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Effects and opinion about piracy in the interactive entertainment industry.

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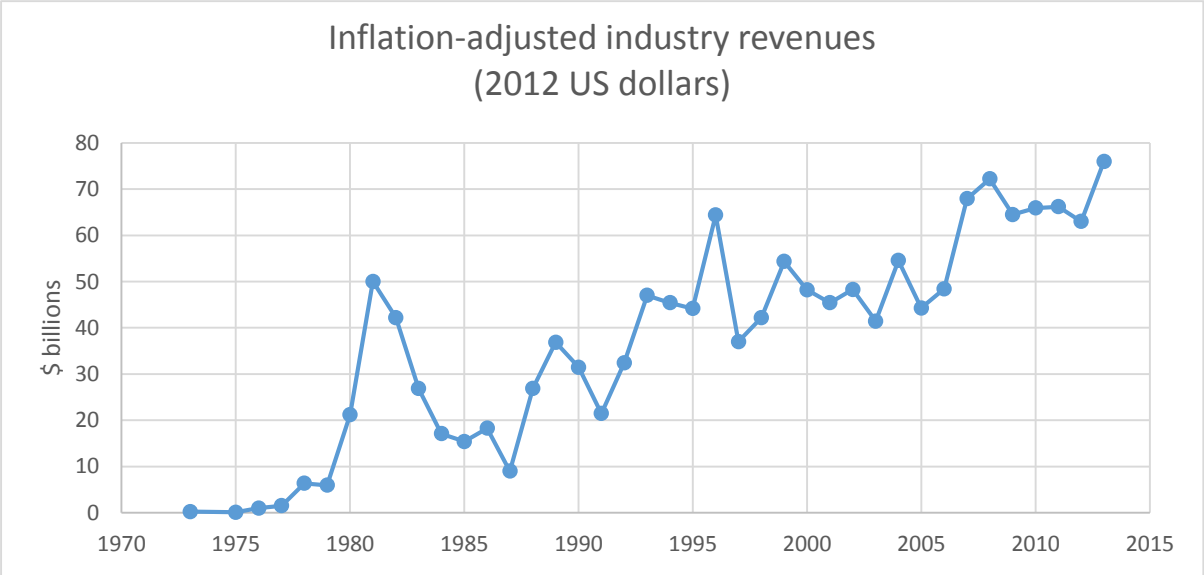
Introduction.

- **A little bit of history.**

The interactive entertainment industry is a young, developing and growingly important market, where the rapid pace of technology dictates continuous changes. It was born in 1971 when the first arcade video game, Computer Space, was released. After that Atari's Pong hit the jackpot selling over 19.000 cabinets as Lipson & Brain report. In 1972 the first home entertainment system was also released, the Magnavox Odyssey. Smaller home gaming stations were just a minor revenue factor, arcade games were the focus, they were sold in heavy cabinets and could be found in bars or public places, and quarter by quarter in 1973 the video game industry was worth over $40 million. Video games popularity was such that many firms started producing Pong game clones giving rise to an excess in supply which eventually led to the 1977 video game crash. Luckily in 1978 the Japanese company Taito released Space Invaders a blockbuster arcade game which sold over 360.000 cabinets all around the world (1), giving new life to the market. The title was then licensed to Atari, a home interactive entertainment firm which itself revived the home sector of the industry with the introduction of the Atari 2600.



