

Software piracy and producers developers' strategies

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Abstract

Confronted with an increasing phenomenon of piracy and the floss competition, which strategy has to adopt an editor of software? In this paper we show that editor can develop a momentary strategy called *tolerant piracy* in order to face the illegal copy phenomenon. But also in order to face the substitution risk of Floss software.

On the one hand it appears that tolerant piracy strategy durably allows an increase in the network effects, on the other hand to impose the compiled software as a standard which will reduce the competition of the floss software.

Keywords: software piracy, tolerant piracy, network effect, illicit competition, substitution.

1. Introduction

There is a common sense about the joint existence of two types of products within the software market. On the one hand, there is the compiled software, on the other hand, the so-called "open free source" software (Floss).

This excludes *de facto* an important dimension of the market, which refers to the usages practices of software, more precisely, the use of illegal copies ("pirate" software). As of 2008, piracy practices have reached considerable levels in France, wherein the piracy rate is estimated at 45 % and the calculated loss of income was about 2,9 billion Euro¹.

Nevertheless and in spite of the importance of income losses, the editors decreased their fight against the hacking of their software, in particular in the years 80-90.

What is the impact of piracy practices on the software market? What margin does the piracy phenomenon leave to the FLOSS software? Does it modify the current aspects of the market, by interfering in the strategic choice between FLOSS and proprietary software?

The objective of this paper is to explain why a producer of software can allow a certain degree of piracy for his software.

On the basis of software market's study, we shall identify, firstly, the various forms of piracy, what types of software and to which extent they are affected by this phenomenon, (countries, users' types, circuits and emerging conditions). Secondly we shall identify the software market and its main features. We shall analyze, finally, the implications of piracy on current business strategies.

¹According to an annual study of IDC (Interactive Data Corp), performed to the Business Software Alliance (BSA) association, which has been entrusted with the fighting against the piracy of their products, by the publishers(editors) of software (Adobe, Apple, McAfee, Microsoft, Symantec).

2. Description of software market

Besides, the existing competitive dynamics on the software's market with the continuous innovation and the risk of substitution between the various types of products (floss and proprietary). There is a risk of illegal copying or piracy that can be considered by an economist point of view and competition law, as a particular shape of "illicit" competition.

This illicit industry is a priori done at the expenses of the compiled software industry, and software editors try duly to reduce it.

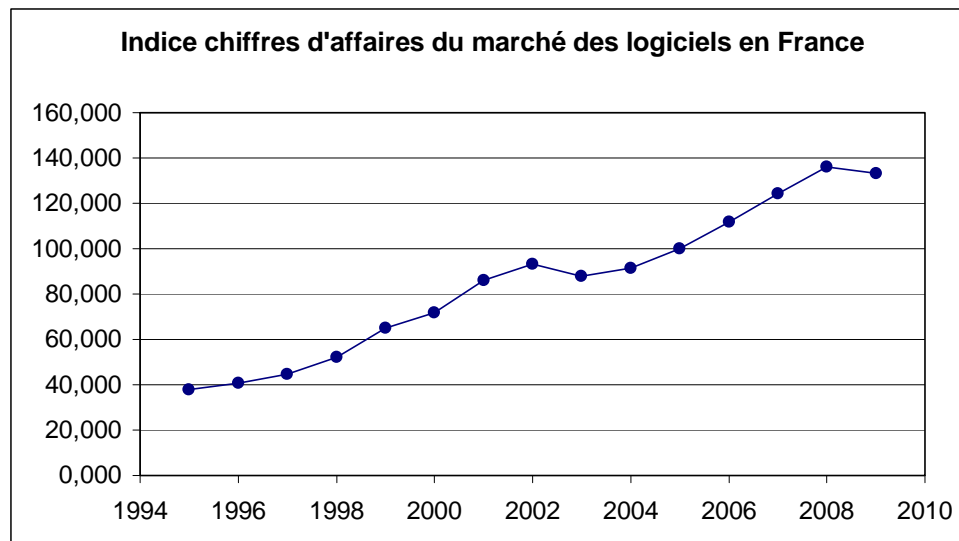
But it also impacts on the development of the floss "industry".

