



Valuing 'Free' Entertainment in GDP: An Experimental Approach

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Some economists believe that measured GDP growth since 2000 is too low because it excludes online entertainment (Brynjolfsson and Oh 2012) (Ito 2013). Although consumers do not pay anything out of pocket, online entertainment is not actually free but rather supported by advertisers. This paper shows that the current methodology of measuring GDP in the System of National Accounts 2008 (SNA) does include the value added of producing advertising supported media in GDP, but it is treated as an intermediate input to other industries rather than as household final consumption and is thus excluded from final expenditures. The paper then introduces an experimental methodology that includes advertising supported media in final expenditures.

Under the experimental methodology, recent GDP growth in the United States changes very little. It is true that advertising-supported online entertainment has grown dramatically since 2000. Concurrently, advertising-supported print entertainment has shrunk dramatically. The net impact is a tiny reduction in annual real GDP growth in the United States, from 2.485% to 2.484%. The experimental method also increases the level of GDP in the United States by 0.19% **more** than it does GDP in the rest of the OECD. Economists comparing GDP across countries may find that including advertising supported entertainment would change their comparisons.

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Introduction

Some economists believe that the Internet has created enormous value for consumers. They argue that recent US GDP growth dramatically underestimates consumer welfare growth since 2000 (Brynjolfsson and Oh 2012). This paper shows that the System of National Accounts 2008 (SNA)'s current methodology for measuring GDP does include the value added of producing advertising supported media like Facebook, but the output is treated as an intermediate input to other industries rather than as household final consumption. The methodology is not explicitly discussed in the SNA handbook, but it is the standard interpretation used by countries around the world. I introduce an experimental methodology for measuring GDP that includes advertising supported media as household final consumption expenditure. I then recalculate nominal GDP and real GDP in the United States from 1929 to 2012.

This paper studies advertising-supported media which provide real value to viewers. For example, broadcast television shows provide significant value to viewers. Consumers willingly purchase televisions and tune them in to advertising supported shows. Because consumers enjoy watching television shows, I treat advertising-supported television as a payment in-kind transaction: consumers 'earn' income by watching advertising and then 'purchase' media. My experimental methodology counts the value of those 'purchased' media services in final consumption expenditure. In 2011, I estimate that advertising-supported entertainment represented \$93 billion worth of payment in-kind.

In contrast, SNA's current method does not even acknowledge the value consumers get from watching broadcast television or playing games online. Instead, media is considered an intermediate input to the advertising industry. In turn, advertising is then considered an intermediate input to other goods and services. SNA's current methodology assumes that intermediate inputs, including advertising, are embedded in the market price of goods and services and hence indirectly included in the final expenditures measure of GDP. This methodology treats entertainment media just like unwanted telemarketing calls. Neither one is counted directly in final expenditures.

I show that real GDP growth in the United States is actually slightly lower under the experimental methodology. It is true that online advertising-supported entertainment has grown much faster than overall GDP since 1995. However, print advertising-supported entertainment has shrunk dramatically over the same time period. Advertising-supported radio and television have also grown slower than overall GDP since 1995. The net impact is a reduction in real US GDP growth from 2.485% to 2.484% annually.

I also show that the experimental methodology raises GDP in the United States by 0.19% relative to the rest of the OECD (0.65% vs. 0.46%). Public television is the main cause of these cross country results. The current SNA methodology includes public television in GDP but does not include advertising supported television. In contrast, the experimental methodology includes both television types equally. Relative to the rest of the OECD, the United States has a much smaller public television sector and larger advertising supported television sector. Accordingly, my experimental methodology raises US GDP more than it raises GDP in the rest of the OECD.

My paper will be divided into three parts. Section 1 collects data on US advertising expenditures back to 1929 and recalculates GDP from 1929 to 2012 using the experimental methodology. Section 2 discusses how my experimental methodology might impact cross country GDP comparisons. Finally,

Section 3 gives a more theoretical discussion. I start out by describing SNA's current methodology for handling advertising supported media in GDP. I then describe my experimental methodology in more detail and show that the experimental methodology produces better welfare comparisons.

Section 1. Changes to United States GDP with Experimental Method

Advertising supported media includes products like newspapers, and services like broadcast television. This paper only studies advertising supported formats which provide valuable media services to consumers to compensate for their time. My discussion assumes that media companies earn money by selling advertising services to outside companies – but the economics are the same if media companies collect and sell private information for non-advertising purposes. I just use the word 'advertising' because it would be too cumbersome to say 'advertising or information collection'. Some media categories receive all of their revenue from advertisers and consumers pay nothing out-of-pocket. Other media categories receive some of their revenue from advertisers and some from consumers. None of the discussion or results in this paper depend on whether consumers pay a positive amount out-of-pocket. It only matters that consumers pay less than the production cost for advertising supported media. In the modern United States, broadcast television is the largest advertising supported media category. But Internet advertising is growing rapidly and may soon overtake broadcast television.

SNA 2008 recommends that countries treat advertising-supported media as an intermediate input, and therefore exclude it from the calculations of GDP using the final expenditure approach. This paper experiments with an alternative method to account for advertising supported media in GDP. Under the experimental methodology, there are two types of output: consumer entertainment and advertising viewership. Consumers produce advertising viewership and then barter it to media companies in return for entertainment. The trade-off is clearest for downloaded apps. Software developers often produce two different versions of the same program: one for a small monetary payment and the other with ads. But consumers can also avoid ads by reading books instead of magazines, buying DVD's instead of watching television, etc. The supplier of the media also sells advertisers access to customers, which is the standard monetary transaction that is already reflected in the SNA. There is no change in value added or operating surplus for the media producer because the value of the newly recognized media output equals the service provided by the households, but I now recognize the household as producing a service for the advertiser by agreeing to watch (or at least be exposed to) advertisements in exchange for the free media service provided by the media producer. I am treating this implicit sale of media as household final consumption expenditure.

My experimental methodology does not require any major conceptual changes to SNA. In this paper, I treat advertising-supported media as a payment in-kind for services produced by households. SNA 2008 already counts other non-cash payments as labor income (Section 7.51). SNA also imputes cash values for barter transactions (Section 3.75) and financial services indirectly measured (Section 6.163). Just like those transactions, I impute a value for advertising-supported media based on estimated costs. However, since the household is not "employed" by the media producer, I treat the household production of the service of providing to access to advertising as a form of production by an unincorporated household enterprise. First, I start with the advertising revenue reported by media

companies on the 2007 Economic Census. Next, I subtract the cost of printing ads, billing advertising clients and other non-media costs. I assume that the remaining revenue is used to purchase existing media content or produce new media content.

My paper is not the first to discuss treating advertising supported media as payment in-kind. Imputation for advertising-supported media was first raised in *The National Income – 1954 Edition* and was extensively discussed in the 1970's (Ruggles and Ruggles 1970), (Okun 1971), (Jaszi 1971) (Eisner (1978) and (Kendrick 1979). The paper 'Consumer Services Provided by Business Through Advertising-Supported Media In the United States' (Cremeans 1980) estimated that advertising-supported media was worth \$28 billion in 1976.² Vanoli discusses the issue in *A History of National Accounting* (2000). More recently, *Businessweek* published an article last year criticizing BEA's GDP numbers for excluding free online media (Ito 2013).³

My paper is very similar to Kendrick's 1979 paper 'Expanding Imputed Values in the National Income and Product Accounts'. Like him, I calculate both real GDP and nominal GDP when advertising-supported media is included in final expenditures. However, my paper extends Kendrick's series from 1973 to 2012. In addition, my paper also decomposes real entertainment consumption into hours of advertising viewership provided and 'earnings' per hour of advertising viewership. This decomposition has no effect on measured GDP, but does have implications for hourly earning growth and productivity growth over time.

Nominal Expenditures on Advertising-Supported Media over Time

When measuring advertising-supported media, I study seven separate media categories: a) printed newspapers; b) printed magazines; c) printed phone directories (yellow pages); d) printed direct mail; e) radio; f) television (broadcast and advertising supported cable television); g) online advertising. In some cases, the line between one category and the next is speculative. In particular, many websites contain material originally produced for offline media use. My estimates of nominal media production are not sensitive to the split between the categories. However, each category has its own price index – so real growth rates may change if the split changes.

Not all of advertising supported media is considered final expenditures under my experimental method. I count popular magazines, leisure websites and other consumer media in final expenditures. Throughout the paper, I will call consumer media 'entertainment.' But professional magazines or productivity software are considered an intermediate input. For example, a doctor might get free medical journals in return for reading pharmaceutical ads. I use the industry literature and my own judgment to determine which media categories are considered 'entertainment' and counted in GDP. My discussion will focus on those entertainment categories.

² For the same year, I estimate that advertising-supported entertainment only added \$9.2 billion to GDP. The main cause of the difference is how I handle non-media costs like advertising agency markups. I consider those non-media costs to be intermediate expenses, and therefore do not count them as media services provided to consumers. I also exclude media costs for business publications.

³Some websites are purely amateur productions, with no subscription revenue or advertising revenue. My paper will not capture them, but they account for only a small fraction of time spent online.

My main dataset is the 2007 Economic Census. That dataset reports nominal advertising revenue for each category. The Service Annual Survey provides annual data from 2001 to 2012. My historical data is taken from my earlier research on intellectual property products (Soloveichik and Wasshausen 2013, Soloveichik 2013 a, b, c, d and e). The Internet Advertising Bureau provides some information splitting online advertising by type, but I had to use my own judgment to get each category precisely. Finally, I use data published in the CS ad expenditure dataset (Galbi 2008). I then benchmarked all of those sources to get advertising supported media back to 1929.

Figure 1 shows advertising revenue for printed media over time. Over the past decade, print advertising has shrunk from 1.0% of nominal GDP to only 0.6% of nominal GDP. The Internet is almost certainly responsible for most of this decline. Classified advertising has moved from newspaper sections to websites. Printed yellow pages are also being replaced by web search. Print media also fell during the 1930's, when radio became an important advertising medium.

