

# **Record Sales, MP3 downloads, and the Annihilation Hypothesis**

**Stan Liebowitz**  
**School of Management**  
**University of Texas at Dallas**

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**Preliminary**

This is, in part, updating material from my book: **Rethinking the Network Economy**

This is a long enough document, and many readers have short enough attention spans, that I realize I had better treat it as if it were a position paper. So I have given it an Executive Summary. I should mention that I am not working for anyone involved in this debate. My motivations, at this time, are not wholly unselfish—I want to sell copies of my book. Also, the paper I wrote for Cato, which was published in April 2002 and which was in part the subject of an interview in Salon, was sent to them in August of 2001. My opinions changed gradually, not rapidly, as it might seem just based on the dates of publication.

## Summary

The sales of recorded music have fallen recently. Many articles have been written and statements made about whether this decline is due to the downloading of MP3 files. The claim has been made that MP3 downloading, if unchecked, would destroy the recording industry, a claim I term the “annihilation hypothesis”.

Unfortunately, much of the analysis appears to be little more than looking at the most rudimentary of numbers and then using one’s favorite hypothesis to explain them. There are partisans on both sides trying to spin the numbers to fit their message. Most of the claims that I have seen are often unsubstantiated and sometimes are based on the use of different definitions.

In the following report I look at 30 years of record sales to try to determine what have been the most important influences on record sales. I then use this information to examine what has happened in the market recently to try to determine whether there is evidence that MP3s have caused harm and how large that harm might be. My conclusions, which tend to change as new data come in, are currently as follows:

- 1) Record sales have had four prior declines in the last thirty years, and the decline as of 2001 does not appear different in character than the other declines.
- 2) Preliminary reports on mid-year record sales for 2002 indicate a more pronounced decline in sales that now appears to make the current dip larger than previous dips. This new data adds support to the claim that MP3 downloads are causing harm to the recording industry.
- 3) Income does not appear to be an important factor in record sales changes during the last 30 years. Therefore the current recession does not appear to be responsible for the current decline, contrary to my previous expectations.
- 4) Sales of singles have been falling almost continuously for the last thirty years. The continuing impact of their decline, therefore, should probably be removed from overall record sales, which diminishes somewhat the severity of the current downturn.
- 5) Inflation adjusted list prices fell during the 1970s but have remained almost constant for the last twenty years. Increased sales by discounters has probably slightly lowered the price paid by consumers. Price does not seem to play a role in record sales fluctuations.
- 6) Unit sales per capita have risen substantially over the last 30 years. The main reason for this appears to be that listening to recorded music can be done in more locations. Additional uses for recorded music became available in the automobile and, particularly in the 1980s, in activities amenable to portable ‘walkman’ type devices.
- 7) The factors that led to growth in unit sales appear to have ended in the mid 1990s. Cassette sales have been dropping to zero and some of the recent decline in overall sales is due to this decline in cassettes.

- 8) My current, very rough, estimate is that if MP3 downloads continue unabated, that unit sales will drop somewhat more next year and then begin to level off, with an overall decline of about 20% that would be caused by MP3 downloads.

After Napster exploded into the public's consciousness in 1999, concerns with MP3 downloads, their impact on the recording industry and the industry's attempt to thwart such downloads, have been in the news almost continuously. The Napster case was only the most public front in a wide ranging battle between the entertainment industries (movies and records) and the millions of individuals who were using the Internet to download, without authorization, copyrighted works, but who otherwise were thought to be the putative customers of these industries.

This fight has spilled over into the political arena. The most recent manifestation is a bill proposed by Representative Howard Berman from California that allows copyright owners to engage with impunity in otherwise illegal activities "disabling, interfering with, blocking, diverting, or otherwise impairing" the "unauthorized" distribution of copyrighted items.<sup>1</sup> The bill does attempt to restrict these otherwise illegal activities to those that do not "alter, delete, or otherwise impair the integrity of any computer file or data residing on the computer of a file trader" but it still amounts to authorizing 'hacking' behavior that is disallowed in other venues.

Not surprisingly, this bill has created quite a ruckus among those who follow these activities. This is only the latest in a flurry of activities taken by the copyright-based industries to protect themselves against what they see as online pilfering of their products.

At the center of the current controversy, which was spawned by Napster, is the fear by the recording industry that great damage, perhaps even mortal damage, will be done to them if they do not stop online 'trading' of music files, a fear I refer to as the "annihilation hypothesis". The movie industry is taking a backseat to the record industry because, for the time being, the size of the files needed to view movies make online movie trading prohibitively time consuming for many users and because most users do not have the equipment to write DVDs.

What should be at the center of discussion of the annihilation hypothesis are empirical examinations either confirming or rejecting the hypothesis, yet it has received a surprisingly small amount of empirical scrutiny. The recording industry attempted to present evidence to support the annihilation hypothesis in the Napster case. As I have explained elsewhere, the evidence provided by the recording industry in the Napster case, in my opinion, failed to support any claim of harm, to say nothing of supporting the annihilation hypothesis, although the judge nevertheless ruled against Napster.<sup>2</sup> I have also argued that although there was not yet good evidence to support such harm, there

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<sup>1</sup> The text of the bill along with its justification can be found at: <http://www.house.gov/berman/pr072502.htm>.

<sup>2</sup> See Chapter 7 in my book "Rethinking the Network Economy" Amacom, 2002 or my article "Policing Pirates in the Networked Age" Cato Policy Analysis No. 438 May 15, 2002 available here: <http://www.cato.org/pubs/pas/pa-438es.html>.

were good economic reasons to believe that online file sharing would be harmful to the industry, perhaps sufficiently so to support the annihilation hypothesis, and I provided rationales as to why the evidence to support this claim had not yet surfaced.

Peer-to-peer file sharing, although anathema to the recording industry, is providing a wonderful natural experiment to economists or anyone else who might be interested in the impacts of unauthorized copying. The longer it goes on, the more evidence that can be accumulated on the impact of the copying on the market for authorized works. The fact that there are actual measurements on the number of files downloaded provides a metric on the size of the copying activity that had never existed with any prior copying technologies. Unfortunately, almost no one seems to be looking at this evidence and this paper is, to my knowledge, the first attempt to do so.

The natural experiment is still ongoing and results are still coming in. With all the energy and heat being generated on these topics, however, this seems like a good time to take stock and examine what we currently know about the impact of MP3 downloading on record sales. My conclusions, in a nutshell, are that MP3 downloading does appear to be causing harm, but that the harm seems unlikely to be sufficiently strong to support the annihilation hypothesis. I can assure the reader that the results are not definitive.

## **I. Background**

Records are just a particular category of consumer goods, and not a terribly large one, at least in terms of revenues. Even so, listening to music is one of the major daily activities for many Americans. Estimates indicate that the average American spends 45 minutes a day listening to recorded music and almost three hours listening to the radio—where music is the major form of entertainment.<sup>3</sup> Thus even if its share of GDP is small, its share of the collective consciousness and behavior of Americans is very large. It is also possible that its share of the total ‘value’ of what is produced might be quite large, just as air or water provide enormous values but very little, if any, market revenues.

As is the case with most economic goods, we expect the demand in the market to be impacted by economic factors such as changes in taste, income, prices of substitutes and complements, demographics, and changes in the nature of the product. Many of these factors are discussed in Section II.A. The factor that is of particular relevance in this market is the impact of copying.

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<sup>3</sup> See Table No.909 “Media Usage and Consumer Spending: 1993 to 2003” in the 2000 US Statistical Abstract.

The analysis will consist, therefore, of simply examining the sales of albums and trying to determine the factors responsible for changes in sales. We can then focus on sales in the last few years, since that is the period in which MP3 downloading began, and see whether sales decline in an otherwise unexplained manner, or whether they fail to increase as we might have expected them to.<sup>4</sup>

This is a blunt analysis, but given the nature of the data, it is probably the best we can do. In defense of this form of analysis, the MP3 phenomena is so large that even a blunt analysis such as this should have little trouble picking up its impact if the impact is in any way ‘large’.

## **II. The Current Numbers with Little Analysis**

Data on quantities of records sold in the United States on a yearly basis are available from the Recording Industry Association of America (RIAA), as are data on revenues. The data on revenues are estimates based on the list price of recordings—actual transaction prices are not available.<sup>5</sup> Although these numbers are for just the United States market, we can presume that any negative impacts of MP3 downloading would be at least as likely to show up in the US market as any other, due to the large number of computers, Internet connections, and CD burners and also to the fact that most of the population can afford to purchase CDs legitimately. Although some data are available for countries other than the US, the different cultural and technological characteristics across countries would seem to make it difficult to apply adequate statistical controls, so I am not anticipating expanding the study in that direction.

