RESEARCH REPORT

of International Laboratory of Decision Choice and Analysis on the project "Investigation of new methods and approaches in the field of mathematical modeling and mechanism design in the social, economic and political spheres", carried out within the framework of the Basic Research Program of the Higher School of Economics in 2013

Co-Heads of the project – FUAD ALESKEROV, ERIC MASKIN.

1.   A BRIEF OVERVIEW

The aim of the project is an investigation of new methods and approaches in the field of mathematical modeling and mechanism design in social, economic and political spheres using the social choice theory, game theory and data mining.

The main results of this project are presented in the following main research directions:

- research on the analysis of universities, innovations and educations scientometric data;
- study of organizational models and mechanisms;
- study of the behavioral model stock exchange;
- study of ethnopolitical tension models;
- construction and application of theoretical models for the calculation of the degree of rule manipulability for preference aggregation;
- game-theoretic approach for the solution of generalized bankruptcy problem;
- efficiency analysis of banking and financial sectors of the economy;
- development of new decision rules for multi-criteria problems in the theory of criteria importance;
- theoretical and experimental study on cluster analysis and computational text interpretation;
- study of changes in the quality characteristics of evidence when they are combined in the framework of the Dempster-Shafer theory;
- study of models of fair division;
- study and development of power indices;
- a comparative study of solutions in cooperative game theory and the social choice theory, application of the social choice theory to ranking data;
- study of double-sided matchings and their application;
- study of the properties of selection procedures based on the superposition of choice functions;
- study of the stability of selection of informative features and representations of images;

- study of a model of an escalating conflict;
- study of political competition in probabilistic correlated voting model.

Fundamental and applied results of different extent were made in every direction of the project.

Members of the Laboratory published 52 materials during the implementation of the project including:

- 1 monograph [Aleskerov et al. f (rus)];
- 6 articles in peer-reviewed foreign journals and edited volumes;
- 11 articles in peer-reviewed Russian journals;
- 5 preprints of HSE.

2. MAJOR RESEARCH RESULTS

The obtained results can be attributed to the following directions.

2.1 Research on the analysis of universities, innovations and educations scientometric data

In this direction:

a) a new model of the data envelopment analysis that takes into account the heterogeneity of the set of objects was elaborated;

b) a problem of evaluation of the co-authors contributions to a joint research was analyzed; a solution, which is equivalent to the Shapley value, was obtained, however, it is more computationally efficient;

c) the model of estimating the contribution of scientists based on the threshold aggregation method was proposed;

d) the analysis of the universities heterogeneity has been carried; the comparative analysis of the effectiveness of Russian universities according to their resource capacity was conducted;

e) we have investigated the impact of socio-economic conditions of the Russian Federation regions on the potential of science, education and innovation activity, and identified regions having similar strategies for the science and education development;

f) methods borrowed from the social choice theory were applied to construction of aggregate journal rankings in three academic fields: economics, political science and management; the most recent (2012) bibliometric data collections were created and processed for that purpose; correlation analysis of aggregate rankings and single-index-based rankings was performed as well; currently we are considering application of the threshold aggregation method to construction of aggregate journal rankings.

Results of the research are presented in [Aleskerov & Petrushchenko; Aleskerov et al. a, c, d, e; Karpov; Abankina et al. a, b; Petrushchenko; Aleskerov & Chistyakov].

2.2   Study of organizational models and mechanisms

In 2013 research was continued in the field of widening classes of applied economic mathematical models that can be mathematically formulated in the form of games on polyhedral sets of connected player strategies and in the form of mathematical programming problems with mixed variables and linear constraints. In the framework of this research:

a) a mathematical model of the interaction of producers and consumers of electric energy in a part of the electrical grid of a country was developed, and sufficient conditions for the solvability of this game were established;

b) two mathematical models for bringing into step the interests of producers and consumers of the homogeneous product having the form of mathematical programming problems with mixed variables were developed;

c) a mathematical model for optimizing the assortment of the goods acquired for retail was developed in the form of a mathematical programming problem with mixed variables and linear constraints; a method for decomposing statistical data on past sales of analogous goods was developed for find parameters of the model;

d) new mathematical features of the mechanism for determining the winner in a one-step sell-bid auction that reduces the chances of forming corrupt ties between the auction organizer and the auction participants were studied; it was shown that this mechanism possesses the features that are analogous to those of the Vickrey mechanism for the second-price auctions;

e) a software complex for researching a mathematical model for organizing the process of studying a college student was developed to be used in optimizing this process on the basis of a mathematical programming problem with mixed variables and linear constraints continued.

