged in both the court of law (*Preferred Communications vs. City of Los Angeles*, 1986) and academia (Hazlett, 1986, 1987; Lee, 1983). In the

Preferred case, the U.S. Supreme Court upheld an appeals court decision that exclusive franchising by municipal governments implicates the freedom of the press and it is in violation of the First Amendment.

Researchers noted problems embedded in the policy of exclusive franchising and the inefficacy of rate regulation by government in an attempt to curb monopoly market power. Critics of monopoly franchising have argued that local government policies, rather than the economics of cable television, have created monopoly market structure. Posner (1972), for example, blamed the practice of exclusive franchising as the factor substantially responsible for discouraging competition in the cable industry. He states that "the immediate cause of [monopoly] is not any inherent characteristic of cable television, but the fact that a cable company must obtain a municipal franchise...[and] municipalities do not grant more than one cable franchise in any area within their jurisdiction" (Posner, 1972, p.111). Johnson and Blau (1974) have asserted that three major economic factors (i.e., costs, pricing, and investment) led to an inevitable natural monopoly in cable television, which, in turn, dictates an exclusive franchise solution. Hazlett (1987) sharply attacked the practice of exclusive cable franchising in a critique of Johnson and Blau. Hazlett argued, however, that monopoly market structure in cable was a product of three factors, none of which supports the monopoly franchise solution. First, multiple entry was illegal in the great majority of local jurisdictions. The expense of court challenges to such licensing exclusions acts as a significant entry barrier. Second, this legal entry barrier is due, not to natural monopoly constraints, but to local governments' objective of maximizing their rents by actively promoting a monopoly arrangement. Third, the assumption of overinvestment due to duplicative costs by competitive entry is a myth because market's efficient allocation of investment capital will result in the firm's internalization of all duplicative costs. They will ultimately discipline entrepreneurs to avoid overinvestment. In short, open entry and competition would make consumers and society better off in terms of economic welfare, but municipalities rarely opt for such a policy.

Hazlett further refined his "free market, open entry approach" to cable television in subsequent research. Applying public choice theory, Hazlett (1990, 1991) hypothesizes that municipal franchising authorities generally will have an incentive to grant monopoly franchises to incumbent cable operators in exchange for side payments to municipal officials and political pressure groups. He argued that municipalities intentionally impede competition and show anti-consumer intent by trying to protect the cable monopoly. Resources expended to obtain these rents add nothing to consumer or producer surplus because they are wasted in unproductive or purely rent-seeking activities. These resource misallocations, according to Zupan (1989a, 1989b), can result in a significant portion of cable costs in the form of nonprice concessions (e.g., I-nets, excess channel capacity, community programming). Such concessions, of course, would raise the costs associated with building and running a cable system. Zupan (1989b) found that nonprice concessions accounted for 26 percent of building costs and 11 percent of operating expenses. Moreover, while the benefits from nonprice concessions are both relatively concentrated and focused in the hands of individuals who tend to be active and influential in local community politics, the benefits from expenditures on "plain vanilla" cable services are relatively diffuse and accrue to the average cable consumers (Zupan, 1989a). If these costs are ultimately immersed in the consumer price, the efficiency-enhancing potential of franchise bidding schemes may be curtailed.

As criticism of rate regulation and exclusive franchise has become the rage in recent years, entry has become a favorite direction for reform. While the 1992 Cable Act prohibits local franchising authorities from granting an exclusive franchise without "legitimate" reasons, the 1996 Telecommunications Act introduces open entry policy to replace rate regulation.

Empirical Foundation of Cable Competition

There have been a few surveys and econometric studies comparing competitive markets with monopolies. Every inquiry found that competition in cable lowers price significantly. Bolstering those results is the fact that unmeasured, nonprice aspects of competitive supply are also more consumer-friendly than service characteristics found in monopoly markets. Several studies have specifically examined the impact of competition on cable service prices and service offerings. Merline (1990) found that the price of basic cable service was 18 percent lower and the number of basic channels 21 percent higher in a 1990 sample of 26 competitive markets relative to a matched sample of monopoly markets. The cost per channel was 33 percent higher in the monopoly market.

Applying a simplified OLS method to the same sample, Levin and Meisel (1991) concluded that overbuild competition reduced the price of basic cable service by 22 percent to 30 percent.

Beil, Dazzio, Ekelund, and Jackson (1993) estimated the effect of competition on social welfare, applying Hazlett's public choice theory and Mayo and Otsuka's (1991) model of simultaneous equations. Drawing on a sample of 178 systems (48 competing, 130 monopoly), Beil et al. (1993) found that competition caused significant decreases in price for both basic and pay service, which, in turn, have a positive effects on the demand for basic cable service measured by total penetration in a market. More specifically, Beil et al. (1993) showed that competition reduced the price of basic cable service by $3.21 and the price of a typical premium channel by $1.15 in 1989. Aggregating this monthly data to yearly figures over the entire non-competing cable systems in the United States in 1989, they approximated the annual deadweight loss to be $3.6 billion. They concluded, therefore, that the reregulation of the cable price accomplished in the 1992 Act would fail to produce significant consumer benefits and that competition may be a viable substitute for rate regulation of cable services.

There are a few empirical studies that have specifically examined the impact of nonprivate ownership on prices or service offerings in the cable television industry. Using a pre- and post-deregulation design, Emmons and Prager (1997) analyzed the underlying characteristics and behavior of competing versus monopoly operators on the one hand, and private versus nonprivate ownership on the other. They concluded private cable systems facing direct competition from another private system offered basic service at prices that were 20.1 percent lower in 1989 than those charged by private monopoly systems. Emmons and Prager (1997, pp.739-740) concluded "the price differentials were even greater for municipally owned systems (23.9 percent in 1983, 25.6 percent in 1989), other nonprivately owned systems (50.3 percent in 1983, 47.8 percent in 1989), and systems operating in markets where a privately owned firm competed directly with a nonprivately owned firm (70.8 percent in 1983, 73.7 percent in 1989)". This study may be criticized in two aspects. First, the effects of competition and ownership modes derived by regression coefficients were overestimated in their interpretation. Emmons and Prager erred in interpreting the coefficients from their regression analysis. The coefficient on *MUNI* was -.256 and they interpreted it as 25.6 percent. Because their estimation was based on a log-level (or semi-log) model, however, more precise estimates would be 22.6 percent [exp(-.256) –1 =.226] for municipal ownership and 18.2 percent for competing systems [exp(-.201) – 1 =.182] in 1989. Similarly, the price differential is 38 percent instead of 50.3 percent for other nonprivately owned systems, and 52 percent instead of 70.8 percent for systems competing with a nonprivately owned firm. This adjustment would not be as crucial for small percentage changes, but it seems necessary with such substantial effects in Emmons and Prager. More critically, Emmons and Prager's estimation did not control for "quality". They justified it by stating that "quality differentials among the various subsamples were statistically insignificant, except for the other nonprivately owned group in 1989". But in fact, there were statistically very significant differentials among the subsamples in both 1983 and 1989, presented in Table 1 (p.736) and Table 2 (p.737). For example, the average number of basic channels delivered on privately owned monopoly systems was 17.73, whereas 24.63 on competing private systems, 12.75 on municipal systems, and 9.10 on other nonprivate systems in the 1989 data. These differentials in the number of channels, used here as a proxy for "quality", were significantly different from zero all at the .01 level. Apparently, the omission of this key variable in their estimation led to the unusually large differences in price due to the failure of "quality" control.

The FCC found in a 1993 study that basic rates charged by private cable systems engaged in head-to-head competition with another private cable system were 22.1 percent lower than rates charged by monopoly systems on a per-channel basis (FCC, 1993). That differential was estimated in a price equation that adjusted for other factors such as the number of system subscribers and the number of satellite channels carried. (When the competitive dummy subsample was extended to include municipal systems and private systems competing with municipals, the price difference increased to about 27.9 percent.) The same survey data were reworked in the FCC's February 1994 rate regulation rulemaking. In an attempt to devise rate caps under the 1992 Cable Act, the FCC (1994b) conducted research on the effects of competition on cable price. The agency used a sample of 420 franchise areas, of which 237 were in the noncompetitive subsample, 148 in the low-penetration sample, 39 in the overbuild sample, and 11 in the municipal sample. The FCC found that in 1992, franchise areas with a complete overbuild (100 percent overlap in a franchise area) had basic cable prices that were 16 percent lower than those in monopoly franchise areas with no overlap. A further 1 percent adjustment was made to reflect heterogeneity in the degree of overlaps within the "overbuild" subsample. Municipal cable systems were found to have rates that were 21 percent lower than comparable competitive franchises and 37 percent lower than comparable noncompetitive franchises (FCC, 1994b). Based on these findings, a further 7 percent rate rollback was implemented in 1994, following the 10 percent price reduction in the previous year.

Using the same data, but with a different pricing equation, Jayaratne (1996) found that rates in the overbuild areas were 12 percent lower than monopoly rates. Jayaratne criticized the use of "overlap" measures in the FCC study. Instead of using a dummy variable for competition, the FCC's estimation included a continuous variable of "overlap", as measured by the fraction of households passed by both the incumbent and new entrant in a given franchise area. Thus, the problem due to this measure of "overlap" in the FCC study is that the FCC's equation forces price to be a continuous function of the degree of overlap since it would have a continuous value in the interval [0,1]. As a result, the pricing behavior of overbuilds with very little overlap (e.g., 10 percent of the entire franchise area) is assumed to have a price that is close to a monopolist price. In reality, however, pricing behavior would be quite different from that of the monopoly case if further expansion is anticipated or if price is a discontinuous function of overlap (Jayaratne, 1996). To illustrate the point, consider the following case. In a particular section in the franchise area, price may have only two values; the competitive price on overbuild streets and the monopoly price in the rest. Further, if the local franchising authority requires a uniform price in the entire franchise area, price would take only a single value regardless of the degree of overlap. Thus, the functional form used in the FCC study would produce a biased estimate of overlap, hence an incorrect estimate of competition on price.

Two comments seem to be warranted on these studies by the FCC (1993, 1994b, 1999b) and Jarayatne (1996), which used the same data as the FCC. First, the unit of analysis in these studies would very likely produce incorrect results in their estimation. Both the FCC and Jarayatne used each and every franchise as the unit of analysis, based on "Community Unit". A Community Unit Identification Number (CUID) is a unique identification code assigned by the FCC to a single operator within a community unless the operator also serves a separate area within the same community. In that case, there would be two separate CUIDs, one for each area served. Thus, a company is considered to be an operator for each CUID it serves. This means that if a company serves 50 CUIDs included in the sample, that company was referred to as 50 systems. But in general, a single cable *system* serves multiple *franchise areas*, that is communities, within a market. Therefore, these studies cannot properly control for system specific characteristics such as the number of subscribers without losing the possible effect of scale economies. If the number of subscribers in each community is assigned to each unit of analysis when the community in question is part of a larger market served by a single system, the estimation would suffer from the omission of scale effects. On the other hand, if the number of subscribers in the equation is the total subscribers to the *system*, assigned to each community simultaneously, it would result in a critical error in measurement. Either way, the estimation is biased.

Second, the estimation of overbuild effects in the FCC and Jayaratne studies may or may not be precise. Facing difficulties of collecting this information, the dependent variable used in the FCC survey was the average franchise area revenues from regulated services per subscriber per month. Jayaratne took advantage of the FCC dataset, but modified the dependent variable to include only monthly subscription charges for all regulated tiers. Thus, both models had the heterogeneity problems with respect to "overbuilding". This is why the FCC opted for a continuous variable OVERLAP rather than a dummy variable OVERBUILD, while Jayaratne attempted to improve the estimation by including OVERBUILD*OVERLAP as well as a pure dummy OVERBUILD. Unfortunately, however, neither of these two would be able to solve the heterogeneity problems.

When only a small portion of the community is wired by the new entrant, the incumbent will most likely employ price discrimination. The literature is replete with selective price-cutting. Hazlett and Spitzer (1997) summarize that "when an entrant begins constructing a competing system, the incumbent typically cuts prices just in those areas (literally, the blocks) where the competitor has placed its lines. Prices have been sharply lower in areas where rivalry has been in evidence" (p.29). Indeed, the telephone survey conducted for the present study revealed that selective price-cutting was not uncommon. For example, Time Warner in the Tampa, Florida areas charged $19.95 in the areas overbuilt by GTE, compared to $29.95 in the nonoverbuild blocks for the same service. If selective price-cutting is available and actually employed, the use of an interaction term (e.g., competition dummy by overlap) would have a high possibility of producing incorrect estimates. In the above Tampa Bay case, the correct measure of competitive effect is achieved if and only if the price charged in the select overbuild neighborhoods (i.e., $19.95) is used as the dependent variable and the competition dummy only as the criterion variable. In other words, the degree of overlap is irrelevant and unnecessary in measuring the effects of competition on price. Regardless of the degree of overlap within a franchise area, the effect of competition is the same in that market. Suppose a cable system with 50 percent overbuild charges $20 in overbuilt areas and $30 in the rest. This two-tier pricing will generate a weighted average revenue of $25 per subscriber per month. And the competitive effect would be a differential between $25 and monopoly price. Suppose the average price of monopoly systems is $30. Then, the methodology used in the FCC and Jayaratne studies would result in $5 differential between monopolies and duopolies, whereas the true effect of overbuild competition is $10. In short, the two studies suffer from the underestimation of the overbuild effects on price. More frustrating is the fact that no one knows whether or not the effect of competition based on this method is even incorrect.

The most recent research also confirms previous studies. The FCC's Price Survey, conducted in 1998, reports that the gap in average monthly rates between competitive and noncompetitive operators has widened. The average monthly rate (for the BST, CPST, and equipment) charged by cable operators facing effective competition was $27.15 and $28.71 as of July 1, 1997 and 1998, respectively. For those not facing effective competition, the average monthly rate was $28.56 and $30.53, respectively, during the same time period. This represents a differential of 5.2 percent and 6.3 percent, respectively, in average monthly rates between the competitive and the noncompetitive. Further, the average monthly rates charged by systems facing head-to-head competition (i.e., systems within the competitive group that meet the overbuild test or the LEC test) was 14 percent less than the average monthly rate charged by noncompetitive systems.

Table 1 Average Monthly Rates of Competitive and Noncompetitive Groups

Date	Competitive Group	Noncompetitive Group	$ Difference	% Difference
8/31/93	$20.51	$22.23	$1.72	8.4%
7/14/94	$21.04	$21.61	$1.03	2.7%
7/1/95	$22.88	$24.43	$1.55	6.8%*
7/1/96	$25.42	$26.21	$0.79	3.1%*
7/1/97	$27.15	$28.56	$1.41	5.2%*
7/1/98	$28.71	$30.53	$1.82	6.3%*

Source: FCC 1996 Price Survey, FCC 1997 Price Survey, FCC 1998 Price Survey. Average rate is for BST, the most highly subscribed CPST, a remote, and a converter. * significant at 95% level of confidence.

The average monthly rates for the competitive and noncompetitive groups for the period of 1993 through 1997 are shown in Table 1. The differential in monthly rates between competitive and noncompetitive operators was 8.4 percent in 1993. Due to the FCC's rate roll-back, the differential decreased significantly to 2.7 percent in 1994. The gap has increased from 3.1 percent on July 1, 1996, to 5.2 percent on July 1, 1997, and to 6.3 percent on July 1, 1998.

Under the FCC definition, effective competition was found where more than one operator serves a community (the "overbuild" test), where there is low subscribership (the "low penetration" test), where the system is owned by a municipality (the "municipal" test), or where the competing service provider is owned by, or affiliated with, a local telephone company (the "LEC" test). The FCC reports that the average monthly rate charged by competitive operators varies significantly according to which test was used to determine effective competition but for all subcategories was lower than the average monthly rate charged by the noncompetitive group. The differentials between the noncompetitive group and each subcategory of the competitive group also vary widely. For 1998, the regression equation results show that operators belonging to the overbuild subcategory had rates that were 11.5 percent lower. Similarly, operators belonging to the LEC test subcategory of the competitive group had rates that were 15.5 percent lower than the noncompetitive group. The municipal systems subcategory was found to charge rates that were 26.4 percent lower than the noncompetitive group. On the other hand, operators in the low penetration subcategory charged rates that were statistically indistinguishable from the rates charged by operators in the noncompetitive group (FCC, 1999b).

The present study goes beyond previous research in several important ways. It first attempts to discover consumer welfare in two dimensions—price and quality—that overbuild competition may generate. From what is found, this study will further attempt to make inferences as to whether overbuild competition will be feasible and pervasive in the cable television industry. In so doing, it seems necessary to find how incumbent cable operators respond to entry. To make grounded inferences, a benchmark group of cable operators is included in the analysis. Including municipal cable operators in the data sample and differentiating competing systems according to a number of system characteristics is expected to produce a richer story about the consumer welfare effect and feasibility of competitive entry in the cable television industry.

Because price reductions are constantly reported as the most visible and dramatic effect of overbuild competition, the primary focus here is placed on price competition. Price competition also is probably the most critical, dynamic element in the competitive struggle between incumbents and entrants in any industry. Our search for the sustainability of overbuild competition begins with the old, yet unresolved, debate on predatory pricing.

Theories of Market Predation

The Chicago School and the "Chain Store Paradox"

It has long been recognized in industrial organization literature that the response entrants expect from incumbent firms would be a major factor in determining the attractiveness of entry, and much of the traditional literature on entry deterrence effectively hinges on the threat of predation. Various types of entry deterrence models tried to explain the dynamic interaction between the dominant firms and fringe firms or the incumbent and new entrants. An old question in industrial organization is whether an incumbent monopolist can maintain its position by threatening to wage a price war against any new firm that enters the market. The Standard Oil case at the turn of the century has been considered a prototypical model of predatory price cutting. *Standard Oil* was allegedly engaged in such anticompetitive conduct to drive its competitors out of the market. This idea was heavily attacked by Chicago School economists such as McGee (1958, 1980), Bork (1978), and Easterbrook (1981) on the grounds that a price war would hurt the incumbent more than colluding with the entrant.

In his pathbreaking article dealing with the famous case of allegedly predatory pricing by the old *Standard Oil Company* of New Jersey, McGee (1958) attacked the Supreme Court decision in the landmark antitrust case of the Standard Oil Company (*Standard Oil Company of New Jersey v. U.S. 221 US 1, 47, 76*) on two main grounds. First, there was little evidence to support the contention that Standard achieved its monopoly position through predatory price cutting. Second, predatory price cutting by Standard would have been irrational because it demanded an excessive sacrifice of profits.

McGee (1958) argued, on the basis of the trial record in the 1911 Standard Oil case, that the old Standard Oil did not use predatory price cutting to acquire or keep monopoly power. Instead, according to McGee, *Standard* used acquisitions or mergers because they are always a preferred alternative to predatory pricing. In large part because predatory price cutting imposes greater costs upon predator than prey, he also doubted how rational and effective—and therefore how frequent—predatory pricing would be in effectuating mergers, or in general. McGee's conclusion that monopoly achieved by the acquisition of the rival is cheaper than monopoly achieved by the elimination of the rival in economic war was modified by later contributors, including Telser (1966) and Bork (1978).

According to Bork (1978), a firm contemplating predatory pricing warfare will perceive a series of obstacles that make the prospect of such a campaign exceedingly unattractive. The losses during the war will be proportionally higher for the predator than for the victim. The costs of predatory price cutting would be prohibitively high for the predator because he faces the necessity of expanding his output at ever higher costs, while the victim not only will not expand output, but has the option of reducing it and so decreasing his costs.

Furthermore, three other considerations make such a strategy even more unattractive and improbable (Bork, 1978, pp.144-155). First, the modern law of horizontal mergers will make it all but impossible for the predator to purchase the victim, so the campaign will have to last until the victim's organization and assets are dissolved. Second, ease of entry will be symmetrical with ease of exit. The easier it is to drive a firm from the market, the easier it will be for that firm or another to reenter once the predator begins to collect his monopoly profits. Conversely, the more difficult entry is, the more difficult and expensive it will be to drive a rival out. This symmetry of entry and exit means that predatory pricing is a poor investment even if the predator has the reserves to bear the disproportional losses required. Finally, while costs due to predatory pricing are immediate, the anticipated monopoly revenues, being deferred, must be discounted by the current rate of interest.

In summary, the Chicago school views predation by price cutting as irrational, improbable, and inconsistent with the fundamental theory in economics, that is, price theory. The theoretical argument presented by McGee (1958, 1980), Telser (1965, 1966), Bork (1978), and Easterbrook (1981) suggests that predatory price cutting is unlikely to exist. Easterbrook, for example, refers to predation as both a unicorn and a dragon—animals much talked about but not found in the real world. They contend, therefore, it is unwise to construct rules about a phenomenon that probably does not exist, or which, should it exist in very rare cases, the courts would have grave difficulty distinguishing from competitive price behavior.

This view seemed to be confirmed by a game theoretic analysis by Selten (1978), who theorized possible outcomes of competition in a game between a multimarket incumbent and new entrants. Selten's model involves a finitely repeated game. He considers an incumbent monopolist in *N* geographically separated markets (i.e., chain store). Firms serving several geographically distinct markets are the prototype in the Chain Store game. The incumbent faces *N* potential entrants, one in each market. The potential entrants must make their entry decisions sequentially, one potential entrant making its decision each period.

Suppose the one-shot game is repeated 20 times in the context of a chain store which is trying to deter entry into 20 markets where it has outlets. The outcome of this finitely repeated game would be much different from that of the one-shot game because the chain store would fight the first entrant to deter the next 19. Sherer and Ross (1990), for example, point to

> "the demonstration effect that sharp price cutting in one market can have on the behavior of actual or would-be rivals in other markets. If rivals come to fear from a multimarket seller's actions in Market A that entry or expansion in Markets B and C will be met by sharp price cuts or other rapacious responses, they may be deterred from taking aggressive actions there. Then the conglomerate's expected benefit from predation in Market A will be supplemented by the discounted present value of the competition-inhibiting effects its example has in Markets B and C" (p.338).

In essence, a response that is predatory at some time in a particular market may signal to would-be entrants the likelihood of equally rapacious responses in other markets at later dates. Intuition suggests that the chain store may predate in the first few markets to establish a "reputation" for toughness and thereby deter the remaining entrants. However, the intuitive appeal of this reasoning is not supported in a straightforward game-theoretic model in Selten (1978). Selten first acknowledges, and it seems intuitively appealing, that in the early rounds of this game the incumbent would adopt the costly predatory action in order to persuade later entrants that they should best stay out, and that only near the end of the game would it be willing to share a market. Yet Selten also points out that this strategy cannot be consistent with the natural solution concept (that of perfect equilibrium) to employ in such situations.

The repeated game in the Chain Store context is much more complicated than the one-shot game. Selten relies on the backward induction approach to solve the problem. A player's decision of what action to choose will depend on what actions both players took in each of the previous periods. In picking his first action, a player looks ahead to its implications for all the future periods, so it is easiest to start by understanding the end of a multi-period game, where the future is shortest. Consider the situation in which 19 markets have already been invaded. In the last market, the subgame is identical to the one-shot entry deterrence game; the entrant will enter and the chain store will collude, regardless of the past history of the game. In the next-to-last market, the chain store can gain nothing from building a reputation for ferocity because it is common knowledge that he will collude with the last entrant anyway. This backward induction leads to the well-known "Chain Store Paradox".

A standard technique for solving repeated games of this kind, the "backward induction" starts by asking what behavior would be rational in the last, that is, N^{th}, stage. Since there would be no more entries, what happens at stage N can have no precedential effect, and so the only rational behavior at that stage would be for the entrant to enter and the incumbent to acquiesce. If so, then at the $N\text{-}1^{th}$ stage, what is done cannot influence behavior at stage N, so both players would choose the rational strategies for that stage only—enter and acquiesce. The same reasoning is iterated at stages N-2, N-3, and so on back to stage 1. Thus emerges the paradox: if the participants foresee rationally what will ensue at each stage all the way to the end of the game, acquiesce, not fight, is a Nash equilibrium solution. The incumbent lacks incentive to discourage subsequent entry, and as a result it ends up sharing its profits with entrants in every market.

Apparently, Selten's model is inadequate to justify Scherer's prediction that reputation effects will play a role. This inadequacy arises because the model does not capture a salient feature of realistic situations. In practical situations, the entrants cannot be certain about the payoffs to the monopolist. Rosenthal (1981) investigated the original chain-store game and pointed out that the paradoxical result in Selten's analysis is due to the complete and perfect information formulation in the model. He argued that in a more realistic formulation of the game, the intuitive outcome will be predicted by the game-theoretic analysis.

The chain store paradox seemingly supports the Chicago School's position that predation is irrational. This support is very limited, however. In other market settings, predation emerges as a rational, profit-maximizing strategy (Ordover, 1998). The challenge is to make predation for reputation a rational strategy. Several possibilities arise. The goal of each is to make "backward induction" impossible. For example, the game may have no end from which to reason backward. In such a model, the incumbent can in fact credibly threaten to predate against early entrants and build reputation for toughness. More importantly, the players in the game may not have complete and perfect information as assumed in the chain store game. I now turn to how this modification can lead to quite distinct outcomes in the game.

The Harvard School and "Reputation Models"

McGee's argument has been criticized on several grounds. First, the point of the reputation models is that much of the benefit from an episode of predation is the impact that it has on future entry or on entry in other industries. Indeed, if the monopolizing firm shows a willingness to merge with any rival, it may face a stream of entrants who enter just for the possibility of being bought out (Rasmusen, 1989). Thus, the simple single-market calculus is inappropriate in a multi-market or multi-entrant context (Ordover & Saloner, 1998). Second, there are legal constraints on mergers. The elimination of the rival is most advantageous when it results in a large increase in market concentration. However, it is in these circumstances that a proposed merger is likely to violate antitrust laws. In choosing between two unlawful methods of increasing its market power, therefore, a firm may prefer predation to merger because the former is much more difficult to detect (Posner, 1979).

The crucial point in McGee's analysis of predatory pricing is that the practice involves predator and victim in unnecessary loss of profits. Such loss or sacrifice of profits is independent, however, of whether the deliberate price cutting by the predator takes the price below cost (e.g., below its long-run marginal cost or average cost). All that is necessary is that the price is taken to a level lower than would otherwise prevail. In the duopolistic market situation which is postulated, the initial price could be at any level, from the competitive price at one extreme to the monopoly price at the other (Yamey, 1972). The aggressor may be able to achieve its objective of eliminating or disciplining the rival and of discouraging potential entrants by means of price cutting falling short of predatory pricing. The aggressor has an obvious incentive of minimizing the extent of its price cutting to achieve a particular result, and has a choice of tactics. A smaller cut may in some circumstances be as effective as a larger cut, especially when the rival has reason to suppose that the aggressor will go further if necessary. On the other hand, a sharp initial cut may sometimes convey the intended message more emphatically and achieve the intended result more quickly.

Critics of McGee also point out that if the predator faces rivals in other markets as well, it may be concerned about the effect of its pricing in one market on its rivals in another market. Yamey (1972, p.131), for example, argued that "the aggressor will, moreover, be looking beyond the immediate problem of dealing with its current rival. Alternative strategies for dealing with that rival may have different effects on the flow of future rivals."

These contributions by Yamey (1972) and others gave rise to what may be called "reputation models". Reputation models simply assume that it is feasible to drive the rival out and focus on a particular aspect of the profitability of predation, namely the effect of reputation on future entry.

In fact, the "chain store paradox" can be escaped if the sequence of entries is neither clearly bounded in number nor ordered in time. More critically, such paradox is resolved if the incumbent's response to early entries alters potential entrants' assessment of the profitability of entry. If potential entrants estimate the probability that an incumbent will fight additional entry on the basis of the behavior they observe in connection with early entry attempts, then it may pay the incumbent to react to early entries by fighting, despite the loss of profits in the markets entered. The more often the incumbent responds by fighting, the higher is the updated probability of fighting, as perceived by uncertain potential entrants (Sherer & Ross, 1990). In this regard, Kreps and Wilson (1982) show that a relatively small probability that the incumbent will fight at the first stage is sufficient to make fighting rational for the incumbent. In effect, the incumbent fights to engender a reputation for toughness that deters additional entrants. If the game has a finite number of well-ordered stages, the incumbent's incentive to react by fighting diminishes as the set of unchallenged markets declines, and eventually, the incumbent will give way to some entrant, after which deterrence will fail repeatedly.

Kreps and Wilson (1982) reexamined Selten's model, adding to it a "small" amount of imperfect information about players' payoffs. They found that imperfect or incomplete information is sufficient to give rise to the "reputation effect" that one intuitively expects in the finitely repeated chain-store game or in the finitely repeated prisoner's dilemma. "If rivals perceive the slightest chance that an incumbent firm might enjoy 'rapacious responses,' then the incumbent's optimal strategy is to employ such behavior against its rivals in all, except possibly the last few, in a long string of encounters. For the incumbent, the immediate cost of predation is a worthwhile investment to sustain or enhance its reputation, thereby deterring subsequent challenges" (Kreps & Wilson, 1982, p.254).

The two models presented by Kreps and Wilson are variants of the Selten's chain-store game. In their first model, a multimarket monopolist faces a succession of potential entrants. But unlike Selten's model, the entrants are unsure about the monopolist's payoffs in Kreps and Wilson (1982). This model shows that there is a unique "sensible" equilibrium where, no matter how small the chance that the monopolist actually benefits from predation, the entrants nearly always avoid challenging the monopolist for fear of the predatory responses. The second model enriches this formulation by allowing, in the case of a single entrant with multiple entry opportunities, that also the incumbent is uncertain about the entrant's payoffs. The equilibrium in this model is analogous to a price war: Since the entrant also has a reputation to protect, both firms may engage in battle. Thus, each employs its aggressive tactic in a classic game of "chicken," persisting in its attempt to force the other to acquiesce before it would itself give up the fight, even if it is virtually certain at the outset that each side will incur short-run losses.

Milgrom and Roberts (1982a) also take issue with those who doubt the rationality and relevance of predatory strategies. Predation will emerge even if it involves losses that cannot be directly recouped in the given market. The viability of this predatory strategy does not depend on being able to induce rival's exit.

Rather, all that is needed is that the predator be able to drive the rival's return from entry below that available elsewhere.

Milgrom and Roberts argue in their game theoretic analysis that if a firm is threatened by several potential entrants, then predation may be rational against early entrants, even if it is costly when viewed in isolation, because it yields a reputation which deters other entrants. Predation emerges as a rational, profit-maximizing strategy, not because it is directly profitable to eliminate the particular rival in question, but rather because it may deter future potential entrants. The mechanism by which this deterrent effect comes about is that by practicing predation the firm establishes a reputation as a predator. This reputation then leads potential entrants to anticipate that the incumbent firm will behave similarly if they should enter, and hence, entry appears less attractive to them.

Milgrom and Roberts (1982a) contend that as soon as the complete information assumption on the game is relaxed, the logic of Selten's backward induction breaks down. The possibility of actions taken in the past being a useful guide to future behavior in similar situations now opens up, and with this, reputation comes into play. Practicing predation now gives one a reputation as a predator which is valuable in deterring entry. Thus, if entry occurs at an early stage, it will meet a predatory response, because any other response encourages further entry. Recognizing this, potential entrants at these early stages will enter only if the market is so lucrative that they are willing to face certain predation. Only as the horizon draws near and the number of markets which may still be entered declines will the firm be willing to share a market.

One of the major properties in these models is that the value of a reputation—and the costs one will be willing to incur to obtain it—has a positive relationship with the frequency with which the reputation may be used, as measured by the length of the horizon and the inter-period discount factor.

Asymmetric information plays a key role in Milgrom and Roberts (1982a), since it provides the rationale for entrants to base their expectations of the firm's future behavior on its past actions. There are numerous reasons why this element of uncertainty should exist. On the one hand, the entrants could be not completely sure about the game being played. For example, it might be that the incumbent firm could actually be involved in some bigger game so that the firm's equilibrium strategy in this bigger game calls for it to prey in earlier stages.

New entrants can by no means be certain that existing firms will give ground. When potential entrants consider entering a market, they devote a good deal of thought to finding an entry strategy that strikes the best compromise between securing scale economies and minimizing the risk of price warfare. One common strategy is to enter at a small scale with a plant that can be expanded gradually when and if demand growth permits. This is done more readily in industries with flexible, divisible production process than in continuous process industries like petroleum refining and cement, where major equipment items may come only in large chunks (Sherer & Ross, 1990).

The presence of informational asymmetries can lead a firm operating in several markets to adopt a predatory strategy against entrants, even though such behavior is irrational when viewed in the context of a single market in isolation and even though there are only a finite number of potential entrants. This same point is made in the one-sided uncertainty model in Kreps and Wilson (1982).

Milgrom and Roberts (1982a) also recognized that predation will only rarely need to be practiced. The credible threat of predation will deter all but the toughest entrants, and so the occasions when the firm will be called upon to carry out its threat will be infrequent.

In sum, these "reputation" models demonstrate that predation is a rational and optimal strategy in a repeated game with incomplete information. The models enhanced our understanding of entry deterrence found in earlier studies by Bain (1956), Wenders (1971), Spence (1977) and Dixit (1979, 1980), which asked "what can the monopolist do prior to the entrant's decision point to make predation optimal in the short run?" These earlier studies suggested, *inter alia*, expanded capacity, limit pricing, sales networks and so forth. The relevance of this question is that the threat of predation is only credible if predation is *ex post* the optimal response, so the monopolist must make it so in order to forestall entry. The new game-theoretical analyses by Kreps and Wilson (1982), Milgrom and Roberts (1982a), and Kreps, Milgrom, Roberts, and Wilson (1982) suggest that in repeated play situations, the actions taken by the monopolist need not make predation actually *ex post* optimal—what they must do is to make predation possible, and perhaps, increase the probability assessed by the potential entrants that it is *ex post* optimal. If deterrence is the objective, as

Kreps and Wilson (1982) argue, it is the appearance, not the reality of *ex post* optimal predation, that may be important.