We shall insist in the presentation of the software market on three aspects:

- The continuous progress character.
- The oligopoly character.
- The double competition:
 - a) Between floss and compiled software
 - b) And between piracy and compiled software (without forgetting the impact on the floss industry)

3.1 Progress and oligopoly character

The following plan shows the evolution, globally continuous, of the growth of the market of the French software, which reached the 140 million euro in 2008.



Source : Insee 2009²

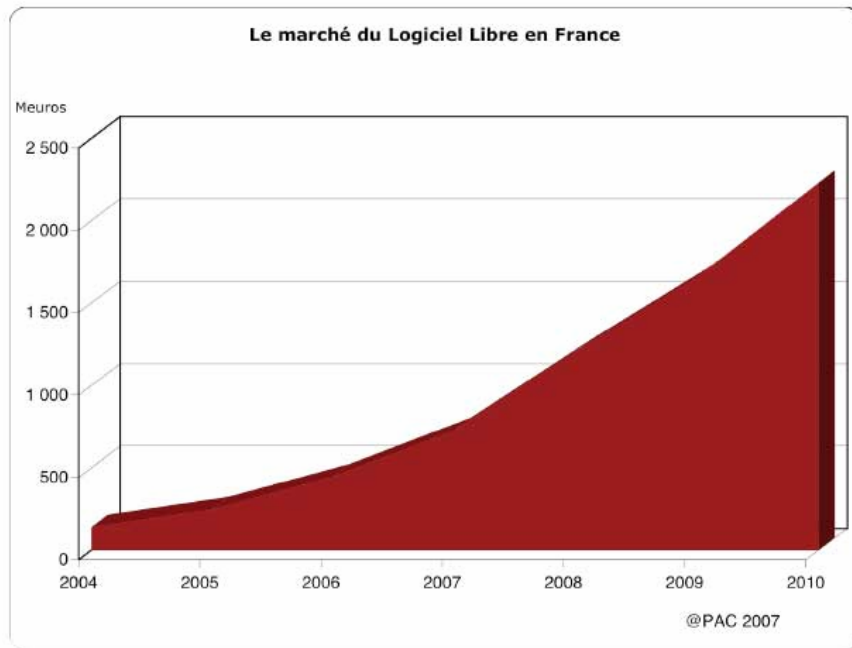
The large profit which this growing volume of sales yields is partially due to the oligopoly character of the market. As an example, the PC's market, over which reigns Microsoft, and in which there are only three types of products: Mac, or, mostly, Microsoft, and recently Linux, with for a very long time and always barriers between the three.

² Indication of turnovers in the services - - Edition of software - Identifier: 001567030.

3.2 The double competition character

a) The substitution between compiled software and floss

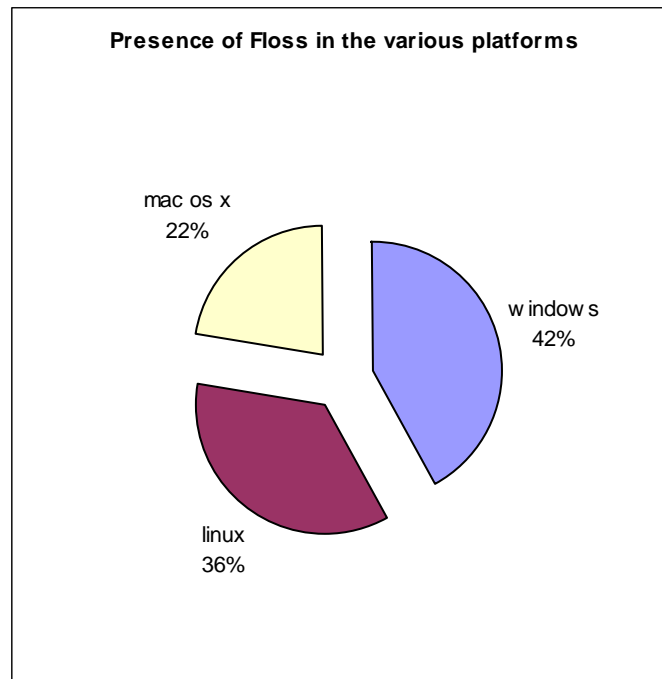
For ten years, things however change on the software market. We observe a certain partial opening with the entry of the floss which is in progress in France. According to the study of the PAC, the market of the floss in France will represent in 2009 not less than 1.5 million euro, with a 50 % growth rate in 2008.



