

# **eCommerce Rhetoric and Reality in the Music Industry: Estimating the Real Impact of File-Sharing Activities on CD-Sales**

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**Abstract:** The vast majority of studies in the area of file sharing have concluded that file sharing is responsible for the decline in CD-sales since 2000 to some extent, but the outcome comprises a spectrum reaching from 0 to 100%. Surprisingly few try to weigh alternative explanations to the declining sales, such as competition from other expanding markets. In other words indirectly measure the impact of file sharing. This paper aims to give an overview of research performed in the area focusing on a sample of the most important publications – their strengths and limitations. This paper concludes above all that it seems to be hard to produce results showing proven trends and casual relationships. Readers should refrain from making too strong statements about a market in transition.

## **1. Introduction**

A common denominator of many successful on-line services like P2P, iTunes, Internet radio and music downloads via 3G-networks is price, diversity and control. The music industry's slow transition to digital downloads, the clinging to obscure [1] DRM-systems and the strategy of suing P2P-software companies, device manufacturers as well as file-sharing 12-year-old children, painted a picture of a greedy industry forcing consumers to stick to the CD. The music industry lost both time and power to act during the first years after Napster and they rejected the early invitation to cooperation from the KaZaA founder Niklas Zennström [2]. Record labels eventually turned out to be out of sync with some parts of the market, without any product comparable to P2P.

There are a number of interesting underlying conflicts that have inspired research in this area. Among all, control of music consumption and ownership. As revenues dropped, the music industry has more obviously tried to control how and where music is consumed. A strategy that has proved to be hard to combine with consumers' creativity and demands for consuming music in their daily life often using multiple devices. In other words a conflict between traditional business models and changing consumer behaviors and demands.

A second conflict is ownership, historically related more or less to physical goods, in this area LPs and CDs. Distributing bits and bytes is something relatively new, and while most people refer to shoplifting as a crime, not everyone might have considered unauthorized downloading of copyrighted material as illegal. Before on-line shopping began to mature and other commercial on-line services emerged, a broad mass of Internet users probably perceived and expected that most of the content on the Internet was for free. There are also movements that advocate either an abolishment of present copyright laws as an expression of civil rights or a more open and flexible view on copyright, such as the so-called Creative Commons.

Since the advent of file-sharing networks, the closing of Napster and the explosive and uncontrolled growth of its successors, numerous surveys and studies have focused on estimations of the economic impact on CD-sales.

The outcomes of the latter subject have – to say the least – pointed to diverse results. The vast majority of different studies have concluded that file sharing has indeed harmed CD-sales to some extent. But it does not seem to be easy correlating concurrent social phenomena such as growing file-sharing networks and decreasing record sales in a global perspective. Many other variables likely influence the outcomes.

Nevertheless the results of the published studies have been frequently quoted in all kinds of media channels often without any comments or additional analysis. But how reliable are the studies and the outcomes? Are they applicable on a region, a demographic group or the market for pre-recorded music as a whole?

## **2. Objectives**

All kinds of studies have of course limitations and all models are incomplete representations of reality. Therefore the main objective of this paper is to survey a sample of the most important works in the area and discuss if it's possible to make relevant estimations of the impact of file-sharing and record sales. If so to what extent? What kind of academic studies have been made, which limitations do these have according to their critics? How do research methods and limitations affect the reliability of the studies and the possibility of generalizing results? To what extent do researchers mention, analyse and weigh alternative explanations (apart from P2P-networks) to declining music sales?

## **3. Methodology**

This is based on analysing a sample of the most important academic research in the area, with an emphasis on economic studies. The main methodologies used are to evaluate the limitations of the research mentioned or not explicitly mentioned in the reports. To analyse the existing or non-existing critique between researchers in the area. In particular those specialized in studying the economic impact of file-sharing on record sales. Analyse the similarities and differences in methods and results that can be observed among researchers associated to the academic and non-academic world.

## **4. A Selection of Academic Studies**

### *4.1 Rob and Waldfogel (2004): Using Survey of Students [3]*

This study is based on interviews of 412 students concerning their downloading habits and expenditure on CDs. The authors argue that surveys by person/group is the safest and most reliable way of getting data on sales displacements due to downloading. The study concludes that even though the respondents value CDs far more than downloads an additional download reduces CD-sales by 0.1 to 0.2 units.

