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THE LEGITIMACY OF INCREASING MARGINAL UTILITY IN SOCIAL SERVICES – THE CASE OF UNIVERSITY EXAMINATIONS

ABSTRACT: *The concept of utility became rightfully recognised in economic theory with the introduction of decreasing marginal utility. However a question that arises is: does an increasing consumption of goods always and without exception lead to diminishing marginal utility? It is quite possible that in some cases marginal utility of goods and services actually increases. If this fact is true, it might additionally strengthen the utility theory and make it applicable in numerous cases of economic and social reality. This paper uses the example of the utility of studying at university (i.e. the utility of university examinations), and tries to add a few arguments in favour of the statement that the law of increasing utility exists.*

KEY WORDS: *marginal utility, law of increasing marginal utility, social services, examination*

JEL CLASSIFICATION: D11, D12, H41, I21

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1. INTRODUCTORY REMARKS

Most of the theoretical and empirical studies of higher education deal either with funding issues[1], the concept of public responsibility or social effects of higher education[2], or which factors influence individual college choices, tuition price, or college quality[3]. However here we use utility theory to examine whether the law of diminishing marginal utility is valid in the case of university education.

The concept of utility has been intriguing economists for more than two centuries. After numerous refinements the utility theory focused on marginal utility, which, because it is defined by concrete circumstances, is more relevant than general utility. A logical advance in the development of this theory was made by the neo-classical theory which defined the law of diminishing marginal utility, according to which marginal utility diminishes if the quantity of the consumed goods increases and all other variables remain unchanged. Due to historical circumstances, although cognitively valid and true, the marginal utility theory has been pushed into the background of microeconomic analysis.

A careful investigation of the literature will reveal that today the discussion on various aspects of utility theory has been relocated into mathematics, actuarial science, statistics, medicine, and even management, whose contribution is mostly the development of game theory and decision-making theory. The vast literature on the topic contains only a few economics papers, like the one by Yihai Liang (2007) who investigates increasing utility in the context of economics of innovation. This present study draws on the original postulates of the utility theory[4] regarding goods and services and observes its contents in terms of increasing marginal utility. In the first section we will conceptually define the framework of our analysis: university education, studying, full-time student, full-time student status, utilities following from that status. The central section of this study investigates the total and marginal utility of passing university exams. The results lead to a conclusion that, in the analysed segment of social activity, the law of increasing yields can be confirmed. The empirical analysis provides arguments for this.

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[1] For instance, see: Barr (2004), Bird (2005), Borck & Wimbersky (2009).

[2] These concepts were for instance in: Bergan (2005), Bovenberg & Jacobs (2005), Rouse (1995).

[3] Long (2004).

[4] We are dealing here with the theoretical line Daniel Bernoulli→Adam Smith→Jeremy Bentham→Vilfredo Pareto→John Hicks, running through the great epochs of economics from classical theory to the present. More on that in Blaug (1996) or Nicholson & Snyder (2009).

2. ON THE UTILITIES OF HAVING FULL-TIME STUDENT STATUS

2.1. Basic concepts

As noted in the introduction, the utility theory will be applied to the university education system, i.e. the utilities obtained from that system by students. This system comprises two categories of students: full-time students with privileges that may include numerous subsidies and allowances, and part-time students who pay for their education and do not receive privileges enjoyed by full-time students. In order to retain the status of full-time student an individual is obliged to comply with university regulations and fulfil various obligations (such as attending classes, doing assignments, writing seminar papers, passing examinations, participating in projects, etc.). Failing that, s/he will be denied the status and lose the privileges deriving from it.

The fiscal effects of full-time studying result from the privileges granted to students by law or regulations.The cost of the study programme is partly or totally subsidised by the government budget, in compliance with the university by-law. The level of student rights and students' financial support is generally determined by the corresponding regulations. For instance in Croatia, as in most European countries, students use the following fiscal subsidies that are financed directly from the government budget: health insurance, exemption from the cost of specialist medical examinations and hospital treatment, family pension, education fee, accommodation in halls of residence, subsidised accommodation in private houses, students' canteen, city transport, intercity bus transport, rail transport, and scholarships granted by the state.

There are also regulations allowing an important non-fiscal income for students. Namely, full-time students have the right to employment through legal entities (the so-called Student Centres) that provide services to the university system, the right to child support, accident insurance, various awards, and tax incentives for parents.
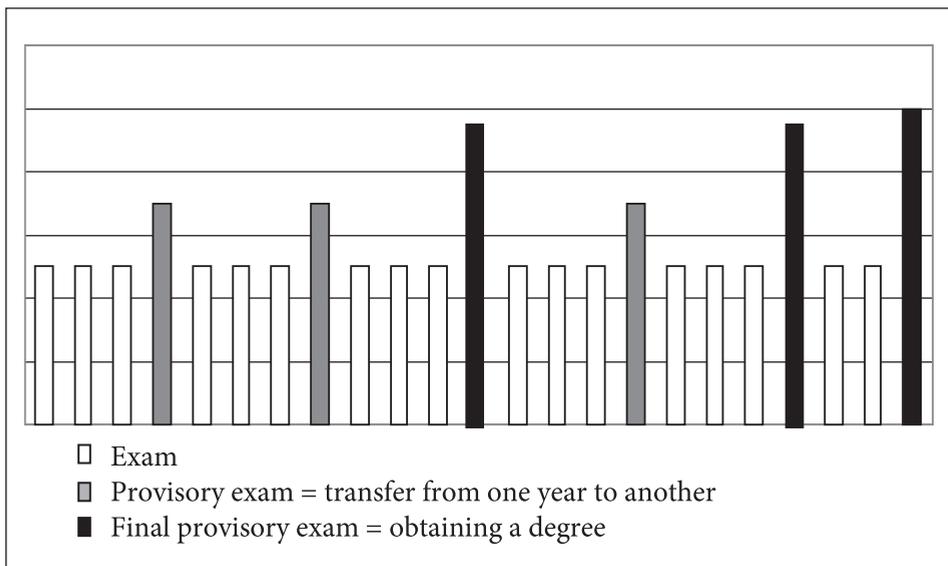
Consequently the status of a full-time student results in significant (fiscal and non-fiscal) privileges or benefits[5]. To ensure that s/he gets them, the student has

