iTunes vs. Napster: Selling or Renting Music Online, Which is the Winner?

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Abstract

The aim of this article is to use the concept of durable good to analyse the market of online music. Our goal is to find theoretical elements explaining the coexistence of selling and renting strategies, and to assess the respective performance of these two types of strategies. In a first part, we make a review of the literature on the durable goods and show that even though renting the durable good is often the winning strategy in the case of a monopoly, in the case of an oligopoly, the selling strategy is usually better. We then study the market of online music and show that the reason behind firms’ decision to rent, rather than to sell, music is the presence of switching costs for the consumers. Both renting and selling strategies are then assessed, both theoretically and empirically, in regards to their robustness to piracy. Last but not least, the impact of durability on selling firms is also analysed.

Key words: Durable goods, Coase conjecture, Online music, Piracy, Competition, Oligopoly, IPR

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Introduction

The year 2005 has seen an intensification of the race for the online music market. The iTunes Music store, one of the pioneers of the (legal) online music market, still holds 70% of the market. However, a lot of competing services selling music online have appeared over the last months, and some of these services are run by major companies in the media/computing business. Despite the growing number of competitors on this market, the strategies of the firms tend to be very homogeneous, and are based either on selling or on renting the music. Another interesting fact is that these two types of strategies are unequally distributed: apart from the leader - iTunes Music Store - who is selling music per song or album, most of the firms decided to adopt a renting strategy: for a monthly fee users can listen to as much of music as they want. However, once they stop paying, the users are not able to play the music they previously downloaded.

This contrast between selling and renting is well known in the literature discussing firms that supply a durable good. The interesting point is that music, as a digital good, has all the characteristics of a durable good. Thus, it should be possible to use the existing theories on durable goods to assess the market of online music.

According to the literature, the presence of a durable good leads to a loss of market power for the firms, who are eventually forced to sell the good at a price equal to marginal cost. Thus, when supplying a durable good, the theory predicts that a renting strategy is more desirable for the firm than a selling strategy. The interesting fact for economists is that, despite the theoretical results showing the superiority of the renting, both selling and renting strategies are present simultaneously on the market. What is more, even though renting is the most commonly used strategy, the best one seems to be selling, since this is the strategy used by the market leader.

Another interesting fact is that the firms operating on this market are not only competing between each other, but are also competing with the pirate market (peer-to-peer networks for example). Therefore, it should be interesting to evaluate the impact of piracy on the performance of both selling and renting strategies.

The aim of this article is to use the concept of durable good to analyse the market of online music. Our goal is to find theoretical elements explaining the

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1 By online music market, we mean the firms supplying music in an electronically distributed form. We therefore do not consider the firms operating online and selling Audio-CDs or any other music distributed on a tangible medium.

2 Apple, Microsoft, Real Networks, Sony, Virgin, Yahoo.
coexistence of the selling and renting strategies, and to assess the respective performance of these two strategies.

In a first part, we make a review of the literature on the durable goods and show that, even though renting the durable good is often the winning strategy in the case of a monopoly, in the case of an oligopoly, the selling strategy is usually better. In the second part we study the market of online music and show that the reason behind firms’ decision to lend, rather than to sell, music is the presence of switching costs for the consumers. The next part of this article will be devoted to a closer study of the firms selling both music and a complementary product and will examine what is the consequence of the durability of music on these firms protected by high switching costs. We will then conduct an empirical study of the strength and weaknesses of both renting and selling strategies and also assess their robustness towards piracy. We will show that although piracy only has a negligible direct effect on the selling strategy, renting is very sensitive to piracy due to opportunistic – pillaging – behaviours that can appear among the consumers. Last but not least we will analyse the consequences, in terms of market segmentation, of the choice of strategy.

1 Music and durable goods

1.1 Music as a durable good

Although music, since the invention of recording, can be considered as a durable good (in the sense that the same piece of music/performance can be consumed a large number of times), it was only after the development of the digital format that its durability really became important. Before the invention of the digital format, copying a music recording necessarily led to a loss in quality. Therefore, the durability of music was determined by the durability of the medium that was used to distribute it (vinyl disk, analog tape, etc.).

The digital format introduced the possibility to copy a music recording without any loss of quality, and thus removed the limit of durability of a music recording due to the medium, as it is always possible to backup the recording on a new medium. Therefore, the introduction of digital systems allowed a potentially infinite durability of music recordings.

This led to important changes for the recording industry. We can indeed see two main reasons to purchase again a particular recording (the fact that you have to renew the purchase making, de facto, the good non-durable):
• Deterioration of the medium
• Change of technology

A damaged medium is, of course, the first reason that could lead to several purchases of the same recording. Vinyl discs and magnetic tape were known to be particularly fragile, and before the advent of digital era, this limitation would insure a certain number of regular sales to the recording industry since the copy of the recording to another medium (from a vinyl disk to an audio-tape for example) would result in a loss of quality.

Apart from the fact that the medium is short-lived, another reason for a recording not to be durable is the fact that the medium technology is short-lived. A straightforward example is the 78 RPM vinyl disks: even if we assume that the medium lasts for a long time, a new technology will appear and 78 RPM players will not be produced anymore. Thus, at some point the consumers will have to buy the same recording once again as there will not be any players compatible with the old technology available anymore. The interesting point is that transferring the recording to a medium compatible with the new technology is not necessarily feasible (in the case of the switch between 78 RPM and 45 RPM) or desirable as this would lead to a loss of quality (transfer of a 78 RPM on an audio tape).

As the digital technology allows a perfect copy (or cloning) of a digital recording, these two limitations of the durability are not present anymore since it is always possible to backup a recording before the medium gets damaged, and since it is also possible to transfer a recording on the next generation medium without any loss of quality.\(^3\)

If music recordings before the digital era were rather durable, their durability was not total. Nowadays, a music recording can be considered as infinitely durable as long as backup and transfers are made on time.

1.2 Durable goods and monopoly: the Coase conjecture

There is an abundant literature in Economics regarding the question of durable goods. The problem, as stated by Coase (1972), is that the sole fact that the good is durable can lead to a total loss of market power for the firms producing a durable good. More precisely, Coase (1972) shows that the monopolist producing a durable good will end up loosing all its market power due to the fact that consumers expect the monopolist to lower its price over the time. The

\(^3\) One can even speculate that one of the drivers of the sales of records over the past decade, which was the re-purchasing of records due to the switch between vinyl and CD, will not arise when switching from CD to DVD.
reason for that is that the monopolist has interest to price sell more: as the monopolist sells at a price higher than the marginal cost, there is a residual demand after the first period of sale. Therefore, the monopolist can increase its profit by selling, at a lower price, some extra units of the good, as there is a residual demand. We can even speculate that, as the monopolist will charge a price higher than the marginal cost, there will still be a residual demand, and the monopolist will be able to increase its profit by selling some more units of the good.

Another intuitive reason for the drop in price is that, if we assume that the demand for the good is constant, each unit sold leads to one lost customer. Therefore, as the firm is selling the durable good, the demand function will shift inwards, leading to a lower price (as the demand is shifting, the marginal revenue shifts as well, and therefore the optimal price is lower) being charged by the monopolist.

In any case, the price of the durable good will fall over time. Ultimately, the price will fall at the marginal cost level and that is the point where the monopolist will stop supplying the durable good. The problem is that the consumers that bought the good at a price higher than the marginal cost face a loss, and as a consequence, if the good is sold, consumers will not buy unless the price is equal to marginal cost.

The Coase conjecture states that a monopoly selling a durable good will end up selling at a price equal to the marginal cost, as the consumers will refuse to purchase the good at any other price. Interestingly enough, this phenomenon is mainly due to the inability of the monopoly to commit to not selling any extra units of the good after the first period of sales. If the monopolist could commit to such a strategy, it would be able to get the monopoly profit, as the consumer would anticipate that there would not be any subsequent period of sale. However, this strategy can not be adopted by the monopolist as it is always worthwhile selling extra units of the good (and get a profit higher than the monopoly profit). As the consumers know that the monopolist can not commit to not selling in subsequent period, they will wait for the price to be equal to the marginal cost before buying.

Thus, a monopolist selling a durable good has to find some alternative strategies in order to be able to regain its market power. Even though it is possible to find strategies allowing to sell the durable good at a price higher than the marginal cost, the most well-known strategy allowing the monopolist to recover its market power is to rent the good instead of selling it.

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4 Bulow (1982) mentions a few of them, for example a contractual engagement of the monopolist to re-buy the good at the price it was purchased. All of these strategies aim at making the monopolist commit with not selling after the initial period of sale.
If the good is rented instead of being sold, consumers know that the monopolist can commit to not lowering the price, and thus the monopolist will be able to extract the monopoly profit. As mentioned above, the main cause of existence of the loss of monopoly power is the inability of the monopolist to commit to not lowering the price in subsequent period of sales. If the monopolist rents the durable good instead of selling it, it has a good reason to commit to not lowering the price (or to restricting the output): as the rent is paid at the beginning of each period of sale, a drop in price for one customer would lead to a drop in rent for all the customers in the subsequent period. For example of a consumer that purchased the good at a high price during the first period will face a loss, if the good is subsequently sold at a lower price. However, if this consumer is renting the good, it certainly faces a (small, as the rent is much lower than the price) loss, but in the next period, will certainly refuse to pay a rent as high as what he paid during the first period. Therefore, if the monopolist decides to lower its price - e.g. the rent - it loses profit on all the units that will be rented afterwards, but also on all the units that were rented before as the rent will not be renewed at the same price level. This is to be opposed with the case when the monopolist sells the good: in this situation, if the monopolist lowers its price, the loss of profit occurs only with the units sold afterwards but not with the units previously sold.

Thus, when the monopolist is renting a durable good, it has sufficient incentives to commit to not lowering the price/increasing the output. As the consumers are aware of this, they do not have any incentive to delay the purchase of the good and will therefore accept to pay the monopoly rental price.

There is another intuitive argument explaining the superiority of renting when supplying a durable good: as the consumers have to pay a rent every period - otherwise they will have to give the good back - it is therefore the same as if they were purchasing a good that lasts only one period. Thus, renting a durable good is equivalent to selling a non-durable good. This therefore solves the loss of market power caused by the durability of the good.