### *4.2 Hong (2004): Using US Consumer Survey [4]*

Hong uses data from the Consumer Expenditure Survey (CEX) to measure the impact of Napster on music sales in the year 2000 using three different models. First difference-in-difference (DID) where he studies changes in music expenditure among consumers with Internet access. He concludes that the quarterly US household expenditure of music has declined 33 percent due to competing Internet use, plausibly via Napster.

Secondly, using cross-price elasticities he finds that changes in demands for other entertainment goods such as concerts, DVDs or computer games might be hard competitors to CDs and could have reduced households expenditure on CDs by 37 percent.

Thirdly, age cohort analysis indicates that average music expenditure in cohort 18-27 has continued to decrease ever since 1996, in other words long before Napster. Hong interprets the strong expenditure of music during the late 1990s in cohort 28-37 and 48-57 as a proof for the transition effect. I.e. updating existing LP-collections with CD ditto. Hong concludes that the transition effect can be responsible to as much as 44,7 percent of the decline in music sales during 2000.

#### *4.3 Rochelandet and LeGuel (2005): Using French Consumer Survey [5]*

The authors first create a model that “identifies and analyses factors that could explain the intensity of copying music over P2P-networks”. Their analysis is based on data (applied in the model) gathered from more than 2,500 French households in January and February 2005 using both paper survey and web survey. Even though the authors do not perform any estimations on the impact of P2P on sales, the results are interesting yet not applicable to the whole music industry. 78 percent of the respondents were men and no less than 74 percent state that they copy over P2P-networks.

The dependant “Cultural spending” such as purchases of CDs and DVDs seem to be unaffected by P2P. The conclusion drawn by the authors is that the substitution effect (downloads substituting purchase) could be neutralized by down-loaders also purchasing music (sampling effect).

The dependant “Willingness to pay” is negatively related to file sharing and averaged 0.3 euros (standard deviation 0.27 euros). Even though the authors do not draw this conclusion, it could mean that copying content is among those who would not buy (even without P2P) at present oligopoly-rates, but would by if price was lowered.

#### *4.4 Zentner (2003) and (2005): Using Countries as a Unit of Analysis [6]*

Both in the initial manuscript written in 2003 and the later published version, the author uses two data sources. First data on aggregated music sales by country 1997-2002 and secondly a European individual cross section of 15,000 individuals from October 2001. By combining the first data source with information about Internet and broadband penetration for each country and using broadband users as a proxy for degree of piracy, Zentner estimates the reduction of sales due to illegal file sharing to 6-9 percent at the mean.

Using the second data source (micro-data) from 2001, Zentner finds that P2P-users are more frequent CD-buyers than non-users of P2P applications. In order to break that simultaneity he uses Internet sophistication as an instrument. An empirical approach on the micro-data suggests that using file-sharing programs reduces the probability of buying music by 30 percent. Also separating down loaders with/without broadband connection reveals a high reduction of CD-purchases among broadband users.

#### *4.5 Waelbroeck/Peitz (2004): Using Countries as a Unit of Analysis [7]*

Waelbroeck & Peitz uses survey data from IPSOS-REID 2002 covering 16 countries representing the vast majority of global music sales. The survey is combined with data from the IFPI World Report 2003 providing data from 1998 to 2002. The authors establish the fact that other factors than file sharing might be responsible for the decline in sales.

In order to weigh alternative explanations, W&P creates an economic model containing variables related to price, country-specific environment, income and economic environments, substitution of other forms of entertainment finally “quality” of music.

W&P concludes that their macro-economic model confirms that P2P-networks may have caused a 20 percent decline in music sales 1998-2002, but that other factors beside file-sharing are likely to be responsible for the decline in 2003.

#### 4.6 *Liebowitz (2005a) and (2005b): Using US Cities as Unit of Analysis [8, 9]*

Professor Stan J. Liebowitz is perhaps one of the most published and quoted academics concerning file sharing, often cited by the music industry. In the two referenced papers he gives an overview of the impact of file-sharing based on economic theory. He mentions the substitution effect (downloading substituting CD-purchase), sampling/exposure effect (that one first downloads, explores known/unknown music and they decide to buy CDs), the network effect (the value of music increases as the number of listeners increase) and indirect appropriability (the value of a product increases as the owner finds new ways of consuming/using the product). Liebowitz argues that all mentioned economic theories when applied to file-sharing indicate that P2P-usage does harm legal CD-sales. The confluence of sharp declining CD-sales per capita and the rapid growth of P2P-networks starting with Napster would be proofs for this interpretation.

