From Broadcast to Broadband:

The Effects of *Legal* Digital Distribution

on a TV Show's Viewership

by

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An honors thesis submitted in partial fulfillment

of the requirements for the degree of

Bachelor of Science

Undergraduate College

Leonard N. Stern School of Business

New York University

May 2007

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1. Introduction

       This paper deals with the effects of *legal* digital distribution on a television

show's ratings, i.e. broadcast viewership. It is important to note that only legal digital

distribution is considered. Within this realm, networks can choose whether or not to

distribute their content, and with proper information, they can optimize that decision.

There seems to be a rush to put content online lately, with all of the major broadcast

networks streaming select shows off of their web sites and offering downloads through

iTunes; yet, there has been no empirical study of the changes in performance of shows

that have been digitally distributed. To that end, I examine the following question:

Should networks digitally distribute their television shows? Specifically, should networks

stream TV shows off their web sites and offer downloads of their TV shows through

iTunes?

       I choose to examine these two distribution platforms because they each represent

one of the current prevailing rights models and they are by far the two most popular

means for distributing new, network-aired programming. According to The NPD Group's

VideoWatch Digital tracking service, in Q3 2006, ninety percent of all paid video

downloads occurred through Apple's iTunes store.[1] The remainder of the services ranked

in this study only sell video content other than TV programming, so it is fair to say that

for legal TV show downloading, iTunes is the only bird worth watching. In terms of

streaming, the vast majority of first-run network shows stream off of the networks' own

branded web sites.

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[1] "The NPD Group: Peer-to-Peer Digital Video Downloading Outpacing Legal Alternatives Five to One,"
The NPD Group, Inc., December 20, 2006.

To answer the Hamletian question, to digitally distribute, or not to digitally distribute, I examine its impact on broadcast ratings, in general and among 18-49 year old viewers. In order to do this, I collect Nielsen ratings data from back issues of the trade publication *Television Week* for all prime-time serialized shows that aired on ABC and NBC from October 2004 to March 2007. The complete dataset comprises 7,513 ratings observations which relate to 109 serialized shows. From *Television Week*, I also collect timeslot, day of the week, year, and network information useful in building a ratings model. I collect additional information on whether the show is a repeat, the genre of the show, and its length from the online databases epguides.com and TV.com. I use company press releases and other online resources to determine the availability of streaming and iTunes downloads on a per show basis. The results indicate that there are two faces to digital distribution.

Streaming has a negative effect on ratings, with the effect being strongest in reducing ratings of repeats while iTunes downloading has a positive effect on ratings, with the effect being strongest in increasing ratings of new airings. These effects are significant and financially material. For the average television show, household ratings decrease by 12% when a show is available for streaming and increase by 13% when it is available for download from iTunes. Specifically, streaming results in a decrease in household ratings of 0.70 points in general, 0.87 points for repeats and 0.43 points for new airings. This translates to a loss of 7% of television households for the average new episode and an astounding loss of 20% of television households for the average repeat. iTunes availability actually results in an increase in household ratings of 15% for the average new airing and a rise of 5% for repeats. Specifically, iTunes availability results in

an increase in household ratings of 0.74 points in general, 1.05 points for new episodes and 0.23 points for repeats. These numbers, however, are household numbers and, advertisers, the financial base of the TV industry, are rarely interested households as they purchase specific demographics.

To advertisers, one of the most desirable demographics is adults between the ages of 18 and 49. For the most part, availability of streaming and iTunes downloads has the same respective deleterious and beneficial effects for this demographic. For the average television show, 18-49 year old ratings decrease by 5% when a show is available for streaming and increase by 22% when it is available for download from iTunes. Streaming has no effect on 18-49 year old viewership specifically with respect to new airings but results in a loss of 15% of 18-49 year old viewers for the average repeat. Specifically, streaming results in a decrease in 18-49 ratings of 0.15 points in general and 0.32 points for repeats. iTunes availability results in a gain in 18-49 ratings of 0.98 points for new airings and a gain of 0.20 for repeats. The affinitive iTunes effect among 18 to 49 year old viewers translates to an increase in viewership among this demographic of 26% for the average new airing and a rise of 9% for repeats.

Given an average primetime advertising CPM of $50 among this demographic, this translates to a loss of approximately $150,000 per half-hour of content due to streaming and a gain of about $700,000 per half-hour of content due to iTunes availability. A unique aspect of the data is that I can measure the interaction between streaming and iTunes availability, assessing whether and how much this overlap affects cannibalization or affinity. In fact, when streaming is available for a show that is already being offered for download on iTunes, the negative effect is most detrimental, resulting

in a loss of about one-third of viewers. These results are statistically significant and robust across the different years in the dataset.

The rest of the paper proceeds as follows. In the next section, I further discuss digital distribution, noting current thoughts on its effects and bringing up relevant points about the television industry overall. In section 3, I describe the data collection process and explain the variables that go into the ratings model. Section 4 describes the empirical model and the results. In section 5, I translate the ratings effects into dollars and discuss the implications for the networks.