The data reported by the RIAA include the number of units of recorded music sold in various recording mediums (e.g., CDs, audio cassettes and vinyl records) as well as the revenues generated by each of these mediums. It also contains a breakdown by size—singles or albums.

Naturally, the RIAA tend to use these numbers in a way that is most consistent with the picture they wish to portray about the conditions of the industry. At the present time the condition they wish to portray is one where the industry is reeling from the impact of MP3 downloads.<sup>6</sup>

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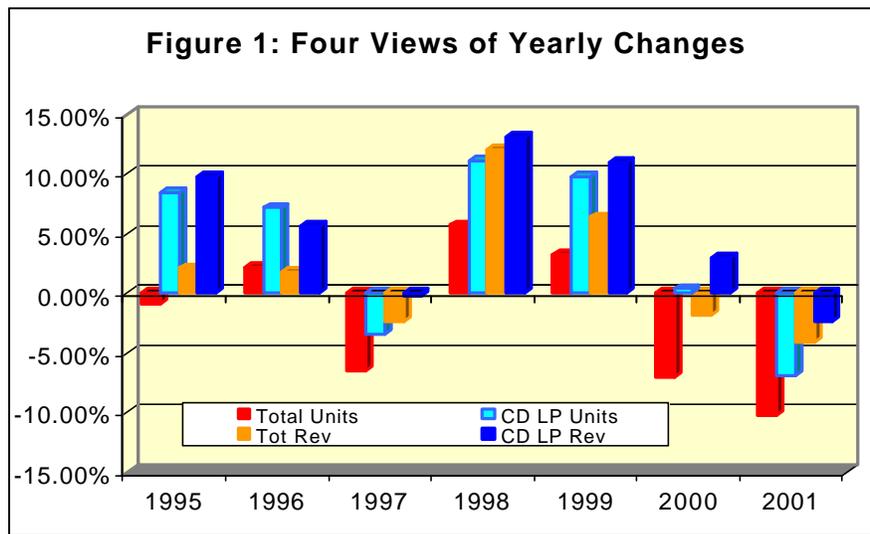
<sup>4</sup> I also address the issue of home copying of audiotapes, as opposed to MP3 downloading. Both would have been expected to lower sales if they were substitutes for purchase.

<sup>5</sup> Data on quantities were reported beginning in 1973. For prior years only the industry revenues were reported. It is not yet clear to me whether the revenues are calculated in the same way as was the case for post 1973 data or whether they represent actual revenues.

<sup>6</sup> Although not likely an issue with the historical data, some concern about the legitimacy of the current and future numbers arises since the industry is trying to make a case of MP3 damage based upon these numbers. The RIAA informs us that the numbers are compiled by PricewaterhouseCoopers, but somewhat greater concern must be in evidence when there is so much riding on these numbers.

Before a more complete analysis of the data is undertaken, it is useful to examine the evidence at its most basic level. This, however, requires some decisions about how we measure the ‘output’ of the industry. Various measures of ‘sales’ can lead to somewhat different views of the industry environment as is seen in Figure 1.

Figure 1 presents yearly changes in sales from 1995 to 2001, measured both as changes in revenues and as changes in units. A further classification breakdown compares just CD-based albums (excludes CD singles) to all items, which would include singles and albums together for all recording medias (CDs, cassettes and vinyl).



Because of the very lengthy and severe decline of singles that is documented below, as well as a very pronounced decline in cassettes, the ‘all items’ categories (red and orange) show weaker sales growth numbers than the categories based only on CDs (light and dark blue). Further, unit sales performed worse than revenues since prices rose somewhat during this period.

In 2001 sales fell by 2%, 4%, 7%, or 10%, depending on which classification one chooses as the basis for comparisons. CD revenues fell the least, total units fell the most. It is not surprising that the RIAA chose total units as the measurement trumpeted in its headlines, experiencing about a ten percent drop in sales that year, since that is a far more impressive a drop than the two percent fall in CD revenues. The fact that the RIAA choose this particular number, however, does not necessarily make it wrong, or even misleading.

To begin with, the proper unit of measure is not straightforward. Although the total industry would seem to be best represented by the ‘grand total’, the focus on the grand total can be misleading when there is a change taking place in the recording medium. For example, sales should be artificially inflated during a period when a new media is rolling out and consumers are replenishing their music collections in the new media. When CD players came on the market, for example, many music listeners would have been expected to purchase CDs to replace their collection of, or at least their favorite, vinyl or cassette recordings. CD sales at that time could have been expected to be higher than would have been the case if a media change had not been occurring.

Still, unit sales of CD albums fell 6.87% in 2001 from 2000 levels. How should this be interpreted? Is this sufficient evidence to conclude that MP3 downloads are damaging the industry? Would sales have been expected to have increased in an MP3-free environment, meaning that the impact of MP3s was actually more damaging than the measured decline? Could the 2001 decline have been due to macroeconomic factors such as the recession that took place?

Perhaps most importantly, if we conclude that MP3 downloading has had a negative impact on sales, just how large an impact has it had and is the impact severe enough to justify the various measures that are being suggested to end it?

### ***A. Economic Factors Possibly Influencing Record Sales***

For most products, income changes are expected to be related to consumption since as income goes up consumption is likely to rise.<sup>7</sup> If consumers decide that listening to music is not as much fun as watching movies, then consumption would be expected to fall. If radio were to become more attractive than album purchase, or if MP3 downloads improved as substitutes for purchase, sales would be expected to fall. All these statements have the usual economist proviso that they are only true *holding everything else equal*. The quantity purchased is a function of all these factors plus others not mentioned.<sup>8</sup>

There are many possible influences on the quantity of records sold. As is typical in economics, we should look for changes in tastes, record prices, incomes, population, the prices of substitutes and

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<sup>7</sup> In the rhapsodic lingo of economists, these are known as ‘normal’ goods.

<sup>8</sup> There is an ‘alternative’ market for music that operates outside of normal distribution channels and often doesn’t use barcodes on CDs. If this alternative market were to grow to become a significant source of CDs, then the official statistics on CD sales would be understated. Unfortunately, I am not aware of any estimates on the size of this market.

complements, and any other factors we might deem important. There are several major factors to be examined:

- i. The price of records and changes in production costs- actual transaction prices do not exist for record sales. Instead we have information from the RIAA that is their estimate of list prices. I am not aware of any good data on yearly production costs.
- ii. Changes in recording formats – we have evidence on the number of different formats (i.e., tapes, vinyl disks, CDs) sold in each year and can try to incorporate this into the analysis.
- iii. Change in the income of potential users – the US government provides data on this. Unfortunately, yearly variations are not particularly large and upon analysis the impact of income appears so small as to make including it in the analysis pointless.<sup>9</sup> It may seem unusual that income should play such a minor role, but there is another element involved that supports this finding, and that is the constraint of time.<sup>10</sup> *Listening to music requires time and higher incomes do not necessarily lead to greater amounts of free time. Nor are there wildly varying higher and lower priced CDs unlike many other industries, such as restaurants, where patrons with different income levels might spend very different amounts.* A CD at Best Buy is the best version that one can buy of a particular group’s music. Thus album purchases may not be strongly related to income. The same would not be true for complementary expenditures associated with listening to music, such as stereo systems, where we would expect to find strong correlations between expenditure and income.<sup>11</sup>
- iv. Changes in the ‘quality’ of music or in musical ‘taste’ would be difficult to ascertain but clearly would have an impact on the market. It is often stated, although in a manner that doesn’t seem testable, that some years are better than others in terms of musical innovation.<sup>12</sup> Perhaps the number of ‘hit’ songs could be used to proxy for this variable, although the number of hits, measured as absolute sales, will

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<sup>9</sup> A regression was run with first differences of per capita album sales as the dependent variable and first differences of per capita real income as the independent variable (with a constant term). The coefficient on income was significant ( $t=2.3$ ) but the average predicted impact of income on sales was merely 1.7% of the value of per capita sales. A chart of per capita sales with and without the income adjustment was virtually identical upon visual inspection.

<sup>10</sup> I am fully aware that during the depression sales dropped from 74.8 million in 1929 to 5.5 million in 1932. There are good reasons that the sales downturn was so strongly related with the fall in income at that time, however: it was a far more severe economic downturn, radio had hurt record sales considerably, and the penetration rate of record players was likely to have been far lower. So the income constraint would have been more important than the time constraint during the depression.

