PEER TO PEER NETWORKS AND THE RECORDING INDUSTRY CRISIS: AN HISTORICAL POINT OF VIEW

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The invention of the phonograph by Thomas Edison in 1877 sets the beginning of recorded music.[1] Recorded music consumption has since developed rapidly to become a mass media. In 2000, an American citizen spent on average 9.1% of its free leisure time on this activity, versus 2.6% in 1970.[2] It is estimated that he listens to music an average of 45 minutes a day.[3] This industry generates important revenues of 33.7 billion dollars (aggregate worldwide revenues, any format) in 2001 versus around 40 billion for the movie industry. In France, industry's turnover was around 1.6 billion euros in 2003.[4]

Recent progress in Information and Communication Technologies (ICT) dramatically changed the set of rules of this industry in two aspects. First, dematerialization[5] and digitalization of the musical good allows its reproduction at zero marginal cost. Moreover, digital music (i.e. dematerialized) can be distributed through the Internet for a cost near zero. This is possible thanks to a dramatic drop in the network transmission costs and improvements in compression standards such as the MP3 format. [6]

The most obvious consequence of the diminution of reproduction and distribution costs is the development of peer-to-peer networks (P2P). On these networks, such as Kazaa or Gnutella, Internet users exchange files in great numbers. It is particularly the case for musical files which are shared at an almost zero marginal cost. These

[1] Recorded music is understood here as any music supported by physical means or not (disc, tape, MP3 etc.) and which is initiated by the final user (opposite to radio for which the consumer cannot choose what he listens).

[2] This number applies for the consumption of recorded music only. Since leisure time has increased between 1970 and 2000, the growth of time spent to recorded music is stronger (317 hours in 2000 vs. 68 hours in 1970). Besides, music consumption allows for some other activities in the meantime (i.e. reading). Cf. VOGEL, H., 2001, *Entertainment Industry Economics: A Guide for Financial Analysis*, 5th edition, Cambridge University Press.

[3] Cf. table no.909, "Media Usage and Consumer Spending: 1993 to 2003", 2000 US Statistical Abstract.

[4] Source: SNEP (<http://www.disqueenfrance.com/> (June 2004)).

[5] This means separating music from its physical support.

[6] MP3 stands for "Motion Picture Experts Group-Layer 3". The size of a music file under its CD format is reduced by a factor 12 when *ripped* (i.e. the term for converting CD music files into MP3) at a 128 kbs compression rate. The MP3 has been created in the mid 80s at the Fraunhofer Institute in Germany.

exchanges of so-called "pirated files"[7] would threaten the economic equilibrium of the recording industry. For instance, according to the International Federation of the Phonographic Industry (IFPI), worldwide records' sales decreased for the fourth consecutive year in 2003.[8] In the United States, the Recording Industry Association of America (R.I.A.A.) points out that the number of records sales went down by 14 % between 1999 and 2002.[9] It declares that exchanges of music files on P2P networks are to a great extent responsible for this decrease. The same argument is taken back in other countries, in France particularly.

An historical perspective shows that it is not the first crisis that the recording industry has to go through. In the past, technological changes (emergence of the radio, long-playing record, audiotapes) often changed dramatically the organization of the industry, thus causing the entrance of new actors or changes of business-models. Therefore, we find useful to compare the present crisis of the industry with past ones. It is what we intend to do in this article.

We start with the evolution of the recording industry since its birth, while distinguishing five periods in its history. Then, we present the organization of the industry in the beginning of the years 2000. We analyze the magnitude of the crisis that started at the end of the nineties in the United States; and discuss the possible explanatory factors of it, in particular the development of file-sharing over P2P networks. Having introduced industry's players' reactions, we conclude the article by a comparison of the current digital crisis with the previous crisis which the recording industry has gone through.

AN HISTORICAL PERSPECTIVE ON THE RECORDING INDUSTRY

The birth of the industry

The *phonograph*, invented by Thomas Edison in 1877, is the first device to allow the reproduction of a recorded sound.[10] Some years later, in 1880, Graham Bell, the

[7] In this article, we shall tackle the question of P2P under a purely economic angle. From a juridical point of view, the copy of a good protected by a copyright or author's right is theoretically assimilated with counterfeiting. There is nevertheless an exception for the entertainment industry with the rule of fair use which allows the copying of an original work for strictly personal use. It does not allow copying for commercial purposes and does not allow the provision of a work to the public without the prior agreement of her author. The matter of knowing if exchanges that take place on P2P networks can be assimilated with fair-use is not clear-cut. A juridical and economic debate on this topic is at currently at work.

[8] Source: <http: //www.ifpi.org/site-content/statistics/worldsales.html> (June 2004).

[9] Counting of authors from the table of data of February 28th, 2003, available at <http://www.riaa.com/news/newsletter/022803.asp>.

[10] Long before Edison, numerous creators tried to record and reproduce sounds. In The Middle Ages, St Thomas d' Aquin ordered the destruction of a machine which imitated the sound of a human voice; he accused this machine of being the work of the devil. Based on the works of Thomas Young, Edward Léon Scott de Martinville invented the phonautographe in 1857. Its device transmitted vibrations of a resonant

inventor of the telephone, unveiled the *Graphophone*, an improvement over the phonograph: the tin cylinder used for the phonograph is replaced with a cylinder of wax. Neither Edison nor Bell perceived the commercial potential of the phonograph in musical consumption. For instance, Edison saw the phonograph as a *Dictaphone* that permitted to improve professional correspondences or that could serve educational ends. While noting the commercial success of the musical slot machines in amusement parks in the United Stated, the Columbia Phonograph Company, created in 1888, was the first one to use the phonograph for musical purposes.

In 1887, German engineer Emile Berliner registered the patent for the gramophone. He used a disc of zinc instead of cylinders used until then. The creation of Berliner was an important technological breakthrough because it allowed the separation of the recording process from the reproduction. Consequently, it was possible to reproduce numerous phonograms[11] from a unique master[12]. The cost of reproduction was therefore considerably lowered.[13] Berliner launched the gramophone commercially in 1896 and the device quickly met a growing market demand.[14]

The introduction of the gramophone on the American market triggered a war of standard between the cylinder and the disc. Edison partnered with Columbia to improve the marketing of the phonograph. For its part, Berliner partnered with Eldridge Johnson to create Victor Talking Machine in 1901. In 1906, Victor created the Victrola[15] player which quickly established itself as the market standard to the detriment of the cylinder.[16] The success of the disc over the cylinder can be explained by the size and aesthetic side of Victrola but also by Victor's better artistic strategy.[17] Victor then decided to license its technology to new business companies, of which

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to a stiletto that engraved them on a cylinder. However, this device didn't permit to reread the curves so drawn. The same year that Edison, Charles Cros exposed in a fold sealed to the academy of the Sciences of Paris the principle of the paléophone (the “talking machine” that permitted to read the curves obtained with the phonautographe. Unfortunately, he was unable to experiment his device. It is therefore Edison that finally invented sound reproduction.

[11] Whereas multiple recording sessions were necessary to produce a given number of recorded cylinders, a single session was sufficient henceforth in the case of the gramophone.

[12] The master is the first unit from which the following copies are accomplished.

[13] JONES, S., 1992, *Rock Formation: Music, Technology and Mass Communication*, London: Sage Publications.

[14] Total device sales reached a million dollars two years later.

[15] For more details on the history of the Victrola, cf. « The Victor Victrola Page », <http://www.victor-victrola.com/ABOUT.htm> (June 2004).

[16] It was also at this time that the speed of rotation of a disc set to 78 rotations per minute. Cf. SHICKE, C.A., 1974, *Revolution in Sound: A Biography of the Recording Industry*, *Boston: Little*, Brown & Company; cited by HUYGENS, M., BADEN-FULLER, C., VAN DEN BOSCH, F.A.J, VOLBERDA, H.W., 2001, “Coevolution of Firm Capabilities and Industry Competition”, *ERIM Report Series Reference No. ERS-2001-61-STR.*

[17] Artists' priority for recording on discs allowed Victor to record the most famous voices of the time. For instance, from 1902 on, tenor Enrico Caruso declared that he would record only on discs (cf. COLEMAN, M., 2004, *Playback: From the Victrola to Mp3, 100 Years of Music, Machines, and Money*, Da Capo Press).

