CHAPTER

4

Industry Structure and Competition Absent Distribution Bottlenecks

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Today, television broadcasting and the Internet are at opposite ends of the spectrum along several dimensions. Broadcast television has relatively high production values, limited consumer choice, and is one-to-many. Internet services generally have very low production values, offer tremendous consumer choice, and can be one-to-one, as well as one-to-many. Technological progress has the potential to break down many of these distinctions.

For at least a decade, discussions of convergence in telecommunications have focused on the convergence of voice and data. Over the next decade, convergence will extend to video. This extension may take several forms. It may entail the current broadcast television infrastructure's being used to offer existing Internet services, such as e-mail and web browsing. Alternatively, it may become possible to offer television-quality video over the Internet's wired infrastructure at low cost.

Although both forms of convergence are probable, the focus here is on the second: What is likely to happen when the Internet can be used to carry individually selected, full-motion video programs to the vast majority of the U.S. population at relatively low cost?[1] The rise of entirely new and

[1]The focus is on the United States because of its important global roles in both the television and Internet industries. Although other countries often have a very different market structures, many of the market forces identified here are relevant to those countries as well.

unforeseen services will very likely turn out to be the most far-reaching and important development. However, it is hard to say much about unforeseen services. Thus, the predictions offered are restricted to services closely related to today's television and the ways in which Internet distribution may affect the industrial organization of, and competition in, the television industry.

This chapter first offers a set of criteria by which to determine what constitutes television for present purposes. It then identifies four important technological trends on which the analysis of television is predicated. Next, the analysis of market effects begins by briefly addressing questions concerning the fundamental business models for television in the light of these technological trends. The next section presents a decomposition of the current television value chain into separate stages and examines how competition in each stage is likely to be affected by the projected technological trends. The implications of these technological trends for the extent of vertical integration and bundling across stages of the value chain are then examined. Lastly, some thoughts are offered on how the predicted developments will affect the economic welfare of existing industry participants. Consumers are likely to be the big winners, and local broadcasters will be the big losers from Internet distribution of television. The effects on other parties will generally depend on their abilities to take advantage of new opportunities. Brief thoughts on the likely timing of various developments are offered in a concluding section.

HOW WILL WE KNOW "TELEVISION" WHEN WE SEE IT?

In order to answer questions about the future of television, a definition of *television* is required. Television can be defined in terms of content (e.g., video news and entertainment), a transmission technology (e.g., wireless transmission within a particular bandwidth), a form factor for receivers (e.g., specifications for TV screens and how close one sits to them for viewing), or even a social context (e.g., whether viewed in a group or alone).

The rise of the Internet to distribute full-motion video is likely to change people's conception of television itself, as well as the industry that provides it. In order to stay focused, this chapter concentrates on services that are much like what is seen on television today. In particular, it adopts a loose definition with the following elements.[2] The flow of content is asymmetrical; the bulk of the information flow comprises "programs" sent from the "service provider" to the "viewer." Messages from the viewer principally consist of instructions to the service provider. The programming is

[2]This definition is similar to one offered by de Vos (2000, p. 13): "In principle, television is the public transmission, over some distance, of audiovisual programmes and services made for a relatively large audience."

created by professionals for relatively large audiences. The programming comes in discrete units of between 15 minutes and several hours. Lastly, a viewer can sample and select the programming relatively quickly, if not instantaneously. Whereas transmission need not be instantaneous or real time, it must be "convenient time." Whether "convenient" turns out to mean a few seconds or a few minutes remains to be seen.

As illustrated in Figure 4.1, television will be only a small part of the forthcoming multimedia Internet.[3] Moreover, there will be few bright-line boundaries between services. Nevertheless, the criteria above help distinguish television from a number of other video services that might be offered over the Internet:

- E-videotape can be thought of as services that require planning to utilize (say an hour or two before viewing or even a day in advance to allow overnight downloading). Using such a service would be similar to a trip to a video store, without the inconvenience of travel and with a much larger, constantly updated selection.[4] Al-

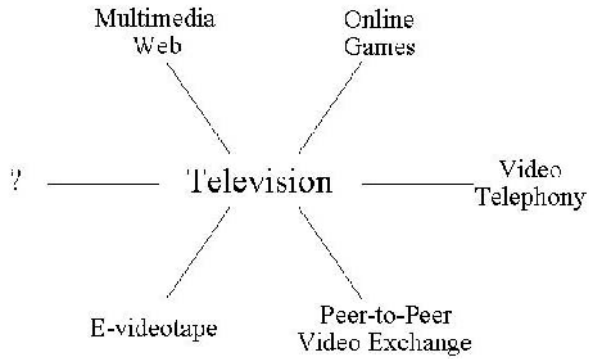

FIG. 4.1. Television within a broader web of applications.

[3]Indeed, there is reason to believe that television services as they have been defined will not drive the deployment of high-speed access to the home. Broadcast and cable television will continue to offer programming and advertising at relatively low cost during the time frame over which broadband is deployed. Consumers' incremental willingness to pay for increased variety and interactivity of television programming is uncertain at this time.

[4]Of course, there is the ongoing debate of whether there are desirable aspects of the video store experience (e.g., buying a box of Milk Duds for immediate consumption or looking for other single people renting movies) that cannot easily be replicated through electronic media.

though such a service may be a relatively close substitute for television for viewing dramas, comedies, and documentaries, it would not be a good substitute for the delivery of fast-breaking news or major sporting events. Such a service could also place different demands on the network and edge devices than will television, substituting storage and processing capacity at the consumer's premises for network transmission capacity.

- Another type of service is peer-to-peer or server-mediated end-user video file exchange (e.g., a "video Napster"). Video file exchange is similar to e-videotape when the files exchanged are professionally produced material, as opposed to something more like video mail.
- Video telephony is a real-time, symmetrical, two-way service that is generally one-to-one without professionally produced content. The way in which consumers use the service will be different from television, as will the demands the service places on the network (e.g., very low latency and bidirectional capacity).
- Online video games have asymmetrical information flows and have professionally produced content, but the degree of interaction is still recognizably greater than television as defined here. There will be some blending of online video games and television as television programs continue to add interactive elements, such as playing along at home with the on-screen game show contestants or guessing the next play called in a televised football game. But these applications demand considerably less of the network in terms of latency than do action video games. Television programming can rely on streaming and the use of buffers to allow transmission over less capable networks.
- Multimedia web services with short video clips integrated into largely text- and graphics-based content will primarily differ from television in terms of user interaction. With multimedia web services, the user actively searches for information and digests it in relatively small chunks. Multimedia web services also place weaker demands on the network in terms of capacity.
- Lastly, entirely new services may develop.

