Online vs. Offline in the U.S.: Are the Media Shrinking?

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Abstract

We find that combined revenues for 10 major media in the U.S. have steadily declined as a proportion of overall economic activity (GDP) from 1999 to at least 2009 (the latest year for which we have complete data). For individual media, we find a generally consistent pattern in which increasing revenues from Internet distribution are exceeded by declines in revenues from established distribution channels, with the exception of television and video games, whose revenues have so far kept pace with GDP. We also report a marked overall shift from advertiser to direct payment support for the media industries over this period. We consider four possible reasons for these revenue trends: shifts in consumer media usage; reduced appropriability due to more difficult copyright protection or to inadequate advertising business models, and reduced costs due to more efficient Internet distribution. Our analysis suggests we may be entering an era of a declining size of media industries in terms of conventional measures, but not necessarily a falling supply of media products themselves.

I. Introduction

In this paper we consider economic effects of the Internet on U.S. media industries from a broad perspective. To varying degrees since the mid-1990s, audiences and revenues are migrating from established "offline" to Internet distributed "online" media. Our premise is that the effects of this economic transition are best understood in context--by observing a broad group of media industries together, over a long period of time. Using descriptive data, we study economic trends in 10 major U.S. media categories (books, newspapers, magazines, recorded music, movie theaters, radio, television broadcasting, multichannel television delivery systems, home video, and video games) over six decades, from 1950 to 2009 or 2010, although data limitations confine more detailed analysis to fewer among these industries since about 1970.

Our main focus is on professionally-produced, copyrighted commercial media products. User-generated blogs, video sharing websites such as YouTube, and Facebook along with other social networks have an increasingly important economic role, however, and we include these media in some of our measures. Our primary methodology is to quantify trends in the size of the media industries as a proportion of overall economic activity, or Gross Domestic Product (GDP). In that respect, our study is in the tradition of Machlup (1962), Rubin et al. (1986), OECD (1981; 1986) and Jussawalla and Lamberton (1988), studies that have sought to measure the size of the larger "information economy" as a proportion of total economic activity. Some other studies, beginning with McCombs (1972) and followed by Scripps (1963) and Chang & Chan-Olmsted (2005), have measured trends in consumer spending on media products and services and in total advertiser spending as a proportion of GDP.[1]

The first of the main research questions we ask: how have online media affected media industry revenues overall? We also ask an important related question: how is the balance of advertiser vs. direct payment support shifting as Internet media grow? Finally, the focus of much commentary in the news media has been the destructive effect of Internet technology on established, offline media systems. Of more interest, we believe, is a third question we consider: how is the Internet affecting the overall quality and variety of media products themselves? That

[1] Other studies, notably Duff (2000) and Apte and Nath (2007) have relied on other metrics to measure the information economy. See Flew and Cunningham (2010) for discussion.

is, are offline plus online media a negative or a positive sum game with respect to content production? At this stage we can offer only speculative answers to this latter question but it motivates our research.

In brief summary, we find that since an historical peak in about 1999, when household adoption of Internet broadband first began growing significantly, media industry revenues have steadily declined as a proportion of overall economic activity in the U.S. (GDP). We also find that there has been a marked overall shift away from advertising, toward direct payment, as the means of support for consumer media, including online media itself; online advertising as a whole has been growing at a rapid pace, but a large portion of it (mainly search) does not directly support consumer media products. These economic patterns are consistent across most individual media sectors. Though television (broadcast and multi-channel combined) and video games remain relatively robust, the sum of offline and online revenues for at least newspapers, books, recorded music, motion pictures (theaters and video), and radio have generally declined from about 1999 to 2009 or 2010 as a % of GDP. Television and newspapers, along with Internet media themselves, have led the shift toward direct pay support.

We then consider four broad reasons for these trends: changing time use and other consumer habits, copyright/piracy issues, the viability of Internet business models, and the potentially greater efficiency of media distribution that the Internet makes possible. Again briefly, while it is evident that younger consumers are shifting their attention to online media, the overall effect of time use shifts on established media appears to be relatively minor to date, and could not account for the dramatic decline in media revenues. Several media, including recorded music, movies and news, have been subject to serious piracy or other copyright difficulties, but evidence suggests that these factors are also unlikely to fully account for the economic decline in their revenues. It is also evident that Internet media business models, especially advertising, have made it difficult for media firms to appropriate the full value of their products, and has likely contributed to the shifts toward direct payment models, which the Internet has proven well-equipped to implement. Finally, we report examples in news, movies, and some other media of substantial cost savings due to the cheaper distribution that the Internet provides--thus

suggesting that the decline in media revenues may overstate the decline in economic resources that can be invested into media production.

II. Economic effects of the Internet in historical context.

1. Overall trends in revenue

The broad historical picture is set out in Figure 1. This graph illustrates trends in total U.S. revenues of 10 major professionally produced consumer media, from advertising and direct payment support combined, as a percentage of GDP, from 1950 to 2009, the latest year for which we have complete data. As in previous studies referenced above, the GDP metric is used to give comparative meaning to the size of the media industries as a proportion of overall economic activity. The various media are generally ordered from bottom to top in terms of the dates of their commercial development: "old" media on the bottom, and "new" media on top. The selection of these 10 media is necessarily arbitrary, but they represent the economically most significant and distinct forms of consumer entertainment and information media in the U.S. Computer software other than videogames, and live media forms, notably the performing arts and sports, are not included. See Flew & Cunningham (2010) for a discussion of definitional issues in the "cultural industries," including others such as museums and libraries that might also be considered a part of media. Stand-alone advertising industries, such as outdoor, for example are not included because they do not directly support consumer media content. Consumer payments for Internet access are also excluded, although these payments help support the distribution infrastructure used for IPTV delivered content.[2] Note finally that no consumer hardware expenditures are included. Such machines obviously facilitate media consumption, but they do not directly support media software production and distribution.

The annual statistics underlying Figure 1 (and several other graphs to follow) appear in Appendix Table A-1. These data are compiled from a variety of sources, described in Appendix

[2] In addition to communications services, e-commerce and other non-media content, access to media products clearly motivates retail level consumer payments for Internet access. Internet content providers, however, generally do not make or receive payments from ISPs or Internet backbone providers.

A. Continuous series published by the U.S. government, industry or advertisers' associations, and reports of industry analysts are generally given priority. Where gaps remained, reports in the financial or general press, and in some cases, between-year interpolations, or authors' estimates based on related data or other written resources were used. As a general matter, data reports for years after 1980 can be considered more reliable. Also, notice from Figure 1 that some data series are incomplete. In particular, we do not have data for recorded music before 1973, or videogames before 1998. The data otherwise remain imperfect. In some cases, for example, definitions have changed over time. The data are thus intended to provide an overall picture of broad trends.

Some other gaps remain within the "Internet" category, which in this graph is separated out as the combined sum of revenues for all Internet-distributed media in the 10 subject media categories for which we could obtain data. (The list is footnoted in Figure 1.) The "lower bound" label is used because it is an incomplete sum; in particular, separate data for non-newspaper operated news websites, magazine websites, and online video games, were not available. Also, note finally that non-commercial user-created media, such as many news blogs, Facebook or YouTube videos, are included in the Figure 1 data only to the extent that they are absorbed and reported as part of commercial media products.

Before turning to alternative estimates for Internet media, several observations can be made from Figure 1. First, in spite of missing early data for recorded music, it is apparent that from the early 1950s to the mid-1970's, total media revenue as a % of GDP fell moderately, or remained relatively flat, as ad-supported television displaced movie theaters, and to a lesser extent, radio, magazines and newspapers. The pronounced rise from the mid-1970s to about 1990 can be attributed to rapid growth of multi-channel cable TV and home video movies, both of which are primarily supported by direct payment, and as discussed further below, had remarkably mild negative economic effects on theaters, broadcast TV, or other media. The apparent revenue peak was reached in 1999--after which media revenues as a percent of GDP fell from 2.68% to 2.12% of GDP in 2009, a relative decline of 21.0%. In current $ terms, the 10 media industries earned total revenue of $301.9 billion in 2009, a 20.5% increase from $250.6 billion in 1999 for the same industries, but that compared to a 52.4% increase in GDP.

The 1999 peak of media revenues as a % of GDP corresponds approximately to the advent of consumer Internet broadband adoption, which according to the Pew Internet & American Life Project surveys (Pew Research Center, 2010) reached 3% in 2000 (the first year it was reported), then 66% in 2010. We will frequently use the 1999 year as a benchmark for subsequent discussion.

The Internet lower bound estimates used in Figure 1 may significantly understate total Internet media revenues due to its omissions, especially non-newspaper operated news sites.[3] We therefore defined an alternative "Internet upper bound" revenue total which includes all internet advertising, except search and email, in addition to the direct payment revenues included in the lower bound estimate. This measure, compiled by the Internet Advertising Bureau, presumably includes all Internet advertising that directly supports professionally-produced commercial media products distributed over the Internet, plus the great majority of revenues accruing to user-generated media such as YouTube and other video sharing sites, Facebook and other social networking sites, and news blogs, as well as advertising on e-commerce sites, etc., that are not relevant to consumer media.[4] Search and email, which accounted for 48% of all Internet advertising in 2009, are excluded because these categories do not appear to support consumer media content directly.

Figure 2 repeats the data of Figure 1 with the Internet upper bound measure. Although this measure is significantly higher in all years than the lower bound measure (eg, $19.4 billion compared to $10.7 billion in 2009), the decline in total media revenues as a % of GDP from 1999 to 2009 (2.73% to 2.27%), a relative decline of 20.5%, is little changed.

[3] A June, 2010 ComScore report showed estimated spending in April, 2010 on display advertising by all "general news" sites to be $77.1 million and for all "newspaper" sites to be $59.4 million. (ComScore, 2010). The Internet Advertising Bureau indicates display advertising to account for 37.89 % of all non-search, non-email Internet advertising in 2010 (PricewaterhouseCooper, 2011). If the ratio of the reported "general news" to "newspaper" display ad spending is the same as the ratio of all newspaper website revenues ($2.74 billion in 2009) to non-newspaper news site revenues, the latter would have earned total revenues of $3.94 billion in 2009, which is 36.8% of the total Internet lower bound estimate for 2009.

[4] Though estimates vary, YouTube was reported to collect about $1 billion in ad revenues in 2010 (Parfeni, 2011). Facebook was reported to earn up to $700 million in 2009 (Eldon, 2010), and $1.86 billion in 2010 (Womack, 2011).

Not measured by the Internet upper bound category in Figure 2 are direct payment revenues for online videogames, mobile media, and sales to consumers of news or other media.[5] While it seems unlikely that the total of these revenues components could be as high as the overstatement of the actual Internet media advertising by the upper bound measure of Figure 2, a more liberal estimate of total direct payment revenues for Internet media based on U.S. Census data also leads to approximately the same rate of decline since 1999.[6]

In conclusion, the role of the Internet in reducing the economic size of the commercial media in the U.S., at least in economic terms of their revenues, seems evident from a range of alternative measurements.

From this point in the paper, we focus mostly on the 9 media for which we have complete revenue data from the early 1970s. For some of the individual media, and for advertising revenue of all media combined, our data at this writing extends through 2010. These data are shown in Appendix Table A-1, and where available, we report on them as we proceed.

2. Trends in direct vs. advertiser support

Figure 3 shows trends in advertiser vs. direct pay support of the 9 media for which we have continuous data, plus Internet media (lower bound), since 1970, or in the case of recorded music, since 1973. While there has been relative parity throughout most of the last 40 years between advertiser and direct payment support, there has been a precipitous fall in advertiser support of media from its local peak in 1999 of 1.39% of GDP to 0.85% in 2009 based on the

[5] A recent report indicates total spending by Facebook subscribers on online virtual goods to be $800 million in 2010 (Takahasi, 2011). Data for 2009 were unavailable. Virtually all of the reported amount for 2010 can be attributed to direct spending in support of online games, and Facebook apparently accounts for the overwhelming majority of this spending.