Columbia. On the eve of the First World War, the American market was divided between Victor and Columbia, of which Victor owned the most important share. Although its activity in music only definitively stopped in 1930, Edison's firm would not survive the disappearance of the phonograph.

Victor's patent for the gramophone expired in 1914, which caused the entrance of many competitors on the market for disc reading devices. Thanks to technical progress, the price of those devices decreased. In the meantime, decrease of reproduction costs encouraged some firms to specialize in artists' recording. The recording industry then entered its first stage of strong growth. The number of music labels increased and the turnover on the American market achieved a high point of 106 million dollars in 1921. In 1920, 50 % of American households possessed a phonograph[18].

In this first stage of the recording industry of music, players faced themselves to set a standard for the medium of recorded music. At the end of this war of standards, the gramophone imposed itself. At the end of this period, the offer of recorded music remained however limited. The number of titles proposed was low and mainly composed of the same popular tunes played by different artists.[19] Besides, as sales did not exceed a thousand of units by title, economies of scale remained low. The arrival of the radio was going to compete with phonogram sales and to trigger the first crisis in the recording industry.

The development of the radio and the first crisis of the recording industry

Radio was developing very quickly in the United States in the 1920's: between 1922 and 1929, the number of radio receivers went from 50.000 to 10 million.[20] From 1922 on, the broadcasting of free music on the radio was perceived as a threat by the recording industry.[21] This fear was reinforced by a decrease in the sales of phonograms. It is estimated that the turnover of the industry went from 106 million dollars in 1921 to 6 million dollars in 1933.[22] Although other factors such as the 1929 economic crash, infatuation for talking movies or the decrease of music quality seem

[18] Cf. FLICHY, P., 2004, *Une histoire de la communication moderne : Espace public et Vie privée*, La Découverte. Even though the Berliner's invention imposed itself over Edison's one, Americans continued to use the term phonograph whereas Europeans used the term gramophone.
[19] Cf. FRITH, S., 1992, *The Industrialization of Popular Music*, Popular Music and Communication, London: Sage Publications; cited by HUYGENS et al., op. cit.
[20] Cf. CHEVAL, 1997, *Les Radios en France*, Editions Apogée.
[21] The Department of Trade in the United States only gave authorizations to broadcast to stations that committed not to play any music on their waves.
[22] Cf. GAROFALO, R., 1999, *From Music Publishing to MP3: Music and Industry in the Twentieth Century*, <http://articles.findarticles.com/p/articles/mi_m2298/is_3_17/ai_62052928/pg_1> ; COLEMAN, op. cit. ; HUYGENS et al. indicate that the number of units sold was divided by six between 1929 and 1935.

to also explain the slump in sales, professionals saw the radio as the main responsible[23].

A restructuring of the industry followed with many small firms brought out of the market[24]. Edison definitely stopped the production of discs in 1930. Finally, both predominant business companies of the previous period, Victor and Columbia, were acquired by players in the radio industry: the Radio Corporation of America (R.C.A.) took Victor's control and Columbia Records was integrated into Columbia Broadcasting System (C.B.S.) in 1938. Concentration also took place in Europe, notably with the creation of E.M.I., following the merger between the foreign affiliates of Victor (Gramophone Co) and Columbia. Decca, created in 1929, entered in the market. The strategy of this new entrant consisted in achieving economies of scale by focusing on a small number of titles. To attain this goal, Decca lowered the final price of the 78 rpm at 35 cents against 75 cents in general at the time. It also aggressively promoted "stars" such as Bing Crosby[25] and the Dorsey Brothers: the star-system was born. R.C.A.-Victor, C.B.S. and Decca were joined by Capitol Records in the middle of the forties.

With the entry of R.C.A. and C.B.S. in the industry, radio was not any more only a rival of recorded music; it also became a promotion tool for the artists. In the meantime, the emergence of the jukebox offered a new outlet and another means of promotion for the music labels. Progressively, record sales rose back. The turnover of the industry increased up to 26 million dollars in 1938.

This first crisis of the recording industry and the reorganization that followed was caused by the transformation of the promotion function. This transformation was due to the arrival of the mass media – i.e., the radio. The medium of recorded music remained unchanged. It would be in next period that a change of medium would happen with the emergence of the 33 RPM and of the 45 RPM.

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[23] The representative of musicians James Petrillo denounced in 1927 "*the heinous crime of radio that broadcast music*" (COLEMAN, op. cit.). Also opposed to the jukebox, he would obtain a strike from the American Federation of Musicians of (A.F.M.) in 1942. The production of discs was stopped for more than a year. The radios were accused of lowering the value of music: according to the Billboard of March 1st, 1930 "songs plugged too strongly over the air would lose their sales value" (cited by Phyllis STARK, « A history of radio broadcasting », <http://www.kcmetro.cc.mo.us/pennvalley/biology/lewis/crosby/bilboard.htm> (June 2004)).

[24] Cf. GRONOW, P., 1983, "The Record Industry: The Growth of a Mass Medium", *Popular Music*, 3, pp. 53-75; cited in HUYGENS et al., op. cit.

[25] Bing Crosby sold more than 30 million discs of its title "White Christmas". This sales record has since been beaten by Elton John with the title "Candle in the Wind".

The rise of the independent labels

Two major facts deeply changed the recording industry in the post-War period: the apparition of the vinyl record in 1948 and the emergence of rock'n roll. These two events were going to boost sales of records and to lead to a new organization of the industry.

Peter Goldmark, then engineer at C.B.S., created the *long playing record* (LP) or "33 RPM" in 1948. Besides its storage capacity that was six times larger than the 78 RPM, the 33 RPM disc offered a far better sound quality. R.C.A. countered this innovation by introducing the 45 RPM in January 1949. Smaller and easier to handle, 45 RPM could nevertheless stock no more than 4 minutes of music in every side.[26] Fifty years after the struggle between the gramophone and the phonograph, a new standard war was triggered. The competition between two new standards created trouble in consumers' mind and proved to be harmful to records' sales. Sales went down in value from 204 million dollars in 1947 to 157 million dollars in 1949.[27] To impose its technology of 33 RPM, C.B.S. decided to give a free license of its patent to the American companies created after the war. R.C.A. was finally giving up to C.B.S. and began producing 33 RPM from 1950 on. C.B.S. decided to market 45 RPM the next year.

The 33 RPM became the reference for the recording of famous and classical artists whereas the 45 RPM was better suited to the recordings of variety. In England, it is not until 1952 that E.M.I. adopted the new format. [28] In the rest of Europe the vinyl record also became the standard.

A new musical genre called rock n' roll also contributed to the rebirth of the recording industry. The emergence of rock'n roll was due to several factors of which some are technological. First of all, the introduction of the magnetic tape in the studios at the end of the forties led to a decrease in recordings' costs.[29] Moreover, the 45 RPM format lowered the costs of production and distribution. These two technological factors stimulated musical creation.

Some other factors were specific to the functioning of the recording industry. In the post-war period, major labels concentrated on certain popular musical types to the detriment of other less lucrative types, as R&B or blues. New entrants then decided to

[26] Later, it would be possible to stock up to around six minutes of music six minutes per side. However, the increased time storage was possible only by closing grooves to the detriment of sound quality.
[27] COLEMAN, op. cit, p. 66.
[28] It is explained by the existence of a large catalog of 78 RPM at E.M.I.
[29] Magnetic tape reduces the length of recording sessions while offering new recording possibilities (edit parts of the song, additions of sound effects etc.).

invest these niche markets.[30] Unlike major labels, these small size independent labels had lean structures that allowed them to perceive the demand for a broader musical diversity among the youngest consumers. Besides, a narrow relation settled between the independent labels and local radios. For the independent labels, radios represented a window of exposure to introduce a new musical genre.[31] For radios, the increase in labels and records allowed to better satisfy the needs of diversity of their audiences.[32]

Post-War technical innovations and the arrival of the rock'n roll stimulated records sales. In 1955, sales reached 277 million dollars in the United States and rose to 603 million dollars in 1959.[33]

A restructuring of industry took place during this period. The majors of the time lingered to discern the emergent market of rock'n roll.[34] Their market share in the United States collapsed from 75 % in 1955 to 34 % in 1959.[35] New competitors arrived on the American market, such as E.M.I. which purchased Capitol Records in 1955 or Philips.[36] Among the majors, only C.B.S., Capitol and R.C.A. managed to stay in the market[37] by retaining around 12-13 % of market share.[38] However, Decca didn't succeed to manage the transition.[39] A strong industry deconcentration began after independent labels broadly penetrated into the market. This time, it was a change in the medium for the recorded music that led to an evolution of the recording industry.