The Milgrom and Roberts model has the merit of showing that predation in one market to protect another market is theoretically possible. However, it does this at the cost of a number of restrictive assumptions, which it shares in part with the Selten model. For example, there is the assumption that entry occurs sequentially, in one market at a time by a different entrant. Consequently, if predation occurs today, its aim is to prevent entry in a later period, not to prevent simultaneous entry in other markets. Furthermore, their models require that predation, once it has begun in any market, must continue in that market, so formally they have a series of one shot games. Since giving up is not permitted, predation, once started, is automatically credible for any market.

Easley, Masson, and Reynolds (1985) have managed to relax this assumption. They allow for the possibility that entry may occur simultaneously in several of the monopolist's markets, possibly to stop or prevent predation. Entrants may now enter new markets to force a rise in profits in previously entered markets. They also allow for a monopolist to prey only for the gain of extra time, that is, to slow down entry in other markets, with full knowledge that the predation will not preclude eventual entry into all of their markets. The incumbent multimarket monopolist recognizes that it will subsequently cease its predation and face complete entry into its markets. Despite this fact, it can attain a greater present value by preying and retarding the rate of growth of competition. The fact that eventual entry is not stopped does not mean that predatory behavior has not occurred or that it has been unsuccessful. Profits can be made from slowing the inevitable. Easely et al. (1985) demonstrate that "successful predation may stifle competition without either eliminating competitors or even stopping (some) competitors from entering!" (p.453).

Easley et al. (1985) defined predation as "the selection of strategy in any entered market which does not maximize present value in that market when it is considered in isolation, but which is selected for the purpose of slowing or stopping future entry of equally efficient firms" (p.448). This definition provides for a very convenient tool for real world analyses. The price here needs not equal or close to marginal cost or long run average cost, which oftentimes is not available for academic research. In fact, the qualification of predatory pricing has been a subject of long debates in industrial economics (Areeda & Turner, 1975; Bork, 1978; McGee, 1980).

It is at times convenient to think of this strategy as a low price. Unlike "limit pricing" which will be discussed later, predatory pricing is only used in response to entry. These acts serve to slow or stop entry and need not require elimination of an entrant. They are knowingly selected in a fashion that does not maximize the monopolist's present value in each market separately. Thus, in Easley et al. (1985), the predatory markets may yield non-negative cash flows. This means a "long purse" (Telser, 1966) or "deep pocket" is not required for predation to have anticompetitive effects in some markets in perpetuity.

In a model with slight modification to the original chain-store game, Phlips (1995) provides a striking case where predation must occur. Suppose each player is immediately informed about the moves of all other players, and thus knows the history of the moves taken each point in the game by it and the other players. Further suppose the history of the incumbent's payoffs is not known to the potential entrants. In this game, predation must be practiced by the incumbent. The basic intuition is that if the chain store ever failed to prey during the game, all potential entrants immediately know with certainty that the incumbent is not a fanatic predator. And then, the chain store paradox becomes valid again.

Is Predation Rational in Cable Television?

How can these theories of market predation fit with the cable industry? To check the plausibility of predation theories with respect to cable television, let us recall some key elements in the Chicago school perspective. In this view, a predator must lower price across the entire market rather than simply discounting to those customers an entrant might serve. This places a large burden upon the predator because predation implies pricing below marginal cost; hence per unit losses are being sustained across an expanded level of output. In contrast, the entrant, attempting only to take some market position, need not commit to sustaining losses across the entire demand curve. This creates an asymmetry in the losses sustained by the incumbent and the entrant. It is this disparity in the distribution of losses during a predatory war which, in the Chicago school's viewpoint, makes predation such an incredible threat and, therefore, an unlikely strategy.

But some industry-specific characteristics might affect the likelihood of predatory pricing as a plausible tool. Industries that exhibit sunk costs, joint capital, and network externalities can be particularly susceptible to market predation (Gabel & Rosenbaum, 1995). Take, for example, the telecommunication industries—cable and telephone to be more specific—where an incumbent firm operates "chain stores" in multiple markets that share joint capital. Suppose a rival firm enters only some of those markets. Pricing in the shared markets below marginal cost imposes losses on the rival. The incumbent firm, however, can offset those low prices with earnings from monopoly markets. As long as revenues from all markets cover combined marginal costs and the joint capital cost, the incumbent remains profitable. In short, the joint nature of the capital imposes a cost disadvantage on the entrant relative to the incumbent.

When joint costs are sunk, the entrant is in a more tenuous position. To overcome cost disadvantages due to the joint nature of the capital, the entrant would consider entry into all markets. The sunk nature of the investment, however, discourages such entry because the investment will be lost if entry is unsuccessful. Therefore, the entrant is destined to be at a cost disadvantage to the incumbent firm unless it undertakes the risky sunk investment of entry into all markets simultaneously (Gabel & Rosenbaum, 1995). In essence, sunk and joint capital costs make predatory pricing a very powerful, plausible and profitable strategy for the dominant firm to oust its rival entrant from the market and deter future entry.

Gable and Rosenbaum (1995) illustrate that these problems of sunk and joint costs, along with network externality, enabled AT&T to successfully engage in predation in the Madison, Wisconsin market at the turn of the 20th century. The reward to AT&T was not so much in its opportunity to raise price after its rival telephone company exited the market, as in the protection such predation provided for AT&T's remaining monopoly markets (Gabel & Rosenbaum, 1995).

Given many similarities between the telephone and cable industries, it is no surprise to find the strategic (ab)use of fixed costs problems and first-mover advantages in the cable industry (Barrett, 1996; Hazlett, 1990, 1995a). In his attack on monopoly franchising, for example, Hazlett (1990) states;

> "The existence of sunk cable plant, however, precisely identifies sub-markets of entrants and thus mitigates the problem of infra-marginal customers for the incumbent. Predatory price cuts need not be sustained across all customers, and the losses of incumbent and entrant will diverge in reverse: the entrant will sustain losses across its entire output range, the incumbent across a limited slice of its output. Indeed, focusing on just those segments where entry can physically occur, the incumbent is able to employ a panoply of scale advantage, for example, in marketing and brand name identifiability, further biasing competitive losses towards the entrant" (pp.105-106).

Furthermore, capital fixity in cable television may offer increased opportunities for the incumbent to engage in predation because it will likely broaden the range of predatory pricing. As extension into sub-markets for cable television service causes the entrant to make nontrivial and nonsalvageable investments, these fixed costs can make the incumbent's price, which is above its average variable cost (AVC), lie below the entrant's average total cost (ATC).

In this case, an incumbent who sets prices equal to or above ATC may be able to discourage an equally efficient entrant. This will facilitate predation by lowering the cost of predation to the incumbent. In sum, "the easy geographical identification and separation of customers, coupled with the necessity of bond posting in specific capital, makes predation a relatively cheap defensive strategy" (Hazlett, 1990, p.107) in the cable industry.

As discussed earlier, predation by incumbents in overbuild markets is an empirical question. Despite the Chicago school's attack on the likelihood of predation in general (Bork, 1978; McGee, 1958), each industry will have a different level of possibility for predatory pricing. In the cable television industry, as noted by Hazlett (1990), predation may be highly likely because "the existence of sunk cable plant precisely identifies submarkets of entrants and thus mitigates the problem of infra-marginal customers for the incumbent". Contrary to Bork's argument that the disparity in the distribution of losses due to predatory pricing makes predation such a weak threat and hence an unlikely strategy, predatory price cuts need not be sustained across all customers in cable television markets. In fact, the entrant will have to sustain losses across its entire output range while the incumbent can employ selective price-cutting strategy across a limited slice of its output. Further, focusing on those segments where entry occurred physically, the incumbent is able to employ an array of scale advantages including marketing and brand name recognition, further biasing competitive losses toward the entrant (Hazlett, 1990). Hazlett concludes that potential and actual competition would be more prevalent were it not for franchise restrictions and predatory behavior by incumbents.

This study is designed to investigate the effects of competition in general, and the existence of predatory pricing in particular in the open entry era since the passage of the 1996 Telecommunications Act. It is hoped that the investigation of competitive interaction with respect to the price dimension will provide us with a glimpse of the feasibility of overbuild competition, and ultimately market structure, in the cable industry in the years to come.

Description of Methodology and Model

In the following analysis, dependent variables are monthly rates for basic cable service and the number of channels in the basic service package. Since cable systems maintain a different rate structure, it is necessary to standardize, or define, this package for a comparable measure. To reflect competitive effects on price more precisely, it seems warranted to measure monthly rates for the standard basic package or tier that must include most popular cable programming networks such as CNN, ESPN, TNT, and USA as well as superstations (i.e., WGN and TBS). Occasionally, cable systems maintain a mini-tier with superstations for an additional monthly charge, separate from the standard basic service. In such instances, this monthly charge was included in the standard basic service rate. In addition, a number of cable operators moved the Disney channel from premium tier to the basic package in response to competitive entry. Thus, the dependent variable in the price equations is monthly rates for the standard basic package and the Disney channel (*BDRATE*). Another dependent variable (*BDHRATE*) in the price equations is monthly rates for the standard package which includes the Disney channel and a primary premium channel, HBO. In very rare cases (in fact, only 2) where HBO is not carried, the monthly rate for Showtime was used. These dependent variables enter the equations in logarithmic form.

On the right-hand side of each equation are a number of exogenous variables that have been found to influence the choice of price and quality through their effects on the demand for cable television service, the marginal cost of production, and the price-cost margin. More specifically, the model estimates the following relation:

Price = f(INCOME, SUBS, DENSITY, CHANNEL, PEG, TOP8MSO, DUOPOLY, MUNICIPAL, POTENTIAL, DIGITAL, INTERNET, VOICE, ONESTOP)

Quality = f(INCOME, SUBS, ADI, DENSITY, TOP8MSO, DUOPOLY, MUNICIPAL, POTENTIAL, DIGITAL, INTERNET, VOICE, ONESTOP)

Complete definitions for the empirical variables included in these equations are provided in Table 2.

Table 2 Variable Definitions

Variable	Description	Expected Sign	Source[a]
Regressand			
BDRATE	Rate charged for basic service including the Disney channel		[1]
BDHRATE	Rate charged for basic service including the Disney channel & HBO		[1]
CHANNEL	Number of satellite-delivered, cable-only channels, excluding broadcast signals, C-SPAN I&II, home shopping, and PEG access channels		[2]
CHANNELC	Number of satellite-delivered, cable-only channels, including C-SPAN I&II, home shopping, and PEG access channels		[2]
CHANNELT	Number of satellite-delivered, cable-only channels, including broadcast signals, C-SPAN I&II, home shopping, and PEG access channels		[2]
Regressor			
INCOME	Median household income ($)	+/+	[3]
SUBS	Number of subscribers to basic cable service	-/+	[4]
ADI[b]	ADI TV market ranking of franchise area	-/+	[4]
DENSITY	Homes passed divided by number of plant miles	-/?	[4]
PEG	Number of Public, Educational, Governmental access channels	+/n.a.	[1]
TOP8MSO	Dummy variable = 1 if firm is one of the top 8 MSOs as of June 1999, 0 otherwise	-/+	[1, 4]
OVERBUILD	Dummy variable = 1 if multiple operators and overbuild areas, 0 otherwise	-/+	[1, 2, 5]
MUNICIPAL	Dummy variable = 1 if system is owned & operated by a local municipality, 0 otherwise	-/?	[4, 6]
POTENTIAL[c]	Dummy variable = 1 if system faces "potential competition," 0 otherwise	-/+	[5, 7]
DIGITAL	Dummy variable = 1 if system offers digital cable service, 0 otherwise	?/?	[1]
INTERNET	Dummy variable = 1 if system offers high-speed Internet access service, 0 otherwise	?/+	[1]
VOICE	Dummy variable = 1 if system offers telephone service, 0 otherwise	?/?	[1]
ONESTOP	Dummy variable = 1 if system offers all of conventional cable, Internet access, and telephone services, 0 otherwise	-/+	[1]

[a] Sources:
[1] Telephone survey
[2] Online survey (*wwww.tvguied.com*, *tv.yahoo.com*, *msn.clicktv.com*)
[3] US Department of Commerce (1994). *County and City Data Book*
[4] Warren Publishing (1999). *Television and Cable Factbook*
[5] FCC (1999). *Community Unit Reference List*

[6] American Public Power Association (1999). *Annual Directory & Statistical Report*
[7] Various trade journals including *Multichannel News*, *Cable World*, and *Cablevision*
[b] ADI TV market rankings were converted to ADI in the following manner (see Mayo and Otsuka, 1991):

= (103 – ADI) if the cable system is located in the top 100 ADI TV markets
= 2 if the cable system is located below the top 100 ADI TV markets
= 1 if the cable system is located outside ADI TV markets

[c] Potential competition" was operationally defined as one of the following three conditions:

(1) A new firm has been granted a cable franchise, but not activated as of survey time
(2) An identifiable firm has been in the franchise negotiation process
(3) The franchise area has been reported in major trade journals that an identified firm was considering entry in the market, 0 otherwise

Estimating the above models amounts to a simple, reduced form comparison of monopoly and duopoly rates on the one hand, duopoly and municipal on the other. No attempt was made to recover structural hypotheses in the present study. Since the primary interest of the present study is to determine how price and quality choices vary with market structure and ownership type (and not particularly concerned with estimating such structural parameters as the own-price elasticity of demand), the analysis of data will focus on estimating reduced-form equations for the determination of price and quality.

Because direct data on the marginal cost of basic service were unavailable, the model includes several variables that are believed to determine marginal cost in the price equations. These include the number of basic subscribers (*SUBS*), a measure of population density (*DENSITY*), the number of channels offered by the cable firm (*CHANNEL*).

To the extent programming cost is related to service price, the number of cable-only channels delivered via satellite would have a direct effect on subscription fees for basic cable. In previous studies, *total* number of satellite-delivered cable channels has been used to control the quality of cable service. In this study, the basic service package is more specified according to each channel's contribution to programming cost. In general, a basic service package is the bundle of multiple programming products that have different attributes in their relationships to cost functions for a local cable system. According to distinct cost functions for each channel, a basic cable package may be divided into separate groups. Most cable channels are carried on the local system for a license fee. Most popular cable channels (in terms of audience rating) such as USA, ESPN, TNT, and CNN, are in this group. But some cable channels do not incur any programming cost due to license fees. For example, home shopping channels (e.g., Home Shopping Network, QVC, and Valuevision) do not charge the cable operator license fees for their programming. Instead, these programmers make payments to the system operator, as a form of commission, for each order originated in the system's franchise areas. In other words, the monetary payment is in reverse: home shopping networks pay a commission to system operators in return for the carriage of their programming. No license fees are necessary for public, education, government (PEG) access channels, although these channels, too, are included in the basic package. PEG access channels, however, may have a positive effect on programming cost for the cable system operator because these channels will require programming personnel and facilities such as studios and equipments (Zupan, 1989a, 1989b). Yet another distinct relationship is found with broadcast signals and C-SPAN I and C-SPAN II. The point is that it would produce more precise estimates of programming cost to exclude all these channels from basic package. Thus, variable *CHANNEL* here is the number of satellite-delivered, cable-only channels, but not broadcast signals, home shopping, C-SPAN I, C-SPAN II, and PEG access channels.

According to (Zupan, 1989a, 1989b), nonprice concessions such as franchise fees and community programming significantly raise cable costs. Among various types of nonprice concessions, Zupan found that community programming on access channels accounted for about 4 percent of the total annual operating costs. Thus, PEG access channels may have a positive relationship with price of cable services, while their contribution to revenue generation is invisible. To test this effect on price, it is necessary to separate PEG access channels from the basic cable package. Variable *PEG* is the number of public, education, government access channels.

The primary measure of cable system size employed here is the number of subscribers (SUBS) to basic cable service. It is the output level of the system that may have an important bearing on the average cost, hence price ultimately, for cable services. However, it should be noted that the size of local cable systems measured in terms of subscribers may not have a significant effect on consumer price for two reasons. First, the extent of scale economies in cable television service has been challenged by both academic research (Noam, 1985; Owen & Greenhalgh, 1986) and numerous entries by small cable systems around the country. Second, the number of subscribers would be a poor measure of programming cost per subscriber at the local level because license fees are paid *on a subscriber basis* to the cable programming networks. In contrast to previous studies by Ford and Jackson (1997), therefore, the average programming cost is the same on all level of system size measured in the number of subscribers at the local system level. Only true fixed costs incurred for headend facilities may be reduced as the system size increases. But its effect, too, may be mitigated by diseconomies of scale. In a study by Ford and Jackson

(1997), the number of subscribers to the local cable system was found to have no effect on programming costs and prices.

Indeed, programming cost per subscriber in cable television service may be related to the total number of subscribers at the national MSO level. Chipty (1995) found tremendous bargaining power of big MSOs and its significant effect on programming costs. Dertouzos and Wildman (1998), Ford and Jackson (1997), and General Accounting Office (1999a) all revealed that big MSOs enjoyed a very stiff "volume discount" for programming fees. For example, one cable channel cost $0.02 per subscriber for MSOs with more than 3 million subscribers, $0.22 per subscriber for MSOs with between 500,000 and 3 million subscribers, and $0.29 per subscriber for MSOs with fewer than 500,000 subscribers (Ford & Jackson, 1997). Despite the significant discounts for large MSOs, previous studies (FCC, 1994a; Jayaratne, 1996; Thorpe, 1985) found that they actually charged higher rates than small MSOs and independent systems. Jayaratne (1996) attributed this to higher quality programming and associated higher programming costs by large MSOs. To capture this MSO size effect, variable *TOP8MSO* is included in the equations to be estimated. As of 1999, the biggest 8 MSOs in the country collectively serve more than 60 percent (42 million homes) of the total wireline cable subscribers. Adelphia Communications, the eighth largest MSO, had about 2.3 million subscribers (*Cablevision*, May 17, 1999, p.43).

Income levels (*INCOME*) in the franchise areas have to do with cable service price in two ways. First, it may have a positive relationship with cost for cable service. Some prior studies, including Emmons and Prager (1997) and Ford and Jackson (1997), used the median household income as a proxy for local wage rates as they may be positively related to marginal cost. However, they failed to control the effect of income level in the community on cable price because they used income at the county level. There are tremendous variations in income among towns even within a county. For example, it is not well devised if one tries to capture an effect of income on price in the Perrine, FL area ($30,481) by using median household income for Dade county ($16,925). In this study, the income level is controlled by using the median household income at the local community level to avoid this problem. Where a cable system serves multiple communities, the median household income for the system's primary operation is used. Another problem is to use the income level as a proxy for wages. Because the operation of a cable system is not labor-intensive, and thus wages do not occupy much in expenses, local wage rates would not produce a meaningful effect on marginal cost. Thus, it seems more appropriate to conceive income levels as a proxy for the intensity of demand in a particular community. Prior studies have found that cable subscribers tend to have a higher income level (Baldwin, McVoy, & Steinfield, 1996).

Marginal cost for cable services decline as the number of homes passed by a cable system increases in a given area. The cost of adding a subscriber to a cable system generally declines as more homes are wired per mile by coaxial cable. *DENSITY* is defined as the number of homes passed, divided by total cable plant size measured in miles.

Despite theoretical debates of predation and case studies supplied by Hazlett (1990), Barrett (1996), and trade journal reports, the issue of predatory pricing has remained unsolved largely because these observations were refuted as an anecdote. But more importantly, in order to show predation, a researcher must have access to various cost information including long-run average cost and marginal cost for both the incumbent and the entrant. Even with sufficient information in a few cases, it would be very difficult for researchers to conduct the systematic analysis of the prevalence of predatory pricing as a competitive strategy.

Faced with these obstacles, the present study attempts to take a different approach. First, a regression analysis of the 247 cable systems allows the researcher to discover price difference between monopolists and duopolists. As consistently evidenced in all previous studies, overbuild markets are expected to charge significantly lower prices for basic and premium channels. To measure the effect of overbuild competition, the equations include a dummy variable *OVERBUILD* defined as a situation in which cable television service is offered by two or more *wireline* cable systems in direct head-to-head competition within the same service area. In the absence of cost information, however, it would be almost impossible for the researcher to determine whether or not price differences, if any, would indicate the existence of predation. To determine this, another group of cable systems was included in the sample. A group of 33 municipal cable systems (*MUNICIPAL*) will be used as a comparison variable, and the comparison of its coefficient to that on *OVERBUILD* should help the researcher determine the intensity of price wars in the overbuild areas. So, the group of municipal cable systems will provide a benchmark test to the extent that these systems are providing their residents with cable services, not for economic "profits", but for other reasons. It is assumed, as in the Emmons and Prager (1997), that privately owned cable system operators choose the price and quality of basic cable service in order to maximize profits, taking as given the demand for their product, the technology, the prices of inputs, and market structure. Nonprivate, city-owned cable systems are permitted to choose price and quality levels that differ from those offered by privately owned firms, to allow for the possibility that they pursue alternative objectives, such as maximizing consumer welfare. Variable *MUNICIPAL* is assigned a value of 1, if the system is owned and operated by a city.

To utilize this comparison effectively, it is necessary to make a few assumptions on the behavior and motivation of municipal cable systems. Indeed, it is conceivable to assume that municipal cable systems will behave differently in many ways. First, many cities operate their own utilities operations (e.g., electricity and water). Most city-owned cable systems share some principal elements of cable networks such as poles, ducts, and conduits with other city-owned operations. The sharing of key network facilities may lead to cost reductions for municipal cable systems. Second, prices for cable services will also likely deviate from those of private monopolies and duopolies because the primary objective of city-owned cable systems is not "maximizing profits". Virtually all managers for municipal cable systems revealed in telephone interviews with the author that their motivation of municipal cable systems was not so much "making money" as "enhancing residents' satisfaction" with cable services. As such, their concern is "break even" rather than "maximizing profits". The performance of municipal cable systems will play two critical roles in this study. First, it should help the researcher observe price deviations between private and non-private systems. Second, it will shed light on strategic use of price by the incumbents. As a benchmark, prices charged by municipal cable systems will be compared to those of incumbents facing a new entrant as well as monopolists.

Another interesting variable included in the equations is the threat of "potential competition". Contestability theory suggests that where entry is possible, even "potential entry", not active, can still form an important competitive constraint on incumbent behavior (Baumol, Panzar, & Willig, 1982). In the presence of such a potential threat, a monopolist will exercise restraint in contestable markets. Due to the number of strong assumptions such as "no fixed costs" and "zero exit costs" which the contestability theory in its original form is premised on, it would be hard to apply the contestability principle to the telecommunication industries that typically require both significant fixed and exit costs. But the idea may still be tested if it is carefully crafted.

In this study, the threat of "potential competition" is embedded as a dummy variable. "Potential competition" (*POTENTIAL*) is present if a local cable system faces one of the following three conditions: (1) a new firm has been granted a cable franchise in a market in question, but the system was not active as of survey period (January 2000); (2) a specified and identifiable firm has been in the process of franchise negotiations with a local franchising authority; (3) a market has been reported in major trade journals that an identified firm was considering entry into a specific market. Thus, if a market met any of these conditions, the incumbent was considered to face "potential competition".

Models of industrial organizations focus almost entirely on economies of scale as the traditional source of efficiencies in most industries. Yet there are other related factors that may be important sources of cost savings as well for the multi-product firm. A growing body of economic literature pays more attention to cost savings that arise from simultaneous production of different outputs over shared facilities. These economies of scope may materialize when there are special cost savings that accrue to a multi-product firm that are unavailable to firms producing only one of the products but not both. In short, the single firm can supply a bundle of products demanded by the market at a lower total cost (and price) than some combination of two or more single-product producers. Such special synergistic effects could arise from: achievement of new markets, stronger combined product lines, buying raw materials in large volumes, eliminating duplicate general and administrative functions/departments, and risk reduction in capital markets. To capture this subadditivity factor and reflect recent development in the cable industry, the price equations include three products dummy variables: *INTERNET*, *VOICE*, and *ONESTOP*. If a cable system provides cable modem service as well in its franchise areas, *INTERNET* is assigned a value of 1, otherwise 0. Large cable MSOs have begun to provide local telephone service within their service areas. A few private or municipal cable systems also operate their own telephone services in small towns. *VOICE* is a dummy variable to investigate cost savings or lack thereof from the joint operation of cable and telephone networks. Yet another group of MSOs, most notably MediaOne, Comcast, and Cox, is moving toward the provision of a complete package of telecommunication services from a single source. These companies claim that consumers will be offered the convenience of 'one-stop shopping". To capture the effects of (dis)economies for these multi-product firms, a dummy variable *ONESTOP* is included in the equations. If a cable system provides cable modem service as well as telephone service in its franchise areas, *ONESTOP* is assigned a value of 1, otherwise 0.

Description of the Data

The following analysis is based on a sample of 247 cable systems across the country. The sample comprises three subsamples. First, this study began with a group of 91 cable systems that are under overbuild competition. This competing subsample includes all systems that could be identified as facing direct competition from another cable operator in some portion of their franchise territory. The researcher collected information on market structure in each local market included in the sample, using various sources. The starting point for the identification of overbuild competition in the local market in question was the FCC's large compilation called the Community Unit Reference List, which contains more than 30,000 US communities and cable systems in each community. This archive contains very basic information on cable systems at the franchise-granting community level. Available in this list are community and county of service area, type of cable system operation, name of system operator, system identification, and beginning year of service. Among 30,000 communities, about 300 communities were found to have granted more than one cable franchise. Because a single cable system usually provides service in surrounding communities as well and operator specific information is available at the system level, not at the community level, the total number of competing systems available for research reduces to 119 cable markets. The problems of missing or incomplete information further reduced the number of competing markets to 91 for the present study.

The municipal subsample consists of all nonprivate, city-owned cable systems. According to the 1999 *Annual Directory & Statistical Report* published by American Public Power Association, there were 76 cable systems that were owned and operated by municipal government as of 1999. Among these 76 systems, all municipal cable systems serving more than 1,000 subscribers were included in the sample. These amounted to 33 systems. But one municipal system was unable to provide information on some system characteristics and was dropped in the analysis. The private monopoly subsample includes 150 randomly chosen cable systems that face no direct competition and are privately owned. Among these, 26 systems were dropped because of incomplete data, leaving 124 monopoly cable systems. Thus, the total number of observations included in the regression analysis was 247 systems encompassing 124 monopoly, 91 duopoly, and 32 municipal systems.

Data on cable system characteristics were collected from the 1999 edition of the *Television and Cable Factbook*. Demographic data on franchise areas were collected from U.S. government publications, including the *County and City Data Book* and *Survey of Current Business*.

The following empirical analysis is based on cable system data collected from five different sources. First, telephone surveys were used to gather information on prices for standard cable service and one premium channel (HBO). The telephone surveys also checked if the cable system provided high-speed Internet access and telephone services other than the plain old cable service in its franchise areas. Second, the Community Unit Reference List file compiled by the FCC was used to find out the existence of overbuild competition. Third, information on channel lineups on each cable system was collected through online television listings services such as *TV Guide Online* (www.tvguide.com), *Gist TV* by Yahoo (tv.yahoo.com), and Microsoft's internet service *MSN* (msn.clicktv.com). These online services are preferable because not only do they provide most updated information on cable programming in each segment by zip code within a cable franchise area, but they also allow the researcher to confirm the FCC data on the presence of overbuild competition. Fourth, the 1999 edition of *Television and Cable Factbook* provided other system characteristics such as the number of subscribers and plant size. Fifth, the

County and City Databook published by the Department of Commerce was utilized for household income levels.

Descriptive Analysis

Table 3 presents descriptive statistics for each variable. The first four variables show that the sample in the present study represents the cable industry very well. The average number of subscribers is 46,397 out of 74,994 cable-available homes. This amounts to the average penetration of 68.3 percent. Paul Kagan Associates, Inc. shows that basic cable penetration was 68.9 percent as of 1998 (NCTA, 1999). The average number of homes per mile, a market density measure, is 92.5, which is almost the same with the national average of 93 homes per mile, as reported by Paul Kagan Associates, Inc. These system characteristics are very close to those used in simulation studies by Smiley (1986) and by Hazlett (1995b). This similarity should allow for the direct comparison of the following econometric analysis with findings in the prior research that was based on hypothetical scenarios.

As of January 2000, the average monthly rate for basic service including the Disney channel was $31.39, whereas the typical cable subscriber was paying $11.57 for HBO. On average, cable consumers received about 42 cable-only channels. Additionally, they were offered a little more than 2 PEG access channels.

More than half (55 percent) of the systems in the sample were affiliated with the nation's biggest 8 MSOs and provided digital cable services. Internet access service over cable (cable modem) was available on half of the systems included in the sample, while local telephone service was offered in about 11 percent of the 247 systems. About 10 percent of these systems provided a complete package of video, data, and voice services for the convenience of "one-stop" shopping.

Table 3 Descriptive Statistics of the Sample

Variable	Mean	S.D.	Minimum	Maximum
SUBS	46397.16	78413.25	401	585000
HOMES	74994.35	139413.10	625	1201093
PRATE	68.25	15.06	10.68	99.65
DENSITY	92.52	70.33	21.90	562.13
INCOME	29031.75	9808.33	12573	63976
BDRATE	31.39	6.94	15	53.89
HBO	11.57	1.81	2	17
CHANNEL	41.62	9.73	13	59
PEG	2.33	2.04	0	11
TOP8MSO	.5543	.4980	0	1
OVERBUILD	.3696	.4837	0	1
MUNICIPAL	.1284	.3352	0	1
POTENTIAL	.0973	.2969	0	1
DIGITAL	.5469	.4988	0	1
INTERNET	.4941	.5009	0	1
VOICE	.1137	.3181	0	1
ONESTOP	.0980	.2980	0	1

Econometric Results

Competitive Effects on Price

The estimates of the price equations are presented in Table 4. Both price equations and quality equations—which will be presented later—were estimated using the log-level model. The results for the two equations are very similar in terms of each model's overall explanatory power and each variable's effect. The model shows that *INCOME* is a significant factor for both basic service and premium channels, although its effect is economically very small. Note *INCOME* is measured in thousands of dollars and its coefficient suggests that a $1,000 increase in the median household income in a community is predicted to increase basic service price by only .2 percent. Similarly, the number of subscribers (SUBS) is also significant, but its effect on price is negligible. In fact, its coefficient says that the addition of a thousand subscribers would increase price of basic service by .4 percent, which does not provide any significant economic meaning. Nonetheless, it is worth noting that the relation between *SUBS* and *BDRATE* and *BDHRATE* is positive and statistically significant. Contrary to the general notion of scale economies in cable television, the system size measured in the number of subscribers does not produce any price benefits for the consumer, holding other factors constant. It is not surprising in cable television, considering the disparity between cost and price (Ahn, 1997). This finding in fact is consistent with previous studies by Noam (1985) and Owen and Greenhalgh (1986). The coefficient on *TOP8MSO* may reveal another example of the disparity between cost and price in cable television. As discussed above, the biggest MSOs have a strong bargaining power over the cable programming networks and they receive substantial amount of "volume discounts" vis-à-vis mid- or small-sized MSOs (Chipty, 1995; Dertouzos & Wildman, 1998; Ford & Jackson, 1997). But these MSOs charge, *ceteris paribus*, 5.6 percent more than smaller cable systems [exp(.0553) =1.0568]. This result is consistent with the findings of Thorpe (1985), FCC (1994) and Jarayatne (1996).

As expected, the number of channels is a statistically very significant factor for cable service price. The addition of one more channel is predicted to increase basic service price by .75 percent, which is a nontrivial effect size in an economic sense.

On the other hand, the coefficients on *PEG* suggest that the number of PEG access channels is negatively correlated with price. Although their effect on *BDRATE* is statistically insignificant while the effect on *BDHRATE* is significant at the .10 level, its effect size is about .8 percent per each additional PEG access channel. It is clearly not negligible and the direction of its effect is against the expectation. It is difficult to interpret this result. One plausible explanation is a spurious correlation. In other words, the number of PEG access channels might have a strong correlation with another attribute of the cable system or of the community that this study did not intend to capture. One of those attributes may have to do with the influence of the local franchising authorities. The number of PEG access channels are basically determined in the franchise negotiation process and franchise authorities try to reserve as many access channels as possible for the public, educational, and governmental use. In franchise negotiations in the past, cable operators tended to promise many nonprice concessions including community programming channels in return for an exclusive franchise. Obviously, more powerful franchise authorities demand more access channels regardless of actual usage. This bargaining power may also be exerted to maintain the low price in a community where the local franchising authorities have regulatory control over price. Even though the rate regulation of cable service was sunset in March 1999, its impact may still remain due to path dependence. In short, there might be a spurious correlation between the number of PEG access channels and price such that another third attribute (e.g., the influence of franchise authorities) might simultaneously determine both access channels (upward) and the price level (downward) in a community.

The coefficients on competition and nonprivate ownership variables are all large, negative, and statistically very significant in both equations. First, consider *OVERBUILD* where two wireline cable operators compete in the same market. Overbuild competition leads to a price reduction by 20.7 percent [exp(-.2324) - 1=-.2073]. This effect has been consistently found in prior studies. Second, municipal cable systems offered basic cable service at prices that were 25.7 percent [exp(-.2969) - 1=-.2568] lower than those charged by monopoly operators. This is comparable to Emmons and Prager's 22.6 percent price differential in 1989 between municipal and monopoly cable systems (1997).