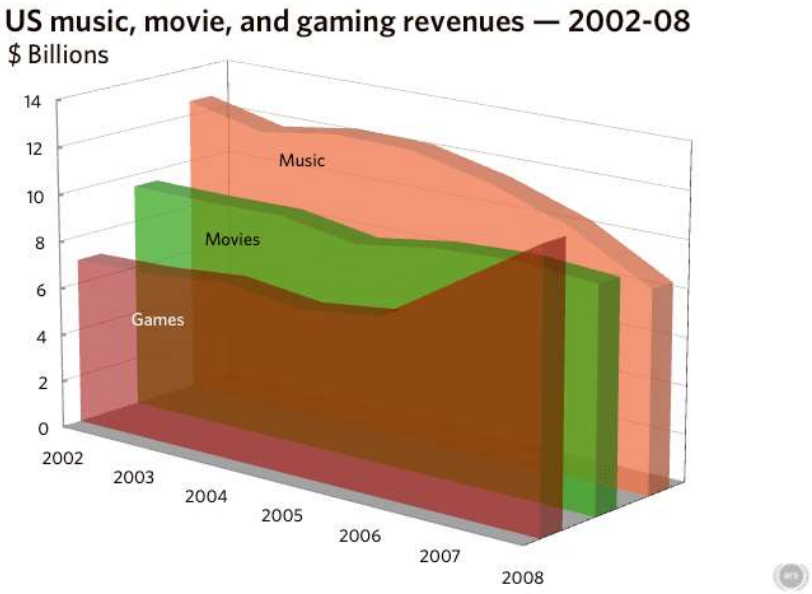
The period from 1979 to 1982 was called the golden age of video games, as we can see from the graph industry revenues were around $50 billion in 1981. In 1983 the North American IE industry suffered again from too much supply of badly developed titles led to the video game crash of 1983. The Japanese response to the North American crisis was the Nintendo Entertainment System or NES which was introduced in 1985 and become very popular revitalizing the market once again. At the same time home computing was also becoming widely available and professional video games companies were starting to proliferate in Europe. This new sector in the interactive entertainment industry took over the market due to many factors like miniaturization and improvement of hardware for 3D graphics and mobile phones, adoption of User Interface (opposed to command line) operating systems and the development of the internet. In 1995 sales reached $44 billion. Since then the industry flourished, more and better games have been developed and the 2000 revenues amounted to over $48 billion. After year 2000 a new category of gaming devices boomed: mobile and social gaming were born. Since the introduction of mobile games the industry was flooded with independent developers who didn't stay in the business for long, sometimes developing one app and then leaving, using the product as a cash cow due to its low initial investment and a high volume of sales at a low price point ($0.99). Unfortunately independent developers didn't last for a long time, they were substituted by powerhouses that developed games on the base of the insane amount of statistics available for the mobile market. The heavy use of such statistics led developers to conform, the variety of games suffered and many games are now developed with the precise aim of being cash cows by adopting the pay-to-win strategy trough microtransactions. Thanks to this new business model video games industry revenues in 2013 exceeded $76 billion.

- **Is the video game industry really bigger than Hollywood?**

It has been since 2009 that rumors such as these are around. In that period Avatar was released grossing around $230 million, almost simultaneously Modern Warfare 2 was released and it more than doubled Avatar's revenues. Since then a trend can be spotted, if we compare the blockbusters of the two categories we observe a solid discrepancy between movies and games sales. But why is this happening? Is it because games are more engaging than movies or is there something else that increases the gap more and more every year? Well, unquestionably games have a totally different enjoyment structure than movies, they make you feel involved and part of the story, almost absorbing the player. On top of this, figure yourself hearing the news that a sequel of your favorite film is being shot, what is the first thought that comes to your mind? I guess it is "I hope it's as good as the first". It's a well-known phenomenon that Hollywood sequels have poor storylines and the overall enjoyment of the movie is not as high as expected. What you might not know is that in the gaming scene sequels are long awaited and most of the times their rating are better than those of their prequels. This often happens because between one release and the other there are substantial changes in the hardware capabilities thus giving the chance to developers to not just make a sequel of the game but to improve the overall aspect and design.

Marketing in the gaming industry plays a central role, in fact (probably without the movie industry even noticing) many best-selling games whose plots were very similar to some of the movies, were released only a short while after the movie was released. Unfortunately testing the relevance of this hypothesis can be very hard.

Last but not least, what is revenues data really taking into account? For the interactive entertainment industry we expect to find: accessories, consoles, digital content for games (updates but not only), games sales (digital or physical) and rental fees. On the other hand only box office revenues are measured and it is unlikely when speaking of the movie industry that DVD players, accessories and rent are taken into account and of course there can't be "expansions" for movies.



Many theories are being made but a very simple explanation can be extrapolated from this. Written stories followed oral storytelling, theatre followed written stories and the cinemas casted a shadow on theatres. Is this the era in which movies will be overcame by interactive games?

- **Mobile gaming, what is changing?**

Mobile gaming has been around for a while now, since the introduction of the well-known "snake" game on Nokia phones in 1997 it was clear that the mobile gaming sector was going to flourish. Since then not a single phone was marketed without at least one game in it. As time went by phones evolved adding colors to the screens, support for Java and internet connection, many companies recognized the endless opportunities technology could offer and started to open gaming related branches. However technology was not fully developed yet and the market struggled to bloom. It was in 2007 with the launch of the iPhone that the true potential of the industry was unleashed, the new phone didn't just feature the biggest touch screen display but for the first time in history an online marketplace called the App Store, where third-party developers could upload their creations, was established. This new feature marked a turning point for the mobile interactive entertainment industry because creators and

users could interact without the phone company interfering. It generated such a positive response from the public that since its introduction in 2008 the Apple App Store counts over 50 billion downloads and almost one million applications.

What really is shifting attention from console/home computing to mobile gaming is that last year there was a total of 6.8 billion mobile subscriptions a much higher number compared to consoles and computers. Unlike video games that cost on average of $50, mobile games are distributed through micro-transactions ($0.99) this low price point enables developers to insert in game content that would be impossible to insert in more expensive games, such as advertisement and pay-to-unlock features.