[30] These labels are Atlantic (R&B), Chess (blues, R&B) and King (country, R&B).
[31] In the United States, 700 radio stations offered programs of so-called "race music" which were played by black artists. These popular stations progressively replaced the traditional networks (COLEMAN, op. cit., p. 77).
[32] This relation ended up in the corruption scandal known as the 'Payola'. The practice of 'Payola' consisted in paying a disc jockey (D.J.) so that he broadcasted a disc first and foremost. Remuneration could take different forms. One of the most common means was the co-signature of a title by a disc jockey. In case of success, the D.J. could earn royalties on accomplished sales. D.J. Alan Freed also known to have popularized the rock not roll to the young white Americans became the symbol of the payola after its accusation for corruption in 1959.
[33] Cf. HUYGENS et al., op. cit.
[34] The majors considered that rock not roll was only a fad. It is illustrated by the decision of C.B.S. not to enter immediately in this market (cf. DANNEN, F., 1991, *Hit Men: Power Brokers and Fast Money Inside the Music Business*, Vintage, New York).
[35] Cf. HUYGENS et al, op. cit.
[36] Cf. BAKKER, G., 2003, "The Making of A Music Multinational: The International Strategy of PolyGram, 1945-1988", AFM Working Paper No. 12, *Department of Accounting, Finance and Management*, University of Essex.
[37] It was only in the middle of the sixties that C.B.S. became interested in the rock'n roll. Thanks to a team effective A&R, C.B.S. succeeded in signing some artists such as Bob Dylan. Capitol had the Beatles in its catalogue. R.C.A. had Elvis Presley in its repertoire (DANNEN, op. cit., pp. 32 et 62).
[38] Cf. DANNEN, op. cit.
[39] In 1962, Decca sold Universal to Music Corporation America of (M.C.A.) a former agency of talents founded in 1924. M.C.A. was acquired by PolyGram in 1980.

The reformation of the oligopoly

A new entrant from the movie industry (Warner Bros) was at the origin of the reorganization of industry at the end of the sixties. His president, Steve Ross, acquired independent labels Atlantic, Elektra and Asylum around of which he was going to organize the firm. His idea was to exploit the creativity of independent labels while benefiting from administrative and logistical synergies within an integrated structure. The majors quickly imitated this strategy.

The concentration of labels within the hands of a few majors can also be explained by the existence of economies of scale in distribution. In the early sixties, C.B.S. was the first major to set up its own distribution network. It was followed by Warner that founded its distribution branch, WEA Corporation, in 1970. Controlling distribution was critical in the musical value chain. Until then, some independent distributors were in charge of routing the records to the retailers. Progressively, independent labels relied on majors whose structures appeared surer and more efficient for the distribution of their catalogs. Due to economies of scale in distribution, independent distributors disappeared little by little as they were not able to compete with the majors. At the end of the seventies, six majors dominated the industry,[40] namely C.B.S., Warner, R.C.A., E.M.I., PolyGram and M.C.A.

With the introduction of the audiotape,[41] which allowed music consumption with mobility and the arrival of disco music, records sales grew up during the seventies. According to I.F.P.I., worldwide sales increased from 4.75 billion dollars to 7 billions between 1973 and 1978.[42] The objective of the firms then became sales' maximization at any cost.[43] Marketing campaigns intensified and the number of produced artists grew up to increase the probability of a hit song. From 1979 on, the growth of sales was nevertheless going to stop.

The second crisis of the sector

Year 1979 marked a violent awakening for the recording industry. Records sales fell of 11 % in the United States and 20 % in England.[44] Several reasons can explain this decrease. For Frith,[45] the situation looked like the one at the end of the thirties: the economic context was unfavourable and new leisure such as the video recorder or

[40] Contrary to the American market, the independent succeeded in resisting a little longer on the British market.
[41] Philips introduced the audiotape on the American market in 1962.
[42] Cf. BURNETT, R., 1996, *The Global Jukebox: The International Recording industry*, Routledge, p. 45.
[43] The motto "whatever it takes" from the Casablanca disco label to justify marketing costs at the launching of a record symbolizes the state of mind in the industry at this time.
[44] Cf. BURNETT, op. cit., p.45.
[45] Cf. FRITH, S., 1988, *Music for Pleasure*, Polity Press, Cambridge.

video games competed with musical consumption. It seems that a decrease in music quality as well as a neglect of the public for disco music also explains this sales drop.[46] At this time, professionals gave another explanation: copies of records on blank tapes were responsible for the sales decrease. A study by C.B.S. in 1980 argued that copying of music on blank tapes costed hundreds millions of dollars to the recording industry. R.I.A.A. then launched a campaign called "Home Taping Is Killing Music" that militated for the transfer of a sum taken on blank tapes sales.[47] Nevertheless, the Copyright Royalty Tribunal published a study the same year which pointed out that audiotape users were also the biggest purchasers of records[48].

We think that this crisis is also explained by the strategies of the majors' of the time in the promotion and distribution areas. Firstly, we notice a strong inflation of marketing costs. Even though the turnover of the industry increased substantially, profits remained low once these marketing costs were deducted.[49] Moreover, there was an anomaly in the records distribution with the *100% return privilege* rule. This clause allowed retailers to send back the unsold to the publishers without undergoing loss. As he didn't support any risk of inventory, the retailer agreed to take all deliveries. However, at this time, sales numbers were posted on the distributed records and did not take in account the returns. Sales were therefore overestimated by a large amount.[50]

The decrease in sales continued until 1983 and the arrival of the compact-disc (CD), which constituted a qualitative improvement over vinyl records. The industry's turnover then rose again; besides, the profit gotten on every sold CD was higher than for a vinyl record. Other factors such as the creation of the Music Television (MTV) channel and the arrival of the *walkman* in the beginning of the eighties also renewed public's interest for recorded music.

The industry crisis was partly due to an evolution in the medium (the possibility to record on tape). It was solved out by another evolution of the medium (the arrival of the CD).

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[46] The« disco music sucks! » movement invited the public to burn its disco records during a baseball game in Chicago on July 12th, 1979
(<http://www.outernetweb.com/focal/disco/headlines/index.html>).
[47] COLEMAN, op. cit., p. 159.
[48] Ibid., p. 160.
[49] Cf. SANJEK, R. & SANJEK, D., 1991, *American Popular Music Business in the 20th Century*, Oxford University Press.
[50] While only 700.000 copies of its single had been sold, Casablanca had 300.000 additional copies made distributed without any existing demand so as to hold its promise to get a gold record (a million copies sold) for the artist Cher (DANNEN, op. cit., p. 163).

THE ORGANISATION OF THE RECORDING INDUSTRY

Downstream, the recording industry is organized in the following way. *Labels* search for new talents (*scouting*) and contract with the artists (for recording, financing, pressing of the record etc.).[51] The *distributors* then route the labels' records to the final retailers. *Retailers* (small record dealers, supermarket etc.) commercialize records to the end customers. Finally, *gatekeepers* advertise records to the public. This activity of promotion is achieved in part by traditional mass media (radio, television, press) and in part on the place of sale (shelving etc.).