1.3 Limits of the Coase conjecture

As stated in Coase (1972) and Bulow (1982), and proven by Stokey (1981) and Thépot (1998), the main limit of the Coase conjecture is the time. More precisely, the loss of market power is related to the time lag between the periods of sales. Coase (1972) considers a situation when the units of goods are sold continuously. In this situation, time does not matter much and consumers have the possibility to wait for the price to fall to the marginal cost level. Bulow (1982) introduces a two-period model in which the durable good is only

5 The discounted sum of which is equivalent to the monopoly price.
produced and sold at the beginning of each period. However, as the duration of the period is not specified, a result similar to Coase’s is obtained.

The issue of the impact of the duration of the sales period was later on studied in Stokey (1981)\textsuperscript{6}. Stokey’s model shows that although the Coase conjecture is verified when the sales are continuous, it is only approximately correct when the sales are discrete and the periods are sufficiently short. Ultimately, as the duration of the periods increases, there is a point where the durability of the good stops to be relevant, and therefore only marginally reduces the monopoly power. As a consequence, one of the strategies to reduce the loss of market power due to the durability of the good is to increase the lag between the periods of sale.

1.4 Durable goods and oligopolies

Obviously, the strategy suggested above - increasing the time lag between the periods of sales in order to regain market power - only works in a monopoly situation. If several firms are competing for the same market, it is not possible for one of the firm to delay its next period of sale as it would mean that the consumers would probably purchase the good from a competitor. Thus, the Coase conjecture has more chances to be verified if, in an oligopolistic market, the firms are selling reasonably substitute products, since the firms will not have the possibility to have big gaps of time between the sale periods. One can even assume that it is a dominant strategy for each firm to have a shorter gap than its competitor, and thus in an oligopolistic market selling a durable good, the sales will tend to be continuous.

As the Coase conjecture tends to be more present in an oligopoly, the renting strategy should be even more valuable in an oligopolistic environment. However, Bulow (1986) and Bucovetsky and Chilton (1986) show that if a monopoly is threatened by the entrance of another firm, the best strategy is to sell the good instead of renting it\textsuperscript{7}. Bulow (1986) also shows that in an oligopoly situation, the firms tend to increase the durability of their products. The competition with other firms leads them to do the exact opposite as what a monopoly would do\textsuperscript{8}.

Likewise, Poddar (2004) shows that when firms move simultaneously, the sell-

\textsuperscript{6} Thépot (1998) gives a slightly different formulation of this problem, and uses different techniques. He also gives a proof that the Coase conjecture is valid (or gives a good approximation) when the duration of the periods is small.

\textsuperscript{7} Sometimes the best strategy can also be a combination of renting and selling. However renting is, in any case, never the best strategy.

\textsuperscript{8} As we have stated earlier, renting is, \textit{in fine}, making a durable good non-durable.
ing strategy dominates the renting strategy. The intuition behind this result is that selling allows to prevent subsequent competition: if the firm sells a good to a consumer, the firm gets the selling price and the consumer exits the market. However, if the good is rented, the firm earns the rent for one period, but then faces the risk that the consumer will switch to a competitor during the next period. What is more, a firm selling instead of renting during the first period can continue selling during the subsequent periods as there is some residual demand and is likely to take consumers from renting firms.

Another important point is related to the difference of level between the selling price and the rent. In theory, the selling price and the discounted sum of rents should be equivalent. However, in an oligopoly when firms can either sell or rent, this is not necessarily the case. If a firm is selling, its potential market is the full cumulated demand for all the periods, and the price this firm is able to charge is related to the full demand for all the periods. If the firm is renting, the rent is also calculated with respect to the full cumulated demand. However, if some units are sold by a competitor, the rent during the second period will be necessarily lower due to the fact that the demand is lower as some customers bought the good and left the market. Selling therefore allows to avoid the future decrease in the rents that will occur if a competitor decides to sell. What is more, as stated above, the “selling” firm gets in addition some customers during the subsequent periods as well.

As mentioned above, Poddar (2004) shows that in an oligopolistic market, selling is the dominant strategy. Thus, if several firms are supplying a durable good, the dominant strategy equilibrium is that all the firms sell. However, Poddar (2004) also demonstrates that this equilibrium is not efficient, and that the firms would be better off if each of them were renting instead of selling. Firms supplying a durable good are therefore in a prisoner dilemma situation: would they be able to collude, they could increase their profit by renting instead of selling the good. A similar result can be found in Bulow (1986). Bulow shows that if firms can collude, they will choose to reduce the durability of the good, which is equivalent to choosing a renting strategy.

All this shows that, as in the monopoly case, oligopolistic firms would be better off if they could either rent or reduce the durability of the good. However, due to the presence of competitors, and unless there is collusion, the firms will tend to sell the good instead of renting it. Thus, music being a durable good, one should expect all the firms to adopt a selling strategy. However, this is clearly not the case for the online music market, since a majority of firms on this market decided to adopt a renting strategy instead. In the next section, we will aim at explaining this phenomenon using the concept of switching costs.
2 Selling vs. renting in the online music market

2.1 The problem of distributing digital music and the DRM systems

As a digital good, music – in addition to be durable – shares common characteristics with public goods. Rayna (2002) shows that due to the availability of technologies allowing to clone digital goods for a low cost, these goods tend to be non-rival and non-excludable. Consequently, it is highly unlikely that a firm would be willing to sell music online since after one unit sold, the music file would spread over the internet, and only few sales would occur. The same kind of phenomenon could obviously occur with any other way of distributing digital music – such as a CD for example. However, when music is distributed on a tangible medium, copying it on a computer in order to spread it on the internet requires some manipulations and some knowledge. In the case of online music stores, no further transformation would be required for a consumer to send a music file newly purchased to everyone in her address book.

It was thus necessary for the firms to develop a system allowing to control the ways the consumers could use a music file, and to prevent some of the usage that could be done (as copying for example). This type of systems is called Digital Right Management – or DRM – and aim at defining precisely the rights the consumer has on the music files. Such a system is usually based on the encryption of the music file, and thus a key is required in order to decrypt and consume this file. The encoding system then either allows or prevents some actions – for example, the consumer may be allowed to listen to the music on one particular computer, but not on another one.

Rayna (2002) shows that these DRM systems aim at diminishing the publicness of the digital good by making the good more rival (for example, the good can only be consumed on one computer at a time) or more excludable (the consumer needs to input some kind of identification for the file to be played). By developing an efficient DRM system, the firms could gain a total control over the usage of the music they supply.

Three problems are usually associated with DRM systems:

- They are fallible: so far, no unbreakable DRM system exists, and it is very likely that it never will. Usually, a few weeks after a new protection system is released, a crack allowing to remove the protection appears (Rayna, 2002).
- They are not inter-compatible: for digital music, there are nearly as many DRM systems as shops, and these different systems are not compatible between each other. This means, for example, that protected music files will not play on any hardware, but only on the media players compatible with the DRM system.
• They tend to restrict the consumers’ rights, even further than the law: for example, no DRM system allows the fair use – or fair dealing – of a music file. As music files protected by DRM restrict the consumer’s rights further more than a CD-Audio, they might be considered by consumers as a lower quality substitute.

Despite these disadvantages, all the online music stores use DRM systems as they see them as the only way to reduce the extent of piracy.

2.2 The online music market

The online music market is still a new market and is not fully established at the moment (the services of the online music firms are not, for example, accessible in every country). However, despite some regular entrances, the current situation gives a good overview of what this service might be in the future: a rather highly concentrated oligopoly.

At the moment, seven major players⁹ are operating on this market: Apple’s iTunes Music Store, Microsoft’s MSN, Napster, Real Networks’ Rhapsody, Sony Connect, Virgin and Yahoo’s MusicMatch. According to the latest statistics available¹⁰, the iTunes Music Store is still the leader on the market, with around 70% of the market, the other companies sharing the 30% remaining.

Despite the small number of firms operating on this market, the online music market can be considered as rather highly competitive. The main reasons for that are:

• The perfect substitutability of the goods on the market. Apart from some temporary exceptions, all the firms tend to have the same catalogue. So far, these online shops do not produce music themselves. They rely on the recording companies to supply them with music. Thus, the recording companies do not have interest to sign an exclusive agreement with one of the firms and will in general supply the same music to all the firms of the market. This leads to the fact that the catalogues of the online shops are very similar, and therefore these firms are actually supplying substitutable products.

⁹ Our analysis focuses on the online music services that are available internationally – e.g. in at least two different countries. However, numerous online music stores are also available locally, and some of them, as Walmart in the U.S.A., have a significant market share.
• **Strong substitutability with other forms of distribution.** The firms of the online music market not only compete with each other, they also compete with firms providing music but using a different way of distribution, as the traditional audio CD market, or the pirate (online or underground) market.

• **The low short run profits.** The online music market is one of the downstream markets of a very highly concentrated upstream market: the recording industry. The upstream market therefore has enough power to force the downstream firms to pay for the music at a high price. As mentioned above, this market is rather competitive which means that the firms have to keep their prices rather low. As the price of the input is relatively high, and the price of the output is relatively low\(^{11}\), the profits in this industry are rather small, at least in the short run.

• **The durability of the music recording.** As stated in section 1.1, the music recordings are durable goods. Therefore, each music recording tends to be in competition with all the music recordings previously sold. Despite the small number of firms, the durability tends to decrease the market power, and makes the market even more competitive.

It is therefore obvious that none of the players is expecting the situation to remain that competitive, but certainly hopes instead that only a few players will remain and that they will be part of these firms.

### 2.3 Adoption of renting and selling strategies

In section 1.4, we showed that, despite the fact that it leads to a loss of market power, selling is a dominant strategy for firms operating on an oligopolistic market. However, when analysing the online music market, this theoretical results seems to be inaccurate, since most of the firms are using either pure renting, or mostly renting (with optional buyout) strategies.

At the moment, there are only two firms on the market which are using a pure selling strategy: Apple’s iTunes Music Store (iTMS) and Sony’s Connect. These firms being part of an oligopolistic market, their choice of a selling strategy seems consistent with the theoretical results mentioned in section 1.4. What is more, as one of them – the iTMS – is the market leader (with 70 % of market share), it can be considered as an incumbent operating on a contestable market. In this situation, Bulow (1986) and Bucovetsky and Chilton (1986) show that the best strategy is also to sell, and this gives us another explanation of the choice of a selling strategy by this firm. However, it is worth noticing that the iTunes Music Store was the first major player to

\(^{11}\)For example, on each song sold by the iTunes Music Store, 60¢ to 80¢ out of 99¢ is given to the recording industry ([http://www.gristforthemill.org/010422music_2.html](http://www.gristforthemill.org/010422music_2.html)).
enter the online music market, and had therefore a first mover’s advantage. Thus, in its early days, the iTMS could have considered choosing a renting strategy instead. This was never the case and one of the reasons for that could be the expected entrance of other competitors in the market. However, due to the extremely low cost of switching from one strategy to another, it seems to us that there should be another explanation to this disregarding of the renting strategy.