Moreover mobile gaming embraces social features, something that other consoles tend to forget. I'm not talking about multiplayer, which is well established, but of a new kind of games that requires the player to interact with other players asking them for resources and help publicly, acting as a sort of advertisement for the game and attracting more customers.

If you think that mobile gaming is just kid's play think again, in 2012 sales revenues were around $12 billion, in game advertisement almost reached $1 billion and additional game content sale was around $6 billion totaling $19 billion.

- **The value of human capital.**

Games are not easy stuff to deal with, 30 years ago a blockbuster game merely contained one dot and two moving lines, this was not an easy task to achieve at that time but in the end development costs were not very high. As time went by, hardware advancements and miniaturization brought several changes in the scene, increasingly powerful CPUs and graphics cards allowed for higher levels of model complexity and world details. Just to bring an example about the famous series of GTA by Rockstar Games: GTA V has 15 to 20 times the amount of details GTA IV had. This means that teams must be 20 time larger in order to develop the game on schedule, in the case of GTA V Rockstar Games' Leslie Benzies reported that the development team counted much more than 1000 members.

Because of this publishers' relevance is becoming crucial, opposed to music industry where anyone can easily produce and publish his own music, in fact such big teams require huge investments, such investments need to have high returns in order to avoid bankruptcy and such returns are not easy to achieve if publishers do not carefully plan advertisement and distribution channels. Unfortunately the interactive entertainment industry is being threatened by piracy.

Special attention has to be paid towards its risk especially on the PC platform, we will discuss about this in the following chapter. Because of such high risk EA (Electronic Arts) estimated that in 2013 the number of developer involved in the production of high budget titles was around 25, compared to 125 in 2005.

Chapter 1.

Piracy

Interactive entertainment software piracy, just like music and movies piracy, is the act of copying and distributing digital content for free thus infringing copyright laws. The most shocking fact about piracy is the attitude people have towards it: a victimless crime. The majority of people that download and use pirated software are barely if not completely unaware that what they are doing is comparable to stealing because there is nothing physical being actually stolen, and copyright infringement is something not many people are aware of. In this chapter I will try to explain why most game publishers are moving towards the console market leaving the PC one behind. I will furthermore investigate on the attitude Luiss students have towards piracy.

- **PC vs Console.**

There are differences among platforms regarding piracy, consoles such as Microsoft's Xbox and Sony's PlayStation suffer from low levels of piracy nowadays. On the other hand other consoles such as PSP or Nintendo DS are called pirate machines, in fact these devices are very easy to modify in order to run pirated software. If we look closer we will notice that PSP and DS are different from consoles but still represent a great portion of the interactive entertainment industry accounting for approximately $1/4^{th}$ of all interactive entertainment hardware.

A very different situation can be found in the pc gaming world, in fact it is the very architecture of PCs that enables users to easily circumvent Digital Right Management software. Think of it this way: every pirate owns a PC but not necessarily owns a console enabled to play the games he pirates. And of course if someone has the capacity to hack a console game he is probably going to hack PC games as well.

In order to better understand the magnitude of this phenomenon lets crunch some numbers. All around the world the number of consoles sold since their first release among PlayStation2, 3 and 4, PSP 1 and 2, Nintendo Wii, Xbox 360 and ONE amounts to around 300 million units.

On the other hand computers have a much larger customer base, estimates report that the number of computers worldwide will exceed 2 billion units from 2014. Since PCs are a flexible interface and can be used for many other activities other than games, a major stake of them has to be excluded from our analysis because they are either office oriented machines and/or are not powerful enough to fuel up newer resource demanding games. A fair estimate of gaming capable computers ranges between 30 and 35 %. This yields an estimate of more than 600 million units.

As we can see consoles' and PC's user base is largely different, suggesting that PC games should sell at least just as much as console ones. Despite this PC version of games are consistently selling $1/4^{th}$ to $1/5^{th}$ (in some extreme cases as low as $1/10^{th}$) the number of copies sold for their consoles' counterpart.

Let's have a look at some factors that may influence game sales:

- Price: game prices among console platforms are quite uniform, usual price for any console game varies around $60, while for PC games it is around $50.

Since PC games are usually 20% cheaper they are expected to sell more and console games should be pirated more. But empirical evidence shows the exact opposite.

- Quality: game quality between PCs and consoles varies slightly, console games are designed for fixed and less performing hardware.

