

## **Integrated Cross-Disciplinary Approach to Household Expenditure Management**

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*Purpose of the article. To analyze theoretical background of expenditure management process in households with the aim to identify reasons compromising the management efficiency and the ways of their handling.*

*Methodology/methods. Comparative analysis of scientific literature, statistical data analysis, cross-disciplinary approach integrating psychology and economics, Maslow's hierarchy of needs theory, vector algebra, case-study based testing.*

*Scientific aim. To justify theoretically a new approach to household expenditure management containing formal pre-purchase procedures used to match the value of goods/services purchased with the specific consumer's preferences by applying value decomposition technique.*

*Findings. Decomposed value components better than aggregate value reflect the ability of good/service to satisfy various complex needs of the consumer, both basic (physiological) and those purely psychological from higher stages of the Maslow pyramid of needs, e.g. esteem and self-actualization. Decomposition gives the possibility to quantitatively evaluate and compare them. Results of case-studies carried out have proved validity of the approach and its potential in being applied as a planning tool in managing household's expenditure.*

*Conclusions. Decryption of aggregate value of goods and services by decomposing it into components reflecting the hierarchy of consumer's needs creates a platform for development alternative approach to expenditure management in households, less dependent on influence of various subjective, intuition based factors. This approach should yield to reduction of spontaneous spending, give the possibility to harmonize not only total/aggregate consumption with the income, but also to find a balance between items in the bunch of products/services purchased, thus preventing an unbalanced (excessive or insufficient) allocation of funds.*

**Keywords:** *Personal Finance, Household Economics, Sustainable Consumption, Household Expenditure Management.*

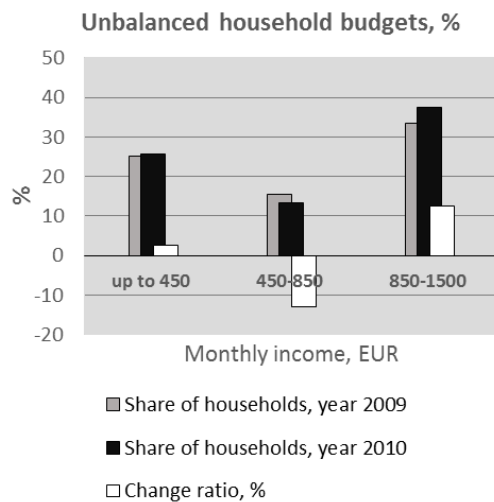
### **Introduction**

Expenditure planning and management is a key element in household economics (Medova *et al.*, 2008). By efficiently planning and managing its expenditure a household can achieve maximum utility and successfully implement life-long wealth building plans and vice-versa. The flow of household-related expenditure in Lithuania makes approximately 2/3 of country's GDP (Ministry of Finance of the Republic of Lithuania, 2014), therefore its influence on economics is huge both on micro and macro levels. The latest developments in various EU countries during the post 2008–2010 crisis period raise a number of questions, which have no clear answers so far. For example, why households and societies in some EU countries, e.g. Greece, express so strong disappointment because of worsening living standard, even followed by serious political consequences, while in other, like Central European and Baltic countries, with several times lower average income and especially pensions the situation is relatively stable? Difference in consumer prices in all the countries is not significant and cannot be the reason to cause such consequences. Average household in Greece

disposes significantly higher resources and should not experience problems with satisfying at least its basic needs. Research on financial performance of Lithuanian households during the same period done by the authors (Figure 1) has revealed that relatively wealthy households have experienced similar problems, while households with lower income had demonstrated even better ability to maintain their budgets balanced (Taujanskaite & Milcius, 2012).

This shows the problem being really wide, not restricted to one specific country or society and indicates the need for efficient ways to control it.

Consumption as a mean to satisfy ones needs has been for many years investigated mainly by using economic and psychological approaches. Classical economic approach, which is based on three fundamental assumptions stating that consumers behave rationally, obey budget constraints and follow preferences set by the consumer himself, presume that consumption is a domain predominantly guided by rationality. Psychological approach, instead interprets it as psychologically motivated and reflecting individuals' reaction to various intrinsic and extrinsic factors, which affect him. In the latter case economic factors are not considered to be determining.