CENTRAL TECHNOLOGICAL TRENDS

Technological progress in computing and telecommunications is giving rise to at least four developments that have fundamental implications for business models and competition in television.[5]

[5]There is a fifth technological development that has important policy implications: Global connectivity of the Internet raises jurisdictional issues for content regulation.

Increased Ability to Process User Feedback

Perhaps the biggest change is the development of a return channel that allows the viewer to send information all the way back to the intelligence in the program provider's system. The existence of back channels carrying messages from the viewer to the service provider creates possibilities for several new types of services. One possibility is for the service provider to pass the end-user's message on to a third party, either to exchange information (e.g., e-mail) or to facilitate some form of e-commerce transaction.

Another possibility is to use the back channel for the viewer to communicate with the video service provider itself. One use of this capability is for the service provider to collect information about the viewer that can then be relayed to advertisers. This back channel can also be used to allow the service provider and end-user to customize the content that the end-user views. For example, an end-user may choose among camera angles when viewing a sporting event. Or she may choose the language spoken by the commentators. Consumers enjoy a degree of interactivity today (e.g., they choose the channel to watch), but the set of choices is constrained by the limited capacity current distribution networks. The future ability to offer customized programming will be a consequence of a broader effect of the back channel—the ability to tailor the signal that is sent to a particular end user will create a dramatic increase in *effective* distribution capacity. This point is sufficiently important to break it out separately.

A Tremendous Increase in Effective Distribution Capacity

Existing over-the-air broadcast television provides distribution at a very low cost, but offers relatively low capacity in terms of the variety of programming.[6] Cable and satellite distribution systems greatly increase the number of channels that can be broadcast, but transmission capacity still is tiny compared to the collection of available programming. One reason for the lack of capacity is that existing distribution technologies send signals for all programs to all consumers and then filter out the unwanted ones at the viewers' premises. In a sense, there exists a very short back channel from the viewer to the program provider that reaches only as far as the television set or set-top box. This situation is illustrated in the top panel of Fig. 4.2. The figure illustrates the fact that a wide range of content is filtered down for broadcast and then further filtered when the viewer selects a particular channel. As shown in the bottom panel of Fig. 4.2, extension of the back channel and creation of user-dedicated transmission channels (i.e., switched broadband access) change the situation com-

[6] In making this statement, I—like the U.S. Congress—am ignoring the tremendous opportunity cost of the spectrum.

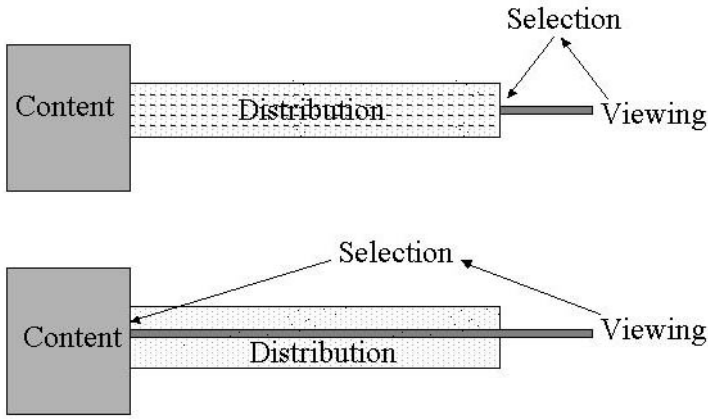

FIG. 4.2. Lengthening the back channel.

pletely.[7] The dedicated channel can be used to carry any properly formatted program in the content library that is selected by a connected viewer.

The Separation of Applications from Transport

The layering model of the Internet allows for the development of applications that are oblivious to the underlying transport infrastructure. This pattern is sometimes referred to as the hourglass structure of the Internet architecture because there are minimal specifications of protocols in the middle that support a wide range of transport networks below and a wide range of applications above (Computer Science and Telecommunications Board, 2000). (Figure 4.3 illustrates this structure.) This architec-

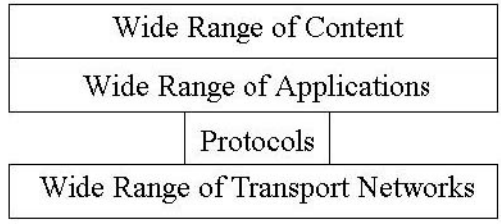

FIG. 4.3. Hourglass architecture.

[7]Although they are not explored here, this increase in capacity has important policy implications. Much of the current U.S. broadcast regulation is an ostensible response to spectrum "scarcity." The already tortured arguments for much of this regulation should be strained to the breaking point.

ture allows innovation to occur at the applications layer and the transport layers separately. The feasibility of independent innovation speeds the rate of innovation and increases the flexibility of the network to take advantage of new opportunities. Someone with an idea for a new application can bring it to market without having to alter the underlying transport infrastructure. As discussed in greater detail later, this technological separation also facilitates the ownership separation of distributors from content creators and packagers.

Continued Increase in Storage and Processing Power Controlled by Viewers

Another (and related) characteristic of the Internet is that the intelligence resides at the edges of the network. Internet devices typically are "smart," in comparison with "dumb" televisions, suggesting that Internet televisions will be smarter than current models. Indeed, consumer television devices already are getting smarter with advent of products such as TiVo, which allows a viewer to record programs on a hard drive and then manipulate the data in various ways, such as pausing. As users have increasing processing power and memory under their control, they can engage in editing, time shifting, and copying, among other activities. This type of user control over programming potentially has profound implications for business models, as the next section discusses.

WHO IS GOING TO PAY FOR "TELEVISION" IN THE FUTURE?

Most suppliers in the television industry are there to make money. Television content creators, aggregators, and distributors' revenues ultimately derive either from payments made by advertisers or from subscription fees paid by viewers.[8] Certain technological developments threaten business models based on either the subscription or advertising revenue streams. There are, however, several possible supplier responses. Moreover, other technological developments may strengthen these business models.

Consumers' ability to copy programming (and the development of widely deployed peer-to-peer communications) threaten suppliers' ability to rely on subscription fees. Service providers can be expected to implement various forms of copy protection in response. However, history suggests that these measures will be defeated, if by nothing else then by consumers' conducting video screen scrapes. Interestingly, the lengthened back channel and the ability to offer interactivity can create personalization that may make copying more difficult and costly. With interactive

[8]For a more detailed description of the current industry structure, see Owen and Wildman (1992).

programming, viewers may only see the results of a particular interaction, not the underlying program that drives the creation of each instance. Although it falls outside of the present definition of television, consider a video game played over the Internet. Even if a player could readily copy all of the images on his or her screen, sending those copies to another person would be a poor substitute for a copy of the game itself.

