

Planimetry of Economic States

S. Melnyk, Kharkov National University of Radio Electronic, Kharkov, Ukraine

I. Tuluzov, Kharkov Regional Center for Investment, Kharkov, Ukraine

A. Melnyk, Kharkov Regional Center for Investment, Kharkov, Ukraine

ABSTRACT

The new information physical method of constructing the space of economic states is proposed. Unlike the existing theories of consumption, its properties are completely determined axiomatically by the operation of measurement and do not require phenomenological assumptions. The authors consider a transaction of exchange of valuables between two proprietors as such operation. The result of measurement is a dimensional number equal to the proportion of exchange. The constructed space appears to be Euclidean vector space with ordinary operators of composition of vectors, their scalar product, etc. The task of determining the parameters of equilibrium of a complex economic system can be formulated as a task of statics in the constructed space and can be solved by one of the physical methods.

Keywords: Economic States, Multidimensional Space, Theory of Consciousness, Transaction

1. INTRODUCTION

In the existing theories of consumer choice the main emphasis is made on modeling the consumer's preferences. In this relation, a number of problems connected with its idealization and the necessity of experimental definition of parameters of the model arise (Gilboa, Postlewaite & Schmeidler, 2010). At the same time, in physics the main properties of the space and the laws of motion in it are determined by the properties of symmetry of the procedure of measurement of distances and time intervals, rather than the properties of objects located in this space. Thus, for instance, the whole STR can be obtained only on the basis of the method of measurement of distances and time intervals using the light "meters" and "hours" formulated by A. Einstein. In the present paper we are following this particular constructive approach to the construction of space of economic states and studying of its properties. We are considering a transaction of exchange of property as a fundamental economic measurement. Natural properties of symmetry of this procedure allow introducing the operations of addition and scalar multiplication in a set of economic states. The obtained results allow predicting the relative value (and its variation in time) without introducing any additional assumptions on the consumer's preferences, but only on the basis of measurement of the projection of the vector of its state. Thus, the proposed approach

DOI: 10.4018/IJPMAT.2015070102

allows excluding from the consideration the “hidden parameters” of the model of consumer, and rely only on the results of measurements of its state (concluded or rejected transactions). In the present paper we have limited ourselves to the discussion of application of the proposed model in the tasks of economic statics. We are first going to study the properties of the space of economic states generated by the method of their measurement. Then, on the basis of these properties, we are going to determine the notion of economic balance and formulate the laws of statics, and, finally, we are going to analyze the special aspects of motion of an economic analog of solid body in the space of states.

2. MULTIDIMENSIONALITY OF THE SPACE OF ECONOMIC STATES

We have previously proposed the physical methodology of constructing unidimensional models of economic systems (Tuluzov & Melnyk, 2010). The unidimensional space of states occurs as a consequence of the idealized assumption on the fact that in the process of exchange of a valuables A for B, B for C and C for A the following ratio is valid:

$$\left\{ \frac{A}{B} \right\} \cdot \left\{ \frac{B}{C} \right\} \cdot \left\{ \frac{C}{A} \right\} = 1 \quad (1)$$

where the symbol $\{A/B\}$ determines the result of measurement – the quantitative proportion of exchange of valuables A for valuables B. This assumption can be conditionally interpreted as a statement – “everything is measured only in money”. Actually, if a fixed value in conventional units (money) is set for each valuable item, then it determines the proportions of its exchange for any other valuables. In this case, the ratio (1) is obvious. At the same time, in real economy it can be violated. Moreover, violation of this ratio actually represents the stimulus of every transaction! Each participant of the transaction assumes that his actions will be eventually profitable. At the same time, it becomes possible only in case of transition to the multidimensional space of states, in which each of the proprietors relies upon his own scale of values in the process of decision-making. In this case, in order that the transaction takes place, the two inequalities must be satisfied:

$$\left\{ \frac{A}{B} \right\} > \left\{ \frac{A}{C_A} \right\} / \left\{ \frac{B}{C_A} \right\}; \left\{ \frac{B}{A} \right\} > \left\{ \frac{B}{C_B} \right\} / \left\{ \frac{A}{C_B} \right\} \quad (2)$$

where C_A and C_B are the units of the scale of values of the proprietors A and B, respectively. It follows from these inequalities that the values A and B cannot be considered as scalars and that the proportions of exchange of two valuable items in a certain transaction can depend on the preferences of the participants of the transaction. Let us note that the main task of the present paper is not so much a formal generalization of the unidimensional space of economic states into a multidimensional state, but rather finding economic analogs of simple mechanical models and notions. The developed instruments of modeling will further allow analyzing the dynamics of complex real economic systems.

7 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/article/planimetry-of-economic-states/135257

Related Content

Virtual Reality for Better Event Planning and Management

Alana Thomson, Ingrid Proud, Andrew L. J. Goldston and Rebecca Dodds-Gorman (2021). *Impact of ICTs on Event Management and Marketing* (pp. 177-198). www.irma-international.org/chapter/virtual-reality-for-better-event-planning-and-management/267509

A Hybrid Approach Based on LP Metric Method and Genetic Algorithm for the Vehicle-Routing Problem with Time Windows, Driver-Specific Times, and Vehicles-Specific Capacities

Ebrahim Asadi-Gangraj and Sina Nayeri (2018). *International Journal of Operations Research and Information Systems* (pp. 51-67). www.irma-international.org/article/a-hybrid-approach-based-on-lp-metric-method-and-genetic-algorithm-for-the-vehicle-routing-problem-with-time-windows-driver-specific-times-and-vehicles-specific-capacities/212676

An Optimal Band for Prediction of Buy and Sell Signals and Forecasting of States: Optimal Band for Buy and Sell Signals

Vivek Vijay and Parmod Kumar Paul (2015). *International Journal of Applied Management Sciences and Engineering* (pp. 33-53). www.irma-international.org/article/an-optimal-band-for-prediction-of-buy-and-sell-signals-and-forecasting-of-states/138783

E-Business Process Management and Intellectual Property: Issues and Implications

Kathleen Mykty and Peter Mykty (2007). *E-Business Process Management: Technologies and Solutions* (pp. 45-67). www.irma-international.org/chapter/business-process-management-intellectual-property/8709

Cultural Models and Variations

Yongjiang Shi and Zheng Liu (2012). *Cultural Variations and Business Performance: Contemporary Globalism* (pp. 278-291). www.irma-international.org/chapter/cultural-models-variations/63922