Cable Regulation in the Satellite Era *

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Abstract

The market for multi-channel video programming has undergone considerable change in the last 10 years. Direct-Broadcast Satellite service, spurred by 1999 legislation that levelled the playing field with cable television systems, has grown from 3% to 25% of the U.S. MVPD (cable and satellite) market and now accounts for virtually all net new subscribers. This chapter considers the merits of regulation in cable television markets in light of this development. It surveys the (dismal) empirical record on the effects of price regulation in cable and the more encouraging (but incomplete) evidence on the benefits of satellite competition. It concludes with a consideration of three open issues in cable markets: horizontal concentration and vertical integration in the programming (input) market, bundling by both cable systems and programmers, and regional concentration ("clustering") by cable systems. While potential market failures in distribution have clearly lessened, concerns regarding bundling and the programming market remain.
JEL: L50, L43, L41, L42

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1 Introduction

Now is a quiet time in the on-again, off-again regulation of the cable television industry. Since the 1996 Telecommunications Act eliminated price caps for the majority of cable service bundles on March 31, 1999, cable systems have been free to charge whatever they like for the services chosen by the vast majority of subscribers. That was a watershed year, as the Satellite Home Viewer Improvement Act of 1999 also relaxed regulatory restrictions limiting the ability of direct-broadcast satellite (DBS) systems to provide local television signals into major television markets. Since then, satellite providers have added 13 million more subscribers than cable, giving them over 25% of the multi-channel video programming distribution (MVPD) marketplace and providing two credible competitors to incumbent cable systems in most markets (FCC (2001d), FCC (2005b)).

On the other hand, the last 10 years has also seen continued consolidation in distribution, with the top 8 firms increasing their share of MVPD subscribers from 68.6% in 1997 to 80.1% in 2004 (FCC (1998c), FCC (2005b)). This has raised concerns about concentration and integration in the programming market. Horizontal concentration and channel occupancy limits enacted after the 1992 Cable Act were struck down in 2001 and remain to be reinstated (FCC (2005d)). As cable prices continue to rise, lawmakers wonder about the feasibility of à-la-carte services to reduce cable prices (FCC (2004a), FCC (2006)).

This chapter considers the merits of regulation in cable television markets in light of these developments. I do so in three parts. In the first part, I survey past and present cable regulations and assess their effects. The majority of this portion surveys the reasons for and effects of the four major periods of regulation and deregulation of cable prices (1972-1984, 1984-1992, 1992-1996, 1996-present). The evidence for regulation is discouraging: unregulated periods exhibit rapid increases in quality and penetration (and prices), while regulated periods exhibit slight decreases in prices and possibly lower quality. Consumer welfare estimates, while few, suggest consumers prefer *unregulated* cable services. This highlights the difficulty regulating prices in an industry (like cable) where service quality cannot be regulated and is easily changed.

I then review the empirical record on the consequences of competition in cable markets with a focus on satellites. Evidence from duopoly ("overbuilt") cable markets is robust: an additional wireline competitor lowers cable prices, with estimates ranging from 8% to 34%. Evidence of the effect of satellite competition is less compelling: surveyed rates are often only marginally lower and sometimes higher. In an important recent study, Goolsbee and Petrin (2004) suggest the importance of controlling for the (unobserved) quality of cable and satellite offerings and find when doing so that DBS competition reduces cable prices by an estimated 15%. Despite satellite competition, however, significant market power remains. The prospect of further entry into video markets by incumbent local telephone carriers looks promising.

Finally, I address three open issues in cable markets: horizontal concentration and vertical integration and its consequences in the programming market, bundling in both the distribution and programming markets, and regional concentration ("clustering") by cable systems. Conclu-

sions in these area are harder to come by. While horizontal concentration has clearly increased in the programming market, theoretical models have ambiguous predictions of its effects and empirical work is hampered by insufficient data on affiliate fees (prices). The evidence on vertical integration is more substantial: integrated systems clearly favor affiliated programming, but whether for reasons of efficiency or foreclosure remain unclear. Finally, bundling impacts market outcomes in both the distribution and programming markets. In distribution, it clearly enables systems to better capture surplus and offer high-quality and diverse programming, but it may do so at significant cost to consumers. How should one trade these off? Worse, theoretical models suggest bundling may enhance market power and serve as an effective barrier to entry, particularly in combination with vertical integration and exclusive content, although there is no empirical evidence to support these claims. The record on clustering is incomplete, but is an important area of concern especially if it could inhibit telephone company entry into video markets. Empirical estimates of all these effects are critically needed.

Note that the focus of this chapter is almost exclusively on the cable television market in the United States. I do this for several reasons. First, the evolution of the MVPD industry and the regulations that have applied to it differ considerably across countries. This has led to dramatic differences in the market reach of cable systems, their market share among households passed, and the relative importance of cable versus satellite in the retail and programming markets (cf. OECD (2001, Table 2)). Second, this is a mostly empirical survey, and by virtue of a series of FCC reports both on cable industry prices and on competition in the market for video programming (e.g. FCC (2005a), FCC (2005b)) and a private data collection industry (led by Kagan World Media and Warren Publishing), there is surprisingly good information about cable systems in the United States, both in the aggregate and for individual systems. Adequately analyzing the experience in other countries would require a chapter in itself, a worthwhile undertaking but beyond the scope of this effort. Finally, beyond a brief description of the current regulatory treatment, I do not consider the economic and regulatory features of the market for broadband Internet access. In part, the economic issues are different and more suitable to a chapter on telecommunications, but in the main for the same reasons as above. This is a deep and substantive policy issue whose treatment would quickly exhaust my space. See Hausman's chapter on Telecommunications markets for further analysis of this issue.

On the whole, the future looks bright for the organization of the cable television industry. Satellite competition has largely replaced price regulation as the constraining force on cable pricing and driving force for innovative services. Moreover, telephone company entry provides the prospect of an additional significant competitor in the distribution market. Several important areas of uncertainty remain, however. The likely impact of widespread unbundling (à la carte) on consumer welfare is unknown and worthy of further study. So too in the programming market. While there is no clear evidence of harm, more research is needed, particularly on the impact of horizontal concentration on market outcomes in program supply and the risks of vertical integration, exclusive contracts, and bundling. Until then, regulatory safeguards may still be necessary.

2 A Cable Television Lexicon

The essential features of cable television systems have changed little in the industry's 50 years of existence. Then as now, cable systems choose a portfolio of television networks, bundle them into services, and offer these services to consumers in local, geographically separate, cable markets.

Cable systems purchase the rights to distribute program networks in the *Programming Market*. Since the mid-1990s, cable systems in the U.S. have had to compete for customers with Direct Broadcast Satellite (DBS) providers. Together, cable and satellite systems are said to compete in the Multi-channel Video Programming Distribution (MVPD) market. This is sometimes just called the *Distribution Market*.

As in many media markets, the multi-channel video programming industry earns most of its revenue from one of two sources: monthly fees charged by cable systems to consumers for access to programming and advertising fees charged (mostly) by networks to advertisers for access to audiences. Figure 1 demonstrates that advertising revenue has grown in importance and now comprises over 34% of the industry's $57.6 billion in 2004 revenue (NCTA (2005a)). Figure 2 provides a graphical representation of the multi-channel video programming industry.

Cable systems today offer four main types of program networks. *Broadcast networks* are television signals broadcast over the air in the local cable market by television stations and then collected and retransmitted by cable systems. Examples include the major, national broadcast networks – ABC, CBS, NBC, and FOX – as well as public and independent television stations. *Cable programming networks* are fee- and advertising-supported general and special-interest networks distributed nationally to systems via satellite. Examples include some of the most recognizable networks associated with cable, including MTV, CNN, and ESPN.[1] *Premium programming networks* are advertising-free entertainment networks, typically offering full-length feature films. Examples include equally familiar networks like HBO and Showtime. *Pay-Per-View Networks* are specialty channels devoted to on-demand viewing of high-value programming, typically offering the most recent theatrical releases and specialty sporting events.

Systems exhibit moderate differences in how they bundle networks into services. Broadcast and cable programming networks are typically bundled and offered as *Basic Service* while premium programming networks are typically unbundled and sold as *Premium Services*.[2] In the last 15 years, systems have further divided Basic service, offering some portion of their cable networks in multiple bundles called *Expanded Basic Services*. In the last 5-7 years, systems have taken advantage of digital compression technology to offer as many as 8-10 digitally-delivered networks on the space previously required to offer a single analog network. These networks are typically also bundled and offered as "Digital Tiers". For Basic, Expanded Basic, or Digital Services, consumers are not permitted to buy access to the individual networks offered in bundles; they must instead purchase the entire bundle.

[1] So-called cable networks earned their name by having originally been available only on cable.

[2] Premium networks have recently begun "multiplexing" their programming, i.e. offering multiple channels under a single network/brand (e.g. HBO, HBO 2, HBO Family, etc.).

In the last 10 years, cable systems have also begun to offer high-speed (broadband) access to the Internet. This required significant investments in physical infrastructure, notably to accommodate digital data and allow upstream communication (cf. Figure 3). This has proven to be a successful undertaking: despite being deployed several years after telephone systems' Digital Subscriber Line (DSL) technology, cable systems now command over 63% of the broadband market, earning revenues of $6.7 billion in 2003, over 12% of cable systems' total revenue and growing fast (FCC (2005b)).

As this chapter goes to press, cable systems continue to innovate in delivering video programming to households. Spurred by the rise in popularity of the Tivo Digital Video Recorder (DVR),[3] many cable and satellite systems now offer to lease or sell DVRs with up to 100 hours of recording time to households. In addition, many cable systems now offer video on demand and some plan to offer Internet-based video over their cable systems (Grant and Searcey (2005), Grant (2006b)).

3 A Brief History of Cable Regulation

3.1 The Early History, 1950-1984

The cable television industry began in the 1950s to transmit broadcast television signals to areas that couldn't receive them due to interference from natural features of the local terrain.[4] In order to provide cable service, cable systems needed to reach "franchise agreements" with the appropriate regulatory body (usually local municipalities). These agreements typically included agreements on a timetable for infrastructure deployment, a franchise fee (typically a small percentage of gross revenue), channel set-asides for public interest uses (e.g. community programming), and maximum prices for each class of offered cable service in return for an exclusive franchise to use municipal rights-of-way to install the system's infrastructure.

Cable grew quickly until 1966, when the Federal Communications Commission (FCC) asserted its authority over cable operators and forbid the importation of broadcast signals into the top 100 television markets unless it was satisfied that such carriage "would be consistent with the public interest, and particularly with the establishment and healthy maintenance of UHF television broadcast service."[5] It also instituted content restrictions that prevented the distribution of movies less than 10 years old or sporting events broadcast within the previous 5 years. In 1972, the FCC provided a comprehensive set of cable rules. First, it sought to balance broadcasting and cable television interests by permitting limited importation of distant broadcast signals. It also, however, imposed a host of other requirements, including Must-Carry, franchise standards, network program nonduplication, and cross-ownership rules (FCC (2000b)).[6]

[3] A Digital Video Recorder is a device that allows households to record video to a hard drive-based digital storage medium.

[4] See Foster (1982, Chapter 5) and Noll, Peck, and McGowan (1973) for a survey of the history of broadcast television and its regulation.

[5] 2 FCC 2d at 782 as cited in Besen and Crandall (1981, p.90).

[6] Must-Carry rules require systems to carry all local broadcast signals available in their franchise area. These

The next decade saw a gradual reversal of the 1972 regulations and a period of significant programming and subscriber growth. First, rules originally established in 1969 were affirmed in 1975 that franchise price regulation must be confined to services that included broadcast television stations (GAO (1989)). As a result, premium or pay-TV stations were not nor ever have been subject to price regulation. Second, in 1972 Time introduced Home Box Office (HBO) for the purpose of providing original content on an advertising-free, fee-supported cable network. In 1975, it demonstrated the ability to distribute programming via satellite and, in 1977, fought and won in court against the FCC's content restrictions, allowing HBO and a generation of subsequent cable networks to provide whatever programming they desired.[7] Since the production of programming is a public good, the advent of low-cost satellite technology with sizeable economies of scale revolutionized the distribution of programming for cable systems. WTBS, CNN, and ESPN began national distribution of general-interest, news, and sports programming, respectively, in 1979 and 1980. In all, no less than 13 of the 15 most widely available advertising-supported programming networks, and all of the top 5 most widely available fee-supported programming networks, were launched between 1977 and 1984. Cable systems grew at double-digit rates.

3.2 Price Regulation Since 1984

While the scope of federal regulations had diminished by 1979, state and local regulations remained. By the mid-1980s, however, the price terms of these contracts came under attack as cable joined the "deregulation revolution" sweeping through Congress (Kahn (1991)). Convinced that three or more over-the-air broadcast television signals provided a sufficient competitive alternative to cable television service, Congress passed the 1984 Cable Act to free the vast majority of cable systems from all price regulations.[8]

By 1991, cable systems had dramatically expanded their offered services. The average system offered a Basic Service including a bundle of 35 channels as well as 4-6 Premium Services (GAO (1991)). Prices also increased, however, rising 56% in nominal and 24% in real terms between November 1986 and April 1991.

Concerned that high and rising prices reflected market power by monopoly cable systems, Congress reversed course and passed the 1992 Cable Act to "provide increased consumer protection in cable television markets". Regulation differed by tiers of cable service and only applied if a system was not subject to "effective competition."[9] Basic tiers were regulated (if desired) by the local franchise authority, which was required to certify with the FCC. Cable programming (Expanded Basic) tiers were regulated by the FCC.[10] Both followed rules set by

rules were amended by the 1992 Cable Act.

[7] See HBO v. FCC, 567 Fd 2nd 9 (1977).

[8] Other terms of franchise agreements remained in effect. See GAO (1989).

[9] There are four separate tests for effective competition: (i) a cable market share under 30%, (ii) there are at least two unaffiliated MVPDs serving 50% of the cable market and achieving a combined share of 15%, (iii) the franchising authority is itself a MVPD serving 50% of the cable market, and (iv) the local exchange carrier offers comparable video programming services (47 CFR 76.905).

[10] In what follows I use Expanded Basic tier to refer to the FCC designation Cable Programming tier.

the FCC, reducing prices to "benchmarks" based on prices charged by systems facing effective competition. In April 1993 the FCC capped per-channel cable prices systems could charge for most types of cable service. The FCC soon found, however, that not only did cable bills fail to decline, but that for nearly one-third of cable subscribers, they had increased. Many systems had introduced new, unregulated services and moved popular programming networks to those services; others had re-allocated their portfolio of programming across services (FCC (1994), Hazlett and Spitzer (1997), Crawford (2000)). In February 1994 the FCC imposed an additional 7% price reduction.

Responding to political pressure from cable systems, the FCC almost immediately began relaxing price controls. First, "Going Forward" rules were established in November, 1994. As discussed by Paul Joskow in his chapter analyzing incentive regulation in electricity transmission markets, an important feature of incentive (price-cap) regulation are the rules governing the maximum price over time. This is particularly important in cable markets, where both the number and cost of programming networks regularly increase over time. Instead of allowing systems to increase prices by a planned "cost + 7.5%" for each added network, the Going Forward rules permitted increases of up to $1.50 per month over 2 years if up to six channels were added, regardless of cost (Hazlett and Spitzer (1997)). Prices controls were further relaxed by the adoption of "Social Contracts" with major cable providers in late 1995 and early 1996. These allowed systems to increase their rates for Expanded Basic tiers on an annual basis in return for a promise to upgrade their infrastructure.[11] The deregulatory process culminated with the passage of the 1996 Telecommunications Act. This eliminated all price regulation for Expanded Basic tiers after March 31, 1999. Regulation of Basic Service rates remains the only source of price regulation in the cable television industry.

3.3 Must-Carry/Retransmission Consent

In addition to imposing price caps, the 1992 Cable Act introduced another set of regulations whose effects are still being felt: Must-Carry and Retransmission Consent. Since 1972, cable systems were subject to Must-Carry: they were required to carry all local broadcast signals available in their franchise area. Systems fought Must-Carry, however, arguing it interfered with their choice of content, and succeeded in having it struck down on First Amendment grounds in 1988. The 1992 Cable Act, however, not only restored it but gave local broadcast stations the option either to demand carriage on local cable systems (Must-Carry) or negotiate with those systems for compensation for carriage (Retransmission Consent). These rules were upheld by the Supreme Court in 1997.

Retransmission Consent has remained a point of contention between broadcast networks and cable systems ever since. Agreements are often negotiated on repeating three-year intervals.[12]

[11] See, e.g., FCC (1998d, p.6) describing the FCC's social contract with Time Warner. In it, Time Warner was permitted to increase its Expanded Basic prices by $1/year for 5 years in return for agreeing to invest $4 billion to upgrade its system. It also dismissed over 900 rate complaints and provided small refunds to subscribers.

[12] Must-Carry requirements must be negotiated on repeating three-year intervals. Retransmission Consent agreements sometimes follow the same cycle, but often are for longer periods.

Smaller (esp. UHF) stations commonly select Must-Carry, but larger stations and station groups, particularly those affiliated with the major broadcast networks, have aggressively used Retransmission Consent to obtain compensation from cable systems. Systems initially refused to pay stations directly for carriage rights, a position they have largely maintained to the present day.[13] Instead, they signed carriage agreements for broadcaster-affiliated cable networks. ESPN2 (ABC), America's Talking (NBC), and FX (Fox) all got their start this way.[14] More recently, Disney (ABC) has used Retransmission Consent to obtain expanded carriage agreements for SoapNet and the Disney Channel and NBC to charge higher affiliate fees for CNBC and MSNBC (Schiesel (2001)). Indeed, the power of retransmission consent to obtain carriage agreements was one stated motivation for the purchase of CBS by Viacom in 1999. I revisit this issue when discussing bundling and market power in Section 7.2.