Although the theory gives us a reasonable justification of the strategy chosen by the iTunes Music Stores and Sony Connect, this is not the case for the strategies chosen by their competitors. Indeed, all the other important firms on this market are using renting strategies instead of selling strategies. This is rather surprising since this strategy is, in theory, dominated in the case of an oligopoly. What is more, their market share is much lower than the one of the market leader. This strategy seems therefore rather inadequate. Indeed, the theoretical models (Bulow, 1986; Bucovetsky and Chilton, 1986; Poddar, 2004) show that adopting a renting strategy against a selling strategy tends to result in a further decline of the market share. However, we can assume that if most of the firms on this market are adopting such a strategy, it means that they see some value in it, at least in the long run.

Thus, it seems that the nature of the goods, in this case their durability, is not the sole determinant in the choice of strategies by the firm. The next section will focus on the other reasons that influence the choice of strategies of the firms of the online music market.

### 2.4 The reason behind renting: switching costs

The main reason explaining the difference of strategy between the selling firms – iTunes Music Store and Sony Connect – and their renting competitors may be found not only in the nature of the music recording, but also in other related factors.

The main difference between the pair iTMS/Sony Connect and the other firms on the market is that both the iTMS and the Sony Connect store are strongly

12 The other reason could be that, despite being the first mover, and thus a temporary monopoly on this market, the iTMS was nevertheless competing with substitute markets – as Audio-CDs and pirate channels. This argument is discussed in section 4.4 p. 32.

13 There are, for example, virtually no catalogue costs.

14 The only exception to this seemed to be Microsoft: its online music service was introduced in September 2004 as a selling only service. However, during spring 2005, Microsoft switched to a subscription-based renting service.
linked - one could even say tied - to a particular hardware music player: the iPod, in the case of the iTMS, and the Sony Walkman players, in the case of Sony Connect. For example, Apple always presented the iTMS and the iPod as being complements, and they actually are complements in the sense that they can not operate without each other. Due to the presence of a DRM system, the music files bought on the iTunes Music Stores can only be played on an iPod\textsuperscript{15} \textsuperscript{16}, and as Apple has so far refused to licence its DRM system to the other online stores, it is also impossible to listen to protected music bought on another music store on the iPod.

Of course, the interesting point is that this combination iTMS/iPod creates important switching costs. For example, if a consumer wants to switch from an iPod to another brand of music player, all the music purchased on the iTMS can not be played on another player without incurring high costs - either in repurchasing the music on another music store, or in spending time “cracking” the DRM protection. Likewise, if a consumer owning an iPod is willing to use another music store than the iTMS, this consumer will face a high cost as she will have to spend time removing the DRM protections of any new music file acquired before being able to play it on the iPod\textsuperscript{17}.

The same type of complementarities exist between the Sony Connect store and Sony’s media players: the music bought on the Sony Connect store can only be played on a Sony media player, and the only songs compatible with Sony’s DRM embedded in the Sony media players, are the ones sold by the Sony Connect store. As Apple, Sony has so far refused to licence its DRM system to other online shops or to other hardware manufacturers. Therefore, as the consumers that chose Apple, the consumers that chose Sony are experiencing high switching costs due to the complementarity between the Sony Connect music store and Sony’s media players.

Thus, the two firms of the online music market that chose a selling strategies – the Apple’s iTMS and Sony Connect – are both benefiting from the existence of switching costs due to the strong complementarity of their online store with a media player they also produce. Thus, it seems that in addition to the choice of a selling strategy, the complementarity with the iPod and the high switch costs help to explain the dominance of the iTMS on the market. As none of the other firms on this market – which all chose a renting strategy – are benefiting from such complementary products, we can therefore expect

\textsuperscript{15} They can also be played on most of the computers, however the main driver of the online music sales seems to be, at the moment, the digital portable music players.\textsuperscript{16} As no technology is ever perfect, these files can also be “cracked” and subsequently be played on any portable music player. This however requires an additional cost, in terms of time, for the consumer.\textsuperscript{17} In addition to being costly, this removal of the protection would be in some countries, as the U.S.A., illegal.
that the choice between renting and selling will be based, in addition to the durability of the good, on the switching costs. More precisely, our hypothesis is that the choice of a renting strategy actually creates the switching costs the other online shops are lacking of.

As, apart from Apple and Sony, all the music stores aim at being compatible with any of the available music players, the consumers would not face any switching cost when switching from one shop to another if the stores were selling: the previously bought music as well as the new one would play on any music player. However, if firms are renting the music, switching costs appear: if a consumer stops its subscription to one service, the music she previously transferred on her music player or computer would stop playing altogether. It would thus create a switching cost as the consumer would have to retransfer all the music from the new service to the music player.\(^{18}\)

A subscription/renting based strategy also creates an additional “trying cost”: as consumers are already paying for one service, trying another service would require them to pay double. Indeed, they can not stop the subscription to the current service, unless they are certain that they want to subscribe to the other service, as they would lose all their current music in this case. Thus if a renting consumer is willing to try a new service, she will have to pay twice since she will have to pay for both service until she knows which service she finally wants to choose. Thus, if consumers are uncertain of the benefits of the different suppliers, they will want to keep the current one during the trial period which leads to the existence of a trying cost.\(^{19}\)

Last but not least, renting also creates a “stopping cost”, which is a particular kind of switching cost: would the consumer stop paying the subscription to the service, this consumer would be left without any music at all. This actually creates an interesting strategy-level switching cost. If we consider the case of the consumer owning no music at all, and starting her consumption process with a subscription to a renting online shop. If at some point this consumer decides to switch to another online shop, she would probably not switch to a selling online shop since the cost of buying all the music this consumer was consuming before the switch would probably be very high. Thus, the best choice would certainly be to switch to another renting online shop. Therefore adopting a renting strategy can lead to a situation where the renting consumers will always be forced to choose a renting shop. Although this does not prevent

\(^{18}\) The cost of learning how to use the new service is ignored here although it could be non-negligible.

\(^{19}\) This trying cost can also be present when the renting firm is competing with a selling firm: as the consumer already pays a monthly subscription allowing the access to millions of song, this might create a psychological cost when purchasing even one extra song as the consumer would not have to pay to consume a rented version of the song.
the consumers to switch to another renting shop, it strongly decreases the competition due to selling firms.

In section 1.4, we stated that in an oligopolistic situation renting was a dominated strategy. However, the online music market shows that the renting strategy may be a good strategy when switching costs are involved since, on the contrary of a selling strategy, it actually increases the switching costs - and even create some when there are none.

Some interesting examples of the importance of switching costs can be found in the recent news reports on the online music market. The first one is the battle between Apple and Real Networks regarding the DRM system of the iPod\textsuperscript{20}. As Apple refused to licence its DRM technology, Real reverse-engineered the DRM system and were able to make their music files compatible with the iPod\textsuperscript{21}. This was obviously a big blow for Apple - who qualified the actions of Real as “piratery” - and the iPod’s firmware was updated immediately in order to deactivate Real’s crack. A similar example is the lawsuit intended by Virgin against Apple for Anti-trust law violation aiming at forcing Apple to licence its DRM system and allowing the competitors to accede the iPod’s market.

Another interesting example is the recent switch of strategy of Microsoft’s MSN. Microsoft opened its MSN online music service in September 2004 as a selling only service. However, the service failed to gain a large market share, and during spring 2005, Microsoft switched to a subscription/renting service. This switch of strategy is important as Microsoft was the only firm not selling a complementary hardware to choose a selling only strategy. This choice, which can seem at first surprising, can be once again explained in regards with switching cost and complementarities: The MSN store is based on Windows Media Player, and this software is bundled with every (recent) version of Windows, e.g. more than 80 % of the personal computers on the market. Thus, one can assume that Microsoft chose a selling strategy due to the fact that it assumed the pre-existence of switching costs: Windows Media Player is bundled with every PC, whereas the other players are not and need to be installed and this creates a switching cost\textsuperscript{22}. However, it seems that the complementarity with Windows, and the switching costs induced, were not high enough

\textsuperscript{20}“RealNetworks: Files Play on IPod”, Wired.com, \url{http://www.wired.com/news/technology/0,1282,64341,00.html}.

\textsuperscript{21}As Apple’s iPod has 70 % of the market, not being compatible with it restricts the potential market share to only 30 % of the market.

\textsuperscript{22}This type of strategies is at the basis of the anti-trust trial conducted by the European Commission against Microsoft. it is also worth noticing that this switching cost is far from being negligible: an important factor in the demise of Netscape Navigator against Microsoft Internet Explorer was the bundling - or tying - of Internet Explorer with Windows.
since the market share of the MSN store remained low and Microsoft subsequently decided to switch to a renting strategy. What is also significant is that Microsoft is trying to push the recording company to offer to any consumer switching from the iTMS to MSN a free version of the songs they previously purchased on the iTMS in the Windows Media format. All this shows how it is important to create switching costs for your customers and to reduce the switching costs of other firms’ customers.

To summarise, it seems therefore that the durability of the music is only taken into account once the firm has established a certain level of market power/differentiation due to switching cost. In this situation, as stated by the theory, the firms in an oligopolistic market choose to sell the durable good. However, when firms are not yet protected by switching costs - as stated in section 2.2 the music market is, despite its oligopolistic structure, a very competitive market - the best strategy seems to be renting as it creates switching costs.

2.5 Renting as a long run strategy: the dynamic advantage of renting

Although creating switching cost may be a good reason to choose renting over selling, this choice may be profitable only in the long run. The first reason for that is that renting is a dominated strategy in an oligopolistic market and thus leads to lower profits.

What is more, the inputs are controlled by another highly oligopolistic industry, and thus there is no reason to believe that songs are sold at a different price to the different firms. The monthly subscription charged by the renting firms is usually equivalent to the price of a full album charged by a selling firm. However, consumers subscribing to a renting shop can certainly not be expected to “consume” only one album per month, at least in the first month. Therefore, renting firms, unless they are able to negotiate some specific contracts with the recording industry, are likely to suffer a loss in the short run. If the consumption of the consumers tends to decrease after a few month of subscription (and falls below one album per month) profits will occur in the long run.