Because of this limited possibilities in developing more detailed content for consoles, PC games usually have better graphics and in general a markup in the overall quality of the game is detectable. Since quality is an indicator prone to bias due to subjective tastes, we will consider online critic scores (Metacritic) for the most popular cross platform game series: Crysis

Source: Metacritic.	Crysis 1	Crysis 2	Crysis 3
PC	91	86	76

Xbox	81	84	76
PS3	81	85	77

As we can see from the table above the only relevant difference among the scores is the first Crysis which was developed with the purpose to become the benchmark for high end computer gaming. For the other two episodes we can easily read through the numbers that the focus has shifted from PC to consoles or at least they (Crytek) didn't intend to raise the bar like they did with the first episode.

Since quality is homogeneously perceived among platforms it is not the right estimator of why PC games sell an incredibly lower number of copies compared to consoles. Other factors such as control system design and gameplay design changed across the 3 editions, in my opinion console oriented design had considerable negative impact on game playability on PC. Crytek should look at their statistics to find out.

- **Console piracy.**

Until now we discussed about the magnitude of piracy across platforms, but what is the situation in the console market? In order to investigate this question I prepared a survey and asked 52 Luiss students, 28 males (56%) and 23 females (44%), about their gaming habits on consoles. Of this 52 students 30 (58%) responded yes when asked if they owned a console of any type among the latest, we are talking about PS3, PS4, Xbox 360 and Xbox ONE.

Among the 30 students that reported to be console owners only 6 (20%) are females and none of them reported to have ever owned a device enabled to play pirated games or to have any interest in owning one in the future.

Male console owner responders were then asked if their console had some kind of piracy-enabling device. Only 5 (16%) individuals reported to currently own a console able to play pirated titles. These five individuals have two things in common, they are all males and 100% reported that the main reason they hacked their console was because the price of games was too high. These subjects were also asked if they were

online players, they all answered no and so they didn't care about being banned from online multiplayer services but didn't exclude the possibility that they will use the service in the future. On the other hand the remaining individuals reported no interest in pirating their machine (12; 40%) because of the possibility of being banned from online services which they regularly use for multiplayer games, and 7, 23% reported that they would modify their console if it was easier to do so. When I reminded them of the ban threat they were surprised saying they didn't know there was one and subsequently switched preferences. 5 reported they were no longer interested in ever pirating their machine as long as the threat existed, this preference reversal took the total of non-interested individuals from 12 to 17; 56%.

One thing has to be taken in consideration, in order to enable these machines to play pirated software an actual hardware chip has to be substituted inside the console. Since consoles have fixed hardware when a player tries to get online to multiplayer a hardware check is run and the player's account is likely to get banned from the platform. As opposed to PCs where just additional software is needed to bypass DRM protection. But hardware checks are modern technology, back in the days when PS1, PS2 and Xbox were around piracy was rampant and almost everyone, that I have ever known, had a pirated console.

- **Some early conclusions on console piracy.**

As we can see from the survey above, console piracy is becoming less and less widespread. 10 years ago in Italy was easy to find street sellers specialized in the sale of pirated video games, nowadays they are (virtually) non-existent, meaning that the demand has lowered since then. Numbers confirm this hypothesis and also tell us that measures taken in order reduce piracy are working.

Unfortunately there will always be some people interested in the opportunity of buying games at $1/10^{th}$ the price they would pay if they bought the game legally but, as numbers tell us, the majority of interested people will experience a preference reversal if informed about the possibility of being banned.

Online services on PlayStations and Xboxes offer more than just multiplayer, they enable users to buy games online for a little discount compared to physical stores, buy expansions for those games and offer other free services like internet calling and messaging. Online cooperative gaming gives users a higher degree of enjoyment than just offline single player, the risk of being banned and the subsequent lower overall enjoyment of the gaming hardware and the game itself, which cost a little fortune, is a powerful deterrent from piracy.

- **PC piracy.**

As I stated before, PCs are conceived in a more open way compared to consoles, due to the nearly infinite hardware configurations possible, the computational power and 3D rendering capabilities of computers have been much higher than home interactive entertainment systems for long time. The introduction of video games back in the 70's took advantage of the advancements in miniaturization technology that led to the widespread adoption of personal computer systems. Computational power of personal computers was much less than .0001 compared to modern computers, video games were the kind of programs that needed all the available one. Also because of this hardware production firms such as Intel or AMD struggled (while making billions) in the battle to supply the most performing hardware to run the latest videogame, among other obvious reasons.