3.4 Programming Market Regulations

While the focus of cable regulations has historically been on controlling prices charged by local monopoly cable providers, there has been recent interest in the organization and operation of the programming (input) market. The basic features of this market are as follows.[15] Most network production costs are fixed. Rights sales generate both transfer payments ("affiliate fees") from MVPDs, typically in the form of a payment per subscriber per month, and advertising revenue. The relative importance of each varies by network, but across basic networks 40% of revenue comes from advertising (NCTA (2005a)). Programming is *non-rivalrous*: sales of programming to one MVPD does not reduce the supply available to others.

Carriage agreements are negotiated on a bilateral basis between a network (or network groups) and an individual system or system groups, also known as Multiple System Operators (MSOs). Comcast is the largest MSO in the United States with 21.2 million subscribers, or 23.4% of the MVPD market. Many of the largest MVPD operators either own or have ownership interests in programming networks as do major broadcast networks. Indeed, all of the top 20 (non-CSPAN) cable networks by subscriber reach and all of the top 15 by ratings are owned by one of 8 firms,[16] raising concerns about diversity in the media marketplace.

The 1992 Cable Act introduced two important regulations regarding competition in the programming market. First, it directed the FCC to establish reasonable limits on the number of subscribers a cable operator may serve (the horizontal, or subscriber, limit) as well as the number of channels a cable operator may devote to affiliated program networks (the vertical, or channel occupancy, limit) (FCC (2005d)). These were set in 1993 at 30% of cable subscribers for the horizontal limit and 40% of channel capacity (up to capacities of 75) for the vertical limit.[17] In the *Time Warner II* decision in 2001, the U.S. Court of Appeals for the D.C. Circuit

[13] Satellite operators, by contrast, have sometimes paid directly for carriage rights.

[14] America's Talking became MSNBC in 1996. CBS lacked any affiliated networks in the initial Retransmission Consent negotiations but used them to launch Eye on People in 1996.

[15] See Wildman and Owen (1985) for a detailed description of the market for the supply of programming.

[16] Comcast, Time Warner, Cox, and Cablevision among cable MSOs; News Corp/Fox, Disney/ABC, Viacom/CBS, and GE/NBC among broadcasters.

[17] The 30% limit was changed in 1999 to 30% of MVPD subscribers.

reversed and remanded these rules, finding the FCC had not provided a sufficient rationale for their implementation. This remains an unsettled issue, although the commission has recently begun a rulemaking proceeding on it (FCC (2005d)). The 1992 Cable Act also introduced program access and carriage rules. These forbid affiliated MVPDs and networks from discriminating against unaffiliated rivals in either the programming or distribution markets and forbid exclusive agreements between cable operators (or common carriers, i.e. telephone companies) and networks affiliated with cable operators (or common carriers). These rules are enforced through a complaint process at the FCC, but complaints have been relatively rare, particularly in the recent 5 years. Notably these rules apply only to *satellite-delivered* programming. This exception has become an issue in some regional markets (e.g. Philadelphia and San Diego) as some regional networks distributed via microwave have reached exclusive agreements with their affiliated MSO, excluding rival MVPDs from access to "critical" content (FCC (2005d)).

3.5 Merger Review

Under the 1934 Communications Act, the FCC's mandate is to ensure that the organization of communications and media markets serves the "public interest, convenience, and necessity". This mandate has been interpreted by the FCC to give it the power to approve or deny mergers among communications or media firms whenever it involves a transfer of licenses. Since the licenses involved are necessary to offer the firms' services,[18] in practice this gives the commission the power to approve all media or communications merger.[19] Prior to the passage of the 1996 Telecommunications Act, this power wasn't exercised as existing regulations on ownership (e.g. ownership limits, cross-ownership restrictions) foreclosed large communications and media mergers. Since then, however, the commission has taken an ever stronger role in approving communications and media mergers, often imposing conditions on the merged entity.

Merger conditions, while not explicit regulations, have the same effect on firms. Recent examples of conditions placed on merging parties cover a variety of alleged harms. In the AT&T-Media One merger completed in June of 2000, the commission ordered AT&T to divest sufficient assets to come under the 30% horizontal subscribership limit. When these rules were remanded in 2001, the FCC dropped the condition (Bloomberg News (2001)). In the AOL-Time Warner merger completed in January of 2001, the commission imposed conditions on the merged entity to ensure non-discriminatory access to the merged companies' network by third-party providers of Internet access services as well as conditions in the instant messaging market (FCC (2001c)). This was in addition to conditions on non-discriminatory access agreed to by the merged firm in a consent decree with the FTC. In the Comcast-AT&T merger completed in November of 2002, the commission again ordered divestiture, this time of the merged firms interests in Time Warner Cable.[20] The commission simply blocked the Echostar-DirecTV merger, voting

[18] In the case of cable systems, the licenses to be transferred are the cable television relay service license that "are essential to the operation of the [firm]" (FCC (2001b)).

[19] Note that the FCC's merger review process is in addition to that required by competition law: any merger between firms of a given size (roughly sales or assets of $50 million) must be approved by the federal antitrust authorities, the Department of Justice or the Federal Trade Commission, under the Clayton Act.

[20] This condition had been agreed to in advance by the companies (Feder (2002)).

unanimously to oppose it in October 2002 (Wall Street Journal (2002)).[21] Finally, in the News Corp-DirecTV and Adelphia-Time Warner-Comcast mergers completed in December of 2003 and July of 2006, respectively, the commission imposed a number of conditions, backed by a binding arbitration process, designed to ensure non-discriminatory access to the combined firms regional sports and broadcast programming networks (Kirkpatrick (2003)).

3.6 Other Cable Regulations

Cable systems are subject to a myriad of additional regulations (FCC (2000b)). A few of these are briefly discussed here.

Broadband Access Regulation The market for high-speed (broadband) Internet access has grown considerably in the last 5 years and is now an important source of revenue for most major cable systems. It has also caused a regulatory fight between cable systems, Internet Service Providers (ISPs), and local telephone providers ("telco's") over the appropriate regulatory treatment of broadband access. As low-speed ("dial-up") access only required access to a local telephone line, ISPs like AOL and Earthlink grew in the late 1990s without regulatory oversight. As broadband access became viable, however, telephone companies were required to share access to their broadband (Digital Subscriber Line, or DSL) network with unaffiliated rivals.

In FCC (2000c), the FCC ruled that cable broadband service was an "information service" and not a "telecommunications service" subject to common carrier (i.e. access) regulation. In June of 2005, the Supreme Court upheld this decision (Schatz, Drucker, and Searcy (2005)). In August of 2005, a similar set of rules was put in place for DSL providers (Schatz (2005)). Going forward, DSL and cable will compete on near-equal terms and neither will be required to share access with unaffiliated rivals.

Cable/Telco Cross-Ownership and Telephone Company Entry The 1984 Cable Act forbid Local Exchange Carriers (LECs) from providing cable service within their telephone service areas. The 1996 Telecommunications Act relaxed this restriction, providing a number of methods under which telephone companies could provide video service, including building a wireline cable system (FCC (2000b, p.17)).[22] Early efforts at video entry were small in scale and often unprofitable. The largest effort was put forth by Ameritech (now owned by AT&T), which purchased and built cable systems that passed almost two million homes. They were only able to attract 225,000 subscribers, however, and exited the business in 1998 (FCC (2004b)). I discuss recent plans by LECs to enter the video business in Section 6.3.

[21] They were not alone. The Department of Justice also sued to stop the merger.

[22] Many early cable franchise agreements were exclusive within a given municipality. The 1992 Cable Act forbid exclusivity.

3.7 Satellite Regulations

Federal regulation of the satellite television industry has also influenced the cable television industry. While satellite distribution of programming was initially intended for retransmission by cable systems, a small consumer market also developed. By the mid-1980s, approximately 3 million households had purchased C-Band (12-foot) satellite dishes, mostly in rural areas without access to cable service.

It wasn't until the mid-1990s, however, that direct satellite service to households thrived. Fuelled by the complementary developments of improved compression technology, more powerful satellites, and smaller (18-inch) satellite dishes, Hughes introduced DirecTV in 1993. Subscriptions grew quickly, particularly among the estimated 20 million households without access to cable service. Wider adoption was hindered, however, by a regulatory hurdle: in an effort to protect local television stations, satellite systems were only permitted to provide broadcast network programming if the household could not receive the local broadcast signal over-the-air. This hurdle was removed, however, with the passage on November 28, 1999 of the Satellite Home Viewer Improvement Act (SHVIA). This permitted direct-broadcast satellite providers to distribute local broadcast signals within local television markets. Within a year, satellite providers were doing so in the top 50-60 television markets. Satellite systems now provide a set of services comparable to those offered by cable systems for the vast majority of U.S. households.[23]

Unlike cable systems, satellite providers have never been subject to price regulations. Most other rules described above for cable service apply equally to satellite providers, however. For example, since January 1, 2002, satellite providers that distribute local signals must follow a "carry-one, carry-all" approach similar to Must-Carry and must negotiate carriage agreements with local television stations under Retransmission Consent (FCC (2005b)). Furthermore, under the conditions put in place in the News Corp-DirecTV merger, the combined firm is subject to the same rules governing competition in the programming market.[24]

4 The Consequences of Cable Regulation and Deregulation

The cable industry has undergone several recent periods of regulation and 'deregulation. This has provided an ample record to evaluate the consequences of cable regulations. In this section I present broad trends in economic outcomes in the industry. In the next section I evaluate the theoretical and empirical evidence of the consequence of regulation on those outcomes.

[23] At this chapter goes to press, EchoStar (Dish Network) provides broadcast programming in about 160 television markets and DirecTV about 145.

[24] At this time, EchoStar does not own significant programming interests and is not subject to programming rules.

4.1 The Facts to be Explained

Prices Figure 4 reports price indices from the Consumer Price Index (CPI) from December, 1983 until June, 2006. Reported are series for (i) MVPD (i.e. cable + satellite) services and (ii) consumer non-durables.[25]

Insert Figure 4 Here

Three distinct periods are clear in the figure and are described in table 1 below. Reported in the table is the compound annual growth rate for each price index corresponding to periods of cable regulation and deregulation. The first period describes price increases following the passage of the 1984 Cable Act. Price deregulation from the 1984 Act begins in December 1986 and continues until April 1993, when the first price caps from the 1992 Cable Act were implemented. The second period begins at that point and continues until the passage of the "Going Forward" rules relaxing price caps in November 1994. The third period starts at that point and continues to the present.

From these price series, it certainly appears that regulation limited cable price increases and deregulation encouraged them. Prices in the period preceding the 1992 Cable Act increased at an annual growth rate of 4.61% greater than that for other consumer non-durables. Similarly, prices after the relaxation of the '92 regulation have increased at a rate 2.34% greater than that of non-durables, while prices during the (short) regulatory period fell 3.45% relative to non-durables.

Subscriptions Did lower prices lead to more subscriptions? Figure 5 reports aggregate subscribers to cable and satellite services by year between 1983 and 2004. Unfortunately, this data is only at the annual level, making precise predictions of the impacts of short regulatory periods difficult. Nonetheless, I duplicate the table on growth rates for prices both for cable subscribers and all MVPD subscribers and report these in Table 2.

Insert Figure 5 Here

There are three interesting features of the data in Table 2. First, subscriber growth is positive throughout the period, including periods when prices were rising. While many features of the economic environment are also changing over this period, one plausible explanation for this relationship is that the quality of cable services has been increasing over time. I measure it to the extent possible in what follows. Second, despite lower prices between 1993 and 1995, cable subscriber growth is *lower* than during the previous, deregulatory, period. This suggests regulation may itself have had an impact on cable quality. Third, note the dramatic reduction in cable subscriber growth after 1995. While a normal feature of a market that is reaching

[25]The cable series began including satellite services in the late 1990s. In principle, it has also included satellite radio since 2003, although as of October 2005 no satellite radio data had been sampled.

saturation, this also reflects the growth in satellite as a viable competitor to cable: total MVPD (cable and satellite) subscriber growth, while not at pre-1995 levels, is still substantial, despite reaching aggregate penetration rates exceeding 80% of U.S. households by 2004.[26]

Quality Both the price and subscription data suggest that accounting for the quality of cable service is important for understanding outcomes in cable markets. Measuring the quality of cable services can, however, be very challenging. Various approaches have been taken in the economic literature, from using simple network counts (Rubinovitz (1993), Crandall and Furchtgott-Roth (1996), Emmons and Prager (1997)) to a mix of indicators for specific networks (e.g. ESPN, CNN, MTV) and network counts (Crawford (2000)) to imputing it from observed prices and market shares under the assumption of optimal quality choice (Crawford and Shum (2005)).

Figures 6 and 7 provide two rough measures of cable service quality over time. The first, Figure 6, reports the total *number* of programming networks available to systems as well as (from 1996) the average number of Basic, Expanded Basic, and Digital Tier networks offered to households. Both the number of networks available to systems and those actually offered to households has increased considerably over time. This is particularly true in the periods 1978-1988 and 1994-present.[27]

Insert Figure 6 Here

The number of cable networks is, however, an incomplete measure of cable service quality. The value of programming on ESPN today is significantly greater than it was in 1985. This increase in the value in programming can partially be measured by the *cost* to cable systems for that programming. Figure 7 describes the average cost to cable systems of program networks (as well as duplicating the average number of networks on Basic and Digital Tiers from Figure 6). The top-most, solid, lines in the figure use the left-hand axis and report the total per-subscriber cost for networks charging affiliate fees according to Kagan World Media (Kagan World Media (1998), Kagan World Media (2004)). The left half of this series is a list ("top-of-rate-card") price, while the right half is an average (across systems) price. One can compare the pattern of these prices with the average number networks over the same period, represented by the dashed line and using the right-hand axis. The trend in total costs roughly matches the trend in number of networks. This might be expected if network costs were constant over time. They are not, however. The bottom, dotted, lines report the total per-subscriber cost for networks charging affiliate fees *conditioning* on the networks charging positive fees in 1989. This isolates the increase in cost to cable systems from increased quality for a given set of programming

[26]Table 5 shows that since the passage of the SHVIA in 1999, cable subscriber growth has effectively been zero.

[27]These are likely supply-side phenomena, the former driven by the relaxation of FCC content restrictions and the feasibility of low-cost satellite distribution and the latter driven by significant upgrades in cable infrastructure and the (possibly anticipated) rollout of digital tiers of service.

networks.[28] Together, these series show that costs to cable systems have been increasing over time due both to increased costs for existing networks as well as increases in the number of offered networks.

Insert Figure 7 Here

Services A final feature of cable service that has evolved considerably over the last 20 years is the number of services from which households can choose. Cable television technology is such that all signals are transmitted to every household served by a system. As such, the least cost method of providing any cable service is to *bundle* all the programming. Early cable systems did just that. The development of Premium networks in the early 1980s, however, necessitated excluding households that chose not to subscribe. This was costly, requiring a service technician go to each household and physically block programming with an electromechanical "trap". The development of scrambling (encryption) technology in the 1980s and 1990s solved that problem but instead required households interested in such programming to have an "addressable converter" (set-top box) to unscramble the video signal. Subscribers and subscriptions to Premium Networks grew (cf. Figure 8).[29]

Insert Figure 8 Here

Addressable converters also allowed cable systems to unbundle some of their Basic networks. These were called Expanded Basic Services (or Tiers). There was some concern in the late 1980s and early 1990s that cable systems were introducing tiers in order to evade rate regulation in the pre-1986 and post-1992 periods.[30] These concerns have waned since the passage of the 1996 Telecommunications Act and most contemporary cable (and satellite) systems now offer multiple Basic Services. Where offered, the vast majority of households choose at least one Expanded Basic service.

Cable systems have continued to offer more services in the 1990s and 2000s. Investments in industry infrastructure in the late 1990s and early 2000s and complementary developments in digital compression technology have allowed systems to offer "Digital Tiers" (or Services), bundles of digitally-distributed networks, and broadband (cable modem) access to the Internet.[31] Table 3 describes the recent evolution of these advanced service offerings.

[28] Consistent with conventional wisdom, this suggests new networks charge lower average prices than established networks. Indeed, new networks often pay systems (i.e. charge negative prices) for a period of years before becoming established and negotiating positive fees.

[29] Subscribers to Premium Networks are often called "Pay Households". Total subscriptions to Premium Networks are often called "Pay Units".

[30] This concern was driven by differential regulatory treatment of different tiers in the various regulatory periods. The 1992 Act in particular introduced a split regulatory structure, with local franchise authorities given authority to regulate rates of Basic service and the FCC given authority to regulate rates of Expanded Basic services. Some estimates of total subscribers to Expanded Basic Services fell after the 1984 Cable Act and increased again after the 1992 Act (GAO (1989), GAO (1991), Hazlett and Spitzer (1997)).

[31] By converting a video picture from an analog to a digital signal and compressing the digital signal, between 4-12 digital networks can be carried on the space of a single analog network. This requires a more advanced addressable converter to both unscramble and decompress the digital signals purchased by the household.

The growing popularity of digital tiers (and associated digital converters) has led some consumer advocates to call for cable systems to *unbundle* some or all networks and offer them to consumers on an à la carte basis (Consumers Union (2003)). I discuss this important policy issue in Section 7.2.

5 The Consequences of Cable Regulation

The challenge in interpreting these trends in the cable data are two. First, how much of the increase in cable prices is due to increases in cable market power and how much is due to increases in the quality of cable services? And to what extent has regulation limited the exercise of cable market power or distorted the incentives to offer quality? Second, even if systems charge monopoly prices, if this gives rise to the right incentives to increase product quality over time, consumers may benefit despite welfare losses from short-run market power. How have consumers valued changes in the portfolio of cable services? How has regulation influenced these choices? I evaluate the theoretical and empirical evidence on these questions in what follows.