Consumers' ability to edit programming affects suppliers' ability to rely on the sale of advertising. Increases in memory and processing power will make it increasingly easy for consumers to avoid commercials.[9] However, several strategies will be available to service suppliers to counter this trend. One is to create commercials that consumers want to view because the advertisements are entertaining or informative. A second strategy is to provide a separate reward to consumers for watching advertisements they would otherwise like to avoid viewing. Consumers' viewing of commercials would be monitored (e.g., consumers might respond via the back channel to instructions or questions embedded in the advertisements), and consumers would be rewarded for watching commercials by being given monetary payments or conditional access to desirable programming.

Another possible strategy in response to consumer sophistication is to create advertisements that cannot be avoided because they are embedded in programming consumers desire to watch. The suggestion that television is moving to a world of ubiquitous product placements is only somewhat facetious.

Whereas some technological developments threaten the advertising business model, others will create new opportunities. Digital technologies will create enhanced product placement capabilities. For instance, technology makes it possible to combine multiple signals on a single screen in an integrated fashion, and different consumers may well see different products in the same place on their screens. This fact raises questions about who will control the screen a viewer sees. Who will control banner ads, electronic product placements, and other forms of advertising or electronic interaction on the screen? The answers to these questions will have profound implications for business models.

New technologies will also make it possible to offer advertisers better monitoring of viewing patterns and more tightly focused viewer demographics. The latter can be attained in two ways. First, the increased fragmentation of viewing audiences due to the creation of targeted programming (discussed later) will offer advertisers narrower audiences

[9]Viewers have some tools at their disposal today. Those viewers watching a stored (on tape or a disc) copy of television program can fast forward through the advertisements. This process may become automated. On the World Wide Web, AdSubtract (http://wwww.adsubtract.com) already offers software that blocks banner ads on web pages.

along the lines that cable television has done. Second, even when a program has an audience with diffuse demographics, it will be possible to transmit different advertisements to different viewers for finer segmentation than that provided by audience self-selection alone.

In any event, the remainder of this chapter assumes that the technologies necessary to support both the advertising and subscription models will be created.[10]

IMPLICATIONS OF TECHNOLOGICAL CHANGE FOR THE VALUE CHAIN

Assuming that a successful business model is developed, how will the rise of the Internet as a medium for distributing video content affect television? The analysis first examines the value chain for video programming and the ways in which the technological developments already discussed will affect *individual* links in the value chain. The following section takes up the issue of how Internet distribution affects relations *across* links of the value chain.

The Current Television Value Chain

Figure 4.4 lays out a simple value chain for video programming. This value chain does not explicitly illustrate the production and sale of advertisements, even though advertising is the primary output of the over-the-air television industry. This value chain is nevertheless useful because viewers provide the eyeballs for which advertisers are paying, viewers pay subscription fees, and viewers will provide a customer base for future e-commerce transactions.

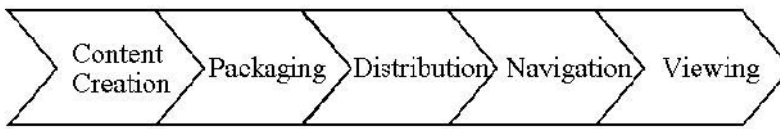

FIG. 4.4. A simple value chain for video programming.

[10]There is a slight danger in this approach in that an entirely new business model might develop that could have profound effects on the industry structure. This is not likely to happen, and in any event who knows what it will be.

Content Creation

Content creation consists of the various activities undertaken to produce the programming ultimately offered to viewers. Television program creation is undertaken by major studios, as well as a variety of independent producers. Local broadcasters also create content, primarily in the form of various news, and what might be called news-lite, shows.

Packaging

There are several dimensions to packaging.

Filtering. Even with cable and satellite transmission, the ability to distribute programming to viewers is greatly limited relative to the potential demand for program variety. There are tens of thousands of programs and hundreds of millions of potential viewers who may want to watch different programs or view the same program but at different times. Hence, an important role today is to select which programs are broadcast and which are not broadcast. Local broadcasters, satellite broadcasters, cable systems operators, and broadcast and cable networks all play this role.

Timing. Timing involves strategies based on the relations of programs within and across channels.[11] Within channels, packagers worry about flow, or how the audience of a program feeds into the audiences of programs following it. Packagers also worry about what program to show against programs on rival channels at a given time. Today, local broadcasters and broadcasting and cable networks are the primary timing decision makers.

Aggregation. At present, packagers engage in several types of aggregation. Terrestrial over-the-air broadcasting and cable television systems distribute video programming over local areas. Packagers engage in geographic aggregation in response. Networks and syndicators reach contracts with a large number of local outlets to broadcast a given program. Doing so economizes on transactions costs because each program producer does not have to reach an agreement with hundreds of different broadcasters and cable systems operators. Second, packagers can offer a single contract to an advertiser through which that advertiser can purchase advertising time on a large number of local distribution systems at once. A network can also provide cross-program aggregation that offers one-stop shopping to a potential advertiser seeking time slots on a range of programs. Lastly, satellite and cable systems

[11]Although timing can be conceptualized as a particular instance of filtering, it useful to discuss the two concepts separately.

operators aggregate consumers in collecting subscription fees for networks, again economizing on transactions costs.

Distribution

Distribution consists of delivering a signal that carries content from packagers to television receivers located on potential viewers' premises. Today, the dominant forms of distribution are terrestrial over-the-air broadcasting, cable television, and direct-to-home satellite broadcasting.

Navigation

Navigation services have at least two components. One is simply to tell potential viewers when and on what channel programming is available. Today, such services are provided by on-screen guides, on-air promotions, newspapers, magazines, and Web sites. A second component is to provide various ratings or advice to potential viewers. Newspapers, magazines, and Web sites all offer opinions on the quality of various programming.

Clearly, the activities of the navigation stage are related to the filtering of the packaging stage. When multiple programs are offered as a package under a common brand, the brand may develop a reputation that consumers use as a basis for making viewing (or at least sampling) choices. These reputations can form as consumers make predictions of the likely quality of unseen shows based on the consumers' experiences viewing other shows offered under the same brand (e.g., on the same network). Perhaps the central difference is the extent to which the process is one of narrowing down the set of choices offered to a consumer (packaging) versus helping the consumer make choices from a wide universe (navigation).

Changes

The distribution of full-motion video over the Internet to a mass audience will dramatically affect the distribution link of the value chain. This development will then have significant effects on the other stages of the value chain.