Figure 2 shows advertising revenue for non-printed media over time. Over the past decade, non-print advertising has grown slightly from 0.6% of nominal GDP to 0.7% of nominal GDP. This increase is more than explained by the growth of online advertising from 0.07% of GDP to 0.22% of GDP. Over the same time period, television and radio advertising have both grown slower than GDP. The main determinant of non-print media advertising is technological progress. Radio was first commercialized in the 1920's and grew rapidly until the 1950. Television started in the late 1940's and grew rapidly until 2000. Finally, the Internet started in the 1990's and has been growing ever since.

Not all of the advertising revenue shown in Figures 1 and 2 is used to produce media. Media companies need a sales staff to reach out to advertisers, plan the exact format of the ad and then bill the advertiser afterwards. Reporters and editors may focus on topics useful for advertisers rather than readers.⁴ In addition, printed media like newspapers spend money printing the ads and then stuffing them in the news sections. In an earlier paper on intellectual property, I estimated that non-media costs account for 60% of newspaper and magazine advertising revenue and 25% of television, radio and internet advertising revenue (Soloveichik and Wasshausen 2013). I did not study direct mail or yellow pages in that paper. Those two media types are heavily oriented towards advertising, so I assume that non-media costs account for 90% of direct mail and yellow pages advertising revenue. Media services receive the remaining 40% of newspapers and magazines, 75% of television, radio and internet and 10% of direct mail and yellow pages. For this paper, the term media services covers licensing costs for pre-existing content, production costs for new content and also physical costs for printing and delivering physical media.

Figure 3 shows estimated share of advertising revenue devoted to media services. From 1929 to 2011, the media share of advertising grew from 32% to 51%. This steady increase is caused by the decline in print media shown in Figure 1 and the rise in non-print media shown in Figure 2. Non-print media outlets spend much less on physical production costs for advertising (e.g. printing classified sections), so they have more advertising revenue available to subsidize media services.

Not all of the advertising supported media shown in Figure 3 is directed towards consumers. Some businesses use media for work and 'pay' by viewing advertising. I do not have precise data

⁴ Some media outlets have procedures to prevent journalists from collaborating too closely with advertisers.

tracking media consumption for work purposes vs. media consumption for leisure.⁵ Instead, I will use media genre data to estimate the split between entertainment and work. For example, I assume that scientific journals are generally used for work. For newspapers, I use the genre splits reported by the CS Ad Expenditure database. For magazines, I use the genre categories provided by the Economic Census and other statistical sources to differentiate between consumer entertainment and professional education. I assume that virtually all radio and television is directed towards consumers and should be counted as entertainment.⁶ For internet advertising, I use the genre splits reported by the Internet Advertising Bureau. For direct mail, I use genre splits reported by the Direct Mail Association. Finally, I assume that yellow pages are split 50% to consumers and 50% to professionals.

Figure 4 shows the estimated share of advertising-supported media devoted to consumer entertainment. From 1929 to 2011, the entertainment share has hovered around 90%. Radio and television are the main cause of the observed fluctuations. Those two media are assumed to be almost exclusively entertainment. Therefore, the average entertainment share rises when they account for a higher percentage of advertising supported media consumption. Interestingly, the consumer share for print advertising does not appear to change when radio or television grow. This suggests that print advertising to consumers is neither a substitute nor a complement for broadcast advertising.

Figure 5 shows the increase in nominal GDP from including advertising-supported entertainment. The overall result is a modest increase in GDP growth. I estimate that advertising-supported entertainment equaled 0.50% of GDP in 1929 and 0.60% in 2011. Excluding World War 2, there is no correlation between GDP growth and the nominal share for advertising-supported entertainment. Therefore, GDP volatility does not change when advertising supported-entertainment is included in final expenditures.

Consistent with Brynjolfsson's research, online advertising-supported entertainment has grown enormously in the past decade and now accounts for 0.13% of nominal GDP. However, this growth is more than canceled out by a decrease in print advertising-supported entertainment. Total advertising-supported entertainment shrunk from 0.65% of GDP to 0.60% of GDP over from 2001 to 2011. Results are similar if I look at real GDP growth over time.⁷

Capital Investments by Advertising Viewers

Consumers often need to buy expensive equipment before they can enjoy advertising-supported entertainment. BEA currently counts televisions, radios and computers as consumer durable goods. However, they might be considered investment if advertising-supported media is considered an in-kind payment for advertising viewership. This change has no impact on measured GDP, but it does increase capital stock and decrease the stock of consumer durables. In that case, the value of advertising-supported media would be considered mixed income and represents both compensation for

⁵ One might think that data on media consumption in the office versus at home would be informative. In fact, many workers view leisure media during work breaks. Conversely, many workers read professional journals at home.

⁶ Educational shows are still counted in final expenditures because private spending on college tuition and other educational costs are counted in personal consumption expenditures.

⁷ Like other new goods, the welfare gains from online advertising-supported media may be much larger than the increase in real GDP. By the same token, one cannot easily measure welfare gains from DSL or smartphones.

time watching advertising and also the capital necessary to watch advertising. If BEA chose to implement my alternative methodology, the value of advertising-supported entertainment would be added to “proprietor’s income” (or “mixed income” in SNA terminology) (NIPA Table 1.10, line 13)

Figure 6 shows the increase in nominal capital stock from reclassifying consumer durables as capital stock. The largest increase to measured capital stock occurred in 1929. At that time, radios were new technology and very expensive. Radio prices dropped quickly and they now represent a tiny category of consumer durables.⁸ Another spike occurred during the 1950’s, when broadcast television was first introduced.⁹ The recent rise in online entertainment does not appear to cause much increase in the value capital used to view advertising-supported media.¹⁰ Perhaps consumers are substituting between broadcast televisions and computers?

Real Advertising Supported Media over Time

It is difficult to develop a price index for media services. Each newspaper article, television program and website is a unique artistic creation, so I can never compare the cost of producing two identical media services at different times. Instead, I will use a variety of price indexes tracking input costs. These price indexes generally assume zero multifactor productivity growth in the entertainment industry. It is true that the consumer entertainment experience has improved dramatically since 1900. However, I believe that new technologies like plasma televisions and smartphones should be considered improvements in entertainment viewing technology – not entertainment production technology. Television networks often re-run old programs to modern consumers.

For each media service, I construct an average price index based on prices for subcomponents. In this section, I weight subcomponents by the consumer entertainment produced by each media type. These weights give a lower share to media categories with high non-media costs and smaller consumer entertainment shares. I believe that these weights are appropriate for this paper, which is focused on advertising-supported entertainment. However, advertisers may be more concerned with total costs for an advertising campaign, whether it is for media or physical costs.

For printed media, I mainly use existing producer price indexes (PPI’s) from the Bureau of Labor Statistics (BLS). For newspapers, I use the PPI for newspaper publishers (PCU51111-51111-) from 1980 to 2011. For magazines, I use the PPI for periodical publishers (PCU51112-51112-) from 1980 to 2011. For phone directories, I use the PPI for directory and mailing list publishers (PCU51114-51114-) from 2004 to 2011. Before those PPI’s are available, I use the consumer price index for books as a proxy. That price index is discussed further in the paper ‘Book Manuscripts as a Capital Asset’ (Soloveichik 2013b). For direct mailing, I use the price index for magazine publishers developed earlier. Many direct mail advertisers have ‘articles’ similar in form to magazine articles – but they are explicitly focused on promoting specific products. Those articles probably have similar writing costs as magazine articles.

For television and radio, I draw on my previous research with entertainment originals. For long-lived television originals, I developed two separate price indexes: one for live action fiction programs like

⁸ BEA does not track radios by themselves. I assume that 10% of ‘audio equipment’ is radio from 1971 to 2011 and a higher proportion in earlier years.

⁹ Most televisions are used to view both broadcast television and cable. I allocate capital in proportion to revenue.

¹⁰ Computers are used both for advertising-supported entertainment, video gaming, word processing and other activities. I allocate 50% of the computer usage for people with internet access to advertising-supported media.

sit-coms or dramas and one for other long-lived programs like cooking shows or animated programs (Soloveichik 2013c). For short-lived television programs, I use three separate price indexes. For sporting programs, I use ticket prices for sporting events as a proxy price. For soap operas and short-lived fiction, I use prices for long-lived live action fiction. Finally, I assume that news, reality television and other short-lived programs track the price for other long-lived fiction. For radio, I focus on costs for music programs because music programs account for more than 80% of modern listenership. My radio price index is a weighted average of pre-existing price indexes for audio equipment prices and royalty rates for broadcast music. The royalty rates for broadcast music are reported in an earlier paper 'Music Originals as Capital Assets' (Soloveichik 2013a).¹¹

For internet media, I study three categories separately: a) online print; b) online video and c) online software. Online print covers websites with mostly text like blogs or newspaper websites. Online video covers websites with mostly video and audio like Youtube or television shows. Finally, online software covers gaming websites, social networking¹² and other services requiring software. For online print media like blogs,¹³ I use the newspaper PPI discussed earlier. Online videos are often very similar to animated television programs or instructional programs. So, I use price index for other long-lived television programs discussed earlier. Online software covers broad categories like search, social media and video games. I use the consumer price index for software (CUUR0000SEEE02) to deflate this revenue from 1998 onwards. Before that consumer price index is available, I use BEA's deflator for pre-packaged software investment. I assume a 30% weight for online print, a 30% weight for online print, 30% for online video and 40% for online software. I used those weights to estimate a combined PPI for the overall online software industry.

Figure 7 shows advertising-supported entertainment prices relative to overall prices for personal consumption expenditures (PCE). Average media prices have risen slightly faster than overall PCE prices. This increase is mainly caused by faster price growth for print media between 1980 and 2000. Radio and television prices have hovered around overall PCE prices since 1940. Online media prices have fallen significantly over the past decade, but online media is still a relatively small share of total advertising-supported entertainment.

The higher inflation rate for print media can be explained by the lower computer share. Newspapers still use journalists to research articles and editors to lay out the paper. Computers might help with a few subsidiary tasks like word processing – but they can't write the whole paper yet. It might seem that better communication technology would allow media providers to share content and therefore cut costs per advertising viewer. In fact, media providers have been sharing content for centuries. On the other hand, radio and television networks use computers to record performances and then edit the show. Online media providers use computers to provide software services. All of these media types have benefited from the dramatic declines in computer prices.