Results relating to this research are reflected in [Belenky a, b, c; Belenky et el.].

2.3   Study of the behavioral model stock exchange

In this direction:

a) a simulation model of the exchange, which uses information about different types of players and their possible interaction, was constructed. It is the implementation of the previously developed behavioral model and;

b) a software package that simulates the stock market using the model mentioned above was elaborated.

Results relating to this research are presented in [Egorova].

2.4   Study of ethnopolitical tension models

Within this field we:

a) the problem of modeling ethnic heterogeneity in contemporary scholarly literature was studied including analysis of ethnolinguistic heterogeneity indices, approaches to measuring distance between groups, applications of these indices to analysis of xenophobia, civil conflicts, economic welfare, quality of government, and the level of democracy;

b) axiomatic systems of social polarization measurement and axiomatic properties of Esteban-Ray index and Aleskerov-Golubenko index were analyzed;

c) comparative analysis of Esteban-Ray and Aleskerov-Golubenko indices was conducted;

d) the reaction of Esteban-Ray and Aleskerov-Golubenko indices on changes in the number of groups in society and on changes in relative positions was studied.

For results of the research see [Kamalova a].

2.5   Construction and application of theoretical models for the calculation of the degree of rule manipulability of rules for preference aggregation

Within this field we:

a) coalitional manipulability for the case of 4 and 5 alternatives and small number (lower than 25) of voters was studied;

b) computational results for coalitional manipulability and 3 alternatives were analyzed for rules, based on majority relation;

c) a software tool for coalitional manipulation is developed;

d) maximal difference of probabilistic measures in IAC and IANC models was studied; results for IC and IANC models were completed with asymptotic behavior of maximal difference;

e) Nitzan-Kelly's manipulability index was computed for ANC model with 3 alternatives and up to 30 voters;

f) properties of threshold aggregation rule were studied; the representation of threshold procedure as a scoring rule was found.

For results see [Veselova a, b].

2.6 Game-theoretic approach for the solution of generalized bankruptcy problem

Within this field:

a) the generalized bankruptcy model was investigated. The novelty of this model is that intercreditor debts are considered. Intercreditor endowments redistribution mechanism is added;

b) nonemptiness of the core (the set of undominated allocations) in the generalized model was proved; the single-valued consistent solution (nucleolus) was found.

2.7 Efficiency analysis of banking and financial sectors of the economy

Within the research area:

a) a long-term model of systemically important banks interaction was built assuming the presence of large and non-large cohorts of banks;

b) the research of derivatives impact on the value of European banks was done based on panel analysis;

c) Markov chains were applied to run stochastic forecast of Russian banking system evolution;

d) hedging efficiency for intraday and interday periods was surveyed;

e) risk properties as a good and a bad were researched; the solution to excessive risk taking through a quasi-insurance fund was proposed;

f) the dependence of banking system regulatory bodies and the level of economic activity was investigated;

g) the analysis of Russian financial analysts forecasts for the equity quotes of traded enterprises and banks was done;

h) financial risks associated with dry bulk time charter rates joint distribution were researched.

Research findings are delivered in the form of the following papers: [Aleskerov et al.f; Penikas et al.; Merikas et al.; Komissarova & Penikas; Sirotkin & Penikas; Penikas & Proskurin; Penikas & Selmier].

2.8 Development of new decision rules for multi-criteria problems in the theory of criteria importance

In this direction:

a) analytical decision rule that does not use values of criteria importance measured on an ordinal scale, and optimization decision rule for problems with criteria measured on the first ordinal metric scale were elaborated;

b) analytical decision rule for problems with criteria measured on the first ordinal metric scale of general form was elaborated.