Distribution

Because they are central to overall developments, consider first changes in the distribution stage. Internet distribution of television entails moving bits from packagers' servers to computers located on viewers' premises over the various networks that make up the Internet infrastructure. With the advent of widely deployed broadband video services, there will no longer be a *technological* bottleneck in distribution. It remains to be seen whether there will be a *commercial* bottleneck due to monopoly or duopoly control of local (or "last mile") broadband distribution.[12] At least

for traditional programming, as long as satellite and terrestrial over-the-air broadcasters remain, the commercial bottleneck will not be any narrower than it is today. Even if there remains a commercial bottleneck, it need not limit the variety of programming made available to consumers. Whether the bottleneck limits variety will depend both on the business model adopted by any bottleneck distributor as well as public policy toward that distributor. This issue is addressed in a later section.

Packaging

Changes in the distribution of television will have major impacts on all three of the roles that packagers play.

Filtering. The increase in the length of the back channel has the effect of making all programming available to potential viewers once the content has been stored in digital form. There is no longer a demand for filtering in response to capacity constraints in the distribution system. Instead, the scarce resource is viewer time (and money). Thus, the filtering function will shift almost entirely to the navigation link in the value chain.

Timing. The change in the distribution model increases the possibility of widespread asynchronous viewing. In an asynchronous world, the role of the packagers in creating flow and engaging in counterprogramming may be greatly diminished. Instead, viewers may work with navigation services that allow viewers to create their own packages for many types of programming.

Synchronous viewing will not disappear. Presumably synchronous viewing will remain important for major sporting contests, awards shows, and other forms of event programming. Synchronous viewing may well continue for comedy and drama series because of benefits of common viewing times that allow people to discuss particular programs with their friends and coworkers the next day.

Aggregation. As many observers have noted, once a site is connected to the Internet, it is globally available. This fact suggests that the explicit geographic aggregation role of packagers will disappear. Indeed, there may be a role for geographic *dis*aggregation, whereby service providers offer targeted advertising or institute charges for advertising based on the locations and other demographics of viewers.

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[12]At least for very densely populated areas, a degree of oligopolistic competition is probable. Faulhaber and Hogendorn (2000) presented a calibrated simulation indicating that 70% of households will have a choice among at least three providers if there is a 66% take rate for broadband access at $50 per month.

Other types of aggregation may become more important than at present. For instance, advertisers place value on being able to reach a mass audience with a single campaign. One way to accomplish this objective is to run an advertisement on a program with a very large audience. The increase in distribution capacity and the resulting number of programs available to viewers will fragment audiences even more than have cable and satellite distribution, making this strategy increasingly difficult. An alternative approach is to show an advertisement in a coordinated fashion across a large number of programs simultaneously. By aggregating a large number of smaller audiences, a packager can thus create a synthetic mass audience.

Programs may also be aggregated in the sense that a variety of programs are offered at a single site or under a single brand name. As discussed earlier, branding can allow firms to form reputations and thus serve as a form of quality certification on which consumers could base viewing choices. In this way, the packaging role would shift to become a navigation role.

Lastly, program providers whose business models rely on payments by viewers may also pursue packaging or bundling strategies. Two extremes frame the possibilities. Under total unbundling, programs would be available in small units (one could imagine charging by seconds of viewing time). In this world, packaging would be limited to branding and the creation of stand-alone dramatic units of programming, and navigation would play a very large role. At the other extreme, programming would be combined into a handful of large bundles and sold to potential viewers only as packages.

It appears that the industry will continue to offer a mix. The continued evolution of the online payments industry will reduce the costs of offering pay-per-view programming over the Web. In addition, the increase in distribution capacity will eliminate the need for channels that provide little bits of all types of programming (e.g., news, sports, comedy, and dramas) as do the traditional broadcast networks. Instead, viewers will be able to select among a huge menu of specialized offerings—taking the development of specialized channels on cable television several steps further. Nevertheless, service providers may charge fees for bundles of programs, rather than on a program-by-program basis, as a strategy to extract surplus from consumers.[13]

If much of this sounds somewhat familiar, it should. These predictions regarding the role of packagers for television over the Internet mirror the

[13]Horizontal bundling strategies may allow firms to engage in certain forms of price discrimination. Moreover, horizontal bundling strategies can affect the nature of competition between service providers. Nalebuff (2000) shows that a firm can gain strategic advantage by selling a bundle in competition with a collection of firms selling individual components.

role of packagers of text and still images on the World Wide Web today. In terms of overall structure, the World Wide Web has a similar value chain to television. And the similarities are likely to increase as television moves to the Internet. Despite the possibility of offering virtually unlimited variety on a per-program basis, packaging takes place (in the form of branded Web sites offering bundles of information, in some cases for a fee) and coexists with extensive independent navigation services (e.g., Yahoo!) and various search engines (e.g., Google).

Navigation

The increase in both the number of programs and the sources of programs will greatly increase the need for both navigation-as-a-map and navigation-as-an-advisor. Viewers will be looking for comprehensive program guides that provide good predictions of whether they will value various programs. Given the limited number of channels available to many viewers today, viewers can attempt to sample (i.e., channel surf) to determine what programming to view. In the future, doing so will be nearly impossible; imagine randomly wading through the millions of sites on the World Wide Web without a search engine or directory to find interesting pages. Web sites will certainly develop that provide recommendations and reviews of Internet television programming, as well as offer search engine capabilities. Presumably, there will be specialized search engines appealing to particular tastes and search engines that build on a user's viewing experiences to refine future searches.

The relatively low costs of setting up such sites, coupled with heterogeneous viewer preferences and the possibility of creating targeted sites, should lead to a monopolistically competitive or oligopolistic market for navigation. That said, the scalability of navigation technology may lead to guides with high market shares that come in many versions, perhaps even tailored to the viewing history and tastes of each person individually.

Content Creation

Given the ability to distribute a wide range of programming, it should not be surprising to see several different developments simultaneously. These developments will have a common thread: There will be increased competition to attract viewers and thus there will be demand for programming that is increasingly attractive to viewers. The increase in distribution capacity provides the opportunity to offer shows highly valued by relatively small numbers of potential viewers. Thus, niche programming targeted at particular viewers' interests will be offered. Just as cable offers more specialized programming than does broadcast television, the Internet will offer more specialized sites than does cable. The specialization may have a geographic component. In Europe, for example, increases in the number

of broadcast channels led to more programming of local interest (so-called proximity TV) (de Moragas Spa, Garitaonandia, & Lopez, 1999).

At the same time, the emergence of a potentially seamless global distribution mechanism will increase the rewards to programs that have broad, international appeal.[14] Thus, there may be huge expenditures on high-end, mass appeal programming, similar to the present motion picture industry. There is reason to expect that most viewing will be of a relatively small number of programs, as one observes with television today.[15]

Just as video games and broadcast television coexist today, in the future there will almost certainly be programming with a wide range of interactivity. In fact, a given program may offer viewers a range of degrees to which they are interactively involved.

