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XBOX ECONOMICS

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Abstract: This paper is a case study research of connection between gaming time and exam results. There has been much talk recently about negative influence of time spend using electronic devices on the emotional and intellectual development of children. The negative effects are becoming more and more obvious in today´s society but there are also numerable positive effects in moderate using of digital technology that are especially valuable in modern businesses. The aim of this paper is to show that there is such a thing as desirable time of playing video games that doesn't necessarily cause negative effects on academic performance of student. The main finding of this research is that it is possible to manage both learning time and gaming time in a way that enables optimal allocation of students most valuable resource, their free time.

Keywords: gaming industry, marginal analysis, video games

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Introduction

A student, who politely excused himself before an exam for a possible bad grade, should be given the credit for this paper. The reason he stated for a possible bad performance at the exam was nine hours of XBOX video games which he played the day before the exam. As a professor and a pedagogue, the author had warned the student about the possible consequences, and since it is our duty as teachers to point out and thoroughly explain all pros and cons, this student was given the explanation about the economics reason, i.e. the video games marginal revenues compared to the marginal costs of the finishing exam and studies. The student was surprised how economics gives a clear and effective explanation of playing video games. In order to reveal how the playing of video games affects the students' grades, as well as to discover the optimum level of video games playing, the cornerstone of the economics theory – marginal analysis will be presented. It will be shown how the marginal costs and the marginal revenues can be used to explain the theory that an optimum level of video games playing time during the exam period does exist.

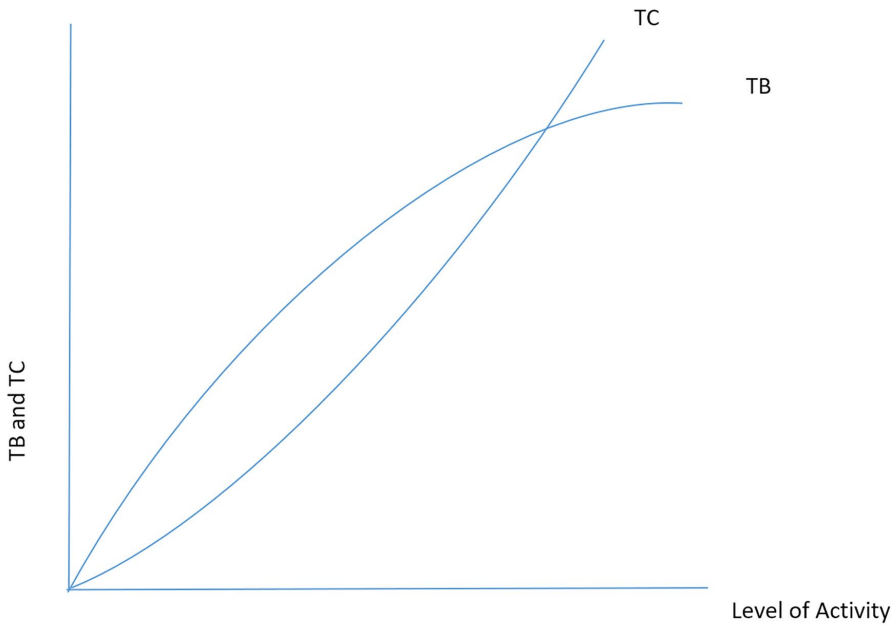
Theoretical background

Economics is a science of decision making and marginal analysis is the cornerstone of optimal decision making whether it is implemented in business or consumer theory. The goal of the decision maker involves an attempt to maximize or minimize an objective function. Objective function in this sense could mean either profit or costs for a firm or consumption of goods for consumer. For our student in this paper the goal is to optimize the allocation of time spend for playing video games and for studying. The value of objective function on the other hang is dependent from the level of one or more activities or choice variables. For example, units of production, time available for learning etc. Choice variables can be discrete, taking only specified integer values or continuous, taking any value between two points. Also, optimization problem can be constrained or unconstrained depending upon whether there is constricted or unconstructed set of choice variables or levels of activity. (Thomas and Maurice, 2013)

Any decision that we make generate certain benefits and costs. General rule for decision making is to gain maximum possible net benefit which is the difference between total benefit (TB) and total cost (TC) from any action we take. Net benefit is thus the objective function we wish to maximize. If we can choose from any level of