In Liebowitz (2005b) the author examines actual music sales in several US cities, before and after the emergence of file sharing, i.e. he uses cities as a unit for analysis. The data source on consumers comes from the US Census, a part of the Current Population Survey performed in 1998, 2000, 2001 and 2003. These surveys on Internet and Computer usage, covering 130,000 individuals provides detailed information about the respondents' age, income, education, and geographic location etcetera. Liebowitz matches data on music sales from Nielsen SoundScan, divided into geographic areas with the Census consumer data in the corresponding geographic areas.

There are some unexpected results in Liebowitz early analysis, for example that parameters in age cohort 10-29 did not relate positive to record sales prior to Napster. According to the author, a plausible explanation is the competition of a wide variety of radio channels in the bigger cities. Even though Liebowitz admits that the final results are less than perfect, and that extrapolating of coefficients include well-known dangers, he concludes that the overall findings supports the theory that file sharing is harming the music industry. Nevertheless Liebowitz warns readers not to draw dramatic conclusions.

#### 4.7 *Oberholzer & Strumpf (2004, 2005, 2007): Using Records as Unit of Analysis [10-12]*

The result from these papers – all deriving from the same empirical study – definitely go against the stream. O&S combine logs from two OpenNap-servers running continuously the last 17 weeks in 2002 with data on CD-sales from Nielsen SoundScan for the same period of time. O&S uses albums as unit for analysis and examines the intensity of downloaded commercial relevant albums with actual CD-sales of the same albums, week by week.

The conclusion drawn by the authors in O&S (2004) is that file-sharing has as small insignificant effect on sales for less popular albums but a large positive on popular albums. In the later papers some of the methods are changed resulting in a conclusion where popular albums now are negatively affected by file-sharing, yet not significantly.

### **5. Alternative Explanations to Sales Displacements**

Far from all researchers mention and value other possible explanations (beside file sharing) to the declining CD-sales. Liebowitz (2003) more or less dismisses all other explanations than file sharing. Waelbroeck & Pietz (2003) and Oberholzer & Strumpf (2005) mention that consumers have during a long period of time replaced old LP-collections with re-mastered CD ditto, a pattern approaching an end.

Only little research has focused on not only mentioning but also weighing alternative factors. The focus of most studies has been the impact of file sharing on legal sales, an interesting and relevant yet not comprehensive strategy. Hong (2004) seems to be an interesting exception showing that other factors than P2P could be responsible for the lion's part of the decline in 2000.

Hong also presents research where statistics on total sales (in dollars) of recorded music from RIAA, Bureau of Economic Analysis (BEA) and the Consumer Expenditure Survey (CEX) are compiled in the same figure. Both the CEX and the BEA curves are much less dramatic than the RIAA ditto also presented in Liebowitz (2003). They also indicate either a stagnating or decreasing music expenditure before the emergence of Napster. Splitting the CEX-data into age cohorts reveals more detailed information about spending.

Contrary to Liebowitz (2003), Hong argues that prices for videos (e.g. DVDs) and toys (also including computer-, video- and handheld games) have decreased steadily from 1998 to 2003 while prices for CD almost remained the same. This development has been paralleled with both increasing prices for tickets and a growing interest for live concerts. Hongs' cross-price elasticity estimation concludes that CDs and Videos seem to be substitutes while CDs and concert tickets are complements.

Waelbroeck & Pietz (2005) [13] also document that CD-prices have not followed any significant trend over the recent years and – more important – that intensive Internet users have reduced their time spent on watching TV as well as listening to pre-recorded music. In other words; Internet itself – with an ever-growing population – seems to be a substitute for music consumption.

Results from Rochelandet and LeGuel (2005) also indicates that the present pricing seem to be out of sync with the expectations among down loaders. Further more, copying behaviour is negatively correlated to the willingness pay when a copy is available on a file-sharing network, but the authors also stress that P2P is only one expression of unauthorized duplicating. They are mainly grounded on more general copying practises.