This competitive dynamics is limited to the proprietary software, and it seems inappropriate to say that price competition is at work when we introduce floss. It seems much more a question of common practices. Indeed, there are at present no studies or no solid statistics to tell this established fact. The term which will agree best is the one of substitution or migration from compiled software to floss.

To take an example, OpenOffice is for the most part of the users an excellent alternative to Microsoft Service, but there is no "market", where these offers would be confronted and would meet the demand. Nothing comparable to the market of the hardware, where various products with their prices and their descriptions are presented. The social and organizational conditions of a real competition do not exist, thus distribution modes, strategies of marketing and control of markets...

At present, one very large number of floss exists on a platform Windows, as well as on Apple (which made it even an axis of its new strategy). There is doubtless today more floss installed on Windows than on Linux (for PC). There is even floss – with GPL license - which works only for Windows. According to the site Framasoft: on 1451 floss, 1228 turn in Windows, 1042 in Linux and 657 in Mac OS X.



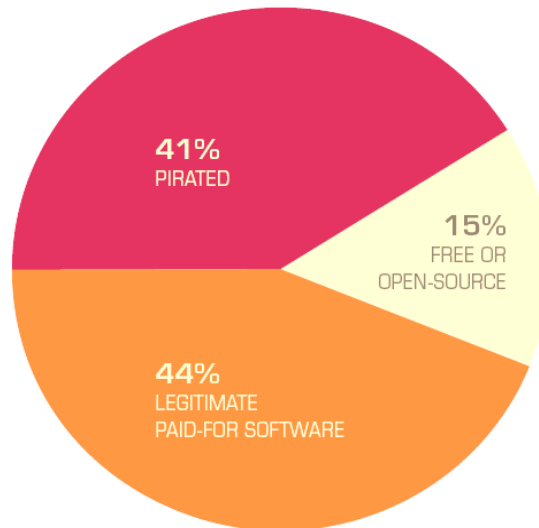
On the other hand, for certain programs, there is really no alternative open source (and thus competition): as for example for the games, where the piracy is important. The subdivision of the market is then total; with a lock in effect which often imposes Windows as a standard as well to the users as to the producers of hardware. Nevertheless, this doesn't exclude the fact that floss can replace the proprietary software.

b) The illicit competition between compiled software and piracy

Piracy doubtless makes shadow to the floss, especially for the commercial distributions of Linux. It is for example the case in China, where the versions pirated by Windows "compete" with that of Linux. But the most important point, outside the countries where it is practically an established or dominant shape of distribution (like in Georgia where the piracy rate reaches 98 %), is the fact that the piracy is completely situated in the proprietary universe. Piracy glorifies in a certain way the compiled software, which is certainly pirated but always preferred to a floss alternative (by voluntary choice or ignorance).

It emerges from a recent survey in 110 countries, published by the BSA³ (2009), that 41 % of the installed software, on personal computers is a pirated version, 15 % of freeware and 44 % of compiled software.

³ we suppose that the study concerns software of application and basic software such as the operating system, the datum base, antivirus, office



Source: Sixth Annual BSA-IDC Global Software Piracy Study, may 2009

3. Presentation of piracy

2.1 Significance

The Code of the Intellectual property stipulates in one of its articles that:

L.122-4 « Any representation or reproduction complete or partial made without the assent of the author (...) is illicit »

L.335-3 « The imitation (...) is the violation of one of the author's rights (...). »

The piracy can thus define itself as being any situation of malpractice of intellectual property rights (copyright). To acquire software, is not at all an appropriation of property rights, but rather an acquisition of some right of usage. Piracy can be considered as a derivative product stemming from the existence of intellectual property rights in the same way as contraband is a product emanating from the existence of customs duties.

On software piracy, there is a literature, which comes up with a general explanation of the existence of the piracy phenomenon. The basic argument stands on the properties of the numeric goods which facilitate their piracy. The not exclusive and no rival character of the software facilitates the sharing of these goods and the behaviour of "free rider".

