

RESEARCH REPORT

of International Laboratory of Decision Choice and Analysis on the project «Design of economic mechanisms», carried out within the framework of the Basic Research Program of the Higher School of Economics in 2011

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1 A BRIEF OVERVIEW

The aim of the project “Design mechanism” is to solve problems on mathematical modeling and mechanism design in social, economic and political fields with the use of the theory of choice, game theory and data mining taking into account:

- inability in some cases of direct construction of “correctly”-operating systems in social and economic fields;
- possibility of counteraction (for instance manipulation of preferences) of agents involved;
- high degree of data uncertainty and complexity of its semantic structure
- poor formalization of factors (for instance, the degree of preference, importance of criteria and etc.) of social and economic sphere

The need to consider of specified features predetermined the following research guidelines performed within the scope of the project

- 1) an elaboration and application of theoretical models calculate degree of manipulability of the aggregation rules;
- 2) an analysis and axiomatics design of proportional representation systems implementing the single transferable vote method;
- 3) a comparative analysis of axiomatic systems of criteria importance theory and the theory of additive value functions, justification of multi-criteria solving rules based on additive value functions using information about importance of criteria and their scales;
- 4) a study power indices and manipulation in the groups;
- 5) a theoretical analysis of social choice and ranking methods that are based on social preferences modeled by a majority relation;
- 6) a development of decision making methods for choosing the parameters of cluster analysis algorithms, methods for fuzzy profiles construction, which are meant to describe text or other kind of objects in terms of a given taxonomy; methods of abstracting and interpreting crisp and fuzzy query sets in taxonomies;

- 7) an investigation of measures of informativeness which are defined on the sets of features of non-deterministic system; finding stable representations and descriptions of non-deterministic systems.

In addition, both within the scope of specified guidelines and, separately, a variety of applied studies have been made

- 1) analysis of bank efficiency and performance;
- 2) investigation and analysis of behavioral models of stock exchange;
- 3) automatic interpretation of text documents and classification of documents on natural language;
- 4) investigation of the stability of obtaining optimal representations of noisy image objects;
- 5) application of methods of game theory and social choice theory for modeling coalitional preferences and decision making by political parties;
- 6) developing of new rankings that aggregate information contained in rankings based on a single criterion by means of social choice methods;
- 7) investigation of the mathematical model of university choice by applicants;
- 8) development of models for operative weather forecasting.

The members of the Laboratory published 43 papers during the implementation of the project

- 2 textbooks published by Springer [Mirkin, 2011a] and [Aleskerov et al., 2011d];
- 11 articles in peer-reviewed foreign journals and edited volumes;
- 15 articles in Russian journals;
- 5 preprints of HSE.

2. MAJOR RESEARCH RESULTS

According to the requirements of the project new theoretical results were achieved in mathematical modeling and mechanism design in social, economic and political spheres with the use of the methods of the theory of choice, game theory and data mining. The results obtained can be conditionally attributed according the following directions:

1. ELABORATION OF THEORETICAL MODELS OF MANIPULATION IN VOTING

Achievements in this direction

- a) strong and weak manipulability is studied for positional and q-Paretian voting rules from the degree of manipulability point of view;
- b) weak manipulability is studied from the freedom of manipulation point of view; voting rules were compared according to this measure;

- c) for most cases both under strong and weak manipulation the least manipulable rules are Nanson's Rule and Hare's Rule
- d) strong manipulability is studied for voting rules, based on majority relation, from the degree of manipulability (Nitzan-Kelly's index) point of view;
- e) impartial Anonymous and Neutral Culture (IANC) is studied.

The results of these researches are presented in [Aleskerov et al., 2011a; Aleskerov et al., 2011b; Aleskerov et al., 2011c].

2. ANALYSIS AND AXIOMATIC DESIGN OF PROPORTIONAL REPRESENTATION SYSTEMS IMPLEMENTING THE SINGLE TRANSFERABLE VOTE

In this direction:

- a) a general description in the form of an iterative procedure of methods implementing the Single Transferable Vote (STV) is proposed;
- b) a new method and the new definition of the quota are proposed based on STV;
- c) a theorem is proved that the proposed method is the only one satisfying all proposed axioms. Results are extended to the methods that transfer a fractional number of votes;
- d) various methods for conducting Single Transferable Vote (STV) elections (the Gregory Method, the Inclusive Gregory Method, the Weighted Inclusive Gregory Method, the Meek Method, the Warren Method) are analysed;
- e) game-theoretic model of corporate board of directors elections is proposed. It is shown that the equilibrium distribution of seats is unique. The uniqueness guarantees nonmanipulability of elections. The distribution is obtained by the d'Hondt method of seats distribution in proportional representation problem. The model is testified on corporate board elections data.

The results of these researches are presented in [Алескеров, Карпов, 2011; Вольский, Карпов, 2011а; Вольский, Карпов, 2011б; Карпов, 2011; Aleskerov, Karpov, 2011].

3. ANALYSIS OF BANK EFFICIENCY AND PERFORMANCE

Main results are the follows

- a) a comparative analysis of three models estimated capital reserves is applied to assess potential damage exposed to operational risks;
- b) a method estimating adequate capital for potential losses due to different risk normally, binormally and Poisson distributed is developed;
- c) regulation approaches to globally systemically important financial institutions are analyzed;
- d) a model for regional investment potential taking into account information from unstructured data sources is developed;

- e) a model for university efficiency estimation is developed;
- f) factors explaining cost efficiency of Russian banks are determined;
- g) methodological issues of cost function modeling for Russian banks are considered;
- h) business models of large, medium, and small banks are analyzed over 2006-2009.