**Figure 1.** Households with Budget Deficit in 2009–2010 in Lithuania (Taujanskaite & Milcius, 2012)

Household expenditure management problem is interpreted by economic approach as finding optimal ratio between funds allocated for current-time consumption and the savings intended for financing various needs in the future in order to guarantee maximal aggregate life-long utility. Mathematically the problem is usually presented in a following way:

$$\max \sum_{t=0}^T b^t \ln(c_t) \quad (1)$$

subject to:

$$k_{t+1} = Ak_t^a - c_t \geq 0 \quad (2)$$

for all  $t = 0, 1, 2, \dots, T$ , where  $T$  is an expected life time of consumer,  $c_t$  is consumption in period  $t$ , which yields utility  $u(c_t) = \ln(c_t)$  (3).  $b^t$  is a factor, which discounts future utility,  $k_t$  is a capital in period  $t$ . Next period's capital  $k_{t+1}$  is determined by this period's capital and current consumption:

$$k_{t+1} = Ak_t^a - c_t \quad (4), \text{ where } A \text{ is a positive constant and } 0 < a < 1.$$

Solving the problem simultaneously for all the choice variables  $c_0, c_1, c_2, \dots, c_T$  and  $k_1, k_2, k_3, \dots, k_{T+1}$ , might look complicated, but the application of the dynamic programming approach (or Bellman's equation), which makes possible to break it apart into a sequence of smaller decisions, significantly simplifies it.

If a sequence of *value functions*  $V_t(k)$ , for  $t = 0, 1, 2, \dots, T, T + 1$  denotes the value of having any amount of capital  $k$  at each time  $t$  and the condition  $V_{T+1}(k) = 0$  (5)

is taken into account, meaning there is no utility from having capital after death, the value of any quantity of capital at any previous time can be calculated by backward induction using the Bellman equation. In this problem, for each  $t = 0, 1, 2, \dots, T$ , the Bellman equation is:

$$V_t(k_t) = \max(\ln(c_t) + bV_{t+1}(k_{t+1})) \quad (6)$$

subject to:

$$k_{t+1} = Ak_t^a - c_t \geq 0$$

This problem is simple compared to previous, as involves only two decision variables,  $c_t$  and  $k_{t+1}$  and one step at a time solution instead of life-time long solution. As

current capital  $k_t$  at time  $t$  is given, the only thing needed is to choose current consumption  $c_t$  and saving  $k_{t+1}$ . Value function of capital at time  $(t = T - j)$  is:

$$V_{T-j}(k) = a \sum_{i=0}^j a^i b^i \ln k + v_{T-j} \quad (7)$$

where each  $v_{T-j}$  is a constant, and the optimal amount to consume at time  $(t = T - j)$  is:

$$c_{T-j}(k) = \frac{1}{\sum_{i=0}^j a^i b^i} Ak^a \quad (8)$$

$$\text{Finally it turns into } c_T(k) = Ak^a \quad (9)$$

when life cycle comes to the end (Sniedovich, 2010; Dasgupta *et al.*, 2006; Denardo, 2003).

Therefore, optimal distribution of funds does not seem to be complicated and the presented economic approach, if applied, should guarantee efficient management of households' financial resources. Why it happens that so big part of households, irrespective of income level, experience difficulties not only with accumulating sufficient savings, but even keeping their current budgets ballanced?

There are several reasons. First, in the problem as presented above, the consumers task is maximally simplified. Utility from current consumption is expressed with one single function  $u(c_t) = \ln(c_t)$  as if one single financial transaction would satisfy all needs of the period. Thus, the problem in this case relies on aggregate utility created by aggregate values of all goods and services purchased during that period. As real aggregate utility  $u(c_t)$  is being composed of every single financial transaction, consumer should repeat the above procedure every time he pays for goods, including the allocation of funds for this transaction and maximizing utility from it in the context of all the rest needs of the period. Therefore, a simple optimization in reality turns into multi-objective optimization problem, where the number of needed solutions equals to a number of goods/services purchased during the period. Second, decision whether or not to buy specific good is subject to consumer's personality, his preferences (Freud, 1904; Maslow, 1954) and features of goods to be purchased. This makes decision making challenging as utility of every good is complex (Lancaster, 1966), therefore optimization problem is not only multi-objective, but also multi-attribute. Third, economic environment where consumer decisions have to be made is very dynamic. Huge efforts and resources, which manufacturers and sellers invest in marketing, change human thinking and behavior. This strongly affects decisions, first of all related to estimation of utility. As a result, the real consumer's problem becomes very complicated and it is not surprising that budget management becomes problematic for so many households.