2. Legal Digital Distribution

As consumers increasingly embrace on-demand technologies that give them more control over media consumption, the major broadcast networks are trying to make sure their programming is not bypassed. Each has made certain shows available for download, offered them for streaming for free of off their web sites, or both. Fueled by the growth in broadband penetration, video is quickly becoming one of the most popular types of content on the Internet. Lately, much of the attention paid to online video consumption has been on free user generated content, especially after Google purchased YouTube for $1.65 billion. Internet video users are however showing an appetite for first-run primetime TV, watching it for free, with in-stream video advertising, or by paying $1.99 per episode for a download-to-own file from iTunes. Adams Media Research estimates consumer spending on download-to-own TV shows to have been $82.5 million in 2006

and concluded another $113 million was spent by advertisers on ads delivered in-stream

with television shows.[2]

2.1 iTunes

Downloading shows through Apple's iTunes store offers consumers legal

ownership of the content, with limited rights to reproduction, as well as transferability

and portability. These downloaded shows can be viewed on a computer, an iPod, or with

Apple TV, even a television. Networks began offering shows for download through

iTunes in 2005.

ABC was the first network to cut a deal with Apple when, in October 2005, its

shows became available for download from iTunes for $1.99 per episode. Other networks

soon followed suit. Immediately, however, digital distribution deals showed the potential

to damage relationships with traditional business partners. ABC's affiliate stations

reacted angrily when the iTunes deal was announced, fearing that they would lose

viewers and revenues. Others believed the deal would signal a threat to cable and satellite

operators by replacing them as content distributors.[3]

For currently aired shows being distributed through iTunes, current season

episodes are made available the day after they are broadcast and episodes from the

complete past seasons of the shows are made available immediately. Apple's iTunes is

the dominant player in the download-to-own video market. According to The NPD

Group's VideoWatch Digital tracking service, in Q3 2006, ninety percent of all paid

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[2] "TV-On-Demand Spending Tops Movies in '06," *Adams Media Research*, February 2007.
[3] "Disney's ABC to offer TV shows free on web," *Financial Times*, April 10, 2006.

video downloads occurred through Apple's iTunes store.[4] In the first twenty days of offering iTunes video downloads, Apple sold one million videos.

According to a February 2007 study released by Adams Media Research, annual consumer spending on Internet downloads of movies and TV shows will top $4 billion in 2011, up from just $111 million in 2006. The study indicates that the growth will be fueled by the introduction of hardware devices such as Apple TV, which converts videos downloaded from the Internet into signals that can be played on high-definition television sets. The study forecasts a period of experimentation between 2007 and 2009, during which the ad-supported model will dominate; but as more consumers connect their PCs to their TVs, spending on downloads will expand rapidly and exceed advertising spending by 2011. Adams predicts that advertiser spending on Internet video streams to PCs and TVs will approach $1.7 billion by 2011. This means that with streaming and downloading, Internet video is expected to generate $5.8 billion by 2011.[5]

2.2 Streaming

Streaming of shows offers consumers less control than downloads, with no ownership of the content. Networks began streaming primetime TV shows off of their web sites in 2006. ABC was the pioneer in this field, making several shows available at ABC.com for free in May 2006. The shows could be viewed the morning after they aired on ABC broadcast stations and could be rewound, fast-forwarded and paused, but included commercials that could not be skipped. The other major networks soon followed

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[4] "The NPD Group: Peer-to-Peer Digital Video Downloading Outpacing Legal Alternatives Five to One," *The NPD Group, Inc.*, December 20, 2006.
[5] "Report: Internet Video Market to Generate $5.8 Billion by 2011," *Digital Media Wire*, February 21, 2007.

suit. Most web sites only offer the most recent episodes for streaming and do not host past seasons.

After it began streaming its shows, ABC hired Frank N. Magid Associates to conduct a survey to learn who was using its service. ABC found that the average age of the online viewers was 29, and more than half were college graduates. The gender breakdown was 53% females and 47% males. The main reason viewers gave for watching a given episode online was that they had missed it on TV. About 87% of the users could remember the advertiser who sponsored the episode they watched. More than 50% rated the advertising experience positively with 84% asserting they were "getting a great deal" by being able to watch the episode online for free in exchange for watching the commercials.[6]

Other forms of digital distribution include streaming off of third-party web sites, such as AOL.com or MSN.com, downloading through services other than iTunes, like Amazon Unbox, and, of course, illegal downloading from P2P networks, news groups, and torrents.

2.3 Current thoughts

Network executives generally view digital distribution favorably, but feelings are sometimes mixed. As a case in point, in a *Variety* article, one network executive whose name was not printed admits, "At some point it has to have an impact on the ratings. ... You're training the audience to watch these shows on other platforms," while ABC scheduling head Jeff Bader reasons, "We're trying to create a circle of life. There are many places to watch a show, but primetime is where it begins." In similar caliginosity,

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[6] "ABC's 'Desperate Housewives' streams successful," *MarketWatch.com*, August 3, 2006.

NBC initially touted streaming as a promotional tool, not believing it could have any impact on viewership;[7] and, then quickly positioned it as a "complementary way to attract new viewers."[8] Even those that do not view digital distribution favorably still see it as a necessary step to capture viewers who are spending more and more time at their PCs.

Although no empirical study has been performed on the effects of digital distribution on broadcast ratings, much qualitative musing has been done. One such musing is NBC's assertion that putting the series "The Office" on iTunes led to a ratings increase. This was the first apparent validation of what network executives gambled on when striking deals with Apple, that is, that new video platforms are additive because they provide more entry points into a show for consumers. It is also believed that marketing buzz from offering shows on iTunes can drive awareness and, in turn, ratings.