<sup>11</sup> This provides an interesting business problem. In most industries producers would have different versions of products of higher and lower quality, to appeal to different users. That has largely not been true in the recording industry where there has typically been only a single quality LP record, a single quality cassette and a single quality CD. It is somewhat surprising that there haven’t been low quality (e.g., low sampling rates on CDs) recordings suitable for inexpensive stereos and higher quality recordings for top notch stereos with perhaps different warranties, packaging, and perhaps, the ability to ‘rip’ or digitize the songs on a computer. Of course, it is also somewhat surprising that the prices of CDs for different acts are so uniform. For a fuller discussion of ‘versioning,’ see Shapiro and Varian’s “Information Rules”.

<sup>12</sup> There is a recent article in Slate by Mark Jenkins that makes this claim. See “Hit Charade: The music industry's self-inflicted wounds.” Tuesday, August 20, 2002 available at <http://slate.msn.com/?id=2069732>. He also claims, however, that CD prices have outpaced inflation, a statement inconsistent with my analysis.

presumably depend on the number of records sold, making this a somewhat circular construct. I do not make any adjustments for music quality in this analysis.

- v. Changes in the size and distribution of potential users – estimates in the distribution of album purchasers are available from the RIAA and these will play a role in the analysis. Population figures are available from the government.
- vi. Changes in the price of complements/substitutes, such as television, movies, radio, videogames and so forth – the best that could be done with this, in my opinion, would be to note any major changes, such as the rollout of television.<sup>13</sup> I am not aware of any ‘major’ change in these categories over the period of analysis. I have heard some claims that record sales are down because videogames are up and movie viewership (theatrical release) is up. In fact, there is essentially no correlation (very slightly positive) between videogame software sales and the sale of albums, whereas there should be a negative relationship if one substitutes for the other. Secondly, if the official numbers are to be believed, listening to recorded music took up approximately 45 minutes of a person’s time per day, whereas going to movies took up 2 minutes, watching prerecorded movies took up 9 minutes, and playing videogames took up 7 minutes.<sup>14</sup> I do not believe it is reasonable to argue, at these low time-levels of usage, that changes in movie attendance, DVD usage, or videogames usage, for the population as a whole, could be responsible for more than a small portion of the changes in album sales discussed below.
- vii. A change in media also changes the nature of the demand, opening up or closing markets. When LP records became the dominant form of recorded music there was no portable form of recorded music. LP records were the domain of the home stereo since they were too bulky to be played in automobiles or other mobile venues.<sup>15</sup> With the advent of 8-track tape, a new market opened up to record producers who were then able to sell tapes for the automobile as well as vinyl records for the home. Prerecorded audio cassettes were another new market, one that allowed listening to music while exercising or just walking around, as well as expanding the automobile market. In our statistics these openings in new markets due to media changes show up as an increase in sales irrespective of any changes in other variables that might be thought to influence the sales of music recordings. This would be particularly true when the recorded mediums used in automobiles or portable devices were incompatible with the devices used in home stereos, as was the case with 8-track tapes, since it would not possible to purchase a single pre-recorded item that could be used in both the home and car.

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<sup>13</sup> In this regard it is interesting to note that a large decline in record sales occurred as radio gained popularity in the early 1920s. Record sales fell by about half from 1920 to 1925. The fact that record companies are willing to pay to get airplay is more indicative of competition between companies within the record industry than it is indicative of any positive value of radio on overall record sales, which is almost certainly negative. Imagine if there were no radio. The only way to listen to music in automobiles, for example, would be to listen to prerecorded music, which would certainly increase record sales along the lines suggested later in the paper. See “Off the Record” by David Morton, Rutgers University Press, 2000, for additional evidence on the impact of radio.

<sup>14</sup> Table 909 in the US statistical abstract. Original source is Veronis, Suhler & Associates

<sup>15</sup> Some small number of automobiles actually did have record players (so I learned in doing this research) but they never achieved any substantial level of penetration.

- viii. Finally, sales might be influenced by the nature of the distribution channels. As authorized digital downloads play an increasing share of this market, the sales of ‘albums’ would be likely to change, particularly if pricing is no longer ‘per unit’ but instead more of the ‘per month’ variety. On a more prosaic level, if distribution shifts from record stores to major discount chains, such as Wal-Mart and Best Buy, as seems to have been the case in the last decade, unit sales might increase because retail margins lower the effective price to consumers. If these large retail chains are able to negotiate lower wholesale prices than record stores were able to, the revenue growth using list prices would overstate the actual health of the recording industry.<sup>16</sup>

### **III. Some Underlying Trends**

The record industry, as is the case with most industries, is fairly complex, with many factors changing at once. Choices need to be made to make the analysis tractable. At the most basic level we have seen that sales in the recording industry have dropped during 2001, although they had risen during 1999, Napster’s first year of existence, and gave mixed results for 2000, depending on how record sales were measured. I try now to perform a somewhat more exacting analysis. To do this I will limit the market to full-length albums, regardless of the media on which an album is housed. First, however, we will examine the market for singles to see what might be left out of an analysis that focuses on albums.

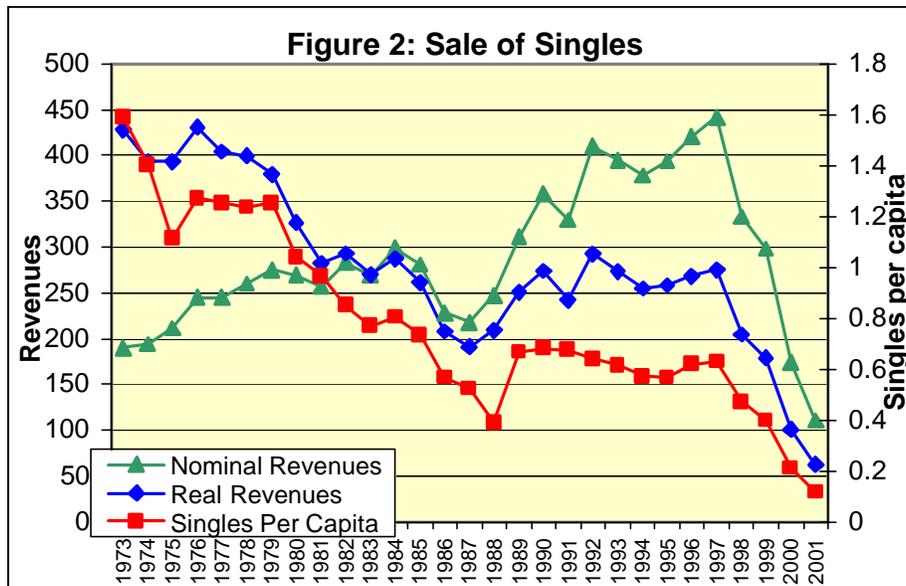
#### ***A. The Market for Singles***

One of the causes of the decline in record sales is the decline of singles that has been ongoing for quite some time. This can be seen in Figure 2.

There are three lines and two vertical axes in Figure 2. On the left hand axis are the dollar revenues in the singles market. The green line with triangle markers represents the ‘nominal’ (no adjustment for inflation) dollar revenues for singles each year. These are the numbers that ordinary people would use in discussing this market, and they indicate that sales of singles basically increased from 1973 to 1997, at which time they experienced a precipitous drop.

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<sup>16</sup> I thank Craig Newmark for making this point to me.



Nominal revenues, however, conflate actual market changes with mere inflationary changes, and are not reliable indicators of actual economic circumstances. Therefore, I adjust the revenue figures for inflation, creating the blue diamond studded line which represents ‘real’ revenues in the singles market.<sup>17</sup>

A very different story emerges when inflation’s impact is removed from the numbers. Real revenue from singles can now be seen to have fallen almost continuously from 1973 to the mid 1980s, whereupon it held at a relatively constant but much lower level until 1997, whereupon it began a steep descent. This, of course, fits with our understanding of this market. Vinyl singles were popular in the 1960s, but when vinyl records lost popularity, so did singles. With the advent of CD singles the market was able to stop its decline, although it did not recover its previous heights. In 1998 the bottom fell out.

The red line with square markers represents the number of singles per capita, to be read off the right hand axis.<sup>18</sup> This line has a very similar pattern to the line representing real revenues. In the early 1970s the typical consumer purchased approximately 1.5 singles. By the mid 1990s that had dropped to .5 singles and by 2001 that number had further dropped to .1 singles per person per year.

Although the decline in singles has been a long time in the making, there is little doubt that 1998 marked a major acceleration of that trend. The bottom began to fall out of the single’s market a year before Napster came into existence. And from Figure 1 we know that 1998 was a good year for the

<sup>17</sup> The consumer price index is the measure of inflation used to adjust revenues.