[6] For periodic years from 1997 to 2008, The U.S. Census reports revenue from "publishing and/or broadcasting on the Internet," for all taxable and tax-exempt employer establishments engaged in "publishing and/or broadcasting on the Internet exclusively" (U.S. Census Bureau, The Statistical Abstract). While it is unclear exactly which firms are in this total, direct sales to both business and consumers are included, as well as advertising revenues. From 1999 to 2008, this Census measure, not including advertising revenues, rose from $0.8 bil. to $10.4 bil. (compared to $ 0 and $3.5 bil., respectively, for our Internet lower bound direct payment measure). Adding this Census direct payment measure to the upper bound total media advertising measure to estimate total Internet media revenues results in a decline in total media revenues as a % of GDP from 2.73% in 1999 to 2.32 % in 2008, a relative decline of 15.3%. That compares to a decline of 16.8% from 1999-2008 for the Internet upper bound measure shown in Figure 2.

Internet lower bound definition. (This represents an actual fall in current $ terms of total media advertising revenues from $129.8 billion to $120.7 billion over this period.) Meanwhile, direct payment media have remained relatively steady over this same period (1.23% to 1.20%). Based on the Internet upper bound definition, the decline from 1999 to 2009 in total media advertising as a proportion of GDP was about the same amount, from 1.44% to 0.90% of GDP. As shown in Appendix Table A-2, total media advertising rose from .85% of GDP in 2009 to .87% in 2010, perhaps reflecting a rebound from the 2008-2009 recession.

Figure 4 shows the same trends in overall advertiser vs. direct pay support as a proportion of total media revenues. From 1999 to 2009, direct payment has grown from 47.0% to 58.7% of the total.

3. Six Individual media

In this section we disaggregate basic results for newspapers, music, television, movies, books, and radio, six media sectors for which we have relatively complete data, again focusing on the period 1970 or 1973 to 2009, or to 2010 where data were available. In each case, we consider both their established and Internet-distributed components.

1) Newspapers

Figure 5 shows economic trends in total revenues as a proportion of GDP in one of the hardest hit of major US media, daily newspapers. Since 1970, the industry has generally declined as alternative media have become established in the market, but since 1999, the industry's decline as been very rapid, especially due to the nearly complete loss of classified ads to Internet distributors. Note, however, that although circulation income (the daily newspaper's component of direct payment support) has also declined with falling circulation, circulation income's proportion of total newspaper revenues increased from 18.4% in 1999 to 28.9% in 2009, suggesting an increase in subscription and single copy sales prices over this period. Thus, newspapers have shifted toward direct payment support. And as widely reported, newspaper websites nowhere near compensate for lost print advertising revenues.

2) Recorded Music

After some fluctuations in the 1970s and '80s, the recorded music industry's even more precipitous decline began after about 1995 (Figure 6). Digital music was the first media product to generate significant direct sales revenue from Internet distribution, but as widely reported, digital revenues have fallen far short of compensating for the decline in revenue from physical music sales, which fell to less than a third their former level as a proportion of GDP between 1999 and 2010. Although artists receive royalty income from radio play and other media, these payments do not generally accrue to music publishers, and are in any case a minor fraction of total music industry revenues. Thus, recorded music has remained almost entirely direct payment supported.

3) Television

Television (broadcast and multi-channel together) has had a remarkably long and successful economic performance in the U.S., more than doubling in size as a percent of GDP from 1970 to the end of the 20th century, then continuing to grow (though apparently flattening) even after the first Internet videos of prime-time broadcast series began to be posted by users to YouTube in 2005 (Figure 7). Online distribution of TV shows only became established as a mostly ad supported business with the launch of *hulu.com* and then *TV.com* in 2007. As evident, television's Internet-based revenues, which include ad sales by local broadcast TV station websites, remain tiny in comparison to broadcast, cable, DBS, and most recently telco-distributed multi-channel revenues.

TV's long term growth has been largely driven by the steady conversion from advertiser supported broadcasting to pay based multichannel systems from about 12% of subscribers in 1970 to 88% in 2009. In the past few years, multi-channel TV has likely been boosted as well by "Triple Play" package sales by cable and telco operators that include broadband Internet service (Bouwman, 2008).[7] The shift to multi-channel distribution is reflected by an increase in the proportion of direct payment support from 8.6% in 1970 to 38.2% in 1999, then 55.7% in 2009.

Note also that in spite of these major shifts, the ad-supported broadcast TV industry has remained relatively healthy. As their market share of viewing has declined, broadcasters have

[7] Note that television revenue data reported in Figure 8 and elsewhere are for television services only.

steadily increased cost-per-thousand ad rates (Papazian, 2011), resulting in what largely appears from Figure 7 to be a "stacking" of multi-channel revenues on top of broadcasters.

4) Motion pictures

Figure 8 demonstrates developments since 1970 in total consumer spending for theaters and DVD sales/rentals, the two main components of direct payment support for theatrical movies, along with digital VOD distribution via the Internet. Together, these media accounted for 85.3% of 2010 U.S. movie studio revenues, nearly all of the remainder coming from broadcast, cable television and other multi-channel exhibition of movies.

In a pattern even more pronounced than that of television, video revenues have essentially stacked on top of theater spending since home video hardware and software diffused in the late 1970s and early 1980s. After about 2004, however, these spending components, especially DVD sales, began a substantial decline. Movies have been digitally distributed via the Internet since the mid-1990s, but in a familiar pattern, that market has remained dwarfed by the decline in DVD media after the mid-2000s.

Throughout the industry's history, direct payment support has been the overwhelming source of US studio revenues.

5) Books

Long term trends in the consumer book industry revenues are less readily interpreted because of a definitional change in the late 1990s,[8] but it is clear that book publishing revenues have followed a pattern of decline in the last decade (Figure 9). Digital, or e-books, have grown, but at least through 2009, not as much as sales of printed books have declined.

6) Radio and other media

The radio industry is unusual in that there has been a significant shift to direct payment support due to development of satellite radio in the late 1990s, which by 2009 accounted for about 18.5% of total radio industry revenues. "Internet/Digital" radio (all website/streaming

[8] The 1998-2008 US. Census data include textbooks, children's books, general reference books, professional technical and scholarly books, and adult trade books.

revenues of radio stations, plus HD radio) has grown slightly since its introduction in 2005. Nevertheless, a decline in ad-supported terrestrial radio revenue since about 2000 has dominated the overall economic picture, resulting in approximately flat total industry revenues in current $ terms since 2000, meaning a substantial fall as a % of GDP as shown in Figure 10.

Although data for Internet website revenues of U.S. magazines were not available, combined advertising and subscription revenues of consumer print magazines have also been roughly flat in current $ terms over the past decade ($22.3 billion in 2000, peaking at $23.8 billion in 2007, then $19.08 billion in 2010), also resulting in a substantial decline in total revenues as a % of GDP (.22% in 2000 to .13% in 2010). There is little doubt that magazine website revenues have fallen far short in compensating for this decline.

While we do not have data for Internet-distributed video games, the contribution of video game software for consoles and computers remained approximately steady as a percent of GDP during the 13 year period for which we have data (.063% in 1998, .064% in 2010).

7) Summary

Overall, total domestic market revenues of 10 major U.S. media, including Internet-distributed products, have declined substantially as a fraction of GDP since about 1999 until at least 2009. As a group, Internet-distributed media have steadily increased as a proportion of GDP over in the past decade--although by reasonable definitions, that contribution remains proportionally small. With the exception of television and video games, whose combined revenues from advertisers and subscribers have remained relatively robust, a pattern of declining revenues from established media channels (eg, print newspapers, DVDs), but much smaller increases in revenues from Internet distribution (eg, newspaper websites, streamed or downloaded movies) is common to the individual media sectors for which we have relevant data.

There has also been a marked overall shift toward direct payment support, away from advertiser support of U.S. media products, during this period. In fact, Figure 11 (based on the Internet lower bound definition), indicates a steady shift toward direct payment support among Internet-distributed media themselves, led first by digital music, then movies and e-book sales. Based on the Internet upper bound definition, the advertising percentages are significantly higher

throughout the period, but show the same increasing trend in direct payment support, in this case rising from 0% in 1999, to 15.6% of the total in 2005, to 33.0% in 2009. Within the established media, shifts toward direct payment support have been pronounced in television and newspapers, and to a lesser extent in radio.

III. Reasons for the recent trends

In this section, we explore four explanations that may account for the recent economic shrinkage in media revenues. These are: (1) a shift in consumer usage away from professionally produced media; (2) copyright enforcement issues; (3) shortcomings of Internet media business models, and (4) cheaper, more efficient media distribution via the Internet.

1. Shifts in consumer usage

Various recent media reports have cited survey research showing that younger individuals are turning away from established media, especially print newspapers and standard television, to pursue other forms of entertainment or news consumption, including IP news and television (Pew Research Center, 2008; 2011). While it is obvious from Internet traffic counts alone that Internet media are attracting increasing usage, the available evidence is that the Internet's overall impact on the consumption of professionally-produced commercial media--or in fact on the consumption of traditional, non-Internet distributed commercial media--has so far been relatively minor.

Table 1 reports the earliest and latest available years, plus the year 2000, from a recreation time use study by CBS/Wilkofsky Gruen Associates and periodically reported in Vogel (1994; 2004; 2011). These data are compiled by its authors from a variety of sources.[9] "Internet" use is defined to include all non-work related activity, including Internet media (eg, online television watching), while "television," for example, includes only standard delivery TV. Note also that estimated hours for each category listed include both primary and secondary activity; that is, if the TV and radio are on while the Internet is used, all three are counted. The totals, therefore, add to more than the total time spent on the group of these leisure activities.

[9] Information in this paragraph is based in part on private correspondence with a representative of Wilkofsky Gruen Associates, Inc.

The long term growth in leisure time use from 1970 to 2000 can be attributed to an expansion of available leisure time use and to higher per capita income for leisure spending (Vogel, 2011). It is also likely that increasing quality and variety of available media products, especially television,[10] have attracted consumers from alternative non-leisure activities. The shorter term growth from 2000 to 2009 suggests that while estimated time use has shifted among media, total media use except Internet has remained relatively steady between 2000 and 2009. Total television use has continued to rise over the period, perhaps encouraged by advances in time shifting technology; TV household use was in fact reported by Neilsen Media Research to increase by 1% between 2009 and 2010 (Stelter, 2011).

Although the CBS/Wilkofsky Gruen study does not have a rigorous methodology and it is difficult to interpret the effects of simultaneous multi-media tasking, other studies corroborate the finding of limited Internet effects on media use.

Based mainly on the American Time Use Survey (ATUS), conducted by the U.S. Bureau of Labor Statistics, which records only primary time use activities and is based on diary records, Robinson (2011) surveys the relevant literature and reports little or no evidence of significant displacement of television or other establish media use by the Internet through 2006--observing in conclusion that "Somehow, the Internet has made its presence felt without disrupting time" (p. 205). Robinson and Martin (2010) report similar findings.

Internet media and consumer habits are rapidly developing, but it appears that time displacement accounts for relatively little of the revenue displacement of U.S. media that we have reported.

A different kind of shift in consumer habits, however, may have significantly reduced both movie and music CD retail sales, which are heavily responsible for the respective declines in movie and music revenues we have reported. It has been frequently suggested that the ready availability of Internet versions of these media products has reduced consumers' inclinations to

[10] The steady rise in U.S. television viewing hours since 1970, for example, has been accompanied by dramatic increases in channel capacity, and accompanying growth in programming investments, that have resulted from diffusion of cable and other multi-channel television services, and their digitization.