GUI (Graphic User Interface) operating systems such as Windows and Mac were a revolution in the PC industry giving easy access to the computer world to millions, billions of users worldwide. Those who first took part in a movement whose primary objective was to learn, started to be called *hacker* or *pirate* with a negative inflexion because young boys in addition to compromising national security had the habit to make and distribute copies of games as well. What started like a joke is now eroding the PC gaming market from the inside out as Chris Taylor, founder of Gas Powered Games reports: *one of the key things that is really affecting the economics and the success of gaming in general is piracy on the PC.*

To take an example, Crysis, the popular and much appreciated title according to Metacritic suffered high levels of piracy. Officially there were only 86,633 units sold

in the first month after launch, on the other hand illegal downloads amounted to over 300.000. Another example is Unreal Tournament 3, Mark Rein, vice president of Epic Games stated that servers received over 40 million attempts at illegitimate access using pirate keys. Of course many say that 40 million connection attempts are different from the same number of lost sales as they want to make us believe, but that's not the point, on PCs even online multiplayer is possible on cracked servers. It will always come back on how computers are conceived, if someone has the skills he or she will be able to bend things to his/her advantage and will off course make money in some way distributing it.

But why is pc piracy so much popular? Is it that just having the opportunity with a little effort to use something amusing for free that drives such high piracy rates or is there something else pushing in favor of piracy? Next section will analyze this problem by trying to understand which the opinion of people towards piracy is.

- **What do people think about piracy?**

Piracy is a topic many people have hardly ever thought about, this section aims at giving an answer to the question: what are the factors that influence the opinion about software piracy? In the survey mentioned in the previous paragraph, I collected data to have a better understanding on this topic then reported the answers in Stata and constructed the dataset that I will operate on, creating the following variables:

Opinion: it ranges from 1 to 5, subjects were asked what their opinion was on computer piracy (downloading music, videos or software for free)? 1= not a crime, 2= unpunishable crime, 3= small fine if caught, 4= considerable fine if caught, 5= comparable to stealing. If we type in summarize and tabulate commands on Stata we get the following outputs:

```
. summ opinion
```

Variable	Obs	Mean	Std. Dev.	Min	Max
opinion	52	2.461538	.9174034	1	5

```
. tab opinion, plot
```

crime degree	Freq.	
1	8	********
2	18	******************
3	21	**********************
4	4	****
5	1	*
Total	52	

As you can see from the summarize output the mean of the observed opinion is at 2.4 meaning that on average people believe that piracy is not a serious crime, moreover the tabulate option gives us an idea of the distribution of observations. We spot an evident positive skew, only one person, 2%, compared piracy to stealing , most of the people, 40%, answered 3, and 8, 15%, answered 1.

A remark has to be made here, this question leads to a central tendency bias when people are unable to form a quick opinion due to the lack of information, accounting for this effect would reduce effective mean. In fact most of the subjects, when I made them think about how many times they downloaded something illegally, told me that in practice they commit such “crime” without even considering the possibility that their action could, in any way, harm anybody.

Experience (*exp*): ranges from 1 to 5, the question is, how good are your skills with computers (general knowledge)? 1= not good, 2= basic skills, 3= average, 4=nerd, 5= advanced skills.

```
. tab exp, plot
```

computer knowledge	Freq.	
1	6	******
2	12	************
3	18	******************
4	13	*************
5	3	***
Total	52	

In the information technology era everyone can use a computer, almost everyone knows how to solve basic problems, in fact the mean is 2.9, almost 3. Does this

question lead to central tendency bias? Well, one consideration has to be made, since the widespread adoption of PCs 20 years ago, the population has a much higher knowledge about computer related problems, so we can infer that a mean of 3, or average, considered the distribution is a good result and I think it really reflects modern level of computer knowledge among students.

Regular user of pirated software (*rusep*): this is a binary variable, the question was: do you regularly use at least one pirated software? 1= yes, 0= no.

```
. summ rusep
```

Variable	Obs	Mean	Std. Dev.	Min	Max
rusep	52	.5576923	.501506	0	1

As we can see from the summary statistics the mean is .56. Since this variable is a binary one the mean indicates the percentage of 1s so we can infer that 56% of interviewees uses regularly at least 1 pirated software. Pushed by curiosity I asked which the software was, most answered Microsoft Office suite, some even told me they were using a cracked copy of Stata. Just few people reported to be using open source software which is free but is not as well developed as a product you can buy. I also have to point out that many people do not really know if what they are using is a pirated software or not, because they are not those who installed it. From personal experience, I worked in a computer repair shop, I can guarantee you that 70% of software installed by these centers is pirated. Of course this cannot be generalized, it is an underground reality so it is almost impossible for those who do not belong to the scene to verify this hypothesis.