In these conditions, the theory demonstrates that the equilibrium of the market is not optimal and that an intensification of the copyright can lead a net increase of the social well-fair.

The loss of the collective surplus, is caused by the under production, because the not appropriation caused by the piracy, incite the producers to decrease their productions. The social well-fair is also reduced by the under consumption of the no pirates users, who anticipate a price reduction of the original software (*Novos et Waldman, 1984*).

2.2 Typology of piracy

There are several types of software piracy classified by their importance degree in five big categories:

- **Industrial Imitation**

This type of piracy is often made under the shape of a software reproduction, which is engraved on CD - ROM, and supplies with documentation and a license, identical to legal software. They are afterward sold on Internet on sites as eBay⁴.

- **Download and illegal sharing of software via Internet**

The development of the Internet, by reducing the cost of distribution of the numeric goods, allowed the emergence of platforms of exchanges between individuals. According to a study made by the IDC (2008), the number of individual in the world having access to Internet amounts at present to 1.2 billion persons and this number increased in one year about 135 millions among which 100 millions in emerging countries (or emerging market).

Certain platforms⁵ became fast the place of exchanges, on which users share works protected by the intellectual property right (essentially video, music and software) by violating the legislation on the copyright⁶.

- **Piracy by the users**

The Piracy by the users is particularly made by small and medium firms and by private individuals, who reproduces software copies without authorization in purposes of personal or commercial usage.

According to a study IDC published by BSA in May, 2007, 45 % of the software installed on microcomputers in France in 2006 lacked license.

This piracy can take on the following forms:

- Abuse of license: install a program under license on several computers.
- Change copies of software under license.
- Acquire software for a usage different from that planned by the license.
- Copy software with the aim of an installation or of a distribution.
- Benefit from update offers without having a previous legal copy.

- **Piracy by the sellers of hardware**

It is the case of certain retailers of hardware who install a not authorized copy of commercial software on a computer system. The most known is "Hard Disk Loading" which is an illicit copy of a software on the hard disk of computers and which the hardware seller can charge

⁴ Business Software Alliance: BSA study, 2009.

⁵ Peer-to-peer technology including applications like eMule, Kazaa, bearshare, and limewire.

⁶ Traffic consumes is between 49% and 89% of all Internet traffic in the day. At night, it can spike up to an astonishing 95%

in the global cost price of the material. The user pays then pirated software which he does not possess an original copy and documentation.

- **Misuse of the customer-server**

This type of piracy occurs when a company has a local area network (LAN), used simultaneously by several employees.

If the company decides to install programs on the server, she has to make sure that the license authorizes it and that the number of users is not superior to that authorized by the license, without which it is in situation of «misuse».

2.3 The scale of the phenomenon

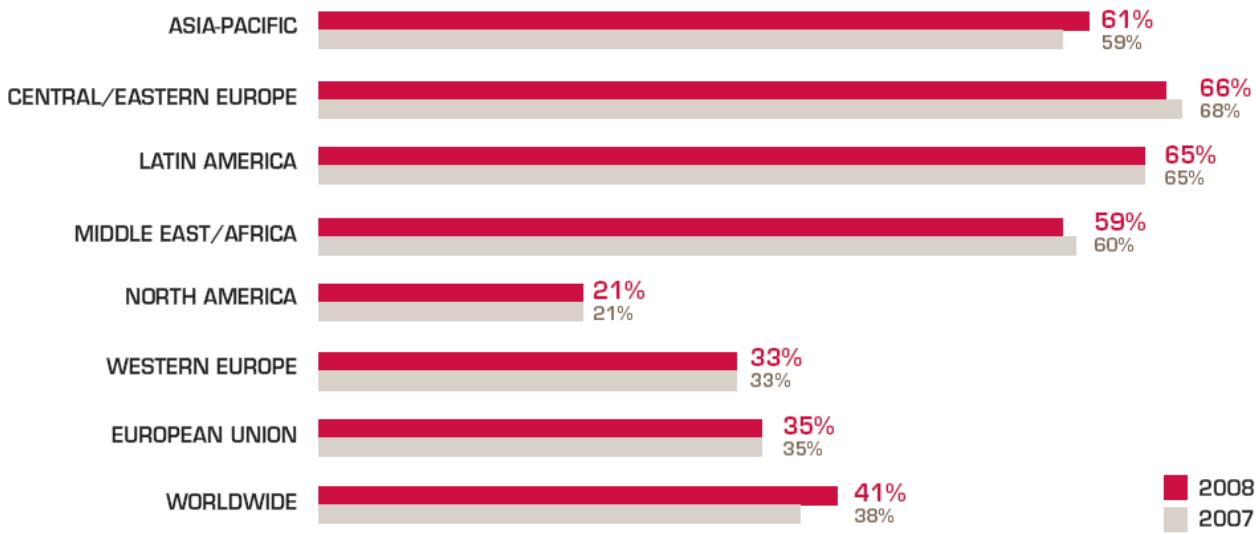
A BSA study precise that the 5 most pirated editors with most products available on eBay are:

- 1- **Microsoft**
- 2- **Adobe**
- 3- **Apple**
- 4- **Corel**
- 5- **Symantec**

A study carried out by Software and Information Industry Association (SIIA) in 2007, indicates that the most pirated software by the professional users (in particular companies), is software of application and more exactly the products Symantec and Adobe:

| The 10 most pirated software | Description |
|------------------------------|-----------------------------------|
| Adobe Acrobat | Text editor |
| Symantec PC Anywhere | Control of remote computer |
| Adobe PhotoShop | Creation and alteration of images |
| Autodesk AutoCAD | Publishing computer- |
| Adobe DreamWeaver | Aided design of Web sites |
| Roxio Easy CD/DVD | CD-DVD burning |
| Creator | CD-DVD burning |
| Roxio Toast Titanium | Immediate messaging |
| Ipswitch WS_FTP | Transfer of files |
| Nero Ultra Edition | CD-DVD burning |

The piracy phenomenon touches the majority of the countries in the world without distinction, but in different proportions



SOURCE: SIXTH ANNUAL BSA-IDC GLOBAL SOFTWARE PIRACY STUDY, MAY 2009

This phenomenon is rather complex to analyze, seen the important number of variable which come into play: change of the professional or particular computer hardware, the use of the software, the retail chains, and the durability of the software... This phenomenon varies from a country to the other one, this variation can explain on one hand by the cultural difference between countries, but also by the anti-piracy laws difference and of their applications (Enforcement). The last report of the BSA (2009) adds to this list the supplementary factor of the financial crisis.

It emerges from this report, that two countries on five exceed the rate of 90 % and that more half exceeds the 70 %.

We shall focus on the European market and more specifically on the case of the French market, where the rate of piracy is about 41 % according to the report of the BSA of 2009.

| | Piracy in France | | | | | | |
|-------------|------------------|--------|--------|--------|--------|--------|--------|
| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
| Piracy Rate | 42% | 45% | 47% | 45% | 45% | 47% | 41% |
| Income loss | \$2,60 | \$2,67 | \$3,19 | \$2,92 | \$2,31 | \$4,29 | \$4,08 |

Source: BSA, 2007 Global Software Piracy Study, Released May 2008

4. The Model

We distinguish a software market on which there is two agent's position; on one hand a producer of software and on the other hand a user, with a degree of technical skill and some specific need for the given software.

The producer can opt for a proprietary solution or floss alternatively. The user can either buy at a given price or pirate the software, or learn how to use the floss if it exists.

4.1 Piracy

Piracy is the result of an arbitration made by the user in view of the price of the compiled software, and of the expected cost of piracy.

His decision has to take into account his skills and the usefulness of the software, as measured for instance by its level of diffusion (network effect).

So the decision of piracy is a positive function of the price (Px), a negative function of the penalty (R), a positive function of the skills (T) and a positive function of the usefulness of the software pirates (U).

Piracy occurs if its expected cost is much below the price of the software, given a certain level of skills and certain usefulness...:

$$g(T, U) > h(Px, R)$$

The real condition which makes user pirates software; is that this software engendered on one hand a high utility and on the other hand requires a high price. The utility implies a strong learning effect and network effects which increases with the number of the consumers using the same software.