The results of these researches are given in [Алескеров и др., 2011а; Алескеров др., 2011г; Алескеров др., 2011д; Белоусова, 2011а; Белоусова, 2011б].

4. COMPARATIVE ANALYSIS OF AXIOMATIC SYSTEMS OF CRITERIA IMPORTANCE THEORY AND THE THEORY OF ADDITIVE VALUE FUNCTIONS, JUSTIFICATION OF MULTI-CRITERIA SOLVING RULES BASED ON ADDITIVE VALUE FUNCTIONS USING INFORMATION ABOUT IMPORTANCE OF CRITERIA AND THEIR SCALES

The results:

- a) A connection is found between importance of criteria (in terms of exact descriptions from the criteria importance theory) and additive preferences structures. It was proven that
 - criteria and groups of criteria can be ordered by their importance, if preferences are based on values, and preference structure is not additive or if preferences are based on connected quasiorder and cannot be determined by value function;
 - an assumption that quantitative importance values of criteria with ordinal scale or with the first ordinal metric exist is equal to the existing of parametrical set of additive value functions;
 - an assumption about an existence of qualitative values of importance does not extend weak preference relation generated by qualitative information about importance of criteria with ordinal scale (all criteria are ordered by importance), but extends this relation if criteria have the ordinal scale of first order.
- b) On the basis of the above mentioned results, the rules of exact and effective multi-criteria solving rules based on additive value function using information about criteria importance and their scales are developed:
 - error-free rounding recurrent solving rules with interval estimations of superiority degrees in importance of criteria are developed;
 - error-free rounding recurrent solving rules with interval restrictions on the growth of preference along the scale of criteria are developed.

The results are given in [Nelyubin, Podinovski, 2011а; Nelyubin, Podinovski, 2011б; Podinovski, 2011; Подиновский, Подиновская, 2011; Подиновский, 2011а; Подиновский, 2011б; Подиновский, Потапов, 2011; Нелюбин, Подиновский, Потапов, 2011].

5. DEVELOPMENT OF DECISION MAKING METHODS FOR CHOOSING THE PARAMETERS OF CLUSTER ANALYSIS ALGORITHMS, METHODS FOR FUZZY PROFILES CONSTRUCTING TO DESCRIBE TEXT OR OTHER KIND OF OBJECTS IN TERMS OF A GIVEN TAXONOMY; METHODS OF ABSTRACTING AND INTERPRETING CRISP AND FUZZY QUERY SETS IN TAXONOMIES

More precisely:

- a) the additive spectral method for clustering similarity matrices and graphs was developed; its full experimental analysis was conducted; for this reason two tasks were examined, first one was to reconstruct generated cluster structure, second – to compare with existing methods (in collaboration with Dr. S. Nascimento, New University of Lisbon, Portugal and her students);
- b) the stop condition was formulated for divisive cluster analysis method, based on the method of random direction; now the experimental tests of the algorithm are conducted;
- c) the developed method for interpretation crisp topic sets in terms of taxonomy by using the optimal lift algorithm was modified for the case of fuzzy topic sets (in collaboration with T. Fenner, Birkbeck University of London, UK and Dr. S. Nascimento, New University of Lisbon, Portugal);
- d) in the study of automated interpretation of Russian text documents was revealed that the VINITI taxonomy is far from being adequate; the new taxonomy of mathematics, applied mathematics and informatics was developed, it was based on the Higher Attestation Commission documents; the study of mapping this taxonomy onto the HSE course syllabuses was started, for this study Russian section of Wikipedia is used as a supporting tool;
- e) the problem of natural language documents classification, based on the set of given economic factor, was explored; in these study a tool for extracting texts from web pages, an algorithm of fuzzy text profile construction, based on the given factors, an algorithm for document multifacet classification were developed and implemented.

The results of these studies are presented in [Mirkin, 2011a; Mirkin, 2011b; Chernyak et al., 2011; Миркин, 2011; Mirkin et al., 2011; Mirkin, Kramarenko, 2011; Mirkin, Nascimento, 2011].

6. INVESTIGATION OF MEASURES OF INFORMATIVENESS WHICH ARE DEFINED ON THE SETS OF FEATURES OF NON-DETERMINISTIC SYSTEM; FINDING STABLE REPRESENTATIONS AND DESCRIPTIONS OF NON-DETERMINISTIC SYSTEMS

In this direction:

- a) the additive stochastic measures of informativeness which are defined on the set of characteristics of non-deterministic system (which in turn are random variables) was investigated; vector representations of noisy point images are described using these measures;

- b) the most stable vector representation of point noisy image was found using additive stochastic measures of informativeness;
- c) the problem of obtaining a minimal representation of a plane curve with the help of fuzzy clustering was investigated;
- d) the stability of finding of symmetry axes of the object on stationary noisy image was investigated.

The results of these studies are given in [Lepskiy, 2011a; Lepskiy, 2011b; Лепский, 2011].