Gamer: this variable tries to capture the degree to which each subject is a computer gamer, the range is from 1 to 5, 1= occasional gamer, 2= sometimes play, 3=regular gamer, 4= clan member, 5= competitive gamer. The mean is 1.4 meaning that many people, as you can see from the distribution, do not use their computers to play and if they do they just use browser games.

```
. tab gamer, plot

   level of
   computer
      gamer |      Freq.
------------+-----------------------------------------
> ------
          1 |         38 |**************************************
          2 |         11 |***********
          3 |          1 |*
          4 |          2 |**
------------+-----------------------------------------
> ------
      Total |         52

. summ gamer

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
       gamer |         52    1.365385    .7147973          1          4
```

Just 2 subjects answered 4 and no one answered 5. I tried to understand why so few people are interested in computer gaming because according to official data there should be much more. The most frequent answer was that they use smartphones and tablets as a form of light gaming devices, others are not interested in computer gaming. I will talk more about mobile gaming in the following paragraphs.

Modified console (*modcon*): this variable is used to assess if having a modified console lowers or rises the opinion on piracy. 0 indicates that no console is owned, 1 indicates that the subject owns an unmodified console and 2 means that the subject owns a console able to play pirated titles. This variable is also used to determine whether just owning a console has any influence on opinion. To have an idea of the distribution let's look at the tabulate output:

```
. tab modcon, plot

own pirated
    console |      Freq.
------------+-----------------------------------------
          0 |         22 |**********************
          1 |         24 |************************
          2 |          6 |******
------------+-----------------------------------------
      Total |         52
```

The dummy variable *digitalstore* should help us understand if alternative methods of distribution such as digital marketplace, for example Steam and Origin are effectively helping reducing piracy. Digital stores are a growing part of the industry since they

were introduced just few years ago. I will talk about this later, many say they are the future of pc gaming because services such as these are a kind of DRM. The question responders were asked is do you know and use Steam and/or Origin services? 1= yes, 0= no.

```
. tab digitalstore
```

steam/origin installed	Freq.	Percent	Cum.
0	42	80.77	80.77
1	10	19.23	100.00
Total	52	100.00	

As we can see almost 20% of the subjects knew and used these services. I didn't expect to see so many people knowing what these services are but I had to change my mind, they are slowly establishing themselves, probably thanks to the lower prices games are sold at.

Ibuy: this binary variable is the answer to: have you ever bought computer software online? 1= yes, 0= no.

```
. tab ibuy
```

buy software online	Freq.	Percent	Cum.
0	31	59.62	59.62
1	21	40.38	100.00
Total	52	100.00	

Another unexpected result, almost 41% of the sample population bought at least once computer software online. However I strongly believe that many responders, even if adviced, included software they bought with their smartphones, which wasn't included in the question, thus reducing the effective percentage.

The last 2 variables *sex* and *age* have little to explain, I will just insert the tabulate output for both variables to better understand age distribution of the sample population.

years	sex 0	1	Total	
17	1	0	1	*
18	3	2	5	*****
19	6	5	11	**********
20	1	5	6	******
21	4	6	10	**********
22	7	6	13	**********
23	0	3	3	***
24	1	0	1	*
27	1	0	1	*
28	0	1	1	*
Total	24	28	52	

- **The model.**

In order to assess if the above mentioned variables have any impact on peoples' opinion I decided to construct and test the following linear model:

Opinion= + *exp* – *rusep* – *gamer* – *modcon* + *digitalstore* + *ibuy* – *sex* + *age.*

My hypothesis is that on one hand higher experience in the computer field, the use of Steam/Origin, confidence in buying software online and age should lead to a higher opinion score on piracy. On the other hand regular use of pirated software, being a PC gamer, owning a modified console and being a man should lower the score. I suppose that an older person or with higher experience in the computer field may have thought more about the piracy issue, just like those who use internet retailers and have experience buying software online. On the contrary being a gamer could be correlated with regular use of pirated software thus reducing opinion score, just like owning a modified console. On the same footing being a man should lower opinion on piracy because we are more likely to engage this kind of activities for fun unlike women.

- **Results**

Stata output for the regression is the following: (next page)

Source	SS	df	MS	Number of obs =	52
				F(8, 43) =	1.47
Model	9.23428479	8	1.1542856	Prob > F =	0.1952
Residual	33.6887921	43	.783460282	R-squared =	0.2151
				Adj R-squared =	0.0691
Total	42.9230769	51	.841628959	Root MSE =	.88513

opinion	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
exp	-.0870412	.1292454	-0.67	0.504	-.3476895	.1736071
rusep	-.5281543	.2953335	-1.79	0.081	-1.123751	.0674424
gamer	.4811731	.1976496	2.43	0.019	.0825746	.8797715
modcon	.0813007	.2189573	0.37	0.712	-.3602689	.5228703
digitalstore	.284441	.3705463	0.77	0.447	-.4628368	1.031719
ibuy	-.362453	.2796258	-1.30	0.202	-.926372	.2014661
sex	-.3184434	.3087518	-1.03	0.308	-.9411007	.304214
age	-.0443999	.0694992	-0.64	0.526	-.1845584	.0957585
_cons	3.480866	1.386461	2.51	0.016	.6848003	6.276931

As we can see the regression R-squared value is quite low, meaning that only a small part of the variance of opinion is explained by this model. However since we are trying to predict human behavior, which by nature is fairly unpredictable, it was not surprising to be lower than .50.

