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THE ELUSIVE SYMBIOSIS: THE IMPACT OF RADIO ON THE RECORD INDUSTRY

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Abstract. Unlike television broadcasters, who must negotiate with the copyright owners before they can broadcast movies, radio broadcasters need not negotiate with the copyright holders for the sound recordings broadcast on radio. In the United States radio broadcasters have no obligations whatsoever to the copyright owners of the sound recordings (although they do have obligations to the copyright holders of the music contained in the sound recording). The reason for this discrepancy appears to be that radio broadcasters have argued, and it is generally accepted, that radio play benefits record sales and thus there is no need for radio broadcasters to purchase the rights to broadcast the sound recording. This impact of radio play on record sales is commonly referred to as a "symbiotic" relationship between these two industries. Yet there appears to be no systematic examination of this relationship. In this paper I present evidence indicating that radio play does not benefit overall record sales. There are obvious implications for copyright. I also examine, by way of comparison, television's negative impact on the movie industry.

1. Introduction

The impact of new technologies on copyright owners has become a topic of increasing interest in the last few years. Although formerly new technologies, such as photocopying, videorecording, and audiotaping have drawn some consideration from analysts, there is apparently nothing like the threat of several hundred lawsuits against otherwise ordinary citizens, as has happened with MP3 downloads, to attract serious attention.[1]

In this paper I examine an older technology – broadcast radio – and its impact on the prerecorded music industry. Radio might, after all, be considered very much like more recent technologies, such as MP3 downloads or videorecording. In the one case we have producers of records or movies concerned that MP3s or VCRs will damage the markets for sound recordings or movies (television). In the other case we have radio broadcasters freely using sound recordings while possibly taking away business from the record industry. Since radio uses sound recordings as a basic ingredient in its broadcasts, and broadcasts might be a substitute for listening to prerecorded music, one can imagine radio threatening the sound-recording marketplace. Except for the technology, there really might be very little difference between these cases.

[1] Although MP3 downloading and its impact on record sales has been the leading copyright story in the news lately, other issues are waiting in the wings. For example, the new generation of digital videorecorders, currently known as "TIVO" allow users to skip commercials while recording. If such recorders become common, what would happen to the market for advertising based television, and what if anything would be the appropriate regulatory response?

Of course, this requires that radio broadcast be harmful to the sound recording market. The potential harm to copyright owners from MP3 downloads or video-recorders is easy to envision, even if the existence of actual harm is a contentious empirical issue.[2] The potential harm to copyright owners from a technology such as radio is somewhat less obvious, but nonetheless real. The key is the extent to which radio listening is a substitute or complement for the purchase of copyrighted musical works. If radio listening is a substitute for purchase of copyright works, and if radio broadcasters do not have to pay for their use of these works there is an obvious potential market failure that is essentially the same as for direct copying technologies, with the only difference being that listening to a broadcast is the consumer's replacement for a purchased item, instead of a copy (e.g., MP3) of the original being a replacement. It is, however, a distinction without an economic difference.

Society has not seen radio as a threat from which the sound recording industry needed protection. For example, although the 1995 Digital Performance Right Act for Sound Recordings granted copyright owners of the recordings control over digital audio transmissions, they have no such right if the transmission is a non-subscription broadcast transmission, i.e. traditional radio, which continues its exemption from having to pay for the rights to broadcast sound recordings.[3] The logic of this distinction appears to be based on the claim that there exists a "symbiotic" relationship between radio broadcast and the sales of sound recordings.

For example, Edward O. Fritts, president and CEO of the National Association of Broadcasters, when testifying about proposed Internet radio royalties stated:

> "The history of copyright protection for sound recordings reflects a dominant, recurring theme: Congress repeatedly took pains to ensure that the grant of copyright *protection did not affect the symbiotic relationship between the radio broadcasters and the record industry.* Congress recognized both that the record industry reaps huge benefits from the public performance of their recordings by radio stations, and that the granting of a public performance right could alter that relationship to the detriment of both industries."[4] (my italics)

Of course, it is easy to understand why the president of the NAB would want to suggest that radio broadcasters should not have to pay for their broadcast of sound recordings. Imagine, by way of analogy, television broadcasters arguing that they should be allowed to broadcast movies without paying for the rights.

Nevertheless, the Courts appear to also believe this claim.[5] Judge Cudahy, in writing the Appeals Court decision about Internet radio royalties stated:

> "While radio stations routinely pay copyright royalties to songwriters and composers (through associations like the American Society

[2]See, for example, Liebowitz (2004), or Peitz and Waelbroeck (2003).

[3]This is true in the US. Other countries (such as Canada) have property rights on radio broadcast of sound recordings in addition to property rights on the broadcast of the musical composition.

[4]Text available online at http://www.house.gov/judiciary/frot0615.htm.

[5]Similar phrasing can be found in Canadian Copyright Board decisions and also in arguments put foward in Hong Kong. I have not, however, performed a thorough examination of the degree to which this claim is accepted throughout the world.

> of Composers, Authors, and Publishers and Broadcast Music, Inc. ("ASCAP") and Broadcast Music, Inc. ("BMI")) for the privilege of broadcasting recorded performances of popular music, they do not pay the recording industry royalties for that same privilege. Perhaps surprisingly, this state of affairs, until about ten years ago, produced relatively high levels of contentment for all parties. *The recording industry and broadcasters existed in a sort of symbiotic relationship wherein the recording industry recognized that radio airplay was free advertising that lured consumers to retail stores where they would purchase recordings.* And in return, the broadcasters paid no fees, licensing or otherwise, to the recording industry for the performance of those recordings. The recording industry had repeatedly sought, however, additional copyright protection in the form of a performance copyright."[6] (my italics)

Additionally, academics and other commentators appear willing to believe in the symbiotic relationship, as evidenced in this quote from Edward L. Carter (see Carter, 2003):

> "In fact, there is credible evidence that AM/FM streaming benefits sound recording copyright holders: "The economics of AM/FM Radio Webcasting work the same way as they do for over-the-air broadcasting, a symbiotic relationship between the record companies and the radio stations who 'promote these songs to 75 percent of Americans who listen to the radio each day."' Evidence of online broadcasting's beneficial impact for copyright holders is not contradicted by the fact that the broadcasts are digital because streaming, unlike downloading into a format such as MP3, does not involve creation and storage of a permanent digital audio file on a radio listener's computer."

Although there is much talk about symbiosis between radio and sound recordings, I have seen no reference to actual *evidence* supporting this claim although I address this point in more detail in Section 5.

This question of radio's impact on the recording industry does not appear to have received much if any attention in the modern economics literature. The focus of economists, to the extent that they have examined radio at all, has tended to be on the allocation of spectrum, with several notable papers on the subject.

Yet the impact of radio on the recording industry should be of interest for several reasons. These industries are highly influential on the popular culture and seem to have an importance far greater than their share of GDP. More generally, understanding what happened with previous technologies may help our understanding of the present and future technologies, particularly if we discover that some received wisdom is incorrect. Finally, various regulations and rules, and a form of regulatory property rights – what are commonly called "performing rights" – are based on estimates of the market outcomes likely to arise under free negotiations, and

[6] Bonnevill International. V. Peters, October 17, 2003, United States Court of Appeals for the Third Circuit, N°01-3720; page 5. Text available online at http://www.ca3.uscourts.gov/opinarch/013720p.pdf.

these estimates will be skewed if the impact of radio broadcast is misunderstood by the regulators.

2. Some Basic Economics

Americans spend approximately 2.7 hours per day listening to radio but only 40 minutes listening to prerecorded music.[7] Yet the main ingredient of radio broadcasts is prerecorded music, for which radio stations pay very little if anything. If listening to radio were treated like a substitute for listening to prerecorded music (much as blank tapes were treated as substitutes for the purchase of a prerecorded tape by partisans for the RIAA[8]) then simple arithmetic might suggest that five times as many records would be sold if radio didn't exist. Although we shouldn't take the math seriously, the possibility of harm is certainly worth examining.

Radio listening can be thought to have two possible components. One is a pure element of consumption. Listening to music is enjoyable and if a radio station can make musical selections that are in tune with a listener's tastes, the listener can derive considerable satisfaction. The fact that individuals spend, on average, almost three hours per day listening to the radio would seem to imply that there is in fact a rather important consumption element in radio listening. The other possible component of radio listening is most likely something of a by-product to the first. One motive for listening to radio is to learn about new musical compositions to help in the purchase of CDs – a motive based on future shopping plans.