7. DEVELOPMENT OF MODELS FOR OPERATIVE WEATHER FORECAST

Achievements in this direction are

- a) operative analysis and forecast (up to 36 hours) of 3D-geometry of atmospheric fronts technology were improved;
- b) the archive of fields of objective analyses as well as the archive of meteorological observations of geopotential, temperature, and wind was extended; optimal weights for original atmospheric fronts' predictors in the formula of final predictor were obtained;
- c) an independent archive of meteorological observations was used for atmospheric fronts' plots for various baric levels; independent experts (synoptics of Hydrometeorological Center of Russia) participated in the comparison with alternative information (in particular, with cloudiness' satellite photos) as well as in the discussions of results;
- d) the technology of analysis and forecasting of atmospheric fronts is introduced into operative practice of Hydrometeorological Center;
- e) statistical connection between zones of precipitations and atmospheric fronts constructing by the new technology was found;
- f) asymptotics in origin and on infinity of differential equations solution can be joined using rational Pade – Hermite approximation; the relative algorithms were studied.

The results are presented in [Алдухов и др., 2011].

8. INVESTIGATION AND ANALYSIS OF BEHAVIORAL MODELS OF STOCK EXCHANGE

The results in this direction

- a) we proposed the behavioral model of stock exchange, where the stock exchange behavior is modeled as its response to the signals about the state of the economy;
- b) we developed a new models, which takes into account player's possibility to learn on his/her actions;

- c) all proposed models were tested on real data of S&P 500, Dow Jones, CAC 40, DAX, Nikkei 225, Hang Seng on time horizon 1999-2009;
- d) different modifications of the basic model are constructed.

The results can be found in [Egorova, 2011].

9. MODELING COALITIONAL PREFERENCES AND DECISION MAKING BY POLITICAL PARTIES USING METHODS OF GAME THEORY AND SOCIAL CHOICE THEORY

Achievements in this direction include

- a) an analysis of the equilibrium in political competition model with 2 candidates and stochastic voters; it was shown that equilibrium political programs of the candidates would differ almost for all voters' preference profiles if the objective function's symmetry is not assumed;
- b) an analysis of the political parties content-programs in postwar Europe showed that the share of time for economic issues depends on the country's level of economic development and the level of interpersonal trust;
- c) an analysis of unstructured textual information (Stenograms of the Meetings of the Politburo of the CC RCP(b)–AUCP in 1923-1938) in order to detect the main splits between the members of the Politburo in 1923-1927;
- d) method of quantitative formalization to measure the extent of the split (taking into account the cases of incomplete information for some agents and time periods);
- e) calculate values of power indices for members of the Politburo in 1925-1926 taking into account preferences for coalition formation.

The results are given in [Алескеров и др., 2011в; Камалова, 2011; Zakharov, 2011; Schofield et al., 2011].

10. INVESTIGATION OF POWER INDICES AND MANIPULATION IN THE GROUPS

In this direction

- a) we constructed and analyzed two sets of axioms for the power indices taking into account the players' preferences for coalition formation;
- b) we proved "the mean value theorem" for the Banzhaf and Shapley-Shubik indices, which states that "on average by quota" a power of a player is proportional to the number of her votes;
- c) we made an analysis of decision-making rules in the European parliaments and showed the possibility of simplification of the rules.

The results are given in [Шварц, 2011а; Шварц, 2011б; Шварц, 2011в].

11. THEORETICAL ANALYSIS AND APPLICATION OF SOCIAL CHOICE AND RANKING METHODS THAT ARE BASED ON SOCIAL PREFERENCES MODELED BY A MAJORITY RELATION

The following results are obtained

- a) set-theoretical relations were either established or refined for the following solutions: von Neumann-Morgenstern solution and two versions of the Banks set on one hand and thirteen tournament solutions (the core, the weak and strong top cycle sets, five versions of the uncovered set, three versions of the minimal weakly stable sets, the uncaptured set, the untrapped set) on the other;
- b) preliminary set-theoretical analysis of game-theoretical and tournament solutions has shown that Nash equilibria may not coincide with a Condorcet winner;
- c) social choice methods were applied in a number of multicriterial problems for construction of rankings that aggregate information contained in rankings based on a single criterion. Aggregate rankings were calculated for 82 management science journals. The journals are ranked by their influence as measured by the most popular bibliometric indices (two- and five-year impact factor, immediacy index, SNIP, SJR, Hirsch index, Article Influence);

The results are presented in [Алескеров и др., 2011б].

12. APPLICANTS' CHOICE AND UNIVERSITY ADMISSION (MATCHING) MODEL

In this direction:

- a) matchings with preferences being simplest semiorders were investigated;
- b) the existence of a stable matching was shown; furthermore, correspondence of any stable matching to some strict extension of original preference profile was shown;
- c) Erdil and Ergin's result on Pareto-efficient stable matchings was extended: necessary and sufficient conditions for applicant-side Pareto-efficiency of a stable matching were formulated;
- d) model of applicant's choice on university applications was proposed and analysed (for the case of unstable matching mechanism).

The results can be found in [Кисельгоф, 2011].