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5 Take for example the University of Split. In the academic year 2007/2008 the total financial support to all the full-time students amounted to € 21.53 million, or € 3,576 per average user (or €2,131 if students that did not use financial support are included). Such high subsidies per average full-time student, considering the level of Croatian GDP, could only be wished for by many employees, as these subsidies, on average, amount to 13.80 monthly net minimum

to avoid the situation in which this status is lost, and this will occur if (a) s/he does not pass the exam in any repeatedly taken course by the end of the academic year, or (b) s/he does not pass an exam for the eighth time.[6]

Following the principles of the "Bologna process" the university system involves three cycles of study. The first, undergraduate cycle lasts for three academic years in which the students are required to acquire 180 ECTS points. The ECTS points (credits) are allotted by the uniform European criterion, and the normal workload of the student during an academic year is 60 ECTS. In other words, by passing the required exams the students have to collect 60 ECTS in one academic year to enter the next one. The second, graduate cycle enabling students to get employed in professionally complex jobs usually lasts for two more academic years with an additional 60 ECTS per year, or 120 ECTS in total. Finally, the postgraduate cycle lasts for three academic years, ending with the PhD dissertation.

Graph 1: Exam scheme in three-cycle "Bologna system" of study

☐ Exam
▨ Provisory exam = transfer from one year to another
▮ Final provisory exam = obtaining a degree

wages in Croatia. To what extent these funds are attractive to students can be seen if the total of student subsidies and financial support is compared to the total funds obtained by all eleven faculties of the University of Split for their annual activity. The consumed subsidies and non-fiscal support to full-time students amount to 74.78% or almost three quarters of all the funds obtained by the University from the government budget (excluding capital investment). More about this issue can be found in Filipic (2009).

6   Zakon o znanstvenoj djelatnosti i visokom obrazovanju, Narodne novine 123/03., Zagreb.

To make the subsequent utility analysis methodologically consistent we have to introduce a few more definitions. In the students' perception the loss of full-time status is always associated with the last failed examination (the passing of which would spare them this undesirable position). Let us call this last exam *provisory*. It is important to understand that in the case when the status is lost all the examinations are equally important, i.e. the full-time student can lose the status by failing any one of them. Therefore, any exam in the academic year can become the *provisory* exam. Furthermore, we also have to define the *final provisory* exam, which is the exam that is taken as final in any of the three study cycles. This *final provisory* exam has an additional utility as it (potentially) denotes the entrance to the labour market, where from the aspect of utility the situation of having a university degree is significantly different from the situation of not having a degree.

2.2. Empirical analysis

A sample of full-time students at the Faculty of Economics in Split was asked to rank examinations as "important", "more important",,or "the most important", and "useful", "more useful" or "the most useful" . The survey was carried out in writing by a questionnaire dealing with the experiences of the previous academic year. For the first year graduate students of Economics the questions referred to the third, final year of the undergraduate programme, while the second year undergraduates expressed their attitudes on the usefulness of exams taken in their first year. The respondents evaluated the marginal utility of exams in the corresponding academic year according to the order of passing them by expressing the level of utility on a scale from 1 to 10.The size of the sample was determined by the total number of full-time students. From the total number of 22 students enrolled on the graduate programme, there were 20 respondents. The number of second year undergraduate respondents (from a total of 238) was 104.
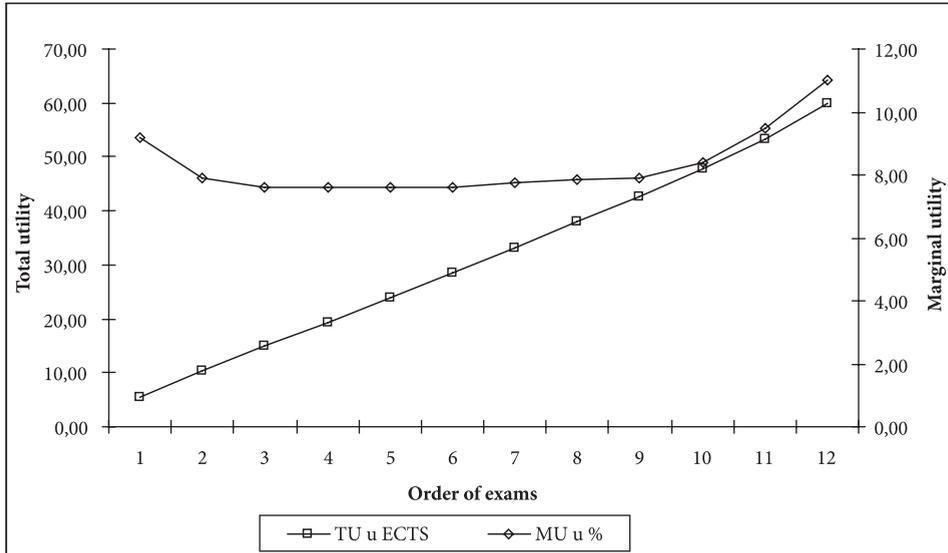
Table 1: Total and marginal utility of exams for first year graduate students of Economics at the Faculty of Economics in Split in the academic year 2008/2009.