5.1 Theoretical Models of Price and Quality Choice under Regulation

Most theory of optimal regulation focuses on products of a given quality or qualities (Breautigam (1989), Armstrong and Sappington (2003)). While there are difficult implementation issues in this case, including how best to accommodate information asymmetries between the firm and regulator and how best to accommodate changes in the economic environment facing the regulated firm over time, the conclusions of the theory are straightforward: regulation can limit the exercise of market power by limiting the prices firms can charge.

The problem is more challenging, however, when firms can also choose product qualities. An unregulated single-product monopolist may under- or over-provide quality depending on the nature of consumer preferences and firm costs (Spence (1975)). A single-product monopolist facing price-cap regulation, however, will generally under-provide quality as it must bear the costs of any quality improvements and may not be able to increase price to recoup those costs (Brennan (1989)). It is the norm, therefore, to accompany price-cap regulation with mechanisms that monitor and penalize firms for adverse product quality (Armstrong and Sappington (2003)).

Products offered by unregulated multi-product monopolists, by contrast, can often be subject to *quality degradation*: offered qualities are below the efficient level for all consumers except those with the highest tastes for quality (Mussa and Rosen (1978)). Regulation, depending on its form, generally reduces distortions, but can have ambiguous effects on prices and welfare (Besanko, Donnenfeld and White (1987, 1988)). If applied to a subset of products, firms may unbundle their offerings and introduce new products in order to evade the regulations (Corts (1995)).

In this section, I briefly present a simple, two-type version of the Mussa-Rosen model of optimal

price and quality choice under regulation originally developed by Besanko, Donnenfeld, and White (1987).[32] This motivates the conclusions described above and provides a useful basis for evaluating the likely consequences of price regulation in cable markets.

The Mussa-Rosen Model Consider a monopolist selling two goods, q_1, q_2 whose qualities can be freely varied over $Q = [0, \bar{Q}]$.[33] Consumers are assumed to be differentiated by a type parameter measuring their willingness-to-pay (WTP) for quality which takes on three distinct values, t_0, t_1, t_2 $(t_0 < t_1 < t_2)$, with respective probabilities, f_i (with $f_0 + f_1 + f_2 = 1$), and associated cumulative distribution function, $F_k \equiv \sum_{j=0}^{k} f_i$. Type 0, t_0, is included to allow for the possibility that some consumers prefer not to purchase either of the firm's products. For convenience, I assume the hazard function for the type distribution, $\frac{f_i}{1-F_i}$, is increasing in i. As in cable markets, the firm is assumed to offer a tariff specifying a different total price per quality variant offered, P_1, P_2. The firm knows the distribution of types in the population and selects the tariff that maximizes his expected profit (with the expectation taken over consumers types).

Consumer preferences are assumed to be quasilinear in money, $u_i \equiv u(q, t_i) = v(q, t_i) - P(q)$. A consumer of type t_i is assumed to choose that bundle, q_i, which maximizes her utility and provides her at least her reservation utility. These are the well-known incentive-compatibility (hereafter IC) and individual rationality (IR) constraints.

The firm's optimization problem is then to maximize expected profits:

$$\max_{P(q)} E[\pi] = \sum_{i=1}^{2} f_i\{P(q_i) - C(q_i)\} \tag{1}$$

subject to the IC and IR constraints. $C(q_i)$ is the firm's cost function, which is assumed purely additive across consumers.[34] Define the total surplus function $S(q, t_i) \equiv v(q, t_i) - C(q)$. Under standard assumptions, one can use the IC constraint to rewrite the objective function, yielding:

$$\max_{q_1, q_2, u_1} E[\pi] = f_1\{S(q_1, t_1) - u_1\} + f_2\{S(q_2, t_2) - [v(q_1, t_2) - v(q_1, t_1)] - u_1\}. \tag{2}$$

This problem is solved by setting the utility of the lowest type to zero, $u_1 = 0$, and maximizing the resulting unconstrained objective function w.r.t. q_1 and q_2. The corresponding first-order conditions are:

$$\begin{aligned} S_q(q_1, t_1) &= \frac{1 - F_1}{f_1}[v_q(q_1, t_2) - v_q(q_1, t_1)] \\ S_q(q_2, t_2) &= 0 \end{aligned} \tag{3}$$

[32] The material in this subsection is presented in more detail in Crawford and Shum (2005).

[33] Since this is a model of monopoly, it best applies to understanding the period when satellite service either was not available or was unable to offer local broadcast networks, i.e. before 2000. This is arguably benign, as similar results are available in oligopoly settings (Stole (2003)).

[34] I make the usual curvature assumptions: $v_1 > 0$, $v_{11} < 0$, $v_2 > 0$, $c' > 0, c'' > 0$, as well as the normalization that $v(0, t_i) = 0$, for all i. Furthermore, I maintain the standard single-crossing condition that $u_{qt} > 0$, which implies higher types have greater willingness-to-pay for quality at any price, or that consumers may be ordered by their type, t.

where $v_q \equiv \frac{\partial v}{\partial q}$. Quality degradation for the low type ($i = 1$) is visible from the first equation in (3). The socially optimal quality for each type, denoted q_i^{**}, is that which sets the derivative of the total surplus function to zero, $S_q(q, t_i) = 0$. In the first line of (3), however, note that q_1 is chosen so that $S_q(q, t_1) > 0$, implying $q_1^* < q_1^{**}$: quality is degraded to low types. By contrast, there is no degradation "at the top", i.e. for the higher type t_2. Given optimal qualities from equation (3), optimal prices fall out naturally from the IR and IC constraints. Since $u_1 = 0$, $p_1 = v(q_1, t_1)$ and $p_2 = v(q_2, t_2) - [v(q_1, t_2) - v(q_1, t_1)]$.

Figure 9, adapted from Maskin and Riley (1984), demonstrates graphically the solution for the one-dimensional case with $N = 2$. I focus only on the solid curves in that figure. The firm would like to extract all consumer surplus by offering product qualities q_1^{**} and q_2^{**} and charging prices p_1^{**} and p_2^{**}, but with such an offering the high type would prefer to mimic the low and select q_1^{**} (note for a given quality, consumer utility is higher the lower on the figure they can locate). The constrained optimum is given by variables with single $*$'s. As above, the high type continues to consume the efficient quality (and pays a lower price), but quality to the low type is degraded, from q_1^{**} to q_1^*.

Price and Quality Choice Under Regulation In a pair of papers, Besanko, Donnenfeld, and White (1987, 1988) extend the Mussa-Rosen model to consider a monopolist's quality choice problem in the presence of regulation. They consider three forms of regulation – Minimum Quality Standards (MQS), Maximum Price (Price-Cap) Regulation, and Rate of Return Regulation – the second of which is most relevant in cable markets.

Suppose regulation forbids setting a price for a good higher than a given level, $\bar{p}$. This introduces a set of constraints, $p_i \leq \bar{p}$, $\forall i$, on the firm's objective function in (2). For convenience, assume that $p_1^* < \bar{p} < p_2^*$, i.e. the constraint binds (if at all) only for the highest quality good offered to consumers.[35]

Let λ be the lagrange multiplier associated with the price cap, $p_2 \leq \bar{p}$. The firm's first-order conditions are then

$$\begin{aligned} S_q(q_1, t_1) &= \frac{1 - F_1 - \lambda}{f_1}[v_q(q_1, t_2) - v_q(q_1, t_1)] \\ S_q(q_2, t_2) &= \lambda \frac{v_q(q_2, t_2)}{1 - F_1} \\ \bar{p} &= v(q_2, t_2) - [v(q_1, t_2) - v(q_1, t_1)] \end{aligned} \tag{4}$$

The right-hand side of the third line of (4) is the formula for p_2 in the unconstrained problem. Taken together, the equations in (4) show that λ is set to ensure p_2 is no higher than $\bar{p}$. Assuming the price cap is binding, prices for the high-quality good are clearly lower.

Setting a price cap also has an important effect on qualities. Comparing the second lines of (4) and (3) demonstrates that in the presence of a price-cap, *quality falls for the high-quality good.*

[35] The implications for quality of the high-quality product would follow if, as for cable markets in the mid-1990s, there were product-specific caps that bound for each product. I discuss how well the theory maps to specific regulations in cable markets below.

With a price cap, the firm cannot charge as much as it would like for a good of the efficient quality. Since it can't raise prices, it simply reduces quality until the price cap is the optimal price to charge.[36] Do consumers benefit? Besanko, Donnenfeld, and White (1988) show that they can for small reductions in prices, but both consumer and total welfare can fall if caps are set too low.

Implications for Cable Television Markets Are these results likely to apply in cable television markets? I argue they are, at least for Basic and Expanded Basic Services.[37] Cable price regulations before 1984 were governed by terms negotiated between cable systems and the local franchise authority. While the theory may apply in those settings, it would depend on the specific terms of those agreements. Generalizing about the many and heterogeneous forms of local price regulation in place at that time is therefore difficult.

Price regulations implemented after the 1992 Act, however, map fairly well to the theory; only a few features of the actual regulations differed from the assumptions described above. In particular, while the theory assumes only the high-quality good is subject to price caps, prices for *all* Basic and Expanded Basic (so-called Cable Programming) Services were subject to regulation under the '92 Act. That being said, most systems in the mid-1990s either offered a single Basic Service or, if offering multiple Expanded Basic Services, earned the majority of their Basic Revenue from the highest-quality service(s), making the effect of the regulations on those services the practically most relevant ones.[38] Furthermore, while the theory describes price caps in levels, prices in cable markets were regulated on a per-channel basis. If anything, however, this made it easier for systems to adjust their (per-channel) product quality by allowing them to add relatively low-value networks rather than dropping networks as would have been necessary to come under a fixed cap.

Why then didn't regulators also regulate product quality, as in Telecommunications, Electricity, and other regulated product markets? In cable markets they cannot. The primary components of product quality for cable television services are the television networks included on those services.[39] By the First Amendment, cable systems have the freedom of expression and regulators cannot therefore mandate what networks to carry (or not).

What then can one conclude from the theory as applied to cable television markets? While the specifics of regulatory interventions matter, the theory strongly advises against the use of price caps in markets, like cable, where quality cannot be regulated and is easily changed by firms. While prices may fall, so too will quality. Furthermore, market power may be unaffected: the regulated price is likely to move toward the optimal monopoly price for the (now-lower) quality.

[36] The effect on low types is the opposite. The firm cannot extract as much surplus from high types with a price cap. This relaxes the incentive compatibility constraint for high types, reducing the incentive to degrade quality to low types. As such, quality and prices actually rise for low-quality goods.

[37] Recall that prices for Premium Services may not and have never been regulated (cf. Section 3.1).

[38] For example, see the sample statistics for 1995 data in Crawford and Shum (2005). Furthermore, Basic Services are the most important offered by cable systems, providing five times the revenue of (unregulated) Premium Services (NCTA (2005f))

[39] Other dimensions that matter, albeit less, include customer service, signal reliability, and advanced service offerings.

Worse, unless caps are set well across markets and time - and how can regulators know? - consumers and firms can *both* be worse off.

5.2 Econometric Studies of the Effects of Regulation

Does empirical research confirm these findings? How much of the increase in cable prices is due to the exercise of cable market power and how much is due to increases in the quality of cable services? And what effect has regulation had?

5.2.1 Research Using Time Series Data

A number of studies have broached these questions using time series data. Jaffe and Kanter (1990) and Prager (1992) analyze the impact of the 1984 Cable Act on outcomes in financial markets to infer it's effects on cable system market power.[40] Jaffe and Kanter (1990) analyze the impact of the 1984 Cable Act on the sales price of cable franchises exchanged between 1982 and 1987 and find important compositional effects: while sales prices appear unchanged in the top 100 television markets (where competition between cable and broadcast markets was stronger), they find large and significantly positive effects outside of these markets. This suggests that, with the relaxation of price regulations, cable systems were expected to be able to exercise market power where competition was weak and that this expectation translated into higher sales prices for franchises. Prager (1992) analyzes the impact of news events associated with the 1984 Cable Act on stock prices for 10 publicly traded cable television companies between 1981 and 1988. She finds no evidence of an increase in stock prices at the time the Act was passed, but does find that cable stocks outperformed the market ex post, i.e. in the years after the rate deregulation was actually implemented. Such unanticipated changes are consistent either with widespread uncertainty about the likely effects of deregulation or with an actual increase in market power due to increased quality of and demand for cable services (possibly themselves influenced by deregulation).

Hazlett and Spitzer (1997) use aggregate time-series data to analyze the impacts of both the 1984 and 1992 Cable Acts. In addition to surveying the economic literature at that time, they analyze a host of outcome measures, including prices, penetration (subscriptions), cash flows, tiering, and quality (as measured by the number of networks, their expenditure on programming, and their viewing shares), and reach three main conclusions. First, price increases after the 1984 Cable Act and price decreases after the 1992 Cable Act were associated with similar changes in cable service quality. Second, (monthly) subscription data suggest that price deregulation did not decrease subscriptions and price regulation did not increase them. Finally, systems appeared to evade price regulation by introducing new Expanded Basic tiers and moving popular programming to those tiers.[41] Similar patterns are apparent in the aggregate data presented

[40] Such "event study" techniques were first applied to analyze the impact of regulation by Schwert (1981), Binder (1985), and Rose (1985).

[41] This is not surprising given the nature of the cable regulation over time. Local and state price regulations (prior to 1984) and federal price regulations (after 1994) often applied only to the lowest bundle of networks

in the last section.

There are several difficulties drawing firm conclusions about the impact of regulation using aggregate time series data, however. First, it is often difficult to control for all changes in the economic environment *other* than the change in regulation (e.g. aggregate sectoral, demographic, and/or macroeconomic trends). Furthermore, a lack of observations often limits the ability to draw strong statistical inferences. The majority of studies analyzing questions of cable market power and the impact of regulation have therefore used disaggregate cross-section data.

5.2.2 Research Using Disaggregate Cross-Section Data

Reduced Form Approaches Early empirical work using cross-section data tested the joint hypothesis that cable systems had market power and that regulation reduced their ability to exercise that power. Most authors used a reduced-form approach, regressing cable prices (or other outcome variables) across markets on indicators of the presence and strength of regulatory control. The evidence from these papers is generally mixed. For example, Zupan (1989a) analyzes data on a cross-section of 66 cable systems in 1984 and finds prices are $3.82 per month lower in regulated markets. Prager (1990), however, analyzes a sample of 221 communities in 1984 finds the opposite result: rate regulation is associated with both more frequent and larger rate increases. Similarly, Beutel (1990) analyzes the franchise award process in 27 cities between 1979 and 1981 and finds that franchises were generally awarded to systems that promised to charge *higher* prices per channel.[42]

One possible reason for this literature's lack of consistent results is the likely endogeneity of the regulation decision within local cable markets. The decision to regulate prices for local cable service (when permitted) likely depends on observed and unobserved features of the cable system, market, and household tastes for cable service and regulation. Ideally one would instrument for the decision to regulate, but finding factors that influence the presence or strength of regulation but don't influence prices can be quite challenging.[43]

A Framework for Measuring Market Power More recent empirical research has taken a different approach to measuring cable market power and the impact of regulation. Following Bresnahan (1987), an empirical literature within the field of Industrial Organization has developed that provides a set of empirical tools to measure market power using explicit models of firm behavior and observations on firms' prices and quantities (or market shares).[44] Furthermore, this framework can also measure changes in quality and the impact of regulation on firm

offered by the system. This introduced incentives to offer Expanded Basic tiers to avoid price controls. Corts (1995) and Crawford (2000) provide further theoretical and empirical support for this view.

[42]Some authors have attributed such findings to evidence of rent-seeking by local franchise authorities (Hazlett (1986b), Zupan (1989b)).

[43]See Crawford and Shum (2005) for a representative discussion of this issue.

[44]See the citations in Bresnahan (1989) for an extensive bibliography. Berry and Pakes (1993) and Nevo (2000) are more recent applications.

behavior. I briefly introduce this framework and then survey existing research applying it in cable television markets.

Consider a cross-section of markets each occupied by a single firm selling a single product of fixed quality.[45] Let aggregate demand in each market be given by $Q_n = D(p_n, y_n)$, where Q_n is quantity demanded in market n, p_n is price of the good in market n, and y_n are variables that shift demand across markets (e.g. income, other household characteristics, etc.). As each firm is a single-product monopolist, optimal prices in market n are given by:

$$p_n = c_n - \frac{Q_n}{\partial D(p_n, y_n)/\partial p_n} \tag{5}$$

where c_n is the marginal cost of the good in market n. This equation shows that prices in market n equal marginal costs plus a markup. Rearranging terms yields the familiar Lerner Index, $(p_n - c_n)/p_n = 1/\epsilon_n^D$ where ϵ_n^D is the (absolute value of the) price-elasticity of demand in market n. The Lerner Index shows that price-cost margins (equivalently, markups) are higher the lower the absolute value of the elasticity of demand facing the firm.

If we could observe marginal costs, c_n, and demand, $D(p_n, y_n)$, we could simply calculate the markup in each market. Firms facing more inelastic demand would have greater markups and thus more market power. In practice, however, we don't observe either. To infer market power, we must estimate them.

Assuming the data provides sufficient variation and good instruments for prices, estimating demand is a straightforward proposition.[46] Estimating marginal costs is more difficult. Rather than obtain hard-to-find cost data, the typical solution is to make an assumption about how marginal costs vary with observables (e.g. cost factors, quantity) and estimate them based on their influence on observed prices in (5).[47] If these issues can be overcome, it is possible to estimate the market power facing firms across markets and/or time.

