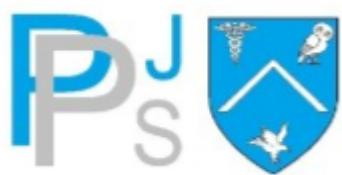


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Lech Keller

Jański College in Łomża

The Problem with the Concept of Utility and its Measurement

Abstract

Utility is a fundamental notion of orthodox (mostly neoclassical) economics, but as it is an idea, that is very vague and thus impossible to define and measure, it did a lot of harm to economics as a science. Therefore, I strongly argue that this outdated and imprecise concept should be finally abandoned, especially as a basis for microeconomic consumer theory, because it is not only illogical, but also ideologically not neutral, and thus unscientific. For sheer inertia, the concept of utility, as a basis for microeconomic theory, is taught to the students, thus corrupting the young minds. Furthermore, the present financial and economic crisis, the most serious since the 1930s, should force the economists from the academia to seriously revise the foundations of microeconomic theory, and, as logical consequence, rewrite the handbooks in microeconomics. I do not merely argue that the utility theory defies both logic and empirical justification, as many authors did it before me. I argue that the very notion of utility is unscientific, and was kept in microeconomic books only because of sheer inertia, but this way it made a lot of harm to the science of economics, and, as a result to the real economies. I also argue that the subjectivist theory of value should be replaced with an objectivist one, based on value of labour.

Keywords: Utility, Ideology, Role of Economics; Role of Economists, Microeconomics, Economic Methodology.

Utility is, without any doubt, a fundamental idea in orthodox economic theory. In orthodox economics, especially orthodox microeconomics, it is assumed that utility is the “ultimate goal of all economic activity” (Penguin 1992: 437). However, there was (at least recently) never any serious discussion on validity of such crucial assumption – it was simply accepted via consensus by orthodox economists¹ that:

- utility exists and as such it is a valid notion;
- utility can be measured² and
- utility can be maximized³.

This lack of serious discussion of the concept of utility is linked to general lack of contemporary discussion on the philosophical and ideological foundations of economics. There are few exceptions, such as Christopher Hayes (2006) who wrote that:

Neoclassical economics, as the Chicago School of thought is now called, has become an international elite consensus, one that provides the foundation for the entire global political economy. In the United States, young members of the middle and upper-middle class first learn its precepts in the academy. Polls routinely show that economists and the general public have widely divergent views on the economy, but among the well-educated that gap is far narrower. A 2001 study published in the University of California’s *Journal of Law and Economics* showed that those with college degrees are more likely to subscribe to the views of neoclassical economists than the general public. This isn’t surprising.

¹ And not only by the orthodox, but also by many unorthodox economists, such as behavioural economists and, above all, by virtually the whole Austrian School, a school based on the very idea of utility (especially marginal utility).

² Either as *cardinal* or *ordinal* utility – see discussion later in his paper.

³ That assumes existence of utility functions and their particular properties – see discussion later in his paper and, for example, Beinhocker (2007) especially chapters 2 and 3.

He adds further:

Conservatives have long critiqued academia for the ways professors use their position to indoctrinate students with left-wing ideology, but the left has largely ignored the political impact of the way people learn economics, though its influence is likely far more profound.

Thus it seems to be of an utmost importance to find how microeconomics, based on such vague and indefinable notion as utility, shapes the whole orthodox economics, including not only micro, but also macroeconomics.

1. Introduction

In orthodox microeconomics, utility is generally accepted to be an illusive and elusive measure of the relative satisfaction from consumption of goods. For example Black (1991: 776) defines utility as "...the capacity of a good or service to satisfy a want...", before going on to discuss the various, more detailed, but in no way more precise or objective definitions of this term. It is also important to note that even in authoritative **The New Palgrave Dictionary of Economics** (1991) the concept of utility is defined by referring it to the concept of wants, or human needs, but without any serious explanation of the latter terms.

Encyclopaedia Britannica (2008) defines utility as "satisfaction or benefit that a consumer derives from buying a commodity or service". Similarly, **Collins Dictionary of Economics** (1988: 534) defines utility as "the satisfaction or pleasure that an individual derives from the consumption of good or service". **The Penguin Dictionary of Economics** (1992: 437) defines utility as "the pleasure or satisfaction derived by an individual from being in a particular situation or from consuming goods or services". Similarly **Investopedia** (2008) defines utility as "an economic term referring to the total

satisfaction received from consuming a good or service", while **Farlex** (2008) is using basically the same definition.

Standard introductory textbook by Fischer and Dornbusch (1984: 103) defines utility simply as satisfaction, and claims that it does not need quantification, which is contradictory with the fundamental assumption that consumers maximize their utility – see also Begg (2005: 66). Furthermore, utility is absent in glossary to this textbook, which proves that even such eminent economists as Fischer and Dornbusch have fundamental problems with this term and are both unable and unwilling to solve it. More detailed discussion of utility is contained in a textbook by McDowell *et al.* (2006: 125-126). Authors explain there some limitations of the concept of utility and especially the impossibility of its measurement (including total failure of Bentham's idea of utilometer), but nevertheless do not dare to reject the very idea of utility. Similarly Estrin & Laidler (1995: 50-61, 115-116) introductory textbook on microeconomics contains detailed discussion on utility maximization, but does not define precisely the very concept of utility. The same problem is with standard textbook on mathematical economics by Chiang (1984: 400-408, 747-748) – continuity of utility function is assumed there, but without any explanation or discussion on validity of such a fundamental assumption. Many textbooks on applied economics, such as on managerial economics, for example by Keat & Young (1996) ignore thus totally the concept of utility, while popular dictionaries such as that by Susan Lee (1988: 215-216) frequently discuss utility in details, however using very imprecise terms, defining it as "the pleasure or fulfilment that people derive from consuming a good or service", and later quite seriously informs the reader about util, as a quantifiable and measurable unit of utility. On the other hand the entry of utility is concluded with a warning about very slippery nature of utility and that it is always changing (so it is very difficult to assess with any reasonable degree of accuracy).

It can be then clearly seen that utility is defined in orthodox microeconomics by satisfaction, benefit or pleasure – very unclear and vague psychological terms, that are rather impossible to define with any reasonable precision, terms that are by their very nature extremely arbitrary and dependent on changing circumstances of the person, for whom we would like to define and measure utility of goods and services, he or she consumes. Only few academic textbooks, such as, for example, Kopycińska (2005: 85.) openly admit that utility is a totally subjective idea, while other, such as, for example Rohacek (1989) try to develop their, rather orthodox, theories of human economic behaviour without even mentioning the concept of utility.