It would seem, based on casual observation, that for most users the first motive dominates the second. It would be difficult to argue that the shopping motive dominates the consumption motive since it seems highly unlikely that individuals would listen to radio for almost three hours per day merely to learn which CDs to purchase for the purpose of improving their listening experience of forty minutes per day.[9]

These impacts of radio broadcast fit neatly into a model that had been previously been created to analyze the impact of copying on the creators of originals. Liebowitz (1981) identified three effects caused by copying: substitution, exposure, and aftermarket effects.

The substitution effect, as its name implies, occurs when someone forgoes the purchase of the original (record) because they have access to an alternative (the copy or in this case, radio play). The substitution effect maps nicely into the consumption motive of radio listening. If a copy or alternative is a replacement for the purchase of an original, demand for the original falls.[10] This cannot help but harm the seller of originals.

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[7] 2001 data found in the US Statistical Abstract, Table N°1102. Media Usage and Consumer Spending: 1996 to 2005. Available online at http://www.census.gov/prod/2003pubs/02statab/infocom.pdf.

[8] See, for example, Alan Greenspan's testimony in 1983 on the Home Recroding Act. Hearings before the subcommittee on Patents, Copyrights and Trademarks, October 25, 1983.

[9] This ignores the component of radio listening devoted to 'talk' which obviously does not normally have an exposure effect.

[10] As long as the seller of the original does not receive extra payment, or indirect appropriation, of the copy when he sells the original, which is the after-market effect. If, for example, everyone makes one tape of each record they purchase, the seller can just raise the price of the record by the amuont of value generated by the copy, which rotates the demand curve counter-clockwise. The after-market effect is clearly not relevant in the context of radio. See Liebowitz (1981) for a fuller explanation.

The exposure effect occurs when someone makes a purchase they would not have made except for the fact that they were able to sample the product in another venue (listening to a copy or on the radio). This maps nicely into the shopping motive. Note that the exposure effect doesn't necessarily have a positive impact on sales, and thus doesn't necessarily have an impact different than the substitution effect. Learning more about a product prior to purchase may allow consumers to derive greater utility from any single purchase. At any given price, however, they may purchase fewer units because they become more quickly satiated. Producers, therefore, may discover that their revenues fall when consumers can better sample the products.[11]

The exposure effect and substitution effect, therefore, are relevant to our analysis. These two theoretical factors played an important role in the arguments made during the Napster case. The economic experts for Napster argued that individuals downloaded MP3s to *sample* songs (exposure effect). These experts suggested that Napster users would purchase CDs containing the songs discovered through downloading. The experts representing the recording industry, on the other hand, argued that downloading MP3s was undertaken as a replacement for the purchase of the original (substitution effect). The court found the arguments made by the recording industry experts to be more convincing and although the decision was probably the correct one, the empirical support put forward by the recording industry was, in my opinion, no stronger than that put forward by Napster defense.[12]

By way of comparison, the exposure effect seems likely to be stronger in the case of radio than in the case of MP3 downloads. Downloaders were unlikely to just encounter music that they enjoyed since downloaders are required to look for music using a search engine. Radio stations, in contrast, play music not chosen by and often unknown to the listener. The listener's choice of the radio station or program, however, reveals that the listener enjoys the particular genre of music played by the station, increasing the possibility that the listener will encounter new music that he or she will wish to purchase.

The substitution effect, at first blush, seems likely to be stronger in the case of MP3 downloads than for radio play of music due to the fact that downloads provide the listener with a copy of the song that has virtually identical attributes to the purchased version. There would seem to be little reason to purchase the song under these circumstances, leading to a very strong substitution effect. Listening to the radio does not leave listeners with a useable alternative that can substitute for the purchase of prerecorded music.

However, the activity of downloading files seems less likely to be a substitute for listening to prerecorded music, whereas listening to radio is an activity that can substitute for listening to prerecorded music. The three hours per day spent

[11]This is a variant of the "chocolate bar" or "light bulb" example sometimes found in textbooks. Increasing the amount of chocolate in a bar, or increasing the longevity of bulbs, holding the price of a bar or bulb constant, has uncertain impacts on the number of units sold and on the total revenues. The elasticity of demand for the now less expensive underlying product (chocolate or light output) determines whether revenues increase or decrease and whether units sold increase or decrease.

[12]The empirical evidence put forward to support the substitution effect was to compare sales in record stores near universities to record stores not near universities, under the assumption that college students were using Napster much more heavilly than ordinary record buyers. In principle this test was fine but the results did not support the claimed results. See Liebowitz (2002), chapter 7.

listening to radio are three hours that cannot be spent listening to prerecorded music. Since listening to prerecorded music generally requires the purchase of the prerecorded music, the more time individuals spend listening to radio the less time spent listening to prerecorded music and the smaller the volume of purchases of prerecorded music.

As is often the case, only empirical evidence can tell us what impact radio broadcast has on the market for sound recordings.

3. The Impact of some analogous Technologies

Before turning our attention to the empirical evidence relating radio broadcasts with on record sales, it is instructive to examine several other instances of new media technologies. In this case I briefly examine the impact of two new technologies on the movie industry since this information will be helpful when examining radio and sound recordings.

3.1. **The Impact of the VCR.** It is common in this literature, particularly in the more popular press, to encounter the claim that copyright owners always cry wolf when a new technology appears to threaten the old, only later to discover that the new technology was nothing short of a bonanza. This claim implies that foolish copyright owners misunderstood the new technology and were fortunate to have been thwarted in their attempts to restrict the new technology.

There clearly have been times when the industry was dead wrong about a technology. But that doesn't mean the industry was always wrong.

One often reads pundits pointing out that VCRs were a boon to the movie industry although the industry fought the VCR. This claim is not exactly correct.

The facts are that shortly after the emergence of the video recorder, leading movie producers did bring a copyright infringement case (the Betamax case) against the producers of the device. Movie and television program producers viewed these devices as a threat to the industry. It is also true that the sale of prerecorded movies has become a leading revenue source for movie producers.

But the threat posed by VCRs was not based on substitution of viewing videotapes instead of viewing the theatrical release. Nor was it based on the possibility of a homemade videotape substituting for the purchase of a commercially prerecorded tape. Instead, it was based on the fear that videotapes would allow users to time-shift television programs and do so in a way that allowed them to avoid the commercials.

This was a legitimate concern because broadcast television depends on commercials for its revenues and if increasing numbers of videorecorder users were to have deleted commercials, television broadcasters would have lost the ability to pay for the programs and movies that made up their broadcast schedule.

In reality, the likelihood that consumers would have been able to skip many commercials was very low. Since a single machine could not both record and playback at the same time, it is unlikely that average television households could have used VCRs for any but a small portion of their viewing. For example, the average television household watches almost 7 hours of television per day. Almost half of this viewing occurs during the prime-time period of 7:00-11:00 p.m. and a majority of television revenues are generated during this prime-time period.[13] If the average

[13]In the Central and Mountain time zones the prime-time period runs from 6-10 pm.

household prefers viewing prime-time programs during the prime-time period, it could not engage in a great deal of videotaping of prime-time programs unless it owned more than one VCR. At that time, use of multiple VCRs was not envisioned.

Assume, for example, that a household that normally watches 3 hours of programming on Monday evenings cannot watch television one Monday and has taped 3 hours of prime-time programming from Monday's (M) programs. Assume now that there are 3 hours of prime-time programming which members of the household would like to watch on Tuesday night. They would not be able to simultaneously watch the tapes of Monday's programs and record the programs that they would then miss on Tuesday while they were viewing Monday's programs since a single VCR cannot both record and playback at the same time. In other words, it is impossible to time-shift viewing by one day so as to skip commercials if the viewing of tapes takes place during the same time period the programs are broadcast. In fact, if members of the household enjoy watching 3 hours of prime-time television shows every night, as does the average American household, they would have difficulty fitting the three hours of Monday's taped programs into their future viewing unless they increased their television viewing above what it would have been had they not owned the VCR. This is a serious constraint on the size of any time-shifting behavior.

In fact, no great time shifting came to pass and the VCR did not damage the television market. Eventually, it opened up an entire new market – the sale and rental of prerecorded tapes – that proved a boon to the movie industry, as I discuss below.

One of the interesting changes in technology is the current hard-disk based TIVO which allows simultaneous playback and recording, as well as automatic deletion of commercials. Because the TIVO removes the constraint of being unable to play back and record at the same time, it poses a far greater threat to advertising revenues than did the VCR. Television broadcasters have legitimate reasons to be concerned, notwithstanding the lessons from the VCR.