IMPLICATIONS FOR VERTICAL STRUCTURE

Having looked at the effects of technological trends on individual stages in the value chain, now consider how these trends will affect the relation between stages. In particular, consider the degree to which vertical integration and bundling are desirable from commercial and public interest perspectives. A firm is *vertically integrated* when it operates in two or more stages of the value chain. A firm engages in *vertical bundling* when it makes its services at one stage available in only fixed combinations with services at another stage.

The Current Extent of Vertical Integration and Bundling

At present, many industry participants are vertically integrated into two or more stages of the value chain. Although primarily packagers, the broadcast networks generally are backward integrated into content creation and forward integrated into distribution. All of the major broadcast television networks have in-house production arms for television programming, and many networks are associated with major motion picture studios. The parents of the major broadcast networks tend to be the larg-

[14]"Potentially" seamless because there are significant business issues with respect to developing advertising models that will work in a global context (e.g., ads with global appeal vs. location-specific ads inserted based on the viewer's address) and collecting subscription fees on an international basis.

[15]Cable and satellite service subscribers have access to dozens, and sometimes hundreds, of channels. Although most of these subscribers' viewing is of cable networks, their viewing is disproportionately concentrated on programming generated by a handful of broadcast television networks. Despite having fallen for decades, the ABC, CBS, and NBC networks' combined television viewing share is between 30% and 40%. (Paul Kagan Associates, *Cable TV Advertising,* February 28, 1999, and June 21, 1999.)

est group owners of local broadcast stations. And Fox Television's parent, NewsCorp, has financial interests in *TV Guide* magazine and on-screen programming guides, which are navigation tools (News Corporation Website, 2002).

The networks are not alone in vertically integrating. Local broadcast stations focus on distribution but, rather than serve as common carriers, they integrate backward into both packaging and content creation (e.g., production of local news and sports programming). Cable systems operators also engage in packaging by choosing which cable networks to carry, and some large cable systems operators have made significant investments in cable programming networks.

Whereas vertical integration is extensive, there are many firms that operate at only one stage or are vertically integrated but operate as at least somewhat open systems. There is partial but significant unbundling across every stage in the value chain. Despite being integrated into packaging and content creation, broadcast networks buy programming from studios associated with other networks. Networks also purchase programming from independent content creators. Many network affiliates are independently owned, and they typically buy programming from nonnetwork packagers as well as the networks. Cable systems carry cable networks not owned by the systems operators. Lastly, navigation is provided by independent entities, as well as by broadcasters and cable systems operators.

Potential Benefits and Costs of Vertical Integration and Bundling

A vertically integrated firm may make its services at each stage available separately from one another. Hence, one should consider separately the arguments for vertical integration and vertical bundling. This part presents a tentative assessment of the desirability of vertical integration and bundling in the television industry of the future from social or private perspectives. The central hypothesis is that television over the Internet will be most successful when provided on an unbundled basis on open platforms and that the benefits of extensive vertical integration are limited. Of course, a number of industry participants appear to take a different view.

Proponents of vertical integration ascribe several benefits to it, which stem from the claimed differences in two separate companies' abilities and incentives to cooperate in terms of pricing and investments in comparison with the abilities and incentives of two divisions within a single company.[16] The following are summaries of arguments made in favor of vertical integration, as well as assessments of their probable importance in the television industry.

[16]For a summary of arguments for vertical integration that take the view that integration aligns incentives, see Perry (1989).

Vertical Integration Prevents Double Marginalization. One benefit ascribed to vertical integration is that it can lead to lower prices when suppliers have significant market power.[17] To illustrate why, consider the incentives of a monopoly supplier of broadband Internet access to raise its price from a set starting point. If that firm is also the monopoly supplier of programming (i.e., is vertically integrated), then it will take foregone programming sales into account when assessing the profitability of an increase in the price of broadband access. But if the programming is sold by a different firm, the access monopolist will not count lost programming sales as a cost and thus has less incentive to restrain price. A similar logic applies to program pricing. This line of reasoning indicates that the sum of the broadband access and programming prices set by an integrated monopolist will be lower than the sum of those prices when set independently by two distinct firms.

The double marginalization logic relies on the existence of suppliers at two or more stages with significant market power. Thus, the problem is considerably reduced if there is competition in the supply of the services at one or both of the two stages. Experience to date suggests that content creation, packaging, and navigation can be supplied by many providers, which should limit their market power. The future degree of competition is more suspect at the distribution level, but the inefficient exercise of market power at this single stage would likely remain a problem regardless of vertical integration or bundling.

Vertical Integration Increases Investment by Internalizing Pecuniary Externalities. The separate ownership of different stages in the supply chain can also have negative effects on investment incentives. An investment at one stage may generate benefits for suppliers at a different stage. When the potential investor ignores the benefits created for other providers, it tends to invest too little from the perspective of maximizing the sum of the profits of the two stages. Moreover, the empirical literature on the economics of innovation has generally found that a firm's private incentives to innovate are lower than is socially optimal.[18]

The problem of underinvestment is particularly strong if an investment at one stage induces providers at another stage to raise their prices to appropriate some of the benefits of the investment; the price increase harms the innovator and thus lowers that firm's incentives to undertake the investment in the first place. This effect is an instance of what is known as the *hold up problem*, because once the first firm has made a sunk investment, the other firm is able to "hold up" the investor and appropriate some of the returns to the investment.

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[17]The problem of double marginalization was recognized by Cournot (1838).

[18]See, e.g., Griliches (1992) and Jones and Williams (1998).

The ability of a distributor with market power to engage in hold up depends in part on its ability to charge different prices for distributing different programs. Program-specific distribution fees provide greater scope for appropriating returns from investments made by any given content creator or packager and thus can weaken the incentives of independent firms to invest in creating content that viewers highly value. Under the traditional broadcast and cable distribution model, a distributor purchases the rights to show content and then charge advertisers and viewers as the distributor sees fit. Under a common carrier model, consumers purchase distribution in the form of transport and then purchase specific programming separately. Thus, a common carrier model of Internet television distribution would be less susceptible to hold up than would the traditional model.

To the extent that there is a potential holdup problem, companies at different stages may recognize the problem. Even self-interested providers of complements can have incentives to cooperate with one another to increase their joint profits. One way is through contracts reached prior to the making of relationship-specific, sunk investments by content creators, packagers, and distributors.[19] Another way is for a firm with market power to encourage investment by developing a reputation for not exploiting its position to expropriate the full returns of investments made at other stages.