At the time, Frederick Huntsberry, president of NBCU Television Distribution said, "The iTunes offering is bringing new audiences to the show that would not otherwise have watched. Consumers have choices, and we are not reaching all consumers with one technology."[9] Indeed, the young-adult target is tougher to reach with traditional media. Kaan Yigit, an analyst with Solutions Research Group in Toronto, believes that "the power of the on-demand new media platforms to be additive is more potent among members of the younger demographics."[10]

In fact, in February 2007, Leichtman Research Group found that 4% of all adults over age 18 in the U.S. watch video online at home daily and an additional 14% at least once a week. Comparatively, 93% of adults spend at least one hour a day, on average,

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[7] "NBC to stream prime-time episodes 24-7," *CNet.com*, September 13, 2006.
[8] "Can't Keep That Date With Must-See TV? Sign On and Tune In," *Washington Post*, September 17, 2006.
[9] "NBC: iPod Boosts Prime Time," *Television Week*, January 16, 2006.
[10] Ibid.

watching TV. While total online video usage has increased in the past year, the percentage of adults watching online video remains relatively unchanged. Men aged 18 to 34 account for 41% of those who view video online on a daily basis. Bruce Leichtman, President of Leichtman Research, believes that "as with most forms of media and entertainment, online video is following the traditional 'heavy hand' model of a minority of users driving the majority of the usage. Rather than replacing TV, in the near-term, emerging video services like online video are best viewed as opportunities to complement and augment traditional TV viewing options."[11] That is why this empirical study not only focuses on the effects of digital distribution on household ratings but on ratings among 18-49 year olds specifically as well.

Another qualitative musing comes in the form of reasons for the decline in viewership for NBC's "Studio 60." Despite large amounts of marketing, "Studio 60" started out with 13.4 million viewers; and, after that, lost 20 percent of its viewers over the next two episodes. *New York Magazine* hypothesized why this might be happening:

> "But we've got a theory brewing about the discrepancy between "Studio 60's" chatter and its ratings — and it concerns those pesky alpha consumers. NBC has been offering full episodes… on its Website. It's a new practice for the network… [and] it's doubtful that these newfangled conduits put much of a dent into "The King of Queens," but when a product is pitched at a sophisticated urban audience, as "Studio 60" undoubtedly is, well, maybe it makes a difference. (Okay, probably not. But it's the most generous theory possible, no?)"[12]

Indeed, as this study shows, *New York Magazine's* conjecture about the negative effects of streaming may not have been so far-fetched.

Rather than just stream off of their own web sites, networks are beginning to cut deals with third-party online distribution platforms. This deal-making is further evidence

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[11] "Men 18 to 34 Years Old Are Key Online Video Viewers," *MediaPost*, February 27, 2007.
[12] "Early-Adopter Fans Kill 'Studio 60'! (Maybe.)," *New York Magazine*, October 10, 2006.

that the entertainment industry in general is moving quickly to embrace the Internet as an important distribution tool. The rush to distribute video over the Web has been prompted in part by Google's purchase of video sharing site YouTube.[13]

Indeed, shortly after this event, Fox and NBC announced that they are launching their own digital distribution platform, dubbed "NewTube" by the media. The press release for this new platform indicates that it will be the "largest Internet-video-distribution network ever assembled." It is scheduled to debut with "thousands of hours of full-length programming, movies and clips" from NBC's and Fox's cable and national broadcast channels.[14] Given the volume of deals being done to put content online, it will be extremely valuable to understand the changes in viewership of shows that have been digitally distributed so far.

2.4 Financial importance

By broadcasting a show, the network gets to sell advertising during the airing of the program. The key factors that determine the price that advertisers will pay for commercials are ratings and the marketplace. The money an advertiser will pay for a commercial is based on the rating multiplied by the CPM, cost per thousands, of a certain demographic. This is why ratings are so important; it is easy to see that if the audience size increases, the advertising rate increases accordingly. This is why this empirical study focuses on the effects of digital distribution on ratings; they are at the lifeblood of the TV industry. This study only looks at primetime programming as it "fills the most visible and

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[13] "CBS to expand Internet video distribution," *MarketWatch.com*, April 12, 2007.
[14] "NewTube Is Just The Beginning," *BusinessWeek*, April 9, 2007.

profitable time period. It is the product that is sold to all constituencies – viewers, affiliates, and advertisers."[15]

3. Data Collection

The complete dataset spans a thirty-month period, October 2004 to March 2007. It comprises 7,513 ratings observations which relate to 109 serialized shows aired between 8:00 PM and 11:00 PM on Sunday to Saturday across 2 networks, ABC and NBC. Appendix 1 presents summary statistics for all variables within the 2004 to 2007 data set.

3.1 Ratings data

Nielsen ratings, both household and 18-49 year old specific, serve as the outcome variables in this research. These ratings are the de facto national TV viewership measurement system for the television industry in the United States. Advertisers pay to air their commercials on TV programs using rates that are based on Nielsen's data and programmers use the data to decide which shows to keep and which to cancel. Simply put, a rating indicates how many people watched a particular TV program; it is the percent of households or persons within a universe (all TV households, or adults 18-49, for example) who are tuned to a particular program in the average minute.[16] Ratings are expressed as percentages and a single national ratings point represents 1% of, or 1.1 million, TV households.