¹¹Broadcasters may not be able to respond to changing music prices in the very short-term. I smooth the annual royalty rates across five years to avoid short-term volatility. During the late 1930's, radio broadcasters developed their own music association and used that association to temporarily drive down payments to the competing royalty association. I treat these lower payments as a decrease in music prices. Another researcher might view the broadcast music association as simply a shift from outsourcing to in-house production, with no price changes.

¹²The content on Facebook is mostly text, but that content is generally created by amateurs for their own purposes. The advertising-supported part of Facebook is the Facebook software which links individual.

¹³In this paper, I consider blogs maintained by amateurs without any advertising to be household production and therefore exclude them from the national income and product accounts (NIPA's). But most major blogs earn money from advertising and are therefore part of the NIPA's.

Figure 8 shows quantity indexes for advertising supported entertainment over time. The combined media quantity index tracks the overall GDP quantity index quite closely. Therefore, my experimental method has little impact on real GDP growth since 1940. The steady total masks dramatic changes across categories. Real advertising-supported print media has been growing much slower than real GDP since 1929. Real advertising-supported radio and television grew much faster than real GDP during the 1950's, tracked real GDP from 1960 to 1990 and then grew slower during the 1990's and 2000's. Online advertising-supported entertainment has been growing much faster than real GDP since the 1990's.

Real Advertising Viewership Over Time

This section is focused on estimating the real value of advertising viewership 'provided' by media users over time. In this paper, I will treat advertising viewership as a form of labor input, just like hired employee time. Measured GDP does not depend on either work hours in the conventional market or advertising viewership 'work'. However, changes in work input are still interesting to researchers studying total factor productivity and similar topics.

Print media advertising is hard to measure. To the best of my knowledge, there is no dataset tracking time use for print media historically. I use newsprint consumption as a proxy index for newspaper advertising. This proxy measures both the number of newspaper copies sold, and also the amount of advertising in each paper. I also use pounds delivered as quantity index for direct mail. For magazines, I use the number of copies sold. For yellow pages, I use the number of copies delivered.

Television advertising is much easier to measure. Nielsen has measured television viewing time since the 1950's. Nielsen's data combines both time watching entertainment, and time watching advertising. I use IMDB data to estimate the amount of television advertising each hour. Between 1960 and 2010, advertising time rose from 15% of broadcast time to 28%. This increased advertising partially compensates for the better show quality. In other words, broadcasters are showing better programs but demanding viewers sit through more ads in return.

Radio and online advertising is also measured based on time use. Arbitron and other data sources track radio time use back to the 1920's. I could not find any precise data on radio advertising shares, but the book "Radio After the Golden Age: The Evolution of American Broadcasting Since 1960" (Cox 2013) suggests that radio broadcasters have also been increasing advertising time. He only gives time allocation for a few years, so I interpolate between those years. Finally, comScore and other sources track internet time use. I do not have any data on internet advertising per hour. For simplicity, I assume that online advertising represents a fixed proportion of time online.¹⁴

Figure 9 shows quantity indexes for advertising viewership 'provided' over time. In order to make it more comparable to Figure 8, I only show consumer entertainment in Figure 9. However, alternative graphs tracking professional information media are available on request. The quantity indexes for entertainment advertising viewership generally track the real quantity indexes for entertainment shown in Figure 8. Print media grows a little faster in Figure 9 than Figure 8 and online

¹⁴ Radio and internet advertising is often integrated into the program, so measuring the time share is hard.

media grows a little slower. But the overall result is pretty similar. None of my quantity indexes adjust for potential quality changes. I do not know how quality adjustment might change my results.¹⁵

Real ‘Hourly Earnings’

Figure 10 calculates a real ‘hourly earnings’ index by comparing the entertainment quantity index shown in Figure 8 with the advertising viewership index shown Figure 9.¹⁶ From 1929 to 1995, real ‘hourly earnings’ for advertising-supported entertainment have been almost flat. Since 1995, real ‘hourly earnings’ have grown rapidly. These higher earnings are primarily caused by better television programming, and so are not directly related to the internet. In Figure 9, I showed that entertainment quantities have risen steadily over time. Most of that increase comes from increases in media consumption over time, not increases in the real value of entertainment ‘earned’ by consumers for each advertising viewership unit provided.

Figure 10 shows a trend break for both advertising viewership ‘hourly earnings’ and market labor wages¹⁷ around 1970. Between 1929 and 1969, real ‘hourly earnings’ for advertising viewership grew at -0.52% per year and real wages for market labor grew at 2.95% per year. Between 1969 and 2011, real ‘hourly earnings’ for advertising viewership grew at 1.63% per year and real wages for market labor grew at 1.06% per year. I do not know why the two series show such different patterns. This result may be a topic for future research.¹⁸

Mismeasured prices are one possible explanation for the stagnant real ‘hourly earnings’ shown in Figure 10. For example, suppose that BLS’s newspaper PPI simply tracks expenditures per page. For most newspaper publishers, expenditures are very close to revenue. Therefore, my entertainment price index will automatically track the advertising price index and real earnings growth will be zero. In fact, BLS’s newspaper PPI tracks wholesale book prices very closely (Soloveichik 2013b). The close correlation is not surprising – books require virtually the same inputs as newspaper articles. In 1980, each newspaper copy contained advertising-supported journalism worth about 28% of a book copy. By 2011, the advertising supported journalism in a single newspaper copy was worth only 14% of a book copy. This quality decline may explain some of the readership decrease over time.

As a robustness check, I also tried computing newspaper quantities based on the number of copies sold. This quantity index shows much lower declines than the newsprint index. I estimate that newspapers used 5.8 pounds of newsprint per subscriber per week in 1980. By 2011, newspapers used only 2.5 pounds. On the other hand, real entertainment output from Figure 7 is unaffected by the

¹⁵ Advertising exposure could be viewed as an arms race. Consumers use technology like remote controls or pop-up blockers to avoid unwanted ads. Broadcasters use technology like embedded ads and cookies to target advertising more precisely. For simplicity, I will assume that exposure is proportional to advertising time.

¹⁶ A small portion of the ‘hourly earnings’ in Figure 10 should be allocated to capital assets used to view advertising-supported media. However, I believe that the capital share is too small to be worth adjusting for.

¹⁷ I use BLS’s Employment Cost Index to get nominal wages from 1975 to 2012. From 1929 to 1974, I use BEA’s pre-existing estimates of employee compensation and pre-existing estimates of US population to get nominal wages per capita. I then deflate those nominal wages by BEA’s price index for personal consumption expenditures. Other researchers might calculate different real wages using different datasets. But the general comparison still holds.

¹⁸ Some changes might be explained by technological change in advertising-viewership technology. For example, high definition televisions might increase demand for high quality television programs. However, networks may compensate for more expensive programming by running more ads.

change. Accordingly, real hourly earnings increase even slower when I measure newspaper quantities differently.

At first glance, the steady real 'hourly earnings' for overall advertising viewership appear contrary to ordinary experience. Most people reading this paper have benefited enormously from online media and software. However, economists may be more comfortable online or have better internet access than the average consumer. Therefore, we generally benefit more from the increase in online media and suffer less from the decline in print media. Economists are probably also better at using DVR's to skip television commercials. Computer proficient people have also enjoyed much higher labor income growth in the past few decades. Measured income inequality might rise if advertising supported media entertainment was included together with labor income.¹⁹

Measured TFP in the Media Industry

SNA's current methodology assumes that media companies produce advertising services for the rest of the economy. The goal of advertising is to produce changes in consumer behavior, which is difficult to measure. However, we can easily measure proxies for advertising exposure like television viewing time or newspaper sales. Measured TFP grows if media companies produce more advertising exposure for the same inputs. This methodology implies shrinking TFP over time. Between 1960 and 2011, aggregate time spent viewing television advertising rose from 15 billion hours per year to 89 billion hours per year. Over the same time period, real television broadcasting inputs rose from \$4.0 billion to \$48 billion. If the value of better television programming is not considered, then measured productivity falls 49% in the television broadcasting industry. Between 2002 and 2012, average time spent online rose from 1.94 hours to 4.03 hours per day. Over the same time period, I estimate that real online broadcasting inputs rose from \$5.9 billion to \$44 billion (2009 \$'s).²⁰ If the value of better online media is not considered, then measured productivity falls 72% in the online advertising industry.

In contrast, my alternative method assumes that consumers provide an input into the production of advertising services and the TFP is constant. Consumers 'earned' 27¢ worth of entertainment from one hour of television advertising viewership in 1960 and 54¢ worth in 2011 (2009 \$'s). This represents real 'hourly earnings' growth of 1.3% annually for consumers watching television. Similarly, consumers earned 3¢ worth of media from one hour online in 2002 and 11¢ worth of media per hour in 2012 (2009 \$'s). Media companies 'hire' individual consumers to watch ads, and then resell their labor services to advertisers. Measured productivity will rise if media companies can transmit content more efficiently or organize it better for advertisers.²¹

¹⁹One could allocate advertising-supported media evenly across all viewers. However, advertisers generally pay much more for certain demographics than others. Networks respond by producing content which appeals to those demographics. This could be interpreted as higher hourly earnings for those demographics.

²⁰ These numbers are based on nominal advertising expenditures online, my estimates of time spent online and my price index for online advertising-supported media. I do know if my TFP numbers match other estimate of TFP.

²¹ Many media companies also produce their own programming. TFP in that area will rise if the companies can produce quality programs without using expensive inputs. In practice, I cannot measure media quality reliably. In my work on entertainment originals, I assumed zero TFP growth over time.

Section 2. Changes to Cross-Country GDP Comparisons

This section is very preliminary. I was not able to purchase data on advertising expenditures by country and year. However, the World Advertising Council (WARC) did provide a sample of advertising data for 15 major countries in 2008. I do not know if those 15 countries are representative of the rest of the OECD, or if 2008 is a representative year. Nevertheless, the sample data yielded interesting results.