<sup>18</sup> The measure of population used here is not the entire population since it excludes individuals younger than 10 as well as individuals older than 60.

record industry as a whole. One explanation that is that MP3s were becoming popular prior to their availability online. Since MP3s are individual songs, they would be closer substitutes to singles than to entire CDs. Further, if the purchase of singles was mainly to try out individual songs with the expectation of later purchasing a CD, then MP3 might achieve that same function. This argument was the essence of the Napster defense—that MP3s were being used to ‘sample’ songs and that CD sales would not be hurt by such sampling. Another possibility, argued in a magazine article, is that record companies decided that singles did not pay.<sup>19</sup>

For all intents and purposes, singles are now practically nonexistent.<sup>20</sup> It seems possible that MP3s are responsible for killing off the singles market, even if what was left of the market was very small (in 1997 singles accounted for merely 3.6% of record revenues). But the *downloading* of MP3s does not seem to have been needed for singles to lose their market value, although it might have been the final nail in the coffin.

## **B. The Role of Price**

As reported, the data provided by the RIAA do not list actual prices but only a derived list price. Price, measured in this way, was found to have no significant impact on sales, statistically or otherwise.<sup>21</sup> Since the law of demand, which states that quantity demanded increases when prices fall, is one of the centerpieces of economic understanding, I need to explain why a counterintuitive result, such as price playing no role, might exist.

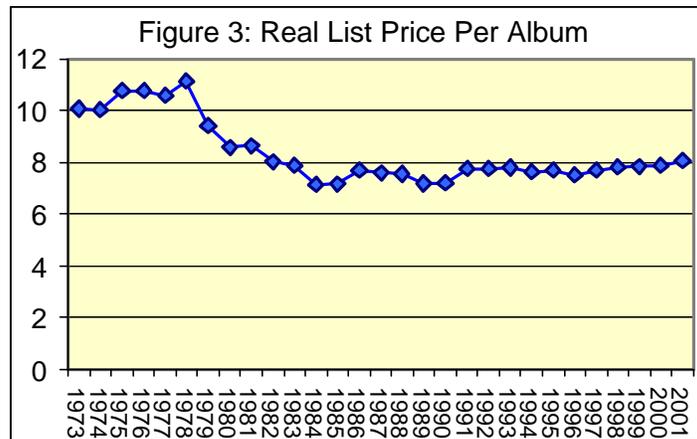
The answer, I believe, is that the inflation adjusted list price has remained largely unchanged for the last twenty years, although there were some significant price changes during the 1970s, as seen in figure 3.

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<sup>19</sup> See Eric Boehlert in Salon.com “Why the record industry is killing the single” December 19, 2001 at [http://dir.salon.com/ent/music/feature/2001/12/19/music\\_industry\\_sidebar/index.html](http://dir.salon.com/ent/music/feature/2001/12/19/music_industry_sidebar/index.html)

<sup>20</sup> They are in the vicinity of twenty million per year in the US. Music videos can be thought of as a substitute for singles since they do not contain the music from an entire album. The RIAA provides data on music videos but their sales numbers are even lower than those of pure music singles.

<sup>21</sup> A regression with unit sales as the dependent variable was run with price as an independent variable and price was found to be unrelated to sales.



Although there was a fairly significant fall in inflation adjusted list prices from 1978 until 1982 (a time of highly variable vinyl prices, unusually high inflation, and a changeover from vinyl records to the less expensive prerecorded cassette), real prices have remained remarkably constant since 1981. The consistency of list prices is almost as if the record industry had decided to keep prices in line with the inflation rate. This means that for the last twenty years price changes can not explain any of the changes in sales per capita. If prices had changed significantly there would undoubtedly have been some response, in line with the law of demand—but where there is no variance, there can be no explanatory power.

Therefore, price will not be playing any role in the analysis that follows.

### ***C. Changes in the Audience***

There was a broadening, or flattening of the audience taking place during this period that would be expected to increase sales of albums. The broadening comes from the wider age distribution of album purchasers, as reported in surveys.<sup>22</sup> This broadening of the consumer market seems to be the result of a generation that grew up with LP records (the baby boomers) and which continued to purchase albums as they aged, whereas previous middle-aged (I refrain from using the term elderly) generations did not purchase albums. This can be seen in Table 1 which lists the age distribution of record purchasers.<sup>23</sup>

<sup>22</sup> Although surveys are often not reliable, and I often argue against anyone taking them too seriously, they are the only mechanism that can generate information on the age distribution of consumers. As long as the questions being asked are very simple and as long as respondents have no reason not to tell the truth, surveys might give useful results.

<sup>23</sup> This information comes from the RIAA and is based on polls taken by Peter Hart Research. More information is available at the RIAA website [www.riaa.com](http://www.riaa.com). I have not seen the surveys used to generate this information so I can not form an opinion about their likely veracity. For our purposes, the implications of the results in the table will hold as long as any imperfections in the survey remain consistent over time.

Age group	1983	2001
10-14	4	8.5
15-19	15	13
20-24	24	12.2
25-35	25	21.2
35+	32	44.2

In 1983 39% of purchases were made by consumers between the ages of 15 and 24. By comparison, those consumers made up only 17.5% of the population. In 2001 this particular age group was responsible for a far smaller share of overall record sales, 25.2% while still making up approximately 14% of the population. Further, consumers at the extremities of the distribution, those aged 10-14 or those older than 45, increased their share purchases.<sup>24</sup>

The differences in purchase behavior by age group, and the flattening that has occurred, can be more clearly seen in Table 2. Here I compute the ratio of a group's share of purchases with that group's share of the overall population, a ratio I define as "purchase intensity". A group with a purchase-intensity of two would mean that the typical member purchased twice as many records as a typical member of the population as a whole.

What Table 2 tells us is that in 1991 those between ages 10 and 14 purchased records at a rate that was 19.54% higher than the typical purchaser from the overall population. Those aged 15-19 purchased records at a rate that was two and a half times as great as the overall population. Those aged 45 and up purchased records at a rate that was only 38% of the overall population rate.

	1991	1995	2000
10-14	119.54%	111.52%	122.74%
15-19	251.69%	246.88%	179.01%
20-24	232.66%	223.61%	184.60%
25-29	169.09%	170.99%	166.03%
30-34	142.40%	145.70%	138.28%
35-39	122.82%	127.30%	132.74%
40-44	94.74%	97.29%	116.39%
45+	38.00%	49.28%	67.86%

If we assume that core listeners, defined as those aged from 15-24, continue to purchase albums with a constant intensity over time, then the fact that other segments of the population have increased their purchases would imply that overall sales should have been increasing.

<sup>24</sup> Although Table 1 has 35+ as the oldest age group, because the 1983 data topped out at 35+, more recent data provides more detailed breakdowns and has 45+ as the oldest category. The share of purchases made by consumers in this age group has increased significantly in the last decade, from 11.8% to 25.7%.

Of course, there is a more sinister interpretation to this flattening of the age distribution of purchasers. It could be, and in fact it probably is the case, that use of MP3s is most prevalent among these younger age groups. The RIAA evidence against Napster (known as the Fine report) focused on college students with the expectation that these users would be most likely to use MP3s.<sup>25</sup> Is it possible to use these data to test the hypothesis that MP3 downloading is responsible for this flattening? The answer is yes, but I caution the reader to take care since these are based on surveys, which have to be considered quite unreliable.

Table 3 presents data for this purpose. Table 3 takes the intensity of purchase estimates, as found in Table 2, and calculates the change in these intensities over time.<sup>26</sup> Examining changes in purchase intensities from 1995 to 2000 provides evidence that would seem to support the RIAA charge that MP3 downloading is injurious to its health. Consumers in two age categories have disproportionately large declines—consumers in age groups 15-19 and 20-24. Their intensity of purchase drops 38% and 21% respectively. These are clearly the two groups that contain the most college students. It is somewhat surprising, under this reading of the data, that those under the age of 14 have not also experienced a decline in purchase intensity since they too would have been thought to have downloaded MP3s.

Age Group	95--00	95--98	98--00
10-14	9.15%	12.75%	-4.13%
15-19	-37.92%	-12.99%	-22.06%
20-24	-21.13%	-19.89%	-1.03%
25-29	-2.99%	-3.09%	0.10%
30-34	-5.36%	4.62%	-10.47%
35-39	4.10%	15.45%	-13.43%
40-44	16.41%	5.08%	11.93%
45+	27.37%	7.68%	21.33%

Yet Napster and other Internet file sharing systems did not come online until the second half of 1999, so their impact could not have been felt until at least later in 1999. The next two columns in the table allow us to address that issue. In those two columns I break the change into a pre-Napster 1995-98 period and a Napster impacted 1998-2000 period. The results are mixed.