However, the main advantage of renting is a dynamic advantage. So far we considered the case of one durable good, i.e. one music recording. Nevertheless, consumers usually consume more than one music recording, and, what is more, usually have a desire for novelty. As consumers are likely to buy recordings on regular basis, the renting strategy can be superior to the selling strategy since it creates long run switching costs. These switching costs tend to restrict competition: a renting consumer would probably not switch to another com-
pany (renting or selling) each time a new recording is produced. Contrariwise, a buying customer does not have any binding relation with the last shop she bought from, and each new recording might lead to the choice of a different shop.

Thus, a renting strategy is advantageous in the sense that it creates switching costs both for the previously obtained musical files but also for the future ones.

The choice between renting and selling seems therefore not to be primarily based on the durability of the good but instead on the switching costs. If a firm has already established switching cost (as Apple, Sony, or as Microsoft thought they had), it is more likely to adopt a selling strategy. On the other hand, a firm with no prior switching cost will have interest to adopt a renting strategy, even if it tends to decrease its short run profits, as it will create both static and dynamic switching costs.

3 Music and quasi-monopolists

The online music market is quite a young market, it is therefore not surprising that the firms on this market are at the moment more concerned with increasing their market share, creating switching costs and barriers to entry – guarantees of a long run advantage – rather than with the problem of durability of the good. However, we can expect that once the market is more mature, the problems associated with the durability of music will become the primary focus of the firms. At the moment, the firms are trying to eliminate some of their competitors, but once this is done, they will face another type of competition: due to the durability of music, they will be in competition with all the units previously sold\(^\text{23}\). Even though this situation should not affect the firms that chose a renting strategy and implemented it successfully, it may be however a problem for the firms that adopted a selling strategy. This might actually already be the case for the firms already protected by high switching costs, since they also have monopoly power. The goal of this section is to study the impact of the durability of music on the profits of monopolistic firms using a selling strategy.

\(^\text{23}\) One famous quote on this subject is “Boeing’s biggest competitor is the used airplanes of today”, recently updated as: “Microsoft’s biggest competitor is still Microsoft” to describe the reluctance of people to switch from Windows 2000 to Windows XP.
3.1 Planned obsolescence and the limits of durability of music

One of the usual ways to solve the problems associated with a durable good is to make it non-durable. When a durable good becomes non-durable, the consumers have to renew their purchase on a regular basis, and thus the Coase conjecture does not apply anymore (Bulow, 1986; Karp, 1996). This type of strategies is usually referred to as planned obsolescence (Bulow, 1986) and can take two forms: either the intrinsic durability of the good - e.g. its quality - is reduced, or a new substitute good with better features is produced and this makes the previous durable good obsolete.

The latter form of planned obsolescence is often used for one particular type of digital good: software. New versions of software and operating systems are released on regular basis, making the previous version obsolete, and pushing consumers to renew their purchase. To this respect, as long as firms release new versions of the software, the problem caused by the durability of software can probably be solved by the adoption of a planned obsolescence strategy. However, music and software are different, and therefore it would be interesting to study to which extent a planned obsolescence strategy could be effective with music records.

As we mentioned in section 1.1, the depreciation of the medium or the obsolescence of the technology could both reduce the durability of a music record. However, we showed that the digital nature of music records - and their clonability - prevents this from happening.

As the intrinsic durability of music can not be reduced, it is worth considering whether it would be possible to make a record obsolete by producing an enhanced version of the same record. This type of strategy seems, at first, feasible and likely to give very good results - this was the case for example when the CD versions of records previously available on vinyl disks were released. However, such significant result was not subsequently achieved when the DVD audio were released. The reason for that is that the new version has to be significantly better than the previous one for this strategy to work. Although this was the case with the Audio CD, the quality of these - close to the actual physical limit of perception of humans - makes it extremely difficult to actually improve the quality of a recording. As any improvement can only be marginal once a recording has been released in a digital form, it is extremely difficult to make a music record obsolete by releasing a new improved version of the same record.

However, obsolescence is not necessarily solely due to the production of a new version of the same good, but can be caused by the production of a close enough substitute. To this respect, the impact of the production of a substitute
will essentially depend on the behaviour of the consumers and more precisely on the degree of substitutability between the goods. For example, a die-hard devoted fan of Elvis Presley will be interested only in recordings of Elvis, and the degree of substitution with recordings of another singer is likely to be very low. As the number of records of Elvis – although large – is fixed, and as there are no close substitutes, Elvis records are durable goods since the demand for records of this consumer will decrease to zero after the consumer achieved to purchase all the existing Elvis records. On the other hand, if we take the example of a dedicated follower of fashion consumer, any new record can make the previous one obsolete since this consumer will only consume the latest hits. In this situation, the durability of a music recording is reduced since it is not very likely that this type of consumers will listen to a record older than a few months.

Between these two extremes, given that the time consumers can devote to the listening of music is fixed, the impact of a new release will depend mostly on the “satiation factor” – e.g. the time the consumers devote to old and newly acquired records and on the difference of quality (or utility) between the newly released record and the previous ones.

Overall, it seems to be very difficult - although possible - to reduce the durability of music. On the contrary of other digital goods, as movies and e-books, music recording have a very high satiation point and can be consumed over and over during years. Only consumers particularly fond of novelties may see music as a non-durable good. Thus, the common strategy consisting in introducing planned obsolescence in order to avoid the loss of market power associated with the selling of a durable good is not likely to be efficient in the case of music.

3.2 Why selling when renting is feasible?

In section 2.4, we showed that selling is the strategy adopted by firms protected by switching costs, whereas the other firms tend to choose renting in order to create switching costs. If the latter seems logical in the light of the arguments exposed in section 2.4, the former might seem more surprising. Indeed, if a firm benefits from switching costs, it means that this firm has a high degree of market power, and in an extreme case where switching costs are particularly high, this firm could even be regarded as a monopoly. If a firm were in this situation, why would such a firm sell?

Such a case is not unrealistic since, for example, the iTunes Music Store has more than 70 % of the online music market, and its switching costs are mostly based on the complementary iPod music player that also represents around
70% of the music players market. These two factors provide the iTMS with a serious advantage and a clearly non-negligible monopoly power. In this situation, one could question the decision of the iTMS to adopt a selling strategy, instead of a renting one, since for a firm with a lot of market power, the Coase conjecture applies, and renting would, in theory, lead to a greater profit.

One explication could be, as stated by Bulow (1986); Bucovetsky and Chilton (1986)\(^{24}\), that the iTMS feels threatened by potential entrants. However, as discussed in section 2.4, we believe that the refusal of Apple to licence its DRM system creates sufficient barriers to entry. Therefore, we think that reason behind the adoption of selling strategies by firms benefiting from switching costs lies somewhere else.

We think that the reasons for which all the firms\(^{25}\) benefiting from existing switching costs decided to adopt a selling strategy is precisely due to the fact that they are supplying a complementary non-durable product. The three firms that decided to sell music instead of renting are Apple, Sony and Microsoft. Both Apple and Sony supply a non-durable complementary hardware. Microsoft supplies a complementary software, the Windows operating system, which can be considered as non-durable since the recurrent updates of Windows tends to make the previous version obsolete\(^{26}\). The very reason for these firms to choose selling over renting despite the fact that they benefit from switching costs – and thus from monopoly power – is actually that selling creates switching costs for the complementary non-durable good. In theory, consumers see renting and buying as equivalent, so the firm should also be rather indifferent between renting and selling – and even should favour renting as this strategy allows to avoid the Coase conjecture. However, in the particular case of the online music market, the firms have an extra advantage: with the help of the DRM system, they can prevent the existence of a secondary market.

None of the online music stores allows the re-selling of purchased music recording. In order to resell a music file, the consumers would have to remove the DRM protection from the file – which is a time consuming process. What is more, once the DRM is removed, the file becomes strictly equivalent, from the consumers’ point of view, to the other illegitimate files available – for free – on the pirate networks. it is therefore very unlikely that the consumer would be able to resell the files that were legally bought.

The absence of secondary market has a very important consequence on the

\(^{24}\) And also discussed in section 1.4.
\(^{25}\) At least at first, since Microsoft subsequently decided to rent music as well.
\(^{26}\) This planned non-durability, instead of actual intrinsic non-durability – as this is the case for the two others, might explain the switch of Microsoft towards a renting strategy. This question is further discussed in section 4.1.
switching costs for the non-durable good. Indeed, for the renting firms the switching costs for the non-durable good are likely to be low. For example, let’s assume that a consumer is renting music on the iTMS and owns an iPod. If this consumer is then willing to buy another branded music player compatible with another rental service, the consumer will just need to stop the subscription to the former rental service, buy a new player and subscribe to the new one. The only switching cost would be to transfer again the songs she likes on the new player.

On the other hand, for the selling firms, the switching costs are likely to be much higher. In the case of the iTMS, for example, the music files can only be played by the iPod. If the consumer decided to switch to a music player sold by a competitor, the consumer would lose the benefits of all the songs previously bought on the iTMS. Of course, this would not be a problem if the consumer were able to resell the music files bought on the iTMS – as music is a durable good, the consumer would be able to totally recover the money spent on the songs and the only switching cost would be to re-download the songs from a new provider. However, the iTMS (or any other firms) is able to prevent – and does prevent – the reselling of the songs. Therefore, the consumer switching to another selling shop would endure a total loss, since it would have to buy the same goods twice and would not even be able to resell the songs purchased on the first store. A consumer willing to switch to a rental service would probably endure a smaller loss, since for the price of the subscription the consumer would be able to download and enjoy as many songs as before. There would still be a loss, however, due to the fact that the new songs are only rented whereas the previous ones where owned and thereby had a greater value.

Thus, the ability the firms have to prevent the existence of a secondary market allow them, by choosing a selling strategy, to create switching costs for the complementary non-durable good. Interestingly enough, we saw in section 2.4 that it is this very same complementary non-durable good that create switching costs for the durable good. Adopting a selling strategy when producing a complementary goods, one durable and one non-durable, allows the firm to benefit from self-reinforcing “looping” switching costs for both goods.