Nevertheless, even the TIVO requires some effort on the part of the viewer. If past history is any indicator, there is every reason to believe that many users will refrain from taking the effort to avoid commercials because the effort will seem too great. That may have to be the best hope of the advertising-based broadcast industry as technology continues to erode the intrusion of commercials.[14]

3.2. **The Impact of Television on the Movie Industry.** Television took audience away from the movies. But television also made possible the VCR which allowed the movie rental business to get started, and which has been a boon to the industry. It is sometimes claimed that television, rather than destroying movies, as was originally feared, merely brought a new source of revenues to the party, allowing movie/television producers to gain from the new technology just as the VCR allowed movie producers to benefit from a large new market for pre-recorded movies.[15]

[14]There are other defensive actions that can be taken by the broadcast industry, the most important among them is making it more difficult for the TIVO to detect when a commercial is on when it is recording in 'commercial-skip' mode. At the moment the TIVO relies on information contained in the broadcast itself to identify commercials.

[15]Typical is this statement found in an editorial in the May 6th 2002 edition of USA Today, "Movie theaters throught television would ruin them. Later, they feared the VCR.

Unlike music, movies are usually seen only once or twice, not over and over again, so the very concept of an exposure effect is limited. Also, television cannot broadcast movies without contracting with the copyright owner for permission to do so. This prevents television from broadcasting movies until the owners of those movies decide they want them broadcast, which happens to be long after theatrical release.[16]

Since movies do not appear on television until after they have finished their theatrical run, having a movie broadcast on television cannot possibly enhance the theatrical box office for the movie (i.e., no exposure effect for theatrical revenues) although there might be some exposure effect for the sale of DVDs and videotapes from individuals who watched part or all of a movie on television.

Because of this timing, television viewing of a movie cannot be a substitute for the viewing of that movie in the theaters. Although viewing a particular movie on broadcast television cannot be a substitute for viewing that movie in the theaters, the activity of watching television is an activity that can substitute for going to see a movie at a theater. Thus there is a strong potential substitution effect in the *time* spent viewing, particularly given the large amount of time spent watching television (approximately four hours per day for adults) which precludes the viewer from engaging in other activities at the same, time and which provides a similar, although smaller-scale, form of video entertainment.[17]

Those who have examined this issue generally understand that television delivered a powerful blow to the movie industry. The movie industry was mature when television became popular in the 1950s and was popular in a way that is hard to imagine today. In the 1930s and 1940s, as revealed in Figure 1, the average American went to the movie theater approximately 30 times per year, compared to the current frequency of approximately five times per year.[18] It is clear that the frequency of movie attendance was far greater prior to television than it is now.

The penetration of television into American households was remarkably rapid during the 1950s, increasing from 9% in 1950 to 87% in 1960. As one can see from Figure 1, that period of time coincides well with a dramatic drop in the number of times Americans went to the movies per week. It also, unsurprisingly, coincides with a large drop in movie box office revenues as a share of personal consumption expenditure, as seen in Figure 2.

The timing of the onset of the new, much lower, equilibrium is another datum strongly supporting the thesis that television viewing caused the change in movie

If Spiderman's $114 million weekend is any measure, both preditions were off." See http://www.usatoday.com/news/opinion/2002/05/07/edtwof.htm.

[16]Movie studios are masters at price discriminating through different markets over time, going from high valued consumers (theaters) to video/pay cable and finally to broadcast television. According to Vogel (2001) table 2.6, a viewing-hour in 1999 generated $4.50 in a theatre, $0.55 in pay cable/home video, and $0.06 on broadcast television.

[17]This is likely to become more accurate as the use of large high definition televisions with surround sound become more common.

[18]Source: Screen Source at http://www.amug.org/∼scrnsrc/theatre_facts.html. There was one problem with the data provided at this source. Values were given from attendance, average ticket price and box office gross. The first two variables, if multiplied together, should equal the third, and usually did. But there were major inconsistencies in the early 1960s and the 1930s. In some cases, the listed attendance figures seemed less reasonable than an attendance figure derived from ticket prices and total revenues. Nevertheless, in Figure 1 I used the listed admissions values since it makes little difference for our purposes and it provides an additional five years of data.

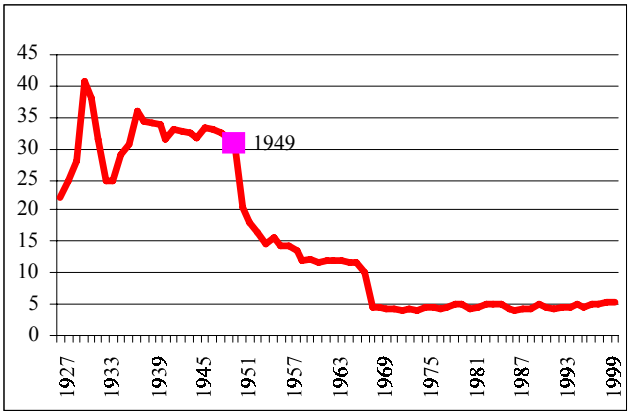

FIGURE 1. Yearly Admissions Per Capita 1926-1999

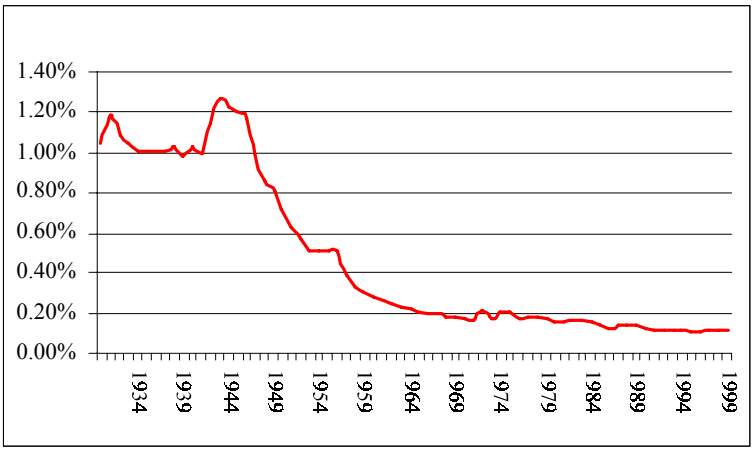

FIGURE 2. Box Office as Share of Personal Consumption

attendance. By 1960, households were spending over five hours per day watching television and by 1965 television's penetration was almost complete at 92% of households. The full effect of television, therefore, should have been felt. At the same time, movie attendance and revenue as a share of personal consumption had entered the modern era which has shown remarkable stability for four decades at approximately 5 viewings per year and approximately 0.15% of personal consumption expenditures.

Movies clearly have lost much of their market to the activity of viewing television. Although the evidence is overwhelming that television had a devastating impact on the traditional movie industry in terms of theatrical admissions and revenues, there is somewhat more to the story.

Broadcast television provided the audience and the rationale for the early cable television industry. The cable networks that arose over the years had a superior revenue generation model than broadcast television since cable networks had both

advertising and subscription fees as potential sources of revenues whereas broadcast television only had advertising. Eventually, cable television networks largely displaced broadcast television as an important market for movies that had finished their theatrical releases.

Similarly, the advent of the VCR, which was itself dependent on the existence of television sets, allowed the movie industry to tap directly into the view-at-home phenomenon by selling prerecorded tapes. According to numbers in Vogel's text (see Vogel, 2001) that I have repackaged in Table 1, home-video revenues to movie studios were double those of theatrical release in 2000, and pay-cable/networks/syndication revenues from movies were virtually the same as theatrical release revenues.[19]

The invention of broadcast television, which was revenue-depleting to movie studios, opened the door for these later revenue-enhancing technologies. What then is the net effect that television has wrought?

Table 1: Vogel's Estimates of Film Industry Revenue		
Theatrical Release	\$3,100	19.25%
Home video	\$7,800	48.45%
Pay Cable	\$1,600	9.94%
Network Television	\$300	1.86%
Television Syndication	\$800	4.97%
Made for TV	\$2,500	15.53%
\$ in millions. Estimates for year 2000: Foreign revenues excluded. From Table 2.8, pg. 62		

The numbers in Table 1 indicate that these additional sources of revenues might have quadrupled movie revenues beyond their simple theatrical levels if you examine only revenues from films made for theatrical exhibition. If you add in movies that were made for television, revenues quintuple.

Yet box office revenue as a share of personal consumption expenditure is currently at about 0.12%. This is one eighth the level of the 1930s. Since these additional television related revenue sources appear to be less than eight times current theatrical revenues, one would conclude, using this admittedly back-of-the-envelope level of detail, that the net effect of television on movie revenues is still negative. The impact appears even more negative in comparison to overall entertainment's share of personal consumption expenditures, which rose from 5.5% to over 8% over this period. Movies might have been expected to participate in this growth, if not for the introduction of television.[20]

One final point worth noting is that the policy implications are very different for television damaging the movie business than for, say, MP3s damaging the sound recording industry. In the former case consumers switch to a different, preferred product. The damage to the movie industry occurs because consumers no longer consume movies. There is no market failure. In the latter case consumers continue to consume the same music, but the existence of MP3s cuts off the payment stream

[19]Table 2.8 in Vogel (2001). Unfortunately, these data in Vogel need to be taken with a grain of salt since there are apparent inconsistencies. His table 2.5 implies that Pay Cable revenues are almost as large as home video and two and a half times as large as network and syndicated television added together. Also, his Figure 2.9 implies that Pay Cable is between 15% and 20% of total revenue, much higher than in his Table 2.8.