The coefficient of experience is negative, even though in is not statistically significant at any reasonable level (0.67 T-value), we can infer that the more experience a person has in the computer field the lower the opinion score the subject is likely to give, as opposed to what the hypothesis stated. In any case, even if it was statistically significant, the magnitude of the impact of an increase in experience would be lower than .1, not a considerable change. Why this coefficient is negative is hard to define, people who spent more time with computers develop lower opinion on piracy probably because they used it many times and since our brain is averse to dissonance (do something considered bad) the opinion the subject has can end up being biased.

Rusep is negatively correlated with opinion. I would say that accounting for dissonance aversion made me right on the prediction, in fact a person that frequently uses pirated software should give a lower opinion score on piracy. On average opinion score was lower by .5 points for the subjects who answered yes. One remark should be made here, question order plays a central role in this kind of answers in fact if I asked for the *rusep* answer first, opinion scores would have been biased due to dissonance again(yes would have led to lower scores). I accounted for this and asked

for the opinion first. The P-value of this coefficient is .08 meaning that it is almost significant at 5% confidence level.

Gamer has a statistically significant coefficient at 5% confidence level. At the antipode of what I stated in the hypothesis, *gamer* has a positive effect on *opinion*. This was unexpected because usually, the more a person is into computer gaming, the more he knows about computers and has probably pirated many games. Apparently this hypothesis does not hold when speaking of Luiss students in fact, according to the regression, the more someone is oriented towards computer gaming, the higher opinion he has on piracy. An increase in *gamer* from 1 to 3 will yield an increase in opinion of almost 1 point, which is not negligible.

The effect of *modcon* on *opinion* is not as straight forward as it may seem, in fact remember that 0 means do not own a console, 1 own a console, 2 own a modified console. As you can see the coefficient is (surprisingly) positive even if the magnitude is negligible and the T-value being 0.37 makes it not statistically significant at any reasonable level.

Using online distribution services like Steam or Origin should increase the *opinion* score towards piracy, in fact the coefficient of *digitalstore* is almost 0.3. Using such services is by itself like expressing one's own opinion against piracy, they are developed in order to prevent people from doing it. It's a pity that the coefficient is not statistically significant for any reasonable confidence level since the T-value is 0.77.

The *ibuy* coefficient was hypothesized to be positive, if someone is acquainted with online software shopping it should be because the subject has not enough skills to pirate a software or because his *opinion* score on piracy is high. Even though it is not statistically significant at 5%, it has 1.3 T-value, it is significant at almost 20% confidence level. Contrary to what the hypothesis stated the coefficient is negative and brings a change in opinion of 0.3 if *ibuy*=1.

Sex was expected to be negative because usually boys (*sex*=1) are the ones that use more computer games and the more computer games one plays the more he is subject to the possibility of downloading a pirated one. Even if not statistically significant my hypothesis is confirmed. Being a man lowers *opinion* score by more than 0.3.

Age was hypothesized to be positive because as a person gets older is supposed to have a more mature view of the world and a wider perception of the consequences of his actions. I couldn't be more wrong. Apparently in Luiss the older people get the lower *opinion* score on piracy they give. Fortunately with a T-value of 0.64 the coefficient is not statistically significant.

- **Some considerations.**

During the data collection phase I realized that the topic of piracy was somewhat absent from people's mind. They had to think about it from scratch and since the opinion question contained a scale from 1 to 5 central tendency bias heavily influenced responses. Moreover due to time restrictions to construct the questionnaire and perform the survey I believe that the quality of variables and their distributions are not representative of the real Luiss population, resulting in some kind of bias. To have a better understanding of the opinion on piracy and what factors affect it I would suggest to collect data about a larger share of students and prepare the questionnaire taking into consideration behavioral factors to facilitate unbiased responses.

Considering that this study is aimed at predicting human behavior which is, as already stated, fairly unpredictable I would suggest to use a higher confidence level, 30% should be better than 5% for human behavior, the *ibuy* and *sex* would become statistically significant.