"own" music or movies (Mayer-Schonberger, 2009).[11] While this may have a sociological element, an economic explanation consistent with our discussion of Internet efficiency below is that consumers are simply substituting cheaper Internet-supplied songs or Internet downloads for the more expensive (and for their distributors, more lucrative) physical versions of these products,because the Internet has made them relatively cheap to distribute.

More difficult appropriability: Copyright and business model issues

The next two reasons fall under the rubric of "appropriability" problems, which basically means an inability to appropriate, or extract, the full value of an information product from consumers. Fundamentally, information products are subject to appropriability problems in the marketplace. These difficulties commonly arise because it can be hard to exclude those who do not pay for an information product from consuming it. Including advertising with a media product is often a viable way to solve or reduce information appropriability problems. (Besen, 1987; Varian, 2005)**.** However, the included advertising may not be effective if consumers can easily evade the ad, if they don't notice it, or if it otherwise does not have an impact.

The Internet may exacerbate information appropriability problems, and thus reduce media industry revenues, due to piracy or related copyright enforcement issues, or because advertising or direct payment revenue systems don't work as well. We consider these in turn.

2. Piracy and copyright issues

Illegal file sharing has been widely blamed for the dramatic decline in music sales since the mid-1990s. Most of a collection of empirical studies have demonstrated negative effects of illegal file sharing on legitimate music sales (notably Peitz and Waelbroeck, 2004; Zentner, 2006; Rafael and Waldfogel, 2006; Waldfogel, 2010), although few of them (notably Liebowitz, 2008), specifically attempt to relate illegal file sharing with music sales trends over time. Recent evidence suggests, however, that file sharing cannot account for all of the continuing decline in legitimate music sales. An NPD survey reported, for example, a decline in the number of

[11] As stated by Mayer-Schonberger, "If in analog times it was cool to *own* lots of books or music records or movies, in the digital age it is cool to *build on them*-to take the artifacts of our information culture and combine them into something original" (p. 61).

Internet users who use P2P networks to pirate music from 16% in 2007, to 9% in 2010 (Indvik, 2011). Legal enforcement against illegal P2P sites has been increasingly vigilant, and over time, legitimate channels for Internet distribution have become more prevalent and easy to use, as well as low cost.

In the movie industry, a relatively few empirical studies have had mixed results. Rob and Waldfogel (2007) found a negative effect of file sharing on legitimate sales in an experimental context. Smith and Telang (2010) found that broadband access had a net positive effect on legitimate DVD sales using data from 2000 to 2003, although this time period was prior to BitTorrent technology, which made movie file sharing much easier. While there seems little doubt that illegal movie file sharing reduces studio revenues to at least some extent, there is little evidence to data of a measurable net effect.

Piracy can have more subtle negative effects, such as limits on legitimate product pricing. For example, it is a good speculation that prevailing prices of around $1 per song from iTunes and similar services are constrained at that level to discourage consumers from taking the illegal P2P route to the same products. It seems evident, however, that factors other than illegal file sharing must be at work in the music and film industries .

Another industry with serious information appropriability problems is Internet news. A practical aspect of this problem is represented by the Google news aggregation controversy. Google posts headlines and the first few sentences of news articles from a variety of news sources, such as major newspapers, with links to the full story at the news source website. Only a fraction of Google news readers, however (44% according to a recent report[12]), click through to the full story, stimulating a series of complaints and legal actions by news sources against Google.

Essentially, the Google news aggregation legal battle is a copyright "fair use" issue, but it raises broader questions about the appropriability of news information by its creators. News can be seen has having two components: facts and analysis. Facts are not copyrightable and even

[12] Wauters, R. (2010). Report: 44% Of Google News Visitors Scan Headlines, Don't Click Through. Techcrunch, available at http://techcrunch.com/2010/01/19/outsell-google-news/.

analysis is not fully copyrightable since the ideas within an analysis cannot be copyrighted. The Internet dramatically lowers the cost of copying news facts and the ideas embodied within news analysis, which in turn limits the ability of news creators to appropriate its value.[14] Incentives to invest in news creation are thus threatened. Certainly this effective crumbling of copyright protection for news has contributed to that industry's myriad economic difficulties.

3. Business model shortcomings

As we have seen above, the overall decline of media industry revenues since 1999 can mostly be attributed to the decline of media advertising; that decline has involved the disintegration of some established media advertising models, notably newspaper classifieds, as well as a continuing ascent of direct payment technologies in other established industries, especially multi-channel television. As the parallel shift toward direct payment support of Internet media itself in the past decade (Figure 11) suggests, however, advertising as a means to support Internet-distributed media has also done less well than has direct payment support.

Internet technology offers potentially important improvements in both advertising and direct payment business models. As widely discussed, advertising can be much more efficiently targeted on the Internet, reducing waste circulation, and enabling fast click-through retail purchases. Direct payment can also be handled very efficiently by Internet-based suppliers--from the posting of large arrays of single and bundled product prices that can be instantly changed, to electronic collection via credit cards or payment services like Paypal. Closely related, price discrimination can be efficiently accomplished by Internet sellers Empirically, however, advertising models for support of Internet media have simply proven to be less lucrative than direct payment.

Internet news is again the most prominent example of the advertising business model's apparent shortcomings. Most of the targeting prowess of Internet advertising has been siphoned off by search engines, leaving relatively ineffectual banners, display, or other models to directly support Internet news. While this recent history has disappointed publishers, it should not be surprising in itself that any one content delivery system does better or worse than another as an

[14] Boczkowski (2010) relates vivid narratives and analysis of news imitation by two Argentinian newspapers.

advertising vehicle. It remains uncertain how well in-program advertising will fare in Internet television distribution. At least, the model directly transfers from standard television to the Internet.

News publishers have long complained that the direct payment model does not work for them either. That failure, however, can be reasonably attributed to excessive competition among news providers, who face extremely low costs of distribution via the Internet. As a media support mechanism, the direct payment model functions--and thus appropriates consumer value--very effectively, as evidenced by the successful sale of music, movies, some television programs, and most recently e-books via the Internet. Whether overall direct sales levels for Internet media are considered healthy or disappointing, it is important to distinguish supply and demand causes from how well the business model itself functions.

4. Lower cost/ more efficient distribution systems.

It may be that even though media industry revenues are declining, distribution costs are also falling, perhaps faster than revenues. This possibility is important to consider, because our most basic interest is the resources available to go into media production, and thus ultimately the variety and quality of media products themselves.

A number of established media, notably cable television and DBS, require large capital infrastructure investments to distribute their products. Similarly, newspapers typically have capital investments in printing presses and they maintain geographic networks for physical distribution of papers. In other cases, such as recorded CDs and DVDs, the process of physical production of copies, then distribution and retailing, are a substantial proportion of total costs.

It is difficult to compare costs of Internet media product distribution with established media systems because of economies of scale or quality differences, etc. Some examples make clear, however, that Internet media distribution can be far cheaper than distribution of the same basic information via established channels.

As Table 2 illustrates, editorial content creation costs made up only 16% of total expenses for a typical 33,000 circulation newspaper in 1994, while more than half of total costs

were accounted for by the physical production and distribution of printed papers. Although classified advertising is not itself a consumer media product, the dramatically more efficient distribution of online news information via the Internet is suggested by recent trends in classified advertising. From its historical peak in 2000 to the year 2009, print newspaper classified ad revenues fell by $13.4 billion; by 2009, however, all classified advertisement spending on the Internet was reported by the Internet Advertising Bureau to account for only $2.3 billion in total revenues (PriceWaterhouseCoopers, 2011). There seems no doubt that far more classified ads are now available on the Internet than newspapers have ever offered; often zero costs for posting ads on the Internet reflect that difference. Internet news distribution surely realizes similarly lower costs in comparison to print or standard television alternatives.

Falling costs of a la carte movie rentals vs. Internet downloads is a second example, illustrated in Table 3. The average "brick and mortar" DVD rental price in 2002 was $3.25, only 33% of which was collected by the movie studios at the wholesale level, reflecting the high costs of video shipping, plus retail inventory and transactions at rental stories. Studios also incurred a $1 to $2 per unit cost of DVD (or VHS) manufacturing to be taken out of that 33% share. In 2010, the average price of an Internet VOD presentation was $4.41, but the studio share reportedly averaged 70%, with no DVD manufacturing costs involved.

Neither example necessarily means lower total distribution costs for copyright owners due to the transitional or perhaps permanent need to maintain both established and IP distribution operations, for example. It is evident, however, that distribution and exhibition costs of most established media, can be greatly streamlined by Internet technology. The relatively low revenue streams coming from IP distribution that were reported for most media above are thus likely to involve substantially lower unit costs of distribution/exhibition. Low Internet news, music and other media revenues, that is, need to be balanced against lower costs to distribute that information, and suggest high promise for the industries as transition to Internet media continues.

To the extent that media distribution costs are falling due to the Internet, greater economic resources should be available for production of media products, suggesting higher quality and variety; or at least, we would expect that media production investments should be falling at a slower rate than are media industry revenues.

III. Conclusion

Measured as a proportion of overall economic activity (GDP), the media industries in the U.S. have indeed been shrinking, fairly steadily since the late 1990s, at least through 2009. Trends of revenue decline in individual media sectors are generally consistent, with exception of television and video games, which have continued to expand or at least keep pace with U.S. GDP.

We also observed a strong shift over the past decade in the means of support for media in the U.S. from advertising to direct payment—including for Internet media themselves. While Internet advertising offers remarkable technologies for targeting consumers, these models have not yet been applied very successfully beyond search, which does not directly support consumer media. On the other hand, direct payment mechanisms seem to function well for Internet media as well as other commerce, and their role has expanded.

We then discussed four explanations that have likely contributed to the recent decline in U.S. media revenues: shifting consumer habits of media use, piracy and related copyright issues, shortcomings of advertising business models, and greater efficiency due to lower costs of Internet distribution.

Our study has evident limitations. It is based entirely on descriptive historical data, and our explanations for the trends generally speculative. The data themselves are collected from a variety of sources, often originating with industry trade associations, and some gaps were filled by estimates culled from press reports, or in some cases by interpolation and other estimation by the authors. Our attempt has only been to paint a usefully broad picture in order to bring attention to sweeping economic changes in the U.S. media industries, and to thus provide a basis for more specific analysis. Among important areas for further research are comparable economic studies of the Internet's effects in other countries, and more sophisticated analysis of effects of the Internet on media time use.[15]

[15] An ongoing study undertaken by the IPTS, European Commission (to which an initial version of the present study contributed) asks some similar questions about the effects of digitization on media industries in the member countries of the European Union. (A series of reports is available at http://ipts.jrc.ec.europa.eu/publications/)

The last of the speculative reasons we identified in this paper for the recent decline of media revenues in the U.S.—greater efficiency due to lower costs--may be the most promising research path for understanding the economic future of media. Is media production, and thus the quality and variety of these products, also shrinking due to the Internet? Or, are the greater efficiencies of Internet distribution disguising a milder decrease, or a net increase, in the quality and variety media products themselves? An implicit interpretation of previous studies of the size of the "information economy" by Machlup (1962) and a number of others who have followed is that greater economic size necessarily implies greater significance. Perhaps the economic trends of the past decade that we have identified are the beginning of a long term decline in total economic revenues as old and inefficient distribution systems are dismantled, but also of increasing economic value of media content as consumers respond to lower prices with higher consumption. [16]

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[16] Two recent studies (Waldfogel, 2011; Mortimer et al, 2012) take a valuable step in this direction by addressing the question of whether recent declines in recorded music industry revenues have been accompanied by reductions in the quality and variety of music in the U.S.