[20]See Vogel (2001), page 21.

that consumer would be willing to pay if property rights were more easily enforced. Disconnecting consumption from payment, as MP3s do, clearly causes a market failure since units of music with net social value will no longer be produced.

4. The Impact of Radio on the Pre-Recorded Music Market

This backdrop now brings us to the main topic of the paper: the impact of radio on sound recordings.

At the time of radio's introduction, the idea of transmitting entertainment and news through the airwaves was revolutionary. New institutions and new business models were developed to take advantage of this technological breakthrough, including the idea of using advertising to support the market, which has largely continued to this day.

Radio grew into a major industry, with a profound influence on the culture and social mores. Although it was later to be eclipsed by television, it continues to this day to be one of the major forms of entertainment, with the average American listening to approximately three hours of radio per day.[21]

Radio stations generate positive values to listeners, as evidenced by the willingness of listeners to spend several hours each day listening to radio even though they have to put up with advertising. Advertisers pay for the right to place their advertisements in radio programming, generating the revenues upon which private radio stations depend for their existence.

We have already discussed the two possible impacts that radio might have – substitution and exposure. It is likely that both effects are at work at any one time. The relative strength of each, however, determines the overall impact of radio on record sales.

The prevailing view is that radio play enhances the market for prerecorded music. Much of this view can be traced to the fact that firms in the recording industry carefully cultivate their relationship with radio broadcasters to make sure that radio stations play their recordings. Often, this cultivation crosses over into what is known as "payola", a pejorative term indicating that record companies are paying radio stations, station programmers, or disc-jockeys to pay particular recordings. This is discussed more fully in section IV below.

As we shall see, the recording industry underwent a devastating decline shortly after the advent of radio. Even some commentators who assign the cause of the recording industry's decline to radio's emergence believe that the major impact of radio on record sales changed from substitution to exposure, and that radio now enhances the sales of recordings. For example, according to the BBC website:[22]

> The record industry had spent the first twenty years of the century convincing the public that they needed a source of music in the home but they didn't foresee the possibility that it may be free. Unfortunately, The Radio Corporation of America (RCA) had by the early 1920s started mass-producing commercial radios which, while acoustically inferior, offered a far wider range of news, drama and music. The record companies retaliated by drawing up contracts for their major artists, forbidding them to work for this rival medium. This move to limit radio's output was doomed to failure

[21] Arbitron claims that 20 hours per week is the average.

[22] See http://www.bbc.co.uk/music/features/vinyl/19201929.shtml.

> as new vacuum tube amplification rapidly improved reception and sound quality. Record sales plummeted.

Nevertheless, the BBC continues:

> Victor subsequently brought out a machine that could reproduce these [recording] innovations, and the increase in fidelity finally ended the drop in sales... Shortly afterward, players and radios were combined, ending rivalry between media. In fact, the new entertainment conglomerates could now use one (radio) to promote the other (records) and a whole new age of marketing was upon us.

We shall have more to say about this history in the next section.

4.1. **Some Natural Experiments.** Determining the empirical relationship between radio listening and the purchase of prerecorded music is not a simple task. If one could design an experiment to test this relationship, one possibility would be to prevent radio broadcast of music in some randomly chosen localities while continuing it in others and then comparing the sales of records in the areas with and without radio broadcasts of music. Unfortunately setting up such an experiment is not within the capability of this, or probably any, researcher.

Alternatively, if one had sufficiently good data and sufficient understanding of the various exogenous and endogenous relationships, one might design a structural equation system to try to statistically determine the net impact of radio on record sales. Finding sufficiently plentiful and high quality data is a daunting if not impossible task, however, and there are always questions about the validity of any particular structural equation model.

The method I have chosen, therefore, is to examine two natural experiments that allow a before/after comparison of radio's impact on record sales. One natural experiment occurred with the advent of radio in the US, which occurred during the decade of the 1920s and 1930s. The second natural experiment was the belated introduction in the last three decades of the twentieth century of commercial radio into a British market that already had a well established record industry and public broadcasting entity.

Neither of these natural experiments is perfect, but both should be capable of providing useful insights.

4.2. **Radio's Introduction in America.** The recording industry was already fairly well established in the US when radio came upon the scene. Radio grew rapidly and became the primary entertainment medium in the country in a fairly short time. The impact of radio on the record industry appears to have been quite dramatic.

4.2.1. *A Brief History of the Recording Industry*[23]. Thomas Edison invented a tinfoil recording process in 1877 which he soon improved by replacing the tinfoil with wax cylinders. To avoid Edison's patents, Emile Berliner developed in the late 1880s a competing recording technology based on discs, which came to be known

[23]Some of the material for this section is based upon Morton (2000), and also from a very nice history that can be found at the BBC's "History of Vinyl" page: http://www.bbc.co.uk/music/features/vinyl/.

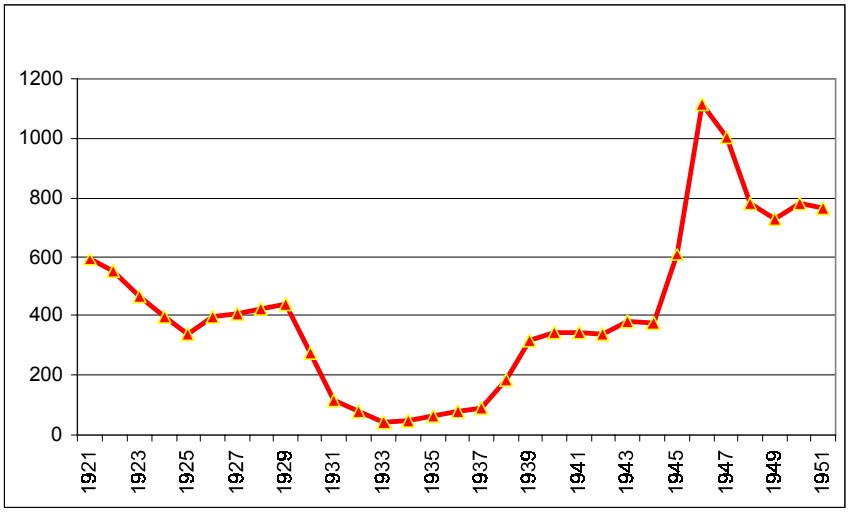

FIGURE 3. Record Sales in 1983 dollars

as the gramophone. A battle between the cylinder and the disc took place over several decades but discs had won the day by 1920. Edison's company introduced its own disc, known as the 'Diamond Disc' with great fanfare and in a precursor to the ubiquitous "is it live or is it Memorex" commercials, embarked on public demonstrations asking the public to guess whether they were hearing live performers or a disc. Supposedly, millions of Americans took this test between 1915 and 1925.

At this time, the recording industry was still engaged in acoustic recording. There were no microphones and no amplifiers. Singers, for example, shouted into a recording horn and the sound energy was converted into a mechanical signal on the disc. In the mid 1920s engineers at Western Electric devised a new method for performers to sing into microphones, which converted the sound into electric currents controlling an electromagnetic record cutter, to produce a recording. These discs were identical in playback format to the old discs and could be played on the older equipment. Many phonographs of the time still reproduced the sound acoustically, without electrical amplifiers.

Statistics provided by the Recording Industry Association of America (RIAA) indicate that sales of records were quite robust in 1921, the first year for which I have data and, ironically, the first year of commercial radio. As shown in Figure 3, sales revenues were almost $600 million in 1921, using 1983 dollars. To put this value in perspective, sales revenue in 1950 was only 33% higher, in real dollars, and revenue per capita was actually slightly lower in 1950. Thus market for records was fairly mature in 1921, at least in terms of the revenues generated.

As documented in Figure 3, for almost twenty years after 1921 the market went nowhere but downhill.

The earlier quote from the BBC claimed that the sales decline came to an end when radio and the recording industry equalized quality and learned to take advantage of each other's strengths. In fact, although sales did stop their decline from 1926-1929, they remained well below their 1921 levels. Further, the apparent slight

increase in the late 1920s occurred during a period of rapid economic growth when a more rapid increase in record sales might have been expected.