| Order of passed exams	First year graduate students (n = 20)				Second year undergraduates (n = 104)			
	MU in ECTS	MU in %	TU in ECTS	TU in %	MU in ECTS	MU in %	TU in ECTS	TU in %
1	2	3	4	5	6	7	8	9
First	5.52	9.20	5.52	9.20	6.37	10.61	6.37	10.61
Second	4.74	7.91	10.27	17.11	5.18	8.64	11.55	19.25
Third	4.57	7.62	14.84	24.73	4.41	7.34	15.96	26.60
Fourth	4.57	7.62	19.41	32.35	4.33	7.21	20.28	33.81
Fifth	4.57	7.62	23.99	39.98	3.99	6.65	24.27	40.45
Sixth	4.57	7.62	28.56	47.60	4.16	6.93	28.43	47.38
Seventh	4.64	7.74	33.20	55.34	4.36	7.26	32.79	54.64
Eighth	4.71	7.85	37.91	63.18	4.38	7.31	37.17	61.95
Ninth	4.74	7.91	42.65	71.09	4.53	7.55	41.70	69.50
Tenth	5.05	8.41	47.70	79.50	5.12	8.54	46.82	78.04
Eleventh	5.69	9.49	53.39	88.99	5.83	9.71	52.65	87.75
Twelfth ("marginal") Total TU	6.61	11.01	60.00	100.00	7.35	12.25	60.00	100.00
Total MU	60.00	100.00			60.00	100.00		

The survey results very clearly confirm the legitimacy of considering utility:

a) It is obvious that total utility (TU) of passed examinations increases. This happens both due to knowledge acquired and due to the retained status of full-time student.Nevertheless, and more important for this analysis, the survey confirms the existence of increasing marginal utility (MU). At the level of one year of study there certainly is an increasing marginal utility from the retained status of full-time student.

b) As could be assumed by anybody familiar with the university situation, the students evaluating the third, final year of undergraduate study clearly express the utility of the last examinations, while the marginal utility curve in students evaluating the first year of study mostly acquires a U shape.

Graph 2: Total and marginal utility of exams in graduates, Faculty of Economics Split, academic year 2008/2009. (n = 20)

Graph 3: Total and marginal utility of exams in 2nd year undergraduates, Faculty of Economics Split, academic year 2008/2009. (n = 104)
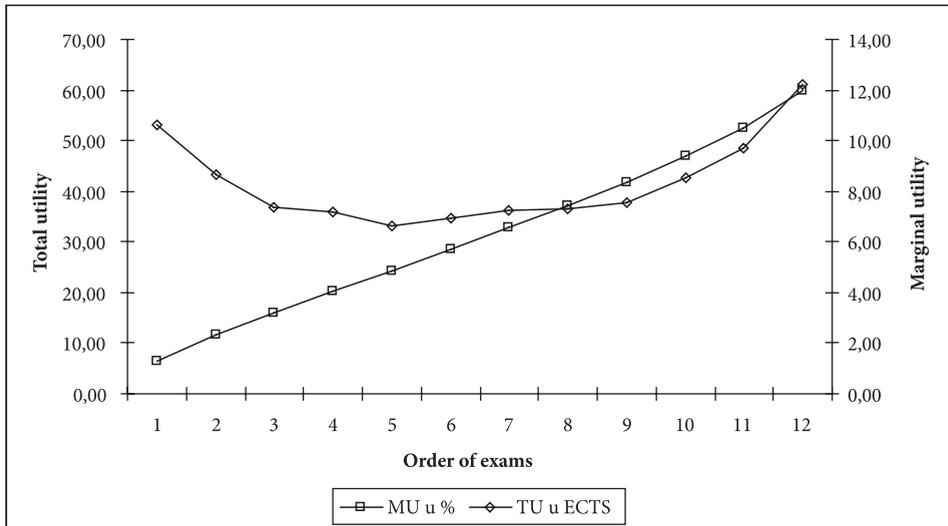
c) What makes the difference between the utility in the first and the final years are the first passed examinations[7]. The first year students attach much higher utility to the first passed exam than the third year students. Moreover, impressed by the new environment and the studying system they extend this increased utility to the second, third, and even fourth exam, which pushes their marginal utility curve closer to the U form. In the case of the final year students the second passed exam already acquires the characteristics of constant utility, which will soonincrease markedly due to awareness that the "provisory" exam acquires the characteristics of "the last provisory" exam.

d) The extent to which students in this survey were serious, and an additional proof that this analysis has a high level of sensitivity and thus also of applicability, is shown by the small hump of the first year students on the marginal utility curve seen in the sixth and seventh exams. It is when passing from the first to the second semester that they have to fulfil obligations (like obtaining professors' signatures for regular attendance in the first semester courses) that make their passage through the entire first year easier.