Oberholzer & Strumpf (2007) also argue for competition from alternative products mentioning that U.S. consumers' spending on DVD/VHS and video games have increased by \$5 billion and \$3 billion respectively from 1999-2003, much more than the CD-sales offset (\$2.6 billion) since 1999. Add to this the tripled teen cell phone use 1999-2003 and there are three strong competitors to the price stable CD.

The same authors also stress the difference between sold and shipped albums and thereby the rhetoric sometimes used by IFPI. From 1999-2003 there has been a 14 percent transition from traditional CD-stores to discount retailers, probably reducing inventories. As a consequence album shipments – often used as a measurement for the decline in legal demand for music – fell more than actual sales, 301 and 99 million units, respectively.

Liebowitz (2005a) also study a number of alternative explanations for the decline, but not cell phone use. The author argues that because there is no radical change in revenues for videogames, box office and pre-recorded movies in 2000, they cannot explain the steep decrease in music sales that year, thus criticizing the analysis by Oberholzer & Strumpf. There was indeed an abrupt increase in sales of DVDs in year 2000 but net profit for pre-recorded movies was eaten by declining rentals, according to Liebowitz. However there is of course a difference in comparing revenues (Liebowitz) and sales (O&S). Based on the comparison on revenues, Liebowitz state that interest for music and video merely goes in tandem whereas O&S sees increasing sales of pre-recorded movies as a plausible contributing factor to falling music sales.

## **6. Limitations in Studies**

Most of the research on file sharing is based on some kind of survey. Even though most studies conclude that P2P hurt sales, the results vary. According to Oberhozler & Strumpf (2005) a general difficulty is that surveys compare purchases of down loaders with the purchases of those who do not download. The fact that down loaders buy fewer CDs might be explained by that P2P-usage is likely to be more popular among time-rich and cash poor – in other words a selection effect. These individuals would not buy more CDs even if they did not use P2P-networks.

The selection of respondents limits the possibilities of generalizing results, for example it is not clear if college students as used in Rob & Waldfogel (2004) are representative of all file-sharers. Liebowitz (2005a) also sees a problem in that respondents sometimes do not know the answer to detailed questions about purchases. He also believes that respondents might tend to deliberately underestimate their reported reduction of CD-purchases due to the highly politicized nature of file sharing.

Rob & Waldfogel (2004) stress a limitation of Zentner's study (2003), namely the fact that some parts are only binary (Do you download music? Have you purchased music recently?). One obvious limitation is that Zentner therefore is not able to estimate the size of sales displacement due to downloading.

There is also a problem in defining "down loaders" in surveys that might bias some results. For example Waelbroeck & Pietz (2004) uses data from IPSOS-REID where all Internet users that has downloaded at least once are defined as "down loaders". There is of course a huge difference between free-riders (downloaders not sharing, non- or rare-CD spenders but still often entertainment spenders), samplers (those who discover music via P2P and often buys CDs) and computer enthusiasts [14] sometimes referred to as squirrels (those who collect and share enormous music libraries more or less for fun, representing 90 percent of available songs on P2P-networks).

Nevertheless according to Rob & Waldfogel (2004) the best way to study sales displacements is to study by person/group. Such methodology eliminates three problems using records as unit for analysis. Firstly CDs are durable goods, which means that if a substitution or displacement occurs, it need not occur within one week. Secondly the popularity of songs varies over time due to advertising campaigns and programming in media channels. Thirdly it does not answer whether a download reduces the probability for a person to actually buy an album.

Liebowitz (2005a) also mentions problems using records as a unit of analysis, as he uses a considerable part of his paper criticizing Blackburn (2004) [15] but foremost Oberholzer & Strumpf (2004 and 2005). Both O&S and Blackburn finds that file-sharing has a negligible impact on the average album, but since a limited number of albums represents the lions part of sales, the popularity of albums must be weighed. In O&S (2004) the popularity is divided into quartiles but in the later updated paper, O&S (2005), the authors uses a method based on prior popularity similar to Blackburn.

Both O&S and Blackburn are criticized for using prior popularity "instead of the more important" current popularity. Moreover Liebowitz argue that the unexpected result from O&S's earlier paper (file-sharing has big positive effect on popular albums) and the contrary result from later papers (file-sharing has a negative yet not significant effect on popular albums) indicate a serious problem in their analysis. Even though O&S is using a respectable number of CD-titles representing the market, Liebowitz question the possibilities to extrapolate and draw conclusions for the whole industry.