Suppose now that the firm in market n is regulated. The extent to which this constrains its pricing can be parameterized as follows.

$$p_n = c_n - \theta\frac{Q_n}{\partial D(p_n, y_n)/\partial p_n} \tag{6}$$

Here θ measures the extent to which prices exceed marginal costs in market n. If demand and marginal costs can be estimated, one can use (exogenous) variation in demand to estimate θ by examining how much prices exceed marginal costs across markets with differing elasticities of demand.[48] If regulation is constraining firm behavior, prices will be close to marginal costs

[45] Much of the presentation in this section follows Bresnahan (1989).

[46] The last 15 years has seen an explosion in the estimation of differentiated product demand systems in Industrial Organization. See, inter alia, Berry (1994), Berry, Levinsohn, and Pakes (1995), Nevo (2001), and Petrin (2003) for recent applications. Crandall and Furchtgott-Roth (1996), Crawford (2000), and Goolsbee and Petrin (2004) apply these tools in the cable industry.

[47] This can introduce difficult identification issues as it may be hard to differentiate between price increases due to diseconomies of scale and those due to increased exercise of market power. Bresnahan (1989) discusses this issue in detail.

[48] A similar approach underlies the method of Conjectural Variations. Despite lacking a sound theoretical

even if demand is inelastic (i.e. $\theta \approx 0$). If not, prices will be close to the monopoly markup (i.e. $\theta \approx 1$).

Quality change is also easy to accommodate, at least in principle. Let q_n measure the quality of the product in market n. If we now parameterize demand by $Q_n = D(p_n, y_n, q_n)$, prices are given by

$$p_n = c_n - \theta \frac{Q_n}{\partial D(p_n, y_n, q_n)/\partial p_n} \tag{7}$$

If quality is higher in some market (or time period), demand will increase and/or become more inelastic, increasing prices. Separating the influence of quality change and market power is simply then a matter of assessing the relative strength of q_n and θ on prices.[49]

Measuring Market Power and the Effects of Regulation in Cable Markets Two papers apply the framework above to measure the impact of regulation on pricing in cable markets.[50] First, Mayo and Otsuka (1991) estimate demand and pricing equations for Basic and Premium services using data from a cross-section of over 1,200 cable markets in 1982. Regulation at this time was determined by terms of local (municipal or state) franchise agreements and varied across the markets in the study. Across all systems (regulated or not), θ is estimated at 0.097 (0.021). While significantly different from 0, the relatively small value suggests regulation significantly constrained system pricing.[51]

Second, Rubinovitz (1993) estimates demand, pricing, and quality (number of channels) equations for Basic cable services using data from a panel of over 250 cable systems in both a regulated period (1984) and an unregulated period (1990). In the raw data, prices are 42% higher in the latter period, but satellite channels have more than doubled and subscriptions are more than 50% greater. For reasons of idiosyncratic model specification, the absolute level of θ cannot be identified in each period, but differences in θ can. This he finds to be 0.18 (0.08), implying that, controlling for increased costs due to expanded channel offerings, the increased exercise of market power increased prices by 18%, or .18/.42 = 43% of the observed price change. He concludes both increased quality and increased market power were responsible for deregulated price increases.

Almost all the studies surveyed to date focus on the impact of regulation on *prices*. But what of quality? The aggregate data in Section 4.1 suggest understanding regulation's impact on quality is critical to understanding outcomes in cable markets. In a recent paper, Crawford and Shum (2005) extend the market power framework to assess the impact of regulation on both prices *and* quality in cable markets. Rather than use observed measures of service quality

foundation, the approach has been used to measure market power in oligopoly settings. See Bresnahan (1989) for more.

[49] Of course, this assumes there are good observable measures of product quality, q_n. This must be evaluated on a case-by-case basis.

[50] While conceptually simple, implementing the framework described above can be quite difficult in practice. Difficult identification issues arise in each of the papers surveyed below, casting at least some doubt on their conclusions. Where possible, I note these concerns.

[51] Unfortunately, the paper lacks a clear discussion of identification. Estimation is "by two-stage least squares", but the motivation for the exclusion restrictions that identify the key parameters is missing.

(e.g. number of offered networks), they use data from a cross-section of 1,042 cable markets in 1995 to estimate preferences and costs and then use the implication of the optimal non-linear pricing (i.e. price and quality choice) to *infer* the level of offered quality in each cable market. An example provides the intuition for their procedure. Suppose the cable systems in two markets had identical market shares for each of two offered services, but the price of the high-quality service was higher in the first market. The higher price in the first market suggests households are willing to pay more for cable service quality in that market (perhaps because mean household age or household size is larger in that market).[52] By making high types more profitable, this tightens the incentive compatibility constraint for those types, increasing the incentive to degrade quality for low types. Thus even if prices are similar in the two markets, offered quality (under the theory) must be lower in the first.

After inferring the quality of each offered service in each cable market, the authors relate these quality measures to indicators of whether the cable market had certified with the FCC to regulate Basic Service under the terms of the 1992 Cable Act. They find that quality for high-quality goods is somewhat higher, that quality for low- and medium-quality goods is substantially higher, and that quality per dollar for all goods is higher in regulated markets (despite higher prices). Interestingly, these effects are consistent with the theoretical predictions of minimum quality standards (and not price-cap regulation).[53]

Measuring the Consumer Benefits of Regulation The previous studies focus on the impact of regulation on cable prices and quality. This relies on a static view of cable markets and focuses on the short-run losses from cable market power. A long-run view must acknowledge that monopoly profits provide strong incentives for systems to invest in service quality if that enhances consumer willingness-to-pay for cable services. Two studies estimate consumer demand for cable services and ask about the welfare effects of (i.e. benefits to consumers from) cable price regulation.[54]

Crandall and Furchtgott-Roth (1996, Chapter 3) examine the welfare effects of changes arising from the 1984 Cable Act. They estimate a multinomial logit demand model on 441 households from 1992 and augment that with information about the cable service available to 279 of them in 1983. Despite the substantial increase in prices in this period (cf. Figure 4), they estimate that households would be have had to be compensated by $5.47 per month in 1992 to face the

[52] In reduced form regressions, the level and shape of the distribution of household income, age, and size were important determinants of cable prices and quality.

[53] The 1992 Cable Act, in addition to regulating prices, required systems to offer a Basic Service containing all offered broadcast and public, educational, and government channels. Many systems introduced "bare-bones" Limited Basic Services as a consequence of those terms. The authors' results suggest this and not price caps had a greater effect on offered service quality in cable markets.

[54] In this setting, welfare effects are measured by either the compensating or equivalent variation. The compensating and equivalent variation are measures of the amount of money required to make households in a market indifferent between facing a cable choice set (e.g. set of services, prices and qualities for those services) before and after a change in the economic environment. The compensating variation asks how much money is required to make someone indifferent to their initial position; the equivalent variation asks how much money is required to make someone indifferent to their final position.

choices available to them in 1983.[55]

Crawford (2000) examines the welfare effects of changes arising from the 1992 Cable Act. He also estimates a multinomial logit demand system on 344 cable systems from 1992 and 1995.[56] Furthermore, he introduces a new approach for measuring service quality. Rather than simply counting the number of networks offered by systems, he controls for the actual identities (among the top-20 cable networks) of those networks (e.g. ESPN, CNN, and MTV). This turns out to be important not only for accurate estimation of cable demand, but in valuing household welfare from the Cable Act.[57] He finds a welfare gain of at most \$0.03 per subscriber per month. The lack of effect is not due to quality reductions in response to price caps, but the simple fact that (in his data) prices increased despite the regulations.[58]

5.2.3 Conclusions

The accumulated evidence is not encouraging for proponents of regulation in cable markets. Research based on time-series data suggest that while prices briefly declined after the 1992 Cable Act, so too may have product quality. Detailed econometric studies based on disaggregate cross-section data provide mixed evidence. Some find that regulation lowers cable prices from monopoly levels, while others find negligible effects. Evidence of the impact of regulation on quality is positive, although further research is necessary, and evidence on consumer welfare effects of changes in cable choice sets is, if anything, in favor of deregulation.

6 The Rise of Competition in Cable and Its Effects

The rise of competition from satellite providers has dramatically changed the cable marketplace. Whereas for 40 years the vast majority of households faced a local cable monopolist, most households have the option of three or more MVPD providers, with the prospect of more on the way. This section addresses the impact on cable prices and services of competition in the distribution market.

[55] This is likely an underestimate of the true welfare loss, as their quality measure is based on the number of offered broadcast and satellite channels and the latter increased significantly in quality over the period.

[56] Care should be taken relying on welfare measures from logit demand systems, particularly when evaluating the introduction of new products (Petrin (2003)). Crawford (2000) argues that this concern is moderated in his case because of the popularity of the newly introduced services.

[57] For example, that the average number of networks increased by approximately 2 from 1992 to 1995 suggests limited welfare gains to households; that on average 1.5 of those 2 were top-20 networks suggests the opposite conclusion. Furthermore, many systems were alleged to have moved their most popular programming to unregulated tiers of service in response to the Act and he can measure that effect.

[58] While both of these studies find consumers no better off from regulation, it is important to note that each draws inferences based on changes in cable choice sets over time. While this is clearly influenced by regulation, any other changes in the economic environment will also influence the measures. Their conclusions must therefore be conditioned on the (very strong) assumption that regulation is the only source of time-series variation in firms' offerings.

6.1 Duopoly ("Overbuilt") Cable Markets

There is considerable evidence that cable prices are lower when there are two wireline competitors in a market. Hazlett (1986a) finds that cable prices are $1.82 lower in duopoly relative to monopoly cable markets. Levin and Meisel (1991) analyze a cross-section of 47 cable systems in 1990 and find that, controlling for the number of programming networks offered, cable prices are between $2.94 and $3.33 per month less in competitive relative to non-competitive cable markets. Emmons and Prager (1997), using data on a cross-section of 319 cable markets in 1983 and 1989, obtain similar results: prices for incumbents that face competition from another cable system are an estimated 20.1% lower in 1983 and 20.5% lower in 1989.[59]

More recent data suggests a similar pattern. Using data from the five most recent FCC reports on cable industry prices, Table 4 reports the average price, number of channels, and price/channel for cable systems defined by the FCC as noncompetitive, facing a wireline competitor, and facing satellite competition.[60] The upper panel of the table presents the raw data, while the lower panel presents the percentage difference between systems facing either a wireline competitor or satellite competition and the noncompetitive sample.

The first set of columns suggest that prices are lower for cable systems facing a wireline competitor than for those that do not face competition. Definitive conclusions about causality are difficult, however, due to selection problems. Entry by a competitor is not exogenous to the price charged by an incumbent cable system or the characteristics of the entertainment market. If new firms entered into markets where incumbent cable systems charged high prices, the table likely under-estimates the true effect of wireline competition on prices. Similarly, as most wireline competition occurred in large urban markets and these have more substitutes to cable, the table may over-estimate the true effect. Accurately controlling for differences in economic conditions across markets and the endogeneity of entry is required in order to make stronger conclusions from such data.

Table 4 also reports the correlation between wireline competition and cable service quality (as measured by the number of Basic and Expanded Basic channels) as well as the price per channel, a useful competitive benchmark. Keeping in mind the same concerns about selection, conclusions about wireline competition and quality are mixed. The table suggests cable systems facing wireline competition may or may not offer greater numbers of Basic and Expanded Basic channels, but do offer a lower price per channel than do noncompetitive systems. Further analysis of recent price and quality data that controlled for the endogeneity of wireline entry would be welcome.

[59] Hazlett and Spitzer (1997, Table 3-3) summarize the findings of these and a number of other studies in the 1980s and early 1990s. Across a variety of datasets, duopoly cable markets are associated with prices 8%-34% lower than monopoly cable markets.

[60] "Price" here equals price for Basic and Expanded Basic Services, plus equipment.

6.2 Competition between Cable and Satellite

The problem with duopoly cable markets is they are rare, accounting for only 1-2% of all cable markets (FCC (2005b, Footnote 627)). From a policy perspective, it is much more important therefore to assess the impact of satellite competition on cable prices and quality.

Table 5 reports the trend in cable and satellite subscribers, their respective share of the MVPD market, and their share of new MVPD subscribers since 1993. Satellite subscriptions grew very quickly, even before 1999 when SHVIA allowed satellite providers to distribute local broadcast channels. Since then, however, cable subscriptions have been flat as almost every (net) new MVPD subscriber has gone to satellite.

Table 4 also provides some evidence on the effect of satellite competition on prices and service quality. Turning to the third set of columns in each group, the table reports average prices, number of channels, and price per channel for cable systems who have been granted a finding of effective competition due to facing at least two satellite competitors whose total market share exceeds 15% of the MVPD market.[61] The table suggests both a selection effect and a competitive effect. The experience of the early years suggests that satellite succeeded earliest in those cable markets that had high prices, few channels, and high prices per channel. After 1999, however, satellite began to draw customers away from cable and this is likely to have had a competitive effect. Under this view, systems that were most affected began adding channels, lowering prices, or both, so that by the end of the sample, such systems offered more channels than their noncompetitive counterparts at slightly (2-4%) lower prices.

While this is promising, it is not as large as one might expect. Given the keen interest in the role of satellite competition, Congress also commissioned the General Accounting Office to conduct several studies of satellite's impact on cable prices and product offerings (GAO (2000), GAO (2003)). The early study, using 1998 data, found a *positive* and significant impact of increased satellite market share on a cable incumbent's prices, while the latter study, using 2001 data, found a negative and significant (though economically small) impact.

So where is the benefit of satellite competition? A fundamental problem in such studies (as in Table 4) is that a regression of cable prices on satellite market shares suffers from a problem of correlated unobservables. If tastes for video programming differ across markets, both satellite market shares and cable prices will be higher in markets with greater tastes for programming, causing an upward bias on the effect of satellite shares on cable prices. Similarly, if offered cable qualities are (unobservably) higher in markets with high satellite shares, as for example if cable systems improve service quality in the face of satellite competition, a similar effect will arise. One solution is to instrument for satellite market shares in the cable price equation, but that can be difficult if instruments are hard to find.[62]

[61] Because of this definition, some care should be taken interpreting the results in this table too broadly. While, for example, the national satellite market share has been above 15% since 2001, the share of subscribers in the 2004 price survey served by cable systems that have been granted a finding of effective competition due to satellite competition was only 2.35% (FCC (2005a, Attachment 1)).

[62] The GAO studies appear to use homes passed and system age as instruments for satellite share, but it's hard to see how these would be appropriate instruments. If correlated with satellite share due to differences across

In a widely cited study, Goolsbee and Petrin (2004) suggest a solution to this problem. First, they estimate a multinomial probit demand system for Expanded Basic, Premium, and satellite services from a sample of roughly 30,000 households in 317 television markets in early 2001. Using a system's franchise fee as their primary price instrument, they find own-price elasticities of -1.5 for Expanded Basic, -3.2 for Premium, and -2.4 for satellite along with quite plausible (and large) cross-price elasticities.

As in previous studies, they regress cable prices on (a nonlinear transformation) of satellite market shares.[63] Unlike previous studies, however, they also include estimates of unobserved characteristics and tastes for Expanded Basic and Premium cable services. By including composite measures of cable service quality, this approach "takes the correlated unobservable out of the error" and allows a consistent estimate of the impact of satellite share on cable prices.[64]

They find the effect to be both statistically and economically significant. Reducing satellite penetration to the minimum observed in the data is associated with a $4.15 (15%) increase in the price of cable services. They also find it is associated with a slight increase in the observed quality of cable services.

6.3 Telephone Carrier Entry into Video Markets

While encouraging, the evidence for the benefits of satellite competition are less compelling than for wireline competition. Is there the prospect of further wireline entry in video markets? The answer is a qualified yes. While entry from independent "over-builders" has long-since stalled, several local telephone carriers (LECs) have ambitious plans to enter video markets.[65]

As described in section 3.6, the 1996 Telecommunications Act permitted LEC entry into video markets. Each of the four extant LECs (AT&T, Bellsouth, Qwest, and Verizon) now offer video programming in some form, mostly by reselling satellite services bundled with telephone service and broadband access (DSL). Verizon and AT&T, however, are also upgrading their networks in order to provide television to the home in direct competition with cable and satellite companies.[66] Verizon has a head start in this venture and began offering television service in September 2005 and plans to have passed 3 million homes by the end of the year (Reardon (2005)). AT&T plans on rolling out similar services to 19 million homes by mid-2008 (Grant (2006a)).

An important likely determinant of the near-term benefits of LEC entry is the ease with which

markets in offered cable service quality, they should also be correlated with cable prices and belong in the cable price regression.

[63] Strictly speaking, they regress cable prices on the mean utility for satellite service. This can be considered a measure of the satellite market share.

[64] This approach, while promising, relies heavily on the assumed functional forms for demand and pricing equations.

[65] Independent competitive cable companies, called Broadband Service Providers (BSPs), initially targeted business and residential customers in large urban markets. Facing cost disadvantages for programming, relative to incumbent cable operators. Due to their small scale, several have filed for bankruptcy, and they remain as a group of small fraction of the MVPD industry.

[66] This is viewed in part as a defensive response to cable entry into local telephone service.

they can obtain agreements to provide video service with local franchise authorities (LFAs). LECs have complained that the existing franchising process is an important barrier to entry in cable markets. For example, Verizon estimates it must obtain agreements with almost 10,000 municipalities if it wishes to provide video programming throughout its service area and that LFAs (backed by incumbent cable operators) take too long and require too many concessions (FCC (2005c)).[67] In September 2005, Texas passed a law introducing a simplified statewide franchising process and the FCC has issued a Notice of Proposed Rulemaking to explore its options to facilitate wireline entry nationwide (FCC (2005c)).