Microsoft’s example is to this respect quite significant. Microsoft – officially to ensure the greatest possible inter-operability between systems – offered its DRM system – and even pushed for its adoption – to any online shop and media player manufacturer. This is at first sight surprising since most of its competitors refuse to licence their DRM system. However, Microsoft refused to

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27 Assuming that the prices of the rental services are the same.
28 Sony is also using a proprietary file/DRM format – ATRAC – on its Connect online shop.
29 Even though the true motives behind this certainly are not, in fact, as noble.
develop – or to let others develop – its DRM systems for any other operating systems\textsuperscript{30}, as Linux or Mac OS. The reason for that is easily understandable if one keeps in mind that the complementary non-durable product for Microsoft is its operating system Windows: any music file using Microsoft’s DRM protection can only be played on Windows creating a potentially huge switching cost for the consumer willing to switch to another operating system. In this case, the consumer would have to purchase again all the music previously bought, since it would not be possible to play the songs protected by Microsoft’s DRM on another operating system.

It is worth noticing that by choosing a selling strategy the firms are subject to the Coase conjecture due to the durability of music. However, due to the absence of secondary market, the more durable music files are sold the higher the switching costs become. One can even imagine that if at some point the consumers bought all the available durable good, the switching costs would be so high that they would not have any choice but to buy the complementary non-durable good over and over. In this case the problem stated in by the Coase conjecture would be solved since the firm would eventually be only selling the non-durable good again and again and would be earning the monopoly profit\textsuperscript{31}.

Thus, selling, by creating high switching costs, solves the problem of loss of market power due to the durability of the good. It could even be in the interest of the firm to sell the durable good as much and as fast as possible – even if it means selling it for a price equal to marginal cost – in order to quickly create a lock-in situation for the complementary non-durable good. The sales of the complementary non-durable could then offset for the loss of profit for the durable good. This type of strategy would be very close to the one adopted by Rockefeller when the Standard Oil was giving away free kerosene lamps (durable) in order to create a large consumer base for oil (non-durable) and a market lock-in.

A similar idea can be found in Marinoso (2001)\textsuperscript{32} who presents a model where

\textsuperscript{30} Despite the fact that they did, however, develop some of their software – for example Microsoft Office and Internet Explorer – for the Apple Macintosh operating system.

\textsuperscript{31} Kuhn and Padilla (1996) show that when a monopolist also sells a non-durable good whose demand is related – as a substitute or as a complement – to the durable good, the Coase conjecture does not hold. This gives another reason to why firms who are benefiting from switching costs sell instead of renting: as the Coase conjecture does not apply, they have no particular reason to rent.

\textsuperscript{32} The focus of Marinoso (2001) is however different from ours since it only considers selling strategies and explores the consequences of tying the complementary products. So far, in the online music market, the complementary products are usually not sold as a bundle.
the production of a durable good and a non-durable complement leads to the existence of endogenous switching costs. In the case where the technologies employed by the firms are incompatible, the endogenous switching costs allow the firm to lock the consumers in and to price discriminate between old consumers and newcomers. The durable part of the good may even be sold below its marginal cost in order to increase future profits.

We can notice that this seems to be the case for the online music market. The original providers of music, the recording companies, usually charge the online music stores a price around 60-80¢ per song. As the price the online music stores usually charge per music file downloaded is 99¢, we can reasonably assume that the cost of running the store – not counting the advertisement – is certainly not covered by the profit margin per song.

4 Selling vs. renting: an empirical evaluation

As we showed in sections 2 and 3, the durability of music is only one of the determinants of the choice between renting and selling. One of the other main determinants is actually the presence of pre-existing switching costs which are most of the time related to the existence of a non-durable complement.

The goal of this section is to use the conceptual elements introduced in the previous sections to practically assess, based on empirical facts, the renting and selling strategies. We will also analyse the impact of piracy on the different strategies.

4.1 Assessment of the selling strategies

For the firms who benefit from switching costs – such as Apple, Microsoft and Sony – the best strategy seems to be, at least at first, a selling strategy. Selling is the optimal strategy for them for several reasons:

- From section 1.4, selling is a dominant strategy when supplying a durable good in an oligopolistic environment.
- From section 2.4, as they already benefit from switching costs, renting is the less advantageous strategy than for the firms that do not benefit from pre-existing switching costs.
- From section 3.2, adopting a selling strategy – due to technological incompatibilities – allows to create switching costs for the non-durable complement which, in turn, reinforce the switching costs for the durable good, and thus leads to a consumers lock-in.
However, we now need to critically assess the efficiency of the selling strategy. By analysing the online music market, and the strategies of the three firms on this market that are also supplying a complementary non-durable, we can notice that the efficiency of the selling strategy only seems flagrant for the leader – the iTunes Music Store. More particularly, it seems that selling is a good strategy if and only if:

(1) The firm produces a complementary non-durable good.
(2) There is an actual tight complementarity with the non-durable complement.
(3) The market share of the non-durable is significant.

These three conditions are required to create high initial switching costs. The firms selling music files certainly all meet the first condition. However, it seems that only the iTMS meets all these requirements.

Microsoft certainly also meets the third condition: the market share of the complementary non-durable – Windows – is certainly incredibly high: around 95% of all the personal computers are supplied with one of the Windows operating systems. However, the second condition does not seem to be satisfied: the complementarity between the Windows operating system is rather weak: having Windows does not require to buy some music – Windows can be, and is used for thousands of other tasks than listening to music. Likewise, listening to music does not require the use of Windows, and on the contrary, using Windows to listen to music only covers one aspect of the music consumption: listening to music in front of a computer. What is more, as more and more people wish to consume music “on the go”, a computer certainly does not represent the easiest way to consume music when walking, travelling, etc.

As the complementarity between these two goods is rather thin, the pre-existing switching costs, despite the very high market share of Windows, are rather low. This may explain why Microsoft, after having launched its MSN online service as a selling only shop, decided a few months afterwards to additionally offer a subscription-based rental service in order to increase the switching costs and ultimately its market share.

The complementarity between the music player produced by Sony and its online music service – Sony Connect – is certainly as tight as the complementarity between the iTMS and the iPod. What is more, Sony started by using a proprietary music file format – the ATRAC format – that ensured that, as for Apple’s iPod/iTMS duo, the only legally obtained music files that could be used on Sony’s digital Walkman players were bought on the Sony Connect store. However, the market share of Sony’s players is certainly lower than the iPod’s, since at the end of 2004, the iPod’s market share was above
80% and Sony’s products market share was less than 1%\(^{33}\). As a consequence, the pre-existing switching costs Sony benefits from are likely to be rather low. Selling certainly allows Sony to lock-in some consumers, however the number of consumers likely to be locked-in is limited due to the low market share of Sony’s music players. It is also worth noting that Sony tried to create even higher switching costs by making its proprietary format, the ATRAC, the only format playable on its Walkman players\(^{34}\). As a consequence, consumers had to convert all the files they already owned – usually in MP3 – to the ATRAC format in order to listen to them on their music player. This was likely to have two consequences. First of all, the consumers were more likely to stick with Sony player since all the files converted to ATRAC were only readable on Sony’s hardware. Secondly, the consumers were even more likely to buy music from the Connect service: as all the files had to be converted, and as converting is costly, this was certainly reducing the opportunity cost of buying the files. However, this attempt to increase switching costs did not work, since consumers were reluctant to buy players that did not allow to play MP3 files, and ultimately Sony had to drop this strategy in order to get a chance to increase its market share.

Microsoft and Sony are good examples that the selling strategy is not necessarily the most efficient one when companies are producing a complementary non-durable good. Indeed, both of these companies’ market share is low, despite the fact that they were among the first to enter the market, and more significantly, their market share is actually much lower than the one of the firms that adopted a renting strategy\(^{35}\).

Thus, despite the fact that pre-existing switching costs certainly can improve the efficiency of a selling strategy – and represent a good reason to choose this strategy, it seems that the sole existence of a non-durable complement, however necessary, is not sufficient. As in the case of the iPod/iTMS duet, there needs to be a tight complementarity between the durable and non-durable goods. Also, the market share of the non-durable good needs to be high enough for the resulting market lock-in to be profitable. Only when all these conditions are present, does the selling strategy have a clear advantage over renting.


\(^{34}\) Sony was the only company to go that far, since all other manufacturers of media players allow, in addition to proprietary format, free format (as MP3, WAV, etc.) files to be played.

\(^{35}\) Both Microsoft’s and Sony’s shops are among the shops sharing less than 1% of the market, whereas Napster and Real, with their subscription based service, enjoy respectively a 11% and a 6% market share.
4.2 Assessment of the renting strategies

In section 2.4, we showed that renting seems to be the best strategy for the firms that do not benefit from pre-existing switching costs. Unsurprisingly, the firms that are “pure music sellers” – meaning that they are not supplying any other complementary product – all chose a subscription-based renting strategy.

The interest of a renting strategy for the firms in this situation is due to the ability of a rental contract to create the switching costs these firms lack of. A look at the online music market allows us to see that this type of strategies seems indeed rather successful. Despite being still far away from the market leader – the iTMS – the three main followers – Napster, RealNetwork’s Rhapsody and Yahoo’s Music Match – all offer a subscription-based service and their market share (respectively 11%, 6% and 6%) is certainly higher than the market share of the firms who do not benefit from high switch costs and decided to sell.

However, despite this relative success, the market share of these firms is, at the moment, rather stagnant, and shows the difficulty of increasing the market share when renting. If this situation seems to be coherent with the disadvantages of renting in an oligopolistic environment, some additional factors may help to explain the relative lack of growth of renting firms.

The first factor that tends to limit the market share of renting firms is due to technological difficulties: the implementation of the DRM system is much more complex for a renting firm than for a selling firm. Indeed, for a renting firm, the DRM system needs to check on regular basis – presumably at least every month – whether the consumer still has the right to play the music file. If this does not create any particular problem when the files are played on a computer – assuming that the computer is connected to the internet – it is an entirely different story when the music files are meant to be played on a music player or burnt on a CD. Music players usually can not connect to the internet and are not necessarily connected to a computer on regular basis. Thus, as a special DRM system – embedded in the media player – is required. However, only a few music players are compatible at the moment with such DRM systems. Thus, a consumer subscribing to a rental service would face a seriously restricted choice in terms of which music player she can purchase in order to listen to the rented music.

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36 c.f. the discussion about Microsoft’s and Sony’s case in section 4.1.
37 See section 1.4.
38 At the moment, only seven devices are fully compatible with Real Networks’ Rhapsody service and eight with Napster’s.
The matter is even worse for the CDs since the current CD-Audio system does not include any DRM system at all. Thus, once a music file has been burnt on a CD, it is impossible to prevent it to be played after the subscription has been stopped. Thus in both case, once the music has been transferred on these media it is very difficult (in the case of the media players) or even impossible (in the case of the CD) for the renting shops to prevent the music files from being played after the subscription has been stopped.