Finally, one should notice the work of George Katona⁴, one of the leading precursors of behavioural (or “psychological”) economics. In his books, such as **Psychological Analysis of Economic Behaviour** (1951) he has developed an original theory of economic behaviour that does not require introduction of such nebulous entity as utility. Katona studied economic processes as manifestations of human behaviour, so it can be said that he was one of the first to integrate psychology with economics. Before Katona the psychologists (or psychoanalysts) saw certain forms of economic behaviour in the daily problems of their patients – according to psychoanalysis, attitudes toward money involved important aspects of human relations, while spending and saving were frequently predicated upon the Freudian “irrational oral and anal needs”. However, such obviously pseudo-scientific “microanalysis” of economic behaviour was not Katona’s topic. He deals with more macroscopic and empirically testable aspects of economic behaviour, formulating cautious lawful propositions concerning the relations between such economic terms as income, saving and spending, and the specific choices of expenditures in a given environment. It is on the actual choice of expenditure in the presence of so-called enabling conditions (such as income and liquid assets), that Katona has

⁴ 1901-1981, former professor of economics and psychology at the University of Michigan, USA.

relatively the smallest amount to say. Katona has to restrict himself more or less to stating that economic processes are manifestations of human behaviour, so those processes can be also analysed from the point of view of modern psychology. His main point is that economic processes are more easily comprehended if the human factors and the psychology of decision formation and action are analyzed, so after explaining the need for psychology in economics, he developed his original theories of consumer behaviour, business behaviour and economic fluctuations. However, more detailed analysis of Katona's psychological theory of economic behaviour is somehow beyond the scope of this paper. What is most important here is that he did not see any need to introduce that unscientific notion of utility.

Given this imprecise and subjective measure of consumers' satisfaction, that is utility, orthodox economists try anyway to explain economic behaviour of individuals in terms of consumers' attempts to increase (generally to optimize) their utility. A theoretical unit of measurement for utility is thus usually called util⁵, but nowadays the majority of economists prefer not to use this unit, as it is virtually impossible to define, so it cannot be regarded as a scientific term. That impossibility to define util is one of the most important reasons explaining the failure of contemporary orthodox microeconomics, so it will be analyzed in more detail later in this paper.

5 Only in the early 18th century economists openly wrote that utility can be expressed as an absolute quantity, i.e. that the *cardinal* utility exists. Although util appears occasionally in modern orthodox economics, it is rather used marginally and not taken as seriously as it should be, providing widespread acceptance of not only the term itself, but also of its measurability. So present day orthodox economists abandoned the notion of *cardinal* utility in favour of *ordinal* utility and related to it indifference maps, in order to avoid unsolvable problems with util and *cardinal* utility. But the fundamental problems with definition of utility and its measurability (even "only" *ordinal*) were not solved, as those problems are simply unsolvable, giving the very arbitrary and immeasurable character of the notion of utility.

2. Controversies around utility

The 18th century doctrine of utilitarianism saw the maximization of utility as a moral criterion and as the most important goal for the humanity. According to leading utilitarians, such as Jeremy Bentham (1748-1832) and John Stuart Mill (1806-1876), society should endeavour to maximize the total utility of individuals, aiming for “the greatest happiness for the greatest number”. However, they were not so precise in details, for example it is not clear what they really understood by “utility” and how it could be aggregated and maximized, especially at the society’s level.

In neoclassical economics, rationality is usually defined in terms of utility-maximizing behaviour under some external constraints. According to microeconomic orthodoxy, utility as a hypothetical behavioural measure of satisfaction from consumption does not require attribution of mental states described as “happiness” or “satisfaction”, but it is anyway not clear how it can be described and measured at all. In order to escape the elusive util, utility is applied by orthodox microeconomists in such theoretical and unrealistic constructs as the indifference curve, which plots the combination of commodities that an individual (or a society) requires to maintain a given level of satisfaction. However, those indifference curves require precise definition of satisfaction, so they only superficially solve the basic problem of impossibility to measure the utility (even in “restricted” ordinal manner).

An indifference curve in orthodox microeconomics is a graph showing different bundles (or “packages”) of goods, between which a consumer is indifferent (at each point on the curve, the consumer does not prefer one bundle over another). However, those indifference curves do not really remove utility from microeconomics, as it is said that each point on the indifference curve is rendering the same level of utility. Utility is then understood here as a device to represent preferences, rather than something from which preferences originate (Geanakoplis 1987: 116-24).

Although indifference curves relate to ordinal utility, they still require several unrealistic assumptions such as:

- *Rationality* (or, in a more general mathematical context, ordering relationship) that requires *completeness* and *transitivity*, so for given preference rankings, the consumer can consistently choose the best bundle(s) - from lowest on up, and
- *Continuity* that means that the consumer can choose to consume any amount of the good, which also assumes that actual function describing indifference curve is continuous.

In orthodox microeconomics individual (as well as social) utility can be then generally interpreted as the dependent variable of a utility function and also of social welfare function. When coupled with production or commodity constraints, these functions can represent so-called Pareto efficiency, as illustrated by such theoretical and totally artificial constructions as Edgeworth's boxes and contract curves. Such efficiency is a central concept of orthodox welfare economics, but as it is outside of the scope of this paper, so will not be discussed here in more detail.

2.1. Cardinal versus ordinal utility

Orthodox microeconomists usually distinguish between *cardinal* utility and *ordinal* utility. When *cardinal* utility is used, the magnitude of utility differences is treated as an ethically or behaviourally significant quantity. On the other hand, *ordinal* utility captures only relative ranking, not strength of preferences. Utility functions of both sorts assign, in totally arbitrary, and thus not scientific way, real numbers to members of a choice set. Those numbers represent the utils – those hypothetical and deceptive units of utility. Orthodox (micro)economists attempted initially to aggregate utilities across different consumers. However, even they had to notice that interpersonal comparisons

of utility are doubtful, because there is no proper way to interpret how different people value so-called consumption bundles (sets of consumed goods and services).

When *ordinal* utilities are used by orthodox microeconomists, differences in utils are treated by them as ethically or behaviourally meaningless. The utility values assigned by them describe nothing else but arbitrary ordering between members of a choice set, so they say nothing about strength of the preferences. Because of problems with measuring utility, contemporary neoclassical economics has largely retreated from using *cardinal* utility functions as the basic objects of economic analysis, in favour of considering so-called agent preferences over choice sets. However, preference relations can often be understood as a special category of utility functions. In technical language (really a kind of pseudo-scientific jargon) of orthodox microeconomics *ordinal* utility functions are equivalent up to monotone transformations, while *cardinal* utilities are equivalent up to positive linear transformations.

However, orthodox microeconomics has not resolved whether utility is *cardinal* or *ordinal* and thus is unable to say in which cases it takes *cardinal*, and in which cases it takes *ordinal* appearance. In my opinion, such a question cannot be answered, as utility itself is an idea, which is impossible to define and measure. Thus the only rational way is to eradicate it in full from economics and especially from introductory handbooks, where it created unnecessary mess and constitutes a deadweight that holds the development of more scientific and thus less arbitrary microeconomic theory. But before arriving to the final results, I would like to show on selected examples how the very notion of utility leads to numerous paradoxes and contradictions.