An 18-49 year old specific rating represents the percentage of all adults 18-49 in the U.S. that watched the broadcast, out of estimated 130.6 million. Nielsen Media

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[15] Mara Einstein, *Media Diversity: Economics, Ownership, and the FCC* (New Jersey: Lawrence Erlbaum Associates, 2004), p.180
[16] Nielsen Media Research

Research's national sample, composed of a cross-section of nearly 10,000 representative homes throughout the United States, is measured by People Meters. These meters give information about not only what is being viewed on the set, but also exactly which members of the household are watching.

Nielsen ratings data is published on a weekly basis in the trade publication *Television Week.* The "Weekly Primetime TV Ratings Chart" includes household ratings and 18-49 year old ratings data for the major broadcast networks for each day of the week, during primetime, that is, from 8:00 PM to 11:00 PM.

I obtained back issues of this publication, from October 2004 to March 2007, and collected the ratings data for serialized shows that aired on ABC and NBC over this timeframe. I did not collect information on sporting events, concerts, or any other special airings. *Television Week* reports Nielsen ratings data for every half hour of television; so, for a one-hour program, there will be two points of data. Along with the ratings values for a show, I also noted the date, day of the week, month, year, timeslot, and network that the show aired on.

These other data points serve as dependent variables useful in building the ratings model. They are treated as dummy variables. Dummy variables for these characteristics account for seasonality and cyclicality among viewing audiences as well as network-wide promotions.

3.2 Repeat data

Repeats are a major part of the network TV business model as they allow viewers to catch up on missed shows and are essentially free programming. Studios do not charge anything extra for second or third runs of a show, allowing networks to amortize the large

license fees they pay for every episode of a primetime drama or comedy. However,

ratings for on-air repeats are eroding due to new technologies like DVRs and availability

on other platforms, such as DVDs and online distribution.[17] This study seeks out to

qualify and quantify the role digital distribution plays in this erosion.

TV's repeat equation has changed dramatically in just a few years. Three years

ago, networks could count on a repeat broadcast of a hit drama to retain as much as 80

percent of its original audience. Now, even shows like "CSI" and "Law & Order: SVU,"

with chief selling points being their repeatability, sometimes hold on to less than 60% of

their audience when it comes to repeats. David Poltrack, chief research officer for CBS,

warns that this early erosion is just the tip of the iceberg: "You will see an increasing gap

between (the ratings) for an original and a repeat as viewing moves to other platforms." [18]

Whether or not a show is a repeat has an important effect on its rating, and as

such, a dummy variable for repeat will play an important part in a TV ratings model.

Also, by indicating whether a show is a new airing or repeat, I can stratify the data and

quantify the effects of digital distribution on new airings and repeats specifically. In other

words, with this data in hand, Poltrack's claim can be empirically tested.

In order to record whether each episode was a new airing or a repeat, I referenced

epguides.com. Epguides.com is a searchable database for information on over 3,500

English language television shows and includes data on the original airdates of episodes.

Since I have date and time information associated with every rating I collected, I

determined if a rating was for a repeat or new airing of a show by referencing the list of

original airdates for that show on epguides.com. In other words, if I have a rating

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[17] "TV rerun ratings eroding," *Variety*, April 5, 2007.
[18] Ibid.

recorded for "Grey's Anatomy" on March 23, 2007 at 8:00 PM and that date is not on the list of original airdates for "Grey's Anatomy" episodes, I know that the rating is for a repeat.

I also collected other descriptive information for each show, such as show genre and length, from TV.com, a CNET Networks property. Genres include comedy, drama, game show, news, sci-fi, and reality. Length is either thirty or sixty minutes. These are all treated as dummy variables in the ratings model.

3.3 Digital content

To assess the effects of digital distribution, dummy variables, for streaming and iTunes availability, indicate whether or not a TV show is digitally distributed. Specifically, if a show will be available for streaming on the day after the broadcast airing, then, the streaming "dummy variable" will be switched on with respect to the ratings instance recorded for that broadcast. So, for a show that makes streaming available from its first episode on, every data instance recorded for that show will have the dummy variable switched on. But, for a show like "Grey's Anatomy," where streaming only became available at the start of its third season, the dummy variable will be switched off for all ratings in regards to airings before that point and switched on for all ratings after streaming becomes available. The same goes for iTunes availability.

There is no way to specifically tell when a show started its digital distribution just by visiting the network's web site or the show's iTunes page; so, in order to determine the exact dates at which shows began digital distribution, if at all, I consulted press releases, blogs, and fan sites.

4. Analysis

My empirical strategy proceeds as follows. I begin by developing a model for broadcast ratings. I then look at the impact of digital distribution on household ratings and 18 to 49 year old ratings. I analyze the effects for the whole dataset as well as for new airings and repeats only. Finally, I look at the interaction between these two types of distribution. I also consider the issue of endogeneity with respect to the managerial decision to digitally distribute television shows.