Economic approach alone does not provide consumer with information needed to make rational decisions taking into account the above mentioned circumstances. The same applies to psychological approach. Combined application of both of them has not yet been developed to the level to adequately meet the households' needs either.

In this paper an attempt was made to analyze theoretical background of expenditure management process in households with the aim to identify reasons compromising the management efficiency and the ways of their handling. A new approach to household expenditure

management, based on synthesis of economic and psychological approaches, has been justified theoretically.

Methods used in this research are: comparative analysis of scientific literature, statistical data analysis, cross-disciplinary approach integrating economics and psychology (as referred to in Maslow's hierarchy of needs theory), vector algebra technique, case-study based testing.

Management of household's resources is closely related to other processes within household economics therefore all economic theories developed to handle issues within this area are relevant to the expenditure management.

### **Related Theories Overview based on Historical Approach**

As households are important integral part of economic system of every country, processes related to households' finances are permanently in focus of numerous scientists (Campbell, 2006; Altfest, 2009; Vahidov & He, 2009; Abreu & Mendes, 2010; Hite *et al.*, 2011; Finke & Smith, 2012; Almenberg & Gerdes, 2012; Carlin & Robinson, 2012; Bosshardt & Walstad, 2014) and institutions, such as: Consumer Federation of America (2012), Certified Financial Planner Board of Standards (2012), Members Equity Bank (2013), International Monetary Fund (2013), Wealth Management Institute (2015), Princeton Survey Research Associates International (2015).

In 1857 German economist Ernst Engel has made an investigation about the reliance on income level and expenditure composition in households. He noted that „when family's income increases, the proportion of money spent on necessities proportionally decrease, but at the same time the expenditure for luxury things increases (Zimmerman, 1932).

Research in personal finance has started as early as the 1920s by Hazel Kyrk who actually laid foundation for the field of family and consumption (or consumer) economics. Kyrk's dissertation and her later work had triggered the development of family economics (Kyrk, 1923, 1933). (Beller & Kiss, 1999) admit her role in incorporating the insights of economics into the field of home economics and creating the Division of Family Economics in the then American Home Economics Association.

Input of Margaret Reid, 1934, another Chicago economist, in several areas of consumer and household behavior is also widely recognized as significant (Hira, 2009).

Consumer theories are undoubtedly important for personal finance and household economics studies. The framework for these theories were made by (Ramsey, 1928; Keynes, 1936; Ramanaukas & Jakaitiene, 2007). In the book: „*The General Theory of Employment, Interest and Money*“, Keynes noted that „individuals' or families' consumption and saving behavior in a given period is related only to their disposable income of that same period“ (Baranzini, 2005). This thesis was described in Keynes absolute income hypothesis in 1936.

However, the precise form of this dependence has been disputed for many years. Ever since Keynes, the saving and consumption behavior of individuals, families, dynasties and classes has been the focus of attention of generations of economists. As a result a number of new

theories within consumption and saving has emerged at the end of the 1940s and in the early 1950s (Baranzini, 2005).

As early as 1947, Nobel Prize winner American economist, psychologist, sociologist Herbert Simon analyzed how organizations and individuals make financial decisions and suggested that the decision maker possessed limited information (knowledge) and did not always seek the best potential choice because of limited resources and personal inclinations. H. Simon claims, that "decision-making <...> must be derived from the logic and psychology of human choice". He argued that „the task of rational decision making is to select the alternative that results in the more preferred set of all the possible consequences. He divides the task into three steps: 1. the identification and listing of all the alternatives; 2. the determination of all the consequences resulting from each of the alternatives; 3. the comparison of the accuracy and efficiency of each of these sets of consequence“ (Simon, 1976). Simon raises doubts if any given individual or organization attempting to implement this model in a real situation would be able to comply with the three requirements. The resulting question would be: given the inevitable limits on rational decision making, what other techniques or behavioral processes can a person or organization bring to bear to achieve approximately the best result? According to Simon, the human being striving for rationality and restricted within the limits of his knowledge has developed some working procedures that partially overcome these difficulties (Ansari, 2000). These simplified procedures are usually based on assumption that he can isolate from the rest of the world a closed system, which contains a limited number of variables and a limited range of consequences“ (Simon, 1991).