Some labels integrate the functions of distribution. It is mainly the case of the major labels. The majors (Universal, Warner, Sony, BMG, and EMI) have several labels[52] and distribute their own label records and that of independent labels.

The majors' domination is due to economies of scale in distribution and promotion. Distribution consists in routing the records from pressing plants to the retailers. A distributor must be able to satisfy a demand that evolves quickly (the commercial life a record generally lasts a few months) and in different points of a large territory. This double constraint (reactivity to the evolutions of the demand and geographical coverage) generates important logistical and administrative fixed costs. The magnitude of these fixed costs, and therefore of economies of scale, leads to a concentration in the distribution function. Today, the five majors achieve 76.5 % of the distribution at the worldwide level. Other distributors are specialized in niche markets.[53]

The promotion stage consists in introducing the disc to the audience. Promotion has two important economic characteristics. First of all, promotion expenses are mainly fixed costs. For a given album, advertisement expenses per unit sold decrease as the number of sold albums increases. Moreover, mass media promotional slots (television, radio) are limited. The number of artists benefiting from broad media coverage is therefore restrained. Economies of scale and promotional capacity constraints in the mass media can lead the majors to saturate media channels with the presence of their artists. Thus, according to Guibert, in France in 1999, only 1 % among the most broadcast titles came from independent labels.

[51] It is difficult to estimate the precise number of labels in the world. A lower bound is provided by Census Bureau (<www.census.gov>) which enumerated more than 550 record companies in the United States in 1999. The number of labels in the world probably adds up in thousands.

[52] A major has generally several labels or groups of labels and each of them covers a specific musical genre. For instance, Universal Music has 13 groups of labels for the American market which amount for 27 labels in total. Among these, the Verve Music group is specialized in jazz music and is constituted by four labels; Island Def Jam is focused on rap music and represents eight labels.

[53] Small size independent distributors are more efficient in niche markets than the major distributors.

ICT progress weakens the two keystones of the traditional recording industry that are promotion and distribution, particularly by allowing the development of P2P networks.

PEER-TO-PEER AND CRISIS OF THE RECORDING INDUSTRY

In 1999, Shawn Fanning, an 18-year-old American student, began developing "Napster", a software to share MP3 files with his friends. Some months later, in June, 1999, the first version of Napster was available online. Shawn Fanning put it online on download.com site and success was immediate. The number of Napster users grew exponentially. After two years of existence, the software counted 60 million users worldwide. However, after a long judicial battle, Napster was forced to the closing of its site in July 2001.[54] Other P2P software such as Gnutella or Kazaa quickly substituted for Napster and contributed to the development of MP3 file-sharing.[55] The international Federation of the Phonographic Industry (IFPI) estimates that in January 2004, 800 million musical files were available on P2P networks.[56]

As the exchanges of MP3 files developed, sales of recorded music went down in some local markets. According to the Recording Industry Association of America (RIAA), unit sales of CD fell by 26% between 1999 and 2003.[57] In France, evolution of sales is less obvious. According to the French syndicate Syndicat National de l'Edition Phonographique (SNEP), over the same period, sales of albums in France went down by 3 %.[58] MP3 file-sharing on P2P networks is considered as piracy by professional associations such as the RIAA or the SNEP. They hold it responsible for the crisis of the industry.

In this section, we start by recalling the features of the crisis that the recording industry goes through. Then, we analyze other factors than file-sharing which could explain this crisis. Finally, we introduce an analysis of file-sharing on P2P networks and its possible impact on the recording industry.

[54] Napster has since been purchased by Roxio. A new legal version has been launched in October 2003 in the United States.
[55] In fact, the MP3 phenomenon precedes Napster's apparition. Before Napster, Internet sites offered MP3 online. Research motors such as Lycos allowed discovering these sites. MP3 search was however more difficult than it will be with Napster or his successors. The MP3 phenomenon really begins with the emergence of the first file-sharing software.
[56] Cf. IFPI, 2004, "IFPI online music report", <http://www.ifpi.org>.
[57] Small size independent distributors are more efficient in niche markets than the major distributors.
[58] Sales of albums (any format) are of 114.7 million units in 1999 and of 111.2 million units in 2003 (source: SNEP, <http://www.disqueenfrance.com>).

The decrease of recordings sales in the world

Since 1999, sales of recorded music strongly lowered in some local markets. As shown in table 1, sales' diminution is particularly strong for the "singles" format. As for the albums in the CD format, the evolution of sales is less clear. Besides, we notice a strong heterogeneity between markets. If the decrease in sales is established for some markets (Germany, Japan, and United States), it is not the case for the French and British markets that testify an increase in their volumes of sales.

Tableau 1: evolution of sales in the BIG 5 markets
(Source: IFPI, 2003)

(millions of units)	**Singles**			**LP (CD)**		
Country	1999	2003	Evolution in %	1999	2003	Evolution in %
Germany	57,1	26,8	-113%	210,6	146,8	-43%
France	37,2	30,9	-20%	110,6	117,9	+6%
Japan	128,1	86,5	-48%	264,9	205,8	-29%
UK	80,1	36,4	-120%	176,9	233,9	+24%
USA	75,3	12,1	-522%	1005,8	746	-35%

In what follows, we analyze separately the evolution of singles' and albums' sales. We present the evolution of sales for the American and the French markets.[59]

The disappearance of the single format

As shown in the table 1, sales of singles are strongly declining in every local market. In 2003, this format had nearly disappeared on some markets such as the American one. Figures 1 and 2 below show the evolution of sales of singles over a longer period in the United States and in France. Figure 1 shows the unit sales of singles (vinyl, cassette, CD) in the United States between 1973 and 2003. Figure 2 shows CD singles' unit sales in France between 1992 and 2003.

[59] We thank Eric Boorstin that provided us his data for the United States.

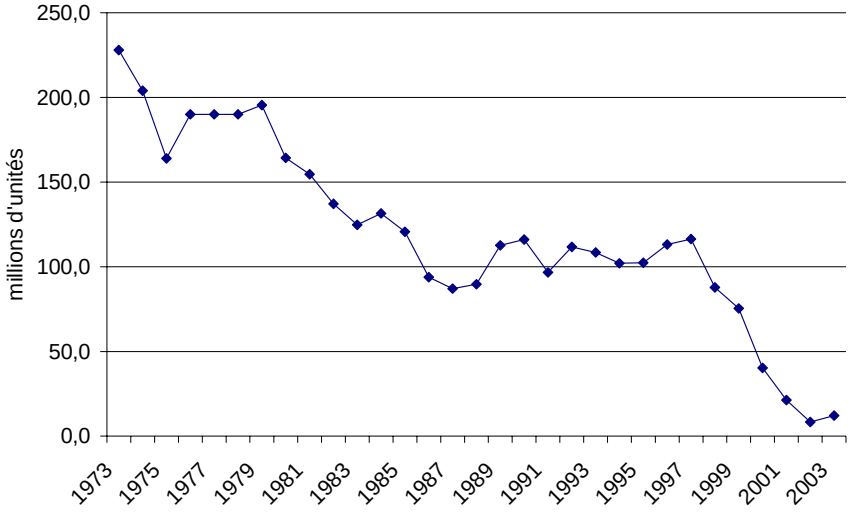

Figure 1: sales of singles in the United States (in million units)[60]

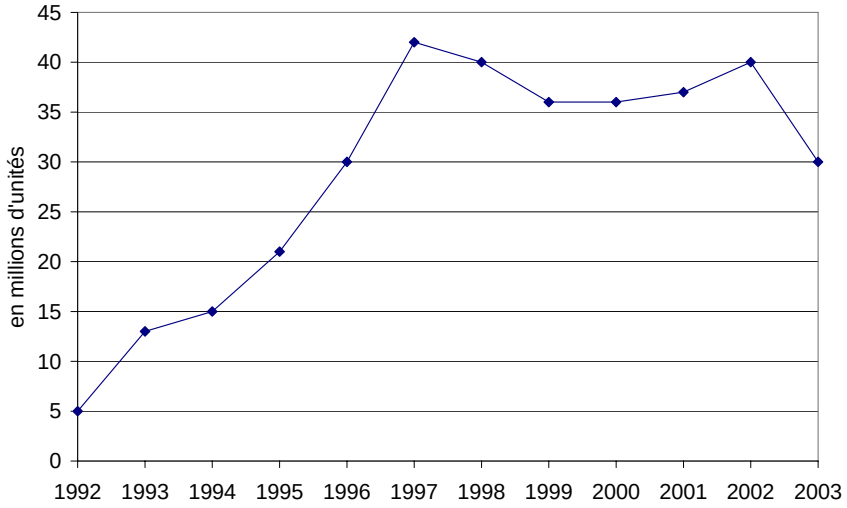

Figure 2: sales of singles in France (in million units)[61]

Figure 1 shows that sales of singles in the United States stabilized in the nineties but that the turning point for sales in this format dates back to the beginning of the seventies. Moreover the strong drop in sales at the end of the nineties started in 1997. It is therefore prior to the development of Napster and P2P networks.