4.1 Ratings model

To begin, I estimate the following model to explain ratings. The model consists of 42 dependent variables.

$$Rating = \beta_0 + \beta_1 \text{Repeat} + \beta_2 \text{Stream} + \beta_3 \text{iTunes} + \varphi \text{Timeslot} + \gamma \text{Weekday}$$
$$+ \varpi \text{Month} + \kappa \text{Year} + \eta \text{Length} + \psi \text{Network} + \zeta \text{Genre} + \varepsilon$$

The outcome variable, rating, refers to the Nielsen rating as reported in *Television Week*. The Repeat dummy variable indicates whether a shows is a new airing (Repeat = 0) or a repeat (Repeat = 1). The Stream dummy variable indicates whether a show is available for streaming on the day after the broadcast (Stream = 1) or not (Stream = 0). The coefficient of this variable will indicate the effect that making a show available for streaming off of a web site has on ratings. The iTunes dummy variable indicates whether a show is available for download from iTunes on the day after the broadcast (iTunes = 1) or not (iTunes = 0). The coefficient of this variable will indicate the effect that making a show available for download has on ratings. For a repeat episode, both iTunes and Stream will be set to a value of 1 if the episode has been made available for streaming or download in the past. The variables Timeslot, Weekday, Month, and Year refer to the

time and date that the show aired on. These variables are dummy variables and capture seasonal and cyclical effects. For example, viewership is higher, in general, at certain times of the day and on certain days of the weeks. During certain months, such as when network "sweeps" occur, viewership, and in turn ratings, is also distinctly higher. The Length variable and Genre variable quantify inherent differences in shows that can lead to difference in ratings. For example, comedies may inherently attract more viewers than science fiction programs, and, reality programming may attract more 18 to 49 year old viewers than news programs. The Network variable loosely captures brand perception or loyalty that may have an effect on viewership. The final term is a random error term.

4.2 Effect on household ratings

In the following analysis, I focus on the data from 2005 to 2007. The analysis indicates that streaming has a negative effect on ratings, with the effect being strongest for repeats and that iTunes downloading has a positive effect on ratings, with the effect being strongest for new airings. All of the coefficients are statistically significant to the 99.9% confidence level.

TABLE 1
Effect of Digital Distribution on Household Ratings (2005 to 2007)

Dependent Variable: Rating

	ABC NBC Full 05-07	ABC NBC New 05-07	ABC NBC Repeat 05-07
R Square	45.36%	42.70%	43.76%
Total Df	7,513	4,695	2,817
F	182.62	105.29	65.64
Sig.	0.000	0.000	0.000
Stream	**-0.70**	**-0.43**	**-0.87**
Significance	0.000	0.001	0.000
iTunes	**0.74**	**1.05**	**0.23**
Significance	0.000	0.000	0.000

The analysis indicates that offering free streaming reduces a TV show's household rating by 0.70 points, which corresponds to about 770,000 households. Given that the average TV show in this dataset has a household rating of 5.8, this results in a loss of ratings of about 12 percent. These results indicate that streaming of content cannibalizes broadcast viewers and provides no evidence that this form of digital distribution complements broadcast ratings. In addition, the results indicate that the cannibalizing effect of streaming increases with respect to repeat airings. An analysis of only repeat airings of shows within the dataset shows that streaming reduces a repeat episode's household rating by 0.87, which corresponds to approximately 957,000 households. Given that the average TV show in this dataset has a household rating of 4.5, this results in a loss of ratings of about 20 percent. An analysis of only new airings of shows within the dataset shows that streaming reduces a new episode's household rating by 0.43, which corresponds to around 473,000 households. Given that the average TV show in this dataset has a household rating of 6.6, this results in a loss of ratings of about 7 percent.

The analysis also indicates that offering iTunes downloads increases a TV show's household rating by 0.74 points, which corresponds to approximately 814,000 households. Given that the average TV show in this dataset has a household rating of 5.8, this results in a boost in ratings of about 13 percent. These results indicate that iTunes downloading is affinitive to broadcast viewing and provides no evidence that this form of digital distribution cannibalizes broadcast ratings. In addition, the results indicate that the additive effect of iTunes increases with respect to new airings. An analysis of only new airings of shows within the dataset shows that iTunes availability increases a new TV episode's household rating by 1.05 points, which corresponds to about 1,155,000 households. Given that the average TV show in this dataset has a household rating of 6.6, this results in a gain in ratings of about 16 percent. An analysis of only repeat airings of shows within the dataset shows that streaming grows a repeat TV episode's household rating by 0.23, which corresponds to around 253,000 households. Given that the average TV show in this dataset has a household rating of 4.5, this results in a boost to ratings of about 5 percent.

By only analyzing shows with iTunes availability, more insight can be gleaned into the deleterious qualities of free streaming. When streaming becomes available for the subset of shows that already offer downloads through iTunes, a TV show's household rating is reduced by 2.26 points. Given that the average TV show in this dataset has a household rating of 6.1, this reflects a loss of over one-third of television households. This regression has an R^2 of 82% and the Streaming effect is significant, with a p-value of 0.000.

4.3 Effect on 18 to 49 year old ratings

The effects are mostly of the same nature but of differing strengths among 18 to 49 year old viewers. The notable difference is that streaming has no statistically significant effect on the viewing of new airings specifically among 18 to 49 year old viewers.