In 1950s the life-cycle theory of consumption and savings was developed by Modigliani, Brumberg and Ando. This theory has added to and partially replaced Keynes's theory of savings by stating that the level of consumption savings depends on the age of consumers, and hence on the demographic structure of society rather than on the level of family income (Baranzini, 2005; Fisher, 1930; Harrod, 1948; Modigliani & Brumberg, 1954; Ando & Modigliani, 1957; Friedman, 1957).

In 1957 Milton Friedman developed the permanent income hypothesis, which is a theory attempting to describe how individuals spread consumption over their lifetime and supposes that a person's consumption at a point in time is determined not just by their current income but also by their expected income in future years - their "permanent income". It provides an explanation for some of the failures of Keynesian demand management techniques (Friedman, 1957; Meghir, 2004).

In 1961 John Muth formulated rational expectations theory. Robert Lucas was awarded the Nobel Prize in 1995 for its further development (Syll, 2011). This economic theory is based on the assumption that people are making financial decisions according to their monetary resources and do not make mistakes. Besides, individuals use all available information in the market for such decisions and they are based on their intelligence, not on the psychology aspects (Lovell *et al.*, 2011). According to T. J. Sargent, there are substantial differences in comparison with the theory of Keynes General Theory, where expectations

were treated as irrational, because they existed in the minds and were analyzed as a psychological phenomenon.

In 1978 R. E. Hall proposed the rational expectations permanent income hypothesis, where consumption is described as random wandering. This hypothesis states that the best forecast for future consumption is only the present level of it. Also, the changes of consumption are purely random and unpredictable, and financial asset does not influence any changes in consumer behavior (Runkle, 1991).

In 1960s Garry Becker was the one who “put the family on the economics profession's research agenda” (Pollak, 2002). (Becker, 1965) is best known for modeling household decisions and resource allocation in a model where a household is both a producing and consuming unit. (Huffman, 2010) points out the parallelism with earlier Margaret Reid's (1934) research and considers her work being an important antecedent to Becker's formal modeling of the productive household. Becker has demonstrated the researchability of the family from the economic side and described what he has termed the "economic approach" to the family. He wrote: "The economic approach <...> assumes that individuals maximize their utility from basic preferences that do not change rapidly over time, and that the behavior of different individuals is coordinated by explicit and implicit markets" (Becker, 1993). Theory distinguishes three main components to constitute the household economics: household production, consumption and time allocation. Household production relates to all the output that a household produce including production related to work. Household consumption includes all things that are consumed by a household including food, sleep, leisure, etc. Time allocation refers to the exact way we spend each minute of our day. Time allocation also introduces the basic concept of opportunity cost, explaining that every minute we allocate to one activity, by definition, cannot be allocated to any other activity. <.....> An approach based on inclusion of production, consumption and time, allows economists to create models that examine the correct allocation of goods and services (Simple Economist, 2015). It reflects the fundamental concept in consumer economics. By utilizing it researchers are able to identify and examine how consumers behave and it helps households to understand the opportunity costs of their time allocation (Lazear, 2000). (Pollak, 2002) admits that foundational assumptions of Becker's economic approach to the family – maximizing behavior and equilibrium – as well as such primary auxiliary assumptions as household production and interdependent preferences, are now widely accepted not only by economists, but also by family sociologists, demographers, and others who study the family.

Becker's theory has been criticized by other scientists, (Pollak 1975, 1985; Behrman *et al.*, 1995; Lundberg, 2001) and others mainly because of his assumptions and analytical methods used (Pollak, 2002). (Bergmann, 1995) notes that some Becker's assumptions make analysis too simple and “leaves out considerations of prime importance”. Nevertheless, as stated by Pollak: „Although we may reject many of Becker's answers and refashion many of his tools, but his answers and his tools provide the starting point for economists who work on the family“.

Consumer theory is concerned with how a rational consumer makes consumption decisions (Levin & Milgrom, 2004), or in other words how people decide what to spend their money on given their preferences and their budget constraints (Nicholson, 2005). It explains how choices are made depending on consumers' income and the prices of goods and services and helps to understand how individuals' tastes and incomes influence the demand curve (Echenique *et al.*, 2011; Dean, 2009). Consumer choice theory instead is a way of analyzing how consumers may achieve equilibrium between preferences and expenditures by maximizing utility as subject to consumer budget constraints (Silberberg, 2001).