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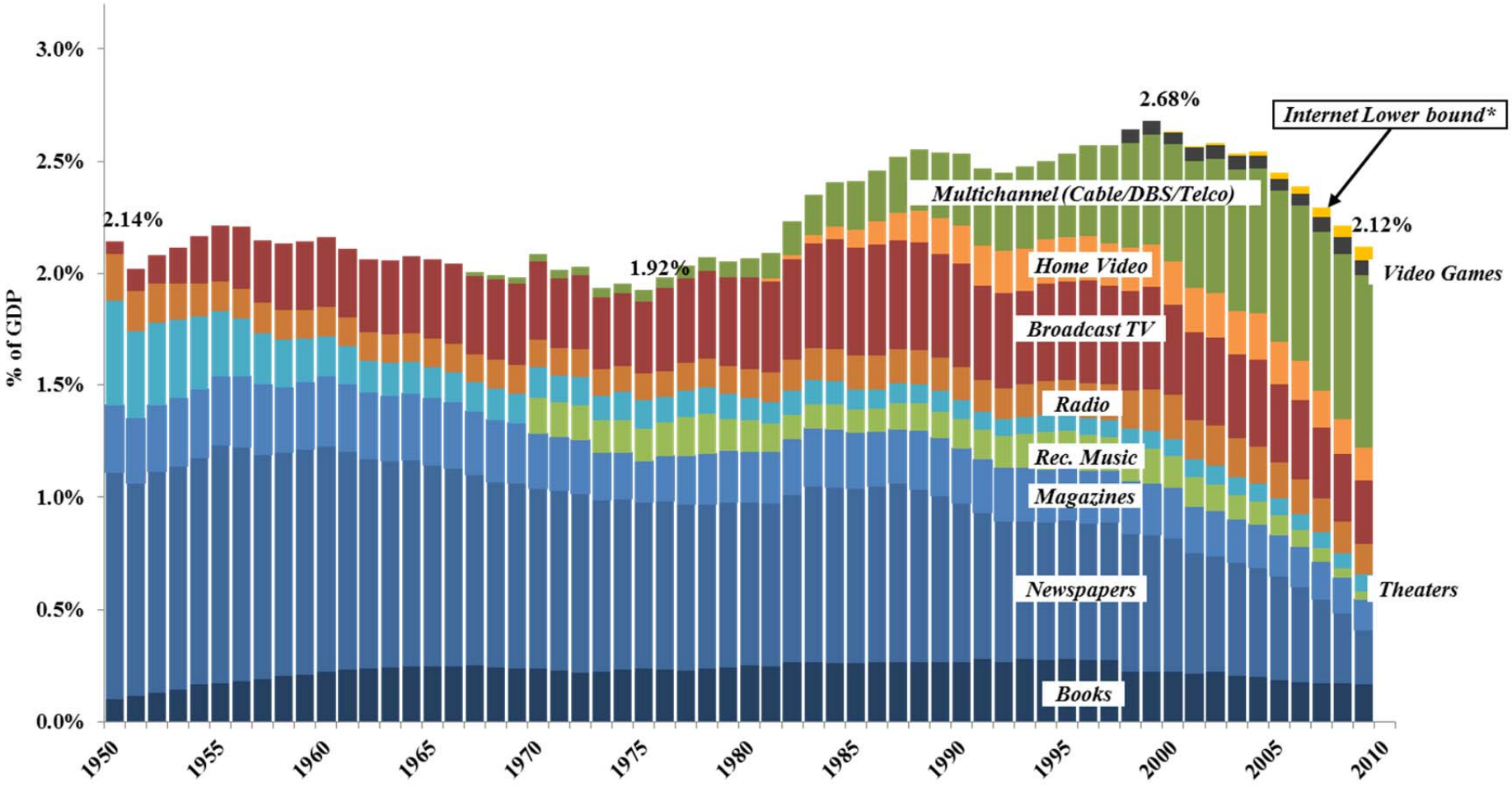
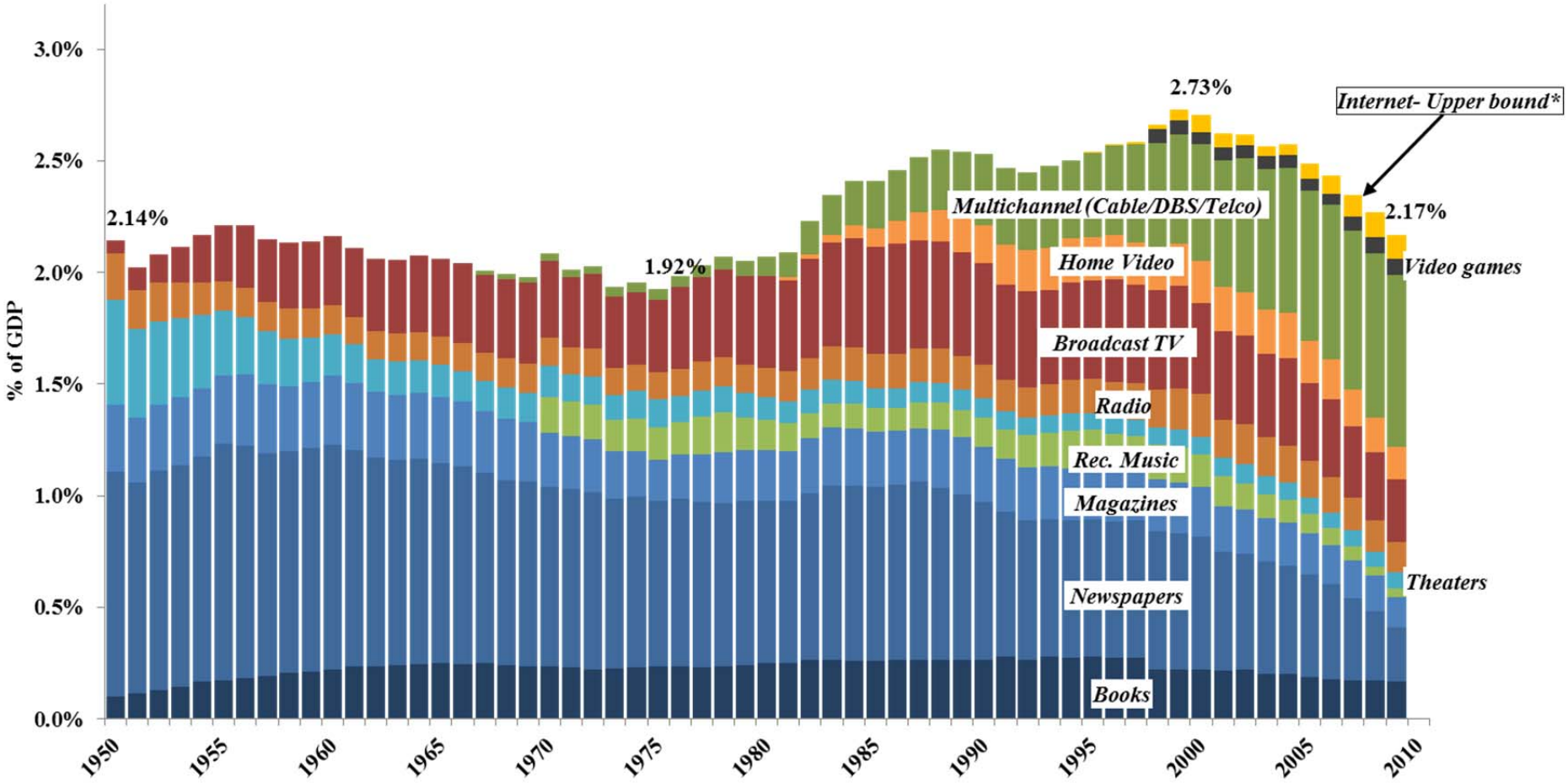
Figure 1: Total U.S. media revenue as a % of GDP (Internet lower bound*), 1950-2009



*** includes newspaper websites; digital music/movies; television station/network websites; Internet radio; e-books**
Sources: U.S. Census; trade associations; industry analysts; 10-K reports; author estimates*; See Appendix A*

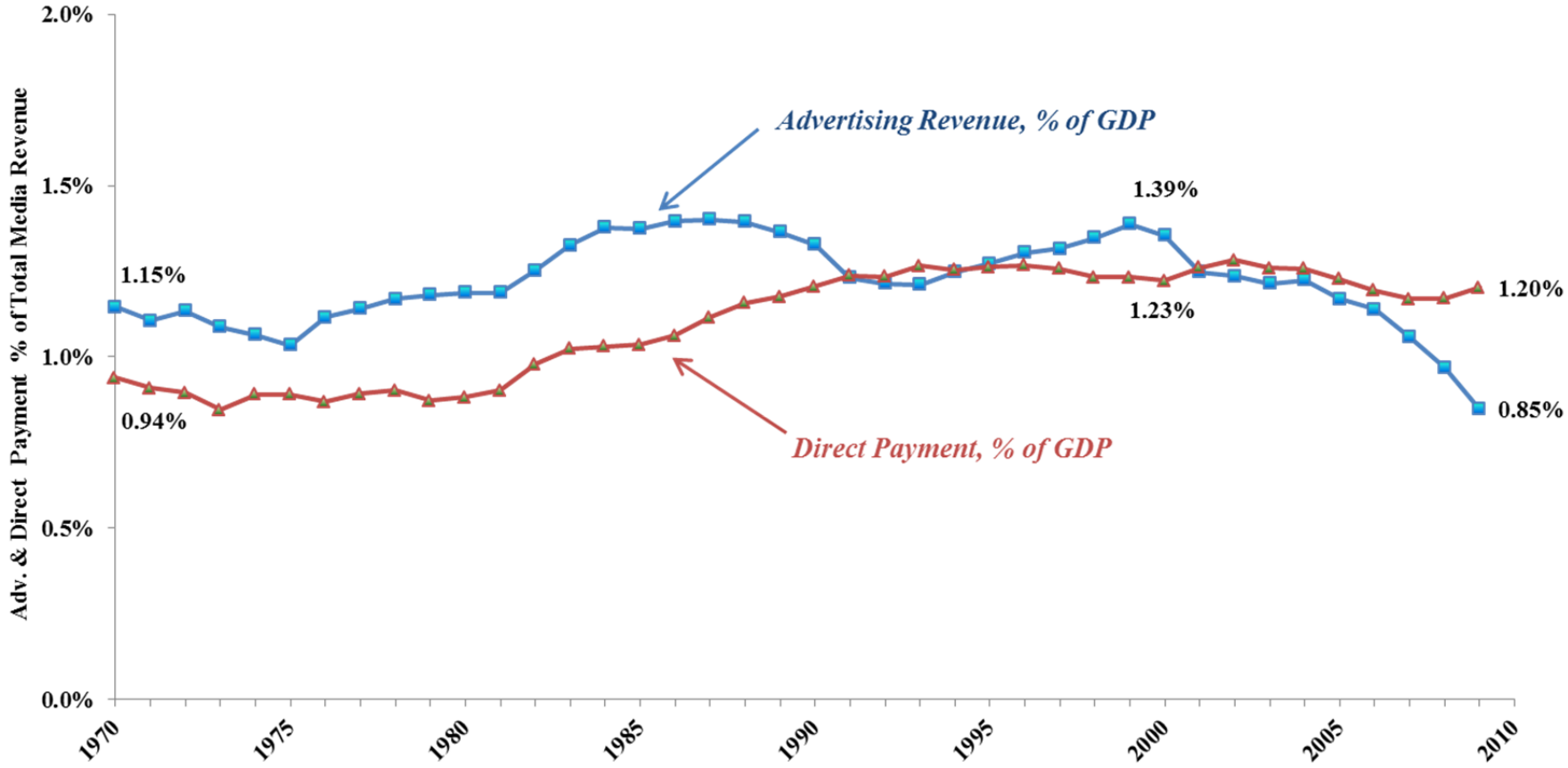
Figure 2: Total U.S. media revenue as a % of GDP (Internet upper bound*), 1950-2009



*** includes all Internet advertising except search and e-mail + all Internet Direct Payment revenue (Digital Recorded Music + E-book + Digital Video)**