Figure 11 shows television and radio advertising across countries. Among the major countries, the United States has the largest broadcast advertising share by far. Under the experimental method, US GDP rises by 0.19% more than GDP in the rest of the OECD sample. Figure 10 also shows a strong positive relationship between population and broadcast advertising. The relationship remains significant even after I exclude the United States or control for GDP per capita, government expenditure shares and GDP growth. I do not know why larger countries should have a larger advertising share for television and radio advertising. Perhaps broadcast advertising has significant economies of scale and requires a large population to support it.

Figure 12 shows newspaper and magazine advertising across countries. Like Figure 11, there is a positive relationship between population and advertising expenditures. However, even very small countries have a print advertising share around 1%. This suggests that there may be fewer economies of scale for print advertising than broadcast advertising. Perhaps it is easier to target print advertising than broadcast advertising?

Section 3. Conceptual Discussion of Advertising Supported Media

The System of National Accounts 2008 (SNA) currently recommends that countries exclude advertising supported media from final expenditures. Media products and services that are paid for by advertisers are considered an intermediate input to advertising. In turn, advertising is an intermediate input to a variety of consumer goods and services. Like other intermediate inputs, advertising contributes to GDP indirectly by helping companies sell products that will be counted in final expenditures. But advertising is not counted in final expenditures directly.²² In contrast, media is included in final expenditures if it is supported by the government, non-profits or consumer payments.²³

Advertising supported media is not the same as entertainment originals. I have done previous research measuring investment, prices and capital stock of long-lived entertainment originals (Soloveichik 2013a, b, c, d and e). Those entertainment originals are sometimes used to produce advertising supported media like broadcast television. However, the categories are not at all identical. Advertising supported media includes short-lived media like newspapers, sports broadcasting and other

²² Advertising purchased by government and non-profits is part of final expenditures.

²³ Some countries use subsidies to support media production. If the subsidies are less than half of production costs, SNA values the subsidized media at market prices. However, media produced entirely or mostly by the government is valued based on government expenditures.

entertainment that is not part of capital stock. Entertainment originals are used to produce consumer products like DVD's or books that are sold to consumers and counted in personal consumption expenditures. This paper uses a lot of the data I collected earlier for my project on entertainment originals. But the theory in this paper does not depend on whether entertainment originals are classified as capital assets or not.

Advertising supported media is also distinct from brand awareness. Previous researchers have argued that advertising increases sales over the long run, and therefore should be considered an investment in brand equity (Corrado, Hulten and Sichel 2009). However, that treatment is focused on the businesses which purchase advertising services from media companies. Regardless of how consumer entertainment is treated in GDP, media companies still earn money from selling advertising services to businesses. None of my results change when advertising is treated as a capital investment.

Does This Experimental Methodology Double-Count Advertising?

One might argue that advertising-supported media is an intermediate input embedded in final output – and therefore my experimental methodology double-counts advertising-supported media. However, that argument assumes that consumers can't watch advertising-supported media without buying the products. From a legal standpoint, that's not true. Advertising-supported media is available to everybody without any purchase requirements. The market price for advertised products only covers the products themselves, not the shows they're advertised on.

Even without legal compulsion, one could argue that advertisements psychologically force consumers to pay higher prices. Ex ante, rational consumers are aware that advertisements manipulate them – but they are willing to be manipulated because they want 'free' entertainment. In that case, the higher price for advertising goods could be considered an implicit payment for advertising-supported media. For example, suppose that Coca-Cola spends \$1 billion on television advertising and sells \$2 billion worth of soda. SNA's current methodology treats this transaction as \$2 billion worth of spending on beverages. Under the psychological force argument, this transaction is actually \$1 billion worth of spending on beverages and \$1 billion of spending on consumer entertainment.²⁴ Adjusted soda prices would rise if Coca-Cola decreased advertising spending without changing the market price for soda. Under the psychological force argument, treating advertising-supported entertainment as payment in-kind will not change aggregate consumer spending.²⁵ But it will reduce the expenditure shares for non-media goods and raise the expenditure share for media goods. Furthermore, inflation rates for individual products might change if advertising expenditures change over time.

Personally, I do not believe that the psychological force story is plausible. In 2011, consumers received only 54¢ worth of television per hour of advertising viewership. That amount is barely large enough to compensate for the time spent watching television, let alone compensating for psychological compulsion. Furthermore, consumers generally find purely informative ads boring and prefer ads with

²⁴ If advertising has a long-term impact on brand preferences, then the psychological forcing must be long-lived as well. In that case, the reduction in consumer spending should be spread over multiple years.

²⁵ Nominal investment might fall if advertising 'forces' businesses to overpay on capital expenditures in return for short-lived media. Conversely, nominal investment could rise if advertising 'forces' businesses to overpay on intermediate expenditures in return for long-lived media products (like free books).

less information despite their greater emotional manipulation. As a robustness test, I tried re-calculating PCE on non-media goods and services if the psychological force methodology is followed. I found no significant impact on measured inflation rates or real PCE growth from the adjustment. More information on my datasets and methodologies are available upon request.

Theoretical Effects on Measured Consumer Welfare

My experimental methodology produces more intuitive welfare comparisons. Many sporting events are now moving from broadcast television to cable television. Cable television networks generally show the same amount of advertising as broadcast networks – so consumers are unambiguously worse off from the switch. They are now required to pay subscription fees to get content they had previously gotten for free. Yet SNA's current methodology treats the new cable subscribers as a real GDP increase.²⁶ Under the alternative method, real GDP falls. Some viewers will choose to miss the sporting event rather than pay cable subscription fees. This drop in viewership is considered a decrease in final expenditures. Nominal GDP does rise with the switch from broadcast television to cable television. However, that nominal GDP growth is more than canceled by higher price for entertainment caused by the switch.

Not all recent media trends harm consumers. Consider the case of a company which switches from direct-mail advertising to online advertising. Holding advertising expenditures constant, almost everybody prefers online media to direct mail. Consumers are clearly better off getting valuable services like social media or search rather than just scrap paper. Yet SNA's current methodology shows no change to measured GDP from the switch to online advertising. In contrast, I assume that direct mail companies provide very little value to consumers for viewing their ads, and online media companies provide much more value. Therefore, a switch from direct mail to online media increases average 'hourly earnings' and unambiguously increases measured GDP.

In addition, the alternative method produces more robust treatment of public broadcasters. SNA's current method counts programs broadcast by governments or non-profits in final expenditures. But advertising supported programs are considered an intermediate expense and excluded from GDP. In some cases, the line between advertising supported media and non-profit supported media is very thin. For example, companies often sponsor PBS television programs and are thanked on air. Should those sponsorships be counted as advertising and excluded from final expenditures, or donations to non-profits and included in final expenditures? (SNA A4.16)²⁷

Own-account advertising is one potential problem with the alternative method. SNA's current method counts neither purchased advertising nor own-account advertising in final expenditures. This paper proposes to count all advertising supported entertainment in final expenditures. I have extensive data on outside revenues earned by advertising supported media back to 1900. Unfortunately, I have

²⁶ Assuming that the larger viewership for cable sports is counted as a quantity increase. In practice, BLS's current price index for cable television does not adjust for programming quality improvements. BEA uses BLS's price index to deflate consumer expenditures on cable, so measured output is basically the number of subscribers.

²⁷ Under the experimental methodology, the treatment still changes industry accounts. If sponsorships are considered advertising, then they are an intermediate expense for companies and 'income' for consumers. If sponsorships are considered donations, then they are neither. But aggregate GDP is the same regardless.

very little data on the implicit advertising revenues earned by media produced and consumed within the same company. In order to be conservative, I will omit own-account advertising from GDP. At the current time, this omission is unlikely to change my results much. A few companies have financed TV shows to promote their products, but those shows are generally much lower quality than regular broadcast television shows. Similarly, some retailers produce their own 'magazines', but those magazines do not appear to have much original reporting.²⁸ I do not know how own-account advertising might change going forward.

Changes to Measured GDP in the United States

The alternative method raises GDP by income 'earned' by consumers watching advertising. By construction, the nominal income 'earned' by consumers watching advertising is precisely equal to the nominal value of entertainment 'purchased'. Accordingly, there is no impact on savings, corporate profits or the statistics discrepancy. If the media provider is located in the same country as the viewer, imports and exports will be unaffected. If the media company is located in a different country, then imports and exports will increase by the exact same amount with no effect on the net balance of trade.

I estimate that advertising-supported online entertainment added \$20 billion to GDP in 2011. This is less than half of the \$71 billion consumers spent out-of-pocket on Internet access in 2011. I also estimate that consumers spent 326 billion hours of leisure time online.²⁹ Therefore, I calculate that advertising-supported websites spent only 6.0¢ on media for every hour spent online. Internet users may also benefit from non-market online activities like fan fiction or personal web pages. Like almost all household production, those non-market activities are excluded from GDP.³⁰

My estimate of \$20 billion in online entertainment is not a trivial amount – but it is much lower than alternative estimates. Brynjolfsson and Oh (2012) estimated a value of \$376 billion in 2011 based on time use data.³¹ Boston Consulting Group (Dean, Digrande, Field, Lundmark, O'Day, Pineda and Zwillenberg 2012) estimated a value of \$500 billion in 2011 based on consumer surveys and an economic model. The much higher numbers are a consequence of their different methodologies. Both studies use indirect methods to estimate the consumer utility gained from leisure time spent online. However, this paper is only trying to estimate the cost of producing online media. There are many areas of the economy where consumer spending on an activity is much lower than total utility for that same activity. For example, sleeping occupies about one third of total time and provides enormous utility to people. Yet beds and mattresses represent a very small fraction of consumer spending.

²⁸ Broadcasters, magazines and newspapers often use unsold ad slots for their own products. When I count these ad slots as advertising, the total count of ads viewed increases. But the average cost per ad decreases to match, so there is no change in advertising supported media value.

²⁹ This includes work breaks devoted to leisure activity but excludes actual work using the Internet.

³⁰ BEA currently includes an imputed rental value for owner-occupied housing, which could be seen as a form of household production. SNA 2008 also recommends that countries include home-produced goods and do-it-yourself home repair in GDP.

³¹ Their paper values free sites, which is not exactly equivalent to advertising supported sites. But that could only explain a portion of the difference.