Brian Arthur (1989) developed a model in which an unpredictable event leads to a situation of progress dependence (path dependency). The equilibrium obtained in such a model is equilibrium with increasing return which can be ineffective in case of irreversible choice.

Arthur by formalizing a situation of dependence of progress in the case of technology diffusion identifies five sources of increasing returns on adoption (RCA) or network effect:

- Learning by doing;
- Externalities of network;
- Economies of scale;
- increasing returns on information;
- And technological interrelations.

We shall be interested in what follows in the effect of learning by doing as main element of increasing returns on adoption (RCA) or network effect.

We can at this stage establish the function of a global demand M addressed to software market:

$$M = N_i + N_p$$

With M: global demand of the software
NI: legal demand for proprietary software And Np level of piracy

4.2 User pirates

Studies on piracy show that there are generally two types of user's pirates, particular and professional.

It was proved that it is easier to detect the piracy of the professional and to repress it with some costs of repression, that the particular users. « It is far more difficult to catch and punish home consumers who pirate than delinquent firms. » (J Slive and D.Bernhardt (on 1998), p. 889).

A recent report published by the BSA, (2009) also demonstrates that:

- The particular users are more dynamic than the professional users, in the installation and the replacement of the former versions software (often pirated) by new pirated versions.
- The professional users, the academic and the administration staff often use versions pirated on their new hardware because of the variety of their suppliers who are not still the same.
- Small and medium firms use more that the big companies pirated versions, seen that these ones buy software at unknown editors.

We propose in this paper a second classification of pirates according to their degrees of technical skills. We shall distinguish between two type of pirates; active pirates and passive pirates:

- The "passive pirates" do not possess enough technical skills to pirate software, but they get back rather old versions with their circle of acquaintances or via forums of exchanges. In generally, passive pirates are present in some type of piracy like the download, the piracy by user and in misuse of server.
- The "active pirates" are competent in decoding and updating pirated versions. They serve generally as support of diffusion of pirated versions towards the passive pirates (via forums or by informal exchanges between persons). Active pirates are at the origin of the industrial imitation and the piracy by buyers.

The group of the "active pirates" is less many than the "passive pirates" group, and it is generally more long-lasting in the piracy, of made of their dependences and their learning strong. Their use of the pirated versions is not momentary and can be made together with legal versions proprietary and floss. They are moreover more difficult to recover as legal users by the editors as it requires very high costs of repression.

The demand of the pirates can thus be detailed as follows:

$$N_p = N_a + N_i$$

With Na: the demand of the active pirates and Ni: the demand of the passive pirates

Secondly, we retain that it is easier for a producer to repress piracy when done

- a) in a professional environment than by a particular for its own use. :
- b) by a passive pirate seen the limits of his technical skills.

We insist *in fine* in the fact that the skills exists only for an active pirate and the utility differ if the pirate is active or passive.

4.3 Risky situation in terms of piracy and floss replacement

To protect software against the piracy requires repression costs averagely high, which vary from software to the other one and from a country to the other one.

The main idea which we remind is that anti-piracy strategies can have one impact on the future of the pirated software by reducing its externality effects and by increase the probability of its substitution by the other solutions (in particular by the floss ones).

The problem that arises for an editor, is to distinguish the various situations of risk engendered either by a replacement of the software by other, or by an illicit acquisition of this one.

This situation can be expressed through a matrix articulating two axes; the software's price and the degree of independence of a user towards this software (expressed by the network effect).

We establish that:

- **P** is the risk of piracy and **p** is the absence of this risk.
- **Pa** is the risk of piracy by active pirates
- **F** is the risk of Floss replacement and **f** is the absence of this risk.

Risky Situation Matrix

| | | | |
|------------------|---|----------------|------------|
| | | Network effect | |
| | | - | + |
| Software's price | + | F + Pa | P+f |
| | - | F + p | p+f |

By basing on the matrix, three situations at risks in terms of piracy and floss substitution are to be distinguished:

- A situation (**P+f**) where the software engenders high learning's effects, but seen its high price, the risk of piracy is strong as the software becomes indispensable and rare.

More the price of the software is high and the degree of dependence (in terms of learning effect) is strong more the probability of piracy is strong.