Preference approach, which was developed by P. Samuelson is a method by which one can discern a consumer's utility function, by observing their behavior. Rather than postulate a utility function or a preference ordering, Samuelson imposed conditions directly on the choices made by individuals – their preferences as revealed by their choices (Samuelson, 1938; Varian, 2006).

The theory assumes that a consumer has a well-defined set of desires, or ‘preferences’, which can be represented by a numerical utility function. Furthermore, it is assumed that the consumer chooses optimally by giving preference to the option with the highest utility of those available to them. This means that a consumer is involved in permanent solving of optimization problem (Dean, 2009).

Conventional financial theory presumes that the world and its participants are, for the most part, rational "wealth maximizers" (Buskens, 2015), or "economic man" (*Homo economicus*) (Sutherland, 2012). This is not always supported by practice, where decisions are often influenced by emotions and psychology, causing unpredictable or irrational behavior. Behavioral finance is the study of the influence of psychology on the behavior of financial practitioners and the subsequent effect on markets (Sewell, 2007). It seeks to combine behavioral and cognitive psychological theory with conventional economics and finance to provide explanations for why people make irrational financial decisions (Phung, 2011). Earlier “economic psychology” has been trying to bring together insights from both psychology and economics (Lea & Newson, 2006). Various aspects, which differ conventional and behavioral finance theories have been analyzed by (Lea & Newson, 2006; Ricciardi & Simon, 2000) and other.

A. Maslow (1943) has been analyzing behavior of individuals only from the prospective of psychology without involvement of economics. Hierarchy of needs developed by him (1943, 1954) comprise five motivational levels of needs, often depicted as hierarchical levels within a pyramid. This five stage model can be divided into basic (or deficiency) needs (e.g. physiological, safety, love and esteem) and growth needs (self-actualization). The deficiency, or basic needs are said to motivate people when they are unmet. Also, the need to fulfil such needs will become stronger the longer the duration they are denied. One must satisfy lower level basic needs before progressing on to meet higher level growth needs. Once these needs have been reasonably satisfied, one may be able to reach the highest level called self-actualization. (McLeod, 2007). Such prioritization of needs is based on strong logics, which is difficult to argue with.

Nevertheless, analysis of financial behavior carried out in Lithuanian households (Taujanskaite & Milcius, 2012) presents a picture, where real bunch of needs being purchased seem to be very mixed. These bunches usually contain items from both the lowest and highest levels of needs, which often result in unbalanced households budget and even difficulties with satisfying the very basic needs, like paying for utilities. Among reasons, which cause such a situation might be a lack of willingness to control ones behavior and to avoid the related inconvenience, but first and probably the most significant factor is a lack of knowledge and information needed to support rational behavior. From this point of view any additional information to help increase financial awareness should stimulate rationality in managing households' financial resources.

Despite numerous researches and theories developed, the decision making process related to control of household budgets still contains significant gaps and remains too complicated to be efficient. In 2011 M. A. H. Dempster and E. A. Medova stated in their article (Dempster & Medova, 2011) "Advances in behavioral finance <...> have not yet delivered a practical solution". They support this statement by citing Paul Samuelson's keynote address at a conference on life-cycle investment 'Is personal finance an exact science?' with the immediate answer 'flat no'. In his words, "It is a domain full of ordinary common sense. Alas, common sense is not the same thing as good sense. Good sense in these esoteric puzzles is hard to come by." (Samuelson, 2007). Above discussed multi-objective and multi-attribute nature of the optimization problem the consumer is forced to solve many times a day is very much in line with and supports Samuelson's, Herbert Simon's statements as well as conclusions of many other authors of latest publications. Decision making criteria used are mainly qualitative, subjective and do not provide information needed to make clear decisions based on measurable quantitative indicators. Attempts to introduce units called "utils" by Jeremy Bentham (1789), as a utility measure, didn't change much as character of decision making criteria itself remained unchanged (The Human Condition Organisation, 2013).

A huge number of application programs using economic approach as a base have been developed during recent years to be used in practice in household expenditure management tasks. They are available on the market and are easy to access. Nevertheless, majority of them are only used to register expenditure and follow-up the cash-flow, but do not guarantee the optimization of purchases. The procedure, when it comes to purchase of specific item, is in most cases limited to registration of the purchase and its aggregate price. Procedures do not include any formal analysis and evaluation of utility.