The results obtained in this survey, which was conducted for another, thematically different research (Filipić, 2009), raised our interest and directed our scientific attention to the utility theory.

3. ELEMENTS OF UTILITY THEORY

Taken generally, utility denotes satisfaction of needs. In economics, it is the subjective benefit or utility provided to the consumer by goods or services. Total utility represents the total satisfaction realised by the consumer from the consumption of goods or services. Marginal utility represents the change in total utility occurring due to consumption of an additional item of goods or services if other products are consumed as before[8]. When it was perceived that the additional satisfaction in consumption of goods is diminished by the extent to which it is

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[7]   We obviously deal with two kinds of examinations (goods, services, activities):
    a)   Marginal activities (the first and the last "provisory" exam) can change MU in only one direction, for i=1 MU decreases, for i=n MU increases, and
    b)   internal activities between the two margins (all other exams) can change MU by increasing, decreasing, or being constant (in the concrete example of social services/ examinations they will either increase or be constant).

[8]   The notions explained here are the usual definitons in all microeconomic textbooks. For instance: Pindyck & Rubinfeld (2008).

increasingly consumed, the law of diminishing marginal utility was defined: the marginal utility of goods diminishes if the consumed quantity increases.

Let us consider this in the following way. Let us assume a case in which utility can be quantified. Then the change in total utility (TU) can be expressed as:

$$\Delta TU_i = U_i - U_{i-1} \tag{3.1}$$

If the differences in utility U_i and U_{i-1} (where i = 1,..,n; and n is the last unit of the goods or service that increases satisfaction) are the consequences of the effect of the independent variable Q, then we obtain the ratio of the change in total utility to the change of Q, which is called marginal utility MU:

$$MU = \frac{\Delta TU}{\Delta Q} = \frac{Change\ in\ total\ utility}{Additional\ unit\ of\ products\ or\ services} \tag{3.2}$$

Consequently, total utility is the sum of marginal utilities:

$$TU = \sum_{i=1}^{n} MUi \tag{3.3}$$

In this context neoclassical economists naturally conclude that marginal utility is adequately defined if

$$\lim_{\Delta Q \to 0} \frac{\Delta TU}{\Delta Q} \tag{3.4}$$

To confirm this they use partial derivation

$$\frac{\partial TU}{\partial Q} \approx \frac{\Delta TU}{\Delta Q} \tag{3.5}$$

and an additional condition that confirms that the marginal utility is diminishing

$$\frac{\partial^2 TU}{\partial Q^2} < 0 \tag{3.6}$$

In the case of diminishing marginal utility, if n is the last unit of goods or services increasing satisfaction then

$$MU_1 > MU_2 > ...MU_n \tag{3.7}$$

The general concept of utility determined by total and marginal utility with particular insistence on diminishing marginal utility will be found in the contents of any microeconomics textbook. Nowadays it is not easy to find anything on utility theory in studies published in economics journals.This is due to the fact that traditional (micro)economic theory is based on the implicit and explicit assumption that market price and utility are quantitatively equal, and therefore treats utility analysis as a case in which marginal utility will only and always diminish. In other words, economic theory ignores the possibility of increasing marginal utility, which, as could be guessed in the previous section of this work, is unjustifiable, because it reduces the utility theory to a special case.

4. TOTAL AND MARGINAL UTILITY OF PASSED EXAMINATIONS
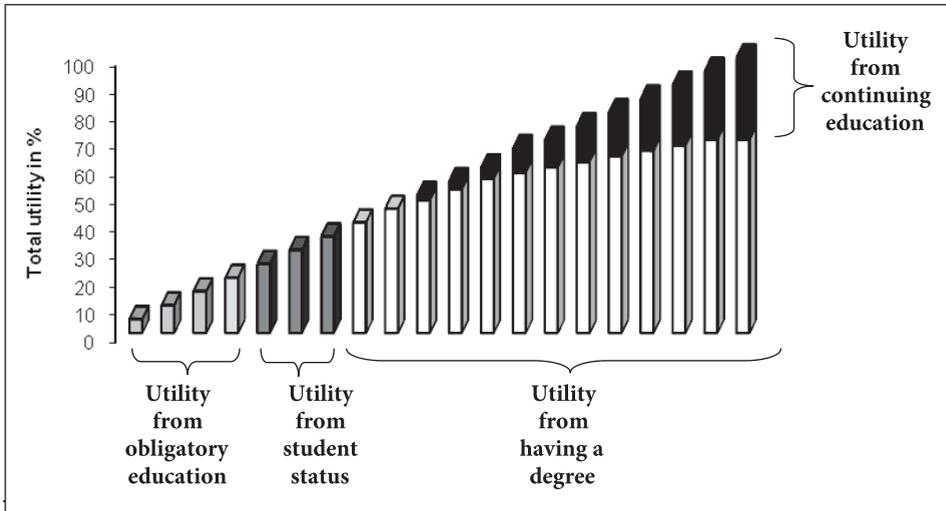
4.1. Total utility of acquired knowledge and total utility of passed examinations