[60] Source : RIAA.
[61] Source : SNEP.

Figure 2 shows that in France, sales of singles did not follow the same path than in the United States. Between 1997 and 2002, sales remained relatively steady before they slightly decreased in 2002 and 2003. However, figures 1 and 2 comparison shows that the evolution of sales of singles in France between 1996 and 2003 looks like the one of the United States between 1991 and 1998. Therefore, one could make the hypothesis that the French market follows the American market by a few years. If one admits this hypothesis, single format should follow the same decline in France.

The single format has been marketed to promote the sales of albums. Today, this marketing strategy appears to be too expensive and is left off. Therefore, development of file-sharing cannot be held directly responsible for the decline of the single format. Sales of music tracks on the Internet should quickly substitute for the sales of CD singles.

The crisis of the album format

Evolution of albums sales greatly differs from that of singles. Figure 3 shows this evolution for the United States over the 1973–2003 period. This figure represents aggregated unit sales of albums for every available medium (vinyl, 8 tracks, tape, CD). We notice four periods. Album sales increase slightly between 1973 and 1986, going from 386 million units to a little bit more than 526 million. Average yearly growth is 2.4%. The emergence of CD leads to a very strong growth of sales between 1987 and 1994: units sold increase at a yearly 7% growth rate from 619 million to 1.02 billion. Between 1995 and 1999, sales maintain (+1.8 % a year on average). Finally, album sales dropped since 2000. This decrease is the strongest the industry has known in the last thirty years.

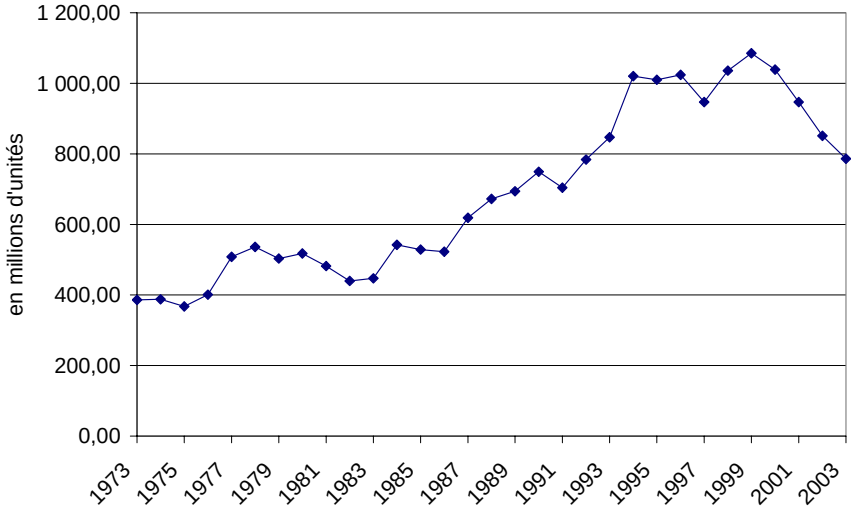

Figure 3: sales of albums in the United States (in million units) [62]

Figure 4 shows unit aggregated sales of albums in France between 1970 and 2003 (vinyl, tape and CD).

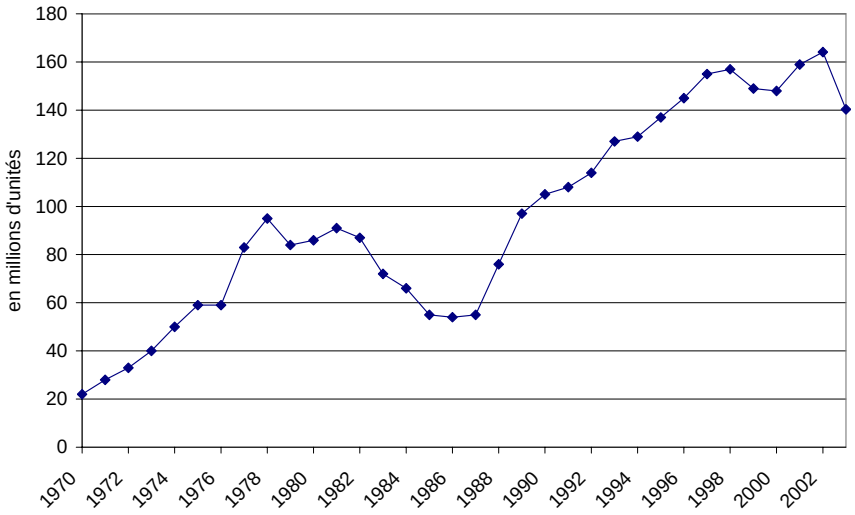

Figure 4: sales of albums in France (in million units)[63]

In France, album sales follow the same upward path that we noticed for the United States over this period. However, the French market experienced a deep crisis between

[62] Source: RIAA.
[63] Source: SNEP.

1981 and 1989 that we do not notice in the United States. In France, album sales went down by more than 40 % between 1981 and 1986. We have to wait until 1989 so that sales get back to the 1981 numbers. This crisis is partly explained by the difficult transition between vinyl and tape formats to the CD. We shall come back on this point in the following section.

Factors of the crisis

What factors can explain the current crisis of the recording industry, that is to say the decrease in sales of albums? In this section, we begin by discussing the other factors than file-sharing over P2P networks. We rely more particularly on works of Boorstin and Liebowitz for this analysis.[64] The possible impact of file-sharing on sales will be discussed later in the article.

The evolution of prices

As shown by Liebowitz,[65] the average price of a CD remained quite constant in real terms since the beginning of the eighties. Liebowitz therefore concludes that the evolution of prices cannot explain the decrease in sales on the American market since 1999.

We think that we need to be cautious about this conclusion. Indeed, a small number of titles achieve a major part of sales in the recording industry. It is said that only one on ten records makes a profit.[66] Since the best selling records represent only a few titles compared with the rest of the production, an increase in their prices could very well affect sales without having significant effect on the average price of a CD. When looking at the industry, we notice that albums prices are effectively strongly dispersed. For instance, while the average price in the United States in 2001 was at $14.19 for the top 50 sellers, 28 titles had price tag comprised between $17.98 and $19.98. On the other hand, only seven sold at prices lower than $14.98.[67] Stability of the average CD price could hide different evolutions between price categories. It is unfortunately difficult to get more detailed information on prices and volumes to produce a price index.

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[64] Cf. BOORSTIN, E.S., 2004, "Music Sales in the Age of File Sharing", mimeo, Princeton University; LIEBOWITZ, S., 2004, "Will MP3 downloads Annihilate the Record Industry? The Evidence so Far", *Advances in the Study of Entrepreneurship, Innovation, and Economic Growth*, Vol. 15, pp. 229-260 ; LIEBOWITZ, S., 2004, "Peer-to-peer networks: Creative Destruction of just Plain Destruction?", *mimeo*, University of Texas at Dallas.

[65] Op. cit.

[66] See the site of the RIAA on this point.

[67] Cf. ZENTNER, A., 2004, "Measuring the Effect of Music Downloads on Music Purchases", mimeo, University of Chicago.