The following can be stated summarizing analysis of investigations and theories that form the background for household expenditure management: both economic and psychological approaches have own advantages and are helpful in analyzing various aspects of consumer behavior. Economic-psychological approach, which combines some advantages of the above two approaches, has emerged in the second half of 20<sup>th</sup> century giving start to several new theories, e.g. behavioral finance. Emergence of the latter was stimulated first of all by the need to better understand

processes on macroeconomics level, especially those related to analysis of supply and demand in commodity and financial markets, therefore processes have been mainly analyzed from this point of view. Analysis of financial decision making from the consumer's point of view was never given high priority therefore the volume of its research remained on much lower level leaving households without adequate theoretical support, at least compared to sellers. This might be one of the reasons causing poor budgetary performance in many households.

The purchase process in real households fully relies on consumer's rationality, which is subjective and decisions made may depend on consumers' intuition, experience and very much on instant mood. Therefore, reduction of influence of these factors by formalizing the decision making process might positively influence the efficiency of using households' resources.

### **Value Decomposition. Theoretical Justification**

We attempt to prove in the paper that aggregate value of the good and the utility it generates to specific consumer may differ a lot therefore decisions made based on aggregate value may not guarantee good solutions even if consumers' overall behavior is rational. Based on this, authors have attempted to develop an alternative approach to household expenditure management, which should less depend on subjective consumers' decisions due to transformed interpretation of value of goods/services purchased. An idea behind this approach is that utility created to specific consumer by goods/services is not subject to their aggregate value, but only to certain value components contained in them. Identification of these value components is possible if value decomposition is performed by simultaneously applying economic methods and Maslow's theory of needs.

To the best of our knowledge none of the theories have so far attempted to apply similar approach. Theory offered by (Lancaster, 1966) is based on the idea of complexity of utility, but does not systemize its components the way Maslow theory does. Theories, like behavioral finance and some other use economics and psychology as a base, but never tried to integrate them to the level, which enables value decomposition and has attributes of synthesis, producing new quality instead of just summarizing features from economics and psychology.

Let's start from the hypothesis, which states that if aggregate value of any good or service can be decomposed into "n" non-substitute value components, each reflecting a certain level in the Maslow's pyramid of needs, than the possibility does exist to rationally, in a strictly formalized way to manage the expenditure of an individual or household by purchasing only those goods and services available on the market, which have the closest direction of the vector of their aggregate value to the direction of vector representing the specific consumer's preferences in the same "n" co-ordinate space.

*Maslow transformation of aggregate value vector.* The aggregate value of any good or service can be split into virtual components by using vector or matrix algebra methods and tools combined with Maslow's hierarchy of needs theory. Original Maslow pyramid of needs comprise



5 hierarchy levels (physiological, safety, social, esteem, self-actualization), but the rank of hierarchy levels can be either increased by splitting the original ones into smaller stages or reduced by combining them into larger groups. Suppose we have “n” hierarchy levels in the present analysis and neither of “n” categories of needs in the hierarchy pyramid can be replaced or substituted by other. For example, basic needs (food to satisfy only nutrition needs, dwelling and clothing to satisfy only physiological needs, etc.) cannot be substituted by neither comfort components (safety, social, esteem) nor prestige components (self-actualization and partly esteem), the same with other needs, so all these “n” categories shall be considered non-substitutable.

First, we’ll try to prove the existence of relationship between the components of the aggregate value and their prices and that this relationship is predictable within certain limits of accuracy. As we always know the market price of the specific good we are looking at, also we can always find an alternative to this specific good, which might have lower aggregate value and so the price, but still able to satisfy our needs to some limited extent, i.e. to the level, which corresponds the basic needs. Thus we can have at least 2 price levels for the same kind of good, which are different and the difference between them indicates the cost of our willingness to acquire more valuable item. So, the possibility does exist to extract the cost of components of aggregate value we are interested in and make choice based on information, which has a quantitative monetary expression.

Suppose that consumer/household holds financial resources M and uses them for purchase of goods or services for the price P to satisfy own needs. Assume the market price of purchased good corresponds to its aggregate value V, where the aggregate value V is a bunch of the good features, which expresses the potential of the good to satisfy the consumers’ needs by creating the required utility U.