In the pre-Napster 1995-1998 period sales fell among the 15-19 and 19-24 groups by 13% and 20% respectively. The pre-Napster fall in purchase intensity is consistent with the findings found in the

<sup>25</sup> The Fine report compared sales at record stores near college campuses with sales at more typical record stores. It found that sales fell in stores near college campuses, but this was true for the year prior to Napster's existences as well as for the year following its birth. I discuss this report (and others) in detail in my Cato Policy Analysis.

<sup>26</sup> It simply takes the ratio of the early data intensity to the later date intensity and subtracts this ratio from 1.

Napster case's Fine Report that retailers near colleges had reduced sales relative to other retailers. One explanation might be that individuals in these groups were sharing MP3 files with one another before the advent of anonymous online file sharing. This result would, however, seem to discredit a hypothesis put forward to explain the Fine report, that is, that college students were purchasing CDs online instead of purchasing them at their local brick-and-mortar retailer. Online or offline, the statistics on purchase intensity would be equally impacted, as long as the sales occurred.

The post-Napster period has less clear-cut impacts. Sales intensity fell by 22% for the 15-19 group, but were essentially flat in the 20-24 group. Sales intensity also fell in users aged 30-39 but if this were due to Napster it would seem to contradict the belief that MP3 downloads were more heavily concentrated in those of college age.

Note also that some part of this result may be driven by the decline in singles, as opposed to sales of albums. If the consumers of singles, which we know fell during this period, consisted mainly of individuals in the 15-24 age groups, then that could account for at least some of these results.

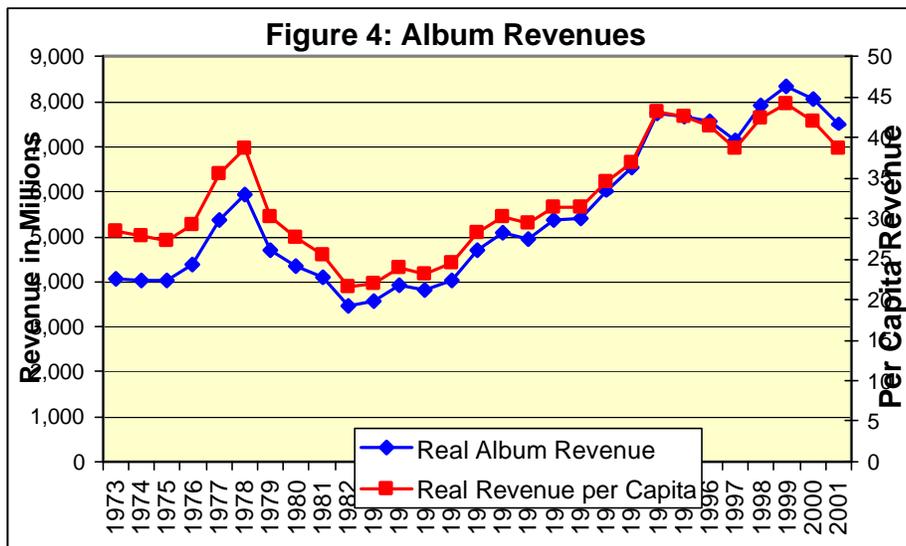
In sum, the evidence from purchase intensities seems consistent with a claim that MP3s hurt record sales, but the evidence is much weaker for the claim that that the ability to download MP3s over the Internet harms sales. Yet it is difficult to believe that Internet downloading would not dramatically increase the number of MP3s relative to personal exchanges. Thus these results are not consistent enough to warrant much confidence.

#### **IV. A Somewhat More Sophisticated Analysis of Record Sales**

I should reiterate that I am looking here only at 'albums' which include long playing vinyl records, long playing cassettes, eight track tapes, and full length CDs. Second, I am ignoring the impact of income since that was already found to be unimportant even if statistically significant. Third, I am ignoring the impact of price, since price remained constant for most of this period.

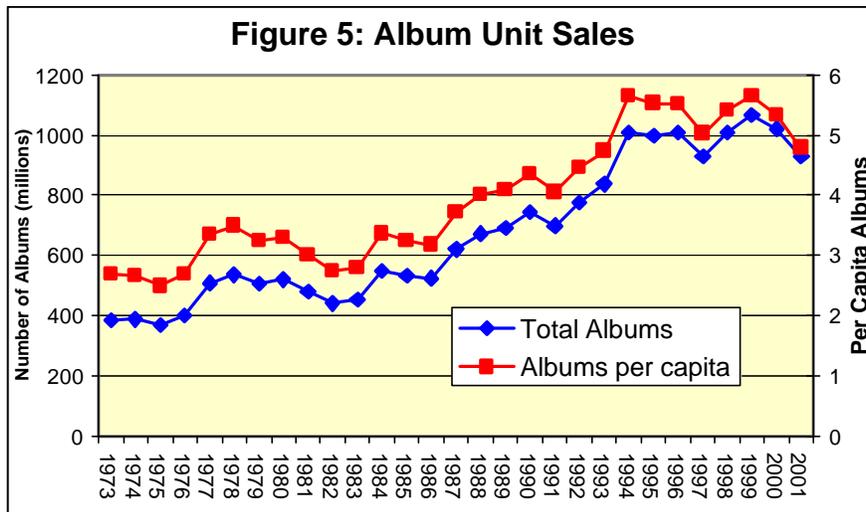
The analysis will consist, therefore, of simply examining the sales of albums and trying to determine the factors responsible for changes in sales. We can then focus on sales in the last few years, since that is the period in which MP3 downloading began in earnest, and see whether sales decline in an otherwise unexplained manner, or whether sales failed to increase as we might have expected. This is a blunt analysis, but given the nature of the data, it is probably the best we can do. In defense of this form of analysis, the MP3 phenomena is so large that even a blunt analysis such as this should have little trouble picking up its impact if the impact is in any way 'large'.

An album is a collection of many songs and album sales have gone in the opposite direction from those of singles. The thirty year decline in singles is to be contrasted with the generally increasing sales of full-length albums which can be seen in Figure 4. Inflation adjusted revenues, either overall or per capita, rose significantly during the period. Album revenues rose from \$4 billion to over \$7 billion after adjusting for inflation, and per capita sales rose from \$28 to almost \$40.<sup>27</sup>



Another way of restating these findings is to look at the impressive increase in unit sales over this time period as illustrated in Figure 5. Total units sold increased by a factor of 2.5, from 400 million to approximately one billion units. Yearly sales of albums per capita (defined over the population between 10 and 60) increased almost as much, from 2.7 albums in 1973 to over 5 during much of the 1990s. Since the population (as defined) only increased by 37% over this period, total and per capita measures cannot greatly differ.

<sup>27</sup> These values are all expressed in 1983 dollars.



The second feature of interest is the nonlinearity of the plot. There are at least four dips in sales prior to the current dip which is underway. These dips occurred in 1979-82, 1985-86, 1991, and 1995-97 with the current dip having begun in 2000. The fact that sales are currently falling, by itself, would not appear to be a cause for alarm, since this has happened several times in the past, only to be followed by further sales increases.

The question that should be at the center of the current controversy is whether the current dip differs in some significant way from previous dips, which would be consistent with the hypothesis that MP3 downloads are having an impact that is different from previous economic fluctuations.

The final important feature of this plot is the realization that the increase in per capita sales took place within a fairly narrow interval, from 1982 to 1993. Per capita sales were largely flat before and after this period. One question that we need to answer is whether the growth during 1982-93 was unusual, or whether the stagnation during 1973-82 and 1994-2001 was unusual.

There were three technological changes that took place prior to MP3 downloading that might influence the sales of albums. First, the recording medium changed—from vinyl to cassettes to CDs. Second, the advent of cassette recorders allowed the taping of pre-recorded material, leading to the first potentially serious ability to replace the purchase of albums with copied albums. Third, cassettes players (and shortly after CD players) allowed the first portable use of prerecorded media since there were no truly portable LP devices.

Each of these will be examined in turn.

## ***A. The Shift in Recorded Media***

Changes in media are might be thought to lead to changes in demand due to a ‘librarying’ motive that consists of individuals wishing to update some of their favorite recordings to play in the new medium, particularly if the new medium has either sonic or utilitarian advantages. The strength of this librarying motive is an empirical question.