2.2. Utility functions

While preferences are the conventional foundation of orthodox microeconomics, it is convenient to represent preferences with a utility

function and reason indirectly about preferences with those utility functions. Let X be the consumption set, the set of all mutually exclusive packages the consumer could conceivably consume (such as an indifference curve map without the indifference curves). The consumer's utility function is then defined as:

$$U : X \rightarrow R \quad (1)$$

Thus this function, in a totally arbitrary way, ranks each package in the consumption set. It is also assumed that if $u(x) \geq u(y)$ ($x \succsim y$), then the consumer strictly prefers x to y or is indifferent between them.

In orthodox microeconomic models, there is usually a finite set of L commodities, and a consumer may consume an arbitrary amount of each commodity. According to orthodox microeconomics utility function $u : X \rightarrow R$ rationalizes so-called preference relation, but the latter term is not properly defined, and this “rationalization” has a very narrow, technical meaning. Furthermore in order to simplify calculations, various assumptions have been made in relation to utility functions such as constant elasticity of substitution (‘isoelasticity’) for utility functions with constant relative risk aversion or exponential form for utility functions exhibiting constant absolute risk aversion. Generally, most utility functions used in orthodox economic modelling exhibit monotonicity, convexity, and global non-satiation, but this is not based on empirical verification, but on totally arbitrary assumptions, so it is totally unscientific.

Early economists believed that total utility derived by a given consumer is additive so it is simply a sum of utilities of each good and service consumed by a particular consumer, i.e. that utility function has a form as below:

$$U_t = U_1(x_1) + U_2(x_2) + \dots + U_n(x_n) \quad (2)$$

where U_t is the total utility and $U_1 \dots U_n$ are utilities of each good or service $x_1 \dots x_n$.

Presently, utility function takes more fuzzy form, as below:

$$U_t = U_l(x_1, x_2, \dots, x_n) \quad (3)$$

It is claimed by orthodox microeconomic theory that equation (3) solves the problem with naïve model of additive utility, as it shows that total utility depends on the amounts and relationships of other goods and services consumed, but it says nothing at all about the shape of the utility function. It is so general statement, that is has no practical value and virtually says nothing about the properties of the utility function, so it should be simply rejected, according to the *Ockham's principle* of economy (Ockham's razor).

In orthodox microeconomics it is also assumed that the consumer always maximizes his or her utility. However, to solve the problem of utility maximization using the differential calculus (as it is routinely used by the marginalist school), we must assume that the utility function is always continuous⁶, otherwise the problem cannot be solved by using formal, mathematical tools.

In practice, a consumer may not always pick an optimal package, as such a choice may require too much time. So to account for the fact that perfectly rational decisions are often not feasible in practice, due to such factors as finite computational resources available for making them, the concept of bounded rationality was introduced in order to salvage utility-based microeconomics. This theory says that consumers can be satisfied with suboptimal ("good

⁶ The other assumption is that goods are not free of charge, but this one is quite realistic indeed.

enough") bundles (so-called *satisficing* – Simon 1957 and Simon 1987). Followers of bounded rationality usually modify standard orthodox assumption by:

- limiting kinds and forms of utility functions;
- recognizing the costs of gathering and processing information and
- the possibility of having a vector or multi-valued utility function.

Bounded rationality also assumes that economic agents (and especially consumers) employ heuristics (or informal methods⁷) to make decisions rather than follow strict (rigid) rules of optimization. They behave this way because of the complexity of the situation, and their inability to process and compute the expected utility of every alternative action. As deliberation costs may be high and there are often other economic activities where similar decision-making is required, so orthodox microeconomics was somehow modified, in order to make it more realistic. Some "bounded rationalists" such as Gigerenzer (2002) even admit that simple heuristics frequently leads to better decisions than the theoretically optimal procedure, but they are unable to get rid of the very concept of utility.

2.3. Utility of money

One of the most common uses of a utility function in economics, is the utility of money. I will analyse this case in more detail, as it provides a good illustration how orthodox economists use the idea of utility in practice. The utility function for money is usually assumed by orthodox microeconomists to be a non-linear

⁷ Heuristic is usually defined as a method that often rapidly leads to a solution that is usually reasonably close to the best possible answer. Heuristics are thus the "rules of thumb", "educated guesses", "intuitive judgements" or even "common sense". In more precise terms, heuristics stands for strategies using readily accessible, though loosely applicable, information to control problem-solving in human beings and machines (Pearl 1983: vii).

function that is delimited and asymmetric about the point of origin. These properties are derived from totally arbitrary assumptions that are generally accepted by orthodox academic economists, such as, for example Rüdiger Dornbusch and Stanley Fischer, and especially by the proponents of rational choice theory, but nonetheless they were never verified empirically. The latter applies even to the proponents of “limited rationality”, such as, for example Herbert Simon with his “half solutions” to a very real problem of consumers and producers behaviour in the real, frequently irrational and largely unknown and hostile world.

According to orthodox microeconomists, the utility function is concave in the positive region, reflecting the phenomenon of diminishing marginal utility, or so-called First Law of Gossen⁸ - a yet another fundamental assumption that also escaped empirical testing. The boundedness of this particular utility function reflects another assumption, namely that beyond a certain (however not properly defined, and arbitrarily chosen) point money ceases from being useful at all, as the size of any economy at any point in time is limited. The asymmetry about the origin reflects another untested assumption that gaining and losing money can have radically different implications both for individuals and businesses.⁹ The assumed nonlinearity of the utility function for money has profound implications in decision making processes, especially in situations where outcomes of choices influence utility through gains or losses of money, which are the norm in most contemporary business settings. According to

⁸ The Second Law of Gossen relates to so-called optimal allocation of money than requires, according to Gossen, equal marginal utilities (or, in other words, “exchange ratio of goods is equal to the ratio of marginal utilities of the traders”). His Third Law was that a good has value only when the demand for it exceeds supply (i.e. subjective scarcity is the only source of value according to Gossen). His Second Law was his most important contribution to orthodox microeconomics and somehow anticipated the marginalist revolution of the 1870s. However, Gossen (1810-1858) was of too high opinion of himself (for example was writing about himself as a new Copernicus), so his method: abstract and detached from economic reality, and his pretentious style of his writings, was strongly criticized by the contemporary German Historical School, especially by Gustav von Schmoller (1838-1917).

⁹ This assumption seems to be quite rational, but, nonetheless, requires proper empirical testing before being accepted as an undisputed fact.

microeconomic orthodoxy, the optimal choice for a given decision depends thus on the possible outcomes of all other decisions in the same time-period. Again, this sounds very reasonable, but the chain of reasoning is not really convincing here, so it can be a case, when correct results are by pure chance derived from dubious reasoning.