For these two reasons, as it is only possible to fully control the usage of rented music when it is played on a computer, all the subscription-based services also offer the possibility to buy music. The problem is that buying the music is the only alternative when it comes to consuming music on an unsupported music player or a CD audio. As the renting firms are unable to control the usage of the music file once it has been transferred on an incompatible music player or burnt on a CD, this type of actions is only authorised after the purchase of the music file.

Unfortunately, these technological limitations tend to decrease the interest of a subscription-based service since the management of the consumer’s music library subsequently becomes quite complicated. Also, this duality can give the consumer the impression that she is paying twice for the same thing: the monthly rent is paid and in addition the same files – that already have been rented – need to be bought out in order to be consumed on the go. What is more, this is even worse for consumers who tend to consume the same songs over and over: due to technological limitations, they have to buy these songs; but if they always consume the same songs, why would they continue paying the subscription once all the songs have been bought?

The incompatibilities and the limitations of the DRM systems tend to seriously undermine the interest for the consumers of a subscription service. Unless the music in only consumed on a computer, then it is probably worthwhile using a selling service instead of a renting one since the music will ultimately have to be bought in any case.

In addition, the restricted compatibility with the music players has another negative effect on the market share. All the online music services are very close substitutes to each other: they usually have roughly the same catalogue and operate in the same way via similar interfaces (thus the learning switching costs are low). On the contrary, the digital music players are less close substitutes: they have different features, shape, size, colour, price, etc. Therefore, chances are high that the consumers will first choose a music player, and only once the music player has been purchased, they will consider which online music shop to choose. Thus, being compatible with a limited number of music players is a factor limiting the potential market share. What is more,

\[39\] For example, not being compatible with the iPod – which is the case of all the
increasing the compatibility with music player is not an easy task since:

- Some of the music player manufacturers (Apple, Sony) own their own music store and will make sure to keep being incompatible.
- The music player manufacturers are reluctant to invest in a DRM system that is not standard and none of the DRM systems of the renting firms has enough support to become one.

Thus, despite the fact that renting strategies can be more advantageous than selling strategies when the switching costs are low or inexistent, such strategies tend to limit the potential market share due to the technological limitations of the DRM systems. More precisely, the inability to control the usage of the rented music forces the renting firms to require the purchase of the music files – in addition to the rental – for the consumption activities they can not control (incompatible music players or burning CDs). Therefore, the advantages that consumers can see in a subscription-based service over a selling service are seriously undermined. What is more, as all the online music shops are very close substitutes and that music players are not as close substitutes, the consumers will tend to choose the music player first. As a consequence, a low compatibility with music players will tend to lead to an even lower potential market share.

4.3 Renting and selling vs. piracy: the durability problem revisited

As we showed in the previous section, the choice between renting and selling as a strategy depends mostly on the prior existence (or not) of switching costs. However, the music market is subject to an intense piracy phenomenon and thus we need to assess the performance of these two strategies with regard to piracy.

It is worth noticing that piracy has both a direct and an indirect impact on the firms. The indirect effect is that as music files are available on the pirate market or peer-to-peer networks, this tends to decrease the demand for “legal” music. Still, one can reasonably assume that this effect is exogenous and is the same for all the firms, regardless of whether they are renting or selling. It is true that music purchased from an online store could be subsequently cracked and distributed on the peer-to-peer networks. However, this is rarely the case as music files are usually available at the same time on the pirate and legal markets, and that regular CDs, due to the absence of protection, are a

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online shops except the iTMS – restricts the market share to at most 30 % since the market share of the iPod is 70 %.

40 It is worth noticing that the only universally supported format is the MP3 and that this format does not embed any DRM.
better source for pirates. Our analysis will therefore focus on the direct effects of piracy, which are endogenous and depend on the strategies chosen by the firms.

One important thing to mention is that all the DRM systems currently used by the firms on the online music market are unable to prevent piracy. The first reason is that it is usually possible to burn the legitimately downloaded music on a regular Audio CD. As this Audio CD is unprotected, it is not only possible to produce as many copies of this CD as one wants, but also the music on this CD can subsequently be re-encoded to an unprotected format (usually MP3) and used on any media player. Also, some software available on the internet allows to remove the protection of any protected music file without having to re-encode the file.

As none of the existing protection systems is really better than the others, all the firms of the market are facing the above described problem. However, depending on whether they are selling or renting, piracy can have either a small or a large impact on their profits.

For a selling firm piracy has not a large direct effect. Once the good is bought, the consumer remains the owner of the good, thus the only interest of cracking the music file would be to remove some limitations introduced by the seller.

For a renting firm, the matter is different since these techniques can be used to remove the necessity for the consumers to pay the rent in order to enjoy the music. Indeed, as long as the music files are protected by the DRM system, the consumers will not be able to play the rented music files without an active subscription. However, if the consumer is able to crack the music files, she will be able to listen to the music afterwards without having to pay the rent. Due to these technological limitations, renting firms can therefore be subject to pillaging. After paying the first rent, consumers have access to an impressive amount of files (more than a million music files are available on most of the online shops). The consumer can then download and modify music files so that they can be played even without subscription. On the contrary of a selling

41 It is worth noticing that this technique, in addition to allowing piracy, can also be used to switch from one shop to another one without loosing the benefits of the music previously obtained. This might also be used, for example, to listen to music not purchased on the iTMS on an iPod.

42 All firms are aware of this bias in their protection system, and some tried to remove the possibility to burn the music on a CD. However, an important part of audio systems (Hi-Fi, car audio player) still rely on CDs, and this removal was not well accepted by the consumers.

43 As the inability to burn more than a pre-defined number of Audio CDs, or the fact that the music can not be used on more than a defined number of computers/media players.
service, there is no extra price to pay when downloading additional music, therefore the only marginal cost borne by the consumer is the cost of removing the protection embedded in the file. Thus, a consumer could subscribe for a month, download a large number of files, transform them and stop the subscription after just one month. As long as the marginal cost of removing the protection is low, this behaviour is likely to beat both buying and renting music from the consumers’ point of view.

Of course, one can reasonably assume that the consumer will be afterwards willing to obtain new music files. The question is whether the consumer would then prefer to subscribe again to a renting service or to buy some additional songs from a selling shop\textsuperscript{44}. This question is very important since if the consumer really likes novelties, and is often willing to obtain a large quantity of new songs, she would probably choose to subscribe to a renting service\textsuperscript{45} and in this situation, it would probably not make much sense to pillage the service in the first place.

However, if the taste of the consumer is such that novelty is not a primary concern, the best way to obtain additional music songs is to buy them, as they are few of them\textsuperscript{46}. In this case, the following opportunistic behaviour could occur: the consumer subscribes at first to a renting service, creates her musical library by downloading and removing the protection of the songs, terminates the subscription to the service, and subsequently buys any desired new songs from a selling service. In the worst case, the consumer could actually wait for a few months, until there are a lot of new songs that she would like to obtain, subscribe for one month, get and modify the songs, terminate subscription and so on.

This opportunistic behaviour would be quite catastrophic for the renting companies. First of all, this would create a great financial burden, since the renting service would have to pay the upstream recording companies for each song consumed in the first place by the opportunistic consumer\textsuperscript{47}. In addition, if the consumer terminates the subscription after the first month, the renting company never gets a chance to recover the costs incurred. Also, recording companies are at the moment very sensible to the problems of piracy and

\textsuperscript{44} We do not discuss here the completely opportunistic behaviour that would consist in pillaging a subscription based service, and obtaining any additional song through pirate channels.

\textsuperscript{45} One can reasonably assume that any consumer willing to add more than a few albums per month to his or her collection would probably be better off renting.

\textsuperscript{46} At the current market prices, this is typically the case when the consumer is willing to obtain less than one album/10 songs per month.

\textsuperscript{47} Despite the repeated demand of the renting firms, asking to switch from a per-song basis to a fixed payment per volume/month, the recording industry has so far always refused to reconsider the way royalties are paid to them.
could decide not to sign any further agreement with renting companies, as they would be seen as encouraging piracy.

Thus the renting strategies are particularly sensitive to piracy, since they give to the consumers the possibility to adopt an opportunistic behaviour. However, the adoption of this behaviour depends mainly on the tastes of the consumers. More particularly, the more customers have a strong preference for novelties, the more the renting strategies still have chances to be successful, and this is for two reasons:

- The consumers are less likely to stop their subscription, even if they are opportunistic, since the new songs released each month make it worth paying the monthly fee.
- The consumers are more likely to choose a rental service over a selling service since paying for every new song released will be much more costly than paying a flat monthly rental fee.

This is quite paradoxical since a renting strategy is supposed to be a more efficient strategy when the good is durable. However, if consumers have a strong preference for novelty, it means that the durability of music tends to be reduced. Therefore, the renting strategies actually seem to be more efficient when the good is less durable. The opposite reasoning applies for selling: a consumer who does not enjoy novelties a lot will probably not sign up for a rental service and thus would certainly choose to buy instead any – rare – novelty that she might be interested in. This, therefore, implies that a selling strategy is more likely to be successful with consumers for whom the music is more durable.

This result is actually the complete opposite of the traditional results on durable goods. The reason behind this may, however, be easily understood once the particular nature of music as a digital good is taken into account. The literature (Coase, 1972; Bulow, 1982) shows that renting is more efficient when supplying a durable good because of the ability of the renting firm to recover all the rented units from the consumers. Thus, the consumers have no choice but to pay the rent every period if they want to consume the good, making the rented durable good the equivalent of a one-period lasting non-durable. However, were the renting firm unable to recover the rented units, the result would be completely different: in this situation, the renting strategy would be less advantageous than the selling one since the consumers would only pay one rent, in order to get the good, and then would stop paying and would still be able to consume the good.