The coefficients on *POTENTIAL* are not only significantly different from zero at the .05 level, but the effect size is quite large. They suggest that competitive threats from a "potential entrant" lead to a price of basic cable service that is 7.7 percent lower than that of monopolists. This differential may be an indication of "limit pricing" by incumbents in an effort to prevent actual, full-blown entry. The incumbent may try to signal that post-entry equilibrium would not be profitable for "potential entrants" and that they would face price warfare should entry occur.

Table 4 Estimates of Price Equations

	Dependent Variable: ln(*BDRATE*)		Dependent Variable: ln(*BDHRATE*)	
Independent Variable	Coefficient (Std. Error)	t-statistic	Coefficient (Std. Error)	t-statistic
INCOME (in thousands)	.0022221 (.0012399)	1.792*	.0021535 (.0009875)	2.181**
SUBS (in thousands)	.0004058 (.0001665)	2.437**	.0002997 (.0001326)	2.259**
CHANNEL	.0074285 (.0015454)	4.807***	.0057592 (.0012308)	4.679***
PEG	-.0087930 (.0061751)	-1.424	-.0081602 (.0049179)	-1.659*
DENSITY	.0001626 (.0001634)	.995	.0001974 (.0001301)	1.517
TOP8MSO	.0553969 (.0270650)	2.047**	.0364250 (.0215550)	1.690
OVERBUILD	-.2324208 (.0258471)	-8.992***	-.1873848 (.0205850)	-9.103***
POTENTIAL	-.0804296 (.0390074)	-2.062**	-.0633207 (.0310661)	-2.038**
MUNICIPAL	-.2969203 (.0364366)	-8.149***	-.2703530 (.0290186)	-9.317***
DIGITAL	-.0319171 (.0263503)	-1.211	-.0176349 (.0209858)	-.840
INTERNET	.0456307 (.0259503)	1.758*	.0403348 (.0206672)	1.952*
ONESTOP	-.0860918 (.0412902)	-2.085**	-.0827502 (.0328841)	-2.516**
Constant	3.1620770 (.0568545)	55.617***	3.533274 (.0452797)	78.032***
	$F(12, 234) = 17.07$ Prob. > F = 0.0000 $R^2 = .4667$ (n = 247) Adj. $R^2 = .4394$		$F(12, 234) = 19.30$ Prob. > F = 0.0000 $R^2 = .4975$ (n = 247) Adj. $R^2 = .4717$	

Note: *, **, *** indicate values that are significantly different from zero at the .10, .05, and .01 levels, respectively.

It might be somewhat surprising to see this result given the fact that the incumbent may launch price warfare at any time *after* actual competition takes place in its service areas. But it should be noted that this 7.7 percent differential is *not* a price *reduction* from a pre-entry monopoly price level. Instead, it is a sign of price-checking power exerted by the threats of potential competition. That is, when "potential competition" exists in its service areas, an incumbent would restrain from using its monopoly power, while others still exploit their immunity from competition to increase price year after year. Where actual competition is present, this trend has been reported frequently in the cable industry (FCC, 1997; Hogan, 1998b). In Sacramento, California, for example, Sacramento Cable Television (the incumbent operator) launched extensive remarketing campaigns in the neighborhoods that were expected to be overbuilt before a new entrant started its service, offering free installation and 3 months of free service (Hazlett, 1995a). The price-constraining power of "potential competition" would be very likely, particularly when entry is imminent. Oftentimes, dramatic price cuts right after competition also bring about consumer backlash since consumers and franchising authorities tend to question the credibility of pre-entry prices. Recall the operational definition of "potential competition" in this study. One of the three conditions to meet the definition of "potential competition" was that "a new firm has been granted a cable franchise in a market in question, but the system was not active as of survey period". Clearly, this does not mean "actual competition", but does suggest competition is "highly likely and credible and imminent". To the extent that this definition correctly measures "potential competition", the econometric results suggest that "potential competition" plays a significant role in keeping price in check, if not reducing it.

One way to cope with the squeezed profit levels due to competitive forces is to expand the line of services using the same cable infrastructure. Another interesting group of variables in the regression analysis attempted to measure whether or not cable prices are reflected with (dis)economies of scope. While statistically insignificant, price of standard (analog) basic service charged by cable systems offering digital cable packages (*DIGITAL*) is about 3 percent lower than that charged by systems that provide only traditional analog service packages. This may reflect operators' pricing strategy that attempts to "recapture" channels from analog to offer digital tiers. On the other hand, cable systems that also provide Internet access service (*INTERNET*) over cable are predicted to charge 4.6 percent more than systems that do not offer such a service. And this difference is significantly different from zero at the .10 level. This seems to imply that there exists cross-subsidization from the cable operation to the high-speed Internet service within a given service area. While no concrete evidence of cross-subsidization is available, there is no reason to believe that diseconomies of scope play a role in increasing cable price. A more plausible explanation is, therefore, cable operators utilize their monopoly profits from the plain old cable television operation to market such new services as the Internet access service through the internal transfer of profits (Baldwin et al., 1996). Interestingly, however, if a cable system provides Internet access as well as telephone services (*ONESTOP*), the system is predicted to maintain a price for cable service that is much lower than otherwise. This is statistically significant at the .05 level, and may suggest the existence of economies of scope in the production of multiple services over the cable network. This may have a significant implication for synergistic effects from the efficient use of cable networks. A dummy variable *VOICE* did not enter in the equations because of the multicollinearity problems with *INTERNET*.

Competitive Effects on Service Quality

Table 5 presents the estimates of quality competition. In estimating the effects of overbuild competition, two dependent variables are used as an indicator of service quality. The first, ln(*CHANNELC*), is the number of cable-only channels in the standard basic service tier including satellite-delivered channels, PEG access channels, and home shopping channels. The second, ln(*CHANNELT*), is the total number of channels in the standard basic service tier including broadcast channels as well as all the cable-only channels. Satellite-delivered cable-only channels are costly to carry since cable operators have to pay a license fee on a per-subscriber basis. In case of broadcast stations, cable operators have to make investments in channel capacity to make room for local and distant signals. PEG access programming requires not only channel space but also personnel and studios. Although much of the broadcast signals and access channels are mandated by either the federal must-carry rules or local franchise requirements, cable operators can choose to import distant signals and to increase access channels. In fact, competition seems to give rise to the importance of community programming as cable operators strive to differentiate their services from those offered by overbuilders and DBS providers. It is presumed here, as in prior studies (Emmons & Prager, 1997; Jayaratne, 1996), that increased channel offerings represent greater service quality to cable subscribers.

Economic theory predicts that a monopoly system operator will add cable channels up to the point where the incremental revenue from increased demand for cable service stimulated by enhanced service quality equals the cost of the last added channel (MR=MC). If two operators compete in the same market, each would perceive that increased quality would attract not only more households to subscribe to cable, but would also draw current subscribers away from its competitor. Hence, overbuild competition is likely to lead to more channels than would a monopoly (Jayaratne, 1996).

Of course, adding channels cannot be done overnight. The decision to increase the number of channels will be impacted by a system's channel capacity and oftentimes will require system rebuild. Thus, it is a long-term effect rather than short term.

The median household income (*INCOME*) is a significant predictor of *CHANNELT*, but not statistically significant in explaining *CHANNELC*. Although it may suggest that cable service quality would be better in high income communities, its effect is not so large. On the other hand, the number of off-the-air (OTA) signals available in a community, measured by ADI ranking, is significantly related to the cable operators' decision of how many channels would be carried on their system.

Table 5 Estimates of Quality Equations

	Dependent Variable: ln(*CHANNELC*)		Dependent Variable ln(*CHANNELT*)	
Independent Variable	Coefficient (Std. Error)	t-statistic	Coefficient (Std. Error)	t-statistic
INCOME (in thousands)	.0021490 (.0017581)	1.222	.0036156 (.0014906)	2.426**
SUBS (in thousands)	.0002950 (.0002049)	1.440	.0002445 (.0001737)	1.408
ADI	.0010591 (.0004192)	2.526**	.0013084 (.0003554)	3.680***
DENSITY	.0004261 (.0002056)	2.073**	.0004794 (.0001743)	2.750***
TOP8MSO	.0863209 (.0334436)	2.581***	.0618432 (.0283542)	2.181**
OVERBUILD	.1072472 (.0312778)	3.429***	.0854082 (.0265180)	3.221***
POTENTIAL	.0857553 (.0484188)	1.771*	.0958863 (.0410505)	2.336**
MUNICIPAL	-.0031513 (.0454903)	-0.069	-.0018542 (.0385677)	-0.048
DIGITAL	.0414891 (.0331491)	1.252	.0385075 (.0281046)	1.370
INTERNET	.1332212 (.0310325)	4.293***	.1054631 (.0263100)	4.008***
ONESTOP	.0688678 (.0508280)	1.355	.0729323 (.0430931)	1.692*
Constant	3.387049 (.0501106)	67.591***	3.605559 (.0424849)	84.867***
	$F(11, 235) = 17.97$ Prob. > F = 0.0000 $R^2 = .4569$ (n = 247) Adj. $R^2 = .4314$		$F(11, 235) = 23.14$ Prob. > F = 0.0000 $R^2 = .5199$ (n = 247) Adj. $R^2 = .4974$	

Note: *, **, * indicate values that are significantly different from zero at the .10, .05, and .01 levels, respectively.**

The effect of OTA signals on price has been found in the past when cable programming was not as rich as today, but more recent studies have not reported such effect. A positive correlation between TV market size and cable service quality found here imply that cable operators prefer to compete with broadcast stations on the quality or viewing choice dimension rather than on the price dimension. This finding is consistent with Jayaratne (1996) who found that cable operators met broadcast competition by offering more cable-only channels, but not by lowering cable rates. This is interesting because cable operators were found to employ price-cutting strategy when they face overbuild competition. But in dealing with competition from broadcasting, cable operators pick up viewing choice strategy rather than price cutting. It is no surprise, however, if one considers the weak substitutability of broadcast signals these days. Closely related to this finding is home density in a community. Unlike the null effect of home density in the price equations discussed above, the number of homes per mile (*DENSITY*) is a significant and positive predictor in both quality equations. It suggests that cable consumers receive more channels, instead of discounted price, where density may help operators achieve cost savings. It also implies that cable systems in urban areas are more likely to have high channel capacity or to upgrade their systems.

A similar analysis may apply to MSO affiliation. Looking at the MSO level, the bigger MSOs (*TOP8MSO*) offer significantly better service relative to the smaller MSOs. In the price equations, *TOP8MSO* was found to have a positive effect on price, contrary to a priori expectations. This confirms Jayaratne's finding that while MSO affiliation is related to higher rates, the larger MSOs also offer better service quality. Like density, possible cost savings for *TOP8MSO* may be transferred to the consumer as a form of higher quality rather than lower price. In the quality estimation, cable operators affiliated with the largest 8 MSOs are predicted to offer 6 to 9 percent more channels than smaller MSOs, holding other factors constant.

The coefficients on *OVERBUILD* suggest that an operator facing overbuild competition offers, *ceteris paribus*, 9 to 11 percent more channels than a monopolist, depending on the model estimated. This would translate to 4 to 5 additional channels on a duopolist cable system since the typical monopolist offers 41 cable-only channels or 52 basic channels in total. These estimates are statistically significant at the .01 level. This finding is inconsistent with Emmons and Prager (1997), but consistent with Jayaratne (1996). While Emmons and Prager found no evidence that competition affected the quality of basic cable service, Jayaratne reported that a cable operator in an overbuild area offered 26 to 34 percent more cable-only channels than a comparably situated monopolist. The present study finds that the effect is somewhere inbetween these two previous studies. Interestingly, potential competition (*POTENTIAL*) was also found to influence service quality upward. The effect size is similar with actual competition and significantly different from zero. On the other hand, municipal cable systems maintain the same service quality, measured by the number of channels, as private cable systems.

Finally, cable systems that sell high-speed Internet access services (*INTERNET*) over cable offer significantly more channels, *ceteris paribus*, relative to systems that do not offer such services. *ONESTOP* is a significant predictor for the total number of channels, which includes broadcast signals, but an insignificant predictor for the number of cable-only channels.

Chapter 4

CONSOLIDATION AND CONCENTRATION OF THE MULTICHANNEL TELEVISION INDUSTRY

The multichannel television industry is a fairly concentrated industry and is also characterized by significant ownership ties among cable companies and related firms. This chapter investigates the effects of concentration in the national market and consolidation of regional markets on overbuild competition in the multichannel television (MCTV) industry. There are three ownership issues that characterize the cable industry: horizontal concentration and relationships among cable operators; vertical relationships between system operators and program suppliers; and clustered cable systems, whereby cable operators consolidate ownership within geographical areas. More specifically, this chapter examines the status of ownership concentration in markets for the delivery of video programming. It also discusses how this can erect barriers to competition, affecting the competitive prospects and viability of overbuilds in the multichannel television industry.

Horizontal Concentration in the Multichannel Television Industry

According to the 1999 Annual Report by FCC (*1999 Report*), a total of 80.9 million households subscribed to multichannel video programming services as of June 1999; 81 percent penetration among U.S. television households (see Table 6). The *1999 Report* also reveals that cable television is still the dominant technology for the delivery of video programming to consumers in the MCTV marketplace, although its market share continues to decline since the mid 1990s. As of June 1999, about 82 percent of all MCTV subscribers received their video programming from a local franchised cable operator, a 10 percent decrease from 1994. The cable market share declined even more than indicated in the study because the subscriber totals of phone companies, which have overbuilt incumbent cable operators, were included in the 82 percent.

While the number of cable subscribers continued to grow, reaching 66.7 million, the total number of noncable MCTV households grew to 14.2 million homes. Much of the increase in the number of noncable MCTV subscribers is attributable to the growth of DBS. DBS appears to attract former cable subscribers and consumers not previously subscribing to an MCTV. As of June 1999, 10.1 million households subscribed to DBS, representing 12.5 percent of all MCTV subscribers. There also have been a number of additional cable overbuilds in the last 5 years. Table 6 also shows that OVS, a new concept first introduced in the 1996 Telecommunications Act as one means of providing multichannel television service for LECs, is practically dead. Over the last 5 years, the number of subscribers to and market shares of other distribution technologies such as MMDS and SMATV remained as fringe services or continued to decline. On the other hand, DBS continues its expansionary trend of gaining new subscribers since its initial launch in 1994.

The very success of DBS poses some regulatory challenges as well. The 30 percent national ownership limits are no longer enforceable as DBS becomes a robust substitute to cable. Since these rules are applied to the number of homes passed by a single entity that provides multichannel television services, the virtual ubiquity of DBS signals renders these 30 percent limits obsolete. If DBS is properly viewed as a close substitute to cable and included in the measures of concentration, as in the recent FCC Annual Report, such national ownership limits must be increased considerably to reflect the coverage of DBS. If DBS does not enter in the relevant product market, the multichannel television industry should be defined as "moderately concentrated," which may warrant more stringent ownership restrictions.

Considering these ownership restrictions are not strongly enforced at the present time, however, one policy option would be to repeal them altogether. They also would be inconsistent to the principle of regulatory symmetry and "level playing field" from the broader perspective of converging telecommunications. It is too myopic to limit the number of homes passed for video programming when the industry is quickly moving toward the provision of complete packages of video, voice, and data. This may require a much greater subscriber base than the traditional telephone or cable services.

Not only do these ownership limits implicate the First Amendment issues, but such limits solve little problems as intended. An MSO even without reaching 30 percent of U.S. households can still ask significant concessions from the program suppliers. Thus, the ownership limits do not provide small MSOs or new entrants with the protection from stiff discounts, which would have obvious implications for overbuild competition.

Should the 30 percent limits be increased or repealed, it might exacerbate the problems associated with horizontal concentration, which will be discussed later. To resolve these issues, it might be necessary to introduce an alternative policy designed to safeguard "fair and nondiscriminatory" terms and conditions for multichannel television programs. The policy must strike the very conduct of possible anticompetitive practices between distributors and suppliers, rather than maintain structural restrictions that do practically nothing for sound competitiveness in the multichannel industry.

Table 6 Assessment of Competing Technologies

Technology Used	1994	1995	1996	1997	1998	1999
TV Households	95,400,000	95,900,000	97,000,000	97,000,000	98,000,000	99,400,000
Percent Change	1.27%	0.52%	1.15%	0.00%	1.03%	1.43%
MCTV Households	63,936,620	68,487,750	72,370,950	73,646,970	76,634,200	80,882,411
Percent Change	6.06%	7.12%	5.67%	1.76%	4.06%	5.54%
Percent of Households	67.02%	71.42%	74.61%	75.92%	78.20%	81.37%
Cable Subscribers	59,700,000	62,100,000	63,500,00	64,150,000	65,400,000	66,690,000
Percent Change	4.37%	4.02%	2.25%	1.02%	1.95%	1.97%
Percent of MCTV Total	93.37%	90.67%	87.74%	87.10%	85.34%	82.45%
MMDS Subscribers	600,000	851,000	1,180,000	1,100,000	1,000,000	821,000
Percent Change	51.00%	41.83%	38.66%	-6.78%	-9.09%	-17.90%
Percent of MCTV Total	0.94%	1.24%	1.63%	1.49%	1.30%	1.02%
SMATV Subscribers	850,000	962,000	1,126,000	1,162,500	940,000	1,450,000
Percent Change	-15.34%	13.18%	17.05%	3.24%	-19.14%	54.26%
Percent of MCTV Total	1.33%	1.40%	1.56%	1.58%	1.23%	1.79%
HSD Subscribers	2,178,000	2,365,400	2,277,760	2,184,470	2,028,200	1,783,411
Percent Change	35.11%	8.60%	-3.71%	-4.10%	-7.15%	-12.07%
Percent of MCTV Total	3.41%	3.45%	3.15%	2.97%	2.65%	2.20%
DBS Subscribers	602,000	2,200,000	4,285,000	5,047,000	7,200,000	10,078,000
Percent Change	760.00%	265.45%	94.77%	17.78%	42.66%	39.97%
Percent of MCTV Total	0.94%	3.21%	5.92%	6.85%	9.40%	12.46%
OVS Subscribers			2,190	3,000	66,000	60,000
Percent Change	N/A	N/A	0.00%	36.99%	2100.00%	-9.09%
Percent of MCTV Total			0.00%	0.00%	0.09%	0.07%

Source: FCC (1998 & 1999), Appendix C

Consolidations within the cable industry continue as cable operators acquire and trade systems. The seven largest operators now serve almost 90 percent of all U.S. cable subscribers. The FCC's examination of upstream national MCTV concentration currently reveals a relatively low level of concentration. The top five firms in the upstream MCTV nationwide programming market are AT&T (with a share of 20.5%), Time Warner (15.95%), DIRECTV (9.23%), Comcast (8.26%), and MediaOne (5.84). The share of subscribers of all MSOs in these top five MCTV operators (except DIRECTV) has changed little over the years. The four largest cable MSOs (AT&T, Time Warner, MediaOne, and Comcast) have served approximately 54 percent of all MCTV subscribers since 1995. The only prominent change is DIRECTV, which accounted for 9.23 percent nationwide.

These shares relate to the broader MCTV market rather than specifically to the cable market. To assess the potential for market power resulting from concentration, the reported MCTV shares can be appropriately translated into HHI figures. The FCC finds that in terms of HHI, national concentration among the top MCTV operators has declined since 1997. In assessing national concentration of the multichannel television industry, the FCC started in 1997 to consider the presence of all MCTV operators and MCTV subscribers, not just cable MSOs and cable subscribers (FCC, 1998). Given the close substitutability, it was an appropriate adjustment to reflect the continuing growth of DBS systems, such as DIRECTV/USSB, Primestar, and Echostar. As of June 1999, the MCTV industry with a Herfindahl-Hirschman Index (HHI) of 923 can be defined as "unconcentrated" under the Department of Justice (DOJ) Merger Guidelines (see Table 7). However, this is largely due to the FCC's introduction of DBS systems into the concentration measure in an attempt to reflect the dramatic rise of DBS services and mergers of largest DBS systems in 1999. This is no surprise because DBS systems such as DIRECTV and EchoStar now rank among the ten largest MCTV operators in terms of nationwide subscribership along with eight cable MSOs. The inclusion of DBS in the measures of industry concentration seems to be appropriate, but it also poses some regulatory challenges, particularly with respect to horizontal ownership limits. This issue will be deferred to the last section of this chapter.

DBS aside, after a stable period of market concentration during the early half in the 1990s, cable MSOs started to increase horizontal concentration within the wireline cable industry. As a result, the *cable* industry has exhibited a strong movement toward internal concentration since the mid-1990s when U.S. Congress was expected to pass new legislation, soon or later, that would allow LECs to provide multichannel television services. Separately considered, the wireline cable industry with the HHI of greater than 1300 can be categorized as "moderately concentrated" nationwide under the DOJ guidelines.

Table 7 Concentration in the National Market for the Purchase of Video Programming: 1996-1999

Market Share	Percent of Multichannel Television Subscribers									
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Top Share	24.0	24.5	25.2	24.3	24.8	25.9	24.25	25.54	26.48	20.50
Top 2	36.7	37.1	37.9	36.9	37.3	42.1	40.69	41.51	42.62	36.45
Top 3	42.0	42.3	43.2	42.3	42.4	48.9	47.37	48.46	48.94	45.68
Top 4	45.6	46.0	48.2	47.2	47.2	54.6	53.30	54.30	54.63	53.94
Top 10	61.6	61.4	64.6	63.2	63.3	73.2	71.40	72.26	71.04	74.95
Top 25	80.8	80.2	84.5	83.1	83.4	88.5	83.96	84.96	80.99	84.92
Top 50	91.2	90.9	94.5	93.1	92.4	95.2	89.68	89.92	86.08	89.58
HHI (MCTV)	866	872	928	880	898	1098	1013	1166	1096	923
HHI (Cable Only)	866	872	928	880	898	1098	1326	1379		

Sources: FCC, Annual Assessment of the Status of Competition in Markets for the Delivery of Video Programming, Fourth, Fifth & Sixth Report (Released January 13, 1998, December 23, 1998, and January 14, 2000, respectively), APPENDICES

Horizontal concentration within the cable industry has been achieved through numerous mergers and acquisitions (M&A). A maturing cable market, consolidation and more technology investments helped spur continuous record years of mergers and acquisitions among cable, DBS, and Internet access providers in the second half of 1990s. Brief review of key M&As during this time period is warranted as they appear to reshape the multichannel television industry.

In June 1998, AT&T announced its agreement to merge with Tele-Communications Inc. Through this merger valued at about $48 billion, AT&T plans to integrate its telecommunications business with TCI's cable networks and thereby build a facilities-based local residential telecommunications network. The merging companies contend that the merger will expand and accelerate AT&T's ability to compete with incumbent local exchange carriers (ILECs) in providing local telephone service to residential customers. After a significant investment to upgrade TCI's cable facilities to allow two-way voice and data communications, the merger will allow almost one-third of American households access to the upgraded high-capacity broadband networks (FCC, 1999c).

AT&T's intention was clear: the best way to bypass the Bells and to grab local customers was to use TCI's cable network business. TCI needed help expanding into telephone and other two-way communications services. TCI also owns stakes in other MSOs, including Cablevision Systems Corp., and it is involved in a number of joint ventures with other large MSOs. AT&T considers those stakes to present at least theoretical access to another 17 million homes and 10 million TCI cable subscribers.

With the purchase of TCI, AT&T acquired big part of "last miles" for cable telephony, but it would be far short of the nationwide local access that AT&T craves. AT&T still needed to find a way to reach the remaining two-thirds of the nation's households not passed by TCI. In 1999, AT&T solidified its dominant position in the telecommunications world, with a series of bold transactions giving the company 3 million MediaOne Group subscribers, a coveted telephony deal with Comcast Corp., and a deep-pocketed partner in Microsoft Corp. Ending a costly bidding war between Comcast, AT&T signed a definitive merger agreement with MediaOne to buy out the fourth largest cable MSO for about $62 billion in May 1999. With the multi-faceted deal, AT&T gained access to Comcast's 8 million homes to deliver AT&T-branded telephony services (Neel, 1999c). The addition of MediaOne vaults AT&T to the top of the cable heap and furthers its strategy to provide bundled video, voice and data services to a vast number of consumers. AT&T now would have access to more than 35 percent of U.S. homes (Farrell, 1999c).

AT&T pays substantial amounts to get direct links to homes. Some estimates for AT&T's local access and interconnection fees run as high as fifteen billion dollars in 1998, about a third of its domestic wireline revenues. TCI's local transport may enable AT&T to cut those charges in half and thus double its net income. Little surprise that some estimates suggest that AT&T plans to have extensive and exclusive cable/phone penetration in four to five years. In that case, gains from video services, let alone Internet access, are just gravy. Seen that way, AT&T got the basic advantage of Internet access for a small marginal cost. Moreover, the modifications required to add Internet capacity to an existing digital cable system are much lower than the estimates of the costs required for upgrade of the digital network itself (Bar et al., 1999).

The purchase of TCI and MediaOne suggests that AT&T firmly believes that there is a business opportunity for them in the local loop, and it is the ultimate endorsement of the cable network into the home. Probably there would be no better partner than AT&T for cable systems to provide the local telephone service. AT&T could help to drive cable telephony (Gibbons, 1998c).

The surprising AT&T/MediaOne marriage will likely prompt a series of other wrenching changes in the cable industry's strategic alliances over the next few years. Of particular interest: the dismantling or restructuring of the often-prickly Time Warner Entertainment partnership between Time Warner and MediaOne, a merger of the @Home Network and Road Runner high-speed data services and a sweeping local-telephone service marketing deal between the new AT&T/MediaOne, Time Warner and Comcast.

At the same time, changes in ownership and reassignments of orbital slots have altered the DBS landscape. FCC consented to the merger of United States Satellite Broadcasting Co., Inc. ("USSB") and DIRECTV, and authorized the transfer of USSB's direct broadcast satellite licenses to DIRECTV. Also in April 1999, Hughes, the parent company of DIRECTV, completed its acquisition of PrimeStar's medium powered satellite business. Subsequent to that grant, Tempo Satellite, Inc, a former DBS licensee that did not actually commence service, was also allowed to transfer its license to DIRECTV. These changes give DIRECTV increased channel capacity, facilitate "local-into-local" broadcast signal carriage and, for the first time, allow for DBS service to Hawaii, which has not previously been served by DBS.

Consolidation of the Regional Markets

Consolidations of cable systems have always given MSOs greater leverage in dealing with equipment suppliers and programming distributors and greater access to investment capital. However, this wave of mergers between MSOs was largely prompted by the need to build "cluster" systems that are geographically proximate. Clustering is a process by which MSOs consolidate system ownership within separate geographical regions.

The trend toward consolidation between MSOs started in the early 1990s. Since 1995, particularly, cable MSOs have accelerated undertaking system mergers, acquisitions, divestitures, swaps, and joint ventures with the objective of creating regional "clusters" of contiguous cable systems (see Table 8). It was a clear indication of cable MSOs' preparation for upcoming competition, which has been continuously and seriously, discussed among the policy makers since the late 1980s. During the period of 1994 through 1998, there were more than 400 such cable transactions. Most of these transactions resulted in the expansion of existing clusters of cable systems or the creation of new clusters (FCC, 1998).

Table 8 Number and Subscriber Size of Major Cable System Clusters
(Cumulative Figures)

Range of Clustered Subscribers (thousands)	1994		1995		1996		1997		1998	
	Clusters	Subscribers (millions)	Clusters	Subscribers (millions)	Clusters	Subscribers (millions)	Clusters	Subscribers (millions)	Clusters	Subscribers (millions)
100-199	58	8.0	76	10.4	76	10.3	49	6.7	33	4.6
200-299	26	6.0	35	8.4	34	8.3	33	8.2	25	6.3
300-399	6	2.0	8	2.8	11	3.7	11	3.8	20	6.7
400-499	3	1.3	10	4.5	8	3.6	8	3.7	7	3.2
>500	4	2.8	8	5.1	10	7.7	16	11.9	21	19.6
Total	**97**	**20.1**	**137**	**31.2**	**139**	**33.6**	**117**	**34.3**	**106**	**40.4**

Source: Paul Kagan Associates, Inc., *Major Cable TV Systems/Clusters,* The Cable TV Financial Databook, 1995, at 38-39; 1996, at 38-40; 1997, at 39-41; 1998, at 38-42; 1999, at 50-55 [Cited in FCC (1998 & 1999), In the matter of annual assessment of the status of competition in the market for the delivery of video programming, Fifth Annual Report (1998), CS Docket No. 98-102), Appendix.C-2; Sixth Annual Report (1999), CS Docket No. 99-230, Appendix C-2]

As a result of acquisitions and trades, cable MSOs have continued to increase the extent to which their systems form regional clusters. Currently, more than 40 million of the nation's cable subscribers are served by regional clusters (see Table 8). Most cable companies are following strategies to cluster their operations geographically so that they may operate most of the cable systems in a particular city or region.

The upward trend in the total number of clusters serving at least 100,000 subscribers observed in 1994, reached a peak in 1996, and began to decrease in 1997. Although the total cumulative number of clusters declined from 139 at the end of 1996 to 117 at the end of 1997, the trend for clusters to increase in subscribership or size appears to be continuing. This tendency toward larger clusters clearly reflects greater economies of scale. In an empirical study that estimated valuation models of cable systems, transactions to form a cluster commanded a higher price, suggesting a premium for the expansion of the local service area (Miller, 1997). System value was most sensitive to changes in subscribership, total miles, and subscribers per mile. Whether or not the buyer was one of the top 50 MSOs was also a significant explanatory factor in Miller's models. Possible reasons for this premium could be that ownership by one of the larger MSOs might generate tremendous value from a distribution perspective such as enhanced access to cheaper capital, technology, programming, and elevated revenue streams. Furthermore, combined with the top 50 MSO status, the consolidation of system assets to achieve possible operating economies stemming from regional clusters is valued at a premium by system buyers.

Large MSOs' consolidation of local systems within a geographic area is changing the competitive landscape of the cable industry in particular, the telecommunications industry in general. AT&T continues to pursue its clustering strategy and has made a number of substantial transactions with other MSOs in furtherance of this strategy. AT&T plans to concentrate about 90 percent of its subscriber base in the top 25 markets in the country. AT&T has been shedding systems east of the Mississippi River through sales, exchanges and formation of partnerships.

In the Chicago metropolitan area, for example, before Ameritech's entry there were five cable operators with large subscriber bases. The area had been served by TCI, Time Warner, MediaOne, Jones Intercable, and Prime Cable. Since 1996, TCI has made a number of swaps and acquisitions through which it has gained control of the systems previously owned by Time Warner, MediaOne, Jones Intercable, and Multimedia. This clustering strategy allows TCI (now AT&T) to control virtually the entire Chicago metropolitan market. AT&T is also eyeing Chicago-area systems owned by Prime Cable and Cablevision Systems Corp. (Multichannel News, April 17, 1998).

MediaOne acquired 30,000 cable subscribers for $60 million in the Detroit area from Time Warner Cable in June 1998. The Time Warner operations included in the sale are suburban systems in Dearborn and Wayne, Mich., which serve 25,000 and 5,000 subscribers, respectively. These cities fit nicely with the other areas that MediaOne serves, where the MSO is offering advanced telecommunications services like high-speed Internet access and digital telephone. MediaOne will have 310,000 subscribers in Detroit, making it the second-largest MSO in that metropolitan area and the third-largest in Michigan. With systems that have already been rebuilt to 750 megahertz, Dearborn and Wayne are candidates for deployment of MediaOne Express, a high-speed Internet-access service that currently passes 52,000 area households (Estrella, 1998b).

In 999, Comcast Corporation and Jones Intercable, Inc. announced agreements to swap certain cable systems with Adelphia Communications. With these cable system swaps, Comcast continues to strengthen its Mid-Atlantic super-cluster, encompassing cable systems in New Jersey, eastern Pennsylvania, Maryland, Delaware, Washington DC and Virginia. These system swaps, together with other pending acquisitions and investments will make Comcast's Mid-Atlantic supercluster one of the largest cable system clusters in the nation with interests in more than four million owned and managed cable subscribers. In addition, they will enhance Comcast's and Jones' cable clusters in the Midwest, in Michigan and Indiana, and also in West Florida (Comcast, 1999b).

TCI started to consolidate the San Francisco market. With the acquisition of Viacom Cable in 1996, AT&T now serves 90 percent (1.3 million households) of the San Francisco Bay area's cable subscribers; 90 percent (900,000 households) of the Seattle-Tacoma, Wash., area; and 60 percent (300,000 households) Portland, Ore., cable customers. In line with that, AT&T's San

Francisco Bay area systems rolled out such new services as telephony and high-speed data access (Neel, 1996).

Cable MSOs have claimed that they are merging to create market clusters to continue growth, to be more efficient, and to build scale economies in cable operations, such as advertising sales and new technology implementation. These companies seem to regard large-scale clusters of cable systems as an important competitive strategy for facing the increasingly aggressive DBS, telephone, and wireless cable companies. It is widely believed in the cable industry that the bigger and the more efficient an MSO is, the more competitive it will be and the less likely it is to need the assistance of a telco to deliver interactive broadband media to consumers (Chan-Olmsted, 1996).

MSOs are trying to form a "cluster" around major cities to reduce costs, to improve operating and management efficiencies, to eliminate system redundancies, and to attract more advertising. By consolidating systems in major markets, MSOs can serve entire regions comprised of numerous local franchise areas. This assures advertisers that they will get extensive regional market coverage. The growing importance of advertising revenues for cable systems has emerged as a major factor promoting regional consolidation.

But more importantly, regional clustering also enhances MSOs ability to compete successfully in the cable services markets under competition. Cable MSOs could obtain greater economies of scale from clustering as compared to having cable systems that were noncontiguous and more geographically spread out. In particular, the clustering strategy enables firms to consolidate facilities for receiving and transmitting programming, reduce the number of repair crews, have regional customer service centers, reduce management, and compete more effectively for local advertising dollars (General Accounting Office, 1999b).