6.4 Conclusions

Are (most) cable markets competitive? The evidence for wireline competition is encouraging, but its narrow scope limits benefits to a small fraction of cable households. While there is some evidence of a positive impact of satellite competition on cable prices, the estimated cable price elasticities suggest cable systems still exert considerable market power.[68] Is this a call then for further price regulation in cable markets? The flexibility of cable quality choice and accumulated interval evidence surveyed in the last section argue against regulatory solutions. Further wireline competition in distribution looks to be the most promising potential solution.

7 Open Issues in MVPD Markets

In this section, I consider three open issues in cable and satellite markets: horizontal concentration and vertical integration in programming, bundling, and regional clustering by families of affiliated cable systems.

7.1 The Programming Market

Since the *Time Warner II* decision rescinded the FCC's horizontal subscriber and vertical channel occupancy limits in 2001, the regulatory treatment of the programming market has been unsettled. In this section, I discuss potential market failures in the programming market and survey the economic literature analyzing these issues.

7.1.1 Horizontal Concentration and Market Power

The primary economic issue in the programming market is that of market power. Cable systems have evolved from small locally-owned operations into major national corporations. Table 6, drawn from FCC reports on the status of competition in the programming market, reports

[67] They particularly object to build-out requirements, especially if they don't overlap with their service area.

[68] For example, an own-price elasticity of -1.5 would imply a markup of 67% in the case of a single-product monopolist.

concentration measures for the industry for several of the past 15 years.[69]

As can be seen in the table, concentration has increased over time.[70] While the sum of the market shares for the top 4 MVPD providers (as well as the HHI) has held steady, the share accruing to the top 8 and top 25 have increased.[71] Now that the two major satellite providers are among the top 4, it is likely to grow even more concentrated in the future.

There are both pro- and anti-competitive effects possible from increased concentration. Increased firm size may yield economies of scale, greater facility developing and launching new program networks, and lower costs for investing in and deploying new services like digital cable, broadband Internet access, and telephone services. It may also, however, increase market power in the programming market.

There has unfortunately been little agreement over the appropriate analytical framework for analyzing outcomes in the programming market. The FCC's original horizontal subscriber limits were based on an "Open Field" analysis which determined the minimum viable scale for a programming network and then set limits such that no two maximal-size MVPD providers could jointly exclude the network from the market (FCC (2005d, Par 72)). The *Time Warner II* decision, however, criticized this approach as lacking a connection between the horizontal limit and the ability to exercise market power.

The FCC has advanced a monopsony model as a potential alternative framework (FCC (2005d, par. 85-89)). Under monopsony, a supplier with market power purchases homogenous inputs until his marginal revenue equals his marginal factor cost. Unlike standard settings where marginal factor costs are given by (presumably competitive) input markets, with monopsony power, a supplier may set prices in the input market and does so to trade off increased revenue from the marginal input against increased costs of higher payments to all inframarginal inputs.

A monopsony approach does not appear useful in describing the programming market, however. Networks are differentiated in important ways, implying there is no single "posted price" required of the monopsony setting. Furthermore, if any cable operator with market power were to reduce its purchases of programming at the margin, it would have no obvious effect on the prices it pays on inframarginal programming. Instead, MSOs and program networks negotiate on a bilateral basis over the potential gains from carrying that network. Barring substitutability or complementarity between networks, failing to carry one network has little effect on prices paid to another.

A Bargaining Approach Given the institutional features of the programming market, a bargaining framework seems most appropriate for analyzing outcomes. Unfortunately, bargaining models are known for their wealth of predictions, often depending on subtle features of the

[69]Note such and measures are most relevant than the programming market. Incumbent cable systems do not strictly he each other.

[70]Furthermore, Comcast and Time Warner have announced plans to purchase Adelphia's cable systems (Grant and Angwin (2005)).

[71]The Herfindahl-Hirschman Index (HHI) is sometimes used as a summary measure of concentration in a market. It is given by the sum of the squares of the market shares for all the firms in the market.

rules of the game that are hard to verify in practice. What can bargaining theory tell us about market power and the consequences of horizontal concentration in programming markets?

The conventional wisdom is that increased concentration in the MVPD market improves the bargaining power of cable systems, reducing affiliate fees to program suppliers. In the simplest models, increased size for an individual cable system reduces the viability of a program network if an agreement is not reached between the two parties. This necessarily lowers the networks "threat point," increasing the expected surplus to the cable system (with specifics determined by the particular model).

Some bargaining models, however, yield predictions contrary to the conventional wisdom. For example, Chipty and Snyder (1999) find that increased concentration can actually reduce a MVPDs bargaining power. They find that the size of the surplus to be split between a cable system and a programming network depends on the shape of network's gross surplus function. If this function is convex, marginal systems provide more surplus than inframarginal systems (with the opposite result for concave gross surplus functions). If the rule governing the split of surplus is invariant to merger, an important assumption, a convex gross surplus function yields disincentives to merge as the sum of the surplus being negotiated is larger for two separate versus one merged firm. Using data on advertising revenues from 27 networks for up to 9 years in the 1980s and early 1990s, they estimate the shape of networks gross surplus function (net of affiliate fees). While intuition might suggest it is convex early and concave late,[72] they find the opposite. For networks of larger size, the authors conclude that systems have disincentives to merge for bargaining power and that efficiency considerations must be driving system consolidation.

In another widely cited study, Raskovich (2003) builds a bargaining model with a pivotal buyer, i.e. one with whom an agreement is necessary for a seller's viability. In his model, being pivotal is *disadvantageous* as if an agreement is not reached the seller will not trade and it is only the pivotal buyer who can guarantee this outcome. As such, gains to the pivotal buyer are equal to its private gains less the shortfall required to ensure viability of the supplier. This can reduce the incentives to merge if merging would make a buyer pivotal.

Empirical Results What does empirical work suggest about horizontal concentration and outcomes in the programming market? Assessing the consequences of increased system size on network surplus in programming markets is conceptually simple, but lack of data on transaction prices (affiliate fees) has prevented much empirical work. Ford and Jackson (1997) exploit rarely available programming cost data reported as part of the 1992 Cable Act regulations to assess (in part) the impact of buyer size and vertical integration on programming costs. Using data from a cross-section of 283 cable systems in 1993, they find important effects of MSO size and vertical affiliation on costs: the average/smallest MSO is estimated to pay 11%/52% more than the largest MSO and vertically affiliated systems are estimated to pay 12-13% less per subscriber

[72] In FCC (2005d, Footnote 311), cable networks claim that Nielsen ratings data do not become useful until a network has access to between 40 and 60 million subscribers. This limits it's ability to obtain advertising revenue before that point. After a point, intuition suggests there are decreasing returns to scale in subscribers.

per month. Chipty (1995) takes a different strategy: she infers the impact of system size on bargaining power from its influence on retail prices. She also finds support for the conventional wisdom that increased buyer size reduces systems' programming costs.

7.1.2 Vertical Integration

Many MVPD operators either own or have ownership interests in programming networks. So do major broadcast networks. This has also drawn considerable attention from regulators in MVPD markets. FCC (2005b) documents the status of vertical integration in current MVPD markets. In brief, of 388 national programming networks and 96 regional programming networks in 2004, 89 (24), or 23% (25%), were affiliated with a major cable operator.[73] An additional 103 (22), or 27% (23%) were affiliated with a broadcast programming provider.[74] Furthermore, all of the top 20 networks by subscribers (save C-SPAN) and top 15 by ratings are owned by either a cable operator or broadcast network.

As in most cases of vertical integration, there are both efficiency and strategic reasons MVPDs and program networks may want to integrate. For example, vertical integration could eliminate double marginalization, improving productive efficiency. Similarly, it could minimize transactions costs and reduce the risk of new program development. It may also internalize important externalities between systems and networks in the areas of product choice, service quality, and brand development. Alternatively, integration may permit cable systems to discriminate against (or raise the costs of) rival MVPDs or allow program networks to discriminate against (or raise the costs of) rival networks.

Existing empirical research has universally found that vertically integrated MVPDs are more likely to carry their affiliated program networks, but whether this is pro- or anti-competitive remains an open issue. Waterman and Weiss (1996) examine the impact of vertical relationships between pay networks and cable operators in 1989. They find that affiliated MSOs are more likely to carry their own and less likely to carry rival networks. Subscribership follows the same pattern, though they find no estimated effect on prices.[75] Chipty (2001) addresses similar questions, including whether integration influences MVPD carriage of Basic cable networks. Using 1991 data, she finds integration with premium networks is associated with fewer premium nets, fewer basic movie networks (AMC), *higher* premium prices, and higher premium subscriptions. On balance she finds households in integrated markets have higher welfare than those in unintegrated markets, although the effects are not statistically significant. As in the studies analyzing the impact of regulation, however, it is difficult to assess if differences across cable systems in product offerings and prices are driven exclusively by integration or by other features of integrated systems (e.g. size, marketing, etc.).

[73] These are Comcast with 10 affiliated national networks and 12 affiliated regional networks, Time Warner with 29 (12), Cox with 16 (5), and Cablevision with 5 (16).

[74] These are News Corp/Fox with 12 affiliated national networks and 22 affiliated regional networks, Disney/ABC with 20 (0), Viacom/CBS with 39 (0), and GE/NBC with 17 (0).

[75] See also Waterman and Weiss (1997) for the impact of integration on carriage of basic cable networks.

7.1.3 Conclusions

The analysis of competition in the programming market is unfortunately inconclusive. Even if increased concentration in distribution increases distributor bargaining power, conventional "monopsony" welfare losses would not occur. Indeed the interests of on the integrated distributors and program networks would seem to be aligned to produce programming that increases their joint surplus and friends and covers the programmers fixed costs.). Instead, it is the combination of concentration and integration that could (but need not) lead to market failure, unfortunately fear he provides no sharp predictions in empirical work has been unable to address this point. If this is a market of interest to policymakers, there is a clear mandate for improved data collection – particularly of the affiliate fees systems pay to networks – and analysis prior to any formal rule-making.

7.2 Bundling

MVPD providers choose a portfolio of television networks and bundle them into services for sale to consumers. As complaints about high and rising cable bills continue, recent regulatory and legislative focus has turned to the consequences of bundling in cable and satellite markets. By legislative request, both the General Accounting Office and the Federal Communications Commission analyzed the likely effects of bundling in cable markets, finding mixed but generally negative (and extremely uncertain) effects for consumers (GAO (2003), FCC (2004a)). In 2006, the FCC, under a new chairman, published a follow-up study that repudiated many of its earlier conclusions and found that unbundling could actually improve consumer welfare (FCC (2006)).

Is then bundling a market failure in cable markets? Might not à la carte sales improve consumer welfare? I survey the existing theoretical and empirical evidence in what follows.

7.2.1 Theoretical Motivations to Bundle

In most product markets, bundling enhances economic efficiency. A variety of industries emphasize the benefits of bundling in simplifying consumer choice (as in telecommunications and financial services) or reducing costs from consolidated production of complementary products (as in health care and manufacturing). In either case, bundling promotes efficiency by reducing consumer search costs, reducing product or marketing costs, or both. Moreover, if profitable, bundling can enhance incentives to offer products by increasing the share of total surplus appropriable by firms (Crawford (2006a)).

Bundling can also, however, reduce welfare in product markets. An influential theoretical literature suggests bundling may arise in many contexts to sort consumers in a manner similar to 2nd-degree price discrimination (Stigler (1968), Adams and Yellen (1976)). When consumers have heterogeneous tastes for several products, a monopolist may bundle to reduce that heterogeneity, earning greater profit than would be possible with component (unbundled) prices. Bundling - like price discrimination - allows firms to design product lines to extract maximum

consumers surplus. While firms clearly benefit in this case, consumer welfare may fall, often because bundling requires consumers to purchase products in which they have little interest (Bakos and Brynjolfsson (1999), Armstrong (1996)).

Moreover, bundling can also be used to extend market power or deter entry (e.g. Whinston (1990), Nalebuff (2004), Bakos and Brynjolfsson (2000)).[76] In this context, bundling reduces the market for potential entrants by implicitly providing a discount on "competitive" products for all consumers with high tastes for "noncompetitive" products. I describe each of these theories and briefly consider their implications for the cable industry in what follows.

Bundling to Price Discriminate Most of the discriminatory bundling literature has focused on the incentives to bundle two goods. Adams and Yellen (1976) formalize the seminal work of Stigler (1963) and present examples where bundling is more or less profitable than component (unbundled) sales. [77] A simple example, adapted from Adams and Yellen (1976) demonstrates the discriminatory incentives to bundle.

Insert Figure 10 Here

There are two goods and four consumers, whose willingness-to-pay (WTP) for each good is represented by a point in the top panel of Figure 10. The bottom three panels show the demand for each good (if offered separately) and demand for the bundle of both goods implied by these reservation values. Unbundled sales yield profits of $140 while bundled sales yield profits of $200. In this example, bundling permits the monopolist to extract *all* available consumers surplus.

The reduction in preference heterogeneity in the example (and associated surplus extraction) generalizes and is the primary benefit of bundling. It is not sufficient, however. In a more general setting, when bundled sales are preferred to component sales depends on three critical features of preferences and costs. First is the extent of heterogeneity reduction possible from bundling. This increases with the negative correlation in preferences for bundle components, a point made clear by the example.[78] Second is the level of marginal costs for components. Since bundling requires consumers purchase all goods, some below-cost sales of components can result (e.g. consumers A and D in the example), reducing the gains from bundling. This becomes more likely the higher are marginal costs relative to the mass of consumer preferences. Third is that bundling requires firms charge a single price. When consumer tastes for components differ considerably (e.g. multiply WTP for one of the example goods by 100), bundling is less attractive than component sales as it permits fewer instruments (prices) to capture consumers'

[76] e.g. antitrust challenges to Microsoft's bundling of software applications (e.g. its Internet browser, media player) with its dominant Windows operating system (Mitchener and Kanter (2004)).

[77] Recent papers by Bakos and Brynjolfsson (1999) and Armstrong (1999) extend the analysis of bundling to consider multiple goods and find similar results to that presented below.

[78] Negative correlation, however, is not necessary for bundling to be profitable (McAfee, McMillan, and Whinston (1989)).

surplus.[79]

Bundling to Enhance Market Power and Deter Entry Two recent papers by Nalebuff (2004) and Bakos and Brynjolfsson (2000) demonstrate the additional advantage of bundling as a means to extend market power or deter entry. To understand this argument, consider an example provided by Nalebuff (2004).

Suppose a monopolist providing two goods (A & B) is facing a potential entrant in either component (but not both). Suppose consumers value only one unit of each good, that their willingness-to-pay (WTP) for the goods is uniformly distributed on the unit square, and that there is no complementarity or substitutability in demand (so their WTP for a bundle is just the sum of the component WTP). Marginal and fixed/entry costs are zero. To fix ideas, suppose the monopolist must pre-commit both to a method of sale (bundling or components) as well as a price/prices.[80]

If the monopolist sells each good separately, the entrant will enter one market (e.g. market B), just undercut the monopolist's price, and earn all the sales in that market. What happens if he bundles? The intuition is captured by the following figure.

Insert Figure 11 Here

In this figure, the monopolist bundles goods A & B. Again the entrant will enter, but this time with smaller effect. All consumers that value good B at greater than its price will buy it. This is given by the shaded area in the southeast of the figure. All remaining consumers that value the two goods at greater than the bundle price will buy it. This is given by the shaded area at the top of the figure.

Note the effect bundling has on the *potential* market for the entrant. Because all consumers with high willingness-to-pay for good A will tend to prefer the bundle, the entrant is able to only compete for half the market, i.e. those with low WTP for good A. In effect, bundling A with B allows the monopolist to provide an implicit discount on good B to all consumers with high WTP for good A. The entrant cannot match that discount and is effectively foreclosed from that portion of the market.

If the entrant faces fixed entry costs, bundling in this setting can foreclose the market from potential entry. Even if the entrant does enter, his profits will be lower than if the monopolist did not bundle.

[79] McAfee, McMillan, and Whinston (1989) extend the analysis of Adams and Yellen (1976) to consider mixed bundling, the offering of *both* component and bundled sales, and show it always yields (weakly) greater profits than pure bundling. The reason for this is clear: it maintains the benefits of bundling (if any) and strictly increases the number of prices available to capture surplus. Despite this fact, mixed bundling is relatively uncommon, perhaps due to the added administrative costs associated with offering both bundled and component goods.

[80] The conclusions drawn for the pre-commitment case also obtain for the more realistic case that the incumbent can charge a different price in the event of entry.

7.2.2 Bundling in Cable Markets

There are many possible motives for bundling. Which are likely to applying cable markets? And what are the implications for consumer and total welfare?

It is easy to motivate that bundling reduces costs to cable systems. As described in Section 4, and it is *unbundling* networks that is costly, requiring methods to prevent consumption by non-subscribers. While the rise of addressable converters (set-top boxes) is lowering this cost, many cable subscribers do not currently use them.[81] Furthermore, bundling simplifies consumer choice, reducing administrative and marketing costs, and it guarantees widespread availability, a feature viewed as essential for networks seeking advertising revenue (FCC (2004a)).

It is also widely believed, however, that systems bundle to price discriminate in cable markets. Cable systems and program networks both argue that bundling allows them to capture surplus from the (possibly many) low-value consumers that would likely not choose to purchase a channel on a stand-alone basis (FCC (2004a)). Furthermore, using data from a cross-section of 1,159 cable markets in 1995, Crawford (2006b) tests the implications of and finds qualified support for the discriminatory theory. He estimates the profit and welfare implications of his results, finding that bundling an average top-15 *special-interest* cable networks is estimated to increase profits and reduce consumer welfare, with an average effect of 4.7% (4.0%). On balance, total welfare *increases*, with an average effect of 2.0%.