2.4. Utility Maximization Problem

All it can be said about utility function is that it can be defined as

$$U_t = U_t(x_1, x_2, \dots, x_n) \quad (4)$$

where U_t is the total utility and x_1, \dots, x_n represent goods and services. The utility maximization problem is therefore defined as finding the consumer's optimal choices $x(p, w)$ where p represents prices of good (services) and w is consumer's wealth. According to orthodox microeconomics the solution $x(p, w)$ need not be unique: if u is continuous and no commodities are free of charge, then $x(p, w)$ is nonempty, but u (the consumer's utility function) must be continuous, otherwise there is no formal solution.

It can be thus seen, that in real life consumer equilibrium, understood as a point at which consumer maximizes his or her total utility U_t , cannot be calculated, as not only consumer's utility function is (as a rule) of unspecified shape (as it has unknown and unmeasurable parameters), but it can also change during the process of its very measurement. In other words in real life combinations of goods and services that consumer chooses for given level of income is impossible to compute as not only his or her utility function u is by definition undefined, but also it constantly changes, as consumer preferences are not fixed, neither is his or her real income (thus also consumer's wealth w is not constant) as prices p of goods and services x_1, \dots, x_n are in a constant flux. This failure to obtain consumer equilibrium is analogous to failure of centrally planned economies to obtain equilibrium understood as optimal allocation of

resources given particular needs, as in both cases it is (was) impossible to determine the crucial parameters of functions (equations) used to estimate the shape of either the utility function or production function.

So it is now clear that in orthodox microeconomics it is consistently assumed that the consumer always maximizes his or her utility. However, to solve the problem of utility maximization using the differential calculus, as it is customarily used by the marginalist school, we must assume that the utility function u is always continuous; otherwise the problem cannot be solved by using formal mathematical methods. As the other assumption says that goods are not free of charge, it can be accepted as realistic. However, ordinal utility is a view of utility measurement based on the presumption that although consumers' preferences cannot be measured according to a scale of their preferences, those preferences between the different goods and services can be ranked (first, second, third, etc.). But this is inconsistent with a demand for continuity of utility function, as goods (services) are ranked as 1st, 2nd, 3rd etc., so the ranking is not continuous at all. Thus this very formal trick with replacement of cardinal ranking by ordinal one does not really work and cancels any serious attempt to introduce differential calculus to microeconomics.¹⁰ There can be thus no surprise, that there were no successful attempts to describe actual utility functions and successfully estimate their parameters, as such functions, being, by definition, not continuous, cannot be analyzed using standard differential calculus.

2.5. Expected utility hypothesis, St. Petersburg Paradox, Ellsberg paradox and paradox of diamonds and water

In short: the expected utility hypothesis assumes that the utility of an agent facing uncertainty is calculated by considering utility in each possible state and

¹⁰ Differential calculus (at least the "traditional" one, as is used by the economists) is based on the idea of infinitely small changes and continuous functions – things (or better processes) not really found in real economies.

constructing a weighted average. The weights are assumed to be the agent's arbitrary assessed estimates of the probability of each state. The expected utility is thus an expectation in terms of probability theory, but based on totally arbitrary, and thus unscientific allocations of probabilities. To determine utility according to this method, the decision maker subjectively ranks his or her preferences according to the expected outcomes of various decision options. Thus according to this pseudo-scientific theory, if someone prefers *A* to *B* and *B* to *C*, then weights for the weighted average must exist, such that he or she is indifferent between receiving *B* outright and gambling between *A* and *C*. Obviously, this chain of reasoning is faulty, as it is entirely based on illogical decisions based on capricious, subjective and constantly changing choices.

Swiss mathematician Daniel Bernoulli (1700–1782) gave the earliest known written statement of this hypothesis as a way to resolve the so-called St. Petersburg Paradox. It is a paradox related both to probability theory and decision theory. It is based on a particular (theoretical) game named St. Petersburg Lottery. That lottery is based on a random variable with infinite expected value, i.e. infinite expected payoff, but would nevertheless be considered to be worth only a very small amount of money – itself an illogical contradiction in terms. The St. Petersburg paradox is a classical situation where a naïve decision theory, i.e. such that takes only the expected value into account, would recommend a course of action that no real rational person would be willing to take. The paradox can be allegedly resolved when the decision model is refined via the notion of marginal utility or by taking into account the finite resources of the participants. Some orthodox economists also claim that the paradox is resolved by noting, that one simply cannot buy that which is not sold, and that sellers would not produce a lottery whose expected results would be a loss to them. In other words: even if an agent (an entity) had infinite resources,¹¹ such a game would never be offered in a real economy (real life). If the lottery represents an infinite expected gain to the

11 Which is, anyway, impossible from the rational and realistic point of view.

player, then it also represents an infinite expected loss to the host. Thus no one could be observed paying to play the game because it would never be offered in a real world. This is totally convincing, but it can be reduced to simply saying that the whole St. Petersburg Paradox is nothing more than pointless case, having nothing to do with the real world, real people and especially the real economy.

In the expected utility theorem, von Neumann and Morgenstern proved that any “normal” preference relation over a finite set of states can be written as an expected utility – thus von-Neumann-Morgenstern utility (von Neumann and Morgenstern 1944). It is important for orthodox microeconomics, as it was developed shortly after the Hicks-Allen “ordinal revolution” of the 1930’s, and it somehow revived the idea of cardinal utility in orthodox economic theory. However, as it was said earlier, orthodox microeconomics has not resolved whether (and if so, in which cases) utility is *cardinal* or *ordinal*.

The Ellsberg paradox is a paradox in decision theory and experimental economics in which people’s choices violate the expected utility hypothesis. It is generally taken by the orthodox economics as evidence for ambiguity aversion. The paradox was popularized by Daniel Ellsberg, although a version of it was noted considerably earlier by John Maynard Keynes (1921: 75-76, 315). As the Ellsberg paradox is well described in the literature (Ellsberg 1961: 643-669), I will only note here that this paradox holds regardless of the assumed shape of the utility function. It can be reduced to a trivial statement that the consumer prefers receiving some money to receiving nothing, but from Ellsberg paradox one can derive (in the formal notation):

$$U(\$n) > U(\$0) \tag{5}$$

but also

$$U(\$n) < U(\$0) \quad (6)$$

$$U(\$n) = U(\$0) \quad (7)$$

where $n > 0$.

Orthodox macroeconomists claim also that the Ellsberg paradox can be taken as evidence for some sort of ambiguity aversion which cannot be accounted for in expected utility theory, as it has been (allegedly) demonstrated that this phenomenon occurs only when the choice set permits comparison of the ambiguous proposition with a less vague proposition, but not when ambiguous propositions are evaluated in isolation (Fox and Tversky 1995: 585-603).