Furthermore, with clustering, cable operators may be able to achieve efficiencies that facilitate the provision of cable and other services, such as telephony. Clustering provides the critical mass of subscribers necessary to support the huge capital investment needed to make system upgrades designed to enable companies to enter other lines of telecommunications services, such as Internet access and local phone service. Clustering thus positions cable as a potential competitor for local exchange services. It enables cable operators to offer a wide variety of broadband services at lower prices to customers in a geographic area that is larger than a single cable franchise area. For this reason, clustering makes cable operators a more effective competitor to LECs whose service areas are usually larger than a single cable franchise area. Clustered systems increase cable operators' ability to be more competitive across a range of services and technologies such as video programming delivery, IP telephony, and Internet access services as "full service providers" in their service area (FCC, 1997).

The industry's maturation and diminished prospects for cash-flow growth also helped spark property sales in recent years. Several media companies abandoned the field, including Times Mirror Co., Viacom Inc., Providence Journal Co., Houston Industries Inc. and E.W. Scripps Co. With TV household penetration rates leveling off, incremental revenue growth through new construction and new subscription has been virtually exhausted. Faced with the prospects of a slower-growing revenue stream and margins, operators have chosen to cluster their holdings by region and other factors in order to achieve efficiencies through lower overhead and cross-selling (Neel, 1997).

Clustering not only increases operating efficiencies, but it may also enhance cable MSOs' competitive position in the video programming acquisition and creation. Industry observers believe that along with local news, local sports holds the most value for operators in the market. As the value and popularity of regional sports programming has exploded over the past decade, cable operators have, for the most part, relied on regional-sports networks to provide access to local professional teams (Umstead, 1998). Recent examples include:

- Cablevision purchased the New York Rangers NHL and New York Knicks NBA teams to fuel its SportsChannel New York (now Fox Sports New York) and Madison Square Garden Network regional networks.
- Comcast Corp. bought the Philadelphia 76ers NBA and Philadelphia Flyers NHL teams in 1996 to anchor programming for its Comcast SportsNet service.
- In 1997, Marcus Cable purchased the Texas Rangers MLB franchise in an effort to develop a new regional-sports network in the market.
- In 1998, Adelphia Communications chairman John Rigas entered into an agreement to purchase a majority interest in the NHL's Buffalo Sabres, as well as to secure the team's cable rights for the MSO-owned Empire Sports Network.

A cluster in a major city with the ownership of these regional sports teams may provide the operator wit a significant competitive advantage in establishing a superior programming portfolio vis-à-vis the overbuild and competing multichannel operators.

Vertical Integration in the Multichannel Television Industry

Vertical integration occurs when a cable operator has an ownership interest in a video programming supplier or vice versa. The total number of programming networks has grown and cable operators continue to consolidate and develop new ownership interests. However, the proportion of vertically integrated channels continues to decline. In 1999, there were 283 satellite delivered national programming networks, of which 104 networks, representing 37 percent, were vertically integrated with a cable MSO (FCC, 2000). One or more of the top six cable MSOs holds ownership interests in each of the 104 vertically integrated services. AT&T, the nation's largest MSO, holds ownership interests in 50 programming networks, or 18 percent of all programming networks, through its subsidiary, Liberty Media. Time Warner has an ownership interest in 24, or 8 percent of all programming networks. Cablevision, through its programming subsidiary, Rainbow Media, owns 11 programming networks, or 4 percent of all national networks (FCC, 1998). Cox Communications has interests in 23, or 8 percent of national programming networks. MediaOne, with ownership interests in 12 national programming networks, controls 4 percent of national programming. Comcast, with its six networks and control over two national networks through Jones Intercable, has ownership interests in 3 percent of all national programming networks.

Vertical integration is not only associated with the largest cable system operators, but also the programming networks with the largest number of subscribers. In addition, currently eight out of the top 15 video programming networks ranked by prime time ratings are vertically integrated with a cable MSO.

It appears that a significant amount of MCTV programming is controlled by approximately twelve companies, including cable MSOs, broadcasters, and other media entities. The 12 companies are: ABC/Disney, General Electric, CBS, News Corp, Time Warner, Viacom, Discovery, Rainbow Media, Liberty Media, USA Networks, E.W. Scripps, and Comcast. For example, of the top 50 programming networks in terms of subscribership, 46 are owned by one or more of these 12 companies. C-SPAN, C-SPAN2, WGN, and The Weather Channel are the four unaffiliated programming networks among the top 50 programming networks.

Sports programming warrants special attention because of its widespread appeal and strategic significance for multichannel television. Industry observers believe that along with local news, local sports holds the most value for operators in the market. As the value and popularity of regional sports programming has exploded over the past decade, cable operators have, for the most part, relied on regional-sports networks to provide access to local professional teams (Umstead, 1998). The *1999 FCC Report* identifies 75 regional networks, 26 of which are sports channels, many owned at least in part by MSOs.

These vertical relationships may have beneficial effects, or may deter competitive entry in the video marketplace, and/or limit the diversity of programming (Ahn, 1997). One of the most important efficiencies of vertical integration between cable operators and program suppliers comes from the reduced risk of program development. Developing new and innovative programming is costly and risky. Not only does the vertical relationship help to reduce costs of negotiating and enforcing long-term contracts between cable companies and program suppliers, but the relationship also helps to ensure an outlet for newly developed programming. For program suppliers, this minimizes the risk that programs will be developed but not be marketable. From the cable operators' perspective, ownership ties to program suppliers help guarantee the continued availability of programming. To be sure, the cable companies' vertical ties to program suppliers are largely responsible for the development of the varied programming that now exists. (General Accounting Office, 1999b).

Concentration, Consolidation, and Competition

The preceding discussion suggests that cable companies realize benefits from their size, ownership interests, and clustering. Consolidation in the cable industry is not unexpected, parallels consolidation in other telecommunications industry segments, and is "a competitive response to challenges from DBS, LECs, and others. Although there are efficiencies realized from the ownership relationships in the cable industry, there is also the potential for adverse market effects from these relationships. Besides the joint and fixed nature of investment capital, and incumbents' market predation discussed in Chapter 3, overbuild entrants face competitive barriers stemming from horizontal concentration at both the national and regional levels. These barriers exist in two dimensions of inputs for cable programming: first, cable entrants have to pay much higher prices for the programming networks, leading to significant cost advantages for the incumbent MSOs; second, new entrants may be denied access to certain types of networks that are either exclusively licensed for incumbents or owned and operated by large incumbent MSOs. Moreover, a clustered system can not only enjoy extra revenue potential from local advertising, but it may also take advantage of their market power at the local level to secure exclusive carriage of certain programming.

Post-Entry Cost Advantages for Incumbents

Benefits are also gained by the large size of some cable companies and from horizontal relationships with other cable companies. Larger cable companies may enjoy reduced programming costs and also have costs savings in management and other overhead functions (General Accounting Office, 1999b). From the standpoint of programming costs, increased concentration can enable the MSO to reduce the price it pays for programming by increasing its subscriber base, its bargaining power, and the magnitude of its quantity discounts. These discounts are the results of the established MSOs' first-mover advantage.

Contractual agreements between a system operator and a programmer are based on several factors, including the value of the network to consumers and local advertisers; the increasing costs associated with the programmer's obtaining the cable rights to programming; and the cost of production. The net impact of the same license fees on cable operators will depend on each operator's contractual agreement with programmers. These agreements include varying discounts and incentives that enable cable operators to reduce program licensing fees (General Accounting Office, 1999a).

There are concerns about competitive disadvantages that horizontal concentration may create for overbuild entrants. Because programming is a major expense category for multichannel television service, "the differences between what entrants pay for programming and what the major incumbent MSOs pay have important consequences for both entrant viability and the vigor of competition where it does occur" (Dertouzos & Wildman, 1998, p.4). It is commonly known that the largest MSOs are able to exploit their control over access to millions of cable subscribers to obtain programming on more favorable terms than smaller MSOs. An MCTV must deliver in excess of several million subscribers to a programming network to qualify for the maximum discounts (Dertouzos & Wildman, 1998; Ford & Jackson, 1997). An analysis of 19 basic cable networks by Dertouzos and Wildman (1998) reveals that small MCTVs pay significantly higher license fees compared to the industry average. Of course, many small cable operators have been able to lower their programming costs by joining the National Cable Television Cooperative (NCTC), which aggregates its members' subscribers to collectively purchase programming. Nonetheless, NCTC does not always receive discounts that are comparable to those given to similarly sized MSOs (General Accounting Office, 1999a).

The Dertouzos and Wildman study (1998) found that the mean of "volume discounts" for large MSOs was about 45 percent off the top rate card prices.

According to Paul Kagan Associates, for example, small multichannel television operators that receive no discounts would pay 62 percent more than the industry average rate for CNN, 60 percent for NICK and MTV, 50 percent for the Discovery Channel, VH-1, Sci-Fi, and the Learning Channel, and 20 percent for ESPN and TNT. For a new entrant with 100,000 subscribers, this programming cost disadvantage amounts to $2.7 million per year in total or $27 per subscriber per year. This is approximately 10 percent of basic service revenues (Dertouzos & Wildman, 1998). Similarly, Ford and Jackson (1997) found that the average size MSO pays about 11 percent more than the largest MSO for programming, while the smallest MSO pays 52 percent more. Clearly, the implied cost advantages from concentration can be substantial.

Such discounts exist because large cable operators have more negotiating power than small cable operators. Programmers have an incentive to have their programming available to the greatest number of subscribers possible because, as the number of viewers increases, so do programmers' revenues from licensing fees and advertising revenue. Therefore, cable operators with a large subscriber base can obtain greater concessions, such as volume discounts, from programmers than small cable operators can (General Accounting Office, 1999a).

The license fee disadvantage is exacerbated when a clustered cable system can generate extra revenue from local advertising—commonly known as "local avails". Of course, the primary beneficiaries of local cable advertising sales are cable systems in large urban areas, which is where major MSO system clusters operate. The net cost of multichannel television programming may be higher for small cable operators because they take in less advertising revenue and are less able to take advantage of some of the other incentives that offset programming costs. Small and large cable companies generally receive a portion of the advertising time that is available within cable programming offered on their systems. For example, programming networks typically provide cable operators with 2 minutes of local advertising per hour during their programming, which represents a revenue source for cable operators. However, the market size of small cable operators limits their ability to sell advertising during the time allotted for local advertising. For example, a cable system needs at least 5,000 subscribers to break even with the costs incurred to develop an advertising sales and production department (General Accounting Office, 1999a).

Dertouzos and Wildman (1998) found that if the contribution of local advertising is taken into consideration, the annual cost disadvantage to an overbuild entrant with 100,000 subscribers amounts to nearly $3.9 million, or $39 per subscriber per year. Thus, it is obvious that a cost disadvantage of this size alone could be a serious impediment to the viability of overbuild competition. Because these programming cost advantages are realized only by the largest MSOs, "they also represent a margin competitive entrants cannot cut into without incurring substantial losses. Alternatively, they constitute a profit cushion that allows incumbents to cut prices to levels that are unprofitable for entrants without incurring losses themselves" (Dertouzos & Wildman, 1998, pp.24-25).

Furthermore, net licensing fees for small cable operators could be even higher because small cable operators have difficulty taking advantage of, or negotiating for, some of the other incentives available to both small and large companies, such as marketing co-op and cash or other incentives. Although the magnitude of these incentives is unclear, it is difficult for small companies to utilize marketing support money because they have limited markets and few media outlets on which to spend promotion funding. It is common practice in the multichannel television industry for programming networks to provide cash or other incentives to system operators in return for airing promotional advertising in the local market. Many small system operators are unable to take advantage of these incentives because they do not have a sufficient number of subscribers to justify the investment necessary to sell, produce, and insert promotional advertising into cable programming (General Accounting Office, 1999a).

A preemptive strategy, which might be preferred by the incumbent monopolist, would be to limit entry by some means other than price. A nonprice signal to potential entrants, such as a threat of postentry reaction, might be preferable because then price need not be held below the potential entrant's average cost. By themselves, threats have never seemed too credible an entry deterrent because they require little financial commitment and the threatened post-entry conflict would harm the initial monopolist as well as the new entrant. Once the potential rival has entered, joint profits are not maximized through price wars (Smiley & Ravid, 1983).

The existence of first-mover advantage, however, opens up a wide variety of strategic possibilities for an initial monopolist and alters one aspect of this strategy (Smiley & Ravid, 1983). The initial monopolist may be able to preempt the market if it can limit entry through a particular pricing strategy. Furthermore, the initial monopolist can earn economic profits while setting price to preempt the market. Thanks to post-entry cost advantage, the initial monopolist can threaten to reduce price below the new entrant's average costs, while at the same time earning profits itself. Thus, first-mover advantages confer the incumbent monopolist a very strong strategic option: "double squeeze." The monopolist may be able to preempt the market while earning economic rents and threats of postentry reaction, directed at potential entrants, will be more credible when learning occurs.

When learning, a process in which average costs decline with increases in cumulative production, occurs in a market, an initial monopolist can preempt the market through the use of a limit price and still make a profit (Smiley & Ravid, 1983). Indeed, as long as its cumulative output exceeds the new entrant's, the initial monopolist can simultaneously earn profits and inflict losses on a new entrant forever. The initial monopolist does not need to convince the potential entrant that the monopolist will act irrationally if entry occurs and destroy both rivals in an Armageddon type war; learning will allow the monopolist to destroy the entrant and earn profits at the same time.

In order for any strategy to preempt a market successfully, a potential entrant must expect entry to result in no economic profits. One such strategy is to set price (establish a price trajectory) so that no economic profits would be earned in the *first period* of a new entrant's experience. If the potential entrant expects this zero profit experience to be repeated in each period, entry will not be a profitable investment.

The monopolist only need to set a price between the potential entrant's average costs and its own. This price will simultaneously result in economic profits for the initial monopolist and deter entry, if the potential entrant expects the negative profit experience of the first period of production to be repeated. And this expectation is a reasonable though not certain one, since if entry did indeed occur, the initial monopolist could continue to price below the new entrant's costs and still earn economic profits except in the unlikely event that the new entrant's cumulative output were to exceed the incumbent's cumulative output. The new entrant is unlikely to have a greater cumulative output, since its attempts to gain market share through cutting price can be matched immediately by the initial monopolist; and in such a destructive price war, the initial monopolist will lose less than will the new entrant, due to the incumbent's first mover advantage (Smiley & Ravid, 1983).

Further, such a threat is more credible if it can be carried out without violating the antitrust laws. Traditionally espoused criteria for predatory behavior (Areeda & Turner, 1975) would allow a postentry policy that set price between the incumbent's and new entrant's costs, and that subsequently drove the new entrant from the market. Although the credibility problem with threats of predatory reaction is perhaps not completely solved, the first mover advantage in a market in which learning occurs substantially alleviates the incumbent's dilemma.

In sum, when production is accompanied by first mover advantages (e.g., learning by doing), the price charged by the initial monopolist will be lower than the static monopoly price. If the rate of entry is a function of price, the monopolist will further lower price to limit entry.

Therefore, an overbuild competitor will inevitably compete at a cost disadvantage to the incumbent MSOs in the supply of cable programming unless it enters multiple markets simultaneously and very successfully. As a result, new entrants are significantly hampered in their efforts to compete viably in the video marketplace. Price increases of programming input represent cost increases to local cable systems and hence compress their profit margins. Should incumbent MSOs simultaneously lower the prices of cable service in the local distribution markets, this form of predatory pricing would now squeeze profit margins for the small, new entrants from above and below at the same time.

This double squeeze is more intensified if the incumbent is one of the larger MSOs that has ownership interests in programming networks. The extensive vertical integration in the cable industry magnifies the anticompetitive impact of such price discrimination. Not only do these entrants have a higher cost of programming than large MSOs, but the increased sums flowing into the vertically integrated programming networks serve to subsidize the large incumbent MSOs' local system operations. In short, there is a compounding effect associated with excessive price discrimination based on subscriber base, which creates a competitive disadvantage for new entrants. It is a formidable barrier to the development of a competitive multichannel television marketplace (Ameritech New Media, 1999).

If these cost savings are passed on to consumers in the form of lower cable prices, then the effects of concentration could be welfare enhancing. Alternatively, if these discounts preclude competitive entry, they may serve to diminish consumer welfare despite a reduction in price.

It is ambiguous, however, whether or not large MSOs transfer their lower input costs into consumer prices. While Chipty (1995) found that a 1 percent increase in national size would result in a 0.01 percent decrease in price, the effect size appears to be trivial. Ford and Jackson (1997) found that MSO size was *positively* correlated to price, although statistically insignificant. The empirical evidence in Chapter 3 suggests that large MSOs charge higher prices, which supports prior studies by the FCC (1994) and Jayaratne (1996). While little consumer welfare is realized, horizontal concentration can result in programming discounts large enough to potentially constitute an absolute cost advantage for incumbent operators vis-à-vis potential entrants, erecting a barrier to entry. Overbuild competition has been shown by numerous prior studies to reduce prices by over 20 percent and the econometric analysis in Chapter 3 confirms these findings. Considering the ambiguity of welfare-enhancing effects of concentration, limits on horizontal concentration may be justified, especially when ownership concentration restrains competitive entry. Large MSOs may have lower costs, either due to economies of scale or due to bargaining power with suppliers. Both these effects of horizontal size on firm costs provide motivation for horizontal integration, although the latter has often been ignored in studies of firm behavior. Dertouzos and Wildman (1998) assert that the programming cost advantage of the largest MSOs over their smaller competitors is almost solely a reflection of MSOs' bargaining power over programmers. They argue that it is difficult to explain price differences of this magnitude with the standard efficiency and incentive reasons for quantity discounts because the actual cost of negotiating network supply contracts is quite small. Chipty (1995) tested a "bargaining power hypothesis" that cable MSOs may be able to horizontally integrate, or increase their size, in order to enhance their bargaining power over input supplier. She found that large MSOs have lower programming supply costs for reasons other than scale economies, suggesting a bargaining power effect on costs. Thus, the anticompetitive potential of absolute cost advantages may not be unwarranted.

Issues of Program Access

In addition to the programming cost disadvantages, loopholes in existing statutes allow incumbent MSOs to negotiate exclusive contracts with attractive cable programming networks that deny these programming sources to competitors. Leveraging their large subscriber bases and extensive geographic coverage, incumbent MSOs find it profitable to outbid entrants for exclusive rights to these networks.

Further, large incumbent MSOs tend to have ownership interests in popular new networks such as the regional sports networks. With a few exceptions, Cablevision Systems Corp.'s Rainbow Media Holdings Inc. and Fox/Liberty Networks either own or are affiliated with more than 20 regional-sports networks that have programming deals with most professional teams: 25 of the 30 MLB teams, 26 of the 29 National Basketball Association teams and 19 of the 26 National Hockey League squads. Fox and ESPN have tied up the rights to most major college conferences for ratings-rich football and basketball. That leaves very little marquee product for operators looking to start their own sports services. Cable operators do not live by local sports programming alone; they are major players in competing for professional-sports rights. Comcast Corp. bought the Philadelphia 76ers NBA and Philadelphia Flyers NHL teams in 1996 to anchor programming for its Comcast SportsNet service. Cablevision Systems Corp. owns the New York Rangers NHL and New York Knicks NBA teams and uses them to fuel its own regional sports networks such as SportsChannel New York (now Fox Sports New York) and Madison Square Garden Network (Umstead, 1998):

There are increasing complaints that incumbent MSOs refuse to license them to competitors. The increasing trend of clustering in the cable industry may worsen this situation. Certain federal laws and FCC rules have been designed to ensure that vertically integrated cable companies make their programming available to other market participants and to limit the extent of horizontal concentration in the industry. Despite these safeguards, there are concerns about the potential harmful effects of ownership ties and concentration within the cable industry.

The program access rules adopted pursuant to the 1992 Cable Act were designed to ensure that alternative MCTV operators can acquire, on non-discriminatory terms, vertically-integrated satellite delivered programming. The terrestrial distribution of programming, including in particular regional sports programming, could eventually have a substantial impact on the ability of alternative MCTV operators to compete in the video marketplace.

The Cable Television Consumer Protection and Competition Act of 1992 includes provisions aimed at, among other things, enhancing competition in the multichannel television market. The FCC's program access rules were designed, in part, to ensure that vertically integrated cable operators generally make their satellite subscription programming available to competitors. The program access rules were very important in helping new competitors—particularly, the DBS firms—to get a foothold in the subscription television market. Despite the success of the program access rules, most of the "noncable" providers and competing cable companies (who are "overbuilding" a cable system where an incumbent's system exists) express concerns about access to reasonably priced programming networks that are owned by cable MSOs. Such concerns include a "loophole," whereby programs owned by cable companies that are delivered to cable systems' facilities through means other than satellite, such as through fiber wires, are not covered under the current program access rules. Although there have only been a few complaints filed with the FCC on this issue, there is concern that such delivery of programs may become more widespread, particularly as the clustering of cable systems increases. The FCC has recently written that this practice needs to be monitored, but the Commission noted that the program access rules as written would need to be clarified to provide clear authority to the FCC over programming delivered in this manner. Therefore, the program access rules should be broadened to include cable-owned programming delivered to cable systems through means other than satellite.

The 1992 Cable Act directed the FCC to place limits on the concentration of ownership of cable systems nationwide. Under the limit that the FCC has set, generally no person or entity can own or have an attributable interest in a cable system that reaches more than 30 percent of the homes with access to cable nationwide. The FCC has stated that with this limit, it is unlikely that a cable company, or a combination of two cable companies acting together, could thwart entry by a new subscription network. However, there are concerns that dominant cable operators are winning price concessions and may have significant bargaining power vis-à-vis subscription networks even when there is no ownership link. A subscription network needs its product to be carried by at least one of the two largest cable companies in order to be economically viable—thus creating a dependence on the larger cable companies and giving them significant influence over the subscription network. In fact, program suppliers that are not vertically integrated (such as MTV, A&E Network, and the Weather Channel) may be very dependent on large cable companies. These independent programming suppliers should generally be required to be made available to all competitors, as is currently the case for programming owned by vertically integrated suppliers.

Clustering also raises certain anticompetitive concerns. Clustering is accomplished through the elimination of potential competition as operators of adjacent cable systems would be the most likely overbuilder in the market. These operators would be relatively low-cost potential wireline overbuilders—because they could likely use their existing headend and parts of their existing trunk lines to serve the new markets—compared to overbuilding a distant wireline system. The potential cost saving is significant because the headend and trunk lines comprise about 25 percent of the capital investment of a cable system. Overbuilding from adjoining franchise areas, however, has rarely been a significant means of entry into cable service markets. In recent instances where overbuilding has occurred or is planned, the overbuilders have not been the operators of existing adjacent cable systems. While these companies generally do not compete against each other in local markets—that is, consumers rarely have a choice of cable operators—this level of consolidation has more significance for the program acquisition market (FCC, 1997).

BellSouth, Ameritech, and RCN report that they have experienced difficulties obtaining programming (Ameritech New Media, 1999; BellSouth Corp., 1999; RCN Corp., 1999). These new entrants point to the actual or potential problem of migration of programs from satellite to terrestrial delivery in order to avoid the program access rules. Ameritech and BellSouth also report difficulty in gaining access to non-vertically integrated networks, and to cable networks owned by the over-the-air broadcast companies.

The FCC has established rules prohibiting unfair and discriminatory practices by vertically integrated cable operators. The program access rules seek to promote competition and diversity in the multichannel video programming market. Some industry observers express concerns related to the migration of channels from satellite delivery to terrestrial delivery and price discrimination. They assert that terrestrial migration weakens the intent of program access rules and threatens the development of a competitive MCTV market. In 1998, the Commission found that the record did not support claims of anticompetitive impact from programming being moved from satellite to terrestrial delivery. However, the FCC noted that terrestrial migration may in the future impact the ability of alternative MCTV operators to compete in the video marketplace (FCC, 1998).

Several commenters advocate extending the program access rules to non-vertically integrated programmers (Ameritech New Media, 1999). Alternative MCTV operators indicate that certain programming networks not owned by cable operators (e.g. fX, MSNBC) are not available to them. They contend that exclusive agreements between unaffiliated programmers and incumbent cable operators is a significant barrier to competition. Similarly, DBS operators assert that cable operators are able to use their "overwhelming" buying power in the programming market with both vertically integrated programmers, as well as independent programmers at the expense of noncable MCTV (DIRECTV, 1999).

BellSouth asserts that consolidation and clustering can have a "chilling effect on the willingness of programmers to sell their product to cable's competitors." The incumbent cable operator generally maintains, however, that consolidation and clustering result in cost savings and efficiencies that promote competition.

The National Cable Television Association (NCTA) disputes that an anticompetitive effect results from the unavailability of terrestrially delivered or non-vertically integrated networks and asserts that product differentiation and exclusivity are legitimate, pro-competitive strategies that increases choices and the amount of programming available to consumers. Non-vertically integrated programmers respond that they actively seek widespread distribution and audience share and thus have no incentive to disadvantage competing distribution outlets. Independent programmers, like Viacom, argue that exclusivity agreements allow them to gain distribution, recognition, and the subscriber base necessary to successfully launch a start-up network and therefore, actually add to program diversity. The FCC, in its *1998 Program Access Order*, declined to extend the program accesses rules to non-vertically integrated programming networks, finding that the record did not support such action.

Clustered systems may find it feasible and profitable to make the terrestrial delivery of regional video programming services. Cable companies under competitive pressure would be tempted to prevent competitors from gaining access to vertically integrated regional programming. Regional consolidation or clustering increasingly renders fiber-based networks more attractive for the incumbent to deliver local cable programming to substantial numbers of subscribers in a number of major markets including New York City, Chicago, Columbus, Philadelphia, Boston, Minneapolis, Orlando, and Kansas City. These fiber networks — as opposed to satellite distribution — are now being used by regional sports networks.

In New York and Philadelphia, where Cablevision Systems Corp. and Comcast had increased its marketing power through system swaps and clustering arrangements, the incumbents changed previously satellite delivered sports programming to terrestrial distribution. Due to loopholes in program access laws, such migration permits the incumbent MSOs to deny its competitor access to MSG Sports Network, Fox Sports Network, New York, and Comcast SportsNet. Similarly, the Tribune company recently migrated nearly 50 Chicago Cubs games from the satellite-delivered WGN to the fiber-based ChicagoLand Television Network (CoreComm Ltd., 1999).

Indeed, in Chicago, where AT&T amassed control over more than 90 percent of the entire market through regional consolidation, terrestrial distribution of cable programming may become more economically feasible (Ameritech New Media, 1999). Whatever the motivation of such a migration might be—be it efficiency reasons or an attempt to evade program access obligations—the issue of terrestrial distribution of programming could have a substantial impact on the ability of alternative MCTVs to compete in the video marketplace (FCC, 1998), if the dominance in a regional market is used to extract exclusive contracts for the incumbent MSO. Indeed, Dertouzos and Wildman (1998) found that incumbent

MSOs are 25 percent more likely to carry regional sports networks than are competitive overbuild systems. The trend toward regional consolidation and terrestrial distribution will continue to increase as overbuild competition occurs in major cities.

In summary, horizontal concentration and the accompanying monopsony power of large MSOs will have a detrimental effect on viability of overbuild competition. Needless to say, however, the financial viability of overbuild entry also depends on other factors such as changes in demand, technological breakthroughs, and potential for market expansion. This issue will be discussed in the next chapter.

Chapter 5

CONVERGENCE AND COMPETITION IN THE TELECOMMUNICATIONS INDUSTRY

As telephone networks provide video and data communication services, cable modems carry high-speed data and voice switched messages, and computer networks transfer voice and video data, the boundaries of the traditionally separated industries of telephone, cable, and computer are blurring. The interaction between technology and conditions of entry creates a new dynamic of intensified competition and an increased flow of new products. These factors fuel each other and intensify the process, creating an ever-accelerating spiral of new competition and barrier disintegration (Litman & Sochay, 1993).

Until recently, RBOCs were not too concerned about cable operators getting into their core voice business. The situation is quickly changing, largely due to the technological advancement and strategic consolidation in the cable industry. Through the acquisition of the two gigantic cable assets—TCI and MediaOne—AT&T Corp. has made cable a credible threat to local telephone companies' core business. After the completion of merging with TCI, and now the proposed merger with MediaOne, AT&T brings the biggest threat in history to telephone companies' local residential dominance. Combining MediaOne properties with the former TCI systems and its affiliates, the Time Warner properties covered by a joint venture agreement, and the agreement with Comcast, AT&T will be able to reach more than 60 percent of U.S. households.

Reaching the remainder could be achieved through wireless access, purchasing unbundled network elements or pure wholesale.

But the most serious threat from AT&T is not its sheer size. Instead, it is Ma Cable's ability to bundle a wide array of telecommunications services that no other company can match. With AT&T's entry into cable, the industry's attention to telephone services and bundled packages is expected to grow dramatically over the next several years. Over time, the rules of engagement will be redefined from one medium to a multimedia industry. The telecommunication industry is rapidly moving in that direction, where one-stop shops offer all sorts of facilities-based voice, video and Internet products, and customers may receive savings and convenience. This chapter begins with the economic implications and effects of convergence on competition. The chapter then presents the current state of integration of voice, data, and video services, followed by a brief comparison of competing broadband services in technological and economic aspects. The chapter concludes with the discussion of how large MSOs can take strategic advantage of the multiproduct operations in dealing with increasing threats of competition in the market.

Structural Effects of Convergence on Competition

Many analysts provide different views of convergence in telecommunications. They appear to agree that convergence may take several forms. Convergence is perceived to emerge as a result of technological integration, business motivation, and regulatory changes (Baldwin, 1997; Katz, 1996; OECD, 1992). Each type of convergence has broad implications on economic welfare. The most obvious way in which convergence affects economic welfare is by expanding the set of potential service offerings. Convergence of technologies, as well as business and regulatory models, allows the provision of old services in new lower-cost, high-quality and more convenient ways.

Clearly technological change has played a key role in driving convergence. While technological change is important, other important forces of change stem from a shift in the policy makers' attitude toward competition in telecommunications markets. The old view held that, as a consequence of natural monopoly cost conditions, competition was antithetical to the public interest. Telecommunications providers were granted monopoly franchises and were thought to be in need of protection from competition in order to ensure their ability to invest in new facilities and their willingness to serve all segments of the public. In addition to stifling competition, this policy stifled convergence. The new view of telecommunications policy holds that competition can generate significant benefits. Since the most likely entrants into many telecommunications markets may be incumbents in other such markets, the new policy of promoting competition may also promote convergence (Katz, 1996).

Conceptual Problems of Convergence

In evaluating economic implications of convergence, it is necessary to refine the forms of convergence. To capture the proper effects of convergence on competition, one must not dwell on the loose definition of convergence since it will lead to not only a misunderstanding of the phenomenon but also ill-advised prediction of market structure and industry evolution. For example, Michael Katz (1996), a business professor at Berkeley, states:

> "Under the new model hailed by many telecommunications executives and policy makers, voice, video and data will converge. But converge in what sense? Will it be convergence of the transmission networks, the service providers or the customer premises equipment, or some combination of these?...[F]rom the end user's perspective, this sort of multimedia convergence could also be achieved through the use of a single, integrating piece of customer premises equipment. Convergence from the end user's perspective may also have little to do with technology, but be much more concerned with billing and customer support, as when a single provider offers one-stop shopping even if that firm does not actually produce some or all of the services being bundled. Today, for example, AT&T will sell you both long-distance telephone services and direct broadcast television services. While the consumer sees a convergence of service provider, the two services are transmitted over completely separate networks and the pieces of customer premises equipment used to receive the services are entirely distinct." (p. 1081)

Apparently, this view obscures the appropriate assessment of convergence from an economic perspective. First of all, convergence from the end users' perspective, while seemingly useful, does not provide any significant help in understanding how the telecommunication industry will evolve as a result of converging technologies, services, and corporate organizations. For example, "convergence of customer premises equipment," as provided by Katz as a form of convergence, does not carry any meaning as to how the integration of voice, video, and data services will influence cost, price, and supply of such services. While it is a very important element in the development of telecommunications, the integration of CPEs has little to do with the evolution of telecommunication service industry and competition. Integrated CPEs may become available as a result, not a cause, of convergence. Integrated CPEs may help enhance consumer convenience and thus ignite a new equipment industry, but they would cast few economic implications, if any, for the development of the telecommunications industry in the future because the cost structure of service suppliers would not be affected by the integration of CPEs.

Furthermore, the view from end users misleads one to the confusion of convergence with bundling. "When a single provider offers one-stop shopping even if that firm does not actually produce some or all of the services being bundled," in Katz's view, it would be a form of convergence. But in fact, it is merely a form of bundling strategies or marketing cooperation, not convergence. It has no direct relation to the cost structure of the firms that provide the service. Nor does it increase or decrease the supply of the service. If one uses the term "convergence" in this sense, therefore, the term is abused and its economic implications become obscured.

Bundling can take place with any products or services, be they related or not. In other words, it is possible for a firm to bundle without changing cost or supply functions of each component in a bundle. Convergence, on the other hand, necessarily implies changes in cost and/or supply functions of products in question. Thus, when RBOCs (or AT&T in Katz's example) sell satellite dishes in a coordinated effort with DIRECTV, it is not a form of convergence, but of marketing cooperation that attempts to take advantage of bundling strategy. The critical point is that unlike convergence, the RBOCs sales of satellite dishes do not change cost of DIRECTV's operations in any way, nor do they influence the output levels of DIRECTV's multichannel television services. The outcome of this marketing arrangement would have little impact on the supply of multichannel television service, and hence competition, because DIRECTV is available regardless of RBOCs engagement.