As stated above, the aggregate value V of the good or service is complex and is composed of virtual value components  $V_n$ :

$$\bar{V} = \sum_{n=0}^{\infty} \bar{V}_n \quad (10)$$

where  $\bar{V}$  and  $\bar{V}_n$  are vectors in a “n” coordinate space. As it follows from the assumption, the market price of good/service  $P_m$  is directly related to the magnitude of its aggregate value vector  $|\bar{V}|$ , i.e.

$$P_m \equiv |\bar{V}| \quad (11)$$

It’s obvious that aggregate value of goods and services is almost always higher than the utility brought by them to the specific consumer as he or she not necessarily needs all the good features (value components) present in the bunch or at least in proportions they are presented in it. The only exception does exist when utility is equal to the aggregate value, which happens in case the value  $\bar{V}$  and the utility  $\bar{U}$  vectors are collinear in reference to the vector representing the consumer’s preferences in a mentioned “n” coordinate space.

The main conclusion from the analysis is that consumer almost always, except of some cases, is about to pay higher price for the goods he purchases. This is because he is expected to pay for the aggregate value (that’s what seller expects and the marketing system works for!), not the components of the aggregate value he really needs, meaning he would pay both for the value he needs and probably some extra value he would prefer to avoid paying for. Even the good would contain all value components the consumer appreciates, the proportions between them might not fit his expectations. Taking this into consideration, a rational consumer should look for goods, which contain the needed set of value components and are priced accordingly  $P_u$ :

$$P_u \equiv |\bar{U}| \quad (12)$$

but not the price  $P_v$ , which corresponds its aggregate value.

$$\text{As } \bar{U} \leq \bar{V}, \quad (13)$$

$$\text{consequently } P_u \leq P_v. \quad (14)$$

Thus, by simply comparing price of the good we are looking at with the price of alternative good of the same purpose, but containing only basic value, we can guide the purchase process so that we make decisions based on objective, quantitative information about the cost of additional value we appreciate.

The decomposition principle applied enables projection of consumer preferences having both physiological and psychological origin onto the aggregate value of goods/services and integration with their economic indicators.

What effect in price reduction can be expected as a result? Let’s analyze several examples.

*Example 1.* Assume the consumer is looking for watch. He can choose from two alternatives: an acceptable quality product, priced 20 Euro from manufacturer specialized in mass production and famous Rolex brand, priced from 5000 to probably 30000 plus Euros. Both products are of same category of goods by application- the devices to measure and indicate time, but the composition of value in each case is completely different. Rolex would contain both value of the watch itself, which would not dramatically differ from the cheap alternative, but will contain value component representing prestige, which would present more than 99 % of its price. The value and price of cheap watch, instead by 99 % would reflect the value of time measuring device, while prestige value would of course be close to zero. Both products have own consumers on the market, but let’s imagine they have exchanged their positions and what would be the consequences, especially for the one who by mistake has bought Rolex instead of cheap alternative. Probably he would put in danger not only himself but also his family just because he has bought the product which value is hundreds, maybe even thousands times higher than the specific utility he needed.

*Example 2.* Assume a pensioner having a very low income purchases cup of coffee in an expensive restaurant located in a busy city-center shopping area and pays some 5 to 10 times the price available in other places. The question is, which value components make the price so high in this case and is this consumer aware of and in need of them?

Examples show that in many cases there is no problem in identifying the price, which corresponds to the basic value of good or service. In case of the watches it's the price of mass production watch as well as in case of cup of coffee it would be the price in another, less expensive location. It's obvious how important is to realize own needs and act accordingly in the consumer market as consequences of ignoring it might be negative and even dramatic.

Identifying the right value and price of the good and focusing on it while making expenditure related decisions can be called harmonization of consumption, as consumers' decisions in such a case would be harmonized to his or her specific needs, meaning that use of financial resources for value components, which have no utility for him shall be minimized. Both examples are quite evident and easy in terms of distinguishing the value components. In case of other goods and services it might be more complicated as value is so much complex, difficult to analyze and distinguish even if the decomposition principles themselves are well understood.

In a similar way the situation can be analyzed not only on micro, but also on macro level, when financial performance of households of entire country is being analyzed.