The same author continue to argue that popular songs will be both heavily downloaded and purchased which causes a similarity problem when using records as unit for analysis. Finding instruments in overcoming these obstacles are not easy for either O&S or Blackburn. Another problem with the dataset in Oberholzer & Strumpf might be the limited time window according to IFPI [16]. The last quarter of a year, where around 40 percent of all sales are made, might make the analysis skewed.

Liebowitz (2005b) also addresses problems associated using countries as unit of analysis as in Zentner (2003) and P&W (2004). One has namely to consider differences in GDP, currency fluctuations, national non-Internet piracy, CD-burner penetration, age distributions as well as domestic music industry, making it hard to draw reliable global conclusions. In addition to this the size of the data sets of these cross country studies are often small due to the number of geographic areas with data on file-sharing are limited.

## 7. Conclusions

The difficulties in measuring the impact of file-sharing is illustrated by the diametrically different conclusions arrived at by researchers. Oberholzer & Strumpf argue that their study shows no significant impact on music sales. Liebowitz state that based on the fact that almost all non-academic and academic reports – including his own – indicates a decline in sales, file-sharing is responsible for most, if not all, of the recent decline in sales. Hong's study gives a little more balanced picture where file-sharing might be responsible for 33 percent of the decline of sales in 2000, but also that other factors could be responsible for about 80 percent of the decline.

Some non-academic studies have been financed by the music industry. Almost all non-academic studies are surveys and conclude that P2P hurts the industry. Unfortunately they all share the same weaknesses as the academic ditto; Limitations of the number of respondents used, the selection of respondents, their honesty and objectivity when answering questions, age, time of the year, differences between countries etcetera. In other words the choice and use of parameters can lead to widely different conclusions – a fact often discussed among academic researchers. On the other hand some of these surveys shows that frequent down loaders are often music lovers, who buy CDs and, and above all, support the live music scene by going to concerts.

Few studies try to weigh alternative explanations to the impact of file sharing on music sales. Surveys like “Are you involved in file-sharing?” “Has your expenditure of CD-purchased decreased/increased or remained the same?” might give interesting results but do not answer if expenditure for example has moved to for example other entertainments unless you ask. Perhaps that has not been interesting enough for some, at least outside the academic world.

Analysing and weighing alternative explanations to the decline of legal music sales seem to be a rather unexplored path, more research is therefore needed. Maybe the music industry is shrinking due to earlier mentioned factors such as overall Internet usage, mobile communication or a change in purchasing habits. Perhaps a new generation of consumers are cherry picking legal downloads from a shrinking aired repertoire due to decreasing diversity in media channels?

Industry data from RIAA states that albums sold per capita has decreased by about 1.5 units from 1999 to 2003. During that period of time the use of cell-phones has soared, the number of broadband users increased, the market for prerecorded DVDs grown and the interest for both PC-games as well as handheld ditto increased. A study performed in US by M:Metrics [17] in 2005 indicates that 13-18 year old college students spend \$41-60 a month on cell phone use. If 1.5 CD corresponds to, say \$14-20, it is reasonable to believe that a significant share of money has moved to any of these mentioned alternatives.

Digital sales are indeed increasing, but incomes do not cover up for declining CD-sales [18] according to IFPI. However the most successful long-term strategy seems to lower technical boundaries, add value and maximize diversity. Apples' and EMI's joint move in May 2007 of removing DRM and improve sound quality in order to add value and fuel sales, will be the first big scale commercial test (by a major company) of this hypothesis.

Constructive criticism is healthy within the world of researchers. As mentioned earlier professor Stan Liebowitz is the most published and cited researcher in the area and has diligently analysed others research on P2P. It would however be sound to see others weighing his contribution to this research area.

A final conclusion is that even though most studies state that file sharing has harmed music sales to some extent, the results should be taken with a grain of salt. It simply seems to be hard to produce results showing proven trends and causal relationships. Even the most prominent and quoted researchers in the area refer to patterns and indications rather than

precise numbers, a warning to both readers of this paper, and industry stakeholders not to make strong statements about markets in transition.

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