On the other hand, my estimate of \$20 billion for 2011 is consistent with values for high speed Internet. In 2006, Greenstein and McDevitt (2010) estimated that households received \$20-\$22 billion of value from broadband internet. In comparison, I estimated that online advertising-supported entertainment provided \$13 billion of entertainment in 2006.³² This \$13 billion excludes utility from non-advertising online activities like Wikipedia or Skype. I do not know how to adjust for those activities, but it seems plausible that adding them would raise my numbers enough to match Shane and Greenstein's numbers.

Going forward, I predict that online entertainment is likely to remain less important than television. Television broadcasting started in the late 1940's and by 1960 more than 85% of households owned a television. Between 1950 and 1960, nominal GDP growth rises by 0.013% annually if advertising-supported television is included in final expenditures. By 2000, advertising-supported television entertainment had stabilized around 0.3% of nominal GDP. In comparison, the Internet basically started during the 1990's and by 2010 more than 75% of households had internet at home.³³ Between 2000 and 2010, nominal GDP growth rises by 0.0065% annually when online advertising-supported entertainment is included. Projecting forward, online entertainment is likely to stabilize at 0.15% of GDP.

Conclusion

Economists have recently criticized the BEA for not including online media in the NIPA's. (Ito 2013). This paper introduced an experimental methodology for measuring GDP that includes advertising supported media. I then recalculated nominal GDP and real GDP from 1929 to 2012.

I found that real GDP growth in the United States is actually slightly lower under the experimental methodology – but the difference is very small. US GDP growth rates did not change significantly when advertising-supported media was included in GDP. On the other hand, the experimental methodology raised US GDP by 0.19% relative to the rest of the OECD (0.65% vs. 0.46%). The impact on cross-country growth rate differences is a topic of future research.

³²Consumer utility from viewing websites = (Cost of Advertising Supported Entertainment) + (Consumer Surplus from Websites) – (Disutility from Viewing Ads). Neither the consumer surplus from websites nor the disutility from viewing ads are measurable. For simplicity, I assume they cancel out.

³³ Some of the remaining households had access through smartphones or work internet available for personal use.