3 MAJOR ORGANIZATIONAL RESULTS

3.1 ORGANIZATION AND CARRYING OF DeCAN LABORATORY SEMINARS AND ALL-MOSCOW SCIENTIFIC SEMINAR "MATHEMATICAL METHODS OF ANALYSIS OPTIMAL SOLUTIONS IN ECONOMICS, BUSINESS AND POLITICS"

Over a period from January to November 2010, 12 sessions of the DeCAN Laboratory seminar were held and the following reports were presented

- 19 December** – K. Sorokin (PhD, DeCAn Laboratory) “The non-convergence in a two-candidate probabilistic voting model under general candidate payoff functions”;
- 12 December** - L. Egorova (graduate student, DeCAn Laboratory) “Games with restricted cooperation”;
- 5 December** - I. Zutler (PhD, NRU-HSE) “Stochastic preferences in cumulative theory of prospect”;
- 24 October** - V. Protasov (PhD, ISA RAS) “Modeling and optimization of systems of collective management”;
- 5 September** – D. Karabekyan (graduate student, DeCAn Laboratory) “Preferences on sets of alternatives with application to the problem of voting”;
- 6 June** - Hasan Ersel (PhD, Sabanci University, Turkey), “Crysis and recovery - the Turkish experience”;
- 23 May** - S. Chernyshev (graduate student, MSU) “Routing problem of transport on large-scale graphs”;
- 16 May** - A. Zakharov (PhD, DeCAn Laboratory), D. Fantazzini (PhD, NRU-HSE) “Minkowski metric in stochastic models of voting”;
- 11 April** - S. Moiseev (PhD, MFIA) "Macprudential policy and its application in Russia";
- 14 March** - D. Veselov (graduate student, NRU-HSE) "Generalized model of economic growth";
- 21 February** - A. Subochev (PhD, DeCAn Laboratory) "Theory of rational choice and social sciences";
- 31 January** - A. Lepskiy (PhD, DeCAn Laboratory) "Various approaches to modeling of uncertainty".

The faculty of the Laboratory involved into the project, actively participate in the organization and conduct of the following scientific research events

1. All-Moscow science seminar "Mathematical methods of analysis of optimal solution in economics, business and politics":
 - Heads – F.T. Aleskerov, V.V. Podinovski;
 - Co-head – B.G. Mirkin.
2. Scientific Seminar "Political Economics":
 - Co-head – A.V. Zakharov.

3.2 PARTICIPATION OF STAFF OF DECAN LABORATORY IN PREPARING AND CONDUCTING CONFERENCES

Laboratory staff were involved in preparing and conducting a series of conferences:

1. XII HSE International Academic Conference on Economic and Social Development, 5-7 April 2011, NRU-HSE, Moscow, Russia, <http://conf.hse.ru>:
 - Aleskerov F.T. – Head of Section, Chair of Session, Vice-Chairman of Program Committee;
 - Zakharov A.V. – Head of Section.
2. International Economic Association Sixteenth World Congress, 4-8 July 2011, Beijing, China:
 - Aleskerov F.T. – Member of IEA Executive Committee.
3. 13th International Conference on Rough Sets, Data Mining, Fuzzy Sets and Granular Computing (RSFDGrC-2011), 25-27 June 2011, NRU-HSE, Moscow, Russia:
 - Mirkin B.G. – General Chair.
4. 38th International Conference “Informational Technology in Science, Education, Telecommunication and Business”, IT + S&E 11, Ukraine, Crimea, Yalta-Gurzuf, 20-30 May 2011:
 - Podinovski V.V. – Member of the Program Committee, Head of Section.
5. International Conference on Classifications, Glasgow UK, July 2011:
 - Mirkin B.G. – Member of the Organizing Committee.
6. Bi-annual conference of International Federation of Classification Societies, Frankfurt, Germany, August 2011:
 - Mirkin B.G. – Member of the Program Committee.
7. Meeting of the European Mathematical Psychology Group, August 2011, Telecom, Paris, France:
 - Mirkin B.G. – Member of the Scientific Committee.
8. International Conference on Advance Computer Science and Information System, December 2011, Jakarta, Indonesia:
 - Mirkin B.G. – Honorary chair.
9. 9th Workshop on Media Economics, October 28-29, 2011, NRU-HSE, Moscow, Russia, <http://www.hse.ru/mew/>
 - Zarharov A.V. - Member of the Organizing Committee.

3.3 ORGANIZATION OF SUMMER SCHOOL

The faculty of the Laboratory with the support of the Center of Fundamental Research organized Summer school “Modern models of the theory of choice”, which was held from September 23 to 25, 2011 in Yaroslavl. At the school the lectures were delivered by Prof. Eric Maskin (Chief Researcher, DeCAN Laboratory, Institute for Advanced Study) and Prof. Roman Statnikov (Naval Postgraduate School, Monterey, CA, USA).

3.4 ORGANIZATION OF THE SERIES OF SEMINARS WITH PARTICIPATION OF LEADING FOREIGN SCIENTISTS IN THE PROGRAMMERS OF PROFESSIONAL SKILL IMPROVEMENT

In 2011 DeCAN laboratory has been visited by such famous scientists as

- 1) Prof. Ahmet Alkan (Sabanci University, Turkey) who gave lectures and seminars on the course “Matching and markets” (16 May – 2 June, 16 academic hours);
- 2) Prof. Hasan Ersel (Sabanci University, Turkey) who gave lectures and seminars on the course «Economics of Banking Regulation and Supervision» (20 May – 10 June, 28 academic hours);
- 3) Prof. Shmuel Zamir (The Hebrew University of Jerusalem, Israel) who gave lectures and seminars on the courses «The Strategic Use of Seller Information in Private-Value Auctions», «Extending the Condorcet Jury Theorem to a general dependent jury» (22 – 26 June, 4 academic hours);
- 4) Prof. Roman Statnikov (Naval Postgraduate School Monterey, CA, USA) who gave lectures and seminars on the course «Multi-criteria decision making» (1 September – 31 October, 24 academic hours);
- 5) Prof. Christian Seidl (University of Kiel, Germany) who gave a seminar;
- 6) Prof. Michel Grabisch (Université Paris I Panthéon-Sorbonne, France) who gave lectures on the course “Games with restricted cooperation”, (25 November – 4 December, 16 academic hours).