This study allowed us to take a look at the correlation there should be between the fact that if a subject knows and uses an online distribution channel he should be more acquainted with online digital purchases. I used a probit model to assess the likelihood of online purchases with the knowledge and use of digital stores. What I found was a slight increase in the likelihood of online purchases but not at a statistically significant level (T 0.68; P 0.5). I decided to add experience in the model and what I found was:

ibuy	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
digitalstore	.1234715	.4681518	0.26	0.792	-.7940891	1.041032
exp	.3143883	.180521	1.74	0.082	-.0394264	.668203
_cons	-1.19836	.559229	-2.14	0.032	-2.294429	-.1022917

Even if chi2 was 3.65 we notice that *exp* has a statistically significant coefficient at 10% which is a great result and is positively correlated, meaning that if knowledge about computers is higher the probability of buying software online increases.

- **Conclusions:**

The internet is overabundant with discussions about piracy, everyone was and still is talking about this issue. There are many people that say piracy should not be illegal for a variety of reasons, first of all the prices companies offer to the people, considered like a theft. Some say that after having bought a game one should be free to copy it to make a backup, this argument is ok, the problem is that after you make a backup you should not post it on hundreds of different P2P sites where hundreds of thousands of people can download it. Others say that DRM measures are too intrusive and impede the gamer to fully enjoy his purchase. Many say that piracy is not comparable to stealing because stealing implies that the one who owned is no longer able to enjoy his property, while piracy obviously does not impede to anyone to enjoy his software, it rather helps other people enjoying it (modern Robin Hoods). The list of arguments taken in favor and against piracy is endless, we will shift our focus from piracy to morality, ethics and after a while we would ask each other why where we talking about Windows vs Mac.

My personal opinion is that piracy has been favored for too long by these incredible prices we see for software. While collecting the answer I was able to understand that the main reason people turn to piracy is that there is no incentive to buy software if it is available in 3 clicks of mouse for free. I am a student, I have a very low income and I should waste my time going in a store, pay a ridiculous amount of money to buy a software to write on the screen and make computations. This reads like a joke to me. Office suite cost ranges from 70$ to 140$ (not for business use) on the Microsoft store, remember that the software will be able to be installed on a limited number of devices depending on $ spent. Moreover people will have to input their credit card numbers which is something anyone likes to do online.

Do you see it now? It is just ridiculous to go through all this when I can simply type in “kickasstorrents.eu” and download the super professional version with unlimited installations for free in less than 30 minutes. It is also true that open source software

of pretty decent quality is available, why people ignore it remains a mystery to me, further investigation on the topic is necessary.

The heavy use of piracy is having a great impact on the PC market, revenues in this sector are declining and as already mentioned in the introduction there are managers of software development studios blaming piracy for the greater part of their lost revenues.

Of course piracy isn't the only to blame, nowadays the way people play is changing, more and more people are occasional gamers and developing "good" games, as gamers would define them, is not ideal for occasional gamers which do not "train" in order to play. Some skills will always be needed, otherwise the game would be boring, but not as many skills as older games. Crysis is a perfect example of this evolution (or involution?).

PC is the preferred platforms of real gamers, the level of competitiveness of the platform is much higher than consoles, this is because mouse and keyboard are much more suited to control games than controllers are (except driving). Unfortunately they require a longer learning curve compared to controllers which allow new players to get acquainted quickly but limit the possibilities for a skilled player. This is another factor that can explain the migration of occasional players to consoles but of course is not the only one.

The ever increasing number of mobile phones is playing a central role in the development of the interactive entertainment software industry, the fact that they are always with us makes them the perfect platform for a quick game in the bus or while waiting. In fact the number of games and applications available on the app stores is increasing at an incredible rate. The expansion of the mobile phone app market gave rise to a change in the business model firms apply to their products, microtransactions are the new frontier and in game advertisement makes developers earn profits from a free to play app. The model behind this is fairly simple, everyone can download the app for free, then if you want to remove advertisement you can purchase it or keep playing with advertisement. It this way companies are able to monetize free riders and give an option to those who do not want advertisements in their apps. Paired with microtransactions this new business model seems to be an efficient solution to the problem.

The PC market is trying to catch up the lost ground introducing gradual changes to the business model that some companies such as Valve guessed right, it enabled users to buy games directly from the internet, Gabe Newell, Valve's president said: "We see sub ten per cent growth rates in our core, packaged retail business" and "Right now we're seeing close to 200 per cent growth in the alternative ways of connecting with customers". No matter where you connect from you will always be able to download and install your favorite game (of course the same account cannot connect from 2 different computers at the same time), it provides a safe network for people to play multiplayer on thanks to personal account system which acts as a kind of DRM (Valve account itself is the DRM). Valve and other digital distribution companies seem to have a bright future in the gaming industry their popularity is still pretty low but is noticeably increasing.

Can the change in business model be the definitive answer to the problem of piracy? Probably not but it is helping for sure.

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