Figure 1: Printed Advertising relative to GDP

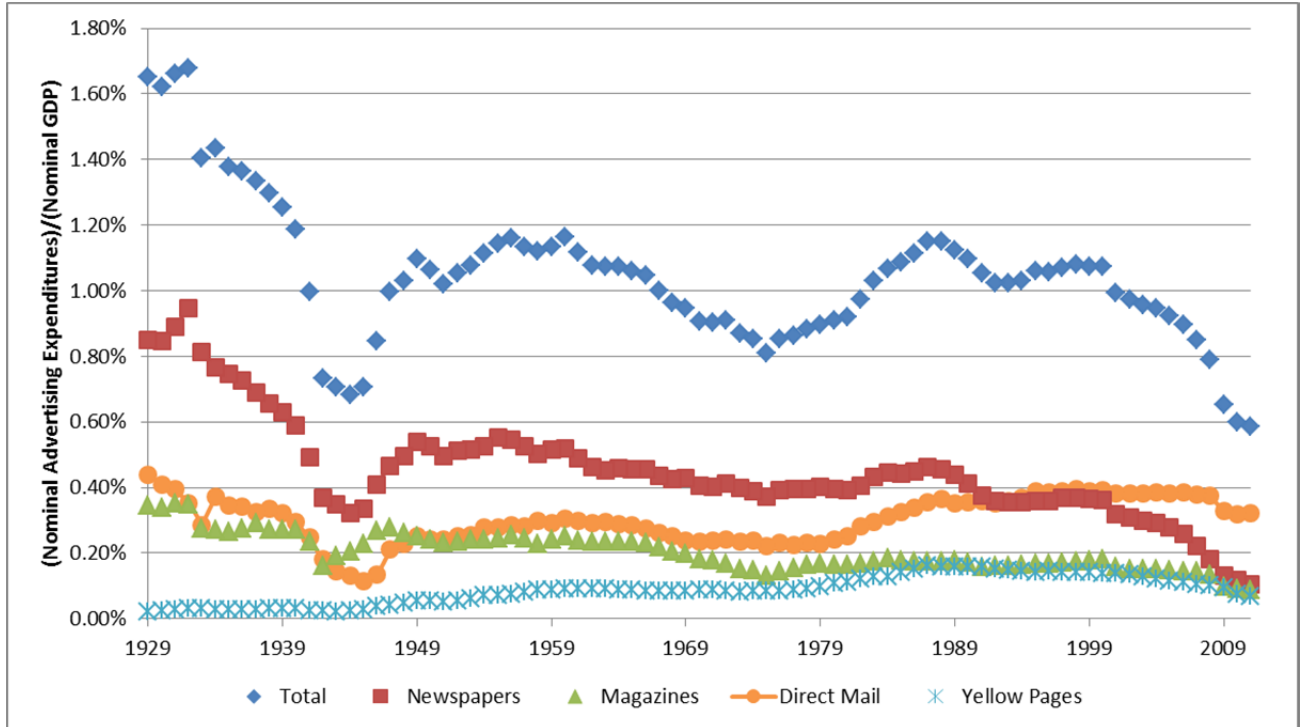


Figure 2: Non-Printed Advertising relative to GDP

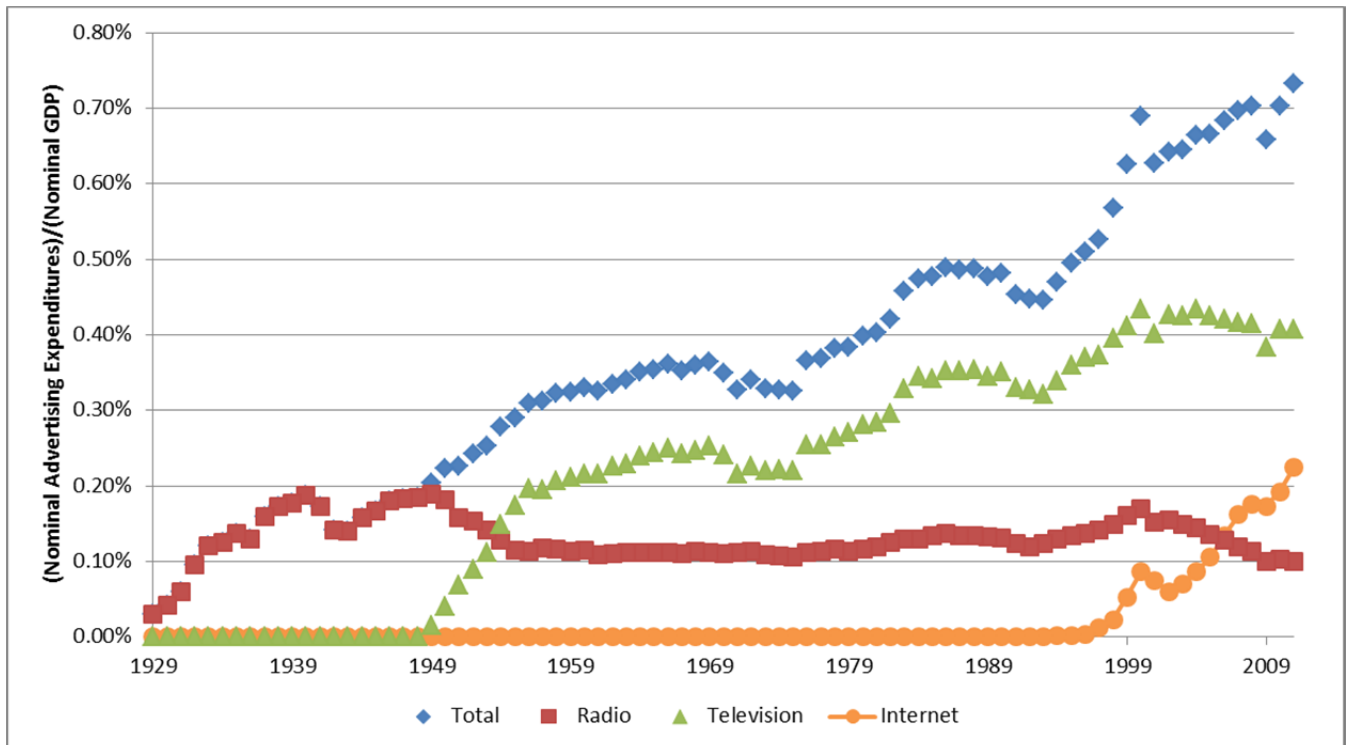


Figure 3: Media Expenditures Relative to Total Advertising

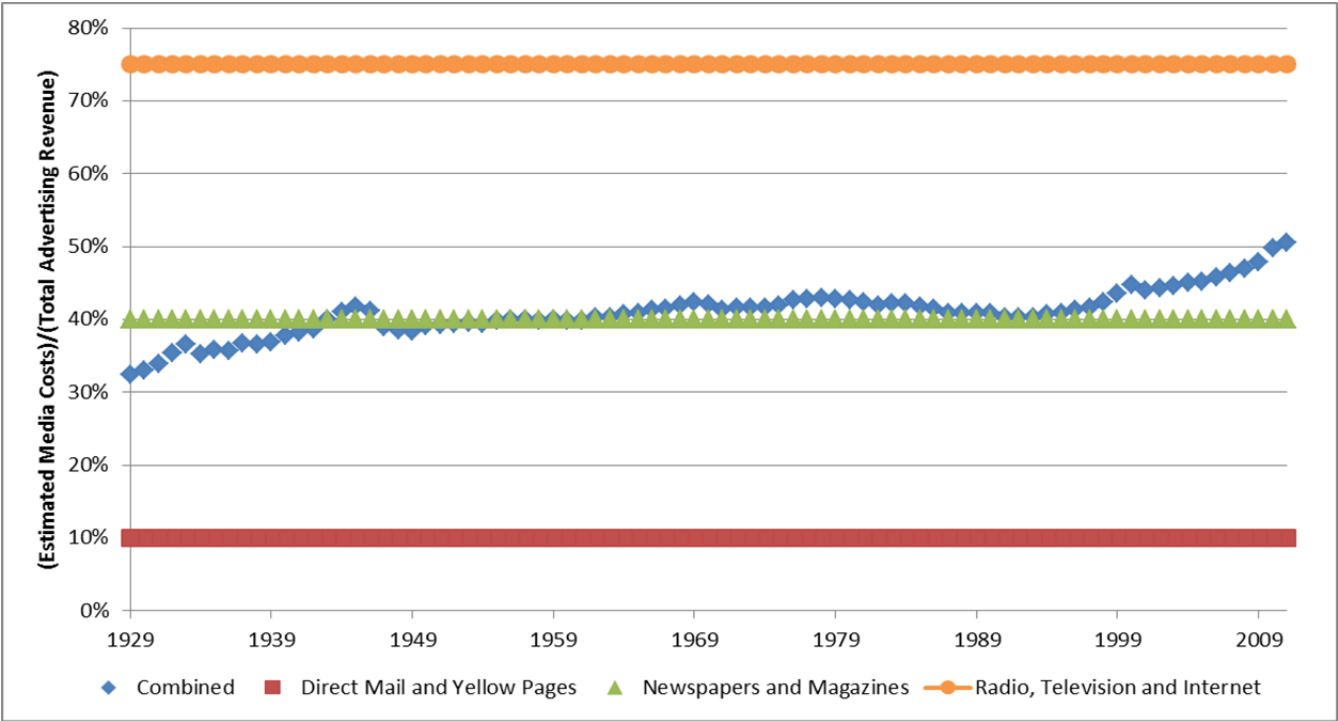


Figure 4: Consumer Entertainment Relative to Total Media

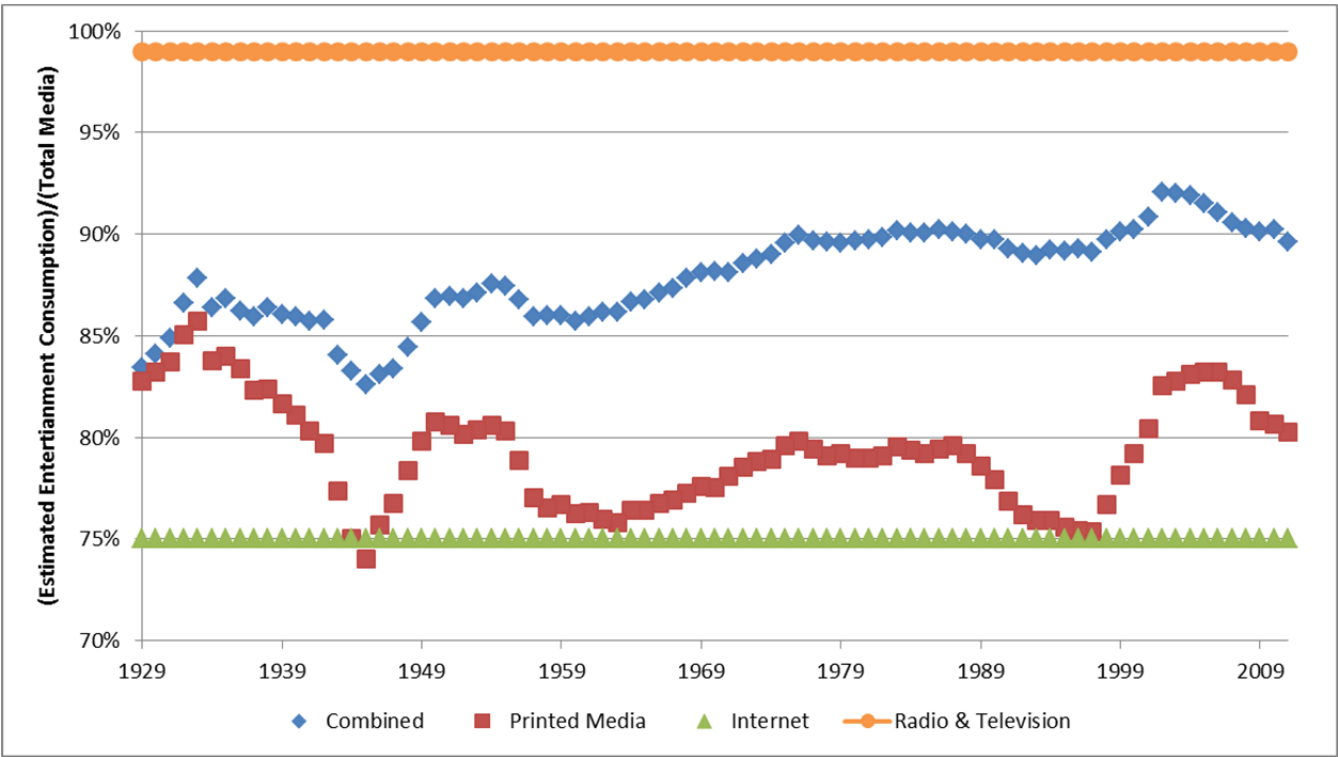


Figure 5: Consumer Entertainment Relative to Nominal GDP

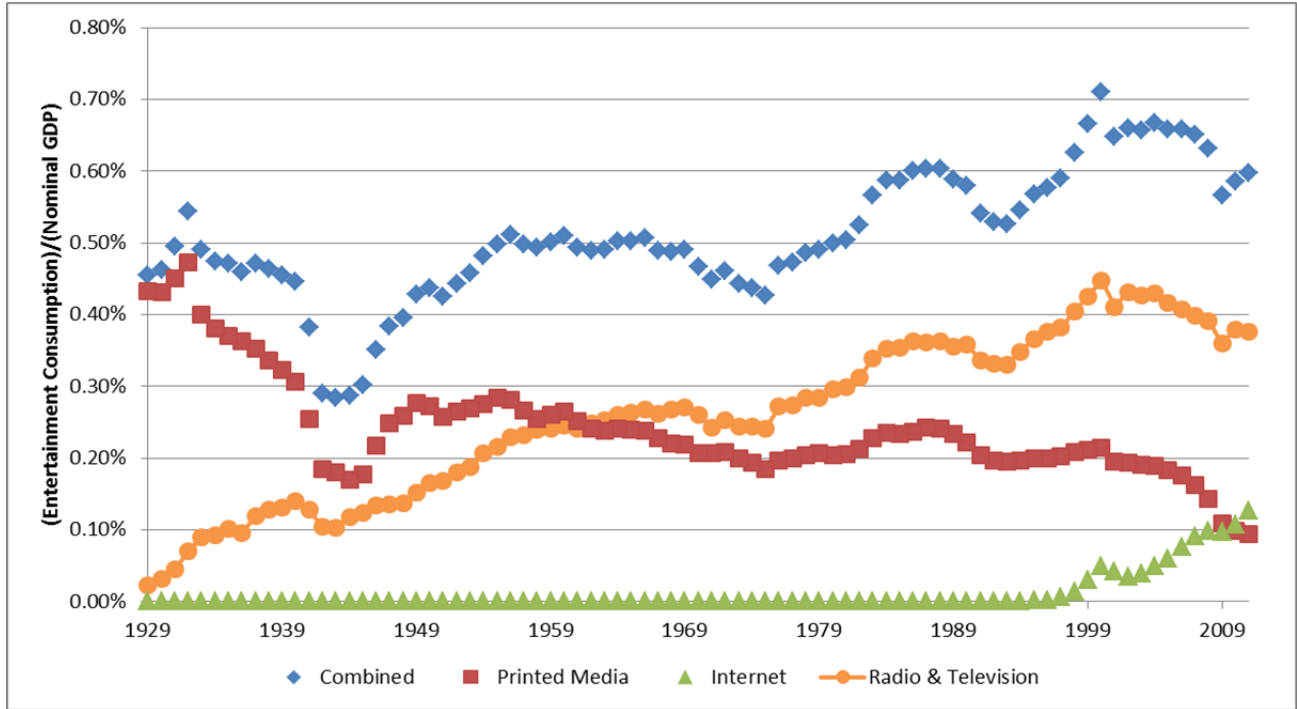


Figure 6: Value of Capital Used to View Advertising Supported Entertainment, Relative to Total Capital Stock