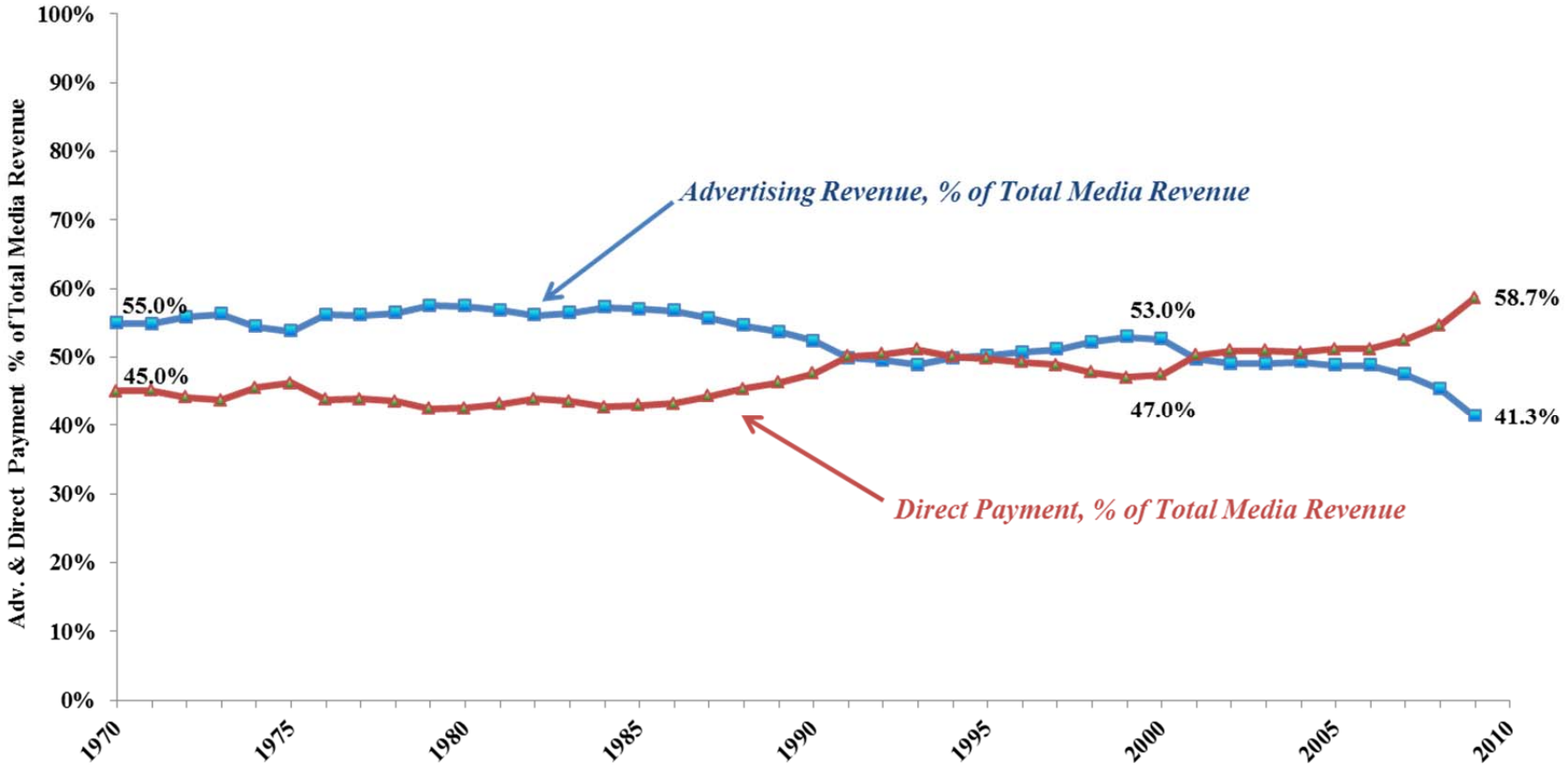
Sources: U.S. Census; trade associations; industry analysts; 10-K reports; author estimates; See Appendix A

Figure 3: Advertiser vs. pay support as a % of GDP, combined media,* 1970-2009



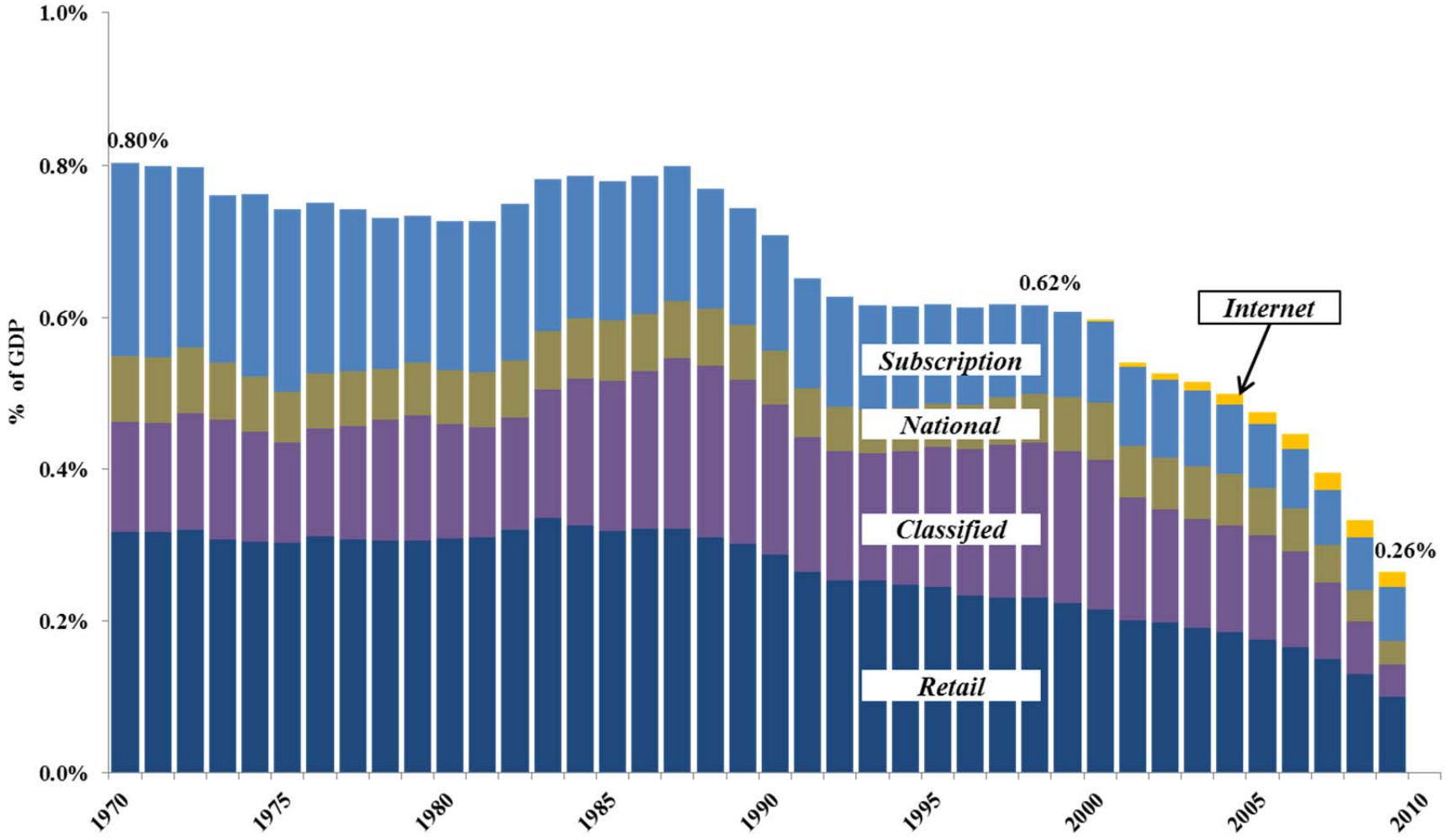
*** Internet lower bound, not including video game software**
Source: see Appendix A.

Figure 4: Advertiser vs. pay support as of total, combined media,* 1970-2009



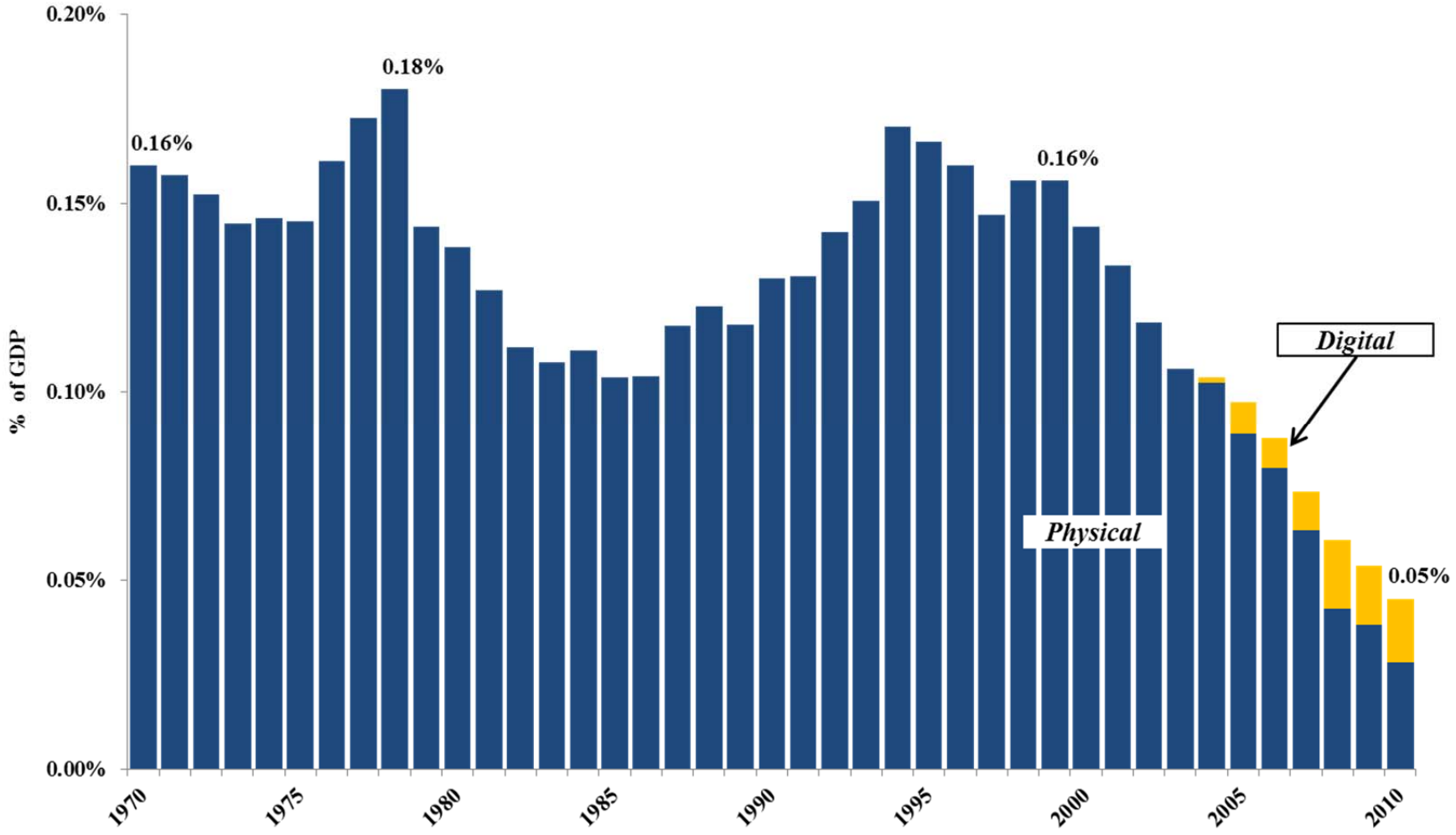
***Internet lower bound, not including video games**