Research findings are delivered in the form of the following papers [Nelubin & Podinovski; Podinovski a, b, c; Podinovski & Podinovskaya].

2.9 Theoretical and experimental studies on cluster analysis and computational text interpretation

In this field:

a) a series of conducted experiments showed that the methods for consensus partition developed in our own data recovery approach are sufficiently more effective than eight methods adopted from international papers;

b) several multicriteria methods for ordering on the fixed set of classes (in other words, for stratification) were developed and examined;

c) a series of experiments on comparison of different string to text relevance in the problem of paper annotation was conducted; it was shown that the previously developed AST-measure is more efficient than the two most popular in international literature measures;

d) the study on "Developing the method for lifting in taxonomies based on maximum likelihood principles" was started; these methods are supposed to be used for computational interpretation of text collections;

e) the study on "Scoring research impact" based on traditional scientometrics figures (i.e. citation count) and several new ideas, such as the usage of taxonomy structures, was applied to analyses the field of "data analysis and machine learning";

f) a study on adopting new technologies for big data analysis (Map Reduce, Hadoop, etc.) was started. These technologies are to be used for big textual data analysis by supporting some cluster analysis methods and the method of annotated suffix trees;

g) several experiments on computational refinement of taxonomy lower levels were conducted. Taxonomy build from materials of Russian HAC (Higher Attestation Committee) was refined with Wikipedia data;

h) to finish the study on individual cluster detection three approaches were formulated: analysis of weighted graphs (networks), consensus partition, the model and method of k-means, which lead us to previously stated algorithms and criteria.

Research findings are delivered in the form of the following papers [Mirkin a, b, c; Mirkin & Shestakoff a,b; Chernyak & Mirkin a, b, c; Dubov & Chernyak].

2.10 Study of changes in the quality characteristics of evidence when they are combined in the framework of the Dempster-Shafer theory

In this direction:

a) the index of decreasing ignorance was defined and studied when combining the evidence based on previously introduced index of imprecision on belief function;

b) the sufficient conditions for the reduction of the index was found for some of the rules of combination and certain types of evidence;

c) the axiomatic measure of conflict between the evidences was introduced and the general form of bilinear measure of conflict was found;

d) the relationship between the measure of conflict and the index of decreasing ignorance was statistically and analytically investigated for different types of evidence.

Results relating to this research are reflected in [Lepskiy a, c, d].

2.11   Study of models of fair division

In this direction:

a) within the general framework of division construction we estimated the hardness measure for the envy freeness condition, that is essential for fairness;

b) we studied how crucial is the envy freeness condition depending on the number of items and participants;

c) we examined how the players can manipulate in the fair division problem when all players have information on other players' preferences and suggest the hypothesis of the equilibriums existence and its possible properties;

d) the measure of hardness of the envy freeness condition (one of the essential fairness conditions) was studied in the framework of the general structure of the algorithm of the set of all divisions' construction;

e) the importance of the envy freeness condition depending on the number of items and participants was generally evaluated;

f) the manipulation in the fair division problem under the assumption of the participants' full information about their preferences was studied; the hypotheses about the existence and properties of equilibriums were suggested.

Research findings are delivered in the form of the following paper [Rubchinsky a].

2.12   Study and development of power indices

In this field:

a) the mean value theorem for the power indices under the assumption that the quota for the vote is more than half of the number of total votes was proved;

b) theoretical estimates for the measure of balancedness of the complete signed graphs were obtained. The results were applied to the analysis of the balance of the State Duma of the Russian Federation;

c) the study of the possibility of computing power indices that depend on the preferences of the participants in anonymous games with a large number of players was initiated.

Results relating to this research are reflected in [Shvarts a, b].

2.13 Study of game-theoretic models

In this field:

a) the model that specifies the possible solutions, and axiomatic in the non-cooperative approach to coalition games was constructed;

b) it was proved that under very general assumptions about the rules of the tournament teams to play the last match may be advantageous (It is the development of D. Dagaev's and K. Sonin's approach); probabilities of such events in the real tournaments were computed.