- A fragile situation where the software has not yet success to be a standard (**F+p**). In the case when the learning effect is weak, the editor can encourage the usage by offering his products temporarily free or durably free but with technical limits (the freeware and the shareware) in order to reduce the risk of replacement and floss migration.
- A situation of replacement of the software and piracy risk if the software does not engender enough network effects and if its price is higher than the need which it engenders (**Pa+F**). This situation concerns especially new products with high potential that can attract actives pirates.

The optimum for an editor will be to capture the user by creating an independence and a need towards the software (strategies of lock in and network effect), and then to sell the software to a high price. But the risk of piracy is strong; in particular if the technical skills of the user pirate are strong, hence a strategy of repression and anti-piracy should be developed.

4.4 Classic anti-piracy strategies

The dynamics of innovation on software's market makes sometimes that software is pirated at once after its distribution and sometimes even before its diffusion⁷.

To protect their software against piracy, editor should develop anti piracy strategies which can be bounded by diverse factors; mainly by the cost of control, but also by the feasibility of the control (respect for the personal freedoms, technical means, enforcement institutions.....).

We will look *a priori* at two types of strategies that can be employed by software developers, as to confront piracy:

The first strategy corresponds to the situation in which, because the substantial repression costs, editor is obliged to leave segment of the market unprotected, as to allow a positive correlation between pirated and compiled software (future profit) which in fine could encouraged the adoption of future versions. (Shy and Thisse, on 1999).

The second and most classic strategy consists of the software protection with different costs of repression, according to countries and some other factors.

The strategy of the producers will be translated by the implementation of alliances as the BSA⁸ (Business Software Alliance) or the SIIA (Software and Information Industry Association), or also the IFPI (International Federation of Phonographic Industry).

The repression strategy can be sometimes translated by means of pressure used by alliances, during their investigation on certain companies. In order to oblige the purchase of certain software, in particular those of Microsoft.

The strategy of repression depends on the costs of control and the potential profit in terms of fines tied with repression and the increasing network effects.

The value of the fines is higher in case of the professional pirates, but difficult to establish in the case of actives pirates.

⁷ case of the Iphone.

⁸ www.bsa.org is an organization mainly compound by Microsoft, Adobe, Apple, Cisco, McAfee....

4.5 Tolerant piracy strategy

Given the importance and the complexity of piracy phenomenon, in which adds the risk of substitution by other types of software (in particular the floss), editors were pushed to the implementation of new strategies.

The main research issue to be tackled in the course of this presentation consists of defuse the idea that anti-piracy strategy can be developed in two situations:

- in a situation of weak learning effect in case of new product. In such situation, the editor can allow the temporary piracy of his software, “*strategy of tolerant piracy*”, in order to encourage the use of his software and the increase of its network effect.
- in a situation of great network effects that makes control difficult and that corresponds to mature software. In this sense Bill Gates declared during a conference to the University of Washington about China where the piracy rate is the highest: « *they are not ready to pay the software, then as much as they pirate ours.* ».

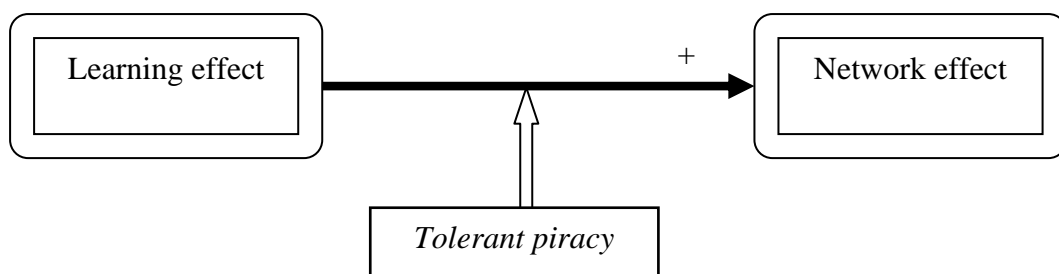
This strategy is possible seen the selling price is not at the maximum and the losses are weak by comparison to the potential profits.

We identify two phases bounded to the diffusion rate evolution and control costs:

- Phase A: in which learning effects still weak. To attract possible users and create an effect of lock in, a strategy of incentive in the learning and adoption can be set up (freeware and shareware). But the producer can also tolerate a certain degree of piracy necessary to attract potential users and create effect of lock in.

