



The Rail Freight Tariffs: The Theoretical Basis of the Transition from the Traditional Formation for Agent-based Modeling

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ABSTRACT

The paper studies the concept, the basic methods, tools, and tendencies of behavioral economics (BE) along with the possibility of using its methodological and cognitive resources for making rail cargo rates. Philosophical analysis was held of criteria and limitations of BE in the context of its actual use in forming a new methodological approach to the calculation of competitive rail cargo tariffs in the quasi-liberal economy of Russia. It was shown that current methods of the cargo tariffs calculation in modern conditions of rail transport development in Russia are unworkable in the nearest future.

Keywords: Behavioral Economics, Rail Cargo Tariffs, Quasi-liberal Economics, Agent-based Modeling, Economic Behavior

JEL Classifications: D7, L9, R1, R4

1. INTRODUCTION

There is a widely spread belief that modern economic science is not integrated with universal research methodology. It looks more like a collection of different research areas, which solve the same task - theoretically analyze the economic processes and develop practical recommendations on the management of the economy (Cato, 2014; Colander, 2007; North, 2014; Nureev, 2014; Pavlov, 2007; Nureyev, 2008; Williamson, 1996; Fishburne, 1978; Friedman and Savage, 1993; Harsanyi and Selten 2001; Camerer, 2000; Colander, 2000; Mullainathan and Thaler, 2000; Smith, 1989; 1994; 2008; 2010; Thaler and Benartzi, 2013).

Also, it becomes more obvious that it is impossible within a single, even strong economic theory, to explain the diversity and specific aspects of various economic phenomena, processes, trends “in the era of no-regularities.” We believe this can be referred to the transformation of the institutional (later - neoinstitutional) and earlier - the classic (later - cal neoclassical) economic theories of realism and empiricism, based on the deductive analysis. The

neoclassical mainstream still set the tone, although the neoclassical itself does not look like ideologically coherent as compared, for example, with a period of 5 decades ago (Colander, 2000, 2007; Arrow, 1982; Rabin, 1993; Smith, 1989; 2010; Thaler, 2008).

At the same time, modern theoretical economics is slowly but surely moving away from the “classics” to more comprehensive concepts and principles of purposeful behavior, to liberal institutionalism, and searching for reasonable self-interest and the conditions for sustainable development, etc. Such changes can be observed in a variety of studies on service and behavioral economics (BE), economics of experiences, evolutionary games theory, agent-based modeling (ABM), experimental and new institutional economics, etc. (Levin, 2001; Lewis and Rife, 1961; Neumann and Morgenstern, 1970; Fishburne, 1978; Friedman and Savage, 1993; Harsanyi and Selten, 2001; Benartzi et al., 2011; Camerer, 2000; Crockett et al., 2009; Dickhaut et al., 2013; Fehr and Schmidt, 1999; Frederick et al., 2010; Massey and Thaler, 2012; Rabin, 1993; Rigdon et al., 2007; Rietz et al., 2013; Smith, 2008; 2010; Thaler, 1988; 2008; Thaler and Benartzi, 2013; Van den Assem et al., 2012).

In this regard, of particular interest are not any specific changes, but its synergistic, multiplicative effect, and the vector of development in which it engages in economic science, along with economic education. The reason for these changes lies in the changed vision of what economists study and how do they do this. Economic science is moving away from researching the rational economic actors in the information-rich environment, and more focuses on the study of institutionalized subjects (agents) based on psychological studies presuppositions analysis (“limited but rational agents”) in a situation of “lack of information.” This approach to study the economics (when behavioral assumptions, based on the analysis of human behavior, integrates into the model) gave impulse to create the new concept in economics known as BE - or “economy of behavior” (hereinafter - BE). It is believed that its ideological basics were laid in 1979 in the article “Prospect Theory: Decision Making Under Risk” of the two US-Israeli psychologists - both the recipient of the Nobel Prize in Economics in 2002, Daniel Kahneman and Amos Tversky. We’ve demonstrated in a series of experiments that real people are not necessarily act in accordance with the principles of neoclassical economics and often show a tendency, at first glance, to a completely irrational behavior (Kahneman and Tversky, 1979, Kahneman et al., 1986, 2008; Thaler, 2008; 2013; Cato, 2014).