4 OTHER INFORMATION

On the whole, problems proposed in the Project task were solved. At the same time, some problems were to be formulated more precisely. There were proposed a number of new problems, some others have just been started by project members. Therefore, we consider it as necessary to continue carrying out research on the project subjects.

The hierarchical structure of the main project research directions is considered as perspective by the project members. The first level of this structure involves fundamental research in the field of mathematical modeling and mechanism design

in the social, economic and political fields. This research uses methods of decision making theory, game theory and data analysis. The directions of the first level are

- 1) economic mechanism design;
- 2) manipulability of social choice rules;
- 3) analysis of proportional representation systems based on single transferable vote;
- 4) criteria importance theory and the theory of additive utility functions;
- 5) study of group manipulation and power indices;
- 6) study of ranking alternatives in a majority graph;
- 7) intelligent data analysis;
- 8) study of informativeness measures defined on the set of attributes of non-deterministic system.

The foregoing areas of research have a common «informational» aspect. Mechanism design theory is a part of economic information theory. The concept of uncertainty is complimentary to the concept of informativeness in the generalized information theory. The theory of manipulability of social choice rules is related to the analysis of representation of wrong information. Then, intelligent data analysis (in particular, cluster analysis) deals with information structurization. Finally, the theory of qualitative and quantitative importance of criteria is concerned with scaling of partially formalized expert information.

The second level of research consists of a number of applied studies, related with

- 1) analysis of operating efficiency of commercial banks;
- 2) modeling of stock exchange processes;
- 3) automatic interpretation and classification of text documents;
- 4) application of game-theory and social choice theory methods to modeling of coalitional preferences;
- 5) study of stability of optimal representation of objects images;
- 6) calculating aggregated rankings;
- 7) study of mathematical model describing behavior of a university entrant while choosing a university.

In general, we suppose that this two-level structure should be followed in future research on the project subjects.

Head of the Project

F.T. Aleskerov

ANNEX 1

PUBLICATIONS AND PAPERS, FEATURING THE RESULTS OF THE PROJECT

[Aleskerov et al., 2011a] Aleskerov F., Karabekyan D., Sanver R.M., Yakuba V. On the degree of manipulability of multi-valued social choice rules // *Homo Oeconomicus*, 28(1/2), 2011, p.205-216.

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[Aleskerov et al., 2011c] Aleskerov F.T., Karabekyan D., Sanver R.M., Yakuba V.I. On The Manipulability of Voting Rules: The Case of 4 and 5 Alternatives // *Mathematical Social Science*, 2011 (IF: 0,508).

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[Mirkin, 2011b] Mirkin B.G. Choosing the number of clusters // WIREs Data Mining and Knowledge Discovery, 2011. № 3. p.252-260.

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и решений в области ИКТ “SIMO NETWORK”. (Королевство Испания, г. Мадрид, 4-6 октября 2011г.) с.37-38.

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ANNEX 2

LIST OF WORKSHOPS, CONFERENCES AND SUMMER SCHOOLS ORGANIZED BY PROJECT PARTICIPANTS

The faculty of the laboratory with the support of the Center of Fundamental Research organized Summer school “Modern models of the theory of choice” (http://www.hse.ru/DeCAn/report_yaroslavl), which was held from September 23 to 25, 2011 in Yaroslavl. 26 faculties from the Laboratory and other departments participated in the Summer school. The lectures were delivered by

- Prof. Eric Maskin (Chief Researches of the DeCAn Laboratory, Institute for Advanced Study), 2 lectures on “Design mechanisms of auctions”;
- Prof. Roman Statnikov (Naval Postgraduate School Monterey, CA, USA), 2 lectures on «Multi-criteria decision making».

There were discussions of the reports and consultations of the speakers with the participants of the Summer school.

ANNEX 3

LIST OF PRESENTATIONS MADE AT WORKSHOPS AND CONFERENCES

1. XII HSE International Academic Conference on Economic and Social Development, 5-7 April 2011, NRU-HSE, Moscow, Russia, <http://conf.hse.ru>:

- Karpov A. “Model of voting in the election to the board of directors of joint-stock company”;
- Aleksashin P., Aleskerov F., Bondarchuk P., Knurova A., Popova E. “Analysis of business models of Russian commercial banks”;
- Belousova V. “Analysis of the influence of macro environment on cost effectiveness of Russian Banks”;
- Kiselgof S. “Model of college entrants’ choice and acceptance campaign in Russia”;
- Karabekyan D. “Weak manipulability of ordinal decision rules”;
- Zarharov A. “Euclidian or city-block? Estimation of voter preferences in a multi-dimensional probabilistic voting model”.

2. Erich Schneider Seminar in Kiel University, Kiel, Germany, 2011, <http://www6.bwl.uni-kiel.de/phd/seminars-schneider.php>:

- February 7: Aleskerov F. “Solution Concepts of Collective Choice Problems and their Applications”.
- May 2: Aleskerov F., Egorova L. “Is it so bad that we cannot recognize black swans?”