The drop in record sales that occurred after 1929 was far more precipitous than the drop during 1921-25. Clearly the depression must have had a large role in this painful decline, beginning as it did right after the stock market crash. The market for records dropped by more than 90% from 1929 to 1933. But although it is easy to blame most of the drop, or even the entire drop, on the depression, we should look a little more carefully at other clues that might provide some additional insight before we attribute the entire decline to the depression.[24]

A somewhat different view of the vicissitudes of the recording industry can be gleaned from Figure 4 which measures record sales both as a percentage of GDP and in sales per capita. As can be seen, the fall in record industry revenues was far greater than the fall in GDP, since as bad as the depression was, the 26% drop in GDP was, thankfully, nowhere near the 90% decline experienced by the recording industry.

It is conceivable that extremely high income elasticities for sound recordings were responsible for the decline in record sales being so much larger than the decline in income in the early 1930s, but such elasticities are inconsistent with the decline in record industry revenues that occurred in the 1920s, at a time when the economy was experiencing robust growth (48% from 1921 to 1928). The elasticities that would be implied if the depression were to be given credit for the entire drop in record sales are also inconsistent with the rather pedestrian improvement in recording industry revenue that occurred in the decade after WWII.

By way of comparison, the movie industry, which suffered a serious decline from 1929 to 1932, came back strongly afterward, matching its pre-depression values (at least in attendance) by 1935, as can be seen in Figure 1.[25] We will see below that radio continued to grow rapidly through the depression. Yet the market for records did not show signs of life until 1938 and even then failed to approach the levels seen in the early 1920s. As Figure 4 makes clear, even then record sales failed to keep up with the growth in the economy since it isn't until after the war that sales return to pre-depression values as measured by share of GDP.

Given this evidence, it seems difficult to blame the entire magnitude of the decline in sound recording revenues during the depression on the macro economy alone. The recording industry appears to have had some other factor(s) hindering its performance, both immediately before the depression and continuing through the depression. The most obvious candidate is the competition from the radio industry.

4.2.2. *A Very Brief History of Radio.* Radio, of course, did not suddenly arise fully formed. There were many experimental broadcasts and many amateur stations. Yet

[24]The BBC history blames the decline entirely on the depression. They state: "If market forces affected the recording industry, the Great Crash of 1929 changed it irrevocably as [sic] leisure items such as electrical items becoming luxury goods. Thomas Edison's cylinders and discs ceased production entirely, while smaller independents were swallowed by new conglomerates that could weather the economic storm... For the first time business interests overtook artistic ones. While pandering to mass markets created a certain dumbing-down in the output, the effects of mass-production did result in a large drop in price of records... One very significant part of the market did, however remain boyant – the Juke-box."

[25]It took the movie industry an additional two years to essentially catch up to total revenue from 1929.

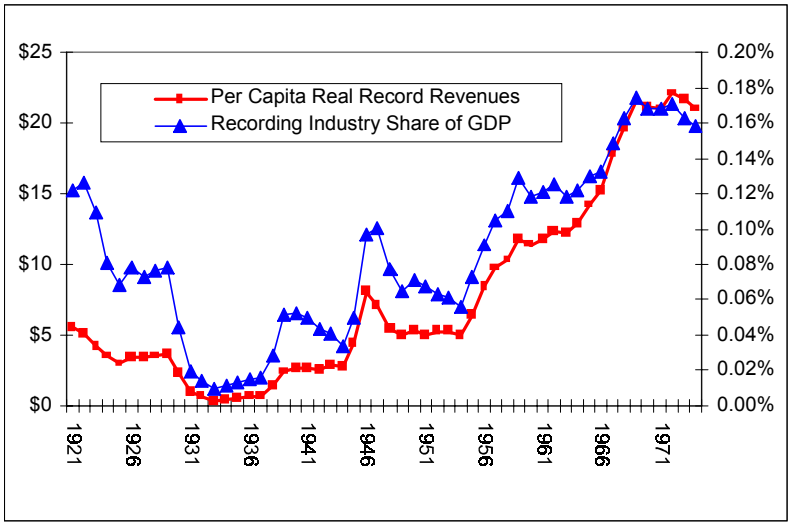

FIGURE 4. Two Measures of the Recording Industry

the first commercial American radio station is generally accepted as being KDKA in Pittsburgh, going on the air continuously in November of 1920. Numerous stations went on the air in the next few years, and by 1923 the number of stations was over 500, which remained the approximate equilibrium value for the next fifteen years.[26]

The number of homes with radios grew somewhat more slowly. In 1922 it was claimed that 1 million households were going to own radios before year end. In 1926, at the time of the formation of NBC, it was claimed that 5 million households had radio, out of a total of 26 million, for a penetration rate of 20%.[27] The penetration rate of radio appears to have reached two thirds of all households by 1935.[28] Clearly, the penetration of radio largely occurred from the early 1920s until the late 1930s.[29] National broadcasting networks, with their superior production values, arose in the mid to late 1920s.

Not only did people buy radios, they used them. It is a fairly remarkable testament to the power of this new medium that during the depression households would spend the money required to purchase a radio receiver.

4.2.3. *Interpretation.* From 1921 on, the story of radio was one of constant growth for the next two decades. This is the inverse of the recording industry, which had fairly constant decline over this period. There are good reasons to think that this relationship is more than happenstance.

[26]Reported in Figure 1 in Hazlett (1997). Hazlett's data are taken from Bureau of the Census.

[27]NBC was created by Radio Corporation of America (RCA), the world's largest producer of radio sets at the time, based upon a station purchased from AT&T. RCA took out large advertisements in newspapers in September of 1926. In the advertisement it was clamed that at that time 5 million homes had radio, with 21 million yet to have a radio. This would be a penetration rate of 19.2%. A copy of the advertisement can be found here http://earlyradiohistory.us/1926nbc.htm.

[28]According to http://history.acusd.edu/gen/recording/radio2.html.

[29]According to Hettinger (1971), page 42, Table II, the number of radio receivers in the US (in millions) from 1923 until 1932 was: 1.5, 3, 4, 5, 6.5, 7.7, 9, 12, 15, 16.68. From Figure 2 in Hazlett's Columbia Law Review article, a similar, fairly smooth increase is shown.

Listening to radio or sound recordings could both be done at home. The acoustic quality of radio was often better than what was available with early recordings. Sound recordings in the 1920s and 1930s tended to allow only four minutes or so of play on a side before another record would have to be loaded onto the platter, making them fairly inconvenient for listening to music at long stretches. It is not surprising, therefore, that there was a reasonable substitution effect that hurt the market for records.

If there was a strong substitution effect between listening to radio and listening to phonographs then the decline in record sales can easily be explained by the growth in radio. The strong decline in record sales implies that either there was little or no exposure effect, or that the substitution effect was overwhelmingly dominant

The timing of radio's ascendance and the record industry's fall seems more than coincidental. There are some other alternatives that might be suggested, however. The movie industry also was also likely to be substitutes for the consumers' entertainment dollar. Yet there is a stronger case for radio having the major impact. Radio was audio based, as were records, radio was music based, as were records, and radio was listened to in the home, as were records. It is also the case that movie "talkies" began in the mid 1920s and attendance skyrocketed from 1926 to 1929, yet in those particular years record sales were hardly affected as would have been expected if movies were responsible for the decline in records sales that occurred (see Figure 1). Further, the record industry had a dismal performance during the 1930s, yet movies did not grow in that decade – radio did.

Thus the evidence supports a claim that radio was strongly detrimental to record sales during this period.

Others have commented on this possibility as well. According to Morton (2000), page 26:

> "Record companies welcomed the subsequent transfer of electrical technology from radio and motion pictures to the phonograph industry, but hated the effect these two new forms of entertainment had on the record business. Radio was the biggest threat. On the eve of broadcasting's debut, between 1914 and 1921, record sales had doubled, largely because of sales of popular music. With the inauguration of network radio in the middle 1920s, the market for popular recordings collapsed, resulting in a number of companies leaving the field or changing ownership."

The timing of the growth in record sales beginning in 1955 is also interesting although I would hesitate to draw too much from it. Returning to Figure 4, a sustained rise in the fortune of the record industry began at the same time that television began to eclipse radio as the dominant entertainment medium in the country in terms of viewers'/listeners' time. Did the shift away from radio as the premier entertainment medium in the country allow the recording industry to breakout of its longtime doldrums? Perhaps, but some alternative explanations such as the rise of rock and roll, or the rise in the Long Playing record have enough strength as alternatives to preclude a clear affirmative answer.

4.2.4. *Caveats.* Clearly, the imprecision in these data, the fluidity of the content and technology, and the changing market conditions all make it impossible to have

a totally clear-cut test of the impact of radio on the recording industry. There are several caveats to make.