Vertical Integration May Improve Investment Coordination. In addition to investing too little, independent firms operating at different stages may have difficulties coordinating the nature or direction of their investments. However, industry-wide standards today limit the need for tight coordination between the distribution stage and the content and packaging stages. The layering of the Internet architecture will similarly minimize the need for cross-layer coordination if this architecture is extended to television. Of course, even with continued layering between applications and underlying transport, some types of programming or interactive capabilities may require specialized terminal devices. It has been suggested that there is a need for integration of content producers and customer equipment manufacturers for this reason. But one might reasonably ask whether arm's length cooperation would provide more flexibility and allow firms to specialize in those areas in which they possess distinctive competencies. Content-equipment coordination is, after all, the theory

[19]In this regard, it is worth noting that government policy should be careful not to create rules that needlessly limit private parties' abilities to design contracts. Several of the network affiliate rules promulgated by the Federal Communications Commission have this effect and thus create private incentives to integrate. Indeed, there are social incentives for network-station integration because of the inefficiencies that arise when arm's length contracting between networks and their affiliates is limited by both explicit governmental policies and implicit political pressures.

that underlays Sony's disastrous vertical integration into the production of theatrical motion pictures in support of its consumer electronics business.

The previous discussion suggests that the social and private benefits of vertical integration will be limited when television is delivered over the Internet. Moreover, whereas proponents of vertical integration claim the aforementioned benefits, both business decision makers and economists have at best an incomplete understanding of vertical integration. In practice, vertical integration does not necessarily solve the problems identified earlier. Most of these problems arise because actions taken by one firm affect the profits of other and these effects may not be taken into account by an unintegrated decision maker. However, as many people who have worked in or studied large organizations know, different divisions of an integrated firm often are in conflict with one another. Indeed, divisions of companies sometimes get along worse with each other than with outside customers and suppliers. Hence, it is far from evident that vertical integration solves the problems identified earlier or does so better than alternative mechanisms.

Further, vertical integration may have social and private costs as well as benefits. Integration may distort the decisions made by the integrated divisions due to shifts in the decision-making locus.[20] Resources may be wasted on internal corporate politics (e.g., one division may attempt to force another division to rely solely on an input produced by the first division even though the input is substandard), which can be less efficient than the market. Additionally, vertical integration may provide a firm with an increased ability to engage in vertical squeezes that can appropriate the profits of unintegrated rivals and thus undermine the rivals' incentives to make product or process investments (Farrell & Katz, 2000). Lastly, vertical integration appears to create at least some pressures for vertical bundling, which can give rise to social costs. All of these factors suggest that the case for extensive vertical integration is a weak one.[21]

Now, consider vertical bundling. It is useful to frame the discussion of vertical bundling in terms of the costs and benefits of *un*bundling. There are at least three significant social benefits of vertical unbundling.

Vertical Unbundling Allows the Realization of Mix-and-Match Benefits. A consumer can take the best offering at one stage and combine it with the best offering at a second stage, even if the offerings are provided by different firms. With Internet distribution, these benefits are potentially much larger than today. There is a huge variety of potential programming, and consumers have widely differing tastes. Internet distribution will create

[20]For a theoretical treatment, see Grossman and Hart (1986).

[21]This conclusion assumes that government policies do not unduly restrict private parties' abilities to write contracts that facilitate coordination across vertical stages.

the technological possibility of distributing a much greater variety of programming to satisfy viewer wants. No one distributor or packager will be likely to have all of the desired content. With multiple providers at each stage, consumers would benefit from being able to combine the best match at each level. Notice that this benefit arises even if firms in the industry are vertically integrated as long as they unbundle. Moreover, this effect is both a social and commercial benefit (it improves the gross benefits suppliers can offer consumers).

Vertical Unbundling Facilitates Innovation by Allowing Single-Stage Innovation. Benefits arise when unbundling makes it feasible for a firm that is not vertically integrated to compete by innovating at a single stage or unbundling allows an integrated firm to combine its innovative service at one stage with the services provided by different firms at other stages. The increased creation and diffusion of innovations can be expected to be social benefits. And, to the extent they improve the value proposition that firms can offer to consumers, they are commercial benefits. Broadband distribution and the tremendous potential for innovation over layered platforms will increase the potential benefits of single-stage innovation.

Vertical Unbundling Reduces Industry Concentration. Vertical unbundling increases competition by preventing the most concentrated stage in the value chain from driving concentration in all of the stages, which is what would happen if all firms had to be vertically integrated to compete. Moreover, vertical unbundling facilitates entry by allowing single-stage entry, which reduces the sunk costs (and thus risk) of entry and lessens the need to acquire multiple skill sets in comparison with multistage entry. The unbundling of distribution from other stages will thus prevent concentration of the distribution stage from limiting competition in other stages, as Fig. 4.5 illustrates. This pattern is what one has seen in cable television, where the networks carried on a given system are not limited to those owned by the system's operator. The increase in competition gives rise to social benefits by promoting efficiency and consumer welfare.[22] However, from the perspective of incumbent suppliers, it is a "cost."

Vertical unbundling can have social, as well as private, costs. In particular, the following arguments have been made against vertical unbundling.

[22]It is sometimes argued that increased competition will reduce innovation. This logic depends critically on what brings about the increase in competition. I am unaware of any evidence that a reduction in entry barriers (other than a weakening of intellectual property rights) has harmed innovation in any telecommunications market. Indeed, in his conference presentation, Dr. Robert Pepper offered data suggesting that competition spurred, rather than discouraged, investment. (Dr. Robert Pepper, "TV Over the Internet: IPTV and Policies for Convergence," conference presentation, Columbia Institute for Tele-Information, November 10, 2000.)

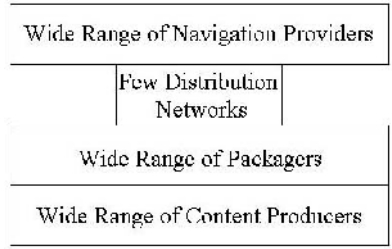

FIG. 4.5. The other hourglass.

Vertical Unbundling Undermines the Coordination Benefits of Vertical Integration. One argument is that vertical bundling is needed to realize the potential gains of vertical integration identified earlier. However, a vertically integrated firm can price its unbundled products to take into account the effects on its integrated profits.[23] Similarly, the firm can make investment decisions with the effects on all of its unbundled products in mind. Moreover, it should be taken into account that decreased concentration due to unbundling may create competitive conditions that limit the extent of double marginalization and coordination problems.

Vertical Unbundling Leads to Underinvestment by Preventing Sufficient Exercise of Market Power in the "Right" Market. As already discussed, vertical unbundling may lead to increased competition at one or more stages. This increased competition may reduce the ability of firms to extract rents from consumers by elevating prices across the board or engaging in more sophisticated, price-discrimination schemes.[24] It is sometimes argued that a firm with a monopoly in one stage should be able to engage in vertical bundling with another stage because otherwise the loss of potential profits from monopolization of the second stage will undermine investment incentives in the initial stage. This argument has been raised, for instance, in the debate over whether cable companies should have to provide open access when their systems provide broadband Internet access. And it may well arise in the future as broadband transport providers assert that they will not make the

[23]The internalization may be less complete, however, than if the firm engaged in bundling. This point is illustrated in the later discussion of bundling's effects on competition.