3. International Workshop “Voting Power in Practice, London School of Economics», London, London School of Economics, 20-22 March, 2011, <http://www2.lse.ac.uk/CPNSS/projects/VPP/workshops/9thannualworkshop.aspx>:

- Aleskerov F., Holler M.J., Kamalova R. Power distribution in the Weimar Reichstag in 1919-1933.

4. European Geosciences Union General Assembly, Wien, 11 April 2011, <http://meetings.copernicus.org/egu2011/>:

- Gordin V.A., Bykov Ph.L. “The objective analysis of three-dimensional geometry of atmospheric fronts”.

5. Workshop «Politics & Economics», University of Hamburg, Hamburg, Germany, 22 January 2011:

- Aleskerov F., Holler M.J., Kamalova R. Scientific publishing: Power Distribution in the Weimar Reichstag in 1919-1933.

6. 4th International Conference on Pattern Recognition and Machine Intelligence (PREMI-2011), NRU-HSE, 27 June – 1 July 2011, Moscow, Russia, <http://premi11.hse.ru/>:

- Mirkin B., Nascimento S., Fenner T., Felizardo R. “How to Visualize a Crisp or Fuzzy Topic Set over a Taxonomy”;
- Lepskiy A. “Stable Feature Extraction with the Help of Stochastic Information Measure”.

7. 13th International Conference on Rough Sets, Data Mining, Fuzzy Sets and Granular Computing (RSFDGrC-2011), NRU-HSE, 25-27 June 2011, Moscow, Russia, <http://rsfdgrc.hse.ru/>:

- Mirkin B., Kramarenko A. “Approximate bicluster and tricluster boxes in the analysis of binary data”;
- Mirkin B., Nascimento S. “Developing Additive Spectral Approach to Fuzzy Clustering”.

8. International Workshop on Soft Computing Applications and Knowledge Discovery (SCAKD-2011), NRU-HSE, 25 June 2011, Moscow, Russia, <http://premi11.hse.ru/scakd>:

- Lepskiy A. “Obtaining the Minimal Polygonal Representation of a Curve by Means of a Fuzzy Clustering”.

9. First International Workshop on Concept Discovery in Unstructured Data (CDUD-2011), 25 June 2011, NRU-HSE, Moscow, Russia, <http://rsfdgrc.hse.ru/cdud>

- Chernyak E., Chugunova O., Askarova J., Nascimento S., Mirkin B. “Abstracting concepts from text documents by using an ontology”.

10. 7th Spain-Italy-Netherlands Meeting on Game Theory (SING7), Paris, France, 18-20 July, 2011 (http://ces.univ-paris1.fr/SING_7.htm):

- Aleskerov F., Karabekyan D., Sanver R., Yakuba V. “An individual manipulability of voting rules in an impartial culture concept”;
- Kiselgof S. “Matchings with the simplest semiorder preference relations: stability and Paretoefficiency”.

11. All-Moscow Seminar “Expert Estimations and Data Mining”, IPC RAS, 2011, Moscow, Russia, <http://www.mtas.ru/seminar/expert.php>:

- October 26: Kiselgof S. “Generalized Matchings: classical models and new results”;
- May 15: Karpov A. “Strategic voting in the election to the board of directors of joint-stock company”;
- November 9: Podinovski V. “The importance of the criteria and the additive value function”.

12. International Conference “Theory of active systems - 2011”, 15 November, 2011, IPC RAS, Moscow, Russia, <http://www.mtas.ru/seminar/ubs2011/>

- Aleskerov F., Kamalova R. “Modeling of Power Distribution in the Reichstag of Weimar Germany”.

13. Public Choice Research Centre (PCRC), Turku, Finland, 5-10 May 2011, http://www.soc.utu.fi/sivustot/pcrc/news/Aleskerov_kurssi.html

- Course of lectures by Aleskerov F. on “Fundamentals of Political Decision Making”.

14. Joint PCRC-DeCAN Workshop, Public Choice Research Centre (PCRC), Turku, Finland, 15 November 2011,

http://www.soc.utu.fi/sivustot/pcrc/news/PCRC_DeCan.html

- Karpov A. "Single transferrable vote, its properties and applications";
- Karabekyan D. "On the extension of preferences";
- Perederina O. "Ratings of political science journals";
- Kiselgof S. "On one-to-many matching's and their applications to students submissions to universities".

15. International Conference “Association of Southern European Economic Theorists 2011 Annual Meeting”, 27-29 October 2011, Evora, Portugal, http://www.cefage.uevora.pt/en/eventos/conferencias_internacionais/2011_asset_a_nnuual_meeting

- Veselova Y. “The difference of manipulability indexes in IC and IANC model”;
- Aleskerov F., Karpov A. “A New Method of the Single Transferable Vote and its Axiomatic Justification”.

16. Chicago Workshop on Institutional Analysis, Ronald Coase Institute, Chicago, USA, 15-21 May, 2011, <http://www.coase.org/whatsnew.htm>

- Belousova V. “Does Shareholders’ Control Improve Banks’ Performance? A Russian Perspective”.

17. XIV All-Ukrainian Conference “Problems and prospects of Ukraine's banking system”, 27-28 October, 2011, Sumi, Ukraine, http://www.uabs.edu.ua/index.php?option=com_content&view=article&id=1517&Itemid=474&lang=en

- Belousova V. “Business models of Russian banks: typology, structure and commitment to the choice”

18. International Conference on Operations Research, 30 August to 2 September 2011, Zurich, Switzerland, <http://www.or2011.ch/index>

- Aleskerov F., Egorova L. “Is it so bad that we cannot recognize black swans?”