Viewed from this perspective, convergence can best be defined as the realization of subadditivity in production due to joint production. Thus, the economic implications of convergence become closely related to the economies of scope, giving rise to cost and output levels of production. Formally, subadditivity is said to exist if the costs of separate production are less than the costs of separate production for any scale of output or combinations of outputs (Bailey & Friedlaender, 1982). Thus, whenever the costs of providing the services of the sharable input to two or more product lines are subadditive, the multiproduct cost function exhibits economies of scope (Panzar & Willig, 1981).

Typically, economies of scope arise from the sharing or joint utilization of inputs. There may be special cost savings that accrue to a multi-product firm that are unavailable to firms producing only one of the products but not both. Typically, such economies are associated with the presence of fixed factors of production, sharing of intangible assets such as research activities or other forms of business know-how, networking, or otherwise reuse of an input by more than one product (Bailey & Friedlaender, 1982). In short, the single firm can supply a bundle of products demanded by the market at a lower total cost than some combination of two or more single-product or low volume producers. These byproduct savings may further entrench economies of scale and enhance the overall barrier to entry (Litman, 1998). Viewed from the economies of scope, convergence casts significant implications for the evolution of the telecommunications industry.

Convergence and Market Structure

One major impact of convergence is through its effects on market structure and competition. There are a number of ways in which convergence can be expected to change the structure of the telecommunications industry and the nature of competition in the markets. From a public policy perspective, one of the most exciting developments is the possibility of increased competition as incumbents in one market enter into other markets. The theory underlying this viewpoint is that technological change has created economies of scope that cut across formerly separate markets and thus create cross-market entry incentives, while regulatory changes such as the Telecommunications Act of 1996 allow firms to respond to these incentives.

Insights into the economic implications of convergence are provided by Baldwin (1997), who writes:

> "Because the advanced integrated communications company has such a powerful, essential and comprehensive set of services, it is unlikely that any government would permit a private monopoly provider. Therefore ... *convergence implies competition.*
> An integrated service provider would compete for the core business of an incumbent non-integrated service, such as a plain old telephone

> service, or cable-based video service. A single private company with an integrated voice, video and data service can offer all of the traditional services and some important new ones based on the integration. If for no other reason, *it is necessary for each traditional provider of a non-integrated service to have a much broader business plan as a matter of self-defense*. A traditional single service provider, from now on, has to fear another type of company in the same service area, becoming an integrated service provider." (p.10)

The view of convergence as a source of increased local service competition posits that where once there were two monopolists, one in voice and one in video, now there will be two multiproduct oligopolists—in addition to any new wireless-based operators such as direct satellite broadcast services and MMDS. To be sure, convergence holds the promise of bringing increased competition to many telecommunications markets by allowing existing service providers in what has traditionally been separate markets to cross over into one another's industries. Potential change is particularly great in markets for the local distribution of voice and multichannel video. As a result of technological and regulatory developments, which removes many legal entry barriers, cable MSOs and LECs have been expected to begin entering each other's markets (Katz, 1996).

Since the technology will permit a single comprehensive system, integrating voice, video and data service, there will be a business or economic convergence. It is possible for a telephone company to offer video and data services, or a cable company to offer voice and high-speed data, or a public utility to offer all of these communication services. And, there could be some brand new entities emerging to provide these services if existing businesses do not accept the challenge. Since it is technically possible for one company to offer all of these services, there is an incentive to do so (Baldwin, 1997).

Indeed, this expectation was grounded on the much debated issues of LECs' intention and potential in the provision of voice, data, and video services over the same transmission facility. Until the repeal of cable-telephone crossownership bans, LECs had continuously contended that the opportunity to provide video programming should increase LECs' incentive to construct integrated broadband network facilities to carry that programming to the home. This, in turn, could lead to the introduction of a wide range of innovative voice, data, and video services for subscribers (NTIA, 1991). Telephone companies argued that it would be more efficient to deliver voice, data, and video services on an integrated basis and that the potential economies of scope might be substantial. They asserted, for example, that because a broadband system has the bandwidth capacity to carry both high-speed data and video services, and because telephony, high-speed data, and video all share the same transport medium in an integrated switched broadband network, an economy of scope would exist for each of these service capabilities. Telephone companies further asserted that economies of scope were likely to arise from the sharing of capital costs and expenses, marketing costs, R&D, and billing and accounting functions among the three types of services carried (NTIA, 1991).

Convergence is believed to have two economic consequences with respect to market structure. It may give rise to a significant shift in economic perspectives of telecommunication services. The integration of voice, data, and video services will strike down the most fundamental barriers to entry in the traditional telecommunications industries. For the established telecommunication service providers such as telephone and cable, convergence may help them realize cost savings from joint production to the extent that the integration of such services is technologically feasible and economically profitable. If substantial economies of scope exist in the integration of voice, data, and video services, it is highly likely that those telecommunication companies invade each other's market sooner or later, resulting in the change of market structure from monopoly to competitive markets. For new business entities that consider entering this industry from scratch, convergence may play a role in two opposite directions. First, the enlarged market opportunities will most likely enhance revenue potential for new entrants. Therefore, integrated services can give these companies extra revenue sources that have not been exploited by any established telecommunication service providers. For example, high-speed Internet access service alone can significantly enhance a possibility for a brand-new entrant to recoup its costs and make profits. Certainly, the new entrant need not have to recoup the costs entirely from its video services. The new, unexplored data services market may confer the new entrant some safety cushion that would not have been available for firms specializing in video services market. Thus, convergence will induce more entry in the multichannel television industry.

On the other hand, one should not overstate the likely extent of competitive entry, especially into local distribution markets. The changes in technology and public policy notwithstanding, significant barriers to entry still remain. In addition, there are economic forces associated with convergence that may reduce competition rather than strengthen it. Increased economies of scope and the increased use of multi-product bundling strategies may lead to the erection of new forms of barriers as well as greater concentration of the multichannel television industry. The converging telecommunications industry will require an increase in capital investment for the new entrant necessary to provide such new services. This, in turn, may increase absolute cost barriers to entry, which will lead to unfavorable conditions for small-scale entry.

But to what extent will convergence create pressures for industry consolidation and increase the difficulty of entry in the long run? To answer this question, one must examine economies of scale and scope, as well as the magnitude of sunk costs. Economies of scale and scope can affect industry structure in several ways (Katz, 1996). Viewed in static terms, a wireline local telephone network and a wireline multichannel video distribution network have been considered to have strong characteristics of natural monopolies. And there clearly are natural monopoly elements present in a combined voice and video network. An important question for industry structure is whether the production technology used by a combined network will have greater economies of scale that increase minimum efficient scale relative to market demand. The effects on entry should also be taken into account. If all providers offer integrated packages of voice, video and data services, a potential entrant might also have to come into the industry as a multiservice provider. This is likely to raise the sunk costs of entry, thus increasing its risk.

Such barriers may be reinforced with post-entry cost disadvantages for the new entrant discussed earlier in chapter IV. Moreover, entry—particularly facilities-based entry—will take time, even when it is by firms already established in related markets. Further, competitive entry will not occur evenly in terms of the targeted user groups. High-volume customers located in urban areas will see competition much sooner than will low-volume, rural customers.

Current Development of Service Convergence

The next generation Internet marketplace will be driven by the deployment of ubiquitous, "always-on" networking with broadband content into the home. Home networks permanently connected to the Internet, with screens in several rooms, are a possible part of this vision. Interactive video conferencing and low cost Internet telephony are also parts. But what really distinguishes this phase is the final convergence of TV and PC, of entertainment, education, and work at home, the seamless linking of the home into the larger electronic community. Broadband means many different kinds of content and communication patterns concurrently; "always-on" makes the home a permanent part of the network. The next generation communication applications and patterns of Internet use will not necessarily be restricted to the home and will be adapted throughout the economy. But the mass market will play a key role in shaping the third generation Internet and e-commerce evolution because it will bring a population of broadband users large enough to constitute a critical mass able to sustain the development of third generation applications (Bar et al., 1999). This section presents a summary of three new services that will significantly alter the landscape of telecommunications: cable modems, IP telephony, and DSL services.

High-speed Internet Service Over Cable

Historically, cable networks were constructed to provide traditional video programming services that required only one-way transmission of signals. Until recently, the typical one-way cable system provided approximately 50 channels of analog video. The network was a full coaxial system designed with a centralized headend and lines called "trunks" leading from the headend to nodes placed in the residential neighborhoods. Distribution lines emanated from these nodes which carried the signals through the residential neighborhood. A coaxial wire called a "drop" line then carried the service from the distribution line to the customer's television set. The distribution and drop lines represent the cable industry's "last mile" of plant into the consumer's home. A traditional 350 MHz coaxial cable systems included many amplifiers to boost the signal along the way to subscribers' homes.

Although telephone and cable incumbents already have facilities serving the last mile, traditional telephone and cable plants are not ideally suited for broadband. Broadband, however, opens the possibility of new facilities to serve the last mile to the home. As Internet usage continues its dramatic rise, the demand for broadband services grows. The market demand to bring high-speed data, video and voice to residential and business customers is reflected in increased levels of investment and faster deployment schedules for various technologies.

According to the National Cable Television Association (NCTA), the cable industry's spending on the deployment of two-way broadband via high-speed cable modems in 1997 alone totaled $6 billion. One estimate is that 63 percent of all cable systems will be broadband-ready by 2001. TCI has committed to spend $1.8 billion to upgrade its plant, in part to provide broadband services. TCI's upgrades are expected to be 60 percent completed by the end of 1999 and 90 percent completed by the end of 2000. Another major cable operator, Comcast, has spent over $1.2 billion in the past three years to upgrade its cable systems, largely to be able to offer broadband. In addition, Microsoft's investment of $1 billion in Comcast, the investments of $210 million each by Microsoft and Compaq in Road Runner, and AT&T's purchase of TCI for $48 billion all appear to be motivated in part by a desire to enter broadband via cable television systems (FCC, 1999a).

Major MSOs are eager to get their network upgraded because they view Internet access as a high-revenue, high-margin product. Cable companies will have to diversify their product and find other revenue sources to survive in the increasingly competitive environment. They invest so much to upgrade their systems because they want to develop new, revenue-generating products, such as interactive television, digital cable, and high-speed Internet devices.

Cable MSOs deployment of high-speed Internet service was prompted largely by an increased level of competition in the multichannel television market. As RBOCs and others enter the video industry, cable MSOs feel Internet access services would allow them to generate another revenue stream in the short term and to maintain a competitive edge in the long term. In many competitive markets, cable operators responded to telephone entry by increasing channel capacity and introducing new services.

Access to the Internet over cable generally has become easier in the past three years. To deliver data services over the cable network, cable operators using a two-way broadband architecture typically allocate one television channel for downstream traffic and one channel for upstream traffic. Cable operators using a one-way broadband network typically allocate one television channel for downstream, while the upstream path is provided over a telephone line. At the cable headend, a cable modem termination system (CMTS) communicates through the allotted channels with cable modems located in subscriber homes to create a virtual local area network (LAN) connection (Kinetic Strategies, 1999).

In addition to the advantage of speed, Internet over cable also offers end users a connection that is "always on," as compared with the more widely-used dial-up services. Furthermore, most Internet over cable providers offer proprietary content. These ISPs are also known as online service providers or OSPs.

As of this writing, virtually all of the major cable operators offer broadband access in some areas, and they are steadily expanding service areas to meet demand. Currently, however, service is not available in all markets. Notably, cable broadband access will continue to become more widely available as cable system infrastructures are upgraded. In markets where cable broadband is available, the industry is hopeful that the eventual standardization of cable modems will increase subscription levels. To that end, an industry consortium called CableLabs has adopted hardware and software interface standards called Data Over Cable Service Interface Specification System (DOCSIS) to support the delivery of data services over the cable infrastructure. This standard should contribute to lower-cost modems, less complex and time consuming installation procedures, and potentially, self-installation by subscribers.

Cable operators have adopted an aggressive schedule to upgrade their networks to provide broadband services. The cable operators are also partnering with a number of cable ISPs that provide comprehensive networking and systems integration services to support broadband access. For example, Excite@Home and RoadRunner offer their own high-speed data backbone and regional data centers with local caching equipment. Other companies, such as High Speed Access Corporation (HSA) and ISP Channel, are offering basic turnkey Internet packages specifically designed for small cable system operators.

The most recent development in cable modem services is summarized in an FCC staff report (Lathen, 1999). As of August 1, 1999, cable modem service was available to 32 million homes. This was equal to 30 percent of all cable homes passed in the U.S. and Canada. The penetration rates for cable modem service averages 3.5 percent as of 1999. The FCC report also found that the total subscriber count could surpass 1.5 million by the end of 1999.

Many analysts believe that cable modem deployment will take off in the coming years. The projections for residential cable modem subscribers range from 4 to 6 million by 2002, and over 11 million by 2005. Particularly, the development of the DOCSIS standards for high-speed data delivery over cable will dramatically accelerate cable modem deployment, because DOCSIS compliant modems will increase the success of retail distribution channels, as well as simplify the installation process.

With Internet usage exploding, the number of cable modem users in North America has passed the 1 million mark and all top 5 MSOs in the US have now signed up more than 100,000 data customers apiece (see Table 9). Led by Time Warner Inc. and MediaOne Group, cable operators signed up about 250,000 Internet users in the first quarter of 1999 only. Both Time Warner and MediaOne now have more than 150,000 data subscribers, while Cox, AT&T and Comcast are estimated to have more than 100,000 high-speed Internet subscribers.

The two leading providers of Internet over cable are Excite@Home and RoadRunner. Both are OSPs, offering proprietary content as well as access to the Internet. As of August 1, 1999, the Excite@Home subscriber count was estimated at 670,000. RoadRunner's subscriber count was estimated to be 350,000. A number of new cable ISPs, such as HSA, Prolog, and ISP Channel, have partnered with cable operators to offer their versions of high speed Internet access. In a number of markets, both Road Runner and Excite@Home are becoming the second biggest Internet service providers, trailing only America Online Inc. (Breznick, 1999a).

Table 9 CABLE MODEM CUSTOMER RANKINGS
(As of September 30, 1999)

Cable Operator	Number of Cable Modem Subscribers
Time Warner	245,000
MediaOne	173,000
Shaw	147,000
Cox	140,474
Rogers	125,400
AT&T	113,600
Comcast	112,900
Cogeco	41,500
Videotron	36,000
Cablevision	31,474
Other	240,000
Total	1,403,333

Source: Kinetic Strategies, Company Reports

Cable Telephony

In addition to high-speed data, large MSOs have begun to offer local telephone service. Voice services from cable operators have grown robustly since 1996 due to MSOs deployment of fiber-optic cable, aggressive marketing strategies and a desire by operators to become "one-stop shops" for multiple communications services. A recent report published by market research firm Frost & Sullivan predicts that voice services will be a major cash cow for cable operators over the next five years (Cho, 1999c).

This positive outlook stems from what they expect to occur as a result of the AT&T's acquisitions of TCI and MediaOne. It was local access and bundling of voice and video services that AT&T believed as having the greatest potential when it decided to acquire TCI and MediaOne (Vittore, 1999). AT&T already is giving regional Bell operating companies their most fierce competition for the residential voice market.

MediaOne has been rolling out telephony since late 1997. The MSO offers telephony in six markets: Atlanta; Los Angeles; Pompano and Jacksonville, Fla.; Richmond, Va.; and suburban Detroit. The MSO began offering its digital-telephone product in the metropolitan Detroit communities of Plymouth, Northville and Canton, Michigan with 55,000 homes passed (Hogan, 1999). The towns mark the first where MediaOne offers all three of its advanced broadband services: high-speed Internet access, digital video and telephony. In Atlanta, MediaOne is offering consumers in neighborhoods that it has rewired with hybrid fiber-coaxial 750-megahertz lines a handful of incentives and features, including free phone installation and the ability to keep their existing phone numbers (Paikert, 1998).

One of the more aggressive MSOs on the telephony front, Cox provides digital telephone service to more than 40,000 subscribers in six markets with a 5.9 percent penetration rate (Farrell, 1999a). In 1997, Cox Communications Inc. launched its "Digital Telephone" service in Orange County, California, followed by Meriden, Connecticut., and Omaha, Nebraska (Applebaum, 1997). In 1998, Cox introduced "Digital Telephone" in two new markets—San Diego and Phoenix.

In general, competitive local exchange carriers (CLECs) such as MediaOne and Cox undercut the incumbent local exchange carrier (ILEC). Interestingly, pricing on the first line for Cox Digital Telephone services is consistently about 20 percent lower—the same price reduction in the overbuild areas for the multichannel service—than the incumbent RBOC, with the second line about 50 percent lower. The discounts apply to Cox cable customers. In San Diego and Orange County, that translates to $9.99 per month for the first phone line, versus $11.25 from incumbent Pacific Bell. A second line costs $4.99 per month (Hogan, 1998e).

TCI has introduced its own telephone service in Hartford, CT, Fremont, CA, and Arlington Heights, IL. TCI and Ameritech New Media are embroiled in a heated race to sign and keep cable subscribers in Arlington Heights, a suburb northwest of Chicago. The two companies also have competed for telephone customers in Arlington Heights since TCI began a soft launch of its local phone service and high-speed Internet service there in 1997. Earlier in 1997, Arlington Heights became only the third test market for a TCI local phone service called PeopleLink and for its high speed Internet-access service, @Home Network. TCI's (now AT&T) phone service uses hybrid fiber-coaxial cable, and the operator offers high-speed Internet access on the same plant (Hogan, 1997).

Residential telephony via Internet protocol (IP) is still in its infancy, but technology is at hand that can give cable service providers a clear advantage over narrowband-service providers as IP-voice applications become commonplace. With IP now embedded in backbones, end-to-end IP connectivity provides the opportunity to process voice calling without having to deal with gateways and traditional switches (Dawson, 1999b).

The idea of offering competitive residential telephone services has captivated cable operators for years. Although reliable telephony equipment for hybrid fiber-coaxial (HFC) networks is commercially available, significant economic and operational barriers have discouraged most MSOs from widely deploying it.

Now, with Internet Protocol (IP) networks emerging as viable platforms for the delivery of voice traffic, MSOs hope to use their high-speed data networks to support packet telephone services instead of deploying standalone HFC telephony equipment. The rationale is clear: Deploying separate telephony and high-speed data architectures creates capital, operational and spectrum inefficiencies, since a cable operator must purchase two hardware platforms, allocate a pair of upstream and downstream channels for each service, integrate two operations support systems, and assign staff to manage each service offering (Kinetic Strategies, 1999b).

There are tremendous implications of IP-telephony trials over cable. Using IP, cable operators hope to create an integrated multi-service communications platform that operates on a lower cost structure than existing circuit-switched alternatives, enabling aggressive service price discounting without sacrificing margins. Besides undercutting competitors, MSOs hope the flexibility of IP networks will allow them to deliver a host of unique value-added features, such as integrated voice mail and e-mail messaging and the real-time provisioning of additional phone lines without rewiring a home.

The ultimate goal of many MSOs is to also offer long-distance IP telephony over their packet backbone networks. For example, a residential cable IP telephony customer served by Comcast in Philadelphia might call another cable IP telephony customer served by MediaOne in Los Angeles. The packet calls could be carried nationwide at very low cost without ever touching a telephone company network. MSOs are currently evaluating options to enter into backbone interconnection arrangements that would make such a solution viable. Apparently, IP telephony will hit the long distance market first, bringing a challenge for traditional interexchange carriers including AT&T. But it will also undermine the potential growth opportunities that LECs have been pursuing for a long time.

Local Exchange Carriers' DSL Deployment

Telephone companies are starting to realize the growth prospects of the data business. In recent years, digital and data services revenue increased 30-40 percent a year. In addition, a large portion of telephone companies revenue comes from data. In fact, Ameritech data revenues overtook voice revenues in 1998 and the LEC expects exponential growth over the next few years as customers are expecting carriers to provide end-to-end data solutions and total converged solutions. Ameritech' plans to transform its revenue structure is so dramatic that in 2010 the LEC hopes to make 99 percent of its revenues from data, leaving only 1 percent from voice (Quinton, 1999b). But most of the data services being offered right now by the RBOCs were in the business sector, rather than on the residential side, where most cable modems are deployed (Cho, 1999d).

Being that data services are becoming such a large portion of the Bells' revenue mix, it is natural for them to get even more aggressive in their deployment of ADSL lines. But Bell companies cannot survive in the long run for several fundamental reasons. Plain old telephone services (POTS) alone can no longer buttress the Bells' business. They must create new markets for revenues including data and video. The telephone companies cannot maintain their monopoly power in voice any more. Nor would they capture a significant market share in data and video. This is partly due to technological advance in telecommunications, but more importantly due to LECs' inability to provide integrated services in a bundle.

Recognizing the significance of the residential broadband market, the telephone companies are aggressively entering the consumer market for high-speed Internet access service by deploying ADSL in an effort to counter the threat of cable modems. About three years after launching cable modem service in selected regions across the U.S., cable operators no longer have the high-speed data market all to themselves. In city after city, regional phone companies, competitive local exchange carriers (CLECs), wireless cable firms and other telecommunications companies are introducing their own high-speed Internet-access services to compete against cable modems. While largely charging higher prices than cable operators, they hope to lure residential and business customers with promises of dedicated bandwidth, greater service reliability and a wider choice of Internet service providers (ISPs).

Technology affording such increased bandwidth for the conventional twisted pair telephone lines is known as "digital subscriber line" and takes many forms (collectively xDSL). To date, the most prominent forms are ADSL (asymmetric DSL) and HDSL (high-speed DSL). DSL technology is capable of increasing the capabilities of the incumbent LECs' existing copper plant, and may be capable of offering many advanced services. DSL uses digital signal processing techniques to make possible the provision, on existing copper loops, of high-speed data communications without interfering with the carriage of voice service. DSL allows a copper loop to be used simultaneously for high-speed data service and ordinary voice service, and keeps the data capability available 24 hours a day.

Although DSL service is available in several versions, there are two general categories, symmetrical and asymmetrical. Symmetrical versions offer the same data rates upstream and downstream and are best suited for business applications such as video-conferencing. Asymmetrical versions offer different data rates upstream and downstream and are ideal for residential users who receive a lot of data but do not originate or send much (*e.g.* Internet surfers). One such version is called asymmetric digital subscriber line (ADSL). As ADSL does not interfere with the basic voice service, the user can simultaneously browse the Internet or watch a movie while talking on the telephone.

ADSL typically delivers up to 8 megabits per second (Mbps) downstream and 1 Mbps upstream (See Table 10). A "skinnied down" G.Lite version delivers 1.5 and .5 speeds. VDSL modems can run at symmetrical 52 Mbps speeds depending on how close telco's central office gets to the customer. It is all dedicated point-to-point bandwidth per user. So it does not pose congestion issues as a shared modem solution may have (Barthold, 1999b).

Table 10 Classes of DSL Technologies

Acronym	Full Name	Maximum Data Rate		Max. Distance from Central Office to End-User (feet)
		Downstream	Upstream	
HDSL	High-data-rate DSL	1.5 Mbps	1.5 Mbps	12,000
SDSL	Symmetric DSL	768 kbps	768 kbps	10,000
VDSL	Very-high-data-rate DSL	51.8 Mbps	2.3 Mbps	4,000
RADSL	Rate-adaptive DSL	8 Mbps	1 Mbps	18,000
ADSL	Asymmetric DSL	1.5-8 Mbps	640 kbps	18,000
G.Lite	DSL Lite	1.5 Mbps	384 kbps	22-25,000

Despite the promise of DSL to deliver broadband access to businesses and consumers, there are several technical issues with regard to the widespread implementation of DSL. One of the primary inhibitors is signal attenuation, also known as the distance limitation. Attenuation describes the dissipation of signal strength as it travels over the copper line. DSL utilizes a higher frequency that is more susceptible to attenuation than ordinary voice transmission. Consequently, the various DSL technologies detailed in Table 10 have distance limitations ranging from 4,000 to 18,000 feet from the telephone company's central office. "These limitations may ease as technologies improve, but as a practical matter, DSL is currently limited to locations within a three-mile maximum loop from the central office" (Lathen, 1999).

The adoption of DSL-lite (or G.lite) should further accelerate the pace of broadband deployment in the residential market, because it increases the coverage area of DSL beyond 18,000 feet from the central office and allows more homes to receive high speed Internet access over their existing copper lines. In addition, G.lite can be installed (plug-and-play) by the customer. This plug-and-play feature is an important competitive factor, because it allows for off-the-shelf retail availability and modem pre-installation in PCs—two goals the cable industry hopes to achieve with its DOCSIS cable modem standard. The plug-and-play feature also lowers labor costs, since it reduces the time technicians spend installing the service at the home or business (Ellis & Dawson, 1998).

The ILECs' aggressive deployment of DSL can be attributed in large part to the deployment of cable modem service. Although the ILECs have possessed DSL technology since the late 1980s, they did not offer the service, for concern that it would negatively impact their other lines of businesses. The deployment of cable modem service, however, spurred the ILECs to offer DSL or risk losing potential subscribers to cable. Prior to cable modem deployment, the ILECs had little incentive to deploy DSL and the consumer had no choice for high-speed Internet access. In fact, the deployment of DSL could have an adverse impact on the telephone companies' T1 business. T1 is a form of high-speed access that was sold primarily to business customers. With a price range of $300 to $3000 per month, the T1 business generated high profit margins for the telephone companies. Since the price point of DSL was lower, ranging from $50 to $1000 per month (depending on the type of DSL), the deployment of DSL service would undercut the T1 business (Lathen, 1999). A contrasting factor between carriers that were moving aggressively into the consumer market and those that were holding back was the extent to which they were willing to risk cannibalizing existing service markets, such as the market for ISDN (Dawson, 1998c). Telcos will not abandon ISDN and T1 services, but as they launch high-speed Internet service more and more, there will be more price pressure on telco's own existing services like ISDN and T1 services.

Various telecommunications providers, from incumbent local exchange carriers (ILECs) to competitive local exchange carriers (CLECs), recently have adopted aggressive deployment schedules for digital subscriber lines (DSL). The pace of telco DSL rollouts has escalated on schedule since 1998, including the first commercial deployment by BellSouth Corp. in September 1998 and a major expansion throughout California by Pacific Bell. Other telcos like USWC, GTE Corp. and Ameritech Corp. have all moved forward with large-scale ADSL deployments in 1998. There were approximately 160,000 DSL lines in service at the end of the second quarter 1999. This represents a 300 percent increase since the fourth quarter 1998 and a 100 percent increase since the first quarter 1999. Analysts predicted that over 30 million telephone lines would be qualified to support DSL services by the end of 1999 (See Table 11). Interestingly, one of the first Bell companies to launch ADSL, Ameritech Corp., is proving to be one of the most cautious in expanding its market base.

TABLE 11 Number of DSL-Ready Lines

	Qualified Lines (in millions)	
RBOCs	1998	1999
Ameritech	n/a	n/a
Bell Atlantic	2.0	7.0
Bell South	2.0	4.0
SBC	3.3	10.0
US West	3.6	5.2
GTE	5.0	6.0
Total:	15.9	32.2

Source: Donaldson Lufkin & Jenrette--Wireline Communications (June 1999) cited in Lathen (1999), Broadband Today, A staff report to William E. Kennard, Chairman of FCC.

ILECs also have entered co-marketing and co-branding agreements with established Internet access companies such as AOL, MindSpring and EarthLink. For example, Bell Atlantic and SBC have agreed to provide volume-discounted DSL transport service to AOL in order to tap its 19 million-customer base and brand name. BellSouth recently reached a similar agreement with MindSpring, which has a 1.2 million customer base. EarthLink has agreements with GTE and Sprint to offer DSL services nationwide (Lathen, 1999).

The ability to cost-effectively offer advanced services over VDSL rests in part on the fact that telcos have ample amounts of fiber already in place within the VDSL transport range. Moreover, the decreasing costs of ADSL equipment used for the delivery of high-speed-data services over telco lines—now in the

$300 range for customer modems—is driving down the costs of the ATM and modulation chips that will be used in VDSL set-top boxes (Dawson, 1999a). As a result, what once seemed to be an ever-receding possibility for the use of telephone wires in delivering high-speed data has suddenly become an imminent reality involving not just the telcos, but an expanding base of competitive local-exchange carriers and Internet-service providers. The activity on the DSL front posing the competitive pressure for cable can be found in market launches that are under way around the country.

Comparison of Broadband Services: Technology and Economics

The market for high-speed Internet service is starting to explode. There is an emerging battle between cable modems and ADSL for getting high-speed access to the home and business. The battle between cable and telephone companies for Internet surfers is heating up, as LECs started to aggressively roll out ADSL service at much lower prices.

In assessing the diffusion of high-speed Internet access services, an objective way, if not the most convincing, is to compare the relative merits of cable and DSL technologies. First, RBOCs' high-speed Internet services never match cable modems in terms of price. High-speed data service through ADSL requires the use of an ADSL modem, which is sold at $200. The service charges are around $40 per month, not including charges for Internet access. Early 1999, Bell Atlantic has formed an agreement with Internet-access giant America Online Inc., making the telco's asymmetrical-digital-subscriber-line service available to

AOL subscribers for an estimated $42 per month. SBC Communications Inc. announced that it plans to roll out ADSL in markets in seven states—including California and Connecticut—for $49 per month with Internet access. The two announcements are significant, as they address what many have said is one of ADSL's biggest problems—that it is just too expensive. But with these offerings, the two telcos are narrowing the gap between ADSL and cable-modem-service pricing, which is generally sold at $40 per month. SBC's $49-per-month price is only valid for customers who commit to service for one year, and who use SBC's ISP. For customers who opt for a month-to-month service or who use an outside ISP, the price climbs to $81 (Farrell, 1999b). But despite the fine print, the new pricing strategy signals the evolution of ADSL from mainly a business service—priced anywhere between $60 and $200 per month—into one where the main target is the residential user. And that change was accelerated by the success of cable modems.

In technological aspects, ADSL data transfer rates are far below those of cable modems. Perhaps the best measure of competitiveness for a various high-speed Internet service would be monthly "bits per buck" ratio, as in the last column of Table 12. The "bits per buck" ratio, created by the FCC, is a short-handed way to illustrate today's performance/price trade-off that a typical end-user would face. Specifically, "bits per buck" here refers to the kilobits per second of data a user would receive for each dollar spent, based on recurring monthly costs (not including one time costs for, *e.g.*, CPE purchases and for installation). The higher the kilobits per second for each dollar spent, the better the value for the end-user. Clearly, broadband deployments in the lead today, such as cable modems, benefit from having lower price points and higher data speeds. ADSL and ADSL-lite, the telephone company's version of high-speed access, offer lower ratio because of lower data speeds and higher price points.

Table 12 TECHNOLOGY DEPLOYMENT & COSTS TO RESIDENTIAL CONSUMERS

Technology	Service Providers	Typical Marketed Downstream Residential Speeds	Current Availability	Cost to Provider	Cost to Consumer - Installation	Cost to Consumer - CPE	Cost to Consumer - Monthly Basic Svc	Cost to Consumer - Monthly Internet Service	Cost to Consumer - Total First-Year Costs	Monthly "Bits per Buck" Ratio
Traditional Analog Phone Wire	ILECs, IXCs, ISPs, CLECs	56 Kbps	Nationwide	N/A	$0	$200	$20	$20	$680	1.4
ISDN	ILECs, Utilities	128 Kbps	Most major cities	N/A	$90 - $160	$300	$30-$50	$30-$50	$1385	1.6
Satellite – Current	Satellite Operators (DirecPC)	400 Kbps	Nationwide	$400-$500 (per subscriber)	$50	$300	$30-$50	$0 (included in access fee)	$830	10.0
ADSL	ILECs, IXCs, CLECs, Utilities	1.5 Mbps	Some major cities, suburbs and rural areas	$600-$800 (per subscriber)	$100	$200	$50-$60	$0 (included in access fee)	$960	27.3
ADSL-lite	ILECs, IXCs	1 Mbps	In trials	$400-$600 (per sub)	$0	$200	N/A	N/A	N/A	N/A
Cable Modems	MSOs, CLECs, Utilities	3 Mbps	Some major cities, suburbs and rural areas	$800-$1000 (per subscriber)	$75-$150	$0 (incl. in install fee)	$40	$0 (included in access fee)	$593	75.0
Terrestrial Wireless - LMDS - 24/38 GHz	LMDS Companies 24-38 GHz Providers	1.5 Mbps	In over 30 major markets	$5000-$15000 (per building)	$200	$1000	$50	$0 (included in access fee)	$1700	30.0
Terrestrial Wireless – MMDS	MMDS Companies	1 Mbps	Some major cities and suburbs; also in 2-way trials	$600 (per subscriber)	$100	$400	$50-$70	$0 (included in access fee)	$1220	16.7
Satellite - Future	Satellite Operators (Geo and Non-Geo)	10-64 Mbps	Under development	N/A	N/A	$500-$1000	N/A	N/A	N/A	N/A

Source: FCC (1999), In the matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, FCC Report 99-5 (CC Docket No. 98-146), February 2, pp.33,45.

Most cable modem systems rely on a shared access platform, much like an office LAN. Because cable modem subscribers share available bandwidth during their sessions, there are concerns that cable modem users will see poor performance as the number of subscribers increases on the network. Common sense dictates that 200 cable data subscribers sharing a 27-Mbps connection would each get only about 135 Kbps of throughput—virtually the same speed as a 128-Kbps ISDN connection. Based on this characteristic, in fact, some analysts contend that DSL will catch up cable modems in terms of speed (Barthold, 1999b; FCC, 1999a; Lathen, 1999). An FCC staff report (Lathen, 1999), for example, argues that transmission speeds over cable networks degrade as more subscribers are online because it is subjected to individual subscriber's action. They argue, therefore, that as traffic mounts, data speeds may fall to the level of ADSL or lower.