If it both reduces costs and enhances surplus extraction, it is no surprise that firms like to bundle in cable markets. But what about consumers? Might not consumers benefit from unbundled, i.e. à la carte, sales? Crawford (2006a) analyzes this question using numerical techniques, paying particular attention to bundling's implications for the number and type of networks offered by systems. He makes assumptions about the nature of household willingness-to-pay and firm costs in cable markets, calibrate these to an "average" 2004 (Expanded Basic) service bundle, and explores the profit and welfare implications of offering an additional network on a bundled versus à la carte basis. He finds that, consistent with the conventional wisdom, bundling provides stronger incentives to offer networks than would à la carte sales, but may do so at significant cost to consumers. The incremental fixed and marginal costs to cable systems from offering à la carte sales and its impact in the advertising market are important factors in determining consumer benefits.

Claims of bundling's potential to deter entry or enhance market power have been made in both the distribution and programming markets. In the distribution market, wireline competitors to incumbent cable systems have articulated versions of the market power argument when objecting to (i) the terrestrial exception to the program access and carriage rules and (ii) the "clustering" of cable systems within localized (e.g. MSA) markets (FCC (2005b, Paragraphs 154-158)). In each case, rival MVPDs may be at a significant competitive disadvantage, even if the foreclosed network is the only network by which rival bundles differ. In the programming

[81] Insight Communications estimates 2/3 of its 1 million customers do not use a converter (FCC (2004a, p. 39)). By contrast, all satellite subscribers must have a digital receiver/converter.

market, MVPD buyers have complained about the bundling of affiliated program networks, both when negotiating rights to broadcast networks under retransmission consent as well as critical non-broadcast networks (FCC (2005b, Paragraphs 162), FCC (2005d, Footnote 232)). In this case, program networks that compete with those bundled with high-value networks may have difficulty obtaining carriage agreements, particularly if they appeal to similar niche tastes. Unfortunately, there is little empirical evidence of entry deterrence in either the distribution or programming markets. Empirical studies of these topics would be welcome.

7.2.3 Conclusions

Is bundling a market failure in the cable industry? While no firm conclusions can be drawn, several areas are of concern and are worthy of further study. Regarding the discriminatory effects of bundling, while it is likely that bundling does better than à-la-carte sales of providing incentives for program carriage and quality improvement (and surely lowers per-channel prices), it may do so at considerable cost to consumers. Estimates of its likely impact on system costs and the advertising market are critically needed to form policy in this area.

Similar uncertainties surround bundling for market power. While existing theoretical research does not draw explicit welfare conclusions, it is clear that bundling can have important competitive effects, particularly if, as seems to be the norm in programming markets, it is partnered with vertical integration and horizontal concentration. This could represent a substantial barrier to entry for diverse independent programming in cable markets.

7.3 Regional "Clustering" of Cable Systems

A recurring complaint among entrants in local cable markets is the increasing consolidation of systems within a single urban area. This "clustering" of cable systems is not the subject of any particular FCC proceeding, but rather has arisen in the proceedings surveying competition in the multichannel video programming marketplace (FCC (2005b, Par. 141-142, 157, 168)), setting horizontal and vertical ownership limits (FCC (2005d, Par 65)), and conducting merger reviews (Adelphia Communications Corporation, Comcast Corporation, and Time Warner Inc. (2005, pp. 49-60).

Table 7 presents patterns of clustering in the cable industry since 1994.[82] While the total number of clusters has risen only slightly over time, these clusters have encompassed an ever-greater share of cable subscribers. From a low of 33.7% of cable subscribers in 1994, clustered systems quickly grew to serve 82.1% of cable subscribers by 2001. While not represented in the table, it has since increased again as a consequence of the Comcast/Time Warner-Adelphia merger approved in July 2006 (America's Channel LLC (2005, pp. 30-31))).

There are both pro- and anti-competitive motivations for clustering. Incumbent cable systems emphasize the technical, economic, and promotional advantages of clustering. They argue clus-

[82] This is the earliest for which data on clustering is available.

tering allows them to optimize their system architecture, achieving local economies of scale by eliminating wasteful infrastructure duplication, efficiently introduce new services, especially broadband access and telephone services, and market those services once they are in place. They also argue that the growing importance of advertising revenue (cf. Figure 1) encourages clustering by enabling them to offer extensive market coverage to local and regional advertisers. On the other hand, clustering may increase barriers to entry for wireline competitors, particularly if the incumbent cable operator can use its local market dominance to obtain access to exclusive programming of local or regional interest (FCC (2005b, Par. 157)).

Despite the importance of this issue to local competition in cable markets, there is relatively little empirical analysis of the topic. The FCC briefly analyzed clustering in its 2000 Report on Cable Industry Prices (FCC (2001a, pp. 15-16)). In that survey, they asked systems whether they belonged to a cluster and whether they offered broadband access and telephone services, two maintained motivations to cluster. 69% of systems reported to be in a cluster and, of these, 48% offered Internet access and 7% offered telephony. Among systems not in clusters, the comparable percentages were 43% and 6%. They also looked at the impact of clustering on prices, finding across a variety of specifications that prices were 2% *higher* in markets where the system was part of a cluster.[83] Singer (2003) analyzes the impact of clusters on the probability of entry by wireline competitors ("overbuilders"). He finds a large, significant, negative effect of cluster size (measured as the sum of the population in contiguous areas owned by the same system) on entry probabilities. While more work is clearly needed, the empirical record suggests that clustering may have adverse effects on prices and entry in local cable markets.

8 Conclusion

This chapter surveys the consequences of economic regulation in the cable television industry and evaluates the impact of competition from satellite television providers on potential market failures in the industry. Prospects for efficient outcomes in the distribution market look better than ever. Satellite competition has largely replaced price regulation as the constraining force on cable pricing and driving force for innovative services, a welcome outcome given the empirical record on the regulation's effects in cable markets. Moreover, telephone company entry provides the prospect of an additional significant competitor in many cable markets. Remaining concerns are mostly distributional. Bundling in the distribution market likely provides important benefits to firms, but may do so at significant cost to consumers. More research is needed to quantify these costs and assess outcomes in a world without bundling.

In the programming market, the jury is still out. While there is no clear evidence of harm, more research is needed, particularly on the impact of horizontal concentration on market outcomes in program supply and the risks of the combination of horizontal concentration, vertical integration, and bundling.

[83] These findings should be taken as merely suggestive. There could be important determinants of whether a system is in a cluster that could be correlated with unobserved determinants of systems' service offering and pricing decisions. These would need to be explored before definitive conclusions could be drawn.

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Table 1: Growth Rates in Cable and Satellite Prices by Period

Period	Cable and Satellite CPI	Nondurable CPI	Difference
12/86 - 4/93	8.99%	4.38%	4.61%
4/93 - 11/94	-2.34%	1.11%	-3.45%
11/94 - 6/06	4.62%	2.28%	2.34%

Source: Bureau of Labor Statistics

Table 2: Growth Rates in MVPD Subscribers by Period

Period	Cable Subscribers	Cable + Satellite Subscribers
1987 - 1993	5.03%	5.06%
1993 - 1995	4.20%	5.93%
1995 - 2004	0.70%	3.72%

Source: FCC (2001d), FCC (2002b), FCC (2003b), FCC (2004b), FCC (2005b)

Table 3: Advanced Cable Services

		Digital Programming		Broadband Access	
Month	Year	Percent Offered	Percent Subscribed	Percent Offered	Percent Subscribed
July	1998	16.8		19.3	
July	1999	30.0		26.6	
July	2000	58.1		45.4	
July	2001	77.6	15.7	70.8	7.4
July	2002	88.3	24.1	69.8	9.6
Jan	2004	97.3	34.9	94.8	26.0
June	2005		40.3		34.6

Source: FCC (1999), FCC (2000a), FCC (2001a), FCC (2002a), FCC (2003a), FCC (2005a), NCTA (2005b)

Table 4: Noncompetitive and Competitive Cable Systems

Year	Prices			Basic & Exp. Basic Channels			Price per Channel		
	Noncomp. Systems	Facing Wireline Comp.	Facing DBS Comp.	Noncomp. Systems	Facing Wireline Comp.	Facing DBS Comp.	Noncomp. Systems	Facing Wireline Comp.	Facing DBS Comp.
	Levels								
1998	29.97	29.46	31.40	48.8	49.9	31.9	0.61	0.59	0.98
1999	31.70	30.82	31.73	51.1	50.6	35.1	0.62	0.61	0.90
2000	34.11	33.74	33.23	54.8	56.5	38.6	0.62	0.60	0.86
2001	37.13	34.03	37.13	59.3	56.0	53.3	0.63	0.61	0.70
2002	40.26	37.61	37.05	62.7	60.9	53.9	0.64	0.62	0.69
2003	43.14	37.14	42.32	67.3	71.5	67.7	0.64	0.52	0.63
2004	45.56	38.67	43.95	70.1	75.3	70.5	0.65	0.51	0.62
	Relative to Noncompetitive Systems								
1998		-1.7	4.8		2.3	-34.6		-3.9	60.3
1999		-2.8	0.1		-1.0	-31.3		-1.8	45.7
2000		-1.1	-2.6		3.1	-29.6		-4.1	38.3
2001		-8.3	0.0		-5.6	-10.1		-3.0	11.3
2002		-6.6	-8.0		-2.9	-14.0		-3.8	7.1
2003		-13.9	-1.9		6.2	0.6		-19.0	-2.5
2004		-15.1	-3.5		7.4	0.6		-21.0	-4.1

Source: FCC (2000a), FCC (2001a), FCC (2002a), FCC (2003a), FCC (2005a)

Table 5: Cable and Satellite Statistics

	Subscribers		Share of MVPD Subscribers		Share of New MVPD Subscribers	
Year	Cable	Satellite	Cable	Satellite	Cable	Satellite
1993	57.2	0.1	99.8	0.2	—	—
1994	59.7	0.6	99.0	1.0	83.3	16.7
1995	62.1	2.2	96.6	3.4	60.0	40.0
1996	63.5	4.3	93.7	6.3	40.0	60.0
1997	64.2	5.0	92.8	7.2	50.0	50.0
1998	65.4	7.2	90.1	9.9	35.3	64.7
1999	66.7	10.1	86.8	13.2	31.0	69.0
2000	66.3	13.0	83.6	16.4	-18.4	118.4
2001	66.7	16.1	80.6	19.4	12.7	87.3
2002	66.5	18.2	78.5	21.5	-10.5	110.5
2003	66.1	20.4	76.4	23.6	-25.7	125.7
2004	66.1	23.2	74.0	26.0	1.8	98.2

Source: FCC (2001d), FCC (2002b), FCC (2003b), FCC (2004b), FCC (2005b)

Table 6: Concentration in the MVPD Market

	1992		1997		2000		2004	
Rank	Company	Market Share	Company	Market Share	Company	Market Share	Company	Market Share
1	TCI	27.31	TCI	25.54	AT&T	19.07	Comcast	23.37
2	TimeWarner	15.28	TimeWarner	15.97	TimeWarner	14.92	DirecTV	12.10
3	Continental	7.53	MediaOne	6.95	DirecTV	10.28	TimeWarner	11.87
4	Comcast	7.12	Comcast	5.84	Comcast	8.43	EchoStar	10.63
5	Cox	4.74	Cox	4.44	Charter	7.36	Cox	6.92
6	Cablevision	3.48	Cablevision	3.92	Cox	7.27	Charter	6.73
7	TimesMirror	3.26	DirecTV	3.58	Adelphia	5.94	Adelphia	5.88
8	Viacom	3.09	Primestar	2.40	EchoStar	5.11	Cablevision	3.19
9	Century	2.48	Jones	2.00	Cablevision	4.29	Bright	2.37
10	Cablevision	2.48	Century	1.62	Insight	1.23	Mediacom	1.66
	Top 4	57.24	Top 4	54.30	Top 4	52.70	Top 4	57.97
	Top 8	71.81	Top 8	68.64	Top 8	78.38	Top 8	80.69
	Top 25	—-	Top 25	84.94	Top 25	89.75	Top 25	90.41
	HHI	—-	HHI	1166	HHI	954	HHI	1097

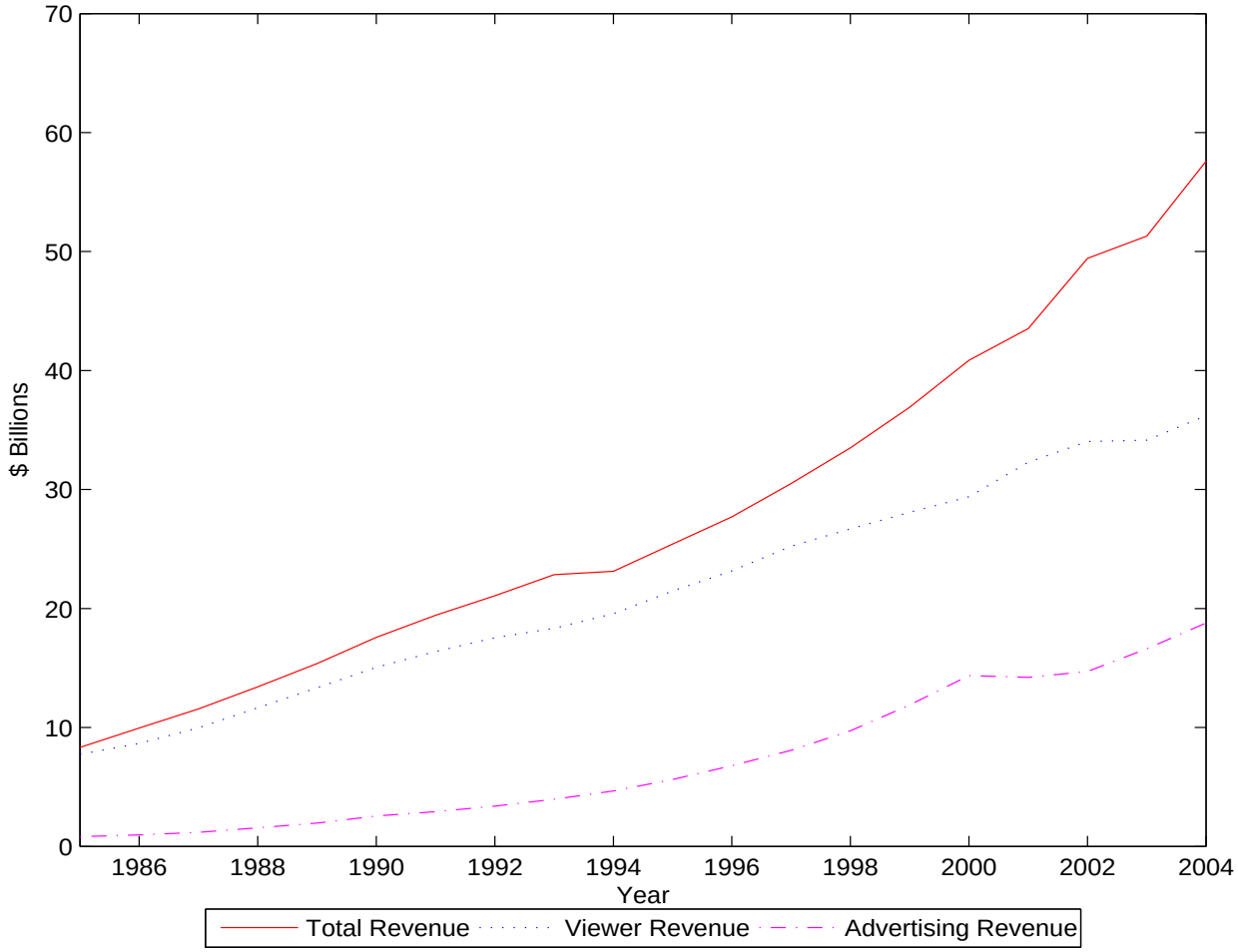
Source: FCC (1997), FCC (1998c), FCC (2001d), FCC (2005b)

Table 7: Clustering in the Cable Industry

Year	Total Clusters	Cluster Subscribers	Total Subscribers	Share of Total Subscribers
1994	97	20.1	59.7	0.337
1995	137	31.2	62.1	0.502
1996	139	33.6	63.5	0.529
1997	117	34.3	64.2	0.534
1998	106	40.4	65.4	0.618
1999	114	43.9	66.7	0.658
2000	108	54.4	66.3	0.821
2001	107	52.3	66.7	0.784
2002	109	51.3	66.5	0.771
2003	108	53.6	66.1	0.812

Source: FCC (2000d), FCC (2001d), FCC (2002b), FCC (2003b), FCC (2004b), FCC (2005b)

Figure 1: Cable Industry Revenue, 1985-2004



Source: NCTA (2005f), NCTA (2005c).