BE increases the explanatory power of the traditional economics due to more realistic psychological explanation of the initial preconditions of the analysis. It should be noted that this constitute a waiver of concept of utility maximization, general economic equilibrium and efficiency, but not of non-neoclassical approach. In contrast, proponents of BE take as the starting point one of the versions of the orthodox theory and believe that the neoclassical approach has already proved its fruitfulness explaining the great number of all possible types of economic behavior, as well as nominating disproved hypotheses. In this case, the main problem is that neoclassics have already used-up all methods of extensive development as a scientific paradigm (due to spreading on areas of knowledge, traditionally not considered as its playground) and need an upgrade of original research methodology (Danko, 1997; Cato, 2014; Colander, 2007; Levin, 2001; Marshall, 1993; North, 2014; Nureev, 2014; Williamson, 1996; Harsanyi, 2001; Benartzi, 2011; Camerer, 2000; Smith, 2010).

Such upgrade options could be BE. It helps in further clarification and refinement of the differences between positive and normative studies of decision-making processes.

Talking about the methods currently used within the BE, we should point out the fact that they are identical to ones used in other areas of economics, ranging from econometric methods for the data analysis collected from field studies, and ending with the experimental testing of different economic concepts in the laboratory.

However, in the last few decades the situation has changed dramatically. A number of experimental studies and the results that were obtained have significantly changed the guidelines of traditional economics, previously never impeachable (Williamson, 1996; Fishburne, 1978; Friedman and Savage, 1993; Benartzi

et al., 2011; Colander, 2000; Crockett et al., 2009; Dickhaut et al., 2013; Fehr and Schmidt, 1999; Rigdon et al., 2007; Rietz et al., 2013; Smith, 1989; Van den Assem et al., 2012).

We can allocate a theory of individual rational choice under risk and uncertainty; games theory and the theory of bargaining; auction theory, experimental testing of different pricing strategies depending on the kind of auction (Dutch, English, American) and identification of the traditional models consequences adequacy to the actual data as the examples of the most significant and impressive economic science areas, which experienced the greatest impact of the experimental studies (Nash, 1961; Fishburne, 1978; Friedman and Savage, 1993; Arrow, 1982; Dickhaut et al., 2013; Fehr and Schmidt, 1999; Massey and Thaler, 2012; Rabin, 1993; Rigdon et al., 2007).

2. THE CAPABILITIES AND LIMITATIONS OF BE THEORY (BET)

What exactly is borrowing psychological categories for the needs of economic science? In our view, it should be noted that the goal pursued by Behavioral economists, who making and proving new theoretical models, is in a significant improvement in forecasting capabilities of traditional models and concepts. Therefore, representatives of BE usually distinguish the following fields of economic analysis, in which they had developed their own models, which are an alternative to existing neoclassical theory:

- Choice under risk and uncertainty;
- Intertemporal choice and Games theory (Cato, 2014; Colander, 2007; Lewis et al., 1961; Neumann and Morgenstern, 1970; Nash, 1961; Williamson, 1996; Friedman and Savage, 1993; Arrow, 1982).

Summing up, we can assert that BE is generally a quite logical analytical framework that has already proved its fruitfulness in the study of a variety of economic phenomena. Despite this, it seems premature saying that we have to deal with the already established system of concepts and views. Only a few sections of BE can prove its harmony and validity of use in practice. However, in our opinion, it is a temporary problem, which can be corrected in the course of further theoretical and research work.