This contention implies that Internet access services over cable networks will have a negative network externality problem (i.e., congestion) as the number of subscribers increases. If so, cable operators will have a terrible dilemma because the service is doomed to grow only to a certain level that can accommodate a limited number of users. The arguments are seriously flawed, however. This scenario may become true only if cable operators will take no action upon the increase in the number of users. Unlike circuit-switched telephone networks where a caller is allocated a dedicated connection, cable modem users do not occupy a fixed amount of bandwidth during their online session. Instead, they share the network with other active users and use the network's resources only when they actually send or receive data in quick bursts. So instead of 200 cable online users each being allocated 135 kbps, they are able to grab all the bandwidth available during the millisecond they need to download their data packets—up to many megabits per second.

If congestion does begin to occur due to high usage, cable operators have the flexibility to allocate more bandwidth for data services. A cable operator can simply allocate an additional 6 MHz video channel for high-speed data, doubling the downstream bandwidth available to users. If the demand keeps increasing, the system may allocate more channels, even half its channel capacity, for data transmission. It would, of course, depend on the relative strengths of demand levels for video, voice and data service. Another option for adding bandwidth is to subdivide the physical cable network by running fiber-optic lines deeper into neighborhoods. This reduces the number of homes served by each network segment, or node. The segmentation of nodes increases the amount of bandwidth available to end users within each node (Kinetic Strategies, 1999). In fact, AT&T Broadband & Internet Services even plans to test a "micronode" architecture that pushes fiber to possibly every 50 homes passed, instead of every 500 or 1,000 (Menezes, 1999). Eventually, cable operators can adopt fiber to the home (FTTH) where every home is fibered from the central office (headend) to the home drop as the demand for data services increases. The beauty of this evolutionary scheme is, of course, its flexibility.

On the other hand, telcos have many issues to deal with as they push ahead with DSL rollouts, even before they get to the point of agreeing on a standardized approach. What makes DSL challenging is its technological problems. There are distance issues [from home to central office] and issues of how to run ADSL over digital loop-carrier systems, not to mention the amount of equipment that has to be installed.

Because of these limitations in delivering DSL to every customer, LECs have to fall back on ISDN (Integrated Services Digital Network). Although ISDN could be a solution where DSL is not available, it may hurt LECs own business (Barthold, 1999). There is limited availability of "last mile" competitive broadband network infrastructure. In many areas, Cable is still the only broadband option for the mass market. The access alternatives for business are considerably better than for households. Indeed, the Local Exchange Carriers, incumbents and competitors alike, have aimed DSL deployment at business customers. Larger businesses in major commercial centers may also have fiber optic connections from a CLEC. Alternatively, wireless broadband access services are emerging in most major urban centers. However, most businesses in the United States do not have access to the cable infrastructure, and running cable to a business results in customer charges of thousands of dollars.

For the residential market, the cable modem and DSL are the only broadband options today and it is clear that wireless broadband Internet is not now and is not likely to be available in the very near future. As a result, the network alternatives for any given household are limited. The phone lines serving a large share of U.S. households are simply unsuitable and will remain unsuitable for DSL services. Reading of the evidence varies, but at least 20 percent, perhaps 40 percent of the local loops in the country will not presently support DSL at anything near Cable-modem speeds, if at all (Bar et al., 1999). Ameritech, for example, estimates that DSL will not work on 45 percent of its loops today, and may never work on 20 percent of them. In the same vein, Bell Atlantic's new DSL service can reach up to 80 percent of telephone subscribers in the Bell Atlantic region. AT&T estimates that "most ILEC loops can be upgraded to support ADSL. With digital loop carrier lines included, an estimated 60-80 percent of RBOC access lines are ADSL qualified" (FCC, 1999a).

Certainly, the share of local loops unsuitable for DSL will fall significantly over time, but these limitations are unlikely to be overcome easily or soon. DSL is therefore unavailable to a significant portion of the American territory today, or anytime soon. Consequently, the benefits of broadband DSL are unlikely to be available to many Americans in the near future.

This explains why LECs are working on a different architecture. BellSouth Corp. is preparing to experiment with a fiber-to-the-home delivery system in Atlanta. BellSouth will use the asynchronous transfer mode data-networking protocol, enabling it to offer significantly higher data speeds and potentially wider availability than digital-subscriber-line technology. Running fiber to the home advances BellSouth's plan to spend $200 million to replace existing copper lines with fiber to the curb for 200,000 homes in metro Atlanta and metro Miami's Dade and Broward counties as a platform for advanced data, video and voice services. The Baby Bell also installs fiber as its preferred infrastructure in new subdivisions. The concept of pushing fiber even deeper into the network has been a hot topic both for phone companies and their cable-system rivals, as they look for cost-effective ways to deliver more bandwidth for supporting advanced consumer services (Menezes, 1999). But high costs and a general absence of incentive to push the technology envelope in this direction have stymied the deployment of fiber-based broadband-telco networks (Dawson, 1999a).

BellSouth believes that fiber to the home (FTTH) is its ultimate platform for satisfying customers' voracious appetite for bandwidth—an appetite that is growing at exponential rates. BellSouth's FTTH setup includes optical-access network equipment developed by Lucent Technologies, such as a network-termination unit installed inside the home for converting optical signals from the fiber to high-speed Ethernet data, which can be used by subscribers' personal computers.

Nor are telco prices where they need to be, even when the service offered is only 256 kbps. At $40 per month plus $19.95 for Internet access, the 256-kbps version of the multispeed Megabit service is about $15 per month higher than it should be to compete with cable modems (see Table 12). Telcos also have to worry about what they can offer beyond speed in efforts to capture a large consumer base. Here, they are well behind the cable industry, where much effort has gone into developing consumer-friendly interfaces and multimedia-enriched content that capitalizes on the power of high-speed access (Ellis & Dawson, 1998).

The Strategic Uses of Convergence

Nevertheless, it is not cable's relative technical strengths against DSL that will determine the prospects of competition in the broadband service industry. The reality is that companies with the best products will not always win, as chance events may cause 'lock-in' on inferior technologies. Quite independently of any inherent technological advantage that cable or DSL may possess, the rapid cable modem roll-out means that cable will have a massive, certainly difficult to dislodge, and perhaps enduring deployment lead at least in the residential market. In network markets such as this, initial leads often result in enduring dominance that can even preempt later competition (Bar et al., 1999). The gap between cable modem and DSL will likely endure because of strategic uses of converging services. This section discusses why cable MSOs will dominate the converging telecommunications market from the strategic perspectives. Cable MSOs will have three main strategic advantages: bundling capability, first-mover advantages, and dynamic resource allocation.

Bundling of Services

No analyses would be complete if it does not capture one critical feature of today's telecommunications business, namely convergence. As many analysts predict, a key growth area in telecommunications that has limitless opportunities is to combine voice, data, and video services. Convergence may play a role in influencing entry decisions in two opposite directions. It may enhance the viability of overbuild competition through the expansion of market opportunities that have not been explored thus far. This newly found market (e.g., high-speed Internet access over cable) will greatly expand revenue potential for an incumbent and an entrant alike, giving rise to a new possibility for the entrant to exploit.

At the same time, however, convergence may further impede entry by increasing the necessary capital investment in the diversified operation for the new entrant. If the entrant is to compete with the incumbent that operates at multiple product spaces, the entrant will be forced to provide at least the same product categories as the incumbent. Theoretically, there is no reason for the entrant to match all the products offered by the incumbent. The entrant can carve out a niche, single market without entering all the submarkets in which the incumbent operates. But this would obviously put the entrant at disadvantage for many reasons. First, the specialized entrant will not be able to achieve efficiencies stemming from economies of scope. To the extent there is a subadditivity factor, this would result in post-entry cost advantage for the multi-product firms. Second, bundling can be a very powerful strategy for the multi-product firms. If a firm monopolized one product, the firm can effectively leverage that monopoly to preclude competition in another market by using a bundled pricing strategy. Further, the ability to drive or preclude a rival from a market using bundled pricing exists even if the rival can offer a superior alternative to the monopolist's non-monopolized product. Microsoft's bundling of its browser with its own operating system offers one prominent example of such cases. In the multichannel television industry, it has been sometimes claimed that an MSO who owns exclusive rights to an anchor channel can preclude competition in thematic channels (e.g., comedy or SF channels) by bundling their own thematic channels with the anchor (Aron & Wildman, 1999).

In this converging marketplace, only the one who can provide multiple services efficiently and seamlessly will survive. In order to be a player five or ten years from now, telecommunications companies would have to offer services in a package. In the days of bundled services, the stakes are higher in the fight to get and keep market share for a full package of telecommunications services. That is why major cable companies are transforming themselves from multiple system operators (MSOs) to broadband service operators (BSOs). As the name tells, "MSO" implies that cable services in the past wer largely confined to "broadcast" of signals in geographically disperse areas. But advanced cable systems today provide diverse services in package, including interactive data and voice as well as the conventional one-way video services over "broadband" networks. Cable operators are no longer counting people in terms of basic cable but as revenue generating units. AT&T and MediaOne have billed themselves as a "broadband" company, and these cable MSOs have spent heavily on system upgrades to two-way 750-MHz fiber optic wires that can be used for high-speed-data transmission and telephony. In the bundling opportunity, moreover, brand-name recognition goes a long way toward keeping subscribers loyal. And, unquestionably, AT&T enjoys high brand recognition.

Given the acceleration of companies trying to offer a full range of broadband services, it is clear that there is a competitive advantage in offering multiple services and that the cable TV providers have, at least, a short-term lead on offering the entire package. With their core business virtually intact in the multichannel television market, major cable MSOs are well poised to take off. While there are certainly additional costs to make digital cable interactive, less than 5-8 percent of the total bandwidth on a digital cable system is used for high speed data services; the rest remains available for profitable video services. (Bar et al., 1999).

Bundling may give significant advantages to broadband service operators (BSOs). It is also expected to offer some benefits to consumers. Bundling may be in the interest of both the business and the consumer. Thus, multi-service firms will likely attempt to provide a bundle of services whenever possible. The ability to include television offerings in its bundles certainly makes it easier for AT&T to create distinctive packages. AT&T could, and apparently intends to, offer integrated bundles of phones service (both local and long distance), multichannel television, mobile services, and ISP (Bar et al., 1999). With bundled package, most cable operators have noted no significant churn or downgrades among their multiple-product customers. The anchor is, of course, cable modems (Haugsted, 1999b).

Some market analysts estimate that merely the prospect of bundled services creates approximately $150 in new value per subscriber for a cable system, irrespective of value created by the anticipated revenue from each individual service offering. There would be competitive advantages in the package of services created, advantages in pricing those services, and advantages in a single bill. Indeed, the consumer's preference for one bill is believed to be strong enough to reduce switching, even without price reduction for the services in a bundle (Bar et al., 1999).

Cable operators across the country have already been testing and launching multiple-service offerings. Comcast Cable Communications Inc. launched its first Comcast-branded long-distance phone service in Detroit in 1998, marking another entry in cable's slow but steady invasion into competitive telecommunications markets. Comcast provides the long-distance service at a discounted price for customers who also subscribe to Comcast cable. The discounted rate is also available to Philadelphia-area Comcast cellular-phone customers. The MSO revealed that the company chose the Detroit market for the launch because it is fighting a competitive battle with Ameritech New Media in the Detroit area for cable services. Comcast, like most cable companies that provide "bundled" or "packaged" services, awards discounts to customers who select multiple services from the company (Hogan, 1998f).

Cox Communications Inc. offers Internet, digital-telephone and digital-television services in select markets, such as Orange County, California. Cox customers, too, receive discounts for multiple services (Hogan, 1998f). Cox initiated the high-speed Internet and data service in Orange County, Calif., in 1996, making the affluent suburb of Los Angeles the first market where subscribers have access to telephony, the Internet and digital TV provided by Cox. On the @Home front, Cox has experienced a rapid growth in a subscriber base with less than 1 percent churn. Cox is focusing especially hard on customer service in connection with @Home. On the telephony front, Cox is fighting based on price. It offers about 20 percent discount for single-line phone service compared with US West. Customers get a stiff discount for a second line. In addition to unlimited local calls, the offering is also being packaged with Cox long-distance service (Estrella & Hearn, 1998).

With multiple products for bundling, as apparent in Cox, BSOs can choose different strategies for different market segments. For a price-sensitive product like telephone, they cut the incumbent's prices. For a complex and technical product like cable modems, they may focus on customer service. This flexibility in marketing, along with cost advantages due to scope economies, would equip multi-product firms with a critical competitive advantage in the increasingly competitive telecommunications industry.

Further, a bundled package of multiple services from a single provider also implies convenient payment from the consumer's standpoint. Many cable operators and analysts agree that integrated billing will become crucial as customers start to demand it and telephone-company competition supplies it. Currently, most operators that have moved into the multiple-product realm are bundling cable and Internet-related services, leaving a separate telephony bill (Haugsted, 1999b).

Despite the challenges involved in moving to integrated billing, doing so offers payoffs to telecommunications service providers. The service rewards time-constrained customers, and it could help to reduce churn among customers who do not want to break up voice service and video packages (Hogan, 1998f). This explains why telephone companies are not just launching their own competing video services. SBC and Bell Atlantic are partnering with DIRECTV, which has built a strong national brand of its own, to co-market the direct broadcast satellite service and to integrate its video programming onto the telephone bill.

Can competitors create equivalent alternative bundles? In bundling, cable systems have certain advantages. Cable's competitors, be it RBOCs or DBS, cannot create equivalent packages simply because they miss at least one key component for bundling—the broadband wires already connected to 95 percent of all US households. Local telephone networks mainly consist of copper wires. By contrast, cable companies mainly use coaxial cable, which has much greater capacity (or "bandwidth") than copper wire. Combined with AT&T's fiber-optic trunk, which has even more bandwidth than coaxial, the cable industry will certainly become dominant at the era of convergence, which will necessarily require a broadband connection to the home. As the telecommunications industry moves toward offering customers more advanced high-bandwidth services—such as interactive video and high-speed Internet access—this additional capacity will be critical for companies that want to diversify their services.As a result, RBOCs will suffer from their lack of video entertainment. DBS providers will certainly play a critical role in the video programming distribution market, but they will not be able to compete with cable for high-speed data service, at least in the near future. Cable's ability to bundle multiple services, particularly with the monopolistic combination of video and high-speed data service, implies that no competitors, including RBOCs, will be able to offer comparable alternative bundles for the consumer.

Local exchange carriers try to offer their video services to offset cable's move into their territory. They recognize that if they do not offer bundled services, AT&T and TCI will take away their share soon. That is why LECs are taking the initiative and the leap of faith to go out and compete in some places such as Detroit, Columbus, Atlanta and Phoenix, where LECs rolled out a complex high-speed DSL voice, video and data offering. US West, for example, compete with Cox in Phoenix with both fiber-to-the-node high-speed video-capable DSL and fiber-to-the-curb (FTTC). GTE is testing the technology in the Southeast (Barthold, 1999b). Bell Atlantic is countering MediaOne's telephony launch in Boston by expanding its DSL services that have been available since April 1999 and beefing up its satellite-TV offerings in the market. The RBOC expects to begin offering customers in Massachusetts direct-broadcast satellite service from DIRECTV. But LECs' strategic options would never be close to those of cable-based broadband service providers. They may resell video products, but cannot use DBS as a leverage. It may prove to be more burden than an asset in terms of profit-generating power. The very essence of most competitive advantages is that they cannot be readily assembled through markets. As the recent development in organizational theory of firms demonstrates (see, for example, (Teece, Pisano, & Shuen, 1997), the firm's competences cannot be replicated by a portfolio of business units amalgamated just through formal contracts as many distinctive elements of internal organization simply cannot be replicated in the market. To overcome this, LECs may have to buy a significant stake in the DBS operation in the future.

First Mover Advantages for Cable BSOs

With the heightened focus on broadband technologies, however, the current state of narrowband access often gets overlooked. Due to the ubiquity of the switched telephone network system, the vast majority of residential consumers continue to access the Internet through analog modems. In January 1999, 65 percent of Internet users were still using analog dial-up modems with an average speed of access of 33 kbps. It is projected that dial-up will remain the principal means of accessing the Internet in the near future.

Nevertheless, cable is now well positioned to take the lead in the high-speed Internet access service market. In the short term, we can expect two distinct broadband "footprints", with little overlap. The Cable modem footprint generally covers residential areas and clearly dominates in many suburbs, while DSL targets predominately the business sector (Bar et al., 1999).

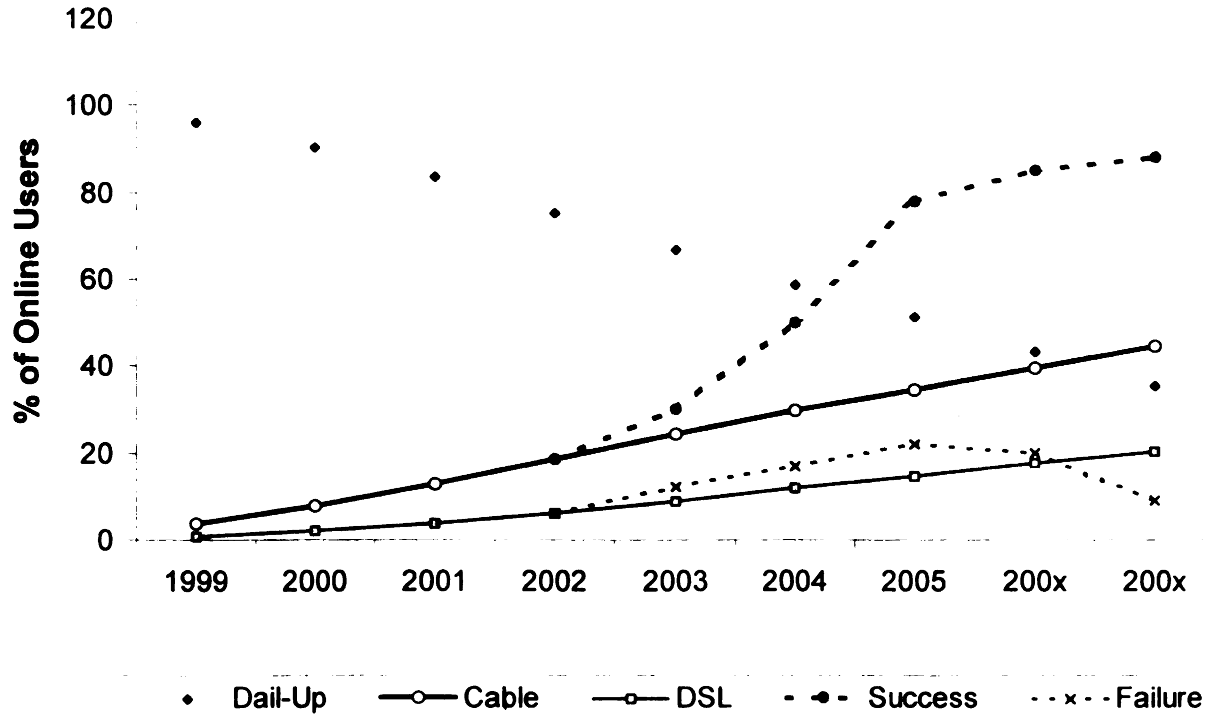
As of 1999, cable modem service has a considerable lead over DSL in terms of total number of subscribers in the residential market. Some analysts believe that DSL will close this lead soon, with the adoption of new technologies and standards that will improve the performance of DSL. Most recent FCC report predicts, for example, that given the rapid pace of DSL deployment in recent years, the subscriber levels for DSL would be nearly comparable to cable by 2007. The FCC cites Lehman Brothers' estimates that cable will capture 14.5

million subscribers and DSL will capture 10.5 million subscribers by the end of the year 2007. Another estimate comes from Donaldson, Lufkin & Jenerette (DLJ) cited in Lathen (1999). According to the DLJ estimates, today's Internet usage is based predominately on dial-up connection (96%), followed by cable modem (3.8%) and DSL (0.8%). Rapid technology improvement and network modernization, coupled with strong demand for broadband transmission, will transform the landscape of "World Wide Wait" rather dramatically. By 2005, about 50 percent of online users will still have to rely on dial-up connection. But 35 percent will use cable modem and the rest,15 percent, DSL (See Figure 5-1). Considering the current pace of high-speed Internet access deployment, this comes as no surprise. Despite some variation in these estimates, they all show the unequivocal trend that cable modem will drive the next generation Internet use and become the major, if not the dominant, platform for the high-speed Internet access. Even the most conservative estimate of these studies anticipates that cable modems will have a 50 percent bigger market share for high-speed Internet access in 200.

Further, these estimates of DSL deployment include competitive local exchange carriers as well. In fact, the competitive threat from CLECs and ISPs significantly reduces ILECs market prospects with DSL services. In addition to the ILECs, a new type of CLECs has begun to focus on the high-speed Internet market. Covad Communications, Rhythms NetConnections Inc., and NorthPoint Communications Inc. all have raised billions of dollars in their initial public offerings. These companies intend to target DSL services to small and mid-sized businesses, as well as to residential customers (Lathen, 1999). Accordingly, LECs' share out of these DSL estimates would shrink to the extent how these non-LEC players will capture online users' attention in the future.

In spite of their validity in deployment rates in the near future, however, all these estimates provide only for a static view of the high-speed Internet access market. It is certain that the adoption of a particular service will be influenced by user's earlier decision and that industry players will try to take advantage of their strategic assets at hand. In that regard, it is critical to acquire a data customer today, not tomorrow.

Figure 1 Breakdown of Online Universe (1995- 2005)
Source: Donaldson, Lufkin & Jenerette, IDC



Looking at Figure 1, one notices that the forecasting of online universe, like most forecasting of technology adoption, is based on a static view of the potential growth in the high-speed Internet access market. As the two solid lines for cable modem and DSL growth in Figure 1 depict, these estimates imply that the two services would increase their market position in a linear fashion. But in reality, considering the close substitutability of cable modem and DSL, their growth rates would take a very different path from a linear trend depicted by these two solid lines. It is reasonable to assume that because cable modem and DSL will compete for the same consumer dollars for broadband services at home, the growth rate of each service will be obviously interdependent on how the other service performs. Thus, sooner or later, it is highly likely that as one service takes off, the other service will suffer from the take-off of its competitor. Consequently, the growth pattern will more likely exhibit a familiar S-curve for the successful diffusion as depicted in the dotted lines while the unsuccessful service may end up with a complete extinction of use (Markus, 1990).

In light of the current status of broadband services, cable modems will most likely be the successful choice of technology for reasons as follows. It may be too early to judge how DSL will compete with the cable modem service in the high-speed online access services. But low churn and customer satisfaction suggest that cable's first-to-market advantage will be a formidable challenge for ADSL. The cable industry, which is now estimated to have more than 1 million customers for high-speed data in the US, is well-positioned to take advantage of being the "first mover" in the high-speed Internet access market.

The first-mover advantages are related either to their demand structures or to their cost functions. On the demand side, early entrants may be able to mold the cost structure of customers. This can occur in three main ways. First, the customers' perceptual space may evolve in a manner that favors the initial position of the pioneer. Second, customers may develop switching costs as they accumulate experience with the pioneer's product. Thus, the first-mover can have an advantage simply by being first, so that buyers have tried its product and thus incurred the sunk set-up costs if any exist, or by trying it they have removed uncertainty over its quality. Third, "network externalities" may establish the pioneer's product as the industry standard. In this case, customers enjoy lower costs or greater benefits when using the standard product, which allows compatibility with the largest base of external users (Lieberman, 1987).

The most typical form of first-mover advantages occurs when there are set-up and switching costs associated with a product. Switching costs can take the form of transaction costs from switching brands, learning costs, or seller-induced costs (Mueller, 1997). With respect to broadband services, the switching costs have two sources: the physical architecture of the network and the logical architecture of the network. The physical architecture of the network creates prohibitively high switching costs and hampers a customer's ability to switch between broadband access service providers using different physical delivery vehicles. Different requirements for inside wiring, different terminal equipment, non-refundable connection charges, and different computer set-ups in many cases are among the factors that can easily push the physical cost of switching from cable to DSL—where both are available— up to $600. Since most industry surveys indicate that consumers are not willing to pay large sums for broadband access, they are even less likely, one would presume, to pay high sums to switch. The logical architecture of the network also creates important switching costs. Information access and transmission systems become embedded with one's current provider. Consider the several costs of switching from one broadband system to another. First, many everyday communication activities are tightly entangled with one's Internet provider, so that shifting providers may range from the inconvenient to the truly burdensome. Consider computer software. Once one has become accustomed to one company's software, one must incur the costs of learning another to be able to switch to another manufacturer's product. With narrowband Internet access, the inconvenience is typically limited to getting a new e-mail address and modifying a few dial-up settings. However, because broadband Internet supports a wide range of new communication activities, switching among broadband access providers would be much more cumbersome (Bar et al., 1999).

Considerable switching costs (the cost customers would incur to switch from one broadband access method to another) combine with early deployment lead for broadband cable to allow the credible exercise of market power. The competitive barriers resulting from these switching costs will help cable maintain its significant deployment lead into the foreseeable future. Hence, even in the limited areas where cable and DSL broadband access are both available, competition between different infrastructures is highly imperfect. Once customers make an initial decision for either cable or DSL, or later perhaps for wireless when it is available, they must live with that decision for a while (Bar et al., 1999).

From the supply-side perspectives, first-mover advantages are related to the structure of production costs. To the extent that some costs like R&D and advertising are sunk, an incumbent firm faces lower costs than a potential entrant, because the incumbent can ignore the sunk costs when choosing its optimal output and price combination where the potential entrant must incur both. The incumbent firm may thus be able to choose price and quantity combinations, which fail to cover the potential entrant's total costs (Mueller, 1997).

Furthermore, if it takes time to install capacity, and there are economies of scale in production, then the first firm in the industry has more time to expand and achieve these scale economies. Large firms have a greater incentive to invest more on cost-reducing innovations (e.g., R&D) and thus their costs should fall faster than those of small firms, leading to further increases in size. These size-related advantages with cost-reducing innovations will then be reinforced by any learning-by-doing cost advantages of the first movers in a market. Since experience accumulates with production, learning-by-doing cost reductions should depend on the cumulative output of the firm, and time. Together, they add up to a potentially significant set of cost advantages that the largest firms in a market can be expected to have. The first companies to establish a significant production lead over their rivals can be expected to have lower and falling unit costs, and thus will be in a position to extend their lead over time. There is considerable evidence that suggests the potential for significant first-mover advantages, even when the first-mover has not chosen the optimal product or production process design from the set of initial candidates (Mueller, 1997).

Cable's early lead in deployment, coupled with substantial first-mover advantages are likely to give AT&T/@Home considerable power in many conceivable scenarios for future market dynamics in the high-speed data service industry. In some set of markets—likely to be a significant set given the limitations on DSL—cable will be the only broadband option. Either DSL service will be technically impossible, or cable's initial lead in deployment will result in an unwillingness of the local RBOC or competitors to spend resources deploying DSL in that area. In this effective monopoly, consumers are likely to be harmed: they will pay the fees for access that an unregulated monopolist can charge, and they will suffer from limitations on the kinds of services offered and the degree of experimentation offered imposed by the single access provider (Bar et al., 1999).

In some markets where asymmetric duopoly exists (i.e., cable on one hand, DSL on the other), the typical residence will possess two active wires capable of carrying broadband video services subsidizing high speed data services. Consumers seeking broadband service will have a choice between the cable-blessed access provider allowed to operate over the cable line, and the set of ISPs and local exchange carriers buying access over the telephone line from the local incumbent phone company. In this case, broadband cable will operate three markets simultaneously. They are the traditional multichannel video services, the broadband access market that includes high-speed data, and the other services it supports such as interactive video teleconferencing and the phone/fax access network market. An upgraded cable television network not only hastens the provision of broadband access to households, it also permits a second line to the home for phone/fax service competition and therefore accelerates the emergence of competition in the historically forbidden market for local telephone companies. Furthermore, cable companies have aggressively deployed digital video services to compete with Direct Broadcast and RBOCs, reaping extra revenues from that deployment. Those revenue sources from video as well as voice service bring them considerable strategic clout to defend the key battlefront, i.e., the Internet access market. Holding a franchise monopoly for cable television thus creates a solid foundation for cable to defend the market for broadband access. If economies of scale and scope in broadband for the consumer market are significant, the present headstart of the cable companies will give them an insuperable first mover advantage and leave them with the kind of dominance they still enjoy in their core market for multichannel video program distribution. This is why some analysts believe that eventually cable television companies will have an 80 percent market share in the broadband industry (FCC, 1999a, fn. 149). The inevitable consequence is cable's "joint dominance" in the video and Internet access markets, which will seriously undermine LECs' competitive position in the increasingly converging telecommunications market.

Dynamic Resource Allocation Through Cross Subsidization

AT&T and cable MSOs are not precluded from entering any market, while RBOCs are. Precluded or not, the thought of a world powerhouse such as AT&T combining with a dominant MSO such as TCI can be frightening. Consider the implications of the merger of America Online and Time Warner. Major cable MSOs' capabilities to provide a bundle of services, backed by AT&T's acquisition of TCI and MediaOne will profoundly affect RBOCs' future. AT&T's acquisition of the two major MSOs will give it a dominant position in the market for providing consumers high-speed access to the Internet (Kuhl, 1998). Being the incumbent in telephony is not an advantage anymore. LECs are still worried about local dial tone and long-distance and wireless and all the other things that they are preoccupied with. RBOCs cannot offer the same service any cheaper than cable operators under the current regime of regulation.

Cross subsidization may come into play in this context. Large MSOs will be able to transfer their profits from monopoly markets to fight in the competitive markets. Unless the new entrant operates in comparable scale throughout the incumbent's geographic markets, cross subsidy can jeopardize the financial profitability for the small-scale entrant. Large MSOs can also utilize their market power in the multichannel television market to help enhance the competitiveness of emerging services. For example, a cable operator can subsidize its new data and voice services with cash flow generated from video programming operations. It is not uncommon for the cable operator to increase cable service prices to help establish a new business like telephony. When Cox offered telephone service in

Omaha, Nebraska at lower price than US West did, the LEC took issues with Cox as to whether the MSO was truly undercutting U S West on price, since the MSO was raising the cost of its cable service by $2 a month at the same time. The LEC blamed that Cox used their cable subscribers to subsidize their entry into the telephone business (Estrella & Hearn, 1998). Cross subsidy may also happen to help high-cost areas (e.g., rural) through the transfer of profits from the low-costs areas (e.g., urban). Whenever necessary, therefore, large MSOs can enhance their market position through the strategic use of their ability to dynamically allocate resources. The financial prospect for the new entrant may not be so promising, ultimately impeding entry and the vigor of competition.

There have been very significant battles in court since LECs entered into the cable business. In particular, Ameritech New Media raised an issue when it introduced the so-called "AmeriChecks" promotion in three Midwest states.

The AmeriChecks plan was offered in three states, and Illinois was the only one to side with the regional Bell operating company. On the other hand, the State Supreme Court of Ohio found that the program undermined competition, while Michigan struck down the plan for discriminating against certain phone customers.

The Ohio Supreme Court ruled in July 1999 that Ameritech Ohio cannot use coupons to give its subscribers americast cable television service rebates on their Ameritech local phone service. The case stems from a promotion launched in the summer of 1997, in which Ameritech New Media issued AmeriChecks to its cable customers in Illinois, Michigan and Ohio, entitling them up to $120 off their Ameritech cable bill, local phone service, security monitoring or cellular-phone bill (Quinton, 1999a).

But that promotion prompted complaints to state regulatory bodies. Local cable associations claimed that the AmeriChecks promotion was subsidized by the phone service, even though ANM insists that the checks were paid for by ANM, and not by the company's telephone division (Hogan, 1997). The Public Utility Commission of Ohio (PUCO) found that "Ameritech attempted to aid its cablevision affiliate by ordering, in effect, lower telephone service rates for its customers who would use americast." Giving those customers "the exclusive benefit of a price break on their telephone service" constituted an unreasonable preference under Ohio law, PUCO found. That finding was upheld in a 4-3 decision in the Ohio Supreme Court (Quinton, 1999a). Following an adverse Ohio ruling, Ameritech customers in that state could not use their AmeriChecks for local phone service.

Michigan became the second state to outlaw an Ameritech Corp. marketing plan aimed at local cable viewers. In 1998, the Michigan Public Service Commission (MPSC) issued a cease-and-desist order after finding that the telco's controversial 'AmeriChecks' promotion violated the Michigan Telecommunications Act. Acting on a complaint by the state's cable operators, the MPSC found that the program discriminated against those consumers who did not sign up for cable service. The MPSC order forced Ameritech to stop accepting the AmeriChecks coupons for local phone service (Estrella, 1998c). In its decision, the MPSC recognized that incumbent local-exchange carriers have considerable resources at their disposal. As a result, they are in a position to use these advantages not only to gain entry into unregulated markets, but also to undermine competition once they gain entry (Estrella, 1998d).

However, in May 1999, the Illinois Commerce Commission (ICC) ruled the same AmeriCheck promotion did not violate Illinois telephone regulations. Illinois became the first state to rule in favor of Ameritech Corp.'s controversial "AmeriChecks" marketing program after Michigan and Ohio found the same promotion illegal a year ago.