Quality and diversity of recorded music

Consumers' decision to buy music depends of course on the price but also on the quality of the musical good. Traditionally, we can distinguish a vertical and a horizontal dimension for quality. In the case of recorded music, "vertical" quality, on which all the consumers agree, includes several elements: quality of sound recording, sound quality of the medium, portability and durability. It is generally admitted that the quality of recorded music improved in these four dimensions; this should have contributed to an increase in the sales of music.[68]

Horizontal dimension of quality corresponds to the matching between consumers' tastes and the kind of music that is offered. Record sales increase when this matching is better. That is what the Monopolies and Mergers Commission in United Kingdom notes:

> "Consumer demand for records is affected by taste, and this can vary among consumer groups and over time. We were told that selling records can be characterized as a fashion industry in which styles come and go. When the repertoire being generated by artists is in line with the tastes of a wide range of consumers, sales are buoyant. […] When consumers have become bored with a genre of music, total sales will tend to fall off until the arrival of the next genre reignites consumer interest." [69]

According to some observers, music offered these last years would not spur too much interest to consumers.[70] Liebowitz[71] questions this point of view. For him, if there was a loss of interest for current music, we should also notice a loss of interest for concerts and musical listening on the radio. However, quite the opposite is happening. 2000 and 2001 were record years for concert revenues and we do not notice a drop in the audience for new musical radio formats. Moreover, we believe that the quality of the matching between offer and demand in music remains difficult to assess.

Income effects

It seems that musical consumption is pro-cyclical, which means that expenses in recorded music follow the same trend that the gross domestic product.[72] According to

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[68] For instance, musical consumption is restricted by listening capabilities. Portable technologies (Sony walkman, portable CD players, etc) extended these listening capabilities and must have therefore increased demand for music.

[69] Cf. Monopolies and Mergers Commission, 1994, "The supply of recorded music", p. 77.

[70] Cf. "Hit Charade: the Recording industry's Self-Inflicted Wounds", Slate Magazine, <http://slate.msn.com/?id=2069732>.

[71] LIEBOWITZ, op. cit.

[72] Cf. Monopolies and Mergers Commission, op. cit., for UK market; LIEBOWITZ, op. cit., for the USA.

Liebowitz,[73] this income effect does not explain the drop in record sales in the United States since 1999. On the opposite, by regressing record sales differentials on income per capita differentials, he shows that albums' consumption should have increased by 0,52 units per capita between 1999 and 2003. It actually went down by almost 2 units.

Recorded music substitutes

The drop in consumption of recorded music could also be due to the transformation of cultural and entertainment consumption. First of all, other forms of musical consumption than MP3 downloading develop on the Internet: online radios, online music video, personalized radios (Musicmatch). Moreover, sales of DVD and video games could have impacted musical consumption. Since entertainment activities are time-constrained, development of new leisure activities could be made at the expense of musical consumption.

Nevertheless, we lack elements to assess the impact of those new leisure activities as substitutes for recorded music. Besides, the recording industry always had to face other forms of entertainment (such as radio, video record or video games). Nothing seems to point out that competition from other forms of entertainment has strongly intensified since the beginning of 2000s.

Formats of recording

We have shown in our historical part that the evolution of the music medium has a strong impact both on sales and the organization of the industry. According to Liebowitz and Boorstin,[74] a new reproduction format can stimulate sales if consumers decide to buy back records they already possess in the ancient format. However, they believe that this effect is not significant in the case of the CD or the audiotape. They argue that if a renewal effect were to happen, aggregate record sales should strongly increase during the observed period. Nevertheless, when audiotapes became dominant in albums sales, sales of vinyl discs decreased by almost the same amount than audiotapes increased.

Still, the observation of sales by format suggests the current industry crisis can be interpreted by the life cycle of technology. Figure 5 shows albums unit sales for three formats (vinyl, tape and CD) in the United States between 1973 and 2003. Figure 6 gives the same data for France, over the period 1970-2003.

[73] LIEBOWITZ, op. cit.
[74] Op. cit.

These two figures show that recording formats have a life cycle: they develop, reach a peak before they enter a period of decline. Vinyl technology reached its peak at the end of the seventies. Audiotape technology reached it at the beginning of the nineties. If we adopt this explanation, CD technology began its decline around the year 2000.

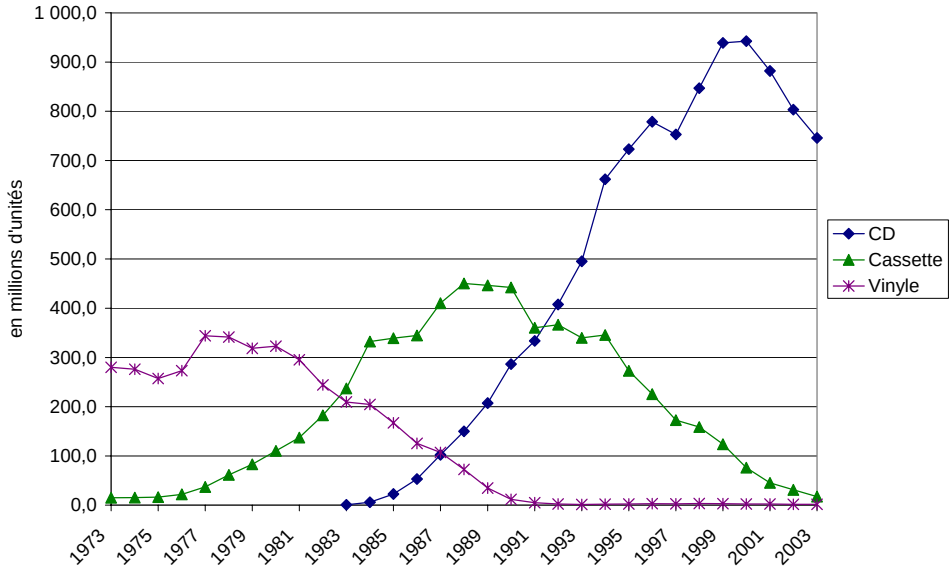

Figure 5: albums sales by format in the United States (in million units)

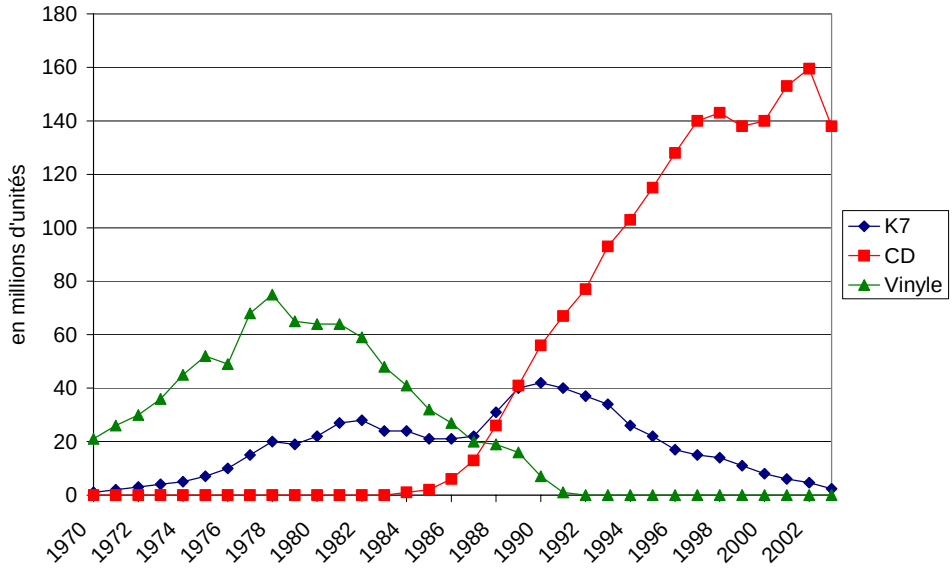

Figure 6: albums sales by format in France (in million units)

The decline of a technology can be caused by the development of a new one. Thus, audiotapes quickly replaced vinyl and CD in the United States. However, there can be a delay between the decline of the ancient technology and the development of the new one. For example, in France, audiotapes did not entirely replaced vinyl discs as it happened in the United States. For some years, this led to a decrease in album sales until the CD developed itself (cf. our previous discussion of figure 4). In this kind of situation, consumers' expectations can play a role: when they make their decisions about music consumption, consumers can anticipate a technological renewal which has not yet taken place. In 2003, consumers could thereby anticipate MP3 or other formats (such as the Super Audio CD (SACD) or the audio DVD) would substitute for the CD.[75]

P2P networks and their impact on the recording industry

P2P networks allow to access different types of files: musical files, videos files (movies), documents, software, etc. We have already pointed it out that for music only, IFPI estimates that around 800 million files were available on P2P networks in January 2004. The fact that file-sharing software's have widely been adopted by Internet users is another indicator of the popularity of these networks. The Kazaa software had been downloaded more than 350 million times on the kazaa.com site in June 2004. Over the same period, the Morpheus software had been downloaded more than 124 million times and the iMesh software more than 75 million times on the download.com site. In order to compare, the iTunes software had been downloaded only 1.3 million times on the same site.