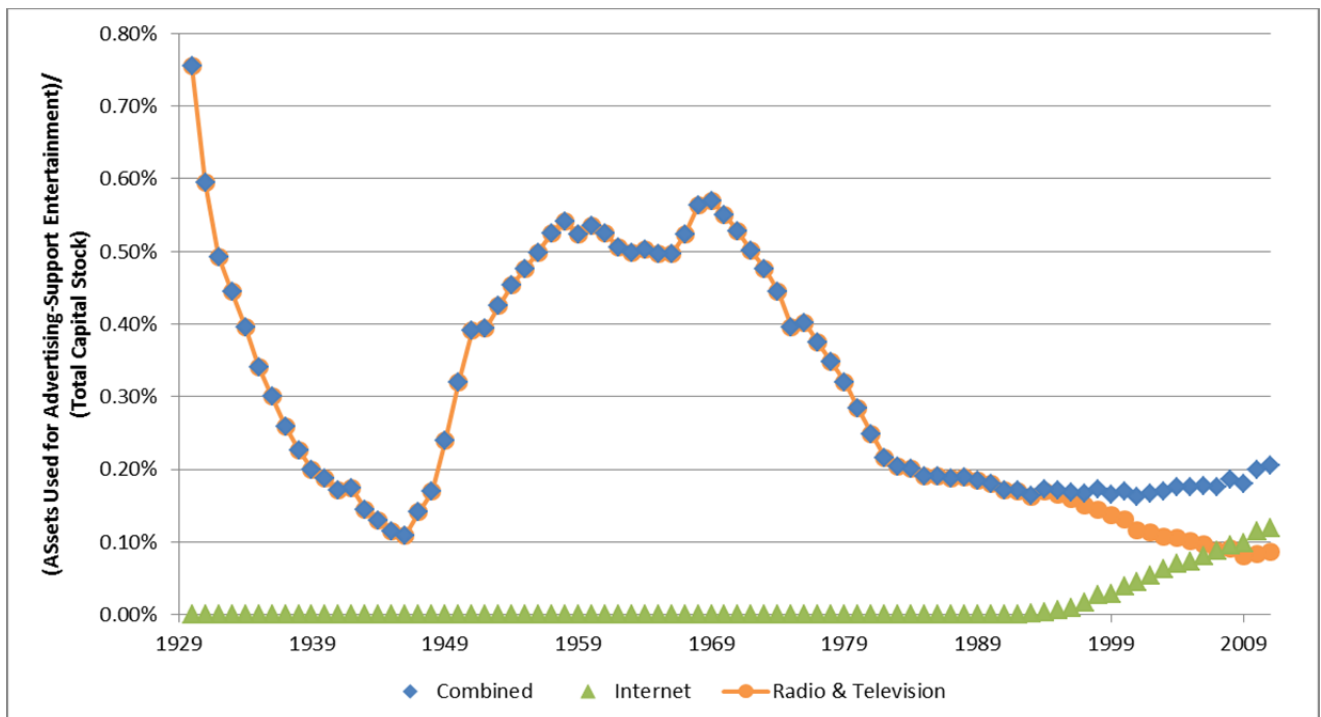


Figure 7: Advertising-Supported Media Prices Relative to PCE

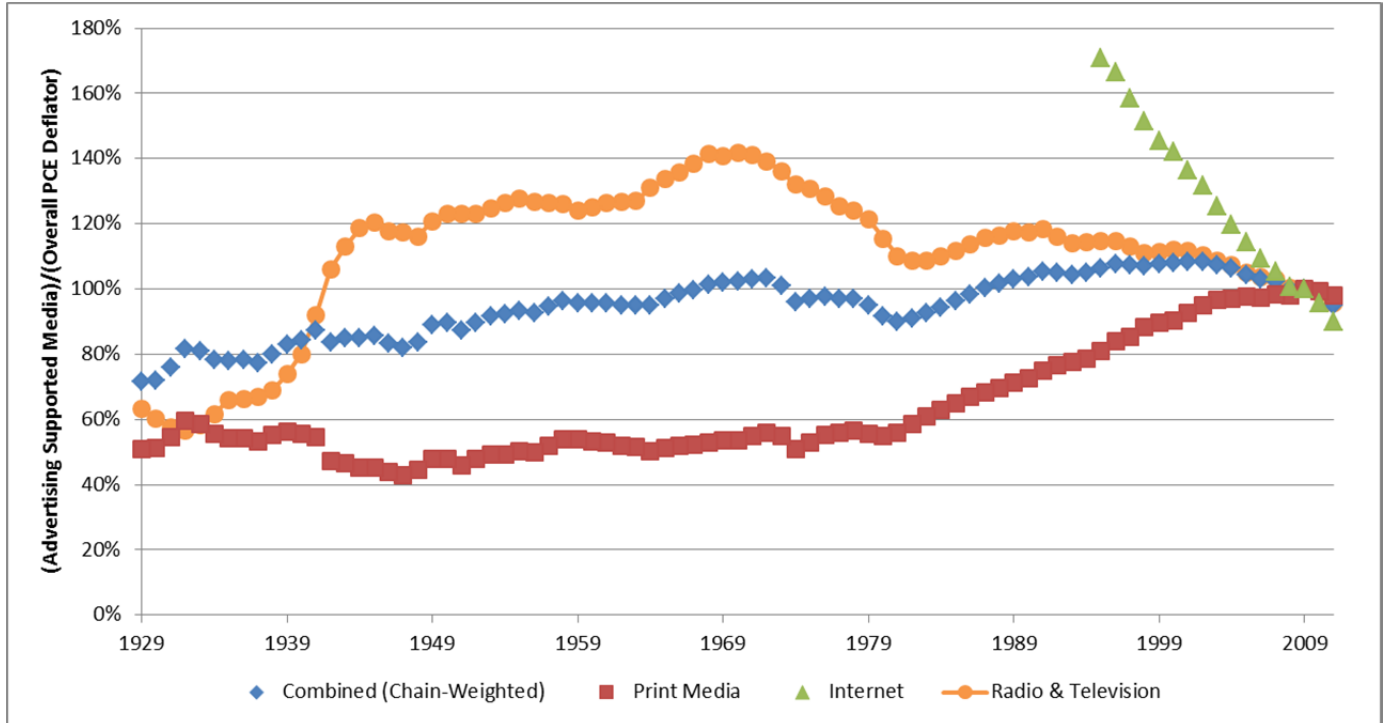


Figure 8: Quantity Indexes for Advertising-Supported Entertainment

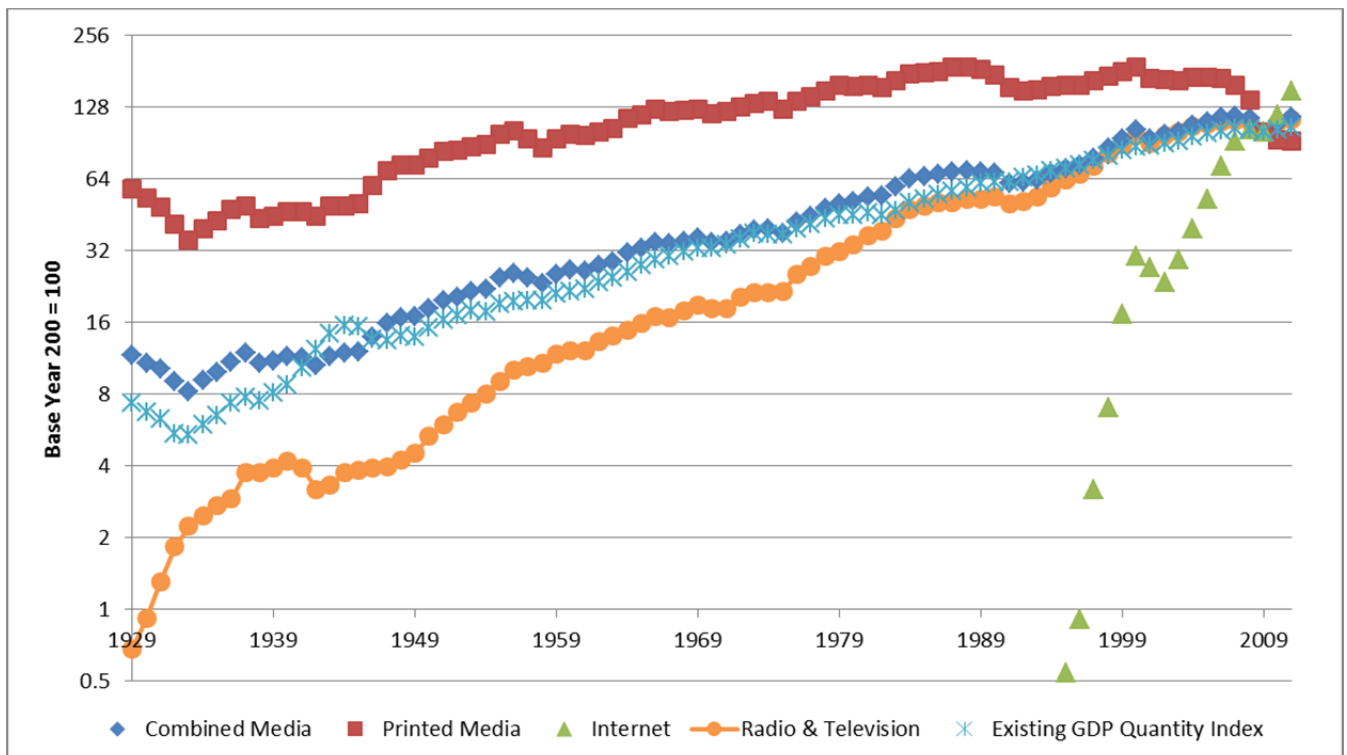


Figure 9: Quantity Indexes for Advertising Viewership by Consumers

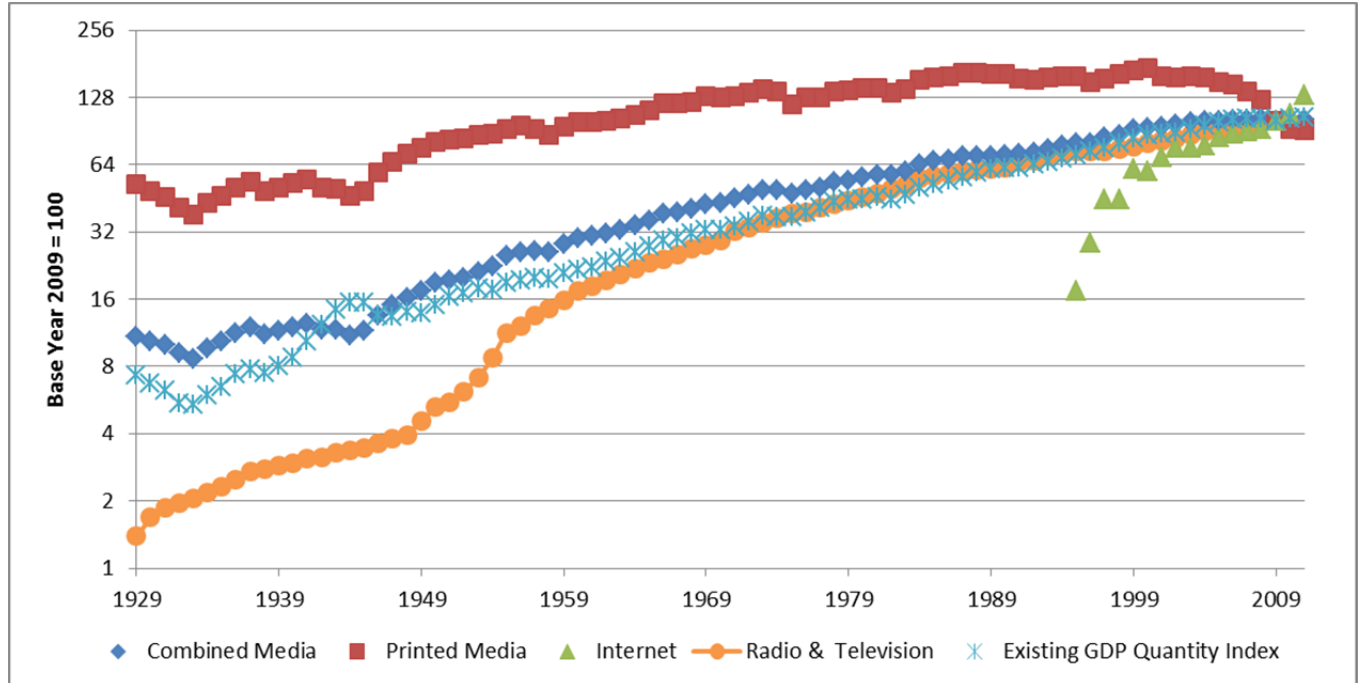