There are two situations that have to be considered:

1. Utility of the acquired knowledge
2. Utility of the acquired status of full-time student (of examinations passed)

(1) Utility of knowledge increases, or, if only the duration of study is considered (to simplify we do not take into account compulsory education and continuing education), it is equal to the total utility of the examinations passed during studies. The student acquires knowledge that will be useful throughout his/her life. Additional utility is obtained if the student regularly passes the examinations.This utility derives from the status of full-time student. At the moment of passing 'the last provisory' exam (the final study exam) the marginal utility of knowledge excludes the short-term utility obtained from the acquired status of full-time student, and (in the case where 'the last provisory' exam is passed) includes the long-term utility of possessing a university degree. Consequently, the total utility of knowledge is equal to the sum of utility obtained by the student status and the utility of possessing a university degree. If the student does not pass 'the last provisory' exam, s/he loses the potential utility of possessing a degree although s/he retains the utility of the acquired knowledge. Seen in this way 'the last provisory exam and any 'provisory' exam have the same weight, the former in the analysis of the acquired knowledge utility and the latter in the analysis of the acquired full-time student status.

**Graph 4: Total utility of knowledge acquired during life-cycle**

(2) Consequently, the total utility of passed examination increases, because:

a) An increasing number of passed examinations up to 60 ECTS enhances the probability of transfer to a higher year of study and retention of full-time student status (short-term utility),

b) An increasing number of passed examinations up to 180 ECTS (or 300 ECTS) enhances the probability of graduation and partial or total exemption from repaying the student loan (medium-term utility), and

c) The acquired knowledge increases leading to a better position in the labour market (long-term utility).

In the case of total (and marginal) utility, the utility is expressed by a number of ECTS for a particular course. In this paper, to simplify the procedure, each course is given an equal number of 5 ECTS.

4.2. Marginal utility of examinations passed

Marginal utility of examinations passed during study, unlike the neo-classical microeconomic situation of diminishing utility of products or services, also increases. Let us consider the following three situations:

Case A

'System 1' denotes conditions of study under which the student does not have to pass all the exams of the current year in order to progress to the next year, i.e. to retain student rights.

In this situation we have a gradual increase of marginal utility (safety, self-confidence, satisfaction, happiness). The utility of the passed examinations gradually increases with each passed examination. Marginal costs decrease. The second exam is more useful than the first, the sixth more so than the fifth. An answer to the question of how much more useful depends on the selected system of study. Giving up studying is less harmful if the student has passed one exam than if s/he has passed ten of them. Namely, at the level of ten examinations the total costs are higher than the costs at the level of one examination. We are dealing with relative increasing marginal utility.

Graph 5: Total and marginal utility of exams "System 1"
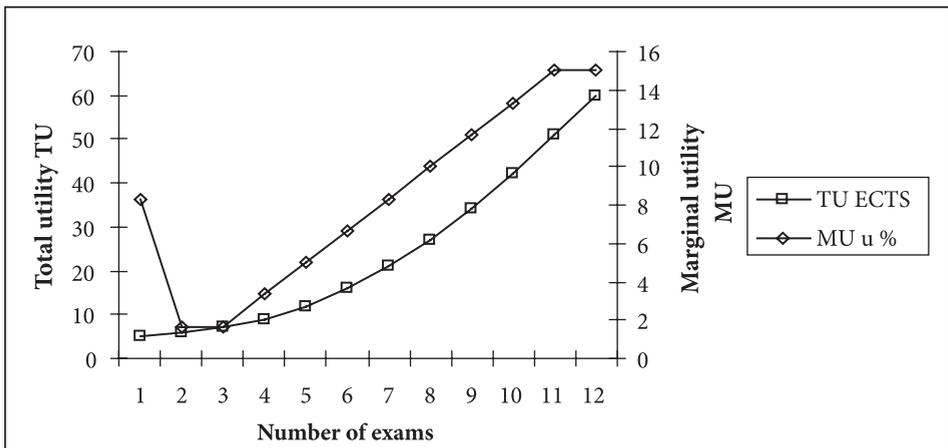
$$MU_i = \frac{\Delta TU}{\Delta Q} = \frac{Change\ in\ total\ utility\ of\ student\ status}{Additional\ exam\ passed} \tag{4.1}$$
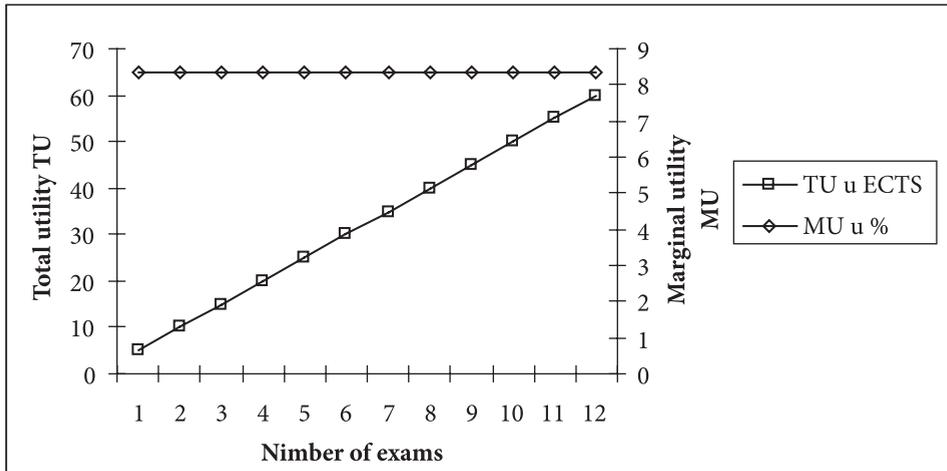
with