TABLE 2
Effect of Digital Distribution on 18-49 Ratings (2005 to 2007)

Dependent Variable: Viewers 18-49

	ABC NBC Full 05-07	ABC NBC New 05-07	ABC NBC Repeat 05-07
R Square	46.97%	47.01%	45.32%
Total Df	7,513	4,695	2,817
F	194.86	125.33	69.94
Sig.	0.000	0.000	0.000
Stream	**-0.15**	**N/S**	**-0.32**
Significance	0.022	0.610	0.000
iTunes	**0.68**	**0.98**	**0.20**
Significance	0.000	0.000	0.000

The analysis indicates that offering free streaming reduces a TV show's 18-49 rating by 0.15 points, which corresponds to 196,000 18 to 49 year old viewers. Given that the average TV show in this dataset has an 18-49 rating of 3.1, this is a loss in 18-49 viewership of about 5 percent. In addition, the results indicate that the cannibalizing effect of streaming increases with respect to repeat airings. An analysis of only repeat airings of shows within the dataset shows that streaming reduces a repeat TV show's 18-49 rating by 0.32, which corresponds to 418,000 18 to 49 year old viewers. Given that the average TV show in this dataset has an 18-49 rating of 2.2, this results in a loss of 18-49 viewership of about 15 percent. An analysis of only new airings of shows within the dataset shows that streaming does not have a statistically significant effect on ratings, i.e. viewership among 18 to 49 year olds, of new episodes.

The analysis indicates that offering iTunes downloads increases a TV episode's 18-49 rating by 0.68 points, which corresponds to 888,000 18 to 49 year old viewers. Given that the average TV show in this dataset has an 18-49 rating of 3.1, this results in a boost in 18-49 viewership of about 22 percent. In addition, the results indicate that the additive effect of iTunes increases with respect to new airings. An analysis of only new airings of shows within the dataset shows that iTunes availability increases a new TV episode's 18-49 rating by 0.98 points, which corresponds to 1,280,000 18 to 49 year old viewers. Given that the average TV show in this dataset has an 18-49 rating of 3.7, this results in a gain of 18-49 viewers of about 26 percent. An analysis of only repeat airings of shows within the dataset shows that streaming grows a repeat TV episode's 18-49 rating by 0.20, which corresponds to 261,000 18 to 49 year old viewers. Given that the average TV show in this dataset has an 18-49 rating of 2.2, this results in a boost to 18-49 viewership of about 9 percent.

By only analyzing shows with iTunes availability, more insight can be gleaned into the deleterious qualities of free streaming. When streaming becomes available for the subset of shows that already offer downloads through iTunes, a TV show's 18-49 rating is reduced by 1.13. Given that the average TV show in this dataset has an 18-49 rating of 3.5, this results in a loss of 19-49 viewership of about 32 percent.

4.4 Robustness checks

These results are representative of other strata of the dataset. Results in the 2004 to 2007, 2005 to 2007, 2006 to 2007, as well as year by year analysis are robust with the same signs for the digital distribution coefficients and similar size. The R^2 and p-values

are also consistent, with all results with respect to the two variables being statistically

significant. See Appendix 2.

4.5 Endogeneity issues

Until now, I have treated as exogenous the decision to offer digital content.

However, it may be that ratings for the broadcast airing also drives the decision of what

type, if any, digital distribution occurs. In addition, networks may make other changes

that affect ratings at the same time that they begin to offer digital content. For example,

the decision to offer digital distribution may coincide with the decision to move the show

to a new night or time.

The effect of this potential endogeneity is not clear. On the one hand, networks

may be more likely to digitally distribute a show with declining ratings as a way to

improve its performance. If this is the case, the above results can overstate the negative

effects of streaming or understate the positive effects of iTunes availability. On the other

hand, networks may perceive greater opportunities to exploit digital distribution for

shows with growing ratings. If so, the above results can overstate the positive impact of

iTunes availability or understate the negative effects of streaming.

4.6 Conclusions

Contrary to the public statements made by many network executives, this

empirical study indicates that there are two faces to digital distribution. When going from

broadcast to broadband, networks need to steer clear of streaming and embrace iTunes. I

find that the availability of streaming cannibalizes broadcast viewership. However, the

effect varies with the overlap between iTunes availability: overlap results in greater

cannibalization. I find that offering content for purchase on iTunes actually increases broadcast ratings. The affinitive effect is in fact strongest among 18 to 49 year olds with respect to new airings.

5. Making cents of the findings

To better understand these ratings effects, it is useful to express the results in monetary values. This exercise is simply for illustrative purposes and can be viewed as what the effect on the average television show might look like. The CPMs used here are past averages and can not be applied to any current show in particular as each show commands a unique CPM based on many factors.

The average prime-time household CPM for the networks in 2005 was $21.45. For comparison, daytime CPMs were $4.66 and late night was $11.33. Therefore, it is more expensive to reach an audience during prime time than it is at other times during the day. This has been the case for years and in fact, it is getting more expensive year by year as in 2004 it was $19.85.[19]

The incremental gain or loss attributed to streaming or iTunes can be computed by the following equation: CPM * CPP * ΔRatings * # of Commercials. CPP is simply the function used to convert ratings to the same scale as CPM, that is, a base of 1,000. The average number of commercials that airs in a half-hour network broadcast is 16. Given that the average primetime household CPM for the networks in 2005 was $21.45, the incremental effects of digital distribution can be calculated as follows.

Incremental loss from streaming: $21.45 * (1,102,000/1,000) * -0.70 * 16 =
Average Loss per Half-Hour Episode Streamed = -$264,745.

[19] "Television Activity Report," *Nielsen Media Research*, 2006.

Incremental gain from iTunes: $21.45 * (1,102,000/1,000) * 0.74 * 16 =
Average Gain per Half-Hour Episode Downloaded = $279,873.

These numbers, however, are household numbers, and advertisers rarely purchase households. They purchase specific demographics. To advertisers, one of the most desirable demographics is adults between the ages of 18 and 49 because it is a more specialized audience than households and is so hard to reach. The CPM for males in this target during prime time in 2004 was $57.40 while the CPM for females was $41.50. Taking an average of the male and female CPMs, the incremental effects of digital distribution can be calculated as follows.