Results relating to this research are reflected in [Zakharov & Schwartz].

2.14 A comparative study of solutions in cooperative game theory and the social choice theory, application of the social choice theory to ranking data

In this field:

a) the comparative set-theoretical and axiomatic analysis of Shapley (cooperative game) solution and tournament (social choice) solutions, such as Condorset winner, uncovered set etc., was performed;

b) algorithms for calculation of the uncovered set and k-stable sets for the case of large numbers of alternatives were designed; software implementation of these algorithms was performed and their performance testing is being conducted.

Some results of the research are presented in [Subochev; Aleskerov et al. d, e; Aleskerov & Subochev].

2.15 Double-sided matchings and their application

In this direction:

a) the model of generalized one-to-many matching with interval order preferences studied; necessary and sufficient conditions of unilateral efficiency of stable matching were found;

b) the problem of choosing a non-manipulable stable mechanism with minimal risk of getting inefficient matchings (in the class of mechanisms with arbitrary elimination of indifference in preferences) was solved for the case of the simplest semioders and semioders satisfying the special condition of regularity;

c) the problem of building stable mechanism with a reduced risk of inefficiency for a wide class of preference relations was studied;

d) the study of the model of generalized matching with given preference in the case of choice functions was initiated;

e) the analytical review of the works devoted to the analysis of existing centralized distribution schemes for students in world universities is being prepared;

f) a software system for comparing the new arrangements with minimal risk of inefficiency to classical mechanisms of random elimination indifference is being developed.

Some results of the research are presented in [Biro & Kiselgof a, b; Kiselgof a,b].

2.16 Study of the properties of selection procedures based on the superposition of choice functions

In this direction:

a) the choice change due to variation of preferences, the set of feasible alternatives, and the set of criteria was analyzed for seven one-stage and 35 two-stage choice procedures;
b) the analysis of 42 different choice procedures on satisfying rationality conditions, expansion, monotonicity, monotonicity 2, strict monotonicity, additivity, participation conditions and non-compensatory principle;
c) a software for choice procedures analysis is being developed.

Results relating to this research are reflected in [Aleskerov et al. b].

2.17 Study of the stability selection of informative features and representations of images

In this direction:

a) the problem of finding the symmetry parameters stability for noisy images was studied; measures and functional of global asymmetry of images were introduced axiomatically and researched for both not noisy and noisy images;
b) some of the asymmetry functional were proved not to possess stability to the level of noise on images;
c) necessary and sufficient conditions for which the axis of symmetry calculated using the functional of asymmetry remains unchanged were found.

Some results of the research are presented in [Lepskiy b, e; Bronevich et al. a, b].

2.18 Study of the escalating conflict model

In this direction:

a) general equilibrium existence results for correlated agent types were obtain in the framework of the escalating conflict model;
b) comparative statics of a symmetric equilibrium for second order domination of agents' types distribution was derived. It allows to obtain a lower and upper bound on the probability of an escalation breakdown when mean values of player types are fixed;

c) comparative statics of symmetric equilibrium for a likelihood ratio dominance shift of agents types joint distribution was derived.

Some results of the research are presented inconferences and seminars [2], [44], [46].

2.19 Study of political competition in probabilistic correlated voting model

Inthisdirection:

a) equilibrium convergence result when number of voters goes to infinity was obtained;
b) convergence properties if voters' probability of voting functions are not independent were studied.

Some results of the research are presented inconferences and seminars [23], [45].

3. MAJOR ORGANIZATIONAL RESULTS

3.1. Organization and carrying of DeCAn Laboratory seminars and All-Moscow scientific seminar "Mathematical methods of analysis of optimal solutions in economics, business and politics"

Over a period from January to December 2013, 9 sessions of the DeCAn Laboratory seminar were held and the following reports were presented:

3 December – Panos M. Pardalos (University of Florida, USA) "Data Mining and