Figure 5: Newspaper revenues as a % of GDP, 1970-2009



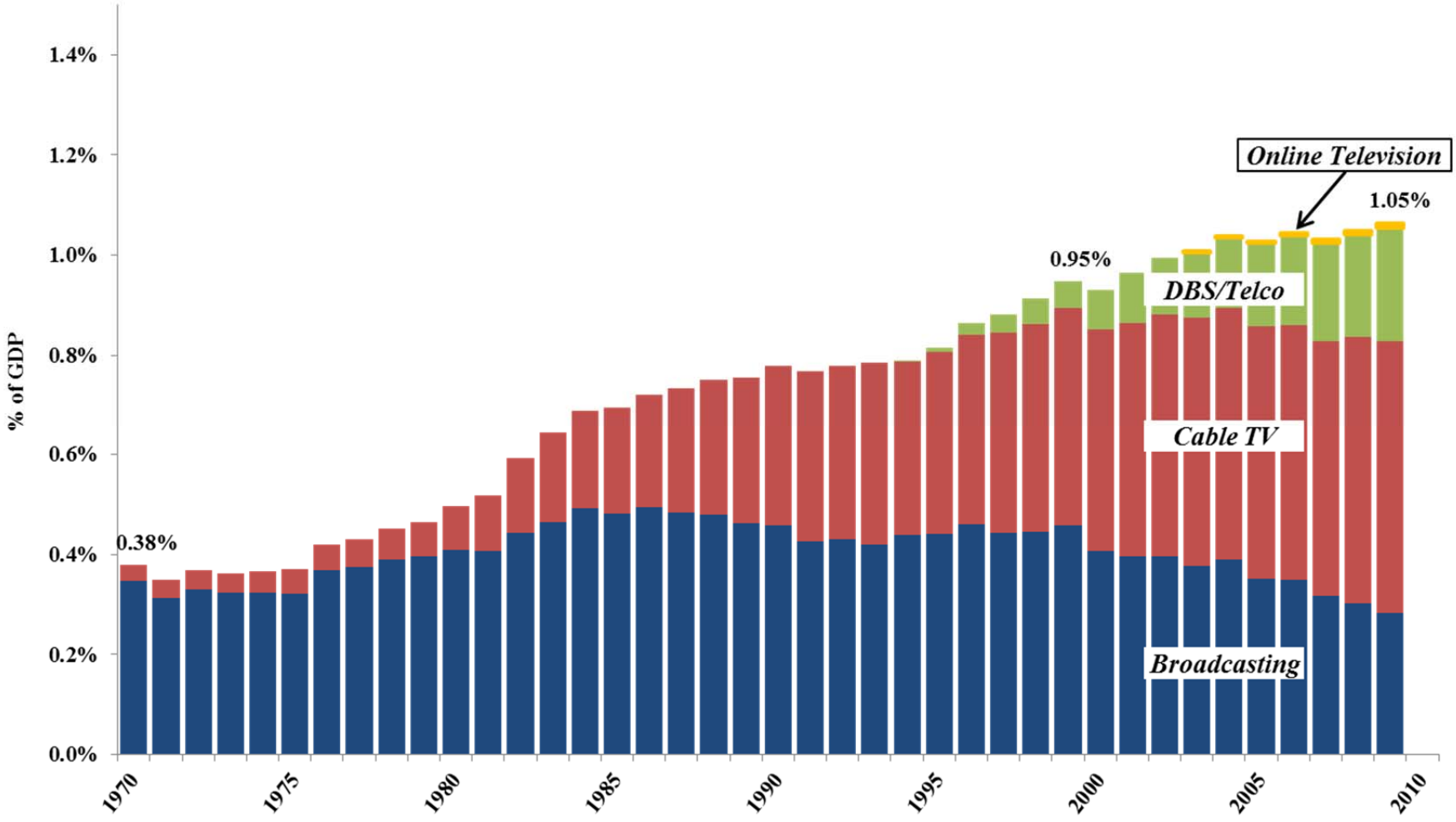
Source: see Appendix A.

Figure 6: Recorded music revenue as a % GDP, 1970-2010



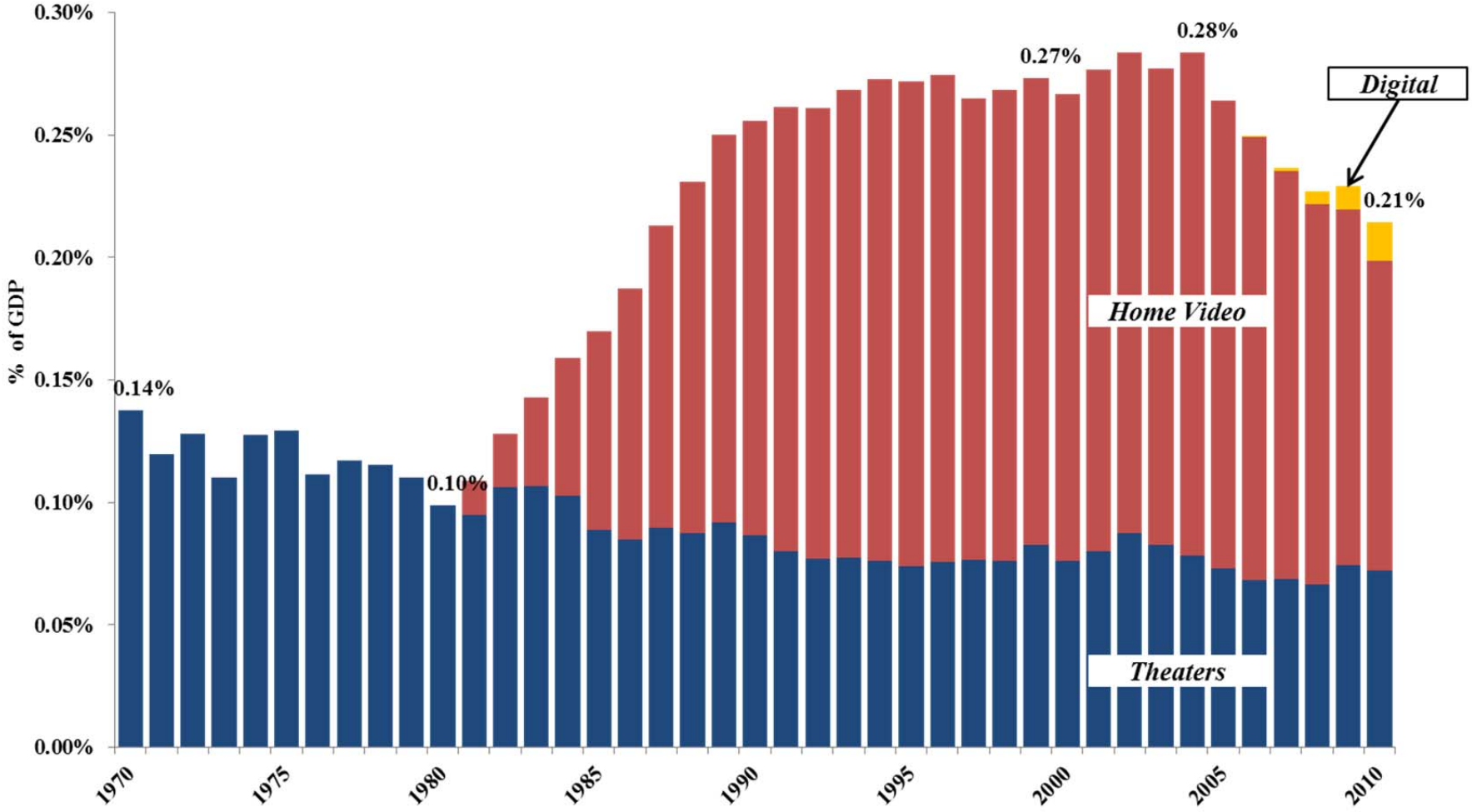
Source: see Appendix A.

Figure 7: Television Revenue as a % of GDP, 1970-2009



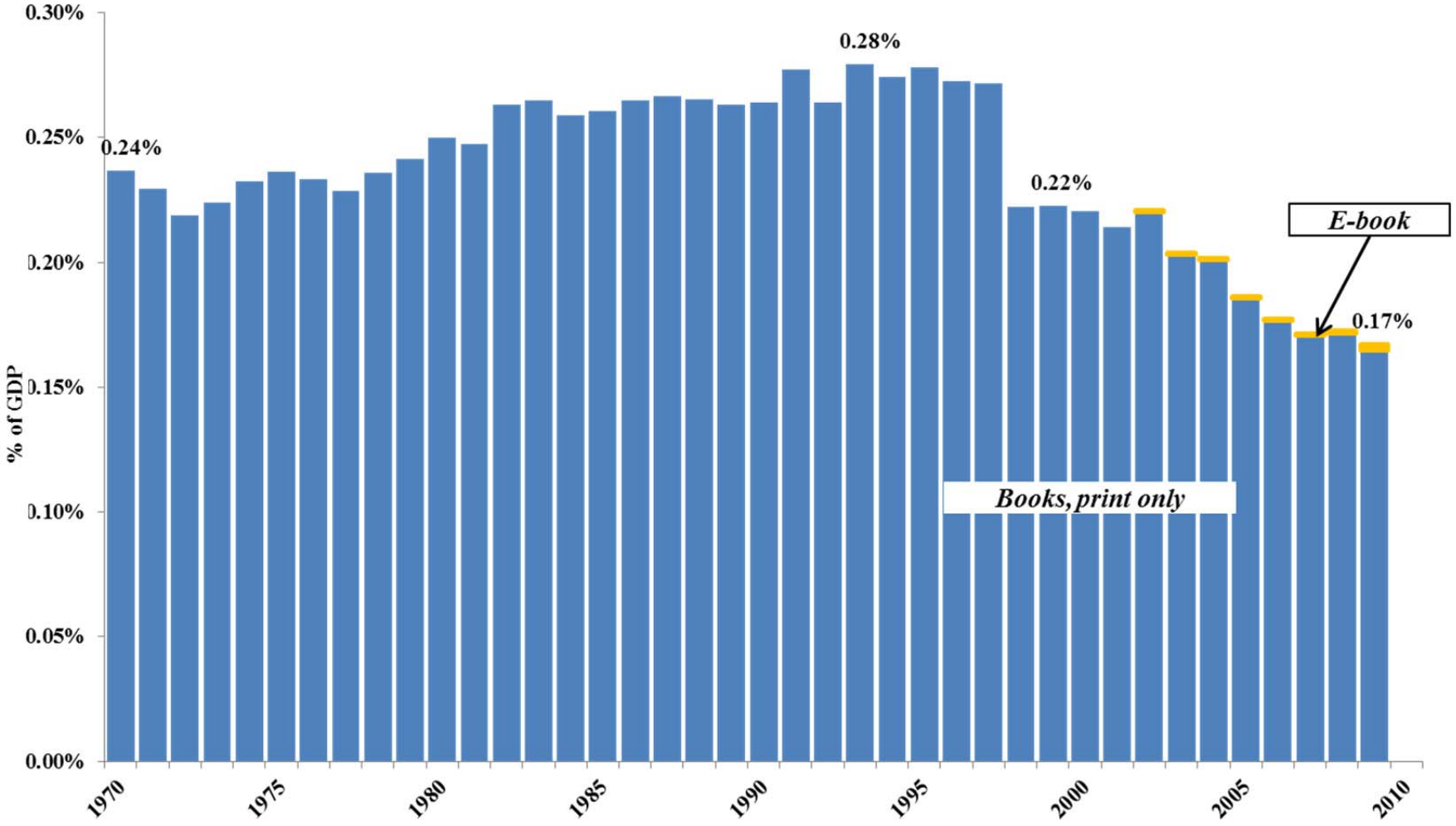
Source: see Appendix A.