The ICC found that Ameritech had not violated the state's Public Utilities Act by offering up to $120 in vouchers to consumers signing up for its Ameritech New Media cable service. In the ruling, ICC accepted Ameritech's argument that the law only prohibits charging a greater or less or different compensation for products or services rendered. "Because Ameritech receives the full tariffed price for its service, the payment of all or part of customers' bills by a third party cannot be found to violate the act, whether the third party is a customer's roommate, an interexchange carrier or New Media," the ICC concluded.

As these cases illustrate, current regulatory regime significantly hampers LECs' resource allocation ability. Like the Cox case, cross-subsidization should not be blamed on its own. It is sometimes inevitable: It is sometimes desirable. In fact, many forms of cross-subsidies in the telephone industry have been largely conducive to universal service policies in the US and the resulting ubiquity of telephone services across the country. So the question is not the use of it, but the effects in promoting principal policy goals set forth with respect to the telecommunications services.

In that regard, the current regulations of prohibiting cross-subsidization fail to envisage the changing technological and economic environments in telecommunications. The rules and regulations governing the telephone industry are based on classic theories of scale economies, but they have not placed much attention on the increasingly important characteristics of telecommunications business: economies of scope. Thus, the prohibition of cross-marketing, as in the case of "AmeriChecks," significantly impede telephone companies from gaining a customer base, thereby heightening barriers to entry and market expansion. The availability of cross-subsidization would be critical on telcos' decision of whether or not they will enter the video industry and how long they will successfully sustain the new business operation in deficit. This is particularly true, considering the only means of funding the development of the advanced telecommunications systems is by cross-subsidization (Baldwin, 1997).

Thus, the requirements of separate subsidiary for video services may in fact block LECs ability to achieve efficiencies resulting from economies of scope. Likewise, the ban of cross-subsidization may have led to the foreclosure of potential entry into the multichannel television industry by LECs.

Chapter 6

SUSTAINABILITY OF OVERBUILD COMPETITION

This chapter further discusses the feasibility and sustainability of overbuild competition based on two analyses: likelihood of overbuild survival, and *q*-ratios. First, an investigation of changes in market structure from a sample of selected markets was conducted. Second, Tobin's *q*-ratios for the cable industry, a traditional measure of market power, were estimated and the interpretation of such estimates will be presented. The chapter begins with a review of prior studies that addressed financial viability of overbuild competition.

Sustainability of Overbuild Competition in Simulation Studies

Economic theory is clear to the benefits of competition. Despite some shortcomings in methodology, empirical evidence from the cable industry is clear. Unlike rate regulation, findings on competitive effects are consistent. Its effects are very large. Prior studies provide substantial and consonant evidence that overbuild competition has led to reductions in price and enhancement in quality. In fact, the effects of competition are so large and unequivocal that one might even suspect the attractiveness of competitive entry in cable television from a potential entrant's standpoint. If this were a strong indication of market predation by incumbents, the prospective entrant would reconsider entering the cable television market.

For overbuild competition to be viable, it is necessary to resolve the issue of natural monopoly in cable television. With an extraordinarily large number of observations (all 4,800 cable systems in operation in 1981), Noam (1985) investigated the extent of economies of scale in cable television operations. He found overall elasticity of scale was 1.096, suggesting a 10 percent increase in size is associated with a unit cost decrease of about 1 percent. According to Noam, economies of scale did not appear to exist primarily in the technical distribution aspects of cable television. Instead, they were observed for the output definitions that include a strong element of marketing success. Owen and Greenhalgh (1986) also found modest economies of scale with respect to system size. They used cost information contained in proposals that were submitted in municipal franchise bidding competition for 34 cities across the U.S. for the period from 1979 to 1982. Their analysis of cost structure for the provision of cable television revealed that overbuild competition would generate a 14 percent penalty in unit costs per subscriber. Owen and Greenhalgh argued that "although this is hardly negligible, it is within the range of monopoly markups that might be expected in the absence of competition or effective regulation" (1986, p.76). Despite the cost penalty from lost scale economies, therefore, they concluded that consumers might be better off with overbuild competition. Similarly, Owen and Gottlieb (1986) argued that the characterization of cable as a natural monopoly is artificial and inaccurate.

A few studies confront the question of whether a competitive market structure is feasible. To date, at least two approaches have been employed in the assessment of overbuild competition. Johnson and Reed (1992) and Owen and Greenhalgh (1986) took the engineering-costs approach, while Smiley (1986) and Hazlett (1995b) used a simulation. Owen and Greenhalgh (1986) found that the economies of scale in dimensions relavant to the feasibility of overbuild competition are not so large as to entirely rule out the possibility of effective actual or potential competition in the cable industry. But they also added that "while [cost subadditivity] does not rule out the desirability of competition, any [overbuild] competition will be fragile" (Owen & Greenhalgh, 1986, p.78).

An engineering-economics study by Johnson and Reed (1992) reached more pessimistic conclusion. Based on the comparisons of costs for integrated broadband, narrowband, and cable television networks, Johnson and Reed found that an integrated broadband network is much more costly than the sum of the separate narrowband and cable television networks. Therefore, they argue that in constructing a hypothetical IBN in a large community, a company would be better off by building two separate networks because the additional cost of building an integrated network would fall short of the additional revenues. In a situation where a cable system is already serving a community, according to Johnson and Reed, the telephone company or a cable operator is not likely to overbuild the existing video network. The entrant would face severe difficulties in seeking to provide video service because of competition from incumbent cable operators. The key conclusion of the Johnson and Reed study is that elimination of the legal entry barriers such as cross-ownership bans and an exclusive franchise would not greatly add to competitive pressures because telephone companies have no special economic advantage over cable operators in entering the residential video market.

A financial simulation of overbuild competition reached a similar conclusion. Smiley (1986) has conducted an assessment of social welfare due to direct cable competition. His cost-benefit analysis approximates the gain in consumer surplus (e.g., price reductions of a duopolistic market) and the increase in costs due to duplication of cable lines and central facilities. From a simulation on benchmark cases for a typical cable system, Smiley found that while a pure monopoly produced less total welfare than either a simultaneous dual entry or a partial sequential entry scenario, a fully sequential overbuild would not likely occur because the second firm earns negative profits. Smiley (1990) states that "if it is difficult for the new entrant to differentiate its service from that of the incumbent, entry is less likely to occur because prices are expected to be lower in the post-entry equilibrium" (p.132). In the Smiley simulation, the sequential entry was found to result in a consumer price that was 18.3 percent lower than that of a monopolist. Smiley concludes that the second entrant's best response in this case is not to enter, suggesting the same equilibrium as in the monopoly scenario.

The Smiley study was criticized by Hazlett on three main grounds: first, the framework lacks any plausible public choice model of the municipal decision to award cable franchises; second, it fails to allow profit-maximizing firms to internalize rationally the costs of duplication; third, social costs are mistakenly overestimated in the Smiley model (Hazlett, 1990). Hazlett argues that, absent municipal franchise restrictions and predatory behavior by incumbents, potential and actual competition would have been much more widespread and would be a significant factor in constraining rates and improving service. He presents some anecdotal evidence from two case studies showing that overbuild competition is feasible.

However, in an industry with over 10,000 cable systems, and given the idiosyncrasies of local regulators and maverick operators, as Smiley (1990) noted, it is possible to find anecdotes to support almost any proposition. Open entry policy notwithstanding, Smiley argues, entry would be rare because of many factors that might undermine the economic viability of overbuild competition.

Hazlett responded to Smiley with another financial simulation study (Hazlett, 1995b). He analyzed the returns available to a hypothetical entrant in a typical U.S. cable market so as to evaluate both the claim of natural monopoly and to assess the importance of entry barriers. This hypothetical market was assumed to have average density (93 homes passed per mile), average penetration (62%), average revenues ($29.93/subscriber/month), and average cash flow margin (42.9). Notably, the entrant was assumed to achieve a 50 percent market share.

Hazlett based his simulation exercise on two basic scenarios. In the benchmark case, Hazlett hypothesized no changes in market price and output levels; two rivals simply split the market evenly with 31 percent penetration apiece, at current price levels. In this scenario, the entrant is able to attain an 18 percent rate of return. Hazlett argues, therefore, that "the market demand for cable is easily able to sustain two competitors at current prices in the typical U.S. market" (Hazlett, 1995b, p.215). In the second scenario, market price and output levels were modified to reflect the effects of competitive entry in the real world; a 20 percent decrease in price accompanied by a 20 percent increase in penetration. The entrant was again assumed to capture a 50 percent market share, implying a penetration of 37 percent. Hazlett's finding in this case was that the typical U.S. cable market would allow an entrant to earn a 16 percent rate of return, assuming a 5 percent annual revenue growth. A 16 percent return, according to Hazlett, shows that "entry is financially viable in typical cable markets, even when prices significantly decline" (Hazlett, 1995b, p.216).

Although much of the debate over cable competition has centered on the issue of the financial feasibility and sustainability of overbuild competition, the question still remains unclear. The present study does not attempt to resolve the disputes. Its goal is much less ambitious. Given the importance of strategic behavior involved in competitive struggles, it is believed that an *ex post* empirical investigation may lead to the more realistic assessment of competitive entry, and the long-haul prospects of market structure, conduct, and performance.

Is Overbuild Competition Sustainable?

The price discounting that is persistently reported in competitive cable markets indicates that market power is exercised in monopoly situations; if other video services were close enough substitutes to cable television service, then prices would be fully constrained before additional cable entry. Instead, strong evidence exists that prices respond, and sharply, to competitive entry.

The empirical investigation in Chapter 3 presents evidence of how difficult overbuild competition is in cable television. It would be useful to discuss the findings of this empirical analysis in the context of feasibility and sustainability of overbuild competition. To the feasibility issue in cable television, a careful review is warranted for two simulation studies that show opposite predictions.

The hypothetical outcomes from Smiley (1986) and Hazlett (1995b) can be cross-checked against the empirical estimation conducted in the present study since both simulations were based on similar system characteristics in many respects. In both simulations by Smiley and Hazlett, the baseline market size was 50,000. Smiley used 90 homes passed per mile with 62 percent penetration, while Hazlett adopted 93 homes per mile. The sample for the present study shows very similar system characteristics with the average market size of 75,000 homes, a 68 percent penetration rate, and 92.5 homes passed per mile (see Table 3). Thus, the assumptions in the Smiley and Hazlett simulation models are indeed a pretty good approximation of the overall characteristics of the typical cable system. What Hazlett's model fails to capture, however, is a dynamic that overbuild competition will bring about in the market under attack. While Hazlett argues that a 5 percent annual revenue growth is conservative because it is far below recent experience, that is precisely what happened recently in the cable industry. Due partly to Congressional concerns of price hikes after the March 1999 sunset of rate regulation, and partly to the increasing threats of competition, the cable industry adopted an industry-wide "limit pricing" policy in 1999. AT&T, the nation's largest cable operator, urged other MSOs to refrain from increasing cable rates more than 5 percent in 1999, which was found to have worked out in the most recent FCC study (FCC, 2000).

The most critical defect in the Hazlett simulation is its static view of competitive interaction between the incumbent and the entrant. While it is theoretically possible for the entrant to carve a 50 percent—maybe even higher—market share, it would be extremely difficult to achieve that goal if the entrant's price is the same as the incumbent's, unless the former can significantly differentiate its programming from the latter. Predatory price cutting represents only one type of the strategic instruments available for the larger MSOs. To split the market evenly with the incumbent becomes a formidable task when there are other strategic advantages for the incumbent that were discussed in Chapters 4 and 5. It suffices here to mention exclusive programming for the incumbent, significant programming cost advantages for the bigger MSOs, and the bundling capabilities of the more advanced cable systems.

Nevertheless, the only dynamic consideration in the Hazlett model is a 20 percent price reduction upon entry. But in the absence of significantly differentiated products, the entrant would have to offer a much cheaper price relative to the incumbent in order to capture a 50 percent market share. Or otherwise the entrant would have to provide a significantly higher level of service quality than that offered by incumbents. Emmons and Prager (1997) state that "when a second firm decides to enter the market, it must offer a higher-quality product (at a lower price) to attract customers away from the incumbent" (p.744).

Are New Markets Big Enough to Surmount Double Squeeze?

Incumbent cable operators typically respond to overbuild entry by adding channels, upgrading their networks and offering new—and in some cases, free—services. Since Ameritech entered the Detroit market following the 1996 Telecommunications Act, incumbent cable companies such as Comcast and MediaOne have offered free premium channels to customers who sign a yearlong contract. Some are reducing or freezing rates; others have added new channels (Solomon, 1997). Hazlett himself provides numerous examples of how costly it is to successfully overbuild: "One explanation for Telesat's initial overbuilding success is that Telesat charged significantly less while offering significantly more channels than did the incumbents" (Hazlett, 1990, p.93).

Along with predatory pricing, such aggressive nonprice competition would inevitably result in more squeezed profit levels for the entrant. Contrary to the Hazlett simulation, therefore, economic theories and empirical evidence suggest that the estimate of a 16 percent rate of return is certainly overestimated, if the entrant is committed to competing for a 50 percent market share. Furthermore, Hazlett's prediction that the second entrant will be able to attain as high as a 16 percent rate of return is very questionable if one comes to the understanding of significant cost advantages that large incumbent MSOs enjoy. In addition to price squeeze through market predation, the entrant must overcome a substantial differential in costs—both programming and operating—between large incumbent MSOs and an upstart entrant.

Once firms have expended the fixed costs necessary to enter the video distribution market, they might have an incentive to expand output in order to lower unit costs and to help recoup fixed investment. One way to do this might be to position their services as closer substitutes for those of cable systems and compete more strongly with those systems on price terms. Cable overbuilders have pursued a strategy based on a certain degree of price competition with incumbent cable systems. They appear to generally provide programming choices that are very similar to the ones provided by incumbent cable systems and try to draw customers away by offering lower prices (FCC, 1995).

When competitors offer close substitutes as is the case in many duopoly cable markets, the entrant must match the incumbent's price to gain half the market. In fact, it is highly likely that the entrant would have to undercut the incumbent's price to lure cable subscribers away from its competitor. Oftentimes, this means the entrant would have to offer significant discounts, unless it is able to differentiate its own services. Hazlett shows this in his strong argument for open entry policy (Hazlett, 1990). Thus, incumbent's price reduction in response to entry makes it quite a task for a new entrant to gain a 50 percent market share in the first place. It may be unrealistic to assume that the new entrant would cut out 50 percent of the market at the same price level with the incumbent. A recent survey of consumer preference conducted by the city of Tacoma, WA (Tacoma Telecommunications Study) discovered consumer inertia; only 29 percent would be willing to switch to a new entrant if both firms offer the same programs at the same price. More than two thirds (68%) responded that they were not likely to switch (Tacoma Public Utilities, 1997). Furthermore, when there are significant first-mover advantage and other types of entry barriers, such as programming at the local level and scale economies at the MSO level, it seems almost impossible for a new entrant to share the market evenly with incumbent.

One may have different views of whether or not more than 20% price reduction by the incumbent cable operator violates the Sherman Acts. However categorized—be it illegal predatory pricing practice or legal aggressive competitive price reduction—the effect on entry and its feasibility would be the same: overbuild competition is not likely to be sustained at this price level.

Furthermore, overbuild entrants will most likely face substantial programming and operating handicaps that stem from horizontal concentration may create. Besides the joint and fixed nature of investment capital, and incumbents' market predation discussed in Chapter 3, overbuild entrants face competitive barriers stemming from horizontal concentration at both the national and regional levels. One of these barriers is higher programming and operating costs. Small systems have to pay much higher prices for the programming networks, leading to significant cost advantages for the incumbent MSOs. Because programming is a major expense category (typically 25-30%) for multichannel television service (FCC, 1998; Kagan Media Inc., 1997), the "differences between what entrants pay for programming and what the major incumbent MSOs pay have important consequences for both entrant viability and the vigor of competition where it does occur" (Dertouzos & Wildman, 1998). Moreover, a clustered system can not only enjoy extra revenue potential from local advertising, but it may also take advantage of their market power at the local level to secure exclusive carriage of certain programming.

Combined with predatory pricing, this post-entry cost advantage allows the initial monopolist to threaten to reduce price below the new entrant's average costs, while at the same time earning profits itself. Thus, first-mover advantages confer the incumbent monopolist a very strong strategic option: "double squeeze."

Entry into the cable industry may be feasible and sustainable when a significant market growth is anticipated or new entrants can achieve substantial cost savings from new technologies or new entrants are able to differentiate their products. It appears that DBS providers have pursued more of a product differentiation strategy, with the focus on their ability to offer digital services that include programming and operational features currently unavailable from many cable systems. On the other hand, overbuild competitors such as Knology and RCN take a different approach. Their strategy is to offer enhanced services (e.g., cable modem and telephone services) together with the "plain vanilla" video service. Municipal cable systems often share some elements of the network facilities with their sibling utilities companies (e.g., electricity, gas, water) operated by the same parent local government. Local exchange carriers appear to take yet another distinct approach in the pursuit of video programming distribution.

Convergence is believed to have two economic consequences with respect to market structure. It may give rise to a significant shift in economic perspectives of telecommunication services. The integration of voice, data, and video services will strike down the most fundamental barriers to entry in the traditional telecommunications industries. For the established telecommunication service providers such as telephone and cable, convergence may help them realize cost savings from joint production to the extent that the integration of such services is technologically feasible and economically profitable.

On the other hand, increased economies of scope and the increased use of multi-product bundling strategies may lead to the erection of new forms of barriers as well as greater concentration of the multichannel television industry. The converging telecommunications industry will require an increase in capital investment for the new entrant necessary to provide such new services. This, in turn, may increase absolute cost barriers to entry, which will lead to unfavorable conditions for small-scale entry.

In sum, the sustainability of overbuild competition is a function of post-entry price reduction, cost differences between incumbents and entrants, and increased revenue potentials due to market expansion. The question, then, becomes whether or not the entrant can overcome such financial difficulties with enlarged revenue pies that will be generated in the converging telecommunications markets. Obviously, this will depend on consumer expenditures on such new services as voice and Internet access services over cable. All these factors considered together, the financial prospect for the new entrant may not be so promising, ultimately impeding entry and the vigor of competition. Worse yet, the overbuild entrant must survive not only the competitive struggle against the incumbent cable system operator, but also the success of DBS service.

The Success of DBS and Its Impact on Overbuild Entry

The recent success of DBS may reveal the significance of competitive interaction in cable television. While direct-to-home (DTH) technology (DBS and HSD) suffers a number of handicaps in competing with wireline cable systems, its technological characteristics permits DBS to escape the most devastating strategic response from the incumbent operator. Once it starts operation, a single transmitter may blanket an entire region of the country, not to mention a television market. This makes selective price-cutting a much more expensive strategy for the incumbent to employ than when fixed cable plant precisely defines the geographic scope of the overbuild. Because market predation against DBS is practically impossible, the incumbent cable systems had to accommodate its entry. This explains the nature of competition between DBS and wireline cable television: the primary battlefront is on product differentiation rather than on price. Despite the critical handicaps due to the lack of local network signals, DBS managed to compete with the wireline industry with much more superior digital signals and enlarged programming options for the consumer. Immunized from predatory pricing, DBS systems were able to steadily increase its footprints in the MCTV industry without incurring too much financial loss in the early period of service operation.

Buoyed by continued strong growth and increased investor confidence, the DBS industry is zeroing in on 10 million subscribers and threatening to reach 20 million customers by as early as 2005 (Breznick, 1999d). In fact, bullish industry analysts now expect DBS to surpass a 15 percent and even a 20 percent penetration of U.S. TV households over the next five to 10 years, despite the accelerating national rollout of digital cable.

Analysts and industry executives believe satellite TV sales will keep surging because of plummeting DBS equipment prices, greater picture and sound quality, more channel offerings, improved promotions, increased marketing budgets, superior service, high customer satisfaction and rising cable rates. A typical cable system now charges $30 to $35 a month for extended basic service, as opposed to $30 a month for DIRECTV's standard Total Choice package (Breznick, 1999d). Industry experts believe the passage of "local-into-local" legislation by Congress, granting DBS providers the right to carry local broadcast stations back to their home markets, will help even further, particularly in large metropolitan areas.

That does not necessarily mean great, or even any, subscriber losses for cable, however. Cable is holding its ground or suffering only minor customer losses as the multichannel video universe keeps expanding and the larger cable systems switch to digital. DBS does not have to kill cable to be a great business. They can co-exist (Breznick, 1999d)

In recent years, the direct broadcast satellite business has seen a tremendous upturn in stock prices. Like the cable industry, the DBS industry has been consolidating, which is trimming the number of service providers. DIRECTV merged with USSB and acquired Prime Star, forming the third largest MCTV operator that has more than 9 million subscribers. The sheer subscriber base now would give significant cost advantages for DIRECTV to compete with the cable systems, securing its long-term viability in the multichannel television industry. Completing the successive mergers and acquisitions with USSB and PrimeStar, DIRECTV commands over ten million DBS subscribers. The acquisition of USSB gives DIRECTV eight more high-power frequencies, split between two orbital slots, and allows the DBS provider to offer unified packages of basic and pay networks.

At the same time, EchoStar Communications purchased frequency spectrum from News Corp. and MCI Worldcom. EchoStar, with more than 3 million subscribers, also became the eighth largest provider of multichannel video programming service in 1999. Many analysts believe this rationalization of the business coupled with what appears to be favorable legislation pending in Congress will continue to propel DBS growth. The growth potential for DBS stocks is strong in long term. Advancements in technology, which will enable DBS providers to sell two-way data and true video on demand, will also spur consumers' desires for DBS systems. Alliances such as DIRECTV and America Online Inc. should also help propel DBS growth (Neel, 1999b).

DBS seemed to gain a big momentum in 1999. Possessing more than 10 million subscribers between them, both DIRECTV and EchoStar gained new subscribers at a breakneck pace, thanks to the elimination of such rivals as cable-backed Primestar Inc., increased marketing, plummeting equipment prices, and rising cable rates (Breznick, 1999e).

Internal consolidation also enhances the competitive position of the survivors in the battle against the wireline cable service. Once DBS passes the survival test and picks up subscriber bases, its programming costs begin to precipitate. These cost savings, in turn, allow DBS operators to subsidize the equipment vendors in their effort to distribute satellite dishes at local retail stores. With more than 12 million subscribers, DBS seems to gain a big momentum in 1999.

Seeking to sustain its record growth, DIRECTV also expanded its marketing and distribution agreement with SBC Communications Inc. to cover the Baby Bell's 18 million residential phone customers. Previously, the SBC deal only covered apartment complexes and other multiple-family dwelling units (Breznick, 1999e).

Also in 1999, the U.S. House and Senate overwhelmingly passed the Satellite Home Viewer Act to allow satellite companies to offer broadcast signals (Glick, 1999a). This legislation permits the satellite operators to beam local broadcast stations back to their home markets throughout the U.S., improving their position against cable.

Overall, there still remain many challenges for DBS to become a true substitute to cable service. DBS service is available from high power DBS satellites that transmit signals to small DBS dish antennas installed at subscribers' premises. While satellite service is popular in states like Montana

(22 percent penetration) and Vermont (20 percent), one may question whether DBS can be viewed as a robust substitute to cable if DBS failed to offer local-broadcast signals, required upfront equipment and installation payments and required subscribers to obtain additional equipment to receive service on more than one TV set (FCC, 1998). The DBS industry must overcome these challenges to compete more aggressively against cable.

It is clear, however, that some competitive barriers appear to be diminishing. DBS equipment costs fall and broadcast signals become available in many markets. Indeed, the advertising for DBS services indicates that DBS is now targeting a broader range of consumers.

The lack of network television signals, the primary disadvantage of DBS, was partly resolved in 1999. On November 29, 1999, a revision of the Satellite Home Viewer Act ("SHVA") was enacted. Under the Satellite Home Viewer Improvement Act of 1999 (SHVIA), satellite providers are allowed to retransmit network and network affiliate signals into local markets. The original SHVA legislation, passed in 1988, granted only a limited exception to the exclusive programming copyrights enjoyed by television networks and their affiliates. This exception recognized that some households are unable to receive network station signals over the air and allowed direct-to-home ("DTH") satellite video providers to retransmit network signals, but only "to persons who reside in unserved households" (also known as "white areas"). In 1998, several federal court decisions that resolved litigation between broadcasters and DBS program distributors over violations of SHVA resulted in the termination of network signals to approximately 1.5 million satellite customers. Subsequently, the House and Senate passed separate bills authorizing DTH providers to retransmit network and network affiliate signals into local markets. Immediately after the law was signed, EchoStar began transmitting local network packages, selling for $4.99 a month, to subscribers in 13 markets: Denver, New York, Los Angeles, Chicago, San Francisco, Boston, Washington, D.C., Dallas/Ft. Worth, Atlanta, Miami, Phoenix, Pittsburgh and Salt Lake City. The local channel package consists of the local affiliates of ABC, CBS, NBC, and FOX. DIRECTV began immediate service to two markets: New York and Los Angeles. In addition to local network channels, DIRECTV will include a national PBS in each local package, which sells for $5.99 a month. During the six-month period beginning on the date of the enactment of SHVIA, DBS providers may retransmit local signals without consent. Thereafter, DBS operators will be subject to retransmission consent rules similar to those established for cable operators (FCC, 2000).

The inability to fully serve urban areas is another barrier to competition faced by DBS operators. DBS is a predominantly rural service and faces obstacles to competitive access to the suburban and urban markets. Approximately 40 percent of DBS subscribers do not have access to cable. Signal interference may continue to limit DBS access for some viewers. For instance, DBS antennas must face south to receive an acceptable quality signal from the satellite, which transmits the video programming service. This means that renters and property owners who do not have south facing exclusive use areas cannot opt for DBS service, and therefore must rely on cable operators.

Finally, because DBS service relies on a telephone return path and can provide only limited interactivity, DBS is at a competitive disadvantage to cable with its broadband conduit to and from the home.

The very success of DBS is of great significance in assessing the prospects of overbuild competition. As DBS strengthens its attractiveness with local network signals and decreasing equipment costs, it would create more difficulties for new overbuilds to compete for survival. Wherever DBS service is available, overbuild entrants will find them as the third multichannel television provider, not as the second. In other words, the viability of overbuild competition will depend not only on the incumbent cable system, but substantially on the availability of DBS service and its substitutability in a given area. In the light of its technological handicaps and diffusion patterns over the years, DBS is expected to continue growing in rural areas where subscribers are not well served by the wireline cable systems and do not have the line-of-sight problems. On the other hand, overbuild entry would almost always be limited to the more populated areas, if it does occur.

Survivor Analysis

It might be helpful for understanding the sustainability of overbuild competition if past experience is to give any lessons. Ironically, Hazlett (1990, 1995) provides very persuasive evidence of predatory pricing in the cable television industry. Facing an aggressive overbuilder (Telesat) in Orange County, Florida, in the late 1980s, two incumbent cable operators dramatically responded by cutting their rates in half, precisely in those regions where the incumbents were overbuilt (Hazlett, 1990). In Sacramento, California, the incumbent poured sales effort such as free TV sets and a $1 monthly rate for basic service into a small area where the entrant would first compete, resulting in losses of $15 per subscriber a month (Hazlett, 1995a). The main thrust of his arguments is that "the constraint on entry is not so much the presence of subadditivity, as the strategic behavior by first movers and franchising agents" (Hazlett, 1990, p.113). Despite Telesat's aggressive efforts in Florida, however, rumors continued to persist that Telesat's primary interest was not in operating cable systems, but in greenmailing competitors (Thompson, 1989). Indeed, even before the 1990 Hazlett study appeared in publication, Telesat announced in August 1989 to sell its two Florida systems to competitors (Multichannel News, 1989, August 14, 1989, p.22). In Sacramento, too, the entrants were unable to survive market predation by the incumbent, deciding to exit from the market (Hazlett, 1990; 1995a).

An examination of how overbuild competition has fared for the last decade is presented in Table 13. The 26 duopolistic markets used in the sample of the Merline (1990) study were reexamined to check changes in market structure for the last ten-year period. Out of 26 competitive markets, only 12 remained duopolistic in 1999. More than half of these 26 markets have changed back to monopolistic ones. A U.S. Senate report reveals similar results: mergers have occurred between the two existing or proposed systems in 62 of the 132 communities in which second franchises have been advanced or were under study (cited in Johnson, 1994). The lesson from such high mortality is clear and simple: overbuild competition in cable television is more likely to fail than to succeed.

Table 13 Changes of Market Structure From 1990 To 1999

City, State	Operators in 1990	Operators in 1999
Troy, AL:	Storer v. Troy Cablevision	Duopoly: AT&T v. Troy Cablevision
Mesa, AZ	Dimension Cable v. Cable America	Duopoly: Cox v. Cable America
Chula Vista, CA	Cox Cable v. Ultronics	Duopoly: Cox v. Ultronics
Sacramento, CA	Pacific Select TV v. Sacramento Cable	Monopoly: Comcast
Cape Coral, FL	Telesat v. Cablevision Industries	Monopoly: Time Warner
Citrus Co., FL	Telesat v. Cablevision of Florida	Duopoly: Time Warner v. Adelphia
Orange Co., FL	Cablevision of Central Florida v. Cablevision Industries	Duopoly: Time Warner v. Adelphia
Orlando, FL	Cablevision of Central Florida v. Cablevision Industries	Monopoly: Time Warner
Brunswick, GA	Rentavision v. Star Cable	Monopoly: Century (Charter) → Time Warner (2000)
Cumming, GA	Cable USA v. Cable TV of GA	Monopoly: Prestige Cable TV Inc.
Vidalia, GA	TCI v. Southl and	Monopoly: Northland Cable
Warner Robins AFB, GA	Cox Cable v. Watson Community Television	Monopoly: Cox Cable
Boone Co., KY	Jacor v. Storer	Monopoly: InterMedia → AT&T (2000)
Frankfort, KY	Consolidated TV Cable v. Community Cablevision	Monopoly: Frankfort Electric & Water Plant Board
Glasgow, KY	TeleScripps v. Glasgow EPB	Monopoly: Comcast v. Glasgow EPB → Glasgow EPB (2000)
Ann Arundel Co., MD	North Arundel Cable v. Jones Intercable	Duopoly: Jones Intercable (Comcast) v. Intermedia
Monroe, MI	Toledo Blade v. River Raisin Cable	Duopoly: Monroe Cablevision v. River Raisin Cable
Omaha, NE	Cox Cable v. Metrovision	Duopoly: Cox Cable v. US West
Hillsboro, NC	Cablevision Ind. v. Carolina Cable	Monopoly: Time Warner
Paramus, NJ	Cablevision v. UA Cablesystems	Monopoly: Cablevision Systems
Cleveland, OH	Metro TEN v. North Coast	Monopoly: Cablevision Systems
Allentown, PA	Twin-County Trans Video v. Service Electric Cable TV	Duopoly: RCN v. Service Electric Cable TV
Pottsville, PA	Service Electric Cable TV v. Warner Cable & Wire Tele-View	Duopoly: Time Warner → Service Electric Cable TV v. Wire Tele-View
Henderson, TN	Multivision v. CableAmerica	Monopoly: InterMedia
Carrollton, TX	Storer v. Planned Cable Systems	Duopoly: AT&T v. Charter Com.
Sandy, UT	TCI v. Insight Cablevision	Duopoly: AT&T v. Insight Cablevision → Monopoly: AT&T (2000)
Sources: Merline (1990) for 1990, Television and Cable Factbook for 1999.		

Analysis of Tobin's *q*

Another method to investigate the sustainability of overbuild competition is the use of Tobin's *q*-ratio. The *q*-ratio is equal to the market value of an asset divided by its reproduction cost. The notion is that in a market in competitive equilibrium, with no monopoly rents, the market value of a firm's assets should tend to equal their reproduction cost. This is so because potential buyers in a competitive industry are unwilling to pay more than the replacement cost of the firm's tangible assets. Therefore, a competitive industry is expected to have the unit value of *q*-ratio ($q = 1$), while monopolies will show much greater *q*-ratios. If the *q*-ratio is greater than one, then another firm would find it profitable to enter the market. Such entry would increase market supply, force prices and profits down toward a competitive level, and hence reduce the market value of the incumbent firm or the industry. The *q*-ratio provides a useful measure of market power and hence, profitability of an industry because of its simplicity. The FCC (1994) and other studies (Hazlett & Spitzer, 1997; Shooshan, 1989) have used the *q*-ratios to gauge the degree to which cable operators actually exercise market power.

To construct *q*-ratios for an industry, it is necessary to collect the replacement costs and market values of an asset. For the cable television industry, the FCC has compiled a large number of system transactions each year. Table 14 presents three widely used measures of market value for cable systems. For the present purpose, one needs to take a look at price per subscriber.

In the early 1990s, each cable subscriber was worth slightly more than $2,000 in system trades. But the rate roll-backs in 1993 and 1994 led to the reduction of cable system trade values in the ensuing years. The shock of the FCC rate cuts was absorbed in 1996, but the market price balked again in 1997 because of the Telecommunications Act of 1996, which struck down one of the most significant entry barriers in cable television by repealing telco-cable cross-ownership bans. Thus, these two events appeared to strongly influence the financial prospects for the cable industry, which is reflected by the low market price of a cable system in 1995 and 1997, as measured in dollar value per subscriber and cash flow multiples. But by 1998, the market price of cable systems resurged to $2,900 per subscriber. In the early half of 1999, the cable industry witnessed an explosive leap in system transactions, with the sales price of $3,800 per subscriber.