The strategy of “*tolerant piracy*”, consisting on monopolizing potential markets by acquaintance potential clients through the use of “home-made” products and by encouraging their learning effects and the dependence on the software (lock in).

The idea as showed by the graph:



This strategy can be organized in a situation where the producer estimates that the software is engendering learning effects necessary for its adoption and to strengthen the adoption of its future versions. But its application should be temporary and up to certain degree of adoption,

beyond the which, it becomes preferable for a producer to apply a strategy of repression (or not it depend of the cost of control and its feasibility).

- Phase B: in which the costs of control increase substantially, the strategy of the producer in that case is the not repression of piracy, because they would be very expensive to control the pirates (in particular active ones) and to repress them (the fines applied to the private individuals are generally lower than those professional users). Even the feasibility of control becomes difficult (Technical limits) and uncertain to get back completely the illegal users.

Conclusion

Face to the piracy phenomena, editor has the choice between to repress or to allow the piracy by making arbitration between control cost and potential benefits. This situation is more difficult to analyze with the presence of floss replacement risk.

An editor has to develop a mixed strategy to face the floss competition called tolerant piracy.

The tolerant piracy strategy can be adopted at first to increase the network effects of the software and to reduce the competition of the floss.

This strategy is then imposed allows as it become difficult to control the diffusion of the software.

Research opportunities

The complexity of piracy phenomenon is forcing the producers of software to dig a distance between them and the pirates, by constantly proposing new products or new versions which can shift the “interests” of the pirates. With sometimes a risk that the new versions are technically weaker than the former ones.

The dynamics of the innovation could be so considered as a will to face this illicit shape of the competition.

Without certain users made independent to the use of certain software, by forms of incentive learning and adoption (freeware and shareware), will see inciting (in indirect way and in case of high price) to prefer to pirate the software in its purchase, in particular if they have technical skills.

Référence:

BSA, FIFTH ANNUAL BSA AND IDC GLOBAL SOFTWARE 2007,
http://global.bsa.org/idcglobalstudy2007/studies/2007_global_piracy_study.pdf.

BSA, May 2009 | SIXTH Annual BSA-IDC Global Software, 08 PIRACY STUDY,
<http://global.bsa.org/globalpiracy2008/studies/globalpiracy2008.pdf>

Dyuti S. Banerjee « Software piracy: a strategic analysis and policy instruments »International Journal of Industrial Organization, Volume 21, Issue 1, January 2003, Pages 97-127

Cheng, H. K.; Sims, R. R.; and Teege H. "To Purchase or Pirate Software: An Empirical Study'," Journal of Management Information Systems (13:4), Spring 1997, pp. 49-60.

Liebowitz, S. J. "Copying and Indirect Appropriability: Photocopying of Journals'," Journal of Political Economy (93:5), 1985, pp. 945-957.

Liebowitz, S. J. "Durability, Market Structure and New-Used Goods Models," American Economic Review (72:4), September 1982, pp. 816-824.

Novos, I. E., and Waldman, M. "The Effects of Increased Copyright Protection: An Analytic Approach," Journal of Political Economy (92:2), 1984, pp. 236-246.

Shapiro, C. "Economic Effects of Home Copying," mimeo, Princeton University, May 1988.

Takeyama, L. N. "The Welfare Implications of Unauthorized Reproduction of Intellectual Property in the Presence of Network Externalities," Journal of Industrial Economics (62:2), June 1994, pp. 155-166.

Varian, H. "Buying, Renting, and Sharing Information Goods," Working Paper, School of Information Management and Systems, University of California, Berkeley, May 1999.

Ram, D. Gopal and G. Lawrence Sanders "Preventive and deterrent controls for software piracy Source", Journal of Management Information Systems archive, Volume 13 , Issue 4 (March 1997)

Sang Hoo Bae and **Jay Pil Choi** « A model of piracy », Information Economics and Policy Volume 18, Issue 3, September 2006, Pages 303-320.

Sougata Poddar "On Software piracy when Piracy is Costly", WP national university of Singapore, January 2003.