There have been various attempts to provide explanations of Ellsberg's observation. Since the probabilistic information available to the decision-maker is incomplete, these attempts focus on quantifying the non-probabilistic ambiguity, which the decision-maker faces. These alternative approaches suppose that the agent formulates a subjective (though not necessarily Bayesian) probability for possible outcomes. One such attempt is based on info-gap decision theory, in which the agent is told precise probabilities of some outcomes, though the practical meaning of the probability numbers is not entirely clear (another example pseudo-scientific mumble, so frequently found in the orthodox microeconomic theory). As no probability information whatsoever is provided regarding other outcomes, so the agent has very unclear subjective impressions of these probabilities. This way everything collapses again to subjective impressions, which are impossible to define and measure, as the elusive and unscientific notion of utility itself.

In light of the ambiguity in the probabilities of the outcomes, the agent is unable to evaluate a precise expected utility. Consequently, a choice based on

maximizing the expected utility is also impossible. The info-gap approach thus *supposes* that the agent implicitly formulates info-gap models for the subjectively uncertain probabilities. The agent then tries to satisfy the expected utility (in an unspecified manner) and to maximize the robustness against uncertainty in the imprecise probabilities. This robust-satisfying approach is assumed to be developed explicitly to show that the choices of decision-makers should display precisely the preference reversal, which Ellsberg observed (Ben-Haim 2006), but none less does not provide salvation to utility-based microeconomic theory.

The last paradox discussed here is the paradox of diamonds and water, which was supposed to prove that the labour theory of value was incorrect. As Adam Smith observed, water is very useful but it was then very cheap. By contrast, diamonds were not very useful in 18th century (they were then used only for jewellery), but were (and still are) very expensive. Thus Smith said that if demand depends on the usefulness of the product, then we would expect water, as the more useful product, to command the higher price, but actually diamonds were more expensive. Because of this alleged paradox, Adam Smith came to the conclusion that willingness to pay is not related to utility, so he distinguished between “value in use” and “value in exchange” (Smith 1976, Black 1991: 776).

According to Smith value in exchange was not related to usefulness and was based on the labour theory of value. The marginalists did not like this,¹² so they introduced the concept of marginal utility and made the following assumption in order to explain this paradox:

¹² Especially as labour theory of value leads to Marxian theory of surplus value and to exploitation of workers as a most important source of profit.

Total satisfaction of the consumer is the sum of the utility of water and the utility of diamonds;

Total utility of diamonds increases as one consumes more diamonds;

Total utility of water increases as one consumes more water;

The consumer tries to spend his or her income in such a way as to maximize utility and

The Law of Diminishing Marginal Utility holds, i.e. marginal utility of given good or service decreases, as the quantity of the good increases, *ceteris paribus*.

Thus the scarcer good (diamonds) are supposed to have the higher marginal utility, even though plentiful good (water) provides the greater total utility. This was supposed to open the way to develop a theory of value and demand based on utility, that is generally based on **equimarginal principle**, i.e. in order to maximize the utility derived from a given income, it is necessary to allocate the spending among different goods and services in such a way that the marginal utility of each good or service consumed, divided by its price, is the same as the quotient of marginal utility divided by price for every other good consumed, or:

$$MU_A/P_A = MU_B/P_B \quad (8)$$

where MU is marginal utility, P is price and A and B are goods or services.

It was then said that this **equimarginal** principle explains higher prices of diamonds as the consumer will be paying the higher price for more scarce good (i.e. diamond) as it has the higher marginal utility. However, those, mostly technical tricks, do not really explain the paradox of diamond and water, as they are based on too many arbitrary chosen and frequently unrealistic assumptions. It is thus more proper to implement here the Ockham's razor and

eliminate the unnecessary entity, in this case utility, and explain this paradox by simply comparing amount of labour required to deliver to the consumer water to this required to deliver diamonds. As water was in times of Adam Smith easily obtainable in Great Britain, but diamonds had to be excavated and transported for a long distance (usually from South Africa), so water was then cheap (and frequently even free of charge), while diamond demanded high prices. Today's relative high prices of diamonds are also a result of oligopolistic market, dominated by De Beers Company, while prices of necessities, such as water, are usually controlled by governments, that are under strong pressure to keep the price of water low, so it will be available even for the poorest members of society.

3. Criticism of utility

Different value systems have different perspectives on the use of utility in making moral judgements. For example, Marxists, Kantians, and certain libertarians (such as Nozick) say, although for totally different reasons, that utility is irrelevant as a moral standard or at least not as important as other factors such as natural rights, law, conscience or religious doctrine.

3.1. Marx

Marxian economics simply reject the very notion of utility as Marxian economic theory is based on labour theory of value, and sees the marginalist schools as "vulgar" or superficial economic pseudo-science, concentrated on events that are happening on the markets and rejecting any more profound investigations as to the source of value, for futile pseudo-scientific investigations of such superfluous entities as utility, entities that cannot be properly defined or measured. Moreover, Marxist School sees the whole orthodox economics as based on class distinctions, as the orthodox school rejects labour theory of value as leading to such ideas as surplus value that has a source in workers' exploitation (Mandel 1979a: 7-28).

Marks (as Smith and Ricardo before him) said that exchange value must depend on something common to all goods and that human labour embodied in goods and services is the one common factor on which exchange value depends.¹³ Marx expressed the labour theory of value even more precisely than Ricardo. In Marx's terms, the value of a commodity is the **socially necessary** labour time embodied in it (so extra time needed by less than average skilled workers does not increase value of their products). Therefore in a competitive capitalist economy, all commodities are priced (at least in a longer run) at their values and in such economy, labour is a commodity and is priced at its value. The wage paid for a labour-day would be thus the labour time socially necessary to produce the goods and services the worker (and his or hers family) needs to be able to work for a day, that is normally much less than what worker produces during the labour-day (otherwise it would make no economic sense to employ the worker). Thus if each day of work produces, under normal conditions, a labour-day of value and costs less than a labour-day of value, there is a fraction of a labour-day left over, which was called by Marx a surplus-value. Since labour produces all value, but gets only a part of what it produces, this surplus value is, according to Marx, a fruit of exploitation and constitutes a profit that is expropriated by the owner of capital. This explains quite well why labour theory of value had to be abandoned by orthodox economists – they had to either accept it, and thus agree that free market capitalism is essentially an unethical system, or reject it

¹³ The most important exception is the land, as it was said that land supply couldn't be increased by more labour. However, labour can be used to improve land and to open to agriculture land, which was previously regarded as not arable. According to Ricardo it is the labour required for production **on marginal land** that determines the normal price or value of agricultural products and the surplus of production on more fertile land is absorbed by the rent. Owners of the land do not have to do anything to earn this rent, as they get it automatically, as a result of the competition for more fertile land. Thus after Ricardo the only exception to labour theory of value were the absolutely scarce goods, such as works of art, but their unusually high prices can also be explained by exceptionally high quality of labour necessary for their creation.

in favour of other theory of value, that would somehow justify the exploitation of labour.