Quality of Sound. The relative quality of radio and recordings was different in the 1920s than it has been in recent times. Radio, of course, was based on electricity. Radio required electrical amplification and speakers in order to operate. This gave radio an initial advantage over acoustic phonographs in terms of sound quality. Although the sharing of amplifiers and loudspeakers between radio and phonographs was to become common, with the two devices often merged into a single device, radio at first had sonic advantages. Nevertheless, when recordings increased in quality in the mid 1920s, due to the use of an electrical as opposed to acoustical recording process, there is no evidence of an exposure effect increasing record sales. At best the decline came to a halt for a few years. There is no support for a claim that radio play enhanced record sales.

The relative quality of sound on records versus radio may have been different in 1920s than it was for most of the latter part of the century. Radio, in the second half of the twentieth century, had lower quality than sound recordings. The inconvenience of using records largely disappeared, particularly when the 33 rpm LP record was introduced in 1948 and automatic record changers became more popular. The impact of radio broadcast on record sales in the 1920s and 1930s, therefore, might have changed in later decades.

Use of Music. One might argue, with some justification, that radio originally played live music when it played music and that it did not play records. Certainly, many of the popular network radio programs, such as Amos and Andy, did not play records. But there were many radio programs based on music. As long as the music played on radio was also recorded on records, the impact of radio play on record sales should be largely the same as it would be whether or not the specific recordings were played directly on the radio. Further there is some evidence that local radio stations did play records.[30]

Although the role of radio in creating an audience for election returns, horse races and prizefights is the stuff of legend, the mainstay of radio broadcasting was music. Analyses of network radio broadcasts by Hettinger (1971) revealed that music made up about two thirds of the content in the period 1927-32. Further breaking down the data, he discovered that popular music made up 35%-40% of programs, with semi-classical music at about 15% and variety music at about 5%.[31] Popular music was played more frequently during the prime time hours with the largest audiences climbing from about 25% in 1927-28 to about 54% in 1931-32. Radio programming, even from this early period, was focused on music and particularly popular music, so it is reasonable to expect that the recording industry would be impacted by whatever effects radio might potentially have.

4.3. **The Introduction of Advertising-Based Radio in England.** The second experiment occurs at a considerably later period of time, the last third of the 20th century, in England. British radio broadcasting was much different from American radio during the 1950s and 1960s. This is particularly striking given that the two

[30]For example, see http://earlyradiohistory.us/1922can.htm.

[31]Table XXIII on page 218 in Hettinger (1971). Variety music, according to Hettinger, changed over the period from mainly classical to mainly popular. Variety programs, which also contained much music tended to have about 5% of the programming.

countries had such similar charts of best-selling records. This difference provides the basis for our second natural experiment.

4.3.1. *A brief history of British Radio.* Radio was monopolized for many years in England by the British Broadcasting Corporation (BBC). The BBC was originally (1922) a consortium of six radio manufacturers who were granted a virtual monopoly over the sale of receivers, with the British Post Office overseeing the consortium.[32] These manufacturers wanted to promote the existence of radio stations so that they could sell more receivers, just as RCA did by creating NBC. In return for the monopoly on the sale of receivers, the manufacturers agreed to give ten percent of the revenues from the sale of receivers to the BBC.

The BBC became a full-fledged public corporation in 1927, financed by a government tax levied on radio receivers. Being a creature or at least a quasi-creature of the government, the BBC endured certain restrictions on its practices. Initially, due to pressure from the press which was concerned with possible declines in newspaper circulation if radio were to broadcast news, the license provided "that the Company shall not broadcast any news or information in the nature of news except such as they may obtain on payment from one or more...news agencies." For years the BBC would begin its news broadcasts by acknowledging the sources from which they had purchased their information.

There were other restrictions more important for our purposes. There was a 'needle-time restriction', limiting the number of minutes that recorded music was permitted to be played weekly. This was due to agreements with the Musicians' Union – since the BBC employed its own orchestra(s) playing music, allowing the playing of records would have reduced the need for musicians.[33]

As the decades ensued, the BBC lost touch with at least one very important segment of the music listening public – the teenagers of the country. One type of music that it did not program to any great extent was rock and roll. The bottom line is that radio listeners in England had only the BBC to listen to, with its handful of networks, only one of which catered to popular tastes (the Light Programme) and even that station had only a few shows with recordings of popular music. The program that gets the most mention, a show called the "Pick of the Pops," was broadcast only once per week.[34] Since the BBC was the only game in town, listeners were captive to its choice of programming. Unlike a producer in a competitive market who must cater to the demands of customers, the BBC was free to program what it felt was appropriate.

Competition is a hardy weed, however. Radio competition, disallowed by law, arose in an unusual form – pirate radio stations, which became quite influential in the mid 1960s.

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[32]Some of this material is taken from "The Unofficial Guide to the BBC" http://www.vaxxine.com/mastercontrol/BBC/chapters/Bbc_form.html.

[33]This comes from a history of the pirate radio stations http://radiolondon.co.uk/kneesflashes/stationprofile/hist.html although another history of UK radio http://dspace.dial.pipex.com/town/pipexdsl/r/arar93/mds975/Content/ukradio2.html suggests that it was record companies that wanted to limit the amount of time that records could be played on radio. The limit on record play, at least in the post-war era, was 37.5 hours per week.

[34]There was also the Home Service, which was speech based, the Third Programme, which was highbrow, and the World Service which went to other countries.

The demand for rock-and-roll was sufficiently large, and the topography of the country was such, that entrepreneurs were able to turn some converted old boats into floating radio stations parked just outside of Britain's territorial waters, with monikers such as Radio London and Radio Caroline. These were advertising-based, for-profit ventures (one was even set up by a group of Texans).

Although it seems impossible to get accurate numbers on the audiences of these stations, they were sufficiently large that the British government, in 1967, passed the Marine Offenses Bill which made it illegal for any Briton to conduct business or interact with the pirate radio stations. This essentially put the pirates out of business.

To appease discontent caused by the shutdown of the pirate stations, the BBC promised to create its own network to play popular records. The stage was also set for the entrance of commercial radio that began in the early 1970s.[35]

4.3.2. *The Impact of Private Commercial Radio.* Private radio stations in England are supported by advertising, thus having the disadvantage of annoying the listener by having to intersperse commercials within the broadcast. Nevertheless, the increase in stations has been impressive and so too has been the growth in audience. Commercial stations finally achieved the majority of listening hours in 1995.

The impact of private radio stations came in three waves.[36] A small number of private stations were licensed beginning in 1973. The government was reluctant to increase the number of stations until new legislation in 1980. The early 1980s saw another increase in the number of stations. The mid 1990s saw another burst of activity and increase in the number of stations. At first the private radio stations were heavily regulated. Over time these regulations softened.

Some evidence on the historical size of the commercial radio audience can be gleaned by the share of advertising generated by British radio stations. It grew from 0.24% in 1973 to 2.49% in 1978 where it largely remained until the early 1990s when it began to steadily grow, achieving a level of 6% in 2000.[37]

The end result of this is that historically, British radio audiences have not had the capacity to listen to popular recorded music on radio to anywhere near the same extent as American audiences. Prior to 1967 there was a very great difference in this ability. This difference began to diminish in the late 1960s and early 1970s and then continued to diminish in the 1980s and 1990s.

If radio play significantly increases record sales, then British record sales should have increased significantly relative to American record sales beginning in 1967 and continuing over the next decade or two, holding everything else equal. By comparing record sales in the two countries over these decades we can test whether radio play increases record sales. Unfortunately, reliable UK data on record sales do not begin until 1973.

Figure 5 examines the ratio of UK/US sales per capita of full-length albums, whether vinyl, cassettes, or CDs. There is no evidence of an upward trend caused by greater radio airplay of popular music.

[35]There is a very nicely detailed history of these events at http://www.icce.rug.nl/%7Esoundscapes/VOLUME06/Fight_free_radio.html.

[36]This discussion is based upon Meg Carter (2003).

[37]These figures can be found on page 57 of Meg Carter (2003). British private radio's share of advertising still appears to be less than the share of other countries. Its share is about one third the US and Canadian level and one half that of Australia (data taken from TVBasics, TVB of Canada, 2003), which might not be surprising given the still very large share of BBC radio.