We can make a logical assumption about the possibility of shared use at least two (or more) approaches to solve a problem of more accurate representing of the economic processes (and events) and the constructing of basic thesis of economic theory. In this sense, we are talking primarily about contradictions in using the basic axioms (postulates, principles) as the basis for the development of a new theory, which can probably claim the status of new theoretical economic paradigm. However, the most important question that arises in this case - is the question of the real driving force of these contradictions and how they can actually be solved in the framework of the “unity of diversity” of different theoretical and methodological approaches.

In the middle of the XIX century. Mill (2002) has developed the theory of inductive logic as a general methodology of Sciences,

wrote in his “a system of logic:” “Targets scientific classification achieved best when the objects of study are divided into groups in accordance with a large number of possible criteria, particularly the criteria for which are much more important than the criteria characterizing other groups, which can include the same objects.”

Also, more than a 100 years ago, one of the representatives of the so-called new historical school of political economy Schmoller said: Observation and description, definition and classification - are only preparatory work. But what we strive to achieve, is a knowledge the interdependence of economic phenomena... “Scientific idea needs induction and deduction in the same way as a person needs to walk with both feet - right and left.” This is an important aspect in the study paid particular attention to economist and founder of the so-called “Cambridge School” Marshall (1993. p. 96-97, 100), who believed that... the best is such grouping of material, that collected similar facts and judgments, resulting in one study may shed light on the other. Spending a long time on studying of one group of circumstances, we are getting closer to those fundamental generalizations, which are called the laws of nature. The economic sciences must be described as the science which studies the economic aspects and conditions of political, social and personal life of a human being but especially its public life. “The task of economics is to receive knowledge for itself and develop a guide to behavior in real life, especially in public.”

It means that, in any economic science not only picking up the facts is the matter, not just conducting an experiment, research, calculations and data collection, but also its scientific analysis, study and creating of a scientific hypothesis, and based on this - substantial scientific and practical interpretation and then using of the results in reality, with the possibility of changing the economic science itself. Research, - stated in the afterword to the second edition of “Capital” Marx - should familiarize itself with the data and analyze the different forms of its development, trace its internal connection. “Only after this work is completed, the real development can be adequately depicted” (Marx, p. 21). “As rightly noted in this regard Danko, considering the process of individual research methods,”... the research process in the economy is a search for consistency in applying the deductive-inductive method within the intended purpose, and the skill of the researcher determined by its ability to build the most appropriate combination of (in the words of Karl Marx - receiving of the “perfect reflection” “(Marx, p. 21) methods for studying of the most common and particular economic problems” (Danko, 1997. p. 37). And here the economist, how exactly, in our opinion, noted Marshall (1993. p. 102), “... should have three great intellectual qualities - perception, imagination, common sense, but most of all he needs is imagination (disciplined, scientific imagination)” he explained. So he would be able to discover the causes of visible events that are hidden from eyes, and imagine the consequences of obvious reasons that are lie on the surface (ibid. 100-101).

Obviously, it is impossible to solve above mentioned problems of scientific knowledge without appropriate tools and scientific language, without which no scientific theory can exist, which is considered as a specific epistemological education, carrying not

only the features of the object of knowledge, but also special, individual characteristics and knowledge learning process. That is why scientific theory inevitably includes both ontological and epistemological components. Therefore, if the purpose of scientific cognition is to penetrate the essence of things, describe the objective reality and on this basis to implement, according to Cont, “rational foresight” (and the vast majority of scientists is convinced about that), one of the most important challenges facing researchers is to construct a model explaining and interpreting on the scientific theory in which it would have received appropriate ontological and epistemological-cal interpretation. Only in this case, a scientific theory can turn into knowledge. Otherwise we will face only a technical, i.e. predominantly instrumental, apparatus, with which one can operate the formal empirical data. Hence - the importance that acquires philosophy to identify the epistemological and ontological content of the theory, which is based on certain views on the general characteristics of the life and the knowledge. In this regard, let us introduce a statement of Kant’s “Critique of Pure Reason:” “Any knowledge based on reason comes from the concepts of design; first called philosophical, and the second - a mathematical...” According to that, knowledge can be objectively philosophical and at the same time subjectively historical... Philosophy is the only possible idea of science, which is nowhere given in concreto, but to which we are trying to approach in different ways, until we open the only path, until a man cannot be the permitted to do equal sample copy... Philosophy is the only... the concept of the knowledge system, researched only as a science with a view to only one goal - creating systematic unity of the knowledge, therefore, logical perfection of it. But there is a world concept (conceptus cosmicus), which has always been at the basis of the term “philosophy,” especially when this concept, so to speak, has personified and seemed like the ideal of the philosopher as a sample. In this sense, philosophy is the science of the relation of all knowledge to the essential objectives of the human mind... (Kant, 1998. p. 820-822).