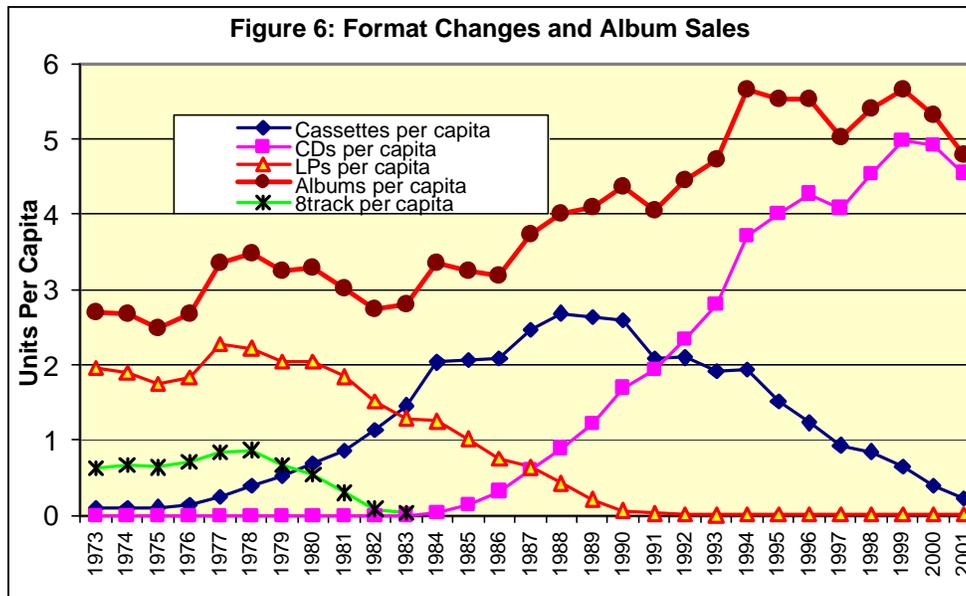
I present yearly sales for albums for different media types in Figure 6.

From the early 1970s until the mid 1990s it was common for consumers to have at least two major media formats available at one time, and for a few years in the mid/late 1980s there were three formats with non-trivial market shares. What this means is that for most of the period since 1978, when cassettes began to replace vinyl records, part of consumer demand should have been devoted to replicating libraries in a new media format. This follows a period of relative tranquility in media dominated by the 331/3 rpm vinyl album.<sup>28</sup>

Figure 6 also provides some evidence of ‘home’ demand versus ‘automobile’ demand for albums. LP records sales were for the home since they were too large to fit in mobile players, whereas 8-track sales were for the automobile. In the mid 1970s this worked out, on a per capita basis, to approximately 2 albums for home use and one for the automobile, although I do not have evidence on the extent to which 8-track devices penetrated the automobile market. I presume they were not as ubiquitous in automobiles as cassettes and CD players are now.

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<sup>28</sup> I am relegating the 8-track tape phenomenon to a lesser status since its sales were never anywhere as large as the major media formats and 8-tracks were popular for little more than the decade of the 1970s.



The empirical support for the librarying hypothesis is mixed, however. When cassettes first started to appear in significant numbers, from 1977 onward, LP (and 8-track) sales fell by about as much as prerecorded cassette sales grew, precluding a temporary upward blip. This may be partly due to the impact of copying, discussed below. It wasn't until the mid 1980s, when CDs began to be sold in large numbers, that overall sales of albums began their fairly dramatic rise, from 3.2 in 1986 to 5.6 in 1994. But even in this decade, the support for the librarying hypothesis is weak since librarying is likely to be done relatively early once the new recording format was adopted and should have come to an end once the library was replicated. If the only factor was librarying, then the sales per capita should have returned to its original level after the librarying was over, and there is no evidence of that.

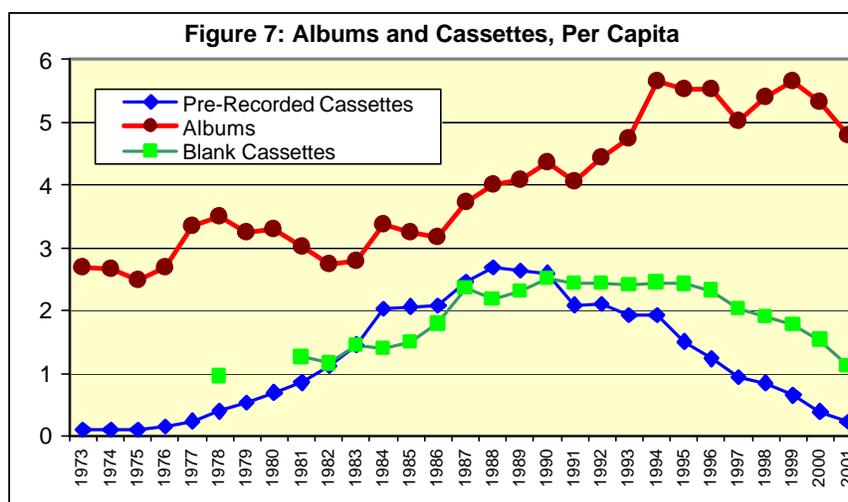
Although the peak of cassette sales was only slightly higher than the peak of LP sales, the peak of CD sales was much higher than either of the older formats. Why did CD sales peak at a level so much higher than the previous recording formats? I will return to this question in section C.

### ***B. Copying Using Cassettes***

The issue of home copying using cassette recorders was a precursor to the current controversy about MP3 downloading. Both would have been expected to lower sales if they were substitutes for the purchase of additional prerecorded material. Home copying of audiotapes might have even been considered to be a better substitute for an original purchase than is an MP3 download (since the latter only goes part-way toward creating an end product identical to the original).

Is there any evidence of the impact of copying in the market for albums?

Figure 7 repeats the information on albums and prerecorded cassettes, but adds in the number of blank cassettes, all per capita.<sup>29</sup> I have only been able to get sales numbers for blank cassettes starting in 1981, although sales obviously occurred prior to that.<sup>30</sup> Cassette recorders allowed using taped copies, in principle, to replace the purchase of originals, but during the period of growth of cassettes, basically the last half of the 1970s and the decade of the 1980s, there was also a large increase in the sales of prerecorded albums. Clearly, the existence of cassette recorder/players seems to have had a positive overall impact on record producers, although we can not say that the growth might not have been more robust had the recording (copying) potential of cassettes been removed.



Of course, copying using cassettes requires having an original handy. That means either borrowing one or purchasing a legitimate copy. The difficulty of borrowing might have been sufficiently great that most copies would have been made from originals purchased by that individual.

Why should the existence of cassettes have increased the sales of albums that had been relatively flat before cassettes came on the scene? The ability to penetrate new markets is the key. Copying may have diminished the need to purchase a second original for the new location, but the extra music-listening time from having new music listening locations available appears to have translated into the purchase of more originals, as explained in the next section.

<sup>29</sup> Information on the number of blank cassettes, as well as information below on the penetration rates of portable technologies all come from Ebrain Market Research, which is a service of the Consumer Electronics Association.

<sup>30</sup> The text of the 1990 Edition of “Information Industry Economics” states that in 1978 approximately 150 million blank tapes were sold.

### ***C. The Impact of Portability on Purchase of Albums***

We have seen that almost all of the increase in sales of albums during the 1973-2001 period came about during the years 1981 to 1993. What might be responsible for this increase? As I have said, the constraint in music listening would seem to be one of time. Since there are not higher and lower quality recordings, the main way to improve the listening experience is to buy better stereo equipment, acoustics, or seating.

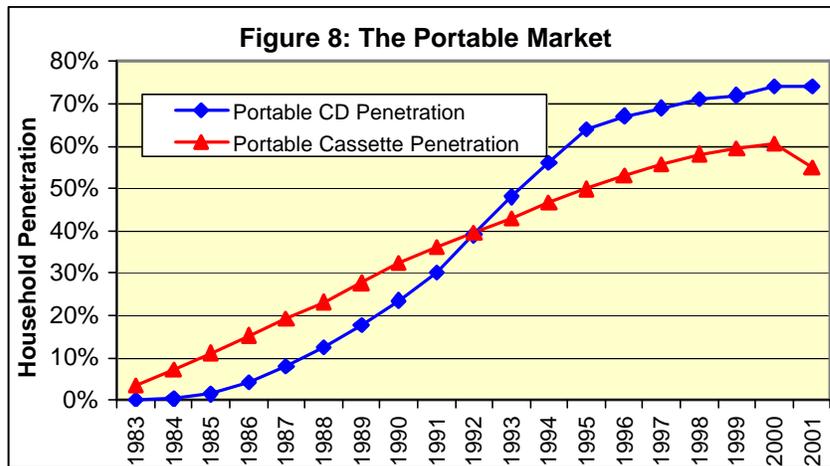
If this is correct, the recording industry could increase sales by allowing or convincing consumers to spend more time listening to recorded music. The industry would either need to improve the musical experience relative to other forms of entertainment, or they would need to create new consumption opportunities. I believe that it is the latter path that they have successfully taken in the last few decades.