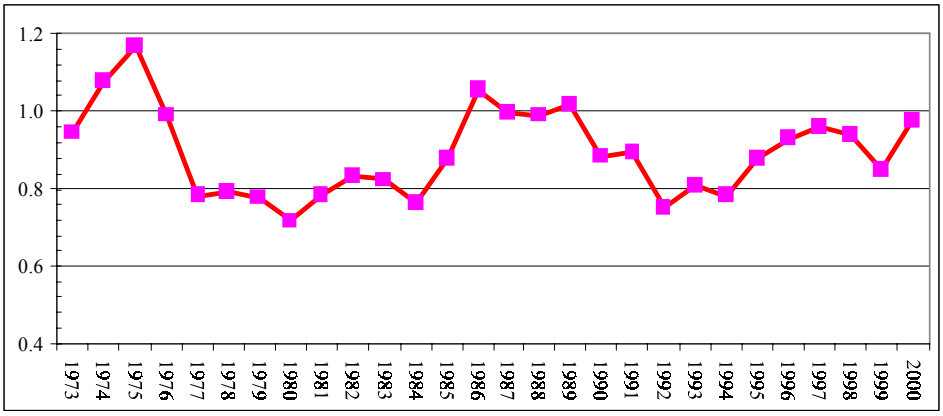

FIGURE 5. UK/US Albums Per Capita

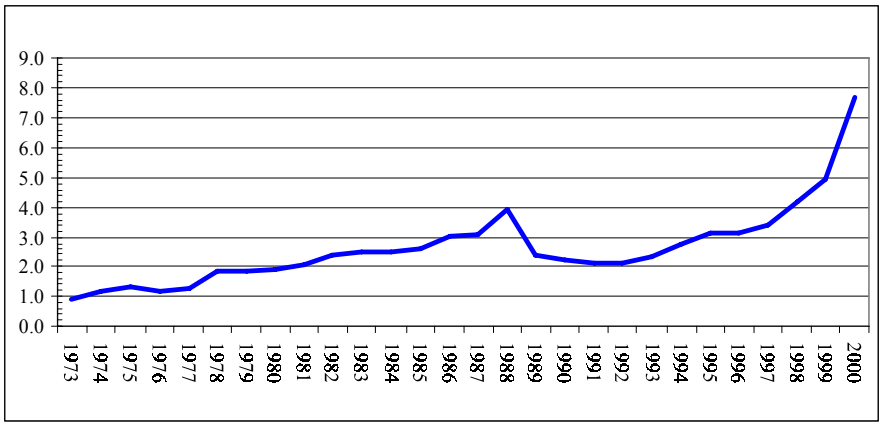

FIGURE 6. UK/US Singles Per Capita

Figure 6 examines the sales of singles, regardless of physical format. Here there might appear to be some evidence for the claim that radio increases record sales since sales of singles increased dramatically in the UK relative to the US. Of course, sales of singles in both countries fell significantly over this period and singles are no longer an important market.

In an attempt to gauge the importance of the increase in UK singles relative to US singles, I assumed that albums contain ten singles and then merged the two series together. Figure 7 presents the results which clearly show that singles have very little impact on the overall market.

These comparisons do not control for other economic variables such as price or income. If by chance the price of records rose in the UK relative to prices in the US, then the quantity sold in the UK would have been expected to fall relative to US quantities. In that case it might still be possible that radio enhanced the market for records in the UK even if the quantity of albums sold in the UK did not rise relative to the US. Alternatively, if incomes in the UK rose by less than incomes in

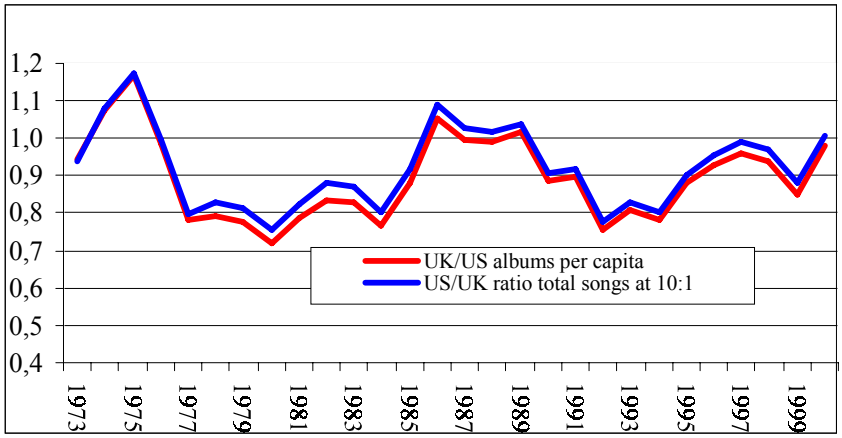

FIGURE 7. UK/US Ratio of Pre-recorded Songs

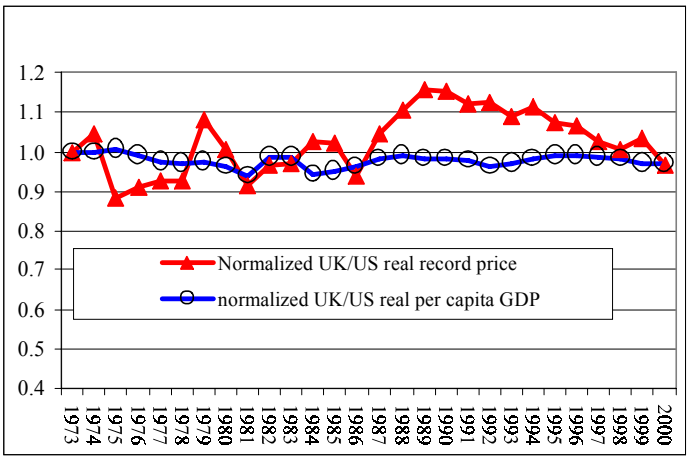

FIGURE 8. UK/US Normalized Incomes and Prices

the US and if record sales are positively related to income, then radio might have had a positive impact on record sales in the UK even though the quantity sold did not rise in the UK relative to the US.

These possibilities are examined, starting with Figure 8. From Figure 8 we can see that changes in both inflation adjusted record prices and GDP per capita were extremely similar between the two countries. Changes in UK inflation adjusted income (GDP per capita) very slightly failed to keep up with changes in US income over this period (2.9% lower over the entire period). Inflation adjusted record prices in the UK increased at a rate very slightly (3.3%) below the US rate although they were above the US rate for much of the period.

With this background it would seem impossible for the impact of price and income to alter the overall conclusion that the introduction of commercial radio had little impact on the quantity of records sold.

Table 2 presents the results from regressions with the percentage change in per capita album sales as the dependent variable and the percentage change in real price and percentage change in real per capita GDP as independent variables. The coefficient on income is positive and significant in both countries. The coefficients on price in either country are not statistically significant, although they are at least of the correct sign.

In both countries we have an income elasticity of approximately two but with fairly large standard errors. From Figure 8, we know that the relative income changes in the two countries never deviate by more than 5%. At the end of the period, the income change in the UK was less than 3% below that of the US. Adjusting UK sales, which rose 2% less than in the US, for the higher income growth in the US, would leave the UK with a mere 4% increase in sales over the US during a three decade period during which radio play of popular music increased dramatically. Given the standard errors we certainly cannot support a claim that radio play increased sales of sound recordings.

Table 2: Dependent Variable is yearly percent change in albums per capita

	B	Std error	t	Sig.	R-squared	Adjusted R-squared
US					0.285	0.222
Constant	-2.30E-02	0.021	-1.105	0.28		
Yearly percent change in real income						
Yearly percent change in real price						
UK					0.153	0.082
Constant	-9.00E-03	0.024	-0.382	0.706		
Yearly percent change in real income	1.729	0.868	1.991	0.058		
Yearly percent change in real price	-0.13	0.307	-0.423	0.676		

The final piece of evidence concerns the revenues generated in the two markets. By using revenues as the variable of interest we can allow both prices and quantities to vary in the two countries. In order to avoid difficulties often associated with trying to control for exchange rate movements, I calculate the share of GDP going to the recording industry in the two countries.[38] The results are reported in Figure 9.

[38]Although not reported in the text, the 1973 share of GDP devoted to record sales was remarkably similar in the two countries (0.14% in both the UK and the US). One could argue that this similarity of ratios indicates that the UK's lack of commercial radio stations in 1973 neither hurt nor hindered record sales, which is not too far from the conclusion I reach in the paper. Differences between the two countries, however, make it unwise to merely compare the absolute shares. The approach taken in the text, to compare the change in relative shares in the two countries, normalizes each country to its specific characteristics (income, tastes, and so forth).

Again, we have a result inconsistent with a claim that radio airplay increases record sales. In fact, over these decades the share of GDP devoted to records in the UK fell relative to the share in the US, and the fall was in the vicinity of 13%. This is slightly more lopsided than the other measurements, but still is not a particularly large difference.