Marx has also discovered that due to differences in organic composition of capital¹⁴, the industries with lower organic composition (i.e. with relative lower importance of labour) have lower rates of profits (as human labour is the only major source of value and profits) – *ceteris paribus*. This seems to be contrary to the principle of equalization of profit rates in competitive system. In other words if organic compositions of capital can vary from one industry to another (that is rather realistic assumption due to different technologies used by different industries) and if profits are equalized in a competitive system by flow of capital from less profitable to more profitable industries, so the value in exchange has to deviate systematically from the labour embodied in the goods or services produced. This is other major reason why orthodox economics has moved away from the labour theory of value.

However, as markets are not perfectly competitive and frequently under some kind of state control and/or dominated by monopolies and oligopolies, it is now generally assumed that labour theory of value is (at least) approximately correct. Nobel Prize winner Chicago economist George Stigler calculated (Stigler 1987) that the labour theory of value could account for 93% of the differences of relative prices in the US in the 1940s, and that the remaining 7% could reflect many different causes, no one of which amounts for more than a percent or two (some of the differences could be simply random fluctuations).

¹⁴ This is a ratio of constant (fixed) capital (such as buildings and machinery) to variable capital, or wages paid to workers – in Marx's terms c/v . Note that other definitions of this term are used in the literature. One is $c/(m+v)$ i.e. the ratio of constant capital to newly-produced value (roughly to what orthodox economists call "value added"), i.e. to surplus-value + variable capital and thus close to the concept of a capital/output ratio. Less common is the measure used by Paul M. Sweezy, i.e. $c/(c+v)$ - the ratio of constant capital to the total capital invested.

Thus it cannot be said that the labour theory is entirely wrong. It is now accepted, even by orthodox economists, that in a modern economy with a wide range of organic compositions of capital, the labour theory holds, but with relatively minor exceptions. As contemporary economies are dominated by huge multinational and transnational corporations, monopolies and oligopolies, it can be now assumed, that criticism based on differences of rates of profits caused by different organic compositions of capital, is of relatively minor importance. Furthermore, as argued by Baran and Sweezy (1966)¹⁵, modern capitalism faces the major problem with selling the economic surpluses, created by capital accumulation. According to them increases in marketing, defence spending and various forms of debt would tend to alleviate the falling rate of profit as foreseen by Marx. However, they believed that these remedies to difficulties of contemporary capitalism were inherently limited and that monopoly capital would tend toward economic stagnation. This was quite accurate forecast, as evidenced by long-term recession started by energy crises of the 1970s and virtually lasting till today, and by the economic and financial crisis of early 21st century (Keller 2010: 119-137, Minc 1998 Chapters VI-VIII).

Furthermore, in an essay titled “The Peaceful Transition from Socialism to Capitalism”, Sweezy (1964) predicted the collapse of so-called Communism¹⁶ in the Soviet Union, more than twenty-five years in advance of the event, and

15 In this book Baran and Sweezy also argued that the whole free market capitalism is, as a system, largely irrational, since though individuals try to make rational decisions, the ultimate systemic goals are irrational: pursue of profits, that destroys human relationships, leading to wider alienation and hostility between humans. The system continues to function so long as Keynesian full employment policies are pursued, but there is the continued threat to stability, for example from less-developed countries, throwing off the restraints of neo-colonial domination (such as today's India and especially China).

16 In reality an extreme form of state capitalism, officially named “real socialism” to distinguish it from the “welfare state” systems introduced in the West by social-democratic and labour parties.

that the Soviet managerial class would become a capitalist class¹⁷. Almost twenty years ago, another follower of neo-Marxist school, James O'Connor (1973), predicted the chronic government deficits that have plagued the more developed countries, especially the US, since the 1980s. This proves that economic analysis based on creative and unorthodox following of Marxian economic theory can be a very powerful tool of diagnosis of dynamics of contemporary capitalism (see, for example, Sweezy 1979).

On the other hand the main problem with utility-based theory of value is that it is too much based on arbitrary and unrealistic assumptions as to human behaviour. Therefore it cannot be accepted as a basis of truly scientific economic theory. As I will try to prove in conclusion to this paper, arbitrary and unrealistic character of utility-based microeconomics made it a kind of 'celestial mechanics of non-existing sky' (Boulding 1981).

3.2. Kant

According to Kant (1997), the principle of "private happiness" is the direct opposite of the principle of morality. Kant understands happiness as consisting the satisfaction of all our desires: *extensive* – in regard to their multiplicity, *intensive* – in regard to their degree and *protensive* – in regard to their duration. Unlike the moral law, happiness, according to Kant, is a hypothetical, not a categorical, imperative. Furthermore, Kant points out that such a pragmatic or utilitarian ethics¹⁸, cannot help being empirical, for it is only by experience that one can learn either what inclinations exist which desire satisfaction, or what are the natural means of satisfying them. Such empirical knowledge is, according to Kant, available for each individual in his own way. Hence there can be no universal solution, in terms of desire, of the problem of

¹⁷ Ernest Mandel argued with this opinion in his article "Why the Soviet Bureaucracy is not a New Ruling Class" (1979b: 63-86). See also Sweezy (1980).

¹⁸ Which is for him the same as an "ethics of happiness".

how to be happy and this how to maximize happiness. To reduce moral philosophy to a theory of happiness must result, therefore, in giving up the search for ethical principles, which are both, according to Kant, universal and *a priori*.

In sharp opposition to the pragmatic rule, Kant sets the moral (ethical) law as a road to not simply be happy, but rather to be worthy of happiness. In addition he claims that a *categorical imperative*,¹⁹ which imposes an absolute obligation upon us, takes no account of our desires or the means of satisfying them. Rather this imperative dictates how we should act in order to deserve happiness. This is drawn from Kantian *pure reason*, and not from experience, and therefore has the universality of an *a priori* principle, without which, in Kant's opinion, a genuine science of ethics is impossible.²⁰ It is thus possible to say that there is no place at all for utility in Kantian philosophical system. Although there is in Kant's philosophy a mention of the Principle of Utility, he understands it as performing only those actions, which have the greatest (possible) benefits for the greatest number of people. These actions are thus to promote general happiness, and should become a universal law, so there are some parallels, but only rather superficial, to Bentham's and Mill's principle of "greatest good for the greatest number of people" (Bentham 1781).

3.3 Nozick

Utilitarianism can also be criticized using a so-called *utility monster* of Nozick. It was assumed that in a given (hypothetical) society exists an entity, which has a greater ability to gain utility from resources, than other entities that belong to this society, so such a monster takes all those resources from the society, and this should be accepted on moral grounds by the utilitarians, as

¹⁹ "Act only according to that maxim whereby you can at the same time will that it should become a universal law" – Kant (1997: 30).

²⁰ See also **Kant's view of utility and happiness?** (2010).

Nozick's *monster* gains more utility from a unit of resources than any other member of this hypothetical society. However, according to orthodox point of view, this would seem to be only relevant to societies with comparatively small total utility. It is assumed that populations with high total utility would require that the Nozicks's *monster* be able to extract ridiculously large amounts of utility to be able to beat the totals of an entire population, so the problem would somehow disappear by itself in a truly miraculous way.

If the Nozick's *utility monster* can get so much pleasure from each unit of resources, so it follows from utilitarianism that the distribution of resources should acknowledge this. If the Nozick's *utility monster* existed, it would justify the mistreatment and perhaps even total destruction of everyone else, according to the doctrine of utilitarianism. This thought experiment, conducted by Robert Nozick²¹, shows that utilitarianism is not actually egalitarian and is simply amoral (at least according to moral standards accepted in the modern Western societies).

3.4. Behavioural economics and its limited critique of utility

In neoclassical economic theory it is assumed, that decision makers, given their knowledge of utilities of given goods and services, alternatives, and outcomes, can compute which alternative will yield the greatest total utility. In the less orthodox microeconomics, especially in behavioural microeconomics, the term bounded rationality is used to designate models of rational choice that take into account the *cognitive limitations* of both knowledge and cognitive capacity. Bounded rationality is thus a central theme in behavioural economics. It is concerned with the ways in which the actual decision-making process influences the decisions that are eventually reached. To this end, behavioural economics departs from one or more of the neoclassical assumptions underlying the theory of rational behaviour.

²¹ 1938-2002, distinguished American philosopher and ethicist.

For example: according to **Colin Camerer (1999: 10575-10577):**

Utility maximization is the assumption that people rank objects – e.g., monetary gambles, shopping baskets of products, and jobs – consistently enough to permit assignment of a unique utility number $u(X)$ to object X . Contrary to this presumption, there is a long list of ways in which utilities depend on how objects are described or on the way in which choices are made; these changes suggest that preferences are ‘constructed’.

Thus behavioural microeconomics on the one hand hits in the very heart of orthodox microeconomics, but on the other hand it halts in half way and does not dare to reject the very notion of utility and possibility of its maximization (Simon 1957, Simon 1987 and Hosseini 2003: 391-409).

It is also interesting to find the main differences between the neoclassical approach and behavioural (sometimes called agent-based evolutionary) approach to consumer theory, which I present in the Appendix. I use the model proposed in year 2003 by Valentino Piana (2008), who wrote that:

Many students at the end of the course in Microeconomics are very sceptical about the realism of the neoclassical theory, especially the part about consumers, since they have direct experience of buying acts and they know how they choose. And they find no trace of high mathematics and optimization procedures. They don't use computer software to compute optimal choices.

So, fortunately, the neoclassical model of consumer, widely presented in standard textbooks used to teach microeconomics, no longer represents the “unique game in town” (using V. Piana words).

4. Conclusion

Criticism of utility, especially as a cornerstone of orthodox microeconomics, can be summarized in few main points:

1. Utility is an abstract, unscientific notion that cannot be properly defined and cannot be measured.
2. Utility is unique to each individual, so it cannot be used to build any universal theory that could be applied to different consumers in different situations.
3. As utility is such a vague and immeasurable notion, it does not make any sense to talk about its maximization, especially as it is impossible to properly define and empirically verify any utility function, which, anyway, cannot be described as continuous (the latter is a formal requirement for application of precise tools, such as differential calculus, to microeconomics).

To avoid the problems with definition of utility and its measurement, orthodox economists rarely argue what consumers really enjoy and at which particular levels of intensity, assuming (rather conveniently) that this enjoyment is a purely psychological fact (Collins 1992: 437) This, however, does not solve the basic problem with definition of utility and says nothing about its measurement. **The Collins Dictionary of Economics** (1992: 534-535) clearly states that as utility is the derivation of satisfaction from the use of a good or service, it will vary according to the (consumer's) state of mind, and therefore is a condition unique to each individual, and can easily change in time for the same individual. Thus it seems logical, that there should be not one orthodox microeconomic theory, but as many different theories as there are individuals, as every human being is unique, and almost every state of human mind is unique, and varies in time.

It also should be not forgotten, that although the very notion of utility was disputed almost since the first moment it appeared in economic theory, and it was never supported neither by empirical evidence nor by pure logic, the existence of utility, and its assumed properties, was, regardless, accepted in economic orthodoxy as an undisputed fact. This has very widespread

consequences, as if utility is in the “worst” case a false idea, or even in the “best” case it cannot be precisely defined and measured, so the whole micro- and also macroeconomic orthodoxy seems to be built on dubious foundations, and thus requires complete rebuilding, this time on different, more rational foundations, as (I shall repeat it gain) in orthodox economics it is assumed that utility is the “ultimate goal of all economic activity” (Penguin 1992: 437).

Therefore, I would like to propose to base the new, scientific microeconomics on labour theory of value, which was, for mostly political and ideological reasons, abandoned in the late 19th century during the so-called marginal revolution in economics. However, the labour theory of value is consistently accepted as (at least generally) valid by even some Chicago School economists, such as Nobel Prize laureate George Stigler, and, above all, by business and politicians, who highly value longer working hours and late retirement ages. The best example is contemporary discussion in France, where conservative government wanted to scrap 35 hours working week, introduced by previous, social-democratic cabinets and has extended the retirement age (even in conditions of high and chronic unemployment). If hours of work did not matter, no government of any major country would be involved in discussion on increasing the length of the working day or on rising up the retirement age. So such discussions clearly confirm, that human labour is the main and most important source of wealth and value, so it should be treated as a basis for any fully scientific economic theory.

Such rational foundations of economic theory are understood here as confirming to the empirical testing and as free of arbitrary and ideology-based assumptions, as possible. In my opinion only economic theory that is not based on such arbitrarily chosen and not provable assumptions as existence of such entities as utility and possibility of its rational maximization, can be used as base for truly rational, truly scientific and truly effective economic policy. The negative influence of utility-based assumptions on economic theory can also

explain, in my opinion, the consistent failure of orthodox economics in predicting real life events in economics, such as the Great Crisis of the 1930s, stagflation of the late 1970s, collapse of Soviet Economy in the late 1980s, and even recent (early 21st century) economic problems in the US and whole capitalist world, but this obviously exceeds the scope of this paper.

Finally, I would like to cite Hayes (2006), who wrote that:

Neoclassical economics smuggles a great many normative wares underneath its positive trench coat, both in its assumptions about how humans operate – as individuals rationally maximizing their utility – and its implied preference for “markets in everything.” Because neoclassical economics always presents itself as a value-neutral description of the world, its ideological commitments can be adopted by those who learn it without any recognition that they are ideological.