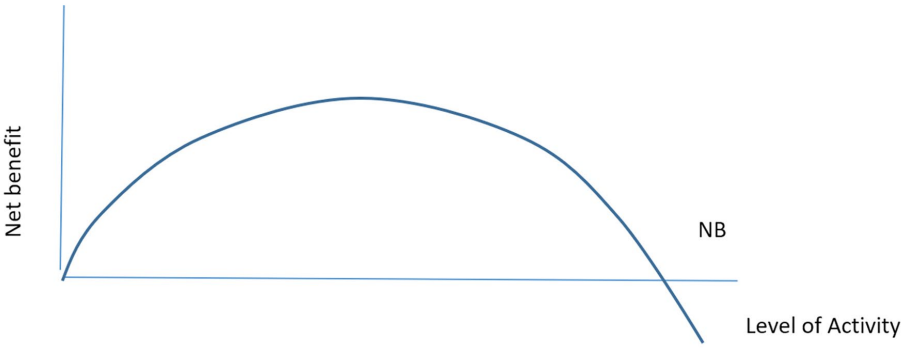
activity we are talking about unconstrained maximization. The optimal level of activity in an unconstrained maximization is shown in figure 1.

Figure 1: The Optimal level of Activity



Source: Thomas and Maurice, 2013

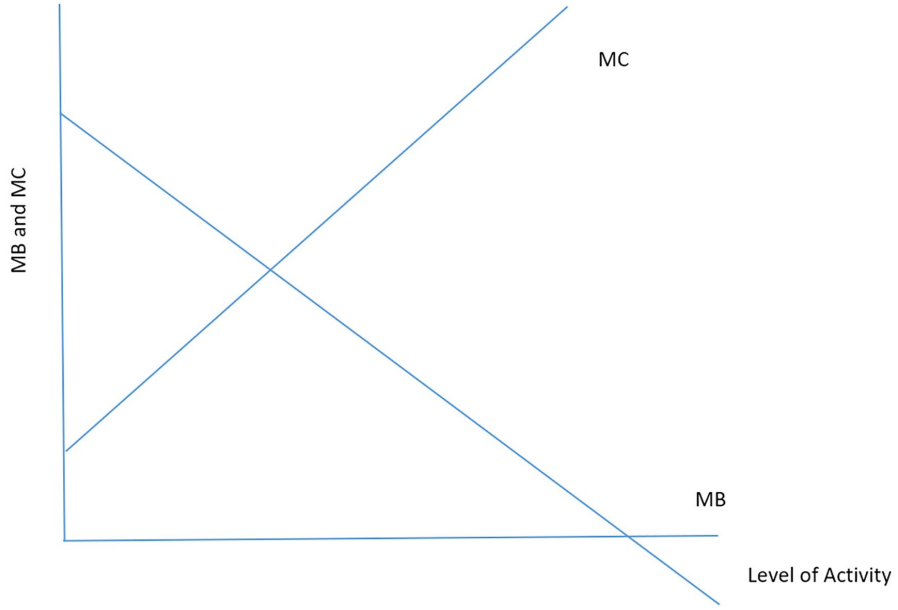
Figure 2: Net benefit curve



Source: Thomas and Maurice, 2013

Key components of marginal analisys are marginal benefit (MB) and marginal cost (MC). Marginal benefit is the change in total benefit divided by an incremental change in total activity, while marginal cost shows the ration beetwen change in total cost and change in total benefit (fiigure 2).

Figure 3: Marginal benefit and marginal cost curves



Source: Thomas and Maurice, 2013

As shown above the optimal decision depends on marginal cost and marginal benefits. In an unconstrained maximization problem the optimal level of activity is the last level where marginal benefits exceed marginal costs. Thus, other forms of costs, such as sunk costs, fixed and average costs are irrelevant for decision making and should not been taken into consideration when making a decision. (Thomas and Maurice, 2013)

How does marginal analisys change when facing constrained optimization problem? In that case the key concept is marginal benefit per dollar spent on an activity. The general role to follow is to choose the level of activity that results in all activities having marginal benefit per dollar spent equal. It is worth mentioning that there are various other optimal decision making techniques, whoose description is beyond the scope of this paper, sach as (Salvatore, 2022):

- benchmarking analisys,
- total quality management (TQM),
- reengineering, learning organisation,
- broadbanding,
- direct business model,
- networking,
- performance management,
- power in pricing.