The bottom line from this examination can be stated as follows: The introduction of commercial radio in the UK did not increase the market for prerecorded music, contrary to the claims of symbiosis often made in the literature. Although there is some evidence that radio may have harmed sales slightly, the evidence is weak. The most reasonable conclusion would appear to be that the introduction of commercial radio had a fairly small negative impact on the record industry in the United Kingdom.

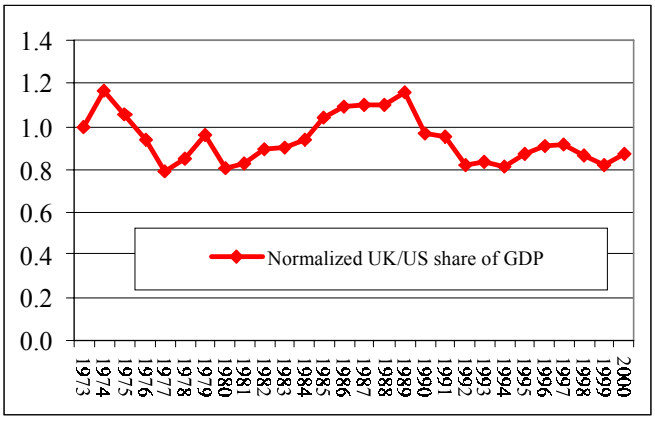

FIGURE 9. UK/US Record Industry Share of GDP Normalized

This conclusion is supported by statements made by the UK Monopoly and Mergers Commission:

> The broadcasting of records – for instance, the 'Top 40' singles or the airing of new product by popular disc jockeys – has long been an important promotional tool for new record artists and products. We were told, however, that the growing quantity of music broadcast on radio has moved towards becoming a substitute for record sales, with a consequent negative impact on such sales. Consumers who want to hear a particular kind of music are increasingly likely to be able to find a radio station that concentrates on it. This can reduce the incentive to buy records, while the growing facility for high-quality home taping may reduce the necessity for such purchases. We were told that these effects had been reinforced by the removal in 1988 of the restriction on independent radio stations which limited them to nine hours of 'needletime' per day. We have been told that this trend is likely to accelerate when high-quality digital broadcasts are introduced.[39]

As long as these other characteristics remain constant between the two countries, the approach taken in the text is more robust and instills greater confidence.

4.4. **Additional Evidence.** Intuition can provide some help in achieving an understanding of the impact of radio broadcast on overall sound-recording sales. Americans spend approximately 3 hours per day listening to radio broadcasts.[40]

According to the US statistical abstract, music listeners spend about 45 minutes per day listening to pre-recorded (presumably purchased) music.[41] Note that the time spent listening to radio is three to four times as large as the time spent listening to pre-recorded music. Without the availability of radio, some consumers who would otherwise have listened to radio would most likely instead listen to more prerecorded music, since that is the closest substitute. If we make the perfectly reasonable assumption that the more time one spends listening to prerecorded music, the more prerecorded music that one will buy, it is easy to see how radio might harm sound-recording sales.[42]

The most clear-cut possibility of pre-recorded music sales being harmed by radio is likely found in the activity of listening to music while driving. According to an Arbitron study of in-car radio use, one third of radio listening occurs in automobiles, which works out to about one hour per day.[43]

If radio were not available, the only way to listen to music in automobiles would be to listen to pre-recorded music. Alternatives, such as movies, reading, or television are not available while driving. With the alternative of silence, and no other substitutes available, it seem very likely that if radio were unavailable, the one hour per day currently spent listening to radio in automobiles would convert to time spent listening to pre-recorded music.

An increase of one hour per dayin listening to pre-recorded music would more than double the daily amount of time the average person spent listening to prerecorded music. It is hard to believe that such a doubling would not dramatically increase overall sound-recording sales. And this is just for automobile usage of radio.

Looked at in this light, therefore, it is easy to imagine that radio broadcast might decrease the purchase of sound-recordings.

5. Payola and the Fallacy of Composition

It is fairly well-known that record labels will often attempt to pay to have their records played by disc-jockeys. In fact, there is a special term that has been coined to describe this behavior – payola – and in the 1950s several American disc-jockeys

[39]Page 79 of the document, "The supply of recorded music; A Report on the Supply in the UK of Prerecorded Compact Discs, Vinyl Discs and Tapes Containing Music," Monopolies and Mergers Commission; presented to Parliament by the Secretary of State for Trade and Industry by command of Her Majesty, June 1994.

[40]According to Arbitron, Americans spent 20 hours per week in listening to radio in the Fall of 2002, which can be found here: http://wargod.arbitron.com/scripts/ndb/ndbradio2.asp

[41]The number is 263 hours per year found in the US Statistical Abstract, Table N0. 1102. Media Usage and Consumer Spending: 1996 to 2005. http://www.census.gov/prod/2003pubs/02statab/infocom.pdf

[42]The advent of cassettes and CDs allowed prerecorded music to become portable for the first time, presumably increasing the amount of time that individuals spent listening to prerecorded music. Liebowitz (2004) demonstrates that the increase in the penetration rate of portable devices coincides with a large increase in sound-recording sales and suggests that causation runs from new uses to increased listening to increased sales.

[43]The study can be found here: http://arbitron.com/downloads/InCarStudy2003.pdf

went through well publicized congressional hearings meant to prevent such activity.[44]

The fact that some record labels were willing to pay those in charge of programming radio stations to promote some records might be taken as evidence that radio play must be beneficial to record sales. Yet that would contradict the evidence on record sales reported in the previous two sections. Is there, in fact, a contradiction?

I think not. Although it seems logical to assume that payola means that radio enhances overall record sales, that conclusion suffers from the fallacy of composition – what may be true for individual observations is not necessarily true for the entire group.

An individual record, particularly if consumers are unfamiliar with the creators, will benefit greatly from airplay. An individual record label will benefit if radio stations tend to focus on broadcasting that label's records. The benefit to that recording or label, however, comes at the expense of other records and other labels since increased play of one record must lead to a decreased play of other records. If radio listening is a substitute for listening to prerecorded music, that substitution will occur regardless of which records are being broadcast, unless listeners feel that the quality of records being played has gone down.

Since radio broadcast of a record generally increases its share of the market it makes sense for labels to try to get their records broadcast. Payola is rational until the marginal benefit from additional payola no longer covers the cost. Radio stations want to maximize their profits, which requires balancing the audience size, which is maximized by playing records that listeners most prefer, against any revenues that might be generated by 'selling' airplay to record labels a la payola. This keeps the radio stations from deviating too far from what listeners would want to hear.

Recordings of the works of well known artists are less likely to need or benefit from payola since radio stations will want to play those records in order to achieve large audiences.[45] It is not unusual for leading stations to be given 'exclusives' over anticipated new recordings for a day or two, although I do not know what the stations 'pay' for this privilege. These are the recordings for which radio stations would be expected to pay large sums for the rights to broadcast if there were property rights in the broadcast of the recording.

It shouldn't be surprising that producers of recordings using little known artists are interested in paying for airtime. This is no different than in many other markets. There are often new entrants into many types of markets and it is not uncommon for new entrants to provide free samples, giveaways, and other devices to try to achieve market share, and that is how payola should be viewed. The media are willing to pay large sums for interviews with major celebrities, whereas minor celebrities are willing to pay to get someone to interview them. It certainly cannot be viewed as indicating that the overall market price of music for performing rights on radio is negative.

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[44]For an in depth history of payola, see Coase (1979). Coase does not directly address the impact of radio on record sales although he does seem to implicitly believe there is a positive linkage. His main interest is to understand the causes of the attempt to ban payola.

[45]Coase (1979) reports that payola was favored by small record labels and that large labels (and music publishers prior to that) had attempted to outlaw activities such as payola for many decades. Coase viewed the ban on payola as anticompetitive.

Even if a majority of recordings were found to have negative prices for broadcast rights, this would not necessarily indicate that the overall market price, which is weighted by transaction size, would be negative. Only a small percentage of recordings are successful, and yet the successful ones dominate the revenue in the industry and would also likely dominate the overall market for market-based performing rights payments.

6. Conclusions

The belief that radio enhances the market for sound recordings seems firmly embedded in current regulatory, commercial, and legal thinking. Yet there appear to be no formal studies examining the relationship between the two markets.

I have examined two episodes in which the impact of radio should be relatively easy to observe. The evidence from this empirical examination indicates that, contrary to common beliefs, radio broadcast does not enhance the market for sound recordings.

Clearly, there is room for additional work. But the evidence seems strong enough, and the intuition supporting the evidence seems compelling enough, that a complete rethinking of the economic relationship between these industries, and the laws, regulations, and decisions having to do with the interaction of these industries, seems appropriate.

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