Figure 8: Motion picture theater and video retail sales/rentals as a % of GDP, 1970-2010



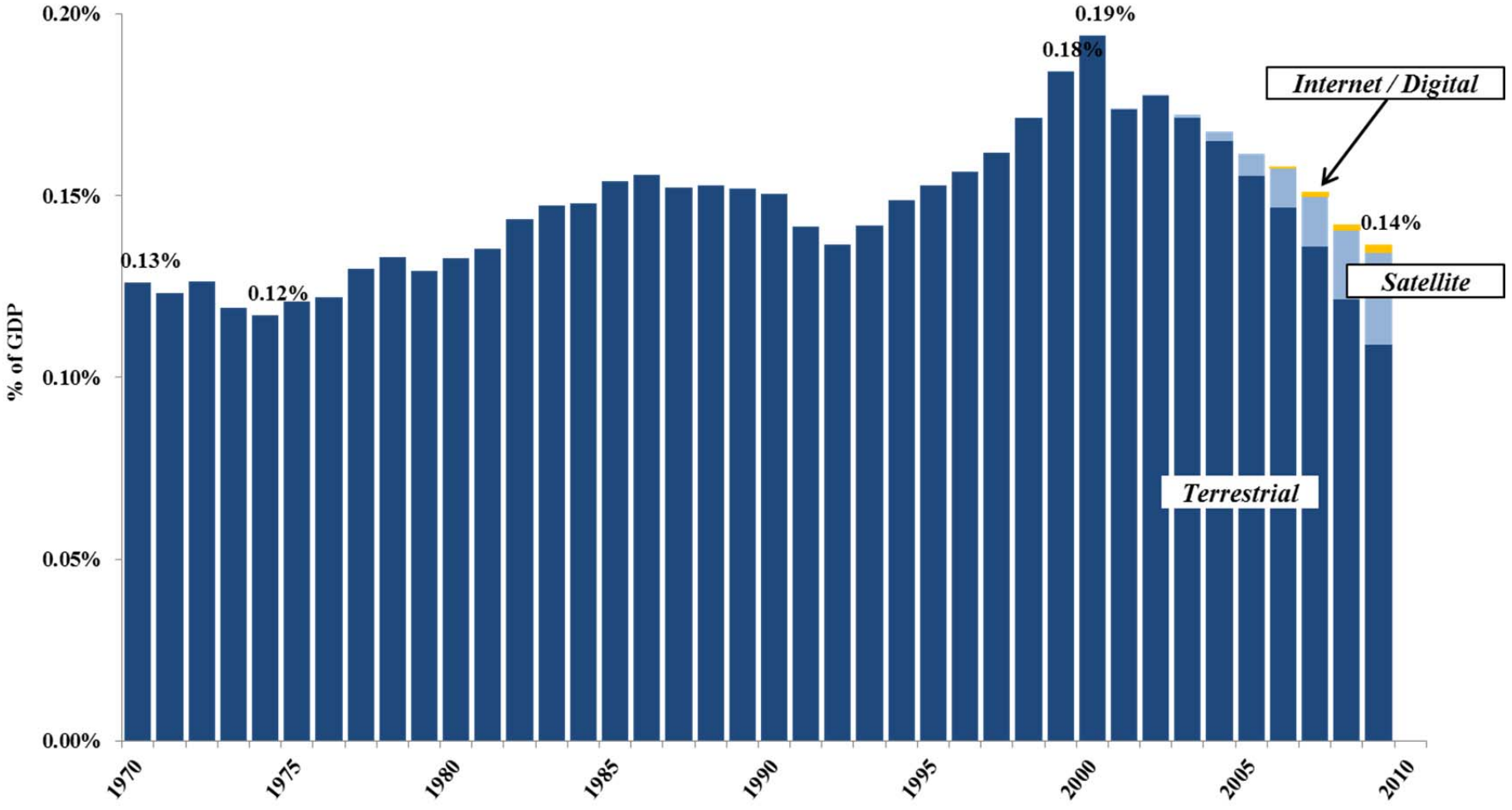
Source: see Appendix A.

Figure 9: Book industry revenues as a % of GDP, 1970-2009



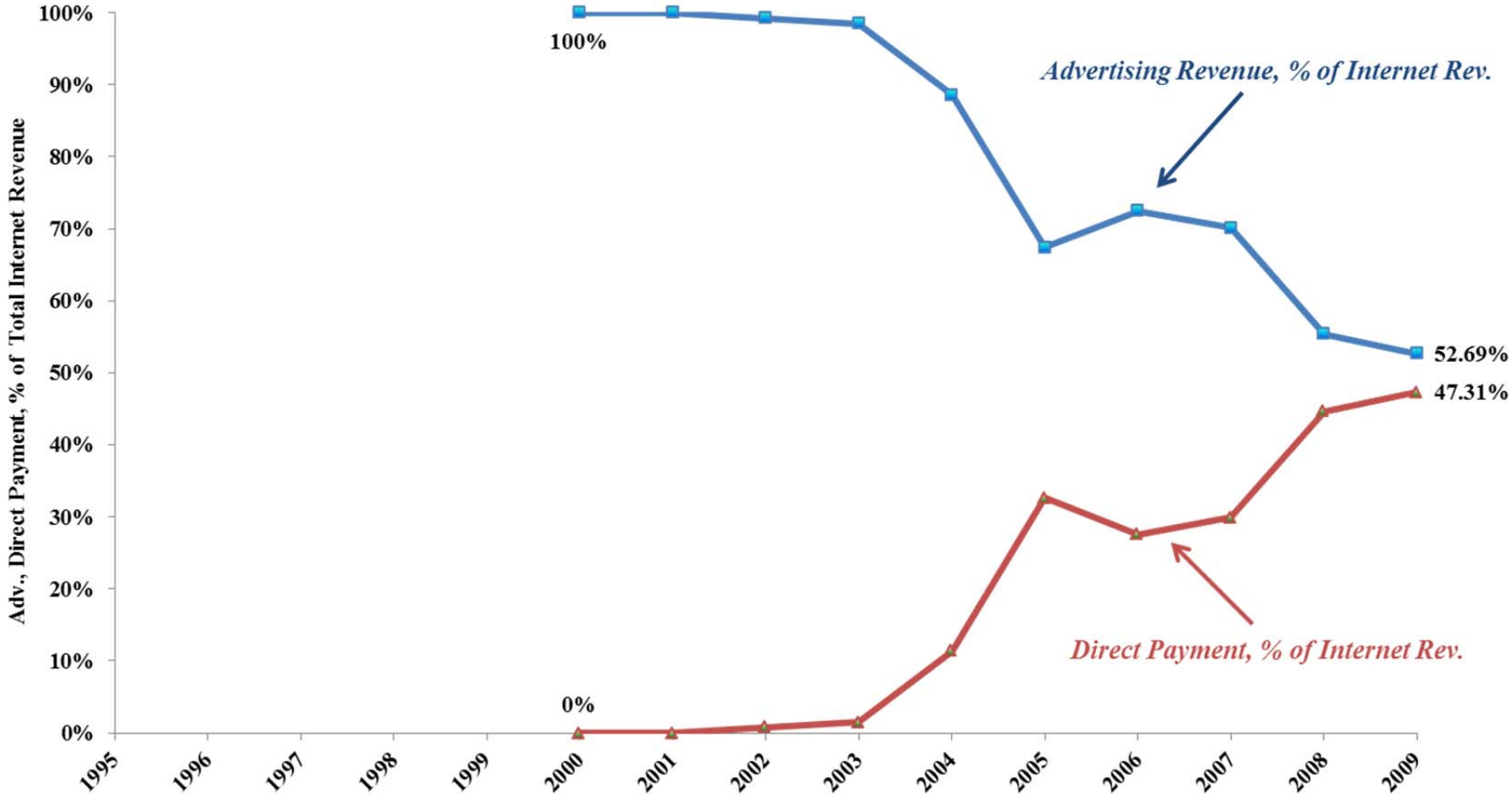
Source: see Appendix A.

Figure 10: Radio industry revenue as a % GDP, 1970-2009



Source: see Appendix A.

Figure 11: Advertising vs. pay support, % of total revenue, Internet lower bound media, 2000-2009



Source: see Appendix A.

Table 1: Leisure time use in the U.S., hours per person per week, major media 1970-2009

	1970	2000	2009
TV	23.5	30.7	34.0
Radio	16.7	20.4	19.9
Print media*	8.7	6.2	5.1
Recorded music**	1.3	6.1	2.9
Theater/home video	0.2	1.3	1.1
Video games	--	1.5	2.9
Cultural/sports events	0.1	0.4	0.5
Total except Internet	**50.5**	**66.7**	**66.4**
Internet***	--	1.0	14.5
Total per week	**50.5**	**67.6**	**80.8**

*** newspapers, magazines, leisure books**
**** including digital in 2009; includes only legitimate transactions**
***** includes all Internet use except work-related**
Source: Vogel (1994, 2004, 2011)

Table 2: Distribution of printed newspaper costs (an average 33,000 circulation paper, 1994)*

News-editorial	16%
Advertising	11
Production/printing	39
Circulation	11
Building/depreciation	32
Total	100%

Source: Inland Press Association

Table 3: A la carte movie distribution cost comparisons

	Rental price	Studio share*
2002	$3.25	33
2010	$4.41	70

*** Before duplications/distribution cost**
Sources: author calculations based on Adams Media Research* and *SNL Kagan Research data for 2002 and 2010 respectively

Appendix A: Media Industry Revenue: Data and sources

Table A-1: Media revenues as a % of GDP by category (Columns 1-10 do not include Internet components)