On the other hand, the increased importance of positive institutional approach to the study of the processes of individual decision-making in situations of risk and uncertainty, which is observed in economic theory during the last decades have lead to the need to find new theoretical foundations and search for new ways to develop the economic theory, including the basis of their interaction. Allocation and justification of these areas does not mean a complete rejection of all the positive that has been accumulated and that “works” today, and apparently means a shift in emphasis, the allocation of new issues, and specific areas of research and specific processes and connections in a research work, with the creating of formalized (is sometimes sketchy) individual behavior, business entity (or groups of) to a “life,” more realistic representation in various situations of their choice, including the process of their experimental and empirical testing, determine the level of coherence of the traditional theory and the consequences derived from it with the facts of reality.

In this aspect, it seems very interesting from a methodological and theoretical point of view as well as from the standpoint of the practical implementation of the obtained results, using of BE to the problems of building the model of rail freight rates making.

How does such work organized in rail transportation management system? The current “system” (or rather, list) of rail transport rates represented Pricelist # 10-01 “rates on transporting of freight and infrastructure services operated by Russian railways” (hereinafter - Pricelist # 10-01) were approved in 2003 (Price list 10-01) in the circumstances of the so-called liberal economy of Russia. In fact, modern liberal economy in Russia represents so-called “quasi-liberal economy,” i.e., economy, declaring liberal values, but in fact, remains largely economy “state capitalism” with its inherent methods and tools of state-monopoly regulation. Principles and approaches to the justification of the existing system of rates making are essentially similar to the previous one (of 1990), which was designed for centralized control of the rail transport with unlimited eligibility of headquarter on the redistribution of financial resources. This fact has led to a very significant simplification and, at the same time, averaging operational and economic parameters of rates. Pricelist # 10-01 has the following methodological features of construction (ibid):

1. To create competitive conditions in the rail transporting of freight for the first time in the Russian railroads history rate is divided into two components: (a) For the use of infrastructure and locomotive traction, and (b) for the use of railway cars (this includes costs for the planned and current reconstruction and depreciation with the level of profitability, taking into account the interest of enterprises and organizations in the acquisition and upgrading of rolling stock);
2. Rates are differentiated depending on the lot size and the type of cargo and used cars.

Pricelist # 10-01 has been formed on the basis of mutually exclusive, or at least the contrary principles of tariff making: Cost and market, and therefore is an attempt to connect the unconnected, i.e., an attempt to harness “a harness horse and quivering doe.” Hence - the corresponding result similar to the famous “confusion and vacillation.” For example, payment for infrastructure is mainly based on the technological principle, and based on the cost elements with the release of so-called “goods solvency,” which is manifested in the division of all goods into three classes. But fee “per car” is based on a different principle - the “usefulness” of products (services), which is determined by the specific situation on transport in the transport market.