Figure 2: The Multichannel Video Programming Industry

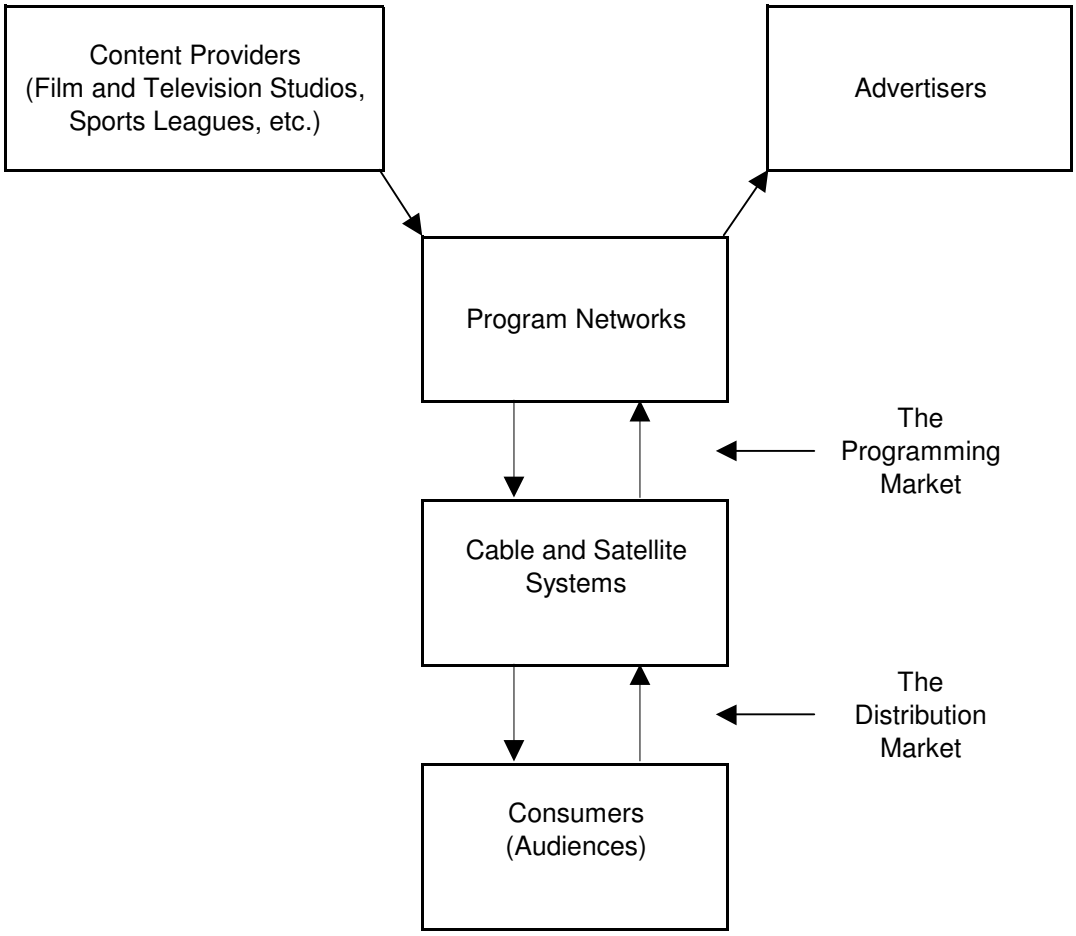
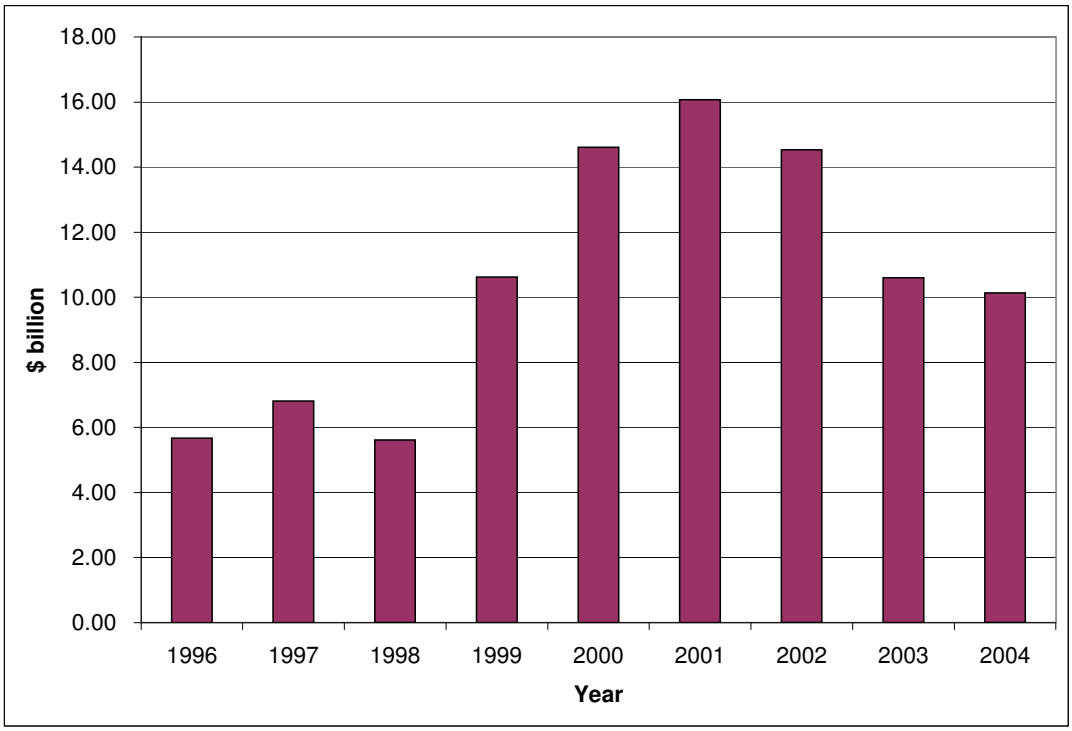
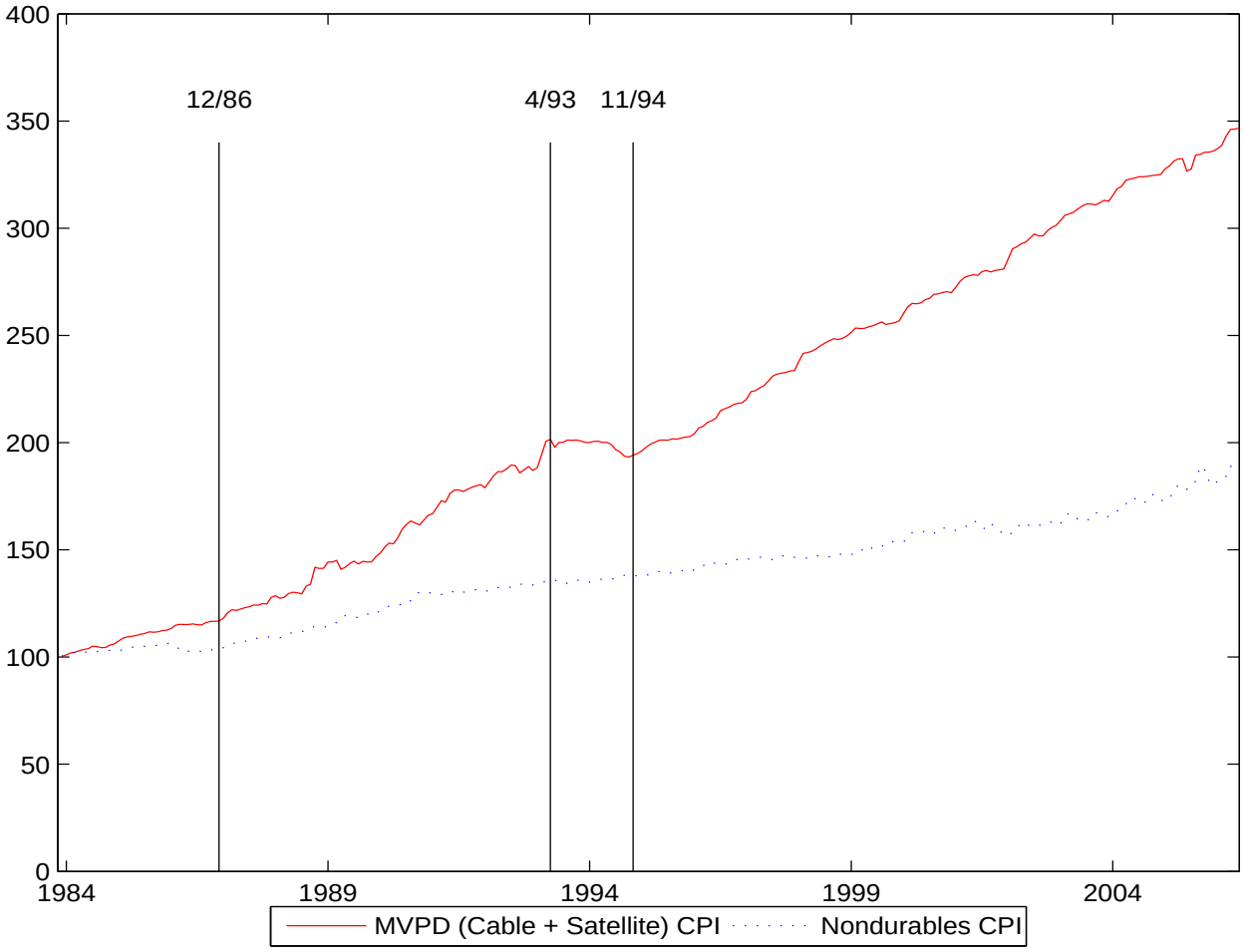


Figure 3: Cable Industry Infrastructure Investment, 1996-2004



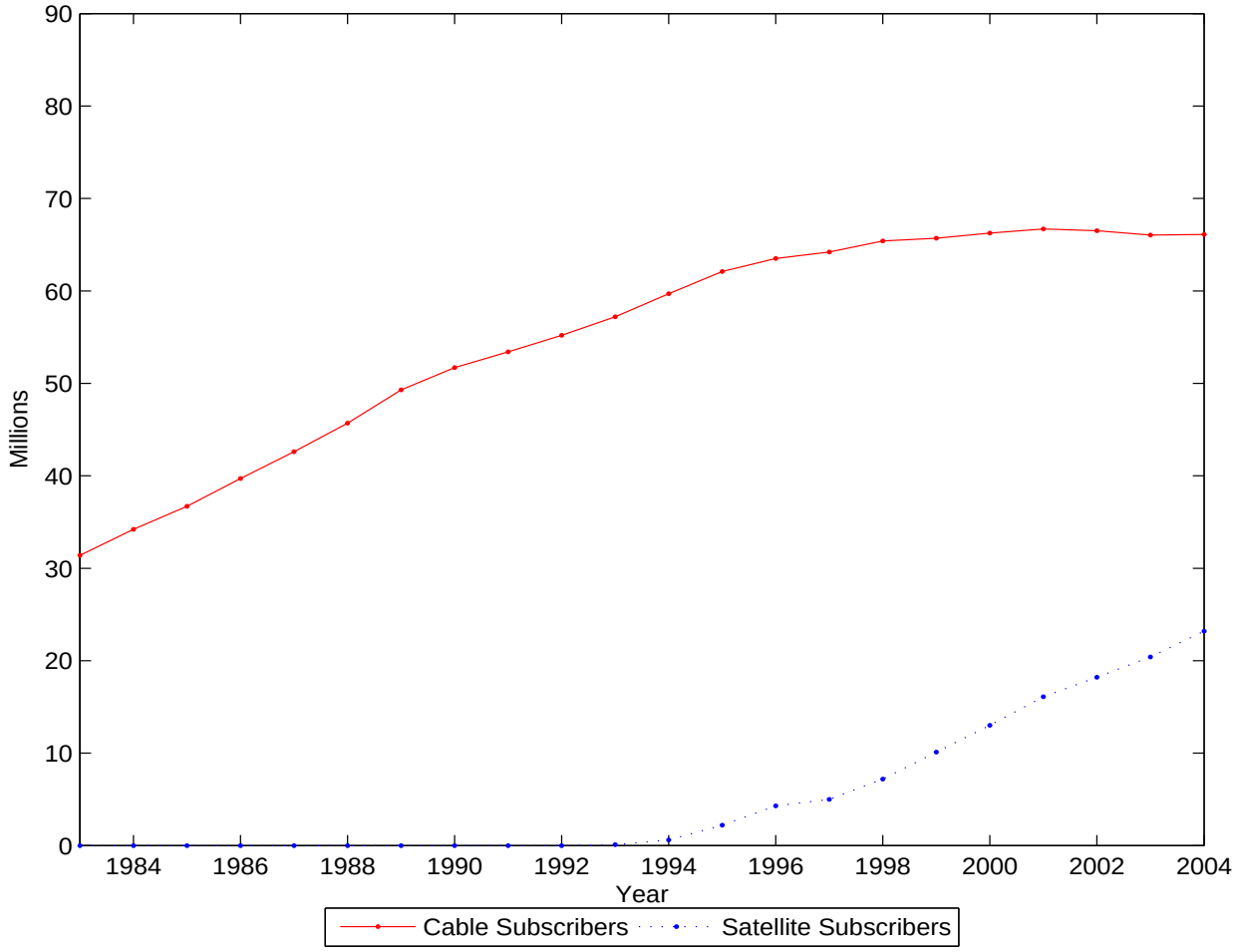
Source: NCTA (2005d).

Figure 4: MVPD (Cable + Satellite) Prices, 1983-2006
December 1983 = 100



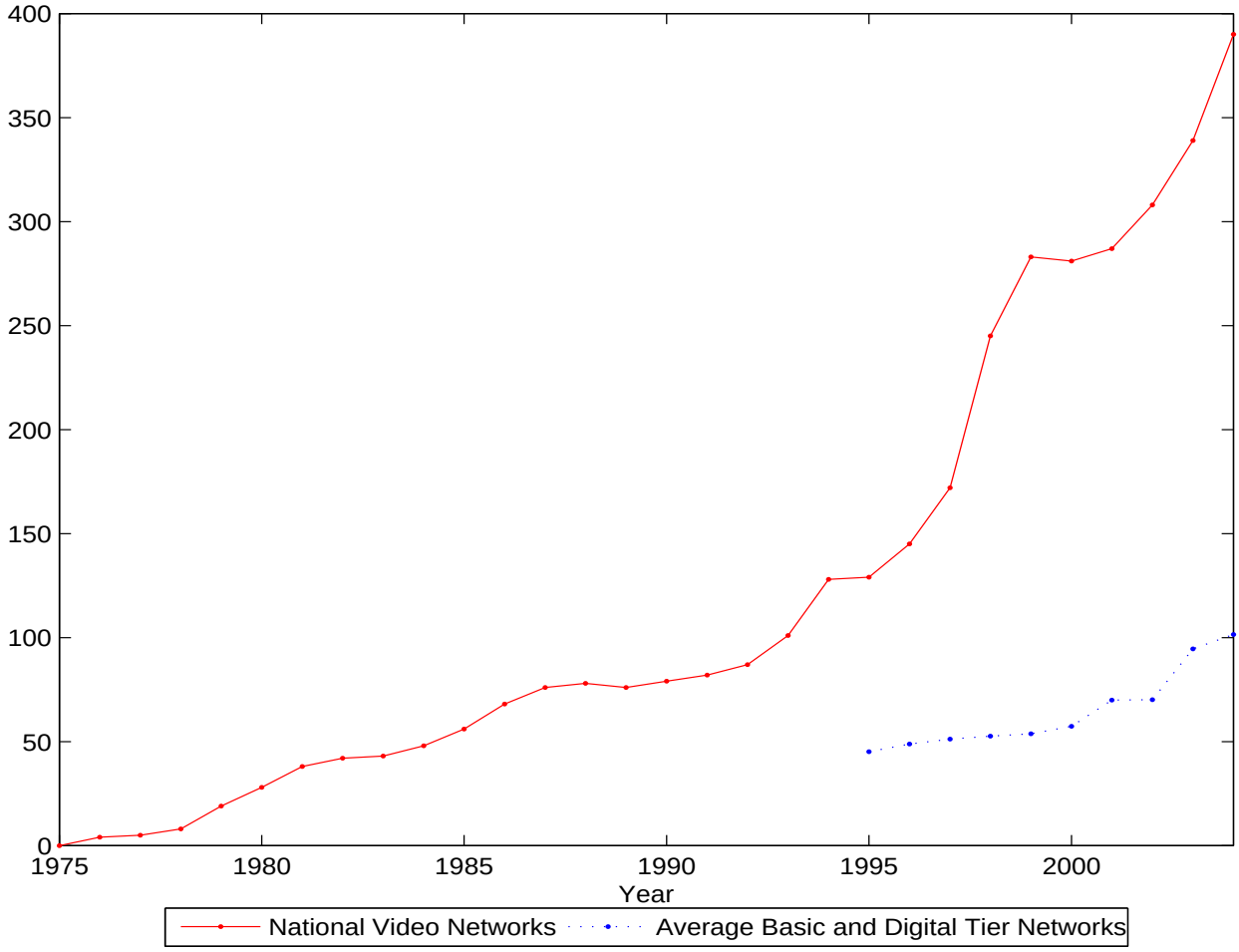
Source: Bureau of Labor Statistics.