*Example 3.* Let's compare situation with average households in two OECD countries- Greece and Estonia. Situation in Greece is nowadays widely discussed on international scale, first of all stressing the disappointment of Greek society with worsening living standard, while Estonia is being considered a relatively stable country from both economic and social points of view. Is it so that Estonian households dispose higher resources for satisfying their needs than the Greek households do? Or, maybe living cost in Estonia is much lower? Statistics say that neither is true. Average income adjusted to purchasing power per household in 2012 in Greece was 20300 EUR compared to 13800 EUR in Estonia, while consumer price indexes (in 2015) are only slightly higher in Greece (consumer plus rent price index 41,5 compared to 39,2, groceries price 58 compared to 49). Only restaurant price index in Greece is noticeable higher: 70 compared to 51 (Numbeo, 2015). Average pension in Greece is also much higher therefore there is no other explanation to justify the problems, which Greek households face than possible significant difference in value (and price!) of total bunch of needs because of different style of life and probably different habits. Analysis carried out based on data from the US Department of Agriculture and EuroMonitor International (EuroMonitor International, 2013) indicates that the amount Greek residents spend on food at home, dining out, alcohol and tobacco is among the 15 highest in the world. The amount spent on restaurant meals only (1158 US\$) is comparable to the total annual food expenditure per person in Lithuania. The Greek people spent more than those of any other country at cafes in 2012 – 609 US\$ per person (The World Post, 2015).

As it follows from the examples, analysis based on value decomposition can provide at least some ideas on why certain phenomenon take place not only in separate households, but on macroeconomics level as well.

## Conclusions

1. Household expenditure is a major factor affecting wealth of the household itself and the economic performance of entire country as determines a significant part of its GDP. In Lithuania its share makes approximately 2/3, therefore efficient household expenditure management is of highest importance on both micro- and macroeconomics level.

2. Research on Lithuanian households revealed that a significant part of them permanently suffer from budget deficit, irrelevant of their income level. Households with lowest income have demonstrated even better performance than those from the high end during the 2008–2010 crisis only lagging behind households with the average or below average income. Similar situation is observed on macroeconomics level, where disappointment with worsening situation in countries with relatively wealthy average households, e.g. Greece is so strongly expressed, while situation in countries with relatively poor households, e.g. post-communist Central European and Baltic countries is relatively stable. Income level is not the only and probably not the major factor to determine financial performance.

3. Analysis of relevant theories and management tools show that majority of them ignore influence of psychological factors on decision making related to expenditure management. Furthermore, they analyze processes on a certain generalized level and do not go deep enough to enable rational decision making when it comes to purchase of every single item, which finally form a bunch satisfying total consumers' needs. The management procedures are usually limited to registration of the purchase or, if allowed, alternatives can be analyzed on the level, which doesn't go deeper than the total price of the item and its full (aggregate) value. It has been shown in the paper that such an approach is not consistent from the point of view of consumers' needs as aggregate value does not necessarily match his personal utility criteria. The purchase process in such a case fully relies on consumers' rationality, which is subject to intuition, experience, instant mood and other subjective factors. It is difficult to avoid contradicting decisions, unbalanced consumption and guarantee maximal utility from the expenditure at these circumstances.

4. Influence of subjective factors on expenditure management decisions could be reduced if decision maker would possess information, sufficient to judge whether the item to be purchased matches his specific needs and if it is priced accordingly. This could be achieved if a special pre-purchase matchmaking block would be integrated into expenditure management algorithms to produce necessary information. Such matchmaking block can be formed by integrating and simultaneously using elements from economics and psychology (as referred to in Maslow's theory of needs).

5. Theoretical principles of new approach to the management of households' expenditure, containing pre-purchase matcmaking stage have been proposed in the paper. The key element of the approach is decomposition of the aggregate value of goods/services into components, each reflecting a certain level of Maslow's pyramid of

needs, and enabling their matching with the corresponding components, which represent consumer's preferences. Thus, consumer preferences having both physiological and psychological origin are projected onto the aggregate value of goods/services and integrated with their economic (price) indicators.

6. The proposed approach makes it possible to quantitatively evaluate and compare the value components representing different levels of the Maslow pyramid of needs and estimate the respective cost of consumer's needs/wishes.

7. Three case studies in micro and macroeconomics segments have been carried out in order to test the principles. The results have proved validity of the approach and the potential in being applied as a planning tool in managing households' expenditure. Reduced dependence on subjective decisions limits spontaneous spending, gives the possibility to harmonize not only total/aggregate consumption with the income, but also to find a balance between every item in the bunch of products/services purchased, thus preventing an unbalanced (excessive or insufficient) allocation of funds.

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