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48 See section 3.1.
49 Assuming than the consumers have a strictly non-null discount factor, and as long as there are several periods of time, the rent to be paid per period is necessarily lower than the price to pay in order to buy the good.
To our knowledge, this type of question hasn’t been given a lot of attention in the literature – why study a renting model where the producer can not recover the goods rented? However, this is exactly what is likely to happen with digital music due to its particular nature. Music has the same attribute as a knowledge-based good (Quah, 2002), and for the same reasons that it is not possible to rent an idea without a proper IPR system, it is not possible to rent music without a DRM protection system. As there is no efficient protection system, consumers always have the possibility to keep consuming the music file they rented after they stopped paying the rent if they remove the protection. Of course, this removal of the protection system comes at a cost, but one can reasonably assume that the more the music file is durable for the consumer, the more it would be worthwhile removing the protection. In any case, the cost of removing the protection is likely to be lower than the cost of buying the good. Thus, the particular nature of digital music, and the piracy, tend to inverse the optimal strategies with respect to the durable goods: a renting strategy tends to be more efficient when the good is rather non-durable, and a selling strategy tends to be more efficient when the good is rather durable.

4.4 Selling, renting and market segmentation

In the previous section, we showed that, due to the existence of piracy, the choice between renting and selling should be based on the durability of digital music. However, due to the particular nature of music, and more precisely, due to the ability that the firms have with the DRM to prevent the existence of secondary markets, the durability of music is not, as it usually is for other goods, an objective characteristic of the good. It is instead linked to the preferences of the consumers towards music and novelties. Therefore, in this situation, the durability ceases to be objective and intrinsic to the music but instead is subjective and intrinsic to the consumer. Thus, as the best choice of strategy depends on the preferences of the consumers, and as the tastes of the consumers are likely to be different, we can therefore expect to observe some degree of market segmentation.

A market segmentation is likely to occur between consumers having a strong taste for novelties – and thus a low satiation point – and consumers who, on the contrary, tend to consume the same songs over and over. In this case, the firms targeting the first type of customers would be better off renting music whereas the firms targeting the second type of consumers would certainly choose a selling strategy instead. A firm aiming at capturing the whole market would probably wish to offer two types of tariffs – one based on renting and the other one on selling – since otherwise competitors could offer an alternative strategy (renting if the firm is only selling and vice-versa) and capture a part of the market.
However, in order to have a more accurate idea of the phenomenon, we prefer to consider the way consumers build their digital library\(^{50}\). Following the model of Bourgine and Rayna (2005), we can reasonably assume that when consumers start building their music library – i.e. when they are young – they have more chances to be attracted by novelties\(^{51}\). There are two reason for that: their library being empty, they have to acquire other recordings in order to consume, and also one can reasonably assume that they are not necessarily sure of their own preferences – or that their preferences are changing. On the other hand, as their library builds up, one can expect that they will be less attracted by novelties for the opposite reasons. Firstly, because they would already have a large quantity of recordings in the library they can choose from for their consumption. Secondly because, as their experience as a consumer increased, it is very likely that they will be more selective in their choices, as they know better about their own taste. Ultimately, we can expect old consumers to seldom add new songs to their library.

From this point of view, it means that consumers having a high preference for novelties are likely to be young and, on the contrary, the one having a low taste for novelties likely to be old. Therefore, it would mean that renting would be a better strategy for firms targeting young consumers and selling a better strategy for firms targeting older consumers\(^{52}\). This idea is interesting because it allows us to assess further the respective merits of the two types of strategies. More precisely, it gives us an insight on which substitute market the renting and selling firms are competing with.

As a renting firm is more likely to attract young consumers – due to their taste for novelty and their relative lack of experience – one of the first obvious competitors are the radio stations: they play novelties and help the consumers to discover their preferences. It is thus not really surprising that all the subscription-based music services also include thematic radio channels in the service package. A less obvious competitor is piracy – piracy among friends and peer-to-peer networks. Pirate channels offer the same advantages as rental services: they allow consumers to access to a lot of novelties, and also help the consumers to explore their taste\(^{53}\). The fact that they are more likely to attract young consumers is not a good thing for the renting firms since these consumers also are the most likely to pirate due to the following reasons:

\(^{50}\) By digital library we mean all the digital goods that belong to a particular individual.

\(^{51}\) Not necessarily novelties in the sense of newly released recordings, but rather as recordings that are not in their library.

\(^{52}\) Or if we reverse the reasoning, it means that renting firms are more likely to be chosen by young consumers and selling firms by older consumers.

\(^{53}\) Consumers can listen to a lot of recordings at virtually no cost, and then possibly decide to purchase the ones they really like.
• The difference of costs: one can not really say that piracy is necessarily cheaper than paying for a rental service since piracy leads to higher search costs, for example. However, the costs associated with piracy are mostly non-monetary costs, but rather time-based opportunity costs. As young people usually have a lot of spare time and not a lot of money, chances are that the piracy will be more suitable for them.

• The difference of durability: rented music files are, by definition, non-durable whereas the pirated files are. As the expected time of consumption for young people is very large, this can give an incentive to choose piracy over renting.

• The networks: piracy is facilitated by large and connected networks, and it is certainly when people are younger than they are in this type of networks.

Thus, one of the disadvantages of a renting strategy, because of its adequation to people consuming novelties – and thus young people – is that it is directly competing with piracy. As the young consumers are also the ones that are most likely to pirate, a renting strategy will tend to lead to a limited market share. It is also worth noticing that these young consumers are also the ones that have the strongest incentives to develop the opportunistic behaviour, described in section 4.3, towards the subscription services.

The market segment targeted by selling firms is of course different, and one can reasonably expect the substitute markets to be different as well. However, in June 2004, Apple’s C.E.O. Steve Jobs stated that

“It is piracy, not overt online music stores, which is our main competitor.”

Our analysis tends to confirm the second part of this assertion: renting online music stores are indeed not the main competitors of the iTMS since they tend to target a different type of consumers. However, we doubt that the main competitor of the iTMS is in fact piracy.

As shown in the previous paragraphs, renting firms are particularly sensitive to piracy due to the fact that piracy is a close substitute. However, according to our analysis, selling firms and pirate networks are not competing directly. A selling strategy is more likely to attract people that have a low preference for novelty, and thus for whom music is very durable. These types of consumers are likely to be older than the ones highly attracted by novelty, and thus we can reasonably assume that they have more money, and less time – or that the opportunity cost of spending time to acquire music is higher for them. As discussed above, this type of consumers is more likely to choose buying over renting. However, we still need to assess whether they would choose buying music online over pirating.

Downloading songs on a pirate network is rather time consuming – it takes time to set up the software, to learn how to use it, and to search for the files – and as time is more costly for these consumers, they certainly are less likely to pirate. On the other hand, as they are not much attracted to novelties, and see music as very durable, these same consumers are the ones that are very likely to buy the traditional Audio-CDs. CDs are costly and very durable (no restricted usage), and these two properties certainly match with the tastes of consumers that only rarely add music to their library, but who will consume the added music over and over.

Thus, it seems that the main competitor of the selling online stores is not, as stated by Mr Jobs, piracy, but instead the traditional CD market. A further justification of this can be given by comparing the costs and benefits of piracy with the other ways of acquiring music (renting online music, buying online music, buying a CD).

We already mentioned that the costs associated with piracy usually are non-monetary costs. More precisely, these costs are due to:

- Rather high initial learning costs: the software allowing to access pirate networks is not necessarily user-friendly. Different networks require different software, and the functioning of these networks can also be quite disparate.
- Rather high initial search costs: the consumer needs to know which network to use, and may have to find a suitable server or group of servers. Some servers or groups might be dedicated to a certain type of music and the consumer would need to find out how to join these servers.
- Additional costs due to the illegality of piracy: some servers of networks are shutdown or disappear. Some might also become less popular. It is therefore very likely that a consumer pirating once every semester would probably have to bear again some learning and searching costs since it is very likely that the networks or server she was previously using are not available anymore.

These costs, however, are all related to the set-up of the computer in order to pirate and are independent of the number of files subsequently downloaded. They are therefore fixed costs, and once the system has been properly set up, the marginal cost of downloading additional songs is very low since only small search costs are required.

Renting music online is also associated to a high fixed cost: the monthly subscription fee paid by the consumers. The marginal cost – assuming that the consumer does not have to buy the songs due to incompatible DRMs – is negligible since it is only related to search costs that are here minimal.

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55 See also section 4.2 p. 26.
On the contrary, the fixed costs associated with buying music online are extremely low, and rely solely on some inevitable learning costs. The marginal cost, however, is rather high since it is the price of a song that needs to be paid for each music file purchased.

Likewise, the Audio-CDs have very low fixed costs. The marginal cost is, however, even higher than with the selling music stores since the price of a CD is higher than the price of an album purchased online. What is more, there is an additional non-monetary marginal cost due to the fact that each new CD has to be converted – ripped – into a format suitable to be played on a music player.

All these costs are summarised in table 1 and clearly indicate the degree of substitutability between these different ways of obtaining music. Both pirate networks and renting online music stores have high fixed costs and a low marginal cost. As mentioned earlier, these two are therefore more suitable for consumers having a strong preference for novelties and thus are substitute markets. However, the fact that the benefits of rented music are very low in comparison to pirated music, that the fixed costs for piracy are opportunity costs, and that consumers liking novelties are likely to be young and thus have a low opportunity cost, are quite unfavourable for renting online shops. What is more, if the DRM system is not compatible with the media players of the consumers, these will have to buy the songs in order to transfer them on the media player. This means that the marginal cost is far from being negligible and depends on the price per song and the number of songs the consumers wish to transfer to their media players. In this case, we can expect that the renting firms will have a lot of difficulties to compete with piracy since both fixed and marginal costs are higher and the benefits are lower.