[24]See Katz (1989) for a review of the economics literature of why a firm at one level might want to integrate downstream to limit competition and support price-discrimination strategies that might not be feasible with downstream competition.

investments necessary to distribute television over the Internet unless they can bundle distribution with packaging.

Public policy has long recognized that some market power can be necessary to provide investment incentives.[25] The issue here, however, is whether it is efficient for a firm to exercise market power at one stage to provide incentives for investment at another.

Unbundling Can Reduce Competition Among Incumbents. Unbundling alters competition among a given set of incumbents in ways that can reduce suppliers' incentives to price near costs. Consider, for example, a situation in which there are only two stages and there are two firms, each of which produces component services at each stage. Suppose that each of the firms is a lower cost producer of one of the two components. When the firms sell their components individually, the lower cost producer of each component sets its price just below that of the other supplier. Hence, consumers pay a total amount for services equal to the sum of the higher costs of each component. When the firms compete by offering bundles, the firm with lower average costs of the two components wins sales at a price just below the other firm's average cost of the two components. This firm's average cost of the two components is manifestly less than the sum of the two higher costs of each component across firms.[26] Intuitively, bundling leads to lower prices because a firm is willing to "take a loss" on its high-cost component in order to make profitable sales of its low-cost component. With unbundling, there is no such trade-off. This example illustrates a real-world effect, but it is just an example. With three or more firms, other examples can be constructed in which bundling leads to higher equilibrium prices, essentially because of the loss of mix-and-match benefits in terms of production costs (Farrell, Monroe, & Saloner, 1998).

Vertical Unbundling Necessitates Standards That Stifle Innovation. The need to set rigid interfaces to allow different firms' services to work together may have the effect of limiting innovation because new technologies

[25]Hence, the acquisition of market power through investment and hard work is not, in itself, illegal. (See, e.g., U.S. Department of Justice and the Federal Trade Commission, *Antitrust Guidelines for the Licensing of Intellectual Property,* April 6, 1995, § 2.2.) Moreover, intellectual property policy grants innovators and creators a degree of market power as an incentive.

[26]Algebraically, suppose Firm 1 has unit costs of producing the two components equal to c_1 and d_1. Suppose Firm 2 has unit costs c_2 and d_2, where $c_1 < c_2$, $d_1 > d_2$, and $c_1 + d_1 < c_2 + d_2$. With unbundling, Firm 1 makes all of the sales of the first component at a price of c_2 and Firm 2 makes all of the sales of the second component at a price of d_1. With bundling, Firm 1 makes all of the bundled sales at a price of $c_2 + d_2$, which is less than $c_2 + d_1$.

may not be readily compliant with the interfaces. Although the layered architecture of the Internet may lead to rigidities, these are likely to remain whether or not suppliers in the television industry are vertically integrated.

Vertical Unbundling Leads to Consumer Confusion and a Loss of Supplier Accountability. A somewhat different type of concern is that no one provider will have responsibility for the services ultimately delivered to consumers and/or consumers may be confused by the existence of different providers at different stages.

These concerns are misplaced. If vertical separation results in customer confusion or a lack of responsibility for customer satisfaction, then there will be market incentives for organizations to offer end users one-stop shopping even if the providers are not integrated or engaging in vertical bundling. Companies offering the one-stop shopping would take responsibility for end-to-end quality and for customer care. These companies would simultaneously enter into agreements with providers at various stages in the value chain specifying the responsibilities of each. As long as the interstage contracts did not call for exclusive dealing, the competitive benefits of vertical separation would be maintained even while offering one-stop shopping. Moreover, consumers may prefer vertical ownership separation and unbundling as means of ensuring objectivity in providing navigation services or recommending mix-and-match decisions to combine offerings at various stages.

The previous analysis is only a starting point. Vertical integration and bundling have a complex set of potential costs and benefits from both the private and social perspectives. Preliminary analysis, however, suggests that there are not strong arguments that extensive vertical integration and bundling are necessary or desirable to create investment incentives and facilitate coordination across stages of the television value chain.

WINNERS, LOSERS, AND SURVIVORS

Who will benefit from the changes discussed earlier? And who will lose? The following discussion is organized around existing entities—rather than on specific stages in the value chain—both out of prurient interest and because existing entities are relevant decision-making units for both business and public policy analysis.

Viewers

Ignoring the broad societal degradation that increased use of electronic media may bring about, the majority of viewers will likely gain significantly from the development of television over the Internet. Technological developments are making it possible to offer viewers a wider range of programming as well as programming with new features. These developments

should also increase competition, which will ensure that the benefits of technological progress largely accrue to consumers, rather than suppliers. That is, increased competition for viewers' attention and money will almost certainly result in viewers' facing lower quality-adjusted prices. The fall in quality-adjusted prices will come about through a combination of lower prices and increased qualities. Increased quality, in turn, will be attained by a combination of programming with increased production values and content increasingly targeted to specific viewer interests.

Of course, not all viewers will gain. Consumers with a high tolerance for commercials who enjoy mass market programming may find that the new equilibrium is worse for them. One witnessed similar developments with the introduction of cable television. There are at least some instances in which sporting events now on cable television would have been on nonsubscription television if cable television had not existed. Viewers who receive strong over-the-air signals and care only about these events are made worse off by cable television.

Advertisers

Like viewers, advertisers will enjoy the benefits created by technological progress because competition will drive suppliers to pass these benefits through to their customers. Targeted advertising and the ability to reach tightly controlled demographics will offer advertisers better services. In the other direction, advertisers will face threats from increased processing power in the hands of viewers. Audience fragmentation may not be a threat because, whereas audiences will continue to fragment, it is reasonable to predict that technology will create synthetic mass media.

Local Broadcasters

The principal effect on local broadcasters of television over the Internet will be to devalue their key competitive asset—spectrum licenses—by creating substitute distribution channels. The television viewing shares of broadcast television have fallen steadily for the last two decades, whereas the viewing shares of cable and satellite services have risen.[27] Television over the Internet will continue this trend.