In particular, music listeners can now listen to their favorite albums in automobiles and while walking or exercising. Although audio cassettes existed in the 1960s, they were not suitable for producing a high-quality music listening experience until Dolby noise reduction, which occurred in 1969. It was the 8-track cassette that opened up the auto market to prerecorded music and 8-tracks were already established when our data begin in 1973. As Figure 7 illustrated, prerecorded audio cassettes didn't have a serious market share until the mid 1970s and did not start to outpace the peak level of 8-track sales until 1981.

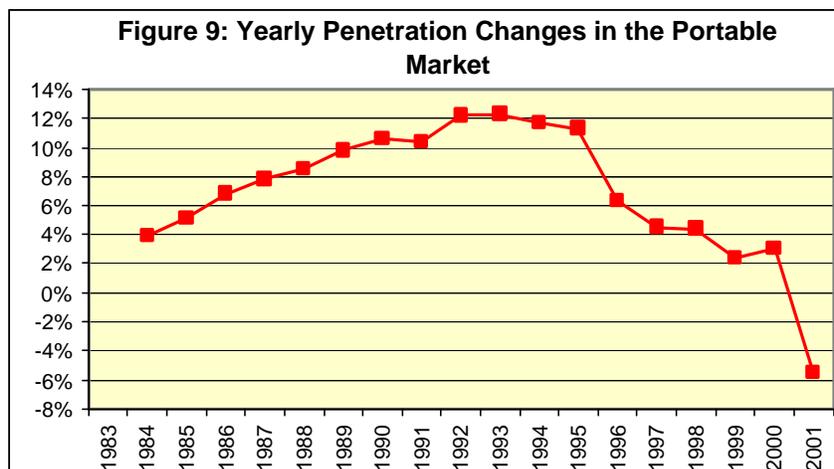
Cassettes, unlike 8-tracks, were used in more than automobiles, however. Cassettes were used in the home as well as in portable devices. Some increase in sales due to a more complete penetration of automobiles undoubtedly occurred, although I do not have detailed information on cassette penetration in automobiles.

We do have detailed information about the portable market, however. Although it was the cassette that first allowed listening to portable prerecorded music, the portable cassette player was very soon followed and eclipsed by the portable CD player.

Figure 8 illustrates the penetration rates of portable cassette players and portable CD players. Cassette players began their penetration in 1983, about seven years after non-portable cassette players began to have an impact, whereas portable CD players began their market penetration in 1985, virtually contemporaneously with non-portable CD player sales.



If you add the penetration rates of both portable formats together and take yearly changes, you get figure 9, which may be a somewhat more informative method of determining the movement toward this new portable market.



The peak in the increase in penetration rate of portable players came during 1990-95. The per capita sales of albums also increased from 4 to 5.5 during this period, its all time peak. This is consistent with the view that the increased sale of albums was due to the opening of new markets that could use prerecorded music in situations where portability was important.

During the early 1990s the portable market had come close to maturing, and it was in the process of converting from cassettes to CDs. During this period prerecorded cassettes started their long decline and the CD format took over as the primary format for prerecorded music. Which takes us to the current situation.

## V. The Current Situation

This brings us up to the current moment. Let's take another look at album sales per capita in Figure 10, which has a slightly exaggerated vertical scale. Without a doubt sales have fallen from 1999 to 2001, as we have seen. Yet the 2001 value of 4.79 albums is still high by historical terms. The questions that I think we would need to be able to answer, if we are to understand the MP3 impact, include the following:

- A) Is the current decline due to MP3 downloads, MP3 use, or neither?
- B) If the current decline is due to MP3s, should we measure the impact as the decline from 1999, from a higher level that might have been expected to occur if not for MP3 downloads, or in some other way?
- C) Is the current decline just the tip of the iceberg?
- D) If the current decline were due to MP3s, could we generate a metric indicating the number of 'lost sales' for each MP3 album equivalent?

So as to let the reader down gently, I must state at this moment that I will not be able to answer these questions with any great precision. What I believe the lengthy examination of the industry which I have just imposed upon the reader can accomplish, however, is to allow us to make some educated guesses about how the recording industry would have evolved without MP3s, and thus to better gauge the impact of MP3 downloads from that information.

What would have been the prognostications for albums sales if MP3 didn't exist? I believe that the movement in the market to but a single recording format, and the maturation of the portable and automobile markets imply that sales would at least have leveled off, with or without MP3s. Whether they would have fallen is less clear, but since purchases of dual recording formats would no longer have been necessary, there is some likelihood of a decline in sales.

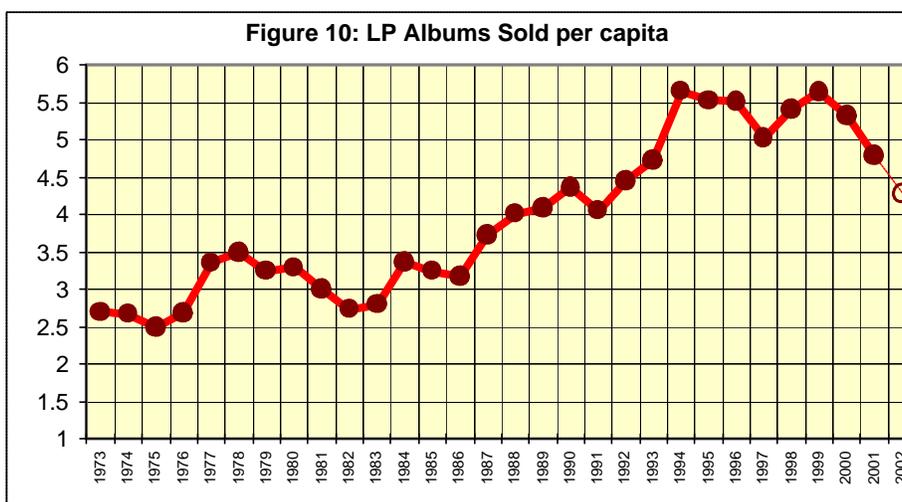
What, then, is the impact of MP3 downloading? Given the enormity of the whole MP3 download enterprise it should be easy to recognize its impact on album sales if its impact is large. What do I mean by 'large'? If each MP3 song substituted for a purchased song, as has often been claimed by the record industry in the case of blank tapes, we would clearly have a large impact.<sup>31</sup> If each two MP3s substituted for one purchased song, that would be large. Even if each four MP3s substituted for one

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<sup>31</sup> When the recording industry made estimates of the harm from copying, each blank audio cassette sold tended to be counted as a lost sale of an album, a nonsensical method of estimation.

purchased song I would consider the impact large. If, on the other hand, each hundred MP3s substituted for one purchased song, that would not, in my opinion, qualify as a ‘large’ impact and it would be most difficult to measure, given all the factors influencing the sales of albums. There is, of course, a vague ‘in-between’ range that is neither large nor small.

First remember that the emergence of Napster occurred in the fall of 1999. The decline in albums sales beginning in 2000 would seem to fit the timing of Napster’s birth quite well. The growth in sales from 1997 to 1999 would seem to argue against a claim that MP3 use, independent of Internet downloads, damaged record sales. This is contrary to the findings in Section III.A which examined the decline in sales of singles, and again with the material in and around Table 3 on the alteration of the distribution of users, where an independent impact of MP3 downloading as opposed to MP3 use, was not discernable. Still, the evidence, in my opinion, currently supports a claim of damage, although the case is far from airtight.



This argument for MP3 damage to record sales is further strengthened by a preliminary number for the first half of 2002 that indicated a 9.8% drop in the quantity of albums sold in the first half of 2002 relative to the first half of 2001.<sup>32</sup> I have plotted a 2002 point in Figure 10 (the open circle) that would represent sales if full-year 2002 sales were 9.8% below full year 2001 values. If this part-year statistic holds up, a much stronger case for damage would emerge.