19. VII International Conference “Russia's Regions: Strategies and mechanisms of modernization, innovation and technological development”, 26-27 May 2011, ISSS RAS, Moscow, Russia <http://www.mesi.ru/our/events/detail/77448/>

- Aleskerov F., Vasiliev S., Ivanov A. "Utilization of associated gas is the way of innovative development of oil and gas regions".

20. International Youth Conference "Systems, methods, techniques and technologies of processing of media content", 25-27 October 2011, MSUP, Moscow, Russia, <http://mediafest2011.hi-edu.ru/ru/index.php>
- Ivanov A., Kudishin D. "Increasing the speed of data collection and processing through automation processing of web pages".
21. 86th Annual Conference of Western Economic Association International, 29 June – 3 July 2011, San Diego, California, USA, <http://weai.org/index.html>
- Aleskerov F., Karabekyan D., Sanver R., Yakuba V. "Manipulability of Voting Rules in the Case of Multiple Choice".
22. 4th CAS Annual Academic Conference "General Equilibrium Analysis" June 3-4, 2011, NRU-HSE, Moscow, Russia, <http://cas.hse.ru/conferences/>
- Aleskerov F., Egorova L. "Is it so bad that we cannot recognize black swans?"
23. International Economic Association Sixteenth World Congress, 4-8 July 2011, Beijing, China, <http://www.chps.fudan.edu.cn/en/content.asp?id=128>
- Aleskerov F., Egorova L. "Is it so bad that we cannot recognize black swans?";
 - Karabekyan D., Yakuba V. "On Weak Manipulability of Voting Rules".
24. 33rd Bosphorus Workshop on Economic Design, Turkey, 9-16 July 2011
- Aleskerov F., Karabekyan D., Sanver R., Yakuba V. "Strong and Weak Manipulability of Voting Rules in the Case of Multiple Choice".
25. Seminar "Mathematical Economics" in CEMI RAS, Moscow, Russia, May 2011,
http://www.cemi.rssi.ru/research/seminars/index.php?ELEMENT_ID=3604
- Aleskerov F., Karpov A. "Axiomatic description of the single transferable vote and a new method of proportional representation".
26. International Conference on Classifications, Glasgow UK, 11-15 July 2011, www.st-andrews.ac.uk/ifcs2011/
- Amorim R., Mirkin B, "Weighting variables with Minkowski metric K-Means clustering".
27. Bi-annual Conference of International Federation of Classification Societies, Frankfurt, Germany, August 2011, <http://www.gfkl2011.de>
- Mirkin B., Kovaleva E. "Random projections for stopping the process of divisions in k-means Bisection clustering"
28. Meeting of the European Mathematical Psychology Group, August 2011, Telecom, Paris, France, www.infres.enst.fr/~hudry/EMPG/

- Mirkin B., Fenner T., Nascimento S. “A Model of Interpretation of Concepts over a Taxonomy”.
29. International Conference on Advance Computer Science and Information System, December 2011, Jakarta, Indonesia, <http://icacsis.cs.ui.ac.id/index.php/icacsis/index>
- Mirkin B. “Data analysis and related fields (Data Mining, Machine Learning, Mathematical Statistics) – similarities and differences”.
30. 38th International Conference “Informational Technology in Science, Education, Telecommunication and Business”, IT + S&E`11, Ukraine, Crimea, Yalta-Gurzuf, 20-30 May 2011:
- Podinovski V. “Qualitative importance of criteria and additive preference structure”.
31. International Conference “Crimea Autumn Mathematical School-Symposium” (KROMSH-2011), Ukraine, Crimea, Sevastopol, Laspi-Batiliman, September 17 – 29, 2011, www.kromsh.info
- Nelubin A., Podinovski V., Potapov M. “Importance of criteria in multicriteria decision-making problems”.
32. La Exposición Internacional de Servicios Profesionales y soluciones en TIC “SIMO NETWORK” El Reino de España, Madrid, De 4 a 6 de octubre 2011,
- Nelubin A., Podinovski V., Potapov M. “Importance of criteria in multicriteria decision-making problems”.
33. Joint Conference of the German Classification Society (GfKI) and the German Association for Pattern Recognition (DAGM), August 30 - September 02, 2011, Frankfurt am Main, Germany, <http://www.gfkl2011.de/>
- Chernyak E., Chugunova O., Askarova J., Nascimento S., Mirkin B. “An approach to using ontologies for interpreting text documents”.
34. 15th All-Russian Conference “Mathematical Methops of Pattern Recognition”, Republic of Karelia, Petrozavodsk, Russia, 11-17 September, 2011, <http://www.mmro.ru>:
- Mirkin B., Nascimento S. “Additive Spectral Approach to Extraction of Fuzzy Clusters from the Matrix of Connection”;
 - Lepskiy A. “About conditions of stability finding of symmetry axes of noisy image”.
35. International Reading Kolmogorov-IX, Yaroslavl, Russia, 17-20 May, 2011, <http://www.yspu.yar.ru/index.php/%D0%9A%D0%BE%D0%BD%D1%84%D0%B5%D1%80%D0%B5%D0%BD%D1%86%D0%B8%D1%8F:%D0%9A%D0%BE%D0%BB%D0%BC%D0%BE%D0%B3%D0%BE%D1%80%D0%BE%D0%B>