$$MU_1 < MU_2 < ...MU_n \tag{4.2}$$

It is to be noted that the respondents from our survey placed their utility in Case A.

Case B

In this case we also deal with a situation of increase of total utility. However in this case the utility of each passed examination during one academic year is equal. In practice, 'System 2' denotes the studying system in which the student enrols in all the programme exams at the moment of entry. The regularity of such a model will be ensured by two constraints: (a) the maximum duration of studying is limited, and (b) the gradual acquirement of knowledge will be ensured by the so-called 'linked courses'.Here we are dealing with constant marginal utility. There are no 'provisory' exams and only the 'last provisory exam' has a special significance in terms of utility. The effect of the 'last provisory exam' on the marginal utility corresponds to the effect of the 'provisory' exam in cases A and C. Nevertheless, as the student will lose the status unless s/he passes 'the last provisory exam' in due time, the importance of this exam is relativized. Consequently in case B we are really dealing with the constant marginal utility of all the exams in the course of studies.

Graph 6: Total and marginal exam utility "System 2"

$$MU_i = \frac{\Delta TU}{\Delta Q} = \frac{Change\ in\ total\ utility\ of\ student\ status}{Additional\ exam\ passed} \qquad (4.3)$$
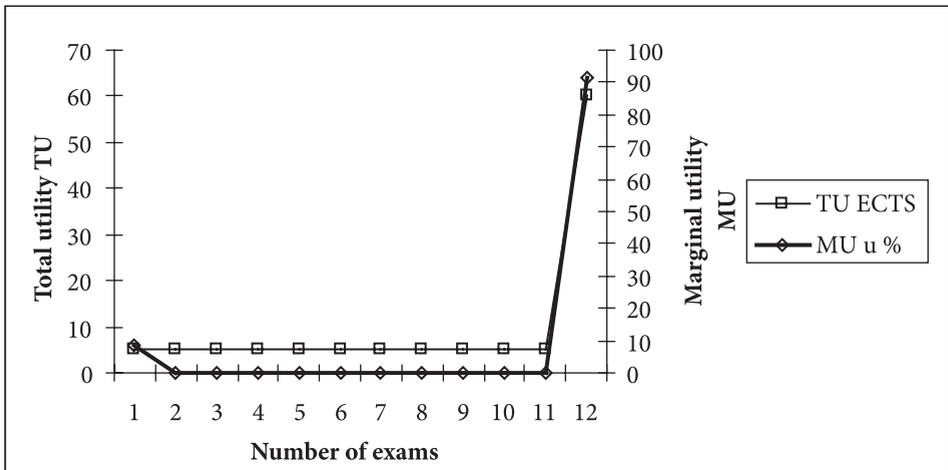
with

$$MU_i = \frac{TU}{n}, \quad (i = 1,...,n) \qquad (4.4)$$

Case C

'System 3' requires the students to pass all the exams of the current year to progress to the next year of study. In terms of losing the status of full-time student the situation is "all or nothing". Here all eleven examinations of the first year have the same marginal utility. The last, twelfth exam, however, has the absolute marginal utility that amounts to the total value of all the ECTS necessary to progress to the next year and to retain full-time student status.This situation, in terms of the utility theory or marginal utility, will be called absolute (ultimate) increasing marginal utility.

Graph 7: Total and marginal exam utility "System 3"

$$MU_i = \frac{\Delta TU}{\Delta Q} = \frac{\text{Change in total utility of student status}}{\text{Additional exam passed}} \qquad (4.5)$$

with

$$MU_i = const. = 0, \; za \; i \; (i = 1,...,n-1)$$
$$MU_n = n - (n-1)Q \qquad (4.6)$$

Let us now summarise the previous observation by analysing the interrelation of total utility curves in the three systems of studying. The curves are shown in Graph 8.

Depending on the selected system of studying the total utility curve 'System 1' can be moved towards the curve 'System 2' or the curve 'System 3'. If the conditions of progress from year to year become more rigid (an increasing number of examinations have to be passed), the curve 'System 1' moves towards the curve 'System 3', and if all the exams have to be passed it becomes equal to the curve 'System 3'. In the case where the more flexible system is used the curve 'System 1' moves to the left as long as it becomes equal to the curve 'System 2'.