Figure 5: Cable and Satellite Subscribers, 1983-2004



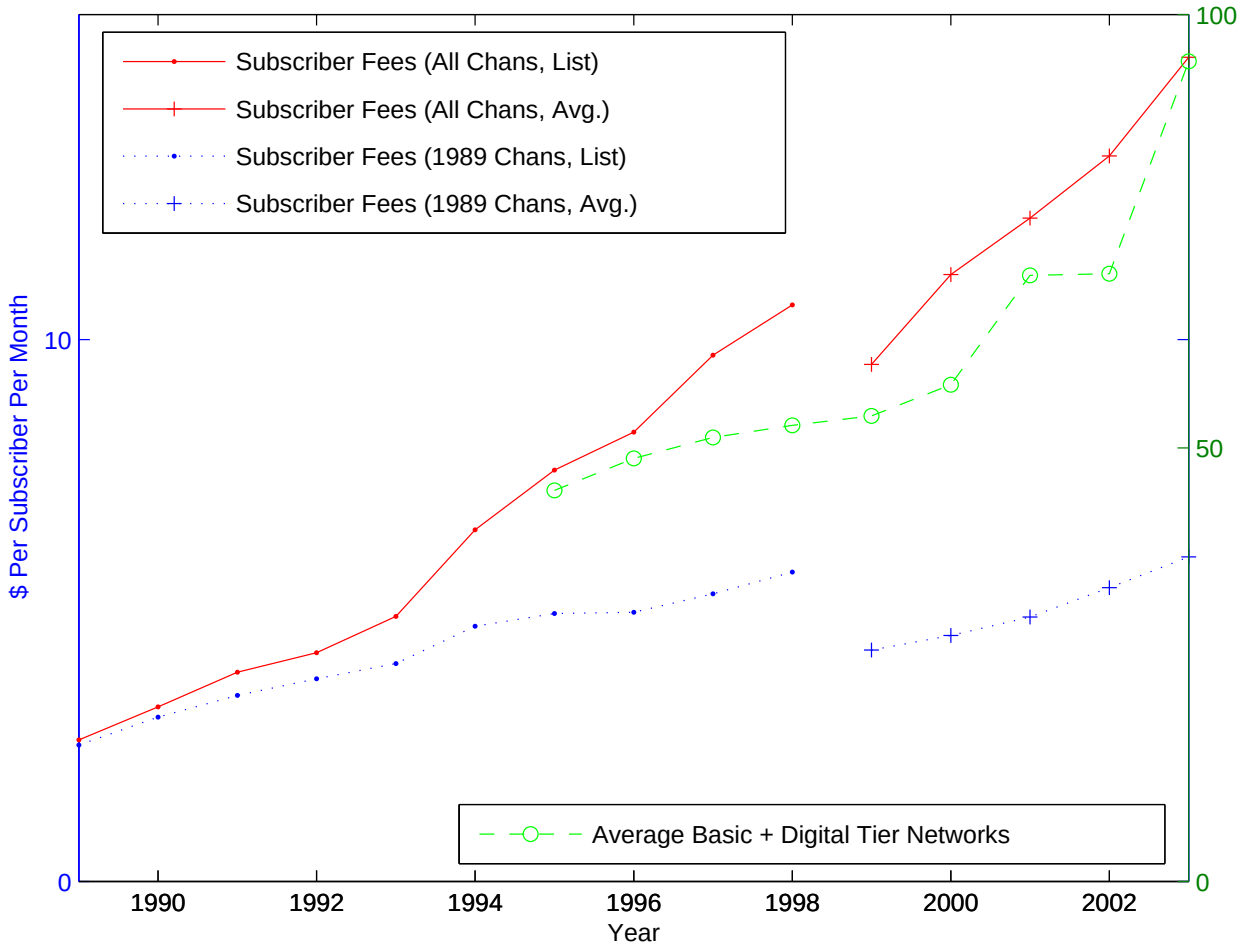
Source: Hazlett and Spitzer (1997), FCC (2001d), FCC (2004b), FCC (2005b)

Figure 6: Cable Programming Network Availability and Carriage, 1975-2004



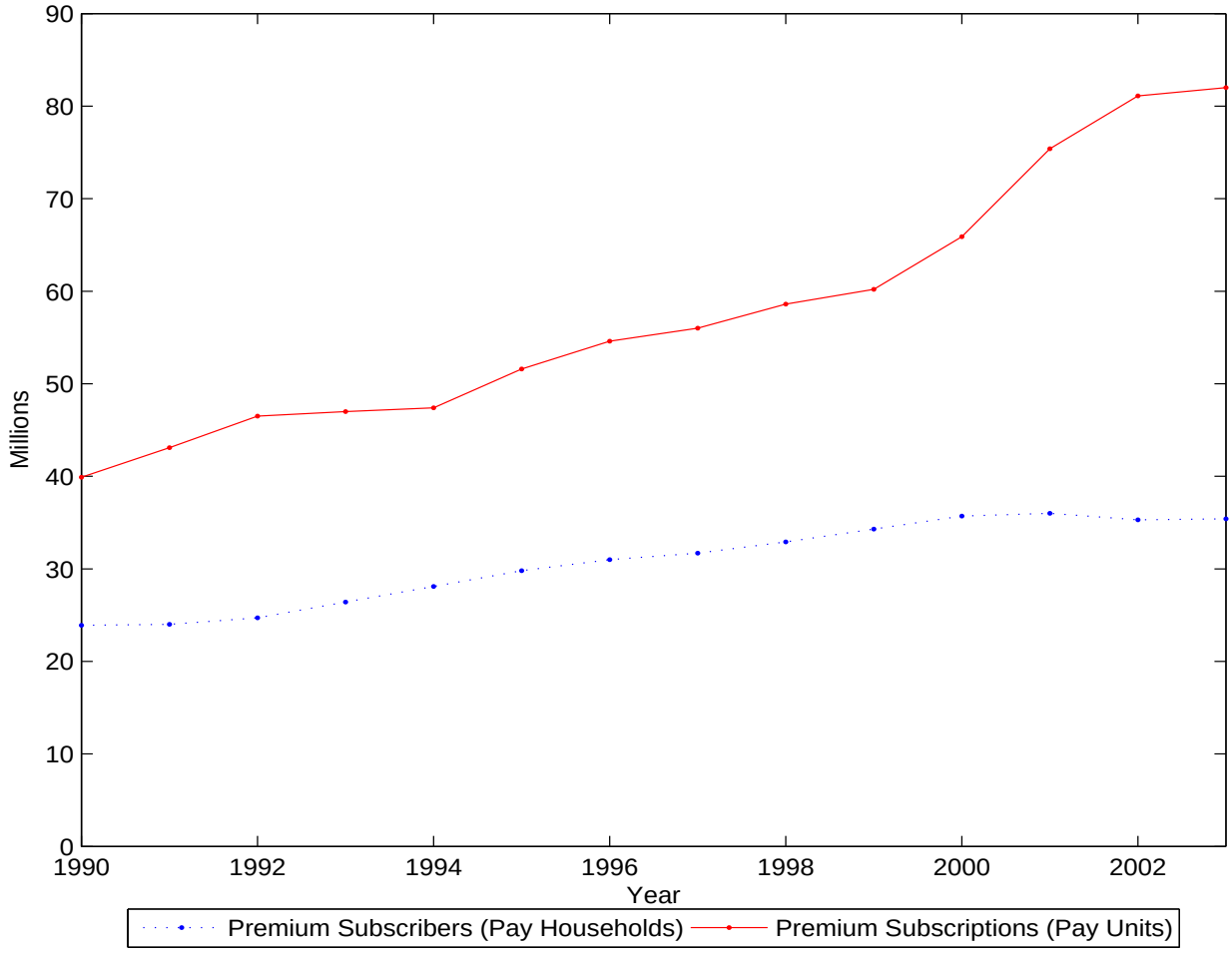
Source: Hazlett and Spitzer (1997, p.96), FCC (1998a), FCC (1999), FCC (2000a), FCC (2001a), FCC (2002a), FCC (2003a), FCC (2005a), NCTA (2005e)

Figure 7: Cable Programming Network Cost, 1989-2003



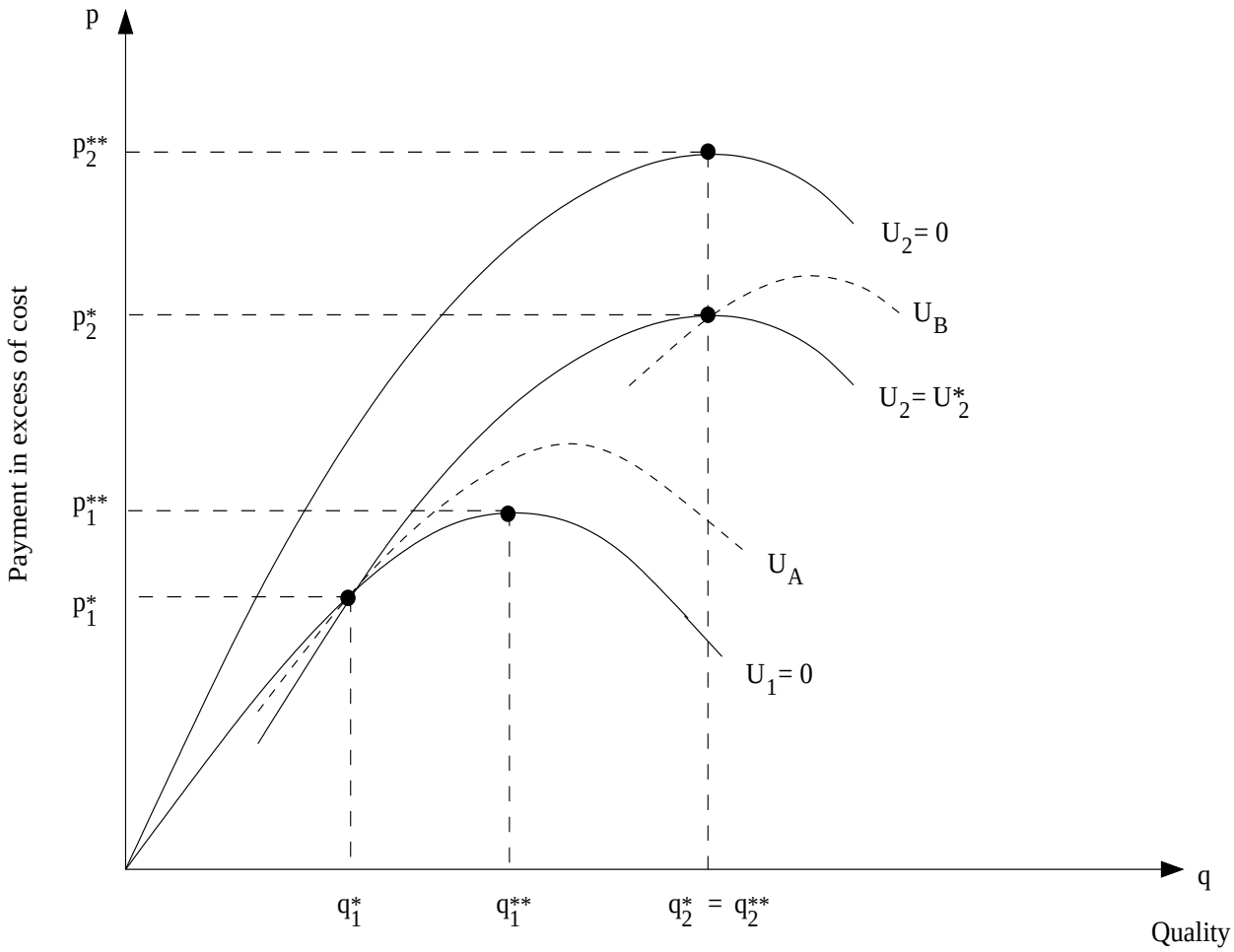
Source: Kagan World Media (1998), Kagan World Media (2004), Hazlett and Spitzer (1997)

Figure 8: Premium Subscribers and Subscriptions, 1990-2003



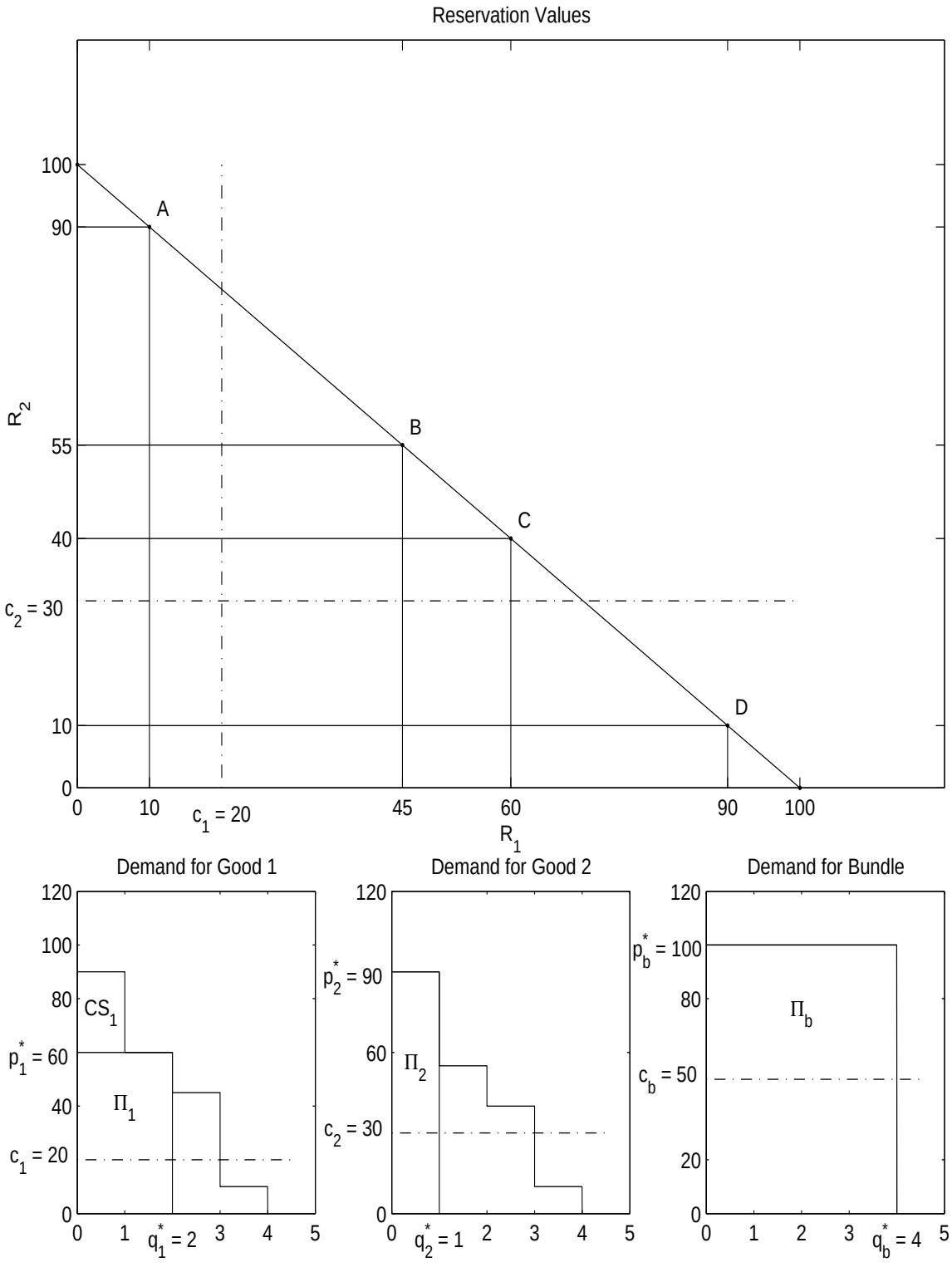
Source: FCC (1998b), FCC (2004b), FCC (2005b)

Figure 9: Quality Degradation with Two Types



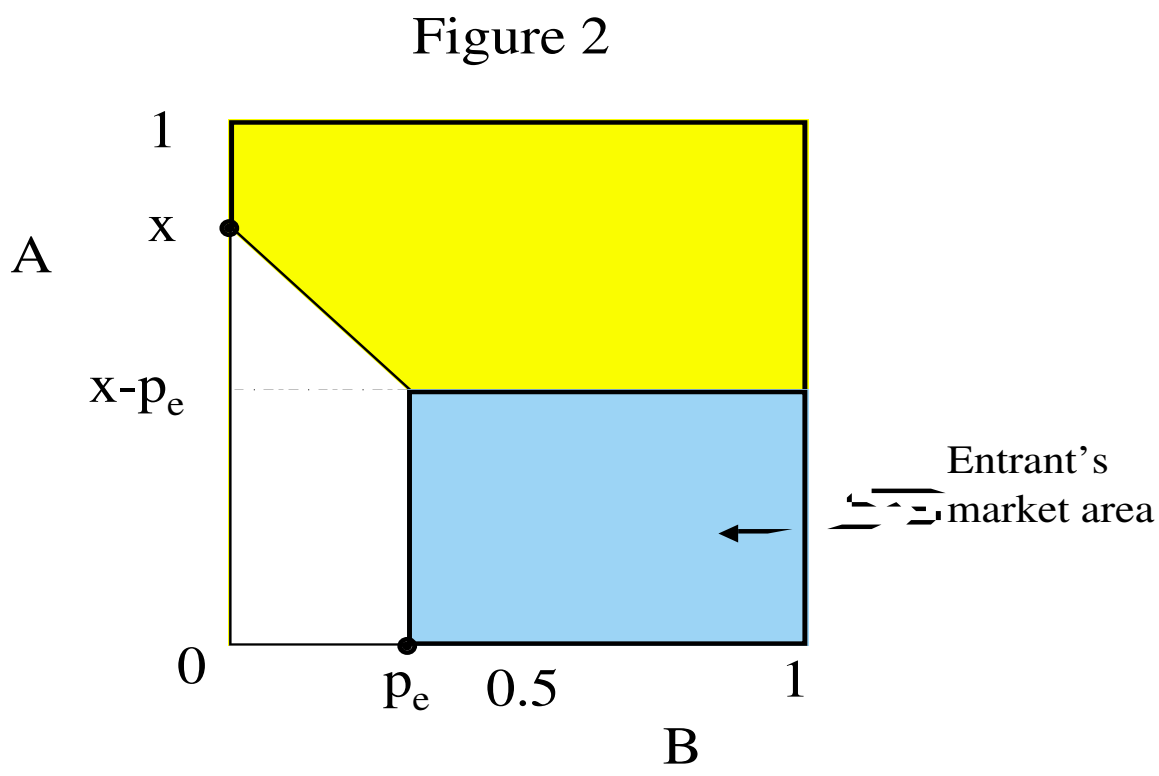
Adapted from Maskin and Riley (1984).

Figure 10: Bundling versus Component Sales: An Example



Source: Adapted from Adams and Yellen (1976).

Figure 11: Bundling to Deter Entry



Source: Nalebuff (2004).