In the context of this paper it is important to highlight the importance of digital technology in modern buissnes and management and also emphasize digital marketing as a key factor in modern marketing (Adžić, 2021b, 2021c¸2023). Gaming as part od digital world we live in has its place in modern bussines. Keith et al. (2021) established that there is a link between team performance and playing video games. Team work is crucial in high performance organisations and leads to productivity growh (Adžić, S., Lazić, J., & Cvijanović, J. M., 2005; Adžić, 2021a). In this paper we are going to analyse the impact of hours spent on gaming on student performance. We are going to use the Case study method which is the most appropriate for our analisys (Adžić, Milunović & Vujić, N., 2022).

Legal relations in the gaming industry

Legal relations in the gaming industry are clearly structured as Developers, the people in charge of software development, i.e. creating all video game elements (visuals, sound, creative ideas), are in the top position. The Developers lay the foundation of the video game. They are usually large companies that employ experts in different fields, where a particular person is responsible for a certain segment of the video game - engineering, visuals, design. Publishers are entities dealing with marketing and marketing of video games. In addition to the above, they research the market and consumer needs as well as provide funding for the entire project. They are the holders of the rights to the game. Nowadays it is common for Distributors to take care of downloading the video game in digital form. At the very bottom, there are entities that deal with the finished product: traders, customers and end users. The product owes its existence to the Gamers who are its end users and consumers.

All entities engaged in game production must be appropriately registered by the competent authorities of each country. In most countries, the production of video games is one form of multimedia content and is clearly defined as an audiovisual activity as part of in providing on-demand audiovisual services.

Autonomous (mandatory legal relations) in the described structure have been clearly elaborated and standardized during the last decades. What has not yet been fully developed are the legislative obligations of entities participating in the entire process of creation, market placement and trade of video games, which would aim to protect the end users (gamers) themselves. There are several obligations that include categorizing each finished product by intended user age prior to publication. National laws prohibit the distribution, sale and rental of video games to minors if the game category is not appropriate for their age. It is also prohibited to publicly display and advertise games not suitable for minors.

In addition to the above, the legal framework in the field of e-sports is undergoing intensive development. First and foremost, e-sports is a serious business venture dominated by the publishers of video and computer games used as a competition platform (Brnabić, 2021). It is only a matter of time before e-sports is officially recognized as a sport. If we start by accepting e-sports as an actual sport, the rules of sports law would also be applied to e-sports entities as *lex specialis* (Frey & Pommer, 2018).

It is an undeniable fact that playing video games has both positive and negative effects on individuals. It is very easy to develop video game addiction, resulting in excessive or compulsive use of video games. The cause of this addiction can be traced to the connection of playing video games with the parts of the human brain responsible for the feelings of reward and pleasure (Ferguson, 2007).

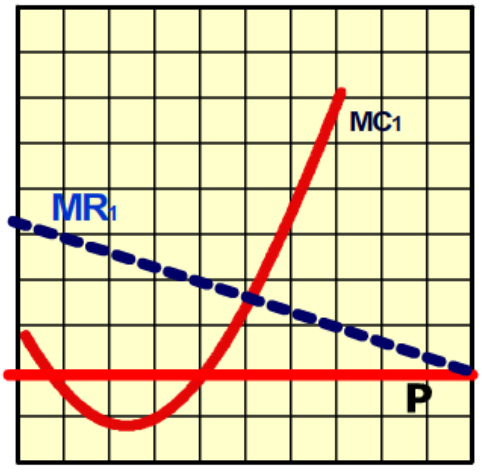
This paper has demonstrated and defined the optimal play time of video games which remains to be taken into account when standardizing any given segment of creating video games. It is the responsibilty of the legislator, *de lege ferenda*, to consider this issue when creating norms. Contemporary gamers use video games not only for individual entertainment, but as an (online) environment in which they socialize. Such an environment shapes them as individuals and affects their development and behaviour in the outside world.