Graph 8: Total utility of exams in analyzed study systems
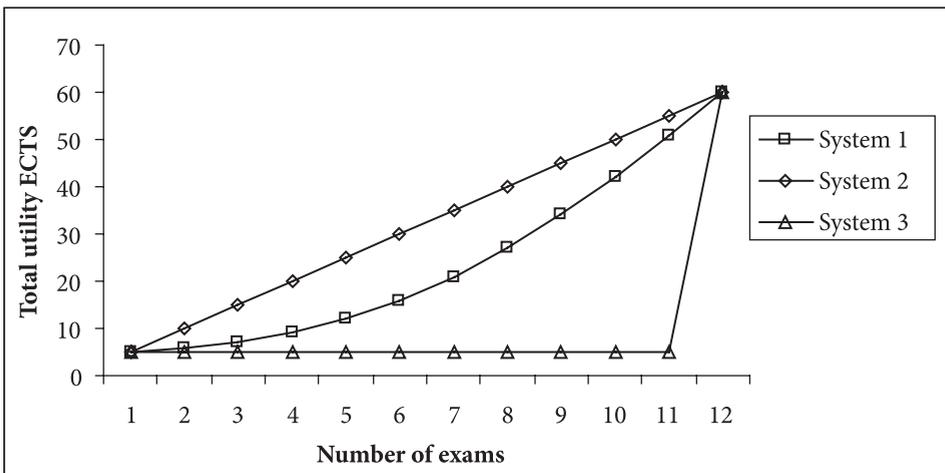
It is possible to follow all these options by marginal utility curves (Graph 9). As the systems of study are changed from the second over the first to the third, the marginal utility curves are increasingly erect; the first is the horizontal curve representing 'System 2' in which the utilities of all the exams are equal, then comes the positively inclined curve representing all the systems of study that are not marginal, in which the utility of single exams grows with the number of passed exams and are represented by the curve 'System 1', and finally, the curve of vertical marginal utility 'System 3' in which everything depends on one "provisory" examination.

Graph 9: Marginal utility of exams in analyzed study systems
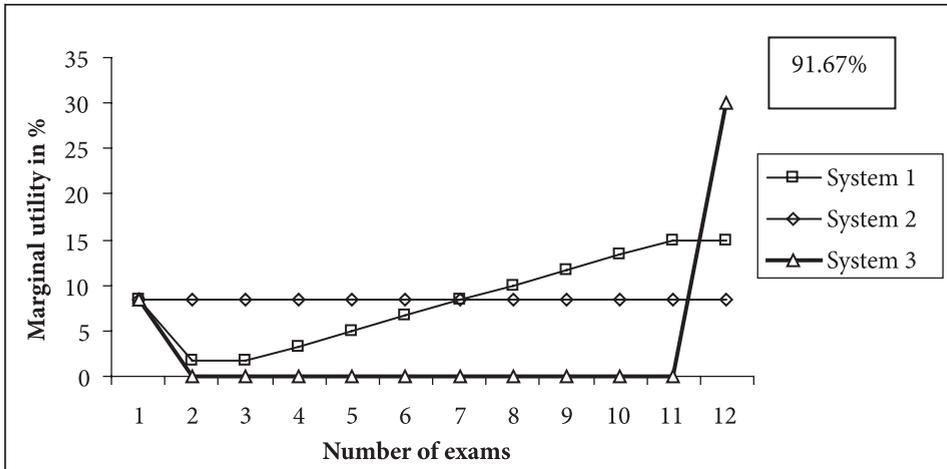
However, if we were to compare the authentic curves of marginal utilities resulting from student surveys (Graphs 1 and 2) with those in the Graph 9 we would find a small upward deviation from the marginal utility curve of 'System 1'.

4.3. The law of increasing marginal utility of social services

The implication of the above discussion is that, by analogy with the law of diminishing utility of goods and services, the marginal utility of examinations increases if the quantity of passed examinations increases.

Defined in this way, the law of increasing marginal utility will have concrete practical applications, because it can:

• Help in designing university curricula that will, in terms of the ''Bologna process'' and European higher education, and according to the principles of increasing utility, result in higher social utility/social welfare.
• Be used in the creation of study systems that allow easier progress, with simultaneous enhancement of quality and quantity of acquired knowledge, with the purpose of increasing student (and instructor) satisfaction.
• Improve university management models.
• Contribute to a more complete functional permeation of the education system and the system of student subsidies and grants, maximising fiscal utility with simultaneous minimization of student costs.

- Explain the connection between the student loan system and utility in continuing education, as well as help establish financing systems suitable for particular social environments (progress).

Non-material service is the 'product' of the higher education system. Non-materiality characterises the 'product' of other social services as well. There is no doubt that the concept of increasing utility can also be applied to other social services. In health care, culture, social welfare, and sport, as well as in any kind of education, there are many examples of increasing utility that confirm the possibility of the application of this law to social services. The law points to important differences between goods and services, or more precisely, between goods and social services. This difference, based on the perception of utility and on an actual increase of utility that can also be mathematically expressed, is the point at which this segment of social activity converts the microeconomic law of diminishing utility of (goods and) services into the law of increasing marginal utility of (social) services.

Consequently the marginal utility of social services increases if the quantity of consumed social services increases.