Table 1
Costs/benefits comparison between pirate networks, online music and Audio CDs

<table>
<thead>
<tr>
<th></th>
<th>Pirate networks</th>
<th>Online renting</th>
<th>Online selling</th>
<th>Audio CD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed costs</td>
<td>High*</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>- high learning costs</td>
<td>low learning costs</td>
<td>low learning costs</td>
<td>low learning costs</td>
<td></td>
</tr>
<tr>
<td>- high setup costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marginal costs</td>
<td>Low*</td>
<td>Negligible/High**</td>
<td>High</td>
<td>Very High</td>
</tr>
<tr>
<td>- small additional search costs</td>
<td>(price per song)</td>
<td>- price per song/album</td>
<td>- price per CD</td>
<td></td>
</tr>
<tr>
<td>- additional costs</td>
<td></td>
<td></td>
<td>- conversion cost *</td>
<td></td>
</tr>
<tr>
<td>Benefits</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>- total durability</td>
<td>limited durability</td>
<td>relative durability</td>
<td>total durability</td>
<td></td>
</tr>
<tr>
<td>- unrestricted usage</td>
<td>(very) restricted</td>
<td>restricted usage</td>
<td>unrestricted usage</td>
<td></td>
</tr>
</tbody>
</table>

* Non-monetary costs  
** Depends on the compatibility of the DRM system

The selling online music stores, on the contrary, have very low fixed costs and high marginal costs. Their cost structure is roughly the same as the Audio-CD, and we can therefore expect them to directly compete for the same type
of consumers: the ones that have a low preference for novelty. The comparison between these two does not lead to a clear winner since the costs are likely to be higher for the CDs and the benefits lower for the online music. The difference in terms of costs relies on the fact that a CD usually costs more than the same album purchased online and that the CD leads to some additional opportunity and financial costs. The presence of opportunity costs is clearly a drawback for the rich consumers since their time is very valuable, and therefore, we might expect them to find the online music less costly. Likewise, poor consumers might also be put off due to the higher cost of the CD. Whether the consumer chooses a CD or online music then depends on a trade-off between this higher cost of the CD and its higher benefits. However, the recent continuous growth of the online music market compared to the decline of the CD market tends to show that the firms selling online music have more advantages. It is also worth noticing that the technologies introduced lately, aiming at decreasing the piracy due to the copying of CDs, are certainly a good news for the online music firms. As these technologies decrease the benefits of the CD – its usage being now restricted – they tend to make the online music even more attractive, and thus have the opposite effect of their initial purpose, as they tend to reduce further the market share of CDs.

As they correspond to different needs and different preferences, the selling and renting firms are in fact targeting different market segments. They are therefore not necessarily direct competitors. The main competitor of renting firms is clearly piracy. According to our analysis, this is the one of the main reasons behind the relatively low market share of renting firms: a cost/benefit comparison between rented music and pirated music certainly favours the later, especially since the targeted consumers are likely to be young. What is more, the problem of incompatible DRM systems hinders further the potential growth of renting firms. To be successful with a renting strategy, the firms should therefore rely on strategic alliances favouring the consumption of rented music. Napster, for example, managed to sign some agreements with universities whereby the universities agreed to include the monthly subscription to Napster in the tuition fees. Such agreements are obviously beneficial for the market share, even though this might not be enough to overcome the disadvantages of rented music.

As one of the main problems of the renting firms lies in the incompatibility of rented music with music players, the potential market share would certainly be

\textsuperscript{56} The CD needs to be converted to a format playable on a media player, and on the contrary of online music, there is no instant delivery of the product, and the consumer may even have to bear some delivery/transportation costs.

\textsuperscript{57} Regan (2005) shows that even when students already benefit from bundled Napster subscription, they still tend to favour iTunes instead, mostly due to the incompatibly of Napster with some media players, and more particularly with the iPod.
increased if a standard inter-operable DRM system were established. However, one can assume that renting firms would certainly be reluctant to agree on such a system since it would deprive them from one of the main advantages of renting: the switching costs. Thus, as we can not really expect competing firms to set-up a standard, the only way towards standardisation would be through a \textit{de facto} standard. This would happen if a big-enough firm were able to convince most of the hardware manufacturers to adopt its DRM system, and, as a consequence, would be able to drive all the other renting firms out of the market. Such a situation would be very similar to what happened with the operating systems and the computer market in the 80’s, and this is certainly not by chance that Microsoft switched recently to a renting strategy. Microsoft would have enough power to push the manufacturers to adopt its DRM system, which ultimately could allow it to take over the whole renting market segment. However, incompatibilities are only one of the disadvantages of rented music, and this alone would probably not be sufficient to win the competition against piracy. Strategic alliances – which are in fact the equivalent of the O.E.M. contracts\textsuperscript{58} signed by Microsoft with the computer manufacturers – would be required to gain an advantage over piracy.

On the other hand, the success of the leading selling firm, the iTMS, can certainly be explained by the fact that the consumers targeted are less likely to pirate music. Indeed, the main competitor of selling firms seems instead to be the Audio-CDs. Despite the undeniable higher benefits of the CDs, its higher costs and some additional disadvantages tend to favour the online music over the CD. Thus, it is not obvious that the growth of the music sold online actually decreased – or will decrease – piracy. Our analysis suggests that, on the contrary, the increased market share of the selling online firms was gained on the CD market share and only marginally on the pirate networks. However, this is an advantageous situation for selling firms since it is much easier to compete with Audio-CDs than with piracy, especially since the release of technologically protected CDs, which decreased further the intrinsic value of CDs. We can therefore expect the market share of selling firms to increase steadily over the next years since it is very likely that online music will progressively replace the CD the same way that the CD once replaced the vinyl discs.

\textsuperscript{58} These Original Equipment Manufacturer (O.E.M.) contracts basically mean that Microsoft Windows is supplied – bundled or tied – with any PC sold by the manufacturers. This protects Microsoft against piracy since at least one copy of Windows is supplied with every computer sold. If such contract did not exist, Microsoft would probably only sell very few copies of Windows.
Conclusion

The starting point of this article was to compare and assess the relative performance of renting and selling strategies when supplying digital music. In section 1.1, we showed that due to its digital nature, music can be considered as a durable good. As a consequence of this durability, selling music should lead to the total loss of market power predicted by the Coase conjecture, and thus the music files should be sold at a price equal to the marginal cost. However, the literature shows that if the good is rented instead of being sold, the loss of market power can be avoided and a monopolist choosing to rent music would be able to obtain the monopoly profit.

Nevertheless, section 1.4 shows that if renting is a good strategy for a monopolist, selling is a dominant strategy in the oligopoly case. Thus, as music is durable and the online music market is oligopolistic, we should expect all the firms on the online music market to sell music. In section 2.2, we noticed that, despite this theoretical result, less than half of the firms of the online music market actually chose a selling strategy, the others preferring a subscription-based renting strategy.

Section 2.4 shows that the reason for choosing a renting strategy in an oligopolistic environment is that renting, on the contrary to selling, creates switching costs. We also noticed that all the firms of the online music market that chose a selling strategy already benefited from switching costs created by the presence of a complementary product. On the other hand, the firms that chose a renting strategy are the firms that do not benefit from pre-existing switching costs, the choice of such a strategy thereby allowing them to create the switching costs necessary to reduce the competitive pressure. In addition, section 2.5 shows that renting also brings a dynamic advantage since consumers are more likely to acquire new songs from the same shop.

The third part of this article was devoted to a closer study of the firms selling both music and a complementary product. More precisely, we examined what would be the consequence of the durability of music on these firms who are protected by high switching costs – and therefore benefit from a rather high monopoly power. Section 3.1 shows that the usual strategies based on depreciation – or planned obsolescence – aiming at solving the durability problem, are not likely to be used in the case of music. This is due to the various degrees of substitutability between music files but also due to the high satiation point for music – as opposed to movies or books.

In section 3.2 we wanted to understand why the firms benefiting from high switching costs – and hence form monopoly power – were selling instead of renting. We found that as all these firms produce a complementary non-
durable good, selling is a better strategy since it creates switching costs for the non-durable good which, in turn creates switching costs for the durable good. Therefore, selling creates a loop of switching costs. What is more, the problem of durability of music tends to disappear since the firms can then use the sales of non-durable good to compensate for the low profit of the durable good.

In Part 4 we decided to use the theoretical concepts discussed in the previous parts as well as some empirical facts in order to critically assess the merits of selling and renting strategies. Section 4.1 shows that for the selling strategies to be efficient, not only a complementary non-durable product is required, but this complementary non-durable good also has to be strongly linked with the durable good and also has to have a high market share of its own. If this is not the case, adopting a selling strategy might lead to a lower market share than renting, as the switching costs induced are too low.

In section 4.2, we assessed the performance of renting strategies. We stated that despite displaying a rather good performance when no prior switching costs are involved, the positive effects of renting strategies are limited due to technological constraints. The lack of compatibility with media players tends to limit the market share, especially since consumers tend to chose the media player first – as they are less substitutable – and only consider afterwards which online music service to choose – as music services are highly substitutable.

We then, in section 4.3, evaluated the impact of piracy on the online music market. We showed that piracy only has a negligible direct effect on the selling strategy, and on the contrary, may be very harmful for renting strategies since opportunistic – pillaging – behaviours can appear among the consumers and seriously damage the profitability of a renting business plan. We then demonstrated that the presence of piracy tends to inverse the usual results found in the literature regarding the best strategy to adopt when supplying a durable good. More precisely, we showed that due to the inability of renting firms to recover the rented music – consumers can remove the protection and keep using the files – renting actually becomes a better strategy when the good is less durable, e.g. when the consumers have a strong preference for novelty. On the contrary, selling is better when the good is more durable – since the more durable the good is, the more incentives consumers have to bear the cost of removing the protection.

Section 4.4 shows that the ability the firms have to prevent the existence of a secondary market changes the durability of the good from an intrinsic and objective property to a subjective preference-based characteristic. As the good can not be resold, the intrinsic durability of the music itself is not relevant anymore, and the actual durability will depend on the tastes of the consumers,
e.g. how many times a consumer is expecting to consume the same music file. As the durability of music is thus not homogeneous and depends on the consumers’ preferences, market segmentation is likely to occur. We showed that renting is more likely to attract young consumers due to their taste for novelties. However, in this market segment, renting firms compete with both radio and pirate channels, and the relative lack of financial resources of the consumers in this segment means that they are more likely to choose the two latter rather than renting firms. On the other hand, we showed that, as selling firms are more likely to be chosen by more mature consumers, the direct impact of piracy is lower. More particularly, we demonstrated that the main competitor of selling firms is, in fact, the traditional Audio-CD market. Our analysis shows that, on the contrary to renting firms that face an intense competition from their main competitors – the pirate channels, online firms selling music have some strong advantages over the Audio-CD market and are expected to gain a significant market share from the firms supplying Audio-CD.

Overall, this article shows that the impact of the durability of music on the choice of strategies of the firm is, as expected, significant. Nevertheless, due to the particular nature of digital music, the effects of durability are different from those discussed in the literature on durable goods: renting is in fact a best strategy when the durability of music is lower, and selling when the durability is higher.

We believe that this article also provides with some insight on the consumers’ behaviour regarding the consumption of digital music. We also argue that when the preferences of consumers are heterogeneous, market segmentation is likely to occur, and thus both renting and selling firms might coexist. In this case, the competition between these two types of firms becomes rather indirect, and renting firms are more likely to compete directly with pirate channels whereas selling firms compete with the traditional Audio-CD market.

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