Of course, the number of downloads of these software's gives a very imperfect measure of their real usage. A Pew Internet and American Life Project study carried out between March and May 2003[76] estimates that 29 % of American Internet users (more ten million persons) have already downloaded musical files so as to listen to them *often*. The same study points out that a small fraction (21%) of Internet users actually shares files (of any types) online. In For the most part, these are downloaded files which are left in the share folder. Only 5 % of Internet users would have provided a new file for sharing over a P2P network.

[75] Before buying a CD, a consumer could ask: «what's the point of buying a CD if this format is going to disappear soon? ».

[76] Survey conducted by telephone between March 12th-19th 2003 and between April 29th and May 20th, 2003, on a sample of 2,515 individuals of 18-year-old and more.
Cf. Pew Internet & American Life Project, 2003, "Music Downloading, File-Sharing and Copyright", July 2003, <http://www.pewinternet.org>.

The impact of P2P on the recording industry

Several economic studies tried to evaluate if music downloads on P2P networks could explain the decrease in records sales. If it was the case, they tried to assess to which extent. Two preliminary comments must be made before we present these studies. Firstly, it is important to consider only CD albums sales (as we showed, evolution of sales of singles follows another logic). Moreover, we will keep in mind that the impact of file-sharing on social welfare is not treated here. Particularly, impact on musical creation or consumers' surplus is not measured.

A first step to measure the impact of music file-sharing on albums CD consists in assessing the quantity of music exchanged over P2P networks. NPD, an American company specialized in the study of P2P networks, points out that 655 million music files were over networks P2P traded in April 2003.[77] If we assume that this figure remains stable over the months, the number of musical files exchanged on P2P networks would then be of 8 billions a year. We can compare this with the 2.4 billion albums and 318 million of singles that were sold worldwide in 2001.[78] By considering that a disc includes ten tracks, we obtain a little bit more than 24 billion sold tracks. According to this calculation and even though records sales go down since 2001, music files exchanged over P2P networks represent about a third of the worldwide market in volume.

A second stage consists in determining if exchanges of music files over P2P networks had a negative economic impact on the recording industry. It would be necessary to compare two theoretical situations to do this: the present one with P2P networks available and a similar one but without possibility to access these P2P networks. Comparing these two situations brings up two main questions. Foremost, would consumers who downloaded files on P2P networks have bought them in the absence of these exchange networks? Effectively, a consumer who acquires a music track at a zero price would not necessarily buy it if the price were strictly positive. Moreover, does demand for music benefits from P2P networks? In fact, it is possible that the consumers use P2P networks to discover new artists. In this case, that could increase their CD purchases.

If we take into account these two effects, the impact of file-sharing on CD sales can be measured by determining beforehand how many downloads cause the decrease of CD sales by a unit. Some studies implicitly consider that a download equals a missed sale. Oberholzer and Strumpf compare a sample of 1.75 million files traded during seven weeks over a P2P network with corresponding sales of downloading files over a

[77] Source : <http://www.npd.com/press/releases/press_030825.htm> (avril, 2003).
[78] Source: Recording Industry World Sales 2002, IFPI.

period of 17 weeks.[79] They show that 5000 downloads of a given music file are required to lower the sale of the corresponding disc by a unit. Their conclusion is that the impact of P2P on CD sales is negligible. If we take the values quoted before, 8 billion music files traded on P2P networks would lead to a CD sales decrease of 160.000 units (8 billions/5000). This represents less than 0.07 % of worldwide CD sales (2.4 billions).

Liebowitz[80] criticizes the Oberholzer and Strumpf study. He supports that in their econometric model, the authors do not correctly control the correlation that exists between album sales and the number of downloaded files that belong to this album. Effectively, it is reasonable to think that top selling records are also going to be downloaded a lot on P2P networks. In a regression where sales are explained by the number of downloads, this popularity effect has a tendency to bias on the upward the coefficient applied to downloads.

However, in spite of these reservations, most of empirical studies agree with Oberholzer and Strumpf to say that even though file-sharing on P2P networks have an adverse effect on sales, it is not possible to wholly attribute them the responsibility in the reduction of sales.

The first empirical study was conducted by Fine as part of the Napster trial.[81] This study compares record sales between the first quarters of 1997, 1998, 1999 and 2000 depending onto nearness with a high school or a university. Fine then shows that while sales globally increased by 6.6 % between 1999 and 2000, they lowered by 2.6 % for stores close to a university. The conclusion is that students reduce their record purchases because they download music files. Fader criticizes this study. He particularly shows that record sales near high schools and universities were going down since 1998, while the total market was growing and that Napster was not available yet.[82]

Peitz and Waelbroeck study downloads on P2P networks in sixteen countries between 2000 and 2001.[83] They estimate that, out of the 8.9 % reduction in record sales in 2002, at most 22.5 % of it (around 2 %) can be attributed to file-sharing on P2P networks. They also speculate that the impact of downloading on record sales will probably be insignificant in 2004.

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[79] OBERHOLZER, F. & STRUMPF, K., 2004, "The Effect of File Sharing on Record Sales: An Empirical Analysis", working paper, Harvard Business School & UNC Chapel Hill, <http://www.unc.edu/~cigar/strumab.htm>.
[80] Op. cit.
[81] FINE, M., 2000, "Soundscan Study on Napster Use And Loss of Sales", June 2000, <http://www.riaa.com/news/filings/pdf/napster/fine.pdf>.
[82] FADER, P., 2000, "Expert Report, A&M Records", Inc v. Napster, Inc. 114 F Supp. 2d 896.
[83] PEITZ, M. and WAELBROECK, P., 2004, "The Effect of Internet Piracy on CD Sales: Cross-Section Evidence", CESifo Working Paper Series No.1122.

Boorstin[84] presents a valuation of CD sales by market in the United States with demographic factors specific to these markets. He shows that the effect of an Internet connection on record sales differs according to age groups. This effect is negative for individuals of 24 years old and under. It is however positive for individuals of 25 years old and above. The balance of both effects is positive: other things being equal, those who are connected to the Internet buy on average more records.

Finally, Zentner studies the effect of music download on record purchases by using a poll performed on 15.000 individuals in seven European countries (among which France, Germany and United Kingdom) from October 2001.[85] He shows that there is a positive correlation between downloads and purchases. Nevertheless, Zentner takes into account that people who download have a stronger appeal for music, he then shows that P2P usage reduces the likelihood of buying records by 30 %. He concludes that downloads could explain a drop in sales of 7.8 % in the observed countries.

These studies bring out that the downloading of music files probably have an adverse effect on CD sales. However, they also indicate that this effect is restricted. Furthermore, it is probable that the impact of P2P on the recording industry is not going to intensify much from 2004 on. Indeed, since the price of an Internet broadband connection is relatively low in most of the observed countries, consumers with a strong propensity to use P2P networks already use them. On the other hand, industry will undergo a mutation caused by the effect of new technologies on different levels of the value chain. This is what we discuss in the following part.