Incremental Loss from Streaming: $49.45 * (1,306,000/1,000) * -0.15 * 16 =
Average Loss Per Half-Hour Episode Streamed = -$154,996.

Incremental Gain from iTunes: $49.45 * (1,306,000/1,000) * 0.68 * 16 =
Average Gain Per Half-Hour Episode Downloaded = $702,649.

5.1 Implications

These calculations make the deleterious and affinitive effects of digital distribution much more tangible. These results make it clear that networks should not stream their shows unless they are certain they can recoup broadcast losses with online advertising revenue and that they should make all of their shows available for download through iTunes.

For networks, the optimal decision is to not stream shows unless they are certain they can recoup broadcast losses with online ad revenue. This *may* be feasible as online CPMs can be much higher than broadcast network CPMs. A study conducted by MillwardBrown concluded that people who watched online video pre-roll ads were less distracted and came away with a higher brand awareness than those who watch traditional TV ads. In fact, online viewing led to 82 percent brand awareness and 77

percent brand recall compared to 54 percent awareness and 18 percent recall for TV. This is because online viewers are more engaged. The study found 46 percent of online users pay attention to the ads compared to 30 percent of TV viewers and 21 percent of DVR watchers.[20]

The streaming sword is indeed double-edged. In addition to the detrimental effects of streaming, networks pay content-delivery networks to stream their video based on the bit rate at which the video is streamed and the bandwidth that is needed to accommodate the traffic. So, for an hour-long episode, networks pay anywhere from "fractions of a penny" to 3¢ per viewer. Networks are actually paying others to aid them in this money-losing cycle!

Assuming an online CPM of $50, to make up for the loss in 18-49 year old viewers, networks would need to stream an episode 3,099,920 times, even bumping that CPM to over $100 still requires over 1.5 million streams. How feasible are these numbers? Well, in March 2007, NBC.com announced the results of its "Heroes360" experience, a new online initiative which included message boards, synched cast commentaries, a two-screen application with pop-ups, an interactive novel, and free streams of eleven episodes of the TV show. The "experience" had over 48 million page views, seven million unique visitors and delivered about 27 million video streams, over 20 million of which were in NBC Rewind, the full episode video player.[21] This averages out to about 1.8 million streams per episodes, which implies a CPM of $86 would be needed to recoup the lost revenues from broadcast rating erosion in the 18 to 49 year old demographic.

[20] "Study: Online video ads superior to TV ads," *lostremote.com*, March 27th, 2007.
[21] "Nbc.Com Delivers With 'Heroes360' – 48 Million Page Views And Over 27 Million Video Streams In Just Eight Weeks," *NBC Press Release*, March 22, 2007.

The networks may very well need to develop comprehensive "experiences" like "Heroes360" to ensure CPMs and streams get high enough to recapture lost revenue. This type of walled-garden community building may in fact be what NBC and Fox aim to plant with "NewTube." Still, the problem of making the service so attractive that even more users abandon the primetime broadcast is ever-present.

Though the total revenue generated by alternative platforms may one day match that lost by decreases in broadcast viewership, today it does not come close. Currently, the networks sell their streaming ads differently. ABC, for example, charges a flat fee to advertisers to sponsor entire individual episodes, but the network rotates the shows in which it runs those ads. Published reports put the price of an ABC.com streaming sponsorship at $100,000-$200,000 per advertiser per quarter, but the network will not confirm those numbers. NBC sells sponsorships to advertisers like Toyota based on how many videos are streamed and pages viewed. As for whether online streaming has pulled viewers away from the TV, Jeff Gaspin, NBC Universal president of cable entertainment, digital content and cross-network strategy isn't worried. "You've got 100 million homes," he says. "If you've got 1 million to 2 million people potentially taking a look at part of a series online, it doesn't hurt."[22] Indeed this study has shown that streaming does in fact hurt ratings, resulting in a worse position for the company financially.

Another clear imperative from this study is that networks should actively work to get as much content on iTunes as fast as possible. Network executives and Wall Street analysts have been uncertain about the iTunes effect. Its prospects hinged on two issues: The extent to which new on-demand sales are incremental rather than cannibalistic to

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[22] "Is There Cash in the Video Stream?," *Broadcasting & Cable*, October 30, 2006.

existing content consumption and consumers' overall threshold for spending on new

forms of media and entertainment. In October 2006, *The Hollywood Reporter* noted:

> "Although it will be awhile before we have answers to those questions,
> JPMorgan Chase analyst Spencer Wang makes some telling comparisons in
> his report "Waking the Sleeping Giants." Such hit primetime series as
> "Desperate Housewives," "CSI: Crime Scene Investigation," "Survivor" and
> "Lost" command about $440,000 per 30-second advertising spot, which
> implies a $26 cost-per-thousand rate. With a typical 17 million viewers and
> 13 minutes of commercial time per hour, one episode of such a hit series
> generates about $12 million in gross ad revenue, he said. By comparison,
> even in the worst-case scenario -- with 20% of TV viewers opting for
> downloads, 100% of which overlap with existing programs -- downloaded
> episodes of such popular series can generate an estimated $15 million in
> revenue. 'The main reason is that the $1.44 in download revenue per user is
> greater than the estimated 57 cents in advertising revenue per user generated
> under the current model.'"[23]

Given that the iTunes effect can now be seen as positive, Wang's worst-case scenario

actually sheds light on how profitable offering shows on iTunes can be. If the 20% of TV

viewers that download the show also watch the broadcast airing, in addition to an

increase in ratings, networks get $1.44 per episode downloaded. iTunes downloading can,

however, imply negative consequences for other streams in the television revenue cycle.