Table 14 Market Valuation of Cable Systems

	1993	1994	1995	1996	1997	1998	1999 Jan.-June
Number of Systems Sold	96	64	142	98	110	114	60
Dollar Val. Per Subscriber	$2,160	$1,869	$1,829	$2,115	$2,044	$2,877	$3,849
Dollar Val. Per Home Passed	$1,258	$1,123	$1,174	$1,299	$1,281	$1,776	$2,428
Cash Flow Multiple	11.3x	10.3x	9.7x	11.4x	9.2x	13.1x	16.3x

Source: FCC, Annual Assessment of the Status of Competition in Markets for the Delivery of Video Programming, Second Annual Report (1995) through Sixth Annual Report (2000)

On the replacement costs side (denominator) of the *q*-ratio, the average construction cost per subscriber has been evaluated by many different sources. Among others, the most reliable estimates are reported in Table 15. No doubt, these estimates of replacement costs are based to some extent on one's subjective judgment, but in aggregation they can provide reliable information. In fact, the estimates of industry observer, economists, and engineers do not vary widely, as seen on column 2 of Table 15. The differentials appear to stem from general inflation in construction costs. So, it seems reasonable to conclude that the replacement cost was about $600 per subscriber in the late 1980s, while approximately $800 to $900 in the late 1990s. Combining these estimates with the average market price in each year from Table 14 results in the *q*-ratios for the cable industry in the 1990s.

Table 15 Estimates of Tobin's *q* for the period of 1993-1999

Source	Cost per Subscriber	1993	1994	1995	1996	1997	1998	1999
Paul Kagan (1988)	$600	3.6	3.1	3.0	3.5	3.4	4.8	6.4
Smiley (1986)	$619	3.5	3.0	3.0	3.4	3.3	4.6	6.2
Egan (1996)	$700	3.1	2.7	2.6	3.0	2.9	4.1	5.5
Ciciora, Farmer, & Large (1999)	$900	2.4	2.1	2.0	2.4	2.3	3.2	4.3

Although the *q*-ratio was originally crafted to measure market power and the accompanying profitability of an industry as an alternative to rate of return and has been so used, it can also be used to indirectly estimate the feasibility of *de novo* entry in an industry. Given its shortcomings in measuring such attributes (see Lindenberg & Ross, 1981; McFarland, 1988; Owen & Wildman, 1992; Smirlock, Gilligan, & Marshal, 1984), the *q*-ratio is perhaps much more appropriate to measure the feasibility of entry in an industry. The logic is simple. If an industry exhibits a high value of *q*-ratio, not only does it demonstrate the levels of excess profitability available to the producer, but it also suggests the difficulties of *de novo* entry in that industry. When entry is open, a potential entrant would have two options; buy out or enter from scratch. If *de novo* entry is believed to be feasible, (i.e., profitable), the potential entrant would not be willing to pay more than the replacement cost to purchase existing assets. It is better to build them from scratch. In this case, the industry will have a *q*-ratio that is close to unity because there is little reason to pay such premium. On the other hand, if *de novo* entry is not profitable for whatever reason, the potential entrant would have two choices. It can choose not to enter or be willing to pay more than the replacement costs, if the potential entrant is committed to the industry. Regardless of the decision outcomes, the industry will show a high *q*-ratio. The point is that the more difficult *de novo* entry, the greater the *q*-ratio.

Looking at Table 15, one immediately notices that the cable industry exercises its market power and enjoys high profitability, when viewed from the conventional interpretation of the *q*-ratio. The other side of the coin is that it is very difficult to enter this industry from scratch. Depending on the estimate of the replacement cost, *q*-ratios for the cable industry vary, but an indisputable fact is that the market for cable systems supports little of the feasibility for overbuild entry. Among the various estimates of *q* in Table 15, the best estimate of the replacement cost in the cable industry for the present time would be those by Egan (1996) and Ciciora, Farmer, and Large (1999). Then, the best estimate of the *q* ratios for 1999 would be somewhere in the range of 4.3 to 5.5. These estimates are very close to earlier estimates. Paul MacAvoy, a Yale economist, submitted a comprehensive analysis of *q* to the FCC 10 years ago. His "best estimate" of *q* for the cable industry as of 1989 was 4.3 (FCC, 1990, Appendix E). FCC's own estimates for 1993 and 1994 ranged from 3.95 to 5.23 (FCC, 1994c).

These high level of *q*-ratios and no significant changes between 1989 and 1999 suggest two conclusions. First, the size of *q*-ratios indicates that the cable industry is reaping excess profits as of 1999. Despite the federal government's incessant efforts in the past 10 years to encourage competition in the cable industry, they failed to constrain the exercise of market power by the cable operator. Second, there must be some impediment to the production of cable service. It appears that the elimination of legal entry barriers would not necessarily lead to pervasive entry because of other than legal and political entry barriers in the cable industry.

As alluded to earlier, the relatively lower *q*-ratios during the period from 1995 to 1997 are the consequence of the FCC's rate roll-backs and open entry policy codified in the 1996 Telecommunications Act. But the most striking change in *q* ratios in the 1990s has occurred since 1998 in which the *q*-ratio started to climb significantly. This resurgence is partly due to the rediscovery of revenue potential in the cable assets that may be created through the provision of new service offerings like digital cable, Internet access, and IP telephony. But equally important, the market for cable systems has learned from the previous years that despite the much hyped open entry policy, overbuild entry by local exchange carriers and others would not materialize as easily and quickly as anticipated and neither would it pose insurmountable competitive threats to the incumbent should entry ever happen. To be sure, when intangible assets account for much of the market value, then *q*-ratios may be a biased estimate in measuring the viability of *de novo* entry. An exclusive cable franchise and goodwill would be an excellent example. The high *q*-ratios in the cable industry in the past perhaps reflected the market power granted by the local franchising authorities and federal laws that prohibited overbuild entry. The high *q*-ratios even after 1996, however, appear to indicate that overbuild is not a viable means of entry. Further, because the numerator of *q*, a firm's market value, reflects a firm's expected future profits with an automatic adjustment for risk, the market for cable systems does not seem to support the notion that overbuild entry is feasible and profitable in the future.

The preceding discussion based on econometric results, survivor analysis, and Tobin's *q* may explain why there has been no nationwide rush into the cable market even after the most significant entry barriers were struck down. And the market predation and the squeezed profitability may be the cause for Ameritech and SNET's decision to stop pursuing further franchises for cable television (Jones, 1999). No rational businessmen would decide to enter an industry that promises less than the cost of capital. Neither would they pay such stiff premiums as 4 times the replacement cost to buy cable systems, if they believe *de novo* entry via overbuilding is indeed profitable. This is especially true when they see a much more attractive industry looming in the horizon. With limited resources, local exchange carriers would opt for the more promising new market, namely high-speed Internet access, in confrontation with incumbent cable systems' price warfare.

When there are promising business opportunities in the marketplace, it is usually businessmen, not economists, who will first notice and exploit such opportunities. In an open market where no legal entry barriers exist, it is actual entry, not conjectures through simulations, that would tell the true story about the profit potential in that market. If overbuild competition were indeed feasible and viable, there should have been wide-scale entries since 1992 and much more so since 1996. The Cable Television Consumer Protection and Competition Act of 1992 specifically prohibits franchising authorities from writing exclusive franchises. Under the Act, franchise authorities may not "unreasonably refuse" to award an additional franchise. The Telecommunications Act of 1996 repealed the line of business restrictions imposed on local exchange carriers under the Modified Final Judgment. The 1996 Act adopted an open entry policy. But with a notable exception of Ameritech and SNET, local exchange carriers have not been enthusiastic about overbuilding the cable market. Where they did overbuild, they faced sharp price reductions by incumbents. As of October 1999, it looked like Ameritech and SNET were preparing retreat.

Chapter 7

CONCLUSION

Prospects of competition in the multichannel television market

Cable television systems now pass virtually every home in the U.S. and provide multichannel television service to approximately 66 percent of them. The 34 percent of residences that choose not to subscribe to cable service do so, for the most part, for reasons other than lack of money. Incumbent cable television systems continue to dominate the multichannel television market, although competition for them is growing. Nevertheless, competition between two wires is not flourishing. The increased level of competition in the multichannel television industry is attributed mainly to DBS.

Recently SBC decided to retreat, at least for a while, from the multichannel television industry by holding any further expansion of Ameritech New Media and SNET's cable business. Some cable industry officials view SBC's decision to halt Ameritech cable operation as a prelude to the RBOC getting out of the cable business (Jones, 1999). The decision also suggests that there are formidable entry barriers to the multichannel television industry.

The overbuilding business has always been risky. The changes in technology and public policy notwithstanding, significant obstacles to competition remain today. Most importantly, sharp price reductions in overbuild markets significantly influence entry decisions in the multichannel television industry. Market predation compresses profit margins for the incumbent as well as an entrant. Large MSOs, however, may still enjoy substantial cost advantages and profits because of lower input costs, associated with both programming and operating. Thus, an entrant suffers "double squeeze" where predatory pricing pushes post-entry price down from above while higher input costs further squeeze profit margins for the entrant from below. Moreover, there are economic forces associated with convergence that may further impede entry into the multichannel television industry. If an entrant is compelled to provide a bundle of services, i.e., not only video but also data and voice, to compete with the incumbent's product space, convergence would mean extra capital requirement for the entrant. Together, the combination of these factors may reduce competition, rather than strengthen it in the multichannel television industry.

Considering all these factors, overbuild competition may not materialize as expected. Competition between the two monopolies will come first in the high-speed Internet access service. Telcos are more likely to focus on data and voice services. The cable industry will move toward interactive video and data services. The first front that telcos and cable companies will meet nationwide will be data service. Video service will remain under monopolistic control by cable operators. The only significant inroads to the multichannel television industry would be provided by DBS services. Voice service will remain under ILECs control for the foreseeable future but the cable industry will gradually expand into voice service market. In this regard, cable operators will be ready more quickly than telcos to provide a "bundle of integrated services". To the extent that consumers would like to get their telecommunications services from a single provider, therefore, cable operators will have significant strategic advantages over their telephone competitors. The findings of the preceding chapters explaining each of these factors are summarized below.

Entry and Market Predation

The present research conducted an econometric analysis of overbuild competition, using a sample of 247 observations encompassing 124 monopoly, 91 duopoly, and 32 municipal systems. The effects of competition and nonprivate ownership variables are all large, negative, and statistically very significant in both equations. First, overbuild competition leads to a price reduction by 20.7 percent. Second, municipal cable systems offered basic cable service at prices that were 25.7 percent lower than those charged by monopoly operators. Third, competitive threats from a "potential entrant" lead to a price of basic cable service that is 7.7 percent lower than that of monopolists. This differential may be an indication of "limit pricing" by incumbents in an effort to prevent actual, full-blown entry.

Of particular interest is the differential between duopoly and municipal rates. When compared to basic service rates charged by monopoly systems, competitive systems charge 20.7 percent less and municipal systems 25.7 percent less. The difference between these latter two groups (5%) may shed light on the existence of market predation and the feasibility of overbuild competition in the long run.

In the service quality dimension, an operator facing overbuild competition offers, *ceteris paribus*, 9 to 11 percent more channels than a monopolist, depending on the model estimated. This would translate to 4 to 5 additional channels on a duopolist cable system since the typical monopolist offers 41 cable-only channels or 52 basic channels in total.

Another interesting set of findings involves multiproduct offerings on the modern cable systems. Cable systems that also provide Internet access service over cable are predicted to charge 4.6 percent more for video service than systems that do not offer such a service. Cable operators seem to take advantage of cross-subsidy through the transfer of their monopoly profits from the plain old cable television operation to market such new services as high-speed Internet access services. On the other hand, cable price is significantly cheaper when the system sells a bundle of multiproducts including telephone services as well as Internet access service over cable. This may indicate the existence of economies of scope in the joint production of video, data, and voice.

Concentration and Competition

As far as competition is concerned, there are three ownership issues that characterize the cable industry: horizontal concentration and relationships among cable operators; vertical relationships between system operators and program suppliers; and clustered cable systems, whereby cable operators consolidate ownership within geographical areas.

Cable television still is the dominant technology for the delivery of video programming to consumers in the multichannel television marketplace, although its market share has continued to decline since the mid 1990s. Consolidations within the cable industry continue as cable operators acquire and trade systems. The seven largest operators now serve almost 90 percent of all U.S. cable subscribers. The four largest cable MSOs (AT&T, Time Warner, MediaOne, and Comcast) have served approximately 54 percent of all MCTV subscribers since 1995. The largest eight MSOs (CR8) take up more than 70 percent of the multichannel television market. The only prominent change is DIRECTV with a 9 percent nationwide market share that ascended to one of the largest four firms in the multichannel television industry in 1999. With DBS excluded, internal concentration within the cable industry continues to increase.

Through numerous acquisitions and trades since the mid 1990s, cable MSOs have continued to increase the extent to which their systems form regional clusters. MSOs are trying to form a "cluster" around major cities to reduce costs, to improve operating and management efficiencies, to eliminate system redundancies, and to attract more advertising. But more importantly, regional clustering also enhances MSOs ability to compete successfully in the cable services markets under competition. Clustering also provides the critical mass of subscribers necessary to support the huge capital investment needed to make system upgrades designed to enable companies to enter other lines of telecommunications services, such as Internet access and local phone service.

Although there are efficiencies realized from the ownership relationships in the cable industry, there is also the potential for adverse market effects from these relationships. Significant size differences between incumbents and entrants result in first-mover advantages for the entrenched MSOs. Substantial discounts for license fees available only to larger MSOs, combined with market predation, may undermine healthy competition.

The difficulties in overbuild business are more intensified if the incumbent is one of the larger MSOs that are vertically integrated into programming distribution stage. The extensive vertical integration in the cable industry magnifies the potential anticompetitive impact of price discrimination. Loopholes in existing statutes allow incumbent MSOs to negotiate exclusive contracts with attractive cable programming networks that deny these programming sources to competitors. Leveraging their large subscriber bases and extensive geographic coverage, incumbent MSOs may find it profitable to outbid entrants for exclusive rights to these networks. There is the actual or potential problem of migration of programs from satellite to terrestrial delivery in order to avoid the program access rules.

Convergence of Telecommunication Services

Convergence can best be defined as the realization of subadditivity in production due to joint production. Thus, the economic implications of convergence become closely related to economies of scope. Viewed from this perspective, one major impact of convergence is through its effects on market structure and competition. To be sure, convergence holds the promise of bringing increased competition to many telecommunications markets by allowing existing service providers in what has traditionally been separate markets to cross over into one another's industries. On the other hand, as discussed earlier, potential entrants will be required to raise more capital, if they are to compete with the multiproduct cable MSOs.

Local exchange carriers have shown interests in multichannel television markets, but the extent to which they will rely on their own facilities (as opposed to resale of those of satellite operators) remains to be seen. Cable companies eventually will go after the local telephone markets in major urban areas, but doing so has proved more difficult than many industry optimists predicted. In many cases, cable companies will first try specialized services, such as cable modems, to establish themselves.

Of particular interest is the emergence of new industry, namely the high-speed Internet access service market. Quite independently of any inherent technological advantage that cable or DSL may possess, cable modem's early lead in deployment means that cable will have first-mover advantages at least in the residential market. Cable MSOs will have three main strategic advantages: bundling capability, first-mover advantages, and dynamic resource allocation.

The ability to include television offerings in its bundles certainly makes it easier for AT&T to create distinctive packages. AT&T could, and apparently intends to offer, integrated bundles of phones service (both local and long distance), multichannel television, mobile services, and ISP. Cable's early lead in deployment, coupled with substantial first-mover advantages are likely to give AT&T/@Home considerable power in many conceivable scenarios for future market dynamics in the high-speed data service industry.

Recently, cable companies have aggressively deployed digital video services to compete with Direct Broadcast and RBOCs, reaping extra revenues from that deployment. Those revenue sources from digital video as well as voice service bring them considerable strategic clout to defend the key battlefront, i.e., Internet access market. Holding a franchise monopoly for cable television thus creates a solid foundation for cable to defend the market for broadband access. If economies of scale and scope in broadband for the consumer market are significant, the present headstart of the cable companies will give them an insuperable first mover advantage and leave them with the kind of dominance they still enjoy in their core market for multichannel video program distribution. It is very likely that the cable industry will dominate the high-speed Internet service in the future. The inevitable consequence is cable's "joint dominance" in the video and Internet access market. And this would seriously undermine LECs' competitive position in the increasingly converging telecommunications industries.

Sustainability of Overbuild Competition

Combined with predatory pricing, the post-entry cost advantage allows the initial monopolist to threaten to reduce price below the new entrant's average costs, while at the same time earning profits itself. Thus, first-mover advantages confer the incumbent monopolist a very strong strategic option: "double squeeze."

Furthermore, the proper assessment of the viability of overbuild competition must take DBS into consideration. The viability of overbuild competition will depend not only on the incumbent cable system, but substantially on the availability of DBS service and its substitutability in a given area. As DBS strengthens its attractiveness with local network signals and decreasing equipment costs, it would create more difficulties for new overbuilds to compete for survival. Wherever DBS service is available, overbuild entrants will find them as the third multichannel television provider, not as the second. In sum, the DBS factor will further exacerbate the viability problems for overbuild competition.

This finding is reinforced with the survivor analysis. The 26 duopolistic markets used in the sample of the Merline (1990) study were reexamined to check changes in the market structure for the last ten-year period. Out of 26 competitive markets, only 12 remained duopolistic in 1999. More than half of these 26 markets have changed back to monopolistic ones. A U.S. Senate report reveals similar results: mergers have occurred between the two existing or proposed systems in 62 of the 132 communities in which second franchises have been advanced or were under study. The lessons from the high mortality of overbuild competition are clear and simple: overbuild is more likely to fail than to succeed.

Further, high *q*-ratios found in the late 1990s may confirm the difficulties that overbuild competition encounters in the marketplace. The high level of *q*-ratios and no significant changes between 1989 and 1999 suggest two conclusions. First, the size of *q*-ratios indicates that the cable industry is reaping excess profits as of 1999. Perhaps more importantly, high *q*-ratios suggest that it is very difficult to enter the cable industry from scratch. The impediments may be the combination of such factors as market predation, cost disadvantage, and increased capital requirements for new services.

Issues and Policy Recommendations

Regulation of Prices and Service Areas

As discussed in Chapter 3, cable service rates keep rising and they are expected to continue in the near future where "effective competition" is absent. It is so particularly because of the rate sunset since March 1999. Overbuild has been growing in absolute number, but it has not spread out nationwide. Further, overbuild competition from LECs now seems to face a stalemate considering the recent halt of franchise negotiations and construction after SBC's decision in October 1999. It remains to be seen whether cable operators will show opportunistic behavior as they did in the late 1980s. But it is highly likely that cable systems exempt from "effective competition" will increase rates as much as they can.

In markets where overbuild competition has partially occurred, regulation of rates and service areas becomes a very troublesome issue. Congress established the uniform rate requirement in the 1992 Cable Act to prevent cable operators from having different rate structures in different parts of one cable franchise, and to prevent cable operators from dropping the rates in one portion of a franchise area to undercut a competitor temporarily. Section 623(d) of the Communications Act requires that: "A cable operator shall have a rate structure, for the provision of cable service, that is uniform throughout the geographic area in which cable service is provided over its cable system." In implementing the 1992 Cable Act, the FCC permits, consistent with the requirement of a uniform rate structure, a cable operator to establish some differences in rates between separate categories of subscribers. For example, nonpredatory bulk discounts to multiple dwelling units (MDUs) are permissible if offered on a uniform basis. Multichannel television distributors can realize significant efficiencies and cost savings by service to MDUs and other high-occupancy buildings, and this way it is possible to avoid foreclosing the prospect that those savings might be passed on to consumers in those dwellings. Allowing cable operators to respond to competition in individual MDUs gives consumers the benefit of lower prices from incumbent cable operators.

The 1996 Act retains the uniform rate requirement for cable operators not subject to effective competition but authorizes affected cable operators to deviate from their uniform rate structures in response to competition at MDUs. The 1996 Act clarifies that the uniform rate requirement does not apply where the cable operator is subject to effective competition and does not apply to programming offered on a per channel or per program basis. The 1996 Act also exempts bulk discounts to MDUs from the uniform rate requirement, and prohibits a cable operator from charging predatory prices to an MDU. For the purpose of the 1996 Act, a bulk discount is a volume discount, available to all residents of the MDU. Congress' objective, that cable operators have the flexibility to offer discounts to MDUs, is satisfied if the discounted rate is offered to all residents of the MDU. Thus, the bulk rate exception does not permit a cable operator to offer discounted rates on an individual basis to subscribers simply because they are residents of an MDU, but rather requires a bulk discount agreement negotiated by the property owner or manager on behalf of all of the tenants.

Incumbent cable operators have heavily utilized this exemption to retain subscribers in overbuild areas and to block further overbuilding throughout their franchise area. The dilemma is evident. Without the exemption, consumers may not benefit from competition in the short term. With the exemption, the entrant has to suffer significant loss due to the incumbent's selective price cutting only within those overbuild areas. Balancing the costs and benefits of this policy is a tough task, but it seems that the long term prospect of competition is dimmed if the exemption is continued. Clearly, consumer benefits from complete overbuild must outweigh consumer welfare available with the exemption. Furthermore, the problem of the exemption is more acute considering the pattern of overbuild entry. A new entrant may have no intention of serving all of the communities at the initial stage, but it may target only affluent, high-density properties. When the entrant has to build its network from scratch, a strategy of attacking high-density properties first is appropriate. They appear to be MDU-rich communities, as opposed to single-home, lower-density communities. If the entrant starts to serve affluent communities, which is very likely, and the uniform rate requirement is exempt so that incumbent cable operator can respond to the entry, the benefits of this competition go to the rich at the expense of the poor. In other words, the incumbent's price reduction would be supported by cross subsidization from the poor communities where competition is absent, to the rich where competition is present. It would be a very troublesome situation that has happened, and might happen, in many overbuild areas. Thus, a uniform rate requirement should apply regardless of the existence of effective competition.

The dilemma may be alleviated if "universal service" requirement is enforced. Without the requirement of universal service in a franchise area, the entrant will likely take advantage of "cream-skimming" and economic "redlining" may occur. And this is where the distortion of welfare transfer arises. However, the universal service requirement may be enforced with flexibility since it could deter entry from the beginning. As discovered in Chapter 3, "potential competition" can still constrain the incumbent's market power to increase rates. The incumbent will not be able to increase rates substantially even when only small portion of its franchise areas has been overbuilt. It is not necessary for a community to be completely overbuilt to realize competitive benefits.

Should there be some form of rate regulation again in the future, if the rising trend continues? Instead of relying on ineffective regulations of prices, we must find other solutions to check the price and to ensure enhanced customer service. Maybe the DBS industry provides the answer in certain markets.

Because of impracticality of widespread overbuild competition, Smiley (1990) noted Schumpeterian competition is more likely to come from other technologies, such as direct broadcast satellite than from conventional cable overbuilds. Schumpeter talked about a different form of long-term competition that threatened the possessors of monopoly power. He called this competitive force "the gale of creative destruction."

Will DBS be the gale? Although the DBS is still in its infancy and there are substantial entry barriers, as revealed with LECs' recent withdrawal from pursuing cable franchises, entry barriers and strategic control are never totally impregnable. But a number of technical and economic factors makes DBS very weak substitute for cable television in some regions, particularly in major cities. This is the most important handicap that DBS must overcome to bring competition in the Schumpeterian sense.

National Ownership Limits

The cable industry is urging federal regulators to relax cable-system-ownership rules in light of the rapid development of direct broadcast satellite as a robust multichannel-video competitor. NCTA, for example, contends that one cable operator should be allowed to serve "well beyond 35 percent" of all subscribers with multichannel-video services. NCTA argues that cable operators are no longer the make-or-break bottlenecks in the programming-distribution market that they were in 1992, when Congress passed a law requiring the FCC to adopt horizontal constraints (Hearn, 1998c).

With the purchase of TCI in 1998 and MediaOne in 1999, AT&T now reaches more than 40 million households. After failing to penetrate local phone markets by reselling incumbent services, AT&T is planning to spend lavishly to upgrade TCI's wires in order to offer voice telephony and high-speed Internet access, along with video programming and long-distance telephone service. AT&T Corp., looking to protect its multibillion-dollar cable-television investment, is urging the FCC to ease up on cable-system-ownership rules as a way of promoting local phone competition.

In many respects, the old rules seem to be inappropriate for today's converging telecommunications market. In the world of convergence, size matters. While cable systems are potentially capped at reaching no more than 30 percent of homes, the Baby Bells are unencumbered by regulations setting horizontal-ownership limits. Bell Atlantic Corp., after its acquisition of GTE Corp., will control 38 percent of the country's 170.5 million local phone lines, and SBC Communications Inc., after its purchases of Ameritech Corp. and Southern New England Telecommunications Corp., will control 40 percent (Hearn, 1999). Viewed this way, the 30 percent cap would be counterproductive because cable companies need to extend their reach to at least match the footprints of regionally concentrated local phone companies. Thus, if one views convergence as a means of competition that cable and telephone invades each other's market, keeping the cap at 30 percent is no longer justified.

When cable and telephone companies begin to provide an array of services to consumers—with advanced set-top boxes that provide a gateway to cable networks, the Internet and voice services—counting cable subscribers for the purpose of enforcing a horizontal cap could be difficult. "A consumer with one of these devices receives a broad range of services, and this makes 'counting' the consumer as a cable subscriber overly simplistic" (Hearn, 1999).

On the other hand, as far as the multichannel television industry is concerned, MSO size has been associated with efficiency gains and market power. Far from the economic justification of such large size usually provided by large MSOs, the econometric analysis in Chapter 3 suggests that consumers do not appear to receive benefits of lower price from large MSOs. Consumer advocate groups, hence, urge the FCC not to relax the 30 percent cap, saying that the benefits of cable-MSO consolidation "have not reached the public" (Multichannel News, August 17, 1998). Large MSOs' market power or "bargaining power" vis-à-vis programming networks has been found in prior studies and it may undermine the vigor of competition as discussed in Chapter 4.

Thus, the ownership issues become more complex in the converging telecommunication services industry. More research is necessary to resolve these conflicting effects of ownership rules. It is important to remember that the cable ownership rules should be redesigned to prevent further consolidation of cable's traditional video service, while encouraging AT&T and its smaller competitors to continue investing in the broadband pipeline.

There is also growing concern that the constitutionality of the FCC's new cable ownership rules could be challenged in court, freezing the entire AT&T-MediaOne deal. That happened in 1993, when Daniels Cablevision Inc. sued the commission, saying the federal statute it used to limit the number of subscribers an MSO can pass violated cable operators' First Amendment rights (Glick, 1999b). The 30 percent cap has been stayed by the FCC indefinitely in response to this decision. In 1998, the FCC reaffirmed the 30 percent cap and refused to lift the stay (Hearn, 1998c). But, the FCC must show that why there should be 30 percent limit, instead of 40 percent or maybe 50 percent. There seems to be no clear evidence to keep or reject the 30 percent cap. Apparently, this rule needs more scientific evidence than hunches.

Programming Access Rules

There were a series of disputes about access to programming between the cable television industry and its emerging telco competitors. Under the 1992 Cable Act, vertically integrated programming entities that are more than 5 percent owned by an MSO cannot withhold or refuse to license programming to another video network operator.

Under current law, most cable companies that own networks are required to sell programming to any company that wants it. But Ameritech and other companies have complained that many networks not covered by the rule are entering into exclusive contracts with incumbent cable companies, blocking them from offering popular programming, such as ESPN's Classic Sports Network

The loophole in the current law has to do with the mode of program delivery. The FCC program-access rules apply only to *satellite-delivered* programming. They do not apply to all producers of programming. Current law does not apply to broadcasters. It does not apply to non-vertically integrated cable operators. In addition, cable programming owned by cable operators that is satellite-delivered may not be withheld from competing distributors of multichannel video programming. In practice, this provision has been used in making exclusive agreement between MSOs and programming networks that are delivered via other than satellite (e.g., terrestrial distribution over fiber optic network).

Cable operators are taking advantage of those exceptions to strike exclusive deals with programmers and deny program access to competitors. DIRECTV has filed a program-access complaint against Comcast Corp. over the MSO's refusal to sell Comcast SportsNet, the Philadelphia regional sports network that Comcast distributes by microwave. The No.1 DBS operator said that in Philadelphia, Comcast has used a loophole in the access laws to get around selling programming to DBS providers. By transmitting through terrestrial means, instead of by satellite, Comcast is not bound by the current law (Maggi, 1998). Bell Atlantic said it has proof that such activity has limited its profitability. The telco, embroiled in a battle with Rainbow Programming Holdings, an affiliate of Cablevision Systems, claims that it has lost potential subscribers in Dover Township, N.J., because Rainbow has denied it access to SportsChannel New York (Levine, 1997a).

In May 1999, Cable overbuilder RCN Corp. filed a program-access complaint at the FCC, accusing Cablevision Systems Corp. of illegally withholding sports programming from RCN's New York City system to benefit

Time Warner Cable in Manhattan. RCN filed the complaint after learning that Cablevision refused to sell it MSG Metro Channel, which Cablevision is partially using as a sports "overflow" channel. Overflow occurs when New York's many area sports teams are playing at once and can't all be seen live on Madison Square Garden Network or Fox Sports New York. RCN alleged that Cablevision agreed to sell MSG Metro to Time Warner in Manhattan, but not to RCN, which has about 50,000 Manhattan subscribers. Cablevision can withhold MSG Metro because it is not satellite-delivered. RCN has access to satellite-delivered MSGN and FSNY, where the bulk of the games appear. "As a result of the loss of the overflow programming that has been moved to MSG Metro, RCN has been besieged by complaints from its subscribers, and it has suffered damage to its business reputation prompted by the loss of such programming," RCN's complaint said (Multichannel News, June 7, 1999).

To level the playing field, therefore, these competitors insist change to the program access laws. Ameritech is asking Congress to extend the exclusivity ban to broadcasters that own cable networks and to independent cable programmers such as Viacom Inc. The Chicago-based Baby Bell also wants the law to guarantee that programming delivered by means other than satellite cannot escape the exclusivity ban (Hearn, 1998b). Consumer groups urge the FCC to cover terrestrial delivery under the rules. In Chapter 4, we discussed that cable MSOs' regional clustering gives operators an incentive to migrate programming off satellite. Given the incentives and abilities of incumbent MSOs, the FCC needs to be more vigilant in enforcing the program access laws.

Cross-subsidization

As illustrated in the "AmeriChecks" and Cox cases in Chapter 5, current regulatory regime significantly hampers LECs' ability of resource allocation. Cross-subsidization is not the evil on its own. The question is not the use of it, but the consequences in promoting principal policy goals that cross subsidization is designed to achieve. The current rules and regulations governing the telephone industry are based on classic theories of scale economies, but they have not placed much attention on the increasingly important characteristics of telecommunications business: converging services and the resulting economies of scope. The failure of adopting this change is reflected in the prohibition of cross-marketing, as in the case of "AmeriChecks," which significantly impedes telephone companies from gaining a customer base, thereby heightening barriers to entry and market expansion. Cross-marketing increasingly becomes critical for telecommunication service providers when they enter new markets. It is imperative for the new entrant to gain critical mass of subscriber base as quickly as possible because it will determine how long the entrant must endure financial deficits. This is particularly true, considering the most likely means of funding the development of the advanced telecommunications systems is by cross-subsidization (Baldwin, 1997). To limit telcos' ability to allocate resources may have a harmful effect on entry rate.

My suggestion is, therefore, that telephone companies be allowed to raise the capital necessary for establishing their video division or integrated telecommunications systems through cross-subsidization. But it is necessary to address how to resolve the major risks that have historically attached to that practice. There are two fundamental concerns with cross-subsidization by telephone companies that enter the cable business: potential anticompetitive practices and the protection of captive rate payers. These concerns are based on the assumption that telephone companies would have the incentive and ability to shift the costs and revenues of its unregulated activities to the detriment of consumers and competitors alike. Cost shifting on the part of the telephone company would have adverse consequences for both regulated ratepayers and cable competitors. Telephone service consumers would face higher rates due to the burden created by additional costs inappropriately shifted from cable services to regulated operations. Cable operators, on the other hand, could be placed at a competitive disadvantage due to the ability of telephone companies to reduce prices in the cable service market (NTIA, 1988).

Recent developments in telecommunications, however, have already alleviated these concerns associated with cross-subsidization by telephone companies. First, it is highly unlikely for LECs to engage in such anticompetitive abuse as predatory pricing because the cable industry has grown big enough to defend itself now. The trend of consolidation will continue in the future and some analysts anticipate that there will be only a handful of cable operators nationwide eventually. Furthermore, the entry of AT&T into the cable industry will significantly enhance their competitive position vis-à-vis LECs.

Second, the widespread implementation of incentive regulations for the local telephone operation allows for the protection of captive rate payers. Under the incentive regulation plans, most notably price caps, telephone service rates are regulated based on the consumer price, not on the costs incurred by the LEC's new operations (For details about incentive regulations, see Loube, 1995; Sappington & Weisman, 1996). In other words, telephone rates for "captive" rate payers is largely irrespective of capital investment by LECs under the price cap regulations. Thus, cross-subsidy would not cause harmful effects on service rates of telephone services charged by telephone companies.

Moreover, the current regulatory regime for the telecommunications industry do not seem to recognize the most critical feature of today's telecommunications technology and economics. Models of industrial organizations focus almost entirely on economies of scale as the traditional source of efficiencies in most industries, yet there are other related factors that may be important sources of cost savings as well for the multi-product firm. Convergence in telecommunications may be translated to economies of scope, which refers to cost savings that arise when a firm produces joint products as part of the normal production process. Economies of scope imply that there may be special cost savings that accrue to a multi-product firm that are unavailable to the firms producing only one of the products but not both. In fact, the requirements of a separate subsidiary for video service may block LECs ability to achieve efficiencies resulting from economies of scope. Likewise, the ban of cross-subsidization may have led to the foreclosure of potential entry into the multichannel television industry by LECs.

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