The reactions of the recording industry

The recording industry reacted in two ways to the rise of MP3 and P2P networks. For one thing, it launched a technical and legal battle against the development of file-sharing over P2P networks and music in the MP3 format. On the other hand, it slowly promoted the development of legal digital music platforms of on the Internet. We analyze these two strategies below.

Counter the development of MP3 and P2P networks

The recording industry progressively introduces digital rights management (DRM) technologies on CD or digital music files. Digital rights specify what is possible to do with a given digital content (possibilities of reading, copying or sharing). These

[84] Op. cit.
[85] ZENTNER, op. cit.

systems are not completely reliable;[86] once the protection has been circumvented, the content can be copied and exchanged again.

DRM protection set up on CD particularly prevent from converting music in the MP3 format. Concerning digital files, the number of permitted copies is restricted and it happens that the file cannot be played on some devices or software. DRM therefore reduces risks of proliferation of music files over P2P networks. However, it removes some benefits allowed by the MP3 format which is the possibility of listening to music very easily with any device or software. The restriction of these rights therefore lowers the value of the good for the consumers and can consequently have an adverse effect on music consumption.

The recording industry also uses the legal way to fight against P2P networks. Following a complaint by the RIAA, Napster was held responsible for contributory copyright infringement and forced to stop its service in July 2001. Contrary to Napster, P2P networks which followed (such as Kazaa or Audiogalaxy) adopted a decentralized architecture: users' requests are not managed by a central server any more. Since these networks only connect users with each other without keeping their repertoires, they cannot be held responsible for exchanges happening on the network just as a telecom operator is not responsible for its phone calls' users. Complaints of RIAA and Motion Picture Association (MPA) against Streamcast Networks and Grokster for contributory copyright infringement were therefore rejected.[87] The recording industry then reacted by filing complaints against the users of P2P networks. In September 2003, 261 complaints were filed against users of P2P software for copyright infringement.[88]

The main purpose in these complaints is to increase the opportunity cost of using P2P networks by introducing a risk of being caught. More specifically, it aims at deterring the biggest files purveyors from sharing. Effectively, P2P networks rely on the existence of altruist users who provide a great number of files (users qualified as "hubs") while a majority provides only a few ones. The removal of these biggest files purveyors could therefore result in the network's downfall.

Up to now, the results of these prosecutions are mixed.[89] At first, the number of Kazaa users would have gone from 7 million to 3.2 million a week between June 2003 and November 2003. The number of downloaded music files in the United States has strongly decreased (from 18 million to 13 million files per month). Yet,

[86] « Unbreakable anti-copy system don't exist », Noam Zur, vice-chairman of Midbar (source: 01net.com 26/09/2002) (our translation).
[87] "Judge: File-swapping tools are legal", J. BORLAND, April 25 2003, <http://news.com.com/2100-1027-998363.html>.
[88] "RIAA sues 261 file swappers", J. BORLAND, September 8 2003, <http://news.com.com/2100-1023-5072564.html>.
[89] "RIAA lawsuits yield mixed results", J. BORLAND, December 4 2003, <http://zdnet.com.com/2100-1105-5113188.html>.

bigchampagne.com[90] shows that after a first decrease in the number of Kazaa users, this number reached a new peak in October 2003 with 5.6 million simultaneous users. According to the Pew Internet & American Life Project,[91] the number of persons who admit they download music has gone from 35 million to 18 million between April and November 2003 before it went back up to 23 million in February 2004.[92]

P2P networks adopted specific business models in which end users are not billed for the use they make of these networks. For this reason, some support the creation of a compulsory license so as to remunerate artists while allowing the use of P2P software.[93] Compulsory license allows broadcasting of a musical piece without prior approval of the copyright owner as long as compensation is paid for this broadcasting. Collected payments are then divided between artists. A sharing which takes into account the consumption of every musical file would require accurate tools to measure consumption on networks; these measurements are probably possible with adapted software. Right now, majors are strongly opposed to the idea of a compulsory license which would change the economic paradigm by replacing the exclusive right by a remuneration right.

Online music sales

Besides struggling to counter MP3 file-sharing over P2P networks, the recording industry began to consider an evolution of its business model by selling digital (protected) music online. First online music platforms such as Pressplay (Vivendi Universal and Sony) or MusicNet (AOL Time Warner, EMI and Bertelsmann) were launched in 2001. These platforms nevertheless never got successful, particularly because of their very poor catalogues.

[90] Bigchampagne (www.bigchampagne.com) is a firm that measures downloads over P2P networks.
[91] Source : http://www.pewinternet.org/.
[92] This evaluation of the number of P2P users remains fragile since it has been conducted on the basis of a declarative poll.
[93] Cf. LESSIG, L., 2002, *The Future of Ideas: The Fate of the Commons in a Connected World*, Vintage, New York.

Table 2: Main online music services

Seller	Strategic position	Business model	Date of entrance
iTunes Music Store	Final seller	Sale of music and complementary goods (MP3 player 'iPod')	April 2003
Napster 2.0	Final seller	Music sale « a la carte » and subscription service	October 2003
Rhapsody	Final seller	Sale of music and complementary goods (online music player)	December 2001
Musicmatch	Final seller	Sale of music and complementary goods (online music player) and other services (online personalized radio ; matching)	Acquired by Yahoo Q3, 2004 Sales online since 2003 (entered in 1997)
OD2	Distributor	Non branded products for third parties (Wanadoo)	May 2000

Since 2000, new players entered in the online music sale market (cf. table 2). Most of the online music players serve the end customers except for OD2 which positions itself as an online distributor for third parties. The new online music players also often market complementary products to listen to MP3 files (portable MP3 player for Apple's iTunes or Sony's Connect, MP3 player software for Musicmatch and Rhapsody) or additional services (online radio and personal music recommendations for Musicmatch).

Those business models differ from the traditional one. Music is now either sold "a la carte" (on a track basis on iTunes; for instance) or with a monthly subscription that gives access to the whole the catalogue for the duration of subscription (case of Napster 2.0). Moreover, competition is not only on price or quality of service (i.e. number of titles in the catalogue) but also on technology. Effectively, a war on standard to read the musical files began between the different actors: Apple offers AAC format for iTunes, Sony offers ATRAC for Sony Connect, Napster 2.0 uses the Microsoft's WMA format, etc. Digital music files bought on a platform are not always compatible with all players or devices.

CONCLUSION

Since the end of the nineties, file-sharing over P2P networks is accused of being the main responsible for the decrease in records' sales. However, the empirical studies that we have presented in this article suggest that file-sharing only explains a minor part of the drop in sales. Other factors related with the development of new entertainment activities (online radio, web surfing, DVD etc.) as well as the likely end of the CD technology also play a role.

The emergence of new technologies – such as MP3 or more generally digital music files – often triggered fears among the leading players in the recording industry. For instance, it was the case when radio developed in the twentieth; it was then accused of being responsible for the drop in sales of phonograms. It was again the case with the emergence of audiotapes that allowed the copy of records. It is true that technological evolutions sometimes caused important changes in the industry. For example, radio is at the origin of star-system and vinyl records helped to the birth of rock n' roll.

The emergence of a new technology can cause a breakdown in records' sales and lead to an industry reorganization with new players coming in the market to take advantage of this opportunity. Music digitalization should cause such effects. First of all, it will probably eliminate the distribution function which conferred a competitive advantage to the majors. Besides, music digitalization might stimulate musical creation and entrance of new labels because it lowers costs and allows setting up efficient searching tools.

Compared to the other crisis that the recording industry went through, the one that started at the end of the nineties is peculiar since it is caused both by an evolution of the medium and of the promotion function. In the past, we showed that the industry always faced only one of these evolutions at once: a war of standard between phonograph and gramophone (medium); the emergence of the radio (promotion); the invention of 33 RPM and of 45 RPM (medium); the audiotape (medium). The information digitalization causes both a transformation of the medium (MP3 and other formats) and of the promotion function (P2P networks, critics posted online, etc) at the same time. It is probably one of the reasons that explain the strength of this digital crisis.

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