What remains to be done is to formulate, in analogy with diminishing utility, the increasing marginal utility of social services:

$$MU_i = \frac{\Delta TU}{\Delta Q} = \frac{Change\ in\ total\ utility\ of\ public\ service}{Additionaly\ consumed\ public\ service} \quad (i = 1,...,n) \qquad (4.7)$$

$$\lim_{\Delta Q \to n} \frac{\Delta TU}{\Delta Q}$$

To confirm this we use a partial derivation

$$\frac{\partial TU}{\partial Q} \approx \frac{\Delta TU}{\Delta Q} \qquad (4.8)$$

and an additional condition confirming that the marginal value is increasing

$$\frac{\partial^2 TU}{\partial Q^2} > 0 \qquad (4.9)$$

which means that in the case of increasing marginal utility, if *n* is the last unit of social service increasing satisfaction, we have:

$$MU_1 < MU_2 < ...MU_n.$$ (4.10)

The utility of examinations can be expressed in money or in ECTS points. This leads us to the cardinal utility, i.e. the utility function that describes by how much the goods/services or market-basket is more useful (attractive, desirable). The emphasis is on *how much*. This is the pattern for calculating the number representing the quantity of satisfaction caused by consumption of a service. This means that it is possible to compare different intensities of utility in terms of how much an exam (or exam-basket) is more desirable than some other exam (or other exam-basket).

Nevertheless, modern economists still refuse direct measurement of utility. There are two reasons for this: (a) most people cannot determine the level of utility more precisely than ranking it (as first, second, third, etc.), and (b) utilities of individuals are not scientifically comparable. People are differentiated by the intensity of their preferences and there is no scientific method to determine how much more somebody enjoys consuming some service in comparison to anybody else consuming the same service[9].

Here we are aided by ordinal utility, which objectifies the issue by ranking goods or services from the least desirable to the most desirable, without using any analytical apparatus for measurement. Here the emphasis is on the rank. Utility (both total and marginal) is a concept that cannot be measured either directly or indirectly and that cannot be expressed in absolute terms, but that still exists as a concept, and can be compared and presented as something that is higher than, lower than, or equal to some other utility. Consequently the utility of examination A is higher, lower, or equal to the utility of examination B, but the differences between them cannot be quantified and expressed numerically. The ordinal framework is ample enough for research into the utility of university examinations. Comprehended and interpreted in the ordinal way, utility analysis of examinations offers a rewarding insight into student behaviour.

5. INSTEAD OF CONCLUSIONS

Marginal utility theory is based on a very simple and decisively important assumption: the product or service whose utility is investigated is a simple or

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[9]   These limitations stimulated the development of indifference analysis, which could ensure an adequate level of scientific credibility only by a quantitative approach.

homogenous product/service. This means that in the consumption process only one kind of this product/service is consumed, which is of the same form, dimension, and quality. This is certainly a strict methodological reduction, which is sometimes mitigated by the introduction of a product-basket instead of a single product. Nevertheless, multiple use of the same product/service or product/service-basket leads to saturation of utility.

Implicitly, the entire analysis in this work is based on the same assumption: all the examinations are of the same form, dimension, and quality. Thus we deal with simple, homogenous services. However, anyone experienced will know that each examination in a study programme can in fact be treated as one product, which is why the law of diminishing marginal utility is not valid here. If it is true, the issue analysed here would be the object of indifference analysis rather than of marginal utility theory.

However, before we thus 'classically' abandon the concept of the increasing marginal utility of examinations, let us deal with some additional arguments.

First, the elements of production theory. Each product can be seen as a service. Services represent the use value of work that is useful as an activity *per se*, and not through the produced item. In analogy with the production theory that systematizes products as homogenous and linked, we could say that services can also be homogenous or linked. Linked services are those that require the same inputs (knowledge, skills, organization, and technology), have common costs, and differ in size and quality. It is obvious that in the case of university examinations we deal with linked services rather than homogenous ones. And it is exactly the definition of linked services that may open the door for increasing utility (of examinations).

Does it mean that for some kinds of services the law of increasing marginal utility is nevertheless valid? To test this statement let us divide services into material and non-material. The first group includes services that are connected to products (transport, catering, tool repair, etc.). We can logically conclude that the utility of multiple use of these services does not increase, i.e. that their utility is the greatest if they are used only once. On the other hand, non-material, social services (social services, education, health care, art, entertainment, etc.) are carried out without the mediation of material products. The volume and structure of these services increase along with social progress. This also happens due to their cumulative effect: consumption of each additional non-material service makes their total utility increase, and their marginal utility as well.

When we are dealing with university examinations (and other non-material social services also) there is another important specific feature that affects the discussion of the legitimacy of increasing utility: there is no substitution effect. A concrete examination cannot be substituted by any other. It is well known that the result of diminishing marginal utility cannot be applied in the case of perfect substitution, because that would mean that the two exams are, in fact, one. The situation with university examinations leads us to the conclusion that neither can diminishing utility be applied in the case where substitution does not exist. If total utility exists and does not result in diminishing marginal utility, then the only remaining possibility is increasing marginal utility.

Diminishing marginal utility is a very appropriate assumption in economics. However this does not mean that it can be universally applied. In the case of university examinations utility, it seems that we are not dealing with indifference analysis, but rather with increasing marginal utility.

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