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- Alduchov O., Gordin V., Bykov Ph. “Large-scale 3D correlation functions for the Earth's atmosphere”.
36. 13th Plinius Conference. Mediterranean Storms. Disasters and Climate Change: Know to adapt. Savona, Italy, 6-9 September 2011,
<http://www.plinius.org/cms/>
- Gordin V., Bykov Ph. “Mediterranean Atmospheric Fronts: Analysis and Forecast of the Three-Dimensional Geometry”.
37. 1st Annual General Conference of The European Political Science Association, 16-18 June 2011, Dublin, Ireland
<http://www.epsanet.org/generalconference2011.html>
- Zakharov A., Fantazzini D. “Euclidian or city-block? Estimation of voter preferences in a multi-dimensional probabilistic voting model”.
38. 5th International Conference on Game Theory and Management, June 27-29, 2011, St. Petersburg, Russia, <http://www.gsom.spbu.ru/gtm2011/>
- Zakharov A. “Probabilistic voting equilibria under non-risk-neutral candidates”.
39. NES/HSE Conference 2011, 17-18 November 2011, NES, Moscow, Russia,
<http://www.nes.ru/dataupload/files/science/conferences/NES-HSE%20Conference%202011%20Program%20November%2017.pdf>
- Zakharov A. “The importance of economic issues in politics: A cross-country analysis”.
40. 8th Open German-Russian Workshop "Pattern Recognition and Image Understanding" OGRW-8-2011, November 21-26, 2011, Nizhny Novgorod, Russia,
<http://agora.guru.ru/display.php?conf=ogrw2011>
- Lepskiy A. “About conditions of stability of finding of symmetry axis of noisy image object”.
41. NES Seminar Project on "Spatial Economics: How Geography Matters for Economics", 11-23 July 2011, Great Novgorod, Russia:
- Sorokin C. “Monopolistic competition in a linear town”.

ANNEX 4

DESCRIPTION OF MOBILITY

Table 1 “Incoming mobility”

who visited	dates of visits	which courses have been delivered	what are the results	what are the costs of the visits (rub.)
Prof. Hasan Ersel (Sabanci University, Turkey)	19.05 - 13.06	lectures on «Economics of Banking Regulation and Supervision» (28 acad. hours)	professional skill improvement, 13 participants	210 673
Prof. Ahmet Alkan (Sabanci University, Turkey)	16.05 – 4.06	lectures on “Matching and markets” (16 acad. hours)	professional skill improvement, 16 participants	207 730
Prof. Shmuel Zamir (The Hebrew University of Jerusalem, Israel)	22.06 – 26.06	lectures on «The Strategic Use of Seller Information in Private-Value Auctions», «Extending the Condorcet Jury Theorem to a general dependent jury» (4 acad. hours)	professional skill improvement, 21 participants	214 328
Prof. Roman Statnikov (Naval Postgraduate School Monterey, CA, USA)	1.09 - 31.10	lectures on «Multi-criteria decision making» (24 acad. hours)	professional skill improvement, 20 participants	360 357
Prof. Christian Seidl (University of Kiel, Germany)	18.11 – 23.11	seminar on «Distributive economics» (4 acad. hours)	professional skill improvement, 14 participants	58 800
Prof. Michel Grabisch (Université Paris I Panthéon-Sorbonne, France)	25.11 – 1.12	lectures on “Games with restricted cooperation”	professional skill improvement, 15 participants	120 409
Total				1 172 297

Table 2 “Outgoing mobility”

Who	which research centers, conference	dates of visits	results	what are the costs of the visits (rub.)
D. Karabecyan	Bosphorus Workshop on Economic Design, Istanbul, Turkey	9.07 - 16.07	participation in the conference with paper	55 601
S. Kiselgof	7th Spain-Italy-Netherlands Meeting on Game Theory, Paris, France	17.07 - 21.07	participation in the conference with paper	62 967
R. Kamalova	Summer Programme in quantitative methods of Interuniversity Consortium for Political and Social Research, Michigan, USA	18.07 – 12.08	participation in the summer school	175 638
E. Chernyak	Joint Conference of the German Classification Society (GfKI) and the German Association for Pattern Recognition (DAGM), Frankfurt am Main, Germany	29.08 – 2.09	participation in the conference with report	33 122
V. Gordin	13 Plinius Conference. Mediterranean Storms. Disasters and Climate Change: Know to adapt. Savona, Italy	4.09 – 11.09	participation in the conference with report	72 441
F. Aleskerov, A. Karpov	Annual Meeting of the Association of Southern European Economic Theorists (ASSET), Evora, Portugal	24.10 – 31.10	participation in the conference with report	106 918
F. Aleskerov, D. Karabecyan, A. Karpov, S. Kiselgof, O. Perederina	Public Choice Research Centre (PCRC), Turku, Finland	14.11 – 17.11	participation in the Joint PCRC-DeCAn Workshop with reports	102 704
S. Kiselgof	Institute of Economics of Hungarian Academy of Sciences, Budapest, Hungary	22.11 – 29.11	participation in the conference with report	18 859
F. Aleskerov, A. Belenky, A. Ivanov, L. Egorova, R. Kamalova	University of Roma “Tor Vergata”	27.11 – 2.12	participation in the science seminar with paper, discussion of joint works	241 175
Total				869 425