Year	Books	News-papers	Maga-zines	Recorded Music	Movie Theaters	Radio	Broadcast TV	Home Video	Multi-channel TV	Video Game Software	Internet (lower bound)	Total media, (Internet lower bound)	Internet (upper bound)	Total media (Internet upper bound)	Total media advertising	Total media direct pay-ment	GDP (bil. $)
1950	0.10	1.01	0.30	--	0.47	0.21	0.06	--	--	--	--	2.14	--	2.14	1.13	1.01	293.7
1951	0.11	0.95	0.29	--	0.39	0.18	0.10	--	--	--	--	2.02	--	2.02	1.10	0.92	339.3
1952	0.13	0.98	0.30	--	0.37	0.17	0.13	--	--	--	--	2.08	--	2.08	1.15	0.93	358.3
1953	0.14	0.99	0.30	--	0.35	0.16	0.16	--	--	--	--	2.11	--	2.11	1.18	0.93	379.3
1954	0.17	1.01	0.30	--	0.33	0.15	0.21	--	--	--	--	2.17	--	2.17	1.23	0.94	380.4
1955	0.17	1.06	0.31	--	0.29	0.13	0.25	--	--	--	--	2.21	--	2.21	1.29	0.92	414.7
1956	0.18	1.04	0.32	--	0.26	0.13	0.28	--	--	--	--	2.21	--	2.21	1.32	0.89	437.4
1957	0.19	1.00	0.31	--	0.23	0.13	0.28	--	--	--	--	2.15	--	2.15	1.28	0.86	461.1
1958	0.21	0.99	0.29	--	0.22	0.13	0.30	--	--	--	--	2.13	--	2.13	1.27	0.87	467.2
1959	0.21	1.00	0.30	--	0.20	0.13	0.30	--	--	--	--	2.14	--	2.14	1.29	0.85	506.6
1960	0.22	1.00	0.31	--	0.18	0.13	0.31	--	--	--	--	2.16	--	2.16	1.31	0.85	526.4
1961	0.23	0.97	0.30	--	0.17	0.13	0.31	--	--	--	--	2.11	--	2.11	1.26	0.85	544.8
1962	0.24	0.94	0.29	--	0.15	0.13	0.32	--	--	--	--	2.06	--	2.06	1.24	0.83	585.7
1963	0.24	0.92	0.29	--	0.15	0.13	0.33	--	--	--	--	2.06	--	2.06	1.23	0.83	617.8
1964	0.25	0.92	0.30	--	0.14	0.13	0.34	--	--	--	--	2.08	--	2.08	1.26	0.82	663.6
1965	0.25	0.90	0.30	--	0.14	0.13	0.35	--	--	--	--	2.06	--	2.06	1.25	0.81	719.1
1966	0.25	0.89	0.29	--	0.14	0.13	0.36	--	--	--	--	2.04	--	2.04	1.26	0.78	787.7
1967	0.25	0.85	0.28	--	0.13	0.13	0.35	--	0.02	--	--	2.01	--	2.01	1.21	0.79	832.4
1968	0.24	0.83	0.28	--	0.14	0.13	0.36	--	0.02	--	--	1.99	--	1.99	1.20	0.79	909.8
1969	0.24	0.83	0.27	--	0.13	0.13	0.36	--	0.03	--	--	1.98	--	1.98	1.21	0.77	984.4
1970	0.24	0.80	0.24	0.16	0.14	0.13	0.35	--	0.03	--	--	2.09	--	2.09	1.15	0.94	1,038.3
1971	0.23	0.80	0.24	0.16	0.12	0.12	0.31	--	0.04	--	--	2.01	--	2.01	1.11	0.91	1,126.8
1972	0.22	0.80	0.24	0.15	0.13	0.13	0.33	--	0.04	--	--	2.03	--	2.03	1.13	0.90	1,237.9
1973	0.22	0.76	0.21	0.14	0.11	0.12	0.32	--	0.04	--	--	1.93	--	1.93	1.09	0.85	1,382.3
1974	0.23	0.76	0.20	0.15	0.13	0.12	0.32	--	0.04	--	--	1.95	--	1.95	1.06	0.89	1,499.5
1975	0.24	0.74	0.18	0.15	0.13	0.12	0.32	--	0.05	--	--	1.92	--	1.92	1.03	0.89	1,637.7
1976	0.23	0.75	0.20	0.15	0.11	0.12	0.37	--	0.05	--	--	1.98	--	1.98	1.12	0.87	1,824.6
1977	0.23	0.74	0.21	0.17	0.12	0.13	0.37	--	0.06	--	--	2.03	--	2.03	1.14	0.89	2,030.1
1978	0.24	0.73	0.23	0.18	0.12	0.13	0.39	--	0.06	--	--	2.07	--	2.07	1.17	0.90	2,293.8
1979	0.24	0.73	0.23	0.14	0.11	0.13	0.40	--	0.07	--	--	2.05	--	2.05	1.18	0.87	2,562.2

1980	0.25	0.73	0.23	0.14	0.10	0.13	0.41	--	0.09	--	--	2.07	--	2.07	1.19	0.88	2,788.1

Table A-1, continued

Year	Books	News-papers	Maga-zines	Recorded Music	Movie Theaters	Radio	Broadcast TV	Home Video	Multi-channel TV	Video Game Software	Internet (lower bound)	Total media, (Internet lower bound)	Internet (upper bound)	Total media (Internet upper bound)	Total media advertising	Total media direct pay-ment	GDP (bil. $)
1981	0.25	0.73	0.23	0.13	0.09	0.14	0.41	0.01	0.11	--	--	2.09	--	2.09	1.19	0.90	3,126.8
1982	0.26	0.75	0.24	0.11	0.11	0.14	0.44	0.02	0.15	--	--	2.23	--	2.23	1.25	0.98	3,253.2
1983	0.26	0.78	0.26	0.11	0.11	0.15	0.46	0.04	0.18	--	--	2.35	--	2.35	1.33	1.02	3,534.6
1984	0.26	0.79	0.26	0.11	0.10	0.15	0.49	0.06	0.20	--	--	2.41	--	2.41	1.38	1.03	3,930.9
1985	0.26	0.78	0.25	0.10	0.09	0.15	0.48	0.08	0.21	--	--	2.41	--	2.41	1.37	1.04	4,217.5
1986	0.26	0.79	0.24	0.10	0.08	0.16	0.49	0.10	0.23	--	--	2.46	--	2.46	1.40	1.06	4,460.1
1987	0.27	0.80	0.24	0.12	0.09	0.15	0.48	0.12	0.25	--	--	2.52	--	2.52	1.40	1.12	4,736.4
1988	0.27	0.77	0.26	0.12	0.09	0.15	0.48	0.14	0.27	--	--	2.55	--	2.55	1.39	1.16	5,100.4
1989	0.26	0.74	0.26	0.12	0.09	0.15	0.46	0.16	0.29	--	--	2.54	--	2.54	1.36	1.18	5,482.1
1990	0.26	0.71	0.25	0.13	0.09	0.15	0.46	0.17	0.32	--	--	2.53	--	2.53	1.33	1.21	5,800.5
1991	0.28	0.65	0.24	0.13	0.08	0.14	0.42	0.18	0.34	--	--	2.47	--	2.47	1.23	1.24	5,992.1
1992	0.26	0.63	0.24	0.14	0.08	0.14	0.43	0.18	0.35	--	--	2.45	--	2.45	1.21	1.23	6,342.3
1993	0.28	0.62	0.24	0.15	0.08	0.14	0.42	0.19	0.36	--	--	2.48	--	2.48	1.21	1.27	6,667.4
1994	0.27	0.61	0.23	0.17	0.08	0.15	0.44	0.20	0.35	--	--	2.50	--	2.50	1.25	1.25	7,085.2
1995	0.28	0.62	0.23	0.17	0.07	0.15	0.44	0.20	0.37	--	--	2.54	0.001	2.54	1.27	1.26	7,414.7
1996	0.27	0.61	0.23	0.16	0.08	0.16	0.46	0.20	0.40	--	--	2.57	0.003	2.58	1.30	1.27	7,838.5
1997	0.27	0.62	0.23	0.15	0.08	0.16	0.44	0.19	0.44	--	--	2.57	0.01	2.58	1.32	1.26	8,332.4
1998	0.22	0.62	0.23	0.16	0.08	0.17	0.45	0.19	0.47	0.06	--	2.64	0.02	2.66	1.35	1.30	8,793.5
1999	0.22	0.61	0.23	0.16	0.08	0.18	0.46	0.19	0.49	0.06	--	2.68	0.05	2.73	1.39	1.29	9,353.5
2000	0.22	0.59	0.22	0.14	0.08	0.19	0.41	0.19	0.52	0.05	0.003	2.63	0.08	2.70	1.35	1.28	9,951.5
2001	0.21	0.54	0.20	0.13	0.08	0.17	0.40	0.20	0.57	0.06	0.01	2.57	0.06	2.62	1.25	1.32	10,286.2
2002	0.22	0.52	0.20	0.12	0.09	0.18	0.40	0.20	0.60	0.06	0.01	2.58	0.05	2.62	1.24	1.34	10,642.3
2003	0.20	0.50	0.19	0.11	0.08	0.17	0.38	0.19	0.63	0.06	0.01	2.53	0.04	2.56	1.21	1.32	11,142.1
2004	0.20	0.49	0.19	0.10	0.08	0.17	0.39	0.21	0.65	0.06	0.02	2.54	0.05	2.57	1.22	1.32	11,867.8
2005	0.19	0.46	0.18	0.09	0.07	0.16	0.35	0.19	0.67	0.05	0.03	2.45	0.07	2.49	1.17	1.28	12,638.4
2006	0.18	0.43	0.17	0.08	0.07	0.16	0.35	0.18	0.69	0.05	0.03	2.39	0.08	2.44	1.14	1.25	13,398.9
2007	0.17	0.37	0.17	0.06	0.07	0.15	0.32	0.17	0.71	0.07	0.04	2.29	0.10	2.35	1.06	1.24	14,077.6

2008	0.17	0.31	0.16	0.04	0.07	0.14	0.30	0.15	0.74	0.08	0.05	2.21	0.11	2.27	0.97	1.25	14,441.4
2009	0.17	0.24	0.13	0.04	0.07	0.13	0.28	0.15	0.77	0.07	0.06	2.12	0.11	2.17	0.85	1.27	14,256.3
2010	---	---	0.13	0.03	0.07	---	0.30	0.13	---	0.06	0.07	---	0.13	---	0.87	---	14,660.4

Data sources

I. Advertising Revenue

Newspapers, 1950-2010**:** National Association of Advertisers; 1999-2002: author estimates of newspaper online advertising revenue..

Broadcast television, 1950-2008: U.S. Census Bureau Statistical Abstracts; 2009 (original source: Universal McCann); 2009-10: TVB ***[does TVB stand for anything?]***

Cable television/DBS/Telco, 1980-2010: SNL Kagan Research
Online Television; National: ADWEEK, TV Week, author estimates based on Comscore reports; Local stations: TVB

Terrestrial Radio; 1950-2007: U.S. Census Bureau Statistical Abstracts (original source from Universal McCann); **2008-010**: Radio Advertising Bureau (original source Miller, Kaplan, Arase & Co.); author estimates [*what do these author calculations consist of?-should words be omitted?]*. **Satellite Radio** Sirius XM Radio Inc. and XM Satellite Radio Inc. Annual Reports.*[did we also use the Sirius annual reports?]***Internet radio, ____-2009:** Radio Advertising Bureau; 2010: www.bridgeratings.com (projection on March 15, 2010).

Magazines: 1950-2008: US. Census Bureau Statistical Abstracts (original source Universal McCann); 2009-10: Internet Advertising Bureau (original source Price Waterhouse Coopers, Inc.)

II. Direct payment revenues

Newspapers: 1956-1989, 1991-2009: Newspaper Association of America; 1950-55,1990: author estimates.

Cable television: 1980-2007: SNL Kagan Research; 2008-09: National Cable Television Association (original source SNL Kagan)

DBS/Telco: 1994-2007: SNL Kagan Research; 2008-09: 10-K reports of_[company names?] and author estimates based on SNL Kagan Research data.

Magazines: 1954, , 1958, 1963, 1967, 1977, 1978-87: Statistical Abstracts of the U.S., other years estimated by authors**;** 1988-2010: Magazine Publishers of America [*can you check 1956? This was not a business census year so it probably should be omitted]*

Recorded Music: 1973-1988: Vogel (1994) (original source Recording Industry Association of America); 1990-2010: RIAA; 1989 interpolated by authors.

Movie Theater; 1950-2008**:** Motion Picture Association of America, SNL Kagan (Domestic Box office); 2009-10: www.boxofficemojo.com

Books; 1950-2008: U.S. Census Bureau Statistical Abstracts; 2009: Association of American Publishers **[*should this be Association of American Book Publishers?—also, we need to indicate the specific years that were interpolated or estimated]***

Home Video; 1981-2010: SNL Kagan Research; 2006-07; author estimates of digital based on SNL Kagan Research data.

Satellite Radio: Sirius XM Radio Inc. and XM Satellite Radio Inc. Annual 10-k Reports. [*also Sirius?*]

Video Games Software; 1998-2010: Euro Monitor, Global Market Information Database, http://www.portal.euromonitor.com/portal/server.pt.

C. Aggregates

Internet lower bound: authors' calculation of sum of online newspaper, online television and Internet radio advertising revenues, plus direct payments for online recorded music, digital motion picture sales and rentals, and e-books *[Sung, is this right? Are there more?]*

Internet upper bound: authors' calculation of total Internet advertising less search and email, based on Internet Advertising Bureau data, plus direct payments for online recorded music, digital video sales and rentals, and e-books *[?] [does digital video include subscription? It should, be we need to be explicit about this]*

GDP: 1950-2009: U.S. Census Bureau Statistical Abstracts; 2010: Bureau of Economic Analysis [*Sung, didn't we revise the GDP data based on a newer report?—it wouldn't hurt to indicate that]*