Figure 10: Implicit 'Hourly Earnings' for Advertising Viewership

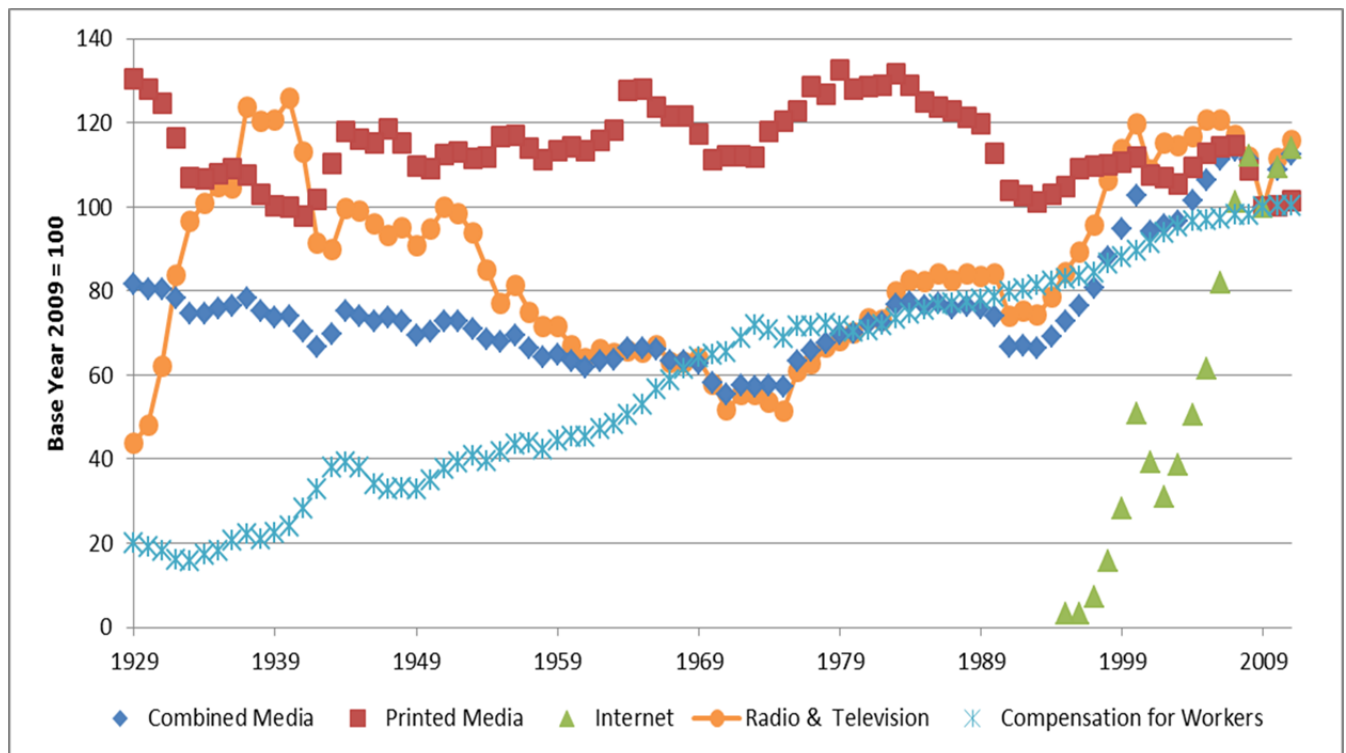


Figure 11: Television and Radio Advertising Across Countries

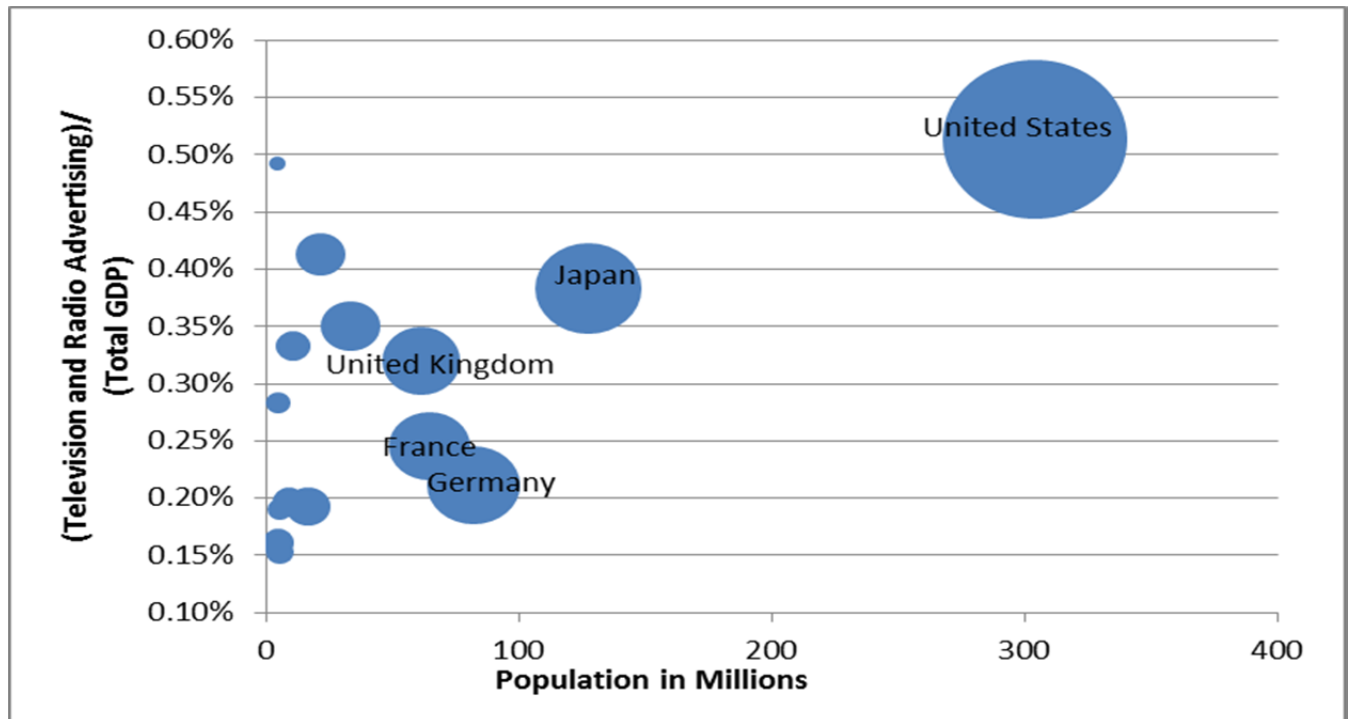
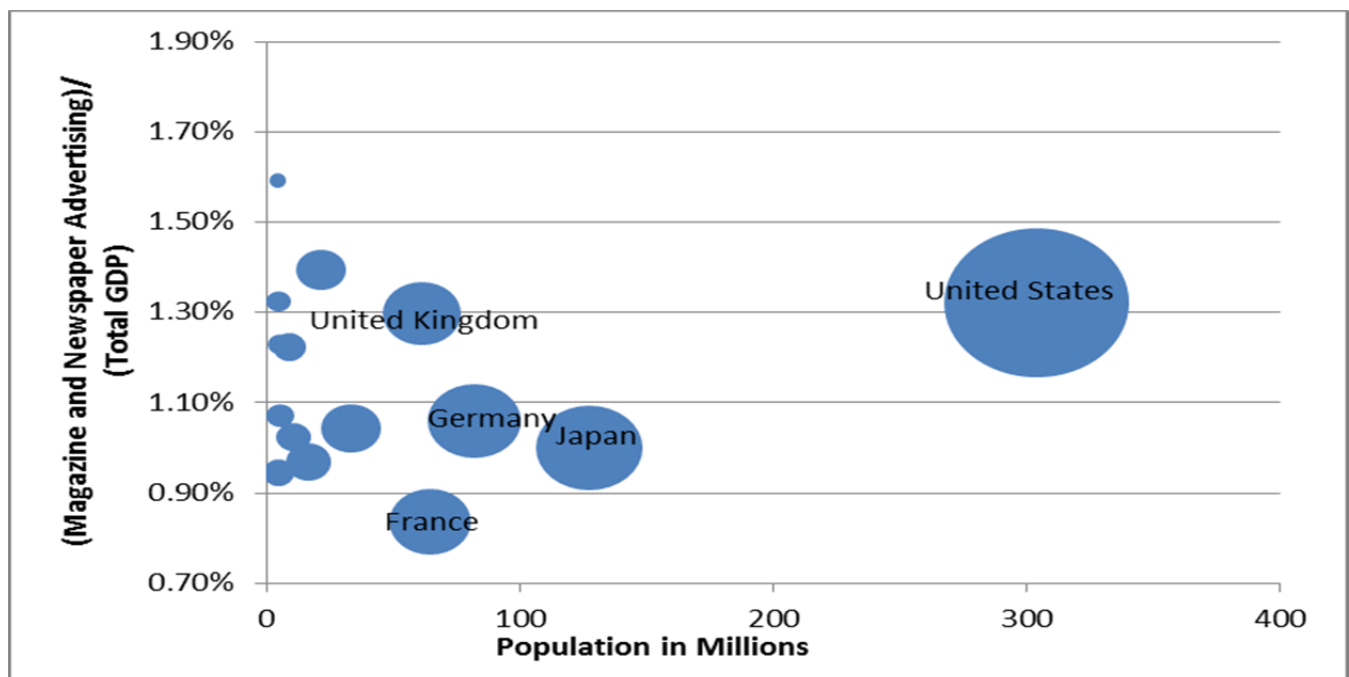


Figure 12: Magazine and Newspaper Advertising Across Countries



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