Marginal Economic Analysis of Playing Video Games

An example of a single curve of marginal revenue and a single curve of marginal cost' (Figure 4) shows that the curve of marginal revenue (MR1) of playing video games is negative. At the beginning, playing video games is fun, but as the time passes it will become increasingly tiresome, even boring. Inevitably at one moment a gamer will stop playing the video games. The negative slope of the MR1 curve also corresponds to the law of diminishing marginal utility (Case et al.). This theory states that when the price of video games playing (P) is higher than its marginal revenue, the cessation in playing video games will occur. When the sunk costs are excluded (e.g. the price of Xbox or PlayStation and the price of games themselves), the price of playing video games is very low and fixed - it includes the cost of electricity and perhaps of some snacks. That is the reason why someone can play video games nine and more hours. What our student did not bear in mind are marginal costs. Marginal costs MC1, according the law of diminishing marginal utility (Case et al.) have a positive slope. When marginal costs become equal to marginal revenues (MC1=MR1) a student should stop with video games playing and start with studying (we shall suppose five hours in this case), because, after that point, the student would need more energy and time (and sleepless nights) to prepare and pass the exam. Shifting the time frame and marginal values to the long run and including the opportunity costs of lower incomes as the result of lower GPA, would shift the MC1 curve left, with a supposed value of maybe just two hours of video games playing in this case.

The curve of marginal cost has a distinctive shape, with first a positive and then a negative slope. Having that in mind, a question is raised would it be possible to obtain the optimal value of playing video games measured in hours. 'An example of a single curve of marginal revenue and multiple curves of marginal cost' (Figure 5) shows that specific point in the place where MR1 is the tangent of the MC1 curve. According to the economics theory, the point where MR1 equals MC1 represents the point of economics optimum.

Figure 4: An example of a single curve of marginal revenue and a single curve of marginal cost



Source: Authors own work

Figure 5: An example of a single curve of marginal revenue and a single curve of marginal cost

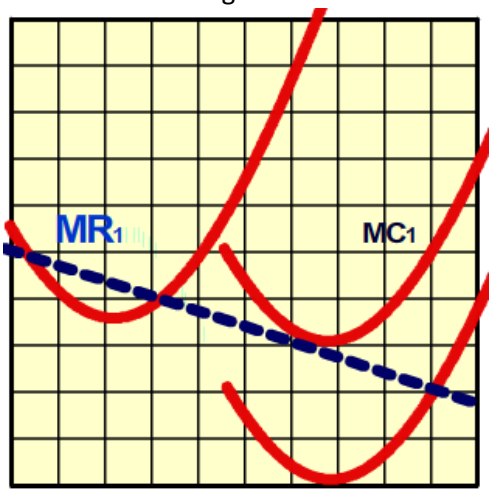


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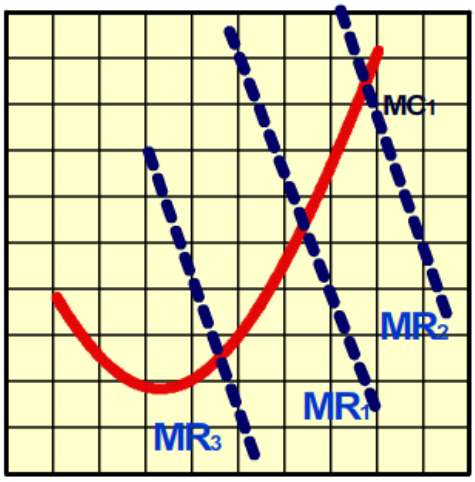
Figure 6: An example of a single curve of marginal revenue and a single curve of marginal cost



Source: Authors own work

Finally, we would like to include one more variable – optimal level of success during studies. Without profound contemplation, one could conclude that the highest possible GPA is the optimum one. Unfortunately, this is not quite true. The highest GPA is the best one, but to achieve such a high score is not easy for many. An example of multiple curves of marginal revenues and a single curve of marginal cost' (Figure 6) can be of help in explaining this. In order to achieve the best GPA, one should invest many hours of studying in additional classes and perhaps a 24-hours' day would be too short. This is represented in Figure 3 as the line MR2 of marginal revenue. On the other hand, investing too little in the education with little or no effort, represented by MR3 line, could result in failure of the academic career. Therefore, we can assume that a line MR1 would exist, where, in the cross section of MR1 and MC1, an optimum of invested time, money, and energy of studying would be shown.

Conclusion

The marginal analysis of the economics theory shows that an optimum level of playing video games is possible. Finally, one might be interested in the grade which the student mentioned in the introduction received; did he pass after nine hours of video games? Surprisingly (or not) yes, not with a perfect, but with a very good grade. The main reason for that probably lies in the fact that he was a

good representative of the "play hard – study hard" group (Adžić et al.), a group of extremely efficient and successful students who know how to effectively use time for both study and gaming. After the finals, he was the student with the highest marks at our Business College.

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