If the preliminary 2002 figure holds up, the decline in albums from 1999 to 2002 would clearly be the largest decline that has occurred over the last 30 years. It might even seem to be consistent with

<sup>32</sup> Year to year as of June 23 according to Nielsen SoundScan. USA Today, July 1, 2002, page D1. “Record sales really are stuck in a downward groove,” Edna Gundersen.

the annihilation hypothesis propounded by the recording industry. But we need to expose these results to greater scrutiny.

The strongest argument against the annihilation hypothesis has to do with the extinction of prerecorded cassettes that has already been documented. The decline in prerecorded cassette sales would seem to have little to do with MP3 downloads. The decline in *album* sales per capita since 1999, as illustrated in Table 3, is 1.37 units, and the decline in cassettes could be almost half of that (although the table assumes a decline to .1 and not 0), but we will have to see the as yet unavailable detailed 2002 statistics to know for sure. A decline of .8 albums per person excluding cassettes, if that turns out to be the 2002 number, would not be unprecedented. It would be large, but not extraordinary.

	Albums	CDs	Cassettes
1999	5.644563	4.974357	0.654841
2000	5.323243	4.915408	0.396362
2001	4.789113	4.545328	0.231931
2002	4.27	4.17	0.1

Are there any other potential causes of this decline? Given the lack of impact caused by income, the current recession would not seem capable of explaining it, contrary to my previous beliefs prior to examining the impact of income. It is possible that doldrums in music quality might cause such a slowdown, as some have suggested. Another argument might be that having but a single format, and one that is more durable than previous formats, is working against record industry sales. I have already explained that movie attendance and videogame playing are unreasonable explanations.

What can we say about the conversion rate of MP3 downloads as replacements for purchase? It does not appear to be zero. But neither does it appear to be ‘large.’ Given the enormous number of MP3 downloads, which are themselves an incomplete portion of the entire MP3 phenomenon, it seems safe to say that the CD equivalent of MP3 downloads is at least equal to the entire sales market for CDs.<sup>33</sup> If MP3s converted at a 1 to 1 ratio, there would be no CD market to speak of. If they converted at 4:1 the album market would have dropped by 25%. Removing the impact of the decline in cassettes,

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<sup>33</sup> At its peak Napster downloads were estimated to be in the vicinity of 2.8 billion files per month, which would roughly be the equivalent of 250 million CDs per month. It was also claimed that the four largest Napster replacements, FastTrack, Audiogalaxy, iMesh and Gnutella, were responsible for 3.05 billion downloaded files a month in August of 2001, although not all of these were songs. The data come from Webnoize, a company that tracks Internet usage as reported by Scarlet Pruitt, IDG News Service\Boston Bureau, September 07, 2001 in “Study: Look out labels: file swapping growing.” See <http://www.idg.net/idgns/2001/09/07/StudyLookOutLabelsFileSwapping.shtml> According to the Fine report in the Napster case, US national sales ran approximately 60 million CDs per month, less than one fourth the CD equivalent number of downloads. So even with the slow bandwidths, the potential impact may have been large. According to the IFPI, total sales of CDs worldwide are less than two and a half billion, which is also less than the CD equivalent of MP3 downloads.

which seems appropriate, it would appear that the conversion rate at the moment is on the order of 7 or 8 to 1. Not large but not small.

The more important question is whether things will continue to get worse without some amelioration of the impact of MP3 downloads. There are two reasons that they might. The first has to do with CD burners. Without burning a CD, MP3s can not substitute for the purchase of CDs in the many devices that were made to use CDs, such as in automobiles, home stereos, and portable devices.<sup>34</sup> The second reason MP3 downloading might grow more harmful is that it might expand and grow even larger than it is, particularly if broadband access grows, making the downloading of large files less burdensome. The cost of broadband, however, dwarfs the typical consumer's expenditures on CDs.

On the first point, I have recently seen an unverified statistic that 30% of American households had CD burners. Since only 59% of American households have PCs, this would imply that half of computer households have CD-burning capability. Since we might expect that this option, which has become quite cheap, would be used by those most interested in burning CDs, the additional impact from providing CD burning capability to the half of computer owners who do not yet have it would presumably be smaller than the impact to date.

I think it is fair to conclude that the outer limit of this impact may lead ultimately to a decline in sales, *excluding the phasing out of cassettes*, on the order of 1.5 CDs per capita. The maximum sales of CDs, achieved in 1999, were slightly below 5 units per person. A drop to 3.5 would be a drop of 30%. A more realistic drop, it seems to me, would probably be 20%, a drop of 1 CD per person, to a level of 4 albums per person. If this last estimate were correct, that would mean that the partial 2002 number alluded to above (4.17) was not quite the end of the decline, but that it was getting quite close. That would work out to a conversion rate of somewhat less than one out of five MP3s that lead to a reduced sale of an album track.

The next two years should allow us to know whether this prognostication is correct. Unless, that is, the record companies can seriously derail MP3 downloading.

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<sup>34</sup> Note that treating MP3s as a new format is possible, but that it has, at least through 2001, a trivial impact in the portable market, with fewer than three million units in use.

## VI. Conclusions

If the analysis in this paper is correct, and I am the first to admit that it is far from definitive, we, as a society, need to determine what actions we are to allow the record companies to take in defending their economic position from the encroachments brought about by MP3 downloads.

I am not here going to take a position on the relative costs and benefits to society at large from allowing unfettered MP3 downloads. It is conceivable that the gains to consumers outweigh the losses to producers. Knowing whether this is true is a very difficult problem to solve. I am not aware of any economist who has come close to solving it, nor do I think it is even solvable given our level of ignorance about the workings of these markets.<sup>35</sup>

It is also understandable that the record companies may not be willing participants in this lab for economic analysis. Why should they risk their revenues in an experiment that may end badly for them? How many of us would volunteer to undergo surgery without anesthesia to test a theory that claimed it wasn't really necessary? I think it is important to understand that 20% is a considerable number. How many of us would fail to notice a 20% drop in our salaries?<sup>36</sup>

Nevertheless, I wonder how far we, as a country, would be willing to go to protect the record industry from a 20% decline in business? Are recent proposals, such as the Berman bill which would allow record companies to tamper with other people's computers going too far? My own view is that such proposals are going too far. Allowing record companies to protect their wares using digital right management technology, on the other hand, seems far more reasonable.<sup>37</sup>

But I do not view this paper as a treatise for taking a particular position. I was hoping to provide some empirical analysis to replace what has often been little more than emotional wrangling and haranguing on both sides. Whether I have succeeded at all in that regard only time will tell.

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<sup>35</sup> Attempts were made to answer this question by the now defunct Office of Technology Assessment based upon a survey of users. This type of survey, asking consumers how much they value a product is, in my opinion, not very useful.

<sup>36</sup> The recording industry is likely to complain that if revenues fall by 20%, that profits will have to fall far more. While there is some truth to this in the 'short run', and some economic entities may be wiped out, a new equilibrium will eventually be achieved with normal profits but with revenues 20% lower.

<sup>37</sup> I discuss this at length in my Cato policy analysis and in my book "Rethinking the Network Economy"

Some, such as Larry Lessig, would argue that MP3 downloads should be allowed and that the recording industry could be compensated through some other taxation mechanism. I presume the recording industry would also be in favor of such a tax, as long as they could also try to stop the unauthorized downloading of MP3 files.

My own views, which are outside the realm of economics, are that record companies should be allowed to engage in moral suasion, and to make life difficult for MP3 downloaders. Actions such as putting phony MP3 files on peer-to-peer networks (such pretend MP3s are known as ‘spoofs’) increase the costs of MP3 downloading but do no other harm. Record companies, in my opinion, should be allowed to put copy protection or anti-ripping devices on their discs if they wish (although they need to realize that consumers will derive less value from such discs and wouldn’t be willing to pay as much).<sup>38</sup> Digital rights management technologies are also, in my opinion, a good idea.

I would allow the record companies to prosecute MP3 downloaders for copyright violations *at their own expense*. I am doubtful that juries will deliver stiff penalties for any but the most egregious downloaders. I view this as a costly and not terribly inviting road for the recording industry, but one they should be allowed to take in defense of their product. If this were somehow turned into a war against downloading, akin to the government’s war against drugs, with funding and support from the government, I would probably change my mind. I see no reason to criminalize a large portion of today’s youth for downloading MP3 files.

But I would also draw the line at exempting record companies from laws that prevent third parties from tampering with the computers of others, whether they are MP3 downloaders or not. The harm brought about by MP3 downloading does not seem sufficiently great to warrant such a bold exception to rules that are otherwise held in great esteem.

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<sup>38</sup> They might want to think about selling two types of discs—those that allow the ripping of MP3 files and those that don’t, with a reasonable premium on the latter discs.