Consumers, for example, may not be willing to spend as much on DVDs if they already

have an iPod full of the content. This may just simply represent a positive shifting of

revenue streams. According to Nielsen Entertainment analyst Larry Gerbrandt, the

content owners take from downloading is nearly the same that a commercial-fee TV

series episode generates from a DVD boxed set.[24] So, networks are capturing the same

revenue they would have, but sooner.

5.2 Going forward

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[23] "Reshaping of revenue at forefront of NATPE," *The Hollywood Reporter*, January 24, 2006.
[24] Ibid.

The spread of broadband in the U.S. is making online video consumption a practical reality, empowering content producers and packagers and diluting the gatekeeper status of distributors. This all could theoretically boost the economic fortunes of the broadcast networks, though much will depend on the details of new business models and their effects on old business models. At least one clear directive in this sea of change is that networks should distribute on iTunes but be weary of the hidden costs of streaming. The subtleties of digital distribution are considerable. It has been seen that iTunes serves as a valid entry point for new viewers and builds audiences for primetime programming, yet streaming does not. In the explosion of digital broadband content opportunities, economic sensibility must not be cast aside. The first imperative of networks should be to do no harm. Consumers have a growing number of platforms on which to consume their media, and as new information is revealed about the effects of these emerging platforms, networks must optimize their decisions.

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Appendix 1
Descriptive Statistics (2004 to 2007)

	N	Minimum	Maximum	Mean	Std. Deviation
Rating	8223	1	19	5.87	2.592
Viewers 18-49	8223	0	14	3.18	1.811
Repeat	8223	0	1	.36	.481
Stream	8223	0	1	.08	.277
iTunes	8223	0	1	.16	.363
Sunday	8223	0	1	.14	.350
Monday	8223	0	1	.13	.342
Tuesday	8223	0	1	.15	.361
Wednesday	8223	0	1	.17	.372
Thursday	8223	0	1	.16	.366
Friday	8223	0	1	.17	.372
Saturday	8223	0	1	.08	.266
8:00 PM	8223	0	1	.16	.371
8:30 PM	8223	0	1	.16	.371
9:00 PM	8223	0	1	.16	.371
9:30 PM	8223	0	1	.16	.371
10:00 PM	8223	0	1	.17	.376
10:30 PM	8223	0	1	.17	.376
30 Minutes	8223	0	1	.15	.353
60 Minutes	8223	0	1	.85	.353
January	8223	0	1	.11	.316
February	8223	0	1	.07	.260
March	8223	0	1	.11	.311
April	8223	0	1	.08	.264
May	8223	0	1	.07	.257
June	8223	0	1	.06	.240
July	8223	0	1	.07	.253
August	8223	0	1	.07	.253
September	8223	0	1	.06	.246
October	8223	0	1	.11	.312
November	8223	0	1	.10	.295
December	8223	0	1	.09	.287
ABC	8223	0	1	.47	.499
NBC	8223	0	1	.53	.499
Comedy	8223	0	1	.18	.383
Drama	8223	0	1	.44	.496
Game Show	8223	0	1	.03	.173
News	8223	0	1	.12	.329
Reality	8223	0	1	.22	.415
SciFi	8223	0	1	.01	.103
2004	8223	0	1	.09	.281
2005	8223	0	1	.40	.491
2006	8223	0	1	.41	.493
2007	8223	0	1	.10	.293
Valid N (listwise)	8223				

Appendix 2
Robustness Checks

Robustness Check, Dependent Variable: Rating, Full Dataset

	ABC NBC Full 04-07	ABC NBC Full 05-07	ABC NBC Full 06-07
R Square	44.56%	45.36%	46.74%
Total Df	8,222	7,513	4,190
F	188.03	182.62	110.57
Sig.	0.000	0.000	0.000
Stream	**-0.68**	**-0.70**	**-0.68**
Significance	0.000	0.000	0.000
iTunes	**0.70**	**0.74**	**0.98**
Significance	0.000	0.000	0.000

Robustness Check, Dependent Variable: Rating, New Airings

	ABC NBC New 04-07	ABC NBC New 05-07	ABC NBC New 06-07
R Square	40.95%	42.70%	47.13%
Total Df	5,246	4,695	2,736
F	106.32	105.29	75.33
Sig.	0.000	0.000	0.000
Stream	**-0.41**	**-0.43**	**-0.34**
Significance	0.001	0.001	0.012
iTunes	**1.02**	**1.05**	**1.18**
Significance	0.000	0.000	0.000

Robustness Check, Dependent Variable: Rating, Repeats

	ABC NBC Repeat 04-07	ABC NBC Repeat 05-07	ABC NBC Repeat 06-07
R Square	43.58%	43.76%	45.14%
Total Df	2,975	2,817	1,453
F	66.81	65.64	36.55
Sig.	0.000	0.000	0.000
Stream	**-0.90**	**-0.87**	**-0.96**
Significance	0.000	0.000	0.000
iTunes	**0.24**	**0.23**	**0.56**
Significance	0.000	0.000	0.000