Today, local broadcasters do more than distribute content packaged by others. Local broadcasters create content, notably local news programming. This fact raises the possibility that local broadcasters could continue

[27]Among cable households, more than one half of their television viewing is now of cable networks and pay services, rather than programming that originated on a broadcast channel. (Paul Kagan Associates, *Cable TV Advertising,* February 28, 1999, and June 21, 1999.)

to dominate this role even after television migrates to the Internet. There are, however, at least three reasons to suspect that local broadcasters will not maintain a significant competitive advantage in news programming. First, the efficient geographic scope of newsgathering organizations may be national or international. At present, many local broadcasters rely heavily on network news organizations for significant programming. Second, reputation or brand is an important asset in the market for news programming. In many instances, this asset appears to belong to the national networks with which local broadcasters often affiliate, rather than to the broadcasters themselves. For example, the ownership of the NBC affiliate in San Francisco was transferred to Young Broadcasting in 2000. At the time, few viewers likely knew about this change of ownership, much less had an opinion of the new owner. Instead, viewers probably relied on the fact that the station still was an NBC affiliate to form their judgments about the likely veracity of the reporting.[28] Third, the opening of the distribution bottleneck will allow other firms with reputations and skills to enter the market. Newspapers, for example, are natural competitors to broadcasters in the provision of multimedia news sites and programming.

Local broadcasters will derive benefits from their current role in local news and public affairs coverage. Because of this role, local broadcasters are unquestionably one of the most powerful lobbying groups before Congress. Local broadcasters have repeatedly used this power to obtain regulatory protection from competition, whether from cable television or satellite. Because the Internet's benefits are so far-reaching and the use of regulation to limit its range of applications is so difficult, competition from the Internet will very likely be impossible to thwart through the political process.

Faced with the impossibility of stopping television over the Internet, it is probable that over-the-air broadcast stations will be allowed to keep their spectrum but use it to provide other services. In some cases, this use will result in the first type of convergence identified in the introduction: the existing broadcasting infrastructure will become a carrier of e-mail, web traffic, data, and other "Internet" services. In other cases, the policy change may simply increase broadcasters' flexibility and allow them to offer traditional mobile voice or even subscription television using the spectrum to which they have usage rights. Although it might be more efficient to let broadcasters sell their spectrum rights to firms more capable of offering nontelevision services, doing so would make it harder to justify the spec-

[28]Author's update: In January 2002, Young Broadcasting's San Francisco station ceased being an NBC affiliate. In November 2002, Young Broadcasting reported that its station was the number one news station in the San Francisco market. Available at http://www.youngbroadcasting.com/ireye/ir_site.zhtml?ticker=YBTVA&script=2100. These facts suggest that either reputations attach to on-air personnel (who remained largely the same after termination of the network affiliation) or reputations are unimportant.

trum rights giveaway. A cynical forecast is that local broadcasters will use the spectrum themselves "to serve the public," and they will do so by taking on partners that have the skill sets needed to offer these services.

Cable Companies

Technological trends will work both for and against cable systems operators. With their fiber-coax networks, cable systems are leading candidates to evolve into distributors of television over the Internet. Thus, cable systems operators will benefit from having increased systems capabilities and thus being able to offer more attractive services to their customers. However, to the extent that alternative forms of video Internet access develop (e.g., if telephone companies' DSL becomes television capable), cable companies will face increased competition for their traditional services, as well as any new ones.

Broadcast Television Networks

Today, broadcast television networks are involved in content creation, packaging, and distribution. Thus, these companies will almost certainly survive the transition to Internet television (although some may be acquired as part of ongoing industry consolidation). These companies will create content and package it for a variety of distribution formats. These developments will continue trends already under way. In response to the rise of cable and satellite multichannel video, over-the-air broadcast networks and their parent companies developed or acquired cable properties. For example, ABC's parent owns ESPN; CBS owns the Country Music Channel; and Fox has Fox News, FX, and the Fox Movie Channel. In response to the rise of the World Wide Web, over-the-air broadcast networks and their parent companies developed dozens of Web sites. For example, ABC's parent owns ESPN.com, one of the top sites on the Internet, and CBS owns MarketWatch.com and MedWatch.com.

Independent Content Producers

Content producers will no longer be squeezed through a distribution bottleneck. Consequently, there will be an increase in demand for programming that has intense appeal to narrow audiences. The history of videocassettes and the World Wide Web suggests that pornography will very likely see an increase in demand, for example. Whether content producers will earn large rents is less likely, however, because of the monopolistically competitive conditions that are likely to prevail for niche programming given product differentiation and the large number of potential producers.

Producers of programs with mass appeal face more mixed effects. Anecdotal evidence suggests that the broadcast rights to major sporting events, awards shows, and other "event" programming have become dramatically more expensive as broadcasters have competed for programming that can attract mass audiences in a multichannel world. However, synthetic mass audiences may devalue these skills, and mass market content creators will face increased competition for viewers' attention from niche programming.

CONCLUSION

This chapter offers several predictions about the future of television over the Internet. In closing, I want to be clear that I am speculating about the *distant* future.[29] It is safe to say that the widespread deployment of Internet television will take longer than many people think.[30] In 2010, the majority of viewers will be watching television that is largely as it is known today and is received either over-the-air or on cable systems constructed primarily to broadcast video. Although the penetration of the Internet has been impressive, it is still far below that of television and shows no sign of approaching it anytime soon.[31] Moreover, the penetration of broadband last-mile access (in the form of cable modems and DSL) is much lower still, and does not offer broadcast quality video in any event.[32]

What will happen over the next 10 years? Optional interactivity will increasingly be offered as a supplement or enhancement for broadcast and

[29]Noam (1995) made many of the same predictions for what was then "the future" that I and others are making today. In part, this is a testament to his foresight, and, in part, it is a reflection of the fact that Internet television has developed very slowly over the last 7 years.

[30]It is amusing to read with the benefit of hindsight the various predictions about interactive and Internet television made during 1994 and 1995 by industry members and analysts.

[31]Television's penetration of U.S. households stands at more than 95%. In August 2000, 41.5% of U.S. households had some form of Internet access. It is notable, however, that penetration rates are considerably higher for high-income households, who presumably are the most commercially attractive viewers and subscribers for television over the Internet. (Economics and Statistics Administration, National Telecommunications and Information Administration, *Falling Through the Net: Toward Digital Inclusion—A Report on Americans' Access to Technology Tools*, October 2000, at 1 and 8.)

[32]At the end of 1999, there were only 1.8 million residential subscribers to telecommunications services capable of delivering transmission speeds of 200 kilobits per second or more in at least one direction. (Federal Communications Commission, *In the Matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996,* "Second Report," CC Docket No. 98-146, released August 21, 2000, at ¶ 8.) In contrast, there are approximately 100 million television households.

cable programming. Consumers will enjoy control of increasing processing and storage power, providing the industry a taste of asynchronous viewing and various threats to advertising business models. Satellite and cable capacity will continue to increase, offering ever greater programming variety. In other words, television will undergo an evolutionary process, "Internet time" notwithstanding.

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