The problems seems to be that:

A growing global movement of “heterodox” economists has criticized the ideological confines and blind spots of the neoclassical approach. As Nobel Laureate Joseph Stiglitz put it, the dominance of the neoclassical model is a “triumph of ideology over science.” In the popular press, however, such dissent is almost entirely absent. When protesters disrupted the 1999 World Trade Organization meeting in Seattle, WTO officials, mainstream economists and the *New York Times*’ Thomas Friedman ignored the fact that in much of the world neoclassical reforms had failed to produce the promised growth. Friedman went so far as to dismiss the protesters as “flat-earthers.” For Thomas Friedman, people can’t “disagree” with neoclassical economics. They can only fail to understand it. (Hayes 2006)

But the general problem seems to be that:

“A little economics can be a dangerous thing “[...] An intro econ(omics) course is necessarily going to be superficial. You deal with highly stylized models that are robbed of context, that take place in a world unmediated by norms and institutions. Much of the most interesting work in economics right now calls into question the Econ(omics) 101 assumptions of rationality, individualism, maximizing behaviour, etc. But, of course, if you don’t go any further than Econ(omics) 101, you won’t know that the textbook models are not the way the world really works, and that there are tons of empirical studies out there that demonstrate this.” (Hayes 2006)

Unfortunately, for the majority of academic economists, those “highly stylized models that are robbed of context” are too frequently the only reality they want to deal with. However, the real danger is when their false vision of how economy works is accepted by the political decision makers. And one of the reasons why that “academic” vision of economy is false, is that is based on such vague and unscientific notions as utility.

Therefore, as an idea of utility is simply illogical and very much unclear and thus impossible to define and measure, it did a lot of harm to economics as a science. For this reason, I strongly argue that this outdated and imprecise concept of utility should be finally abandoned, especially as a basis for microeconomic consumer theory, for it is not only unscientific, but also ideologically biased. Only because of sheer inertia and resistance to change, the concept of utility, as a basis for microeconomic theory, is been taught to the students, thus corrupting the young minds of the future leaders. Furthermore, the present financial and economic crisis of the early 21st century, the most serious since the 1930s, should force the economists from the academia to seriously revise the foundations of microeconomic theory, and, as logical consequence, rewrite the handbooks on microeconomics.

I do not merely argue here that the utility theory defies both logic and empirical justification, as many authors did it before me. I argue that the very notion of utility is unscientific, and was kept in microeconomic books only because of the conservatism, sheer inertia and ideological, anti-labour bias of the majority of academic economists, so this way it made a lot of harm to the science of economics, and, as a result to the real economies. I also argue that the subjectivist theory of value should be replaced with an objectivist one, based on value of labour. As this mean return to Ricardo and Marx, so be it. As with the so-called marginal revolution the science of economics went astray, we have no other choice as to start again, from the point that is located in the late 19th century, when Jevons, Menger and Walras, for purely ideological reasons, introduced to the theory of economics an unscientific, irrational and simply harmful idea of so-called diminishing marginal utility (Black 1991: 777).

Appendix

Comparison of the neoclassical and behavioral approaches to consumer theory according to Valentino Piana

I. The context of choice

Topics	Neoclassical approach with well-behaved preferences	Behavioral (agent-based evolutionary) approach
Timing	All buying choices are taken at the same time (simultaneously).	Choices are sequential.
Information available to consumer	The consumer has full information about all existing products, their use and their effects on his welfare (utility).	Limited information.
Degree of difficulty of the choice	Zero. The choice is always easy, with all 'pros' and 'cons' already evaluated and compressed in a monotonic measure (utility).	Choice can be easy, moderate or extremely difficult, depending on the situation.
Importance of advertising	None. The consumer has its own tastes and they cannot be changed.	The limited information of the consumer can be extended by advertising. Depending on the decision-making style, advertising can have an important influence beyond the mere information.
Mistakes	The consumer does never make mistakes in computation and choices.	The consumer can make mistakes.

Consumption and purchases	Consumption decision and their psychological laws determine purchase acts.	Buyer does not need to be the direct consumer. Buying decision may have an intrinsic logic different from consumption (e.g. to buy large quantities when the good is cheaper and store them for long periods).
The role of experience	None. The consumer <i>ex ante</i> knows everything and actual consumption does not change his evaluation of the utility.	The first-time purchase is characterized by expectations; repurchase is, at least in part, based on the experience gained through personal experience.

The place where choice is made	Non-explicit; it is a virtual decision in the consumer's mind.	In shops, supermarkets, and other Point of Sales; through Internet or other non-store distribution channels. The available commercial offer does influence final choice.
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II. How the consumer decides

Topics	Neoclassical approach with well-behaved preferences	Behavioral (agent-based evolutionary) approach
Consumer rationality	Full rationality based on consumer's (assumed) huge mathematical skills.	Bounded rationality based on simple decision-making rules with almost no mathematics.
Budget	The consumer has a money budget limit, which is systematically exhausted.	The consumer keeps always a reserve of slack resources to cope with further expenditures.
Non-monetary constraints	Absent.	Time is a non-monetary, non-purchasable constraint in many choices; in grocery purchases, at physical commercial premises the weight of the purchased basket can be a constraint (lower for consumer coming back home by foot and higher for car users).
Definition of substitution between the goods to be chosen	Two goods are substitutes when a fall in consumed quantity in one can be perfectly compensated by an additional quantity of the second (so that consumer's utility is constant).	Two goods are substitutes when they fulfil the same need(s).
Substitution foundation	Completely subjective, given, expressed in terms of a linear or non-linear indifference curve.	Interpersonally validated.
Mathematics used in formal models to solve the problem of the consumer	Equations and systems of equations are the main formal devices.	Tree algorithms and disequations are the main formal devices; extensive use of IF-THEN statements.

III. What the consumer buys

Topics	Neoclassical approach with well-behaved preferences	Behavioral (agent-based evolutionary) approach
Chosen set of goods	The chosen bundle of goods maximizes utility (graphically: it is on the highest indifference curve) and exhausts the budget (it is on the budget line).	The chosen good is the “first solution matching certain sufficiency criteria” or is selected across simple comparisons.
Effects of marginal changes in prices	Small changes in one price modify the quantity bought of all goods.	No change of quantity or discrete changes on the few goods concerned.
Range of purchased goods	All goods (X, Y,..) are bought by the consumer.	A specific consumer buys only a small selection of all existing goods.

IV. Market

Topics	Neoclassical approach with well-behaved preferences	Behavioral (agent-based evolutionary) approach
Market demand	Market demand is the sum of individual demand of totally independent consumers.	Market demand is the sum of individual demand but consumers may interact (e.g. imitate other's choices).
Heterogeneity of consumers I	Consumers differ because of income.	Consumers differ because of income, skills, decision-making routines, etc.
Heterogeneity of consumers II	Consumers differ because of utility functions (Cobb-Douglas, sum-of-squares,...) - never used in real marketing research.	Consumers differ because of parameters, which have empirical counterparts.
Who reacts to changes in prices	Changes in prices modify the behaviour of all consumers.	Most consumers continue to behave as before, only some change so to produce the entire market effect.
Diffusion of a specific good in the population	All consumers.	Most consumers do not buy.

Source: Piana, V. **Consumer Theory: The Neoclassical Model and its Opposite Alternative** <http://www.economicswebinstitute.org/essays/consumertheory.htm> (as on 10 February 2008)

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