This, in general, is not an isolated example, and at the moment gives us reason to say no to the existing verified and scientifically based state tariff policy on rail transport. On the contrary, there is a wide range of opinions in the methodological approaches to the justification of tariffs making, lack of clear and adequately understood of ideology of improving the “system” of tariffs itself. As a result - failure to perform tariffs’ fundamental functions - to measure and to stimulate; the absence in rates of many objective differences in the business conditions, as well as the appearance (in modern conditions of development of the Russian market of cargo transportation) of new entrants of economic and legal relations on the cargo transportation and ownership. The basic rates has been formed and calculated basically 10 years ago, today no longer reflect significant changes in the structure of costs that occurred during passed time, and changed economic relations on the market. On the other hand, in the current Pricelist

10-01 includes content that co-temporary economic conditions creates an economic imbalance in the relationship between users and transport intermediaries, hinder the realization of economic opportunities and the development of effective alternative carriers.

How can there be a way out of this situation? In our opinion, the strategic direction of solving this problem stated in the adopted more than a decade ago, Russian Federation Government Resolution # 448 of May 15, 1998 “The Concept of Structural Reform of the Federal Railway Transport” and the Russian Federation Government Resolution # 384 of May 18, 2001 “On the program of structural reform of rail transport” (On the concept of structural reforms of the Federal railway transport). These regulations has declared a phased transition from the model of state monopoly to the new institutional model of market relations in the field of railway transport services with a qualitatively different level of service and high investment demand. However, for the last time in the area of changing of the approaches to the problem of the formation or the calculation of tariffs for cargo rail transportation nothing has been done. In this case we are not talking about adopted at different times some private, non-system solutions that are taken at different levels of the Ministry of Transport of the Russian Federation and the Government to improve the efficiency of rail transport and the current Pricelist # 10-01.

In our opinion, the real a breakthrough decision is to increase the efficiency of formation, calculation and usage of tariffs which corresponding to the ideas of economic theory, and can be implemented in the regard of using of the teaching tools and techniques arsenal that BE provides us with, and, in particular, games theory and ABM (e.g., Suslov et al., 2010; Chirkunov, 2011). We believe that these theoretical and methodological tools allow to take into account such important features of economic and behavioral relationships of railway transport participants as a free economic choices of participating economic entities, their economic interests and legal protection (based on agreements or contracts), the level of risk they are taking and selected price (tariff) strategy, sanctions and incentives, etc.

In this sense, for example, the central concept of one of the most advanced and promising, in our opinion, methods of computer modeling studies of economic processes as dynamic systems of interacting agents - ABM - is the notion of an “agent.” Agent in this context - is usually some entity (individual, or some virtual entity - in the model), which has a certain economic activity and economic interests, the individual behavior and the right to take appropriate decisions in accordance with established institutional and regulatory rules, the ability to be varied (evolve) and the ability to interact with other agents (including the state and authorities) and external environment (primarily business environment).

The purpose of ABM is primarily to obtain the views of the real economic behavior of the agent, those entities with which it interacts, and the actual (or potential) reaction of the environment. Especially when it comes to the heterogeneous modeling objects and their spatial relationships which are extremely diverse. These features defining the difference, between numerous users of rail cargo transport services - enterprises, organizations, institutions,

and the railway companies themselves and their derivatives structures. In this case, the use of ABM, aimed at modeling the process of cargo transportation tariffs making as an object ABM, can be quite effective and useful.

3. CONCLUSION

Summing up the above, we can conclude about the possibilities and potentially high scientific and methodological and heuristic efficiency of use of ABM in the field of cargo tariff making modeling. Anyway, today it is the obvious fact (few who have seriously challenged) that the current problems of the cargo tariffs making which would be effective for Russia's economy need deep and detailed studies on the basis of modern scientific methods and technologies, including both computerized methods of simulation and ABM.

Moreover, their use may be based on both traditional (neoclassical approach) and modern (BET) research methodology.

In this case, is not as important as the tools themselves study, how many goals and objectives, and the conditions for their implementation in particular economic object, or in relation to specific economic and behavioral processes of its functioning. And this, again, implies not only technical, but also methodical (and methodological) synthesis of classic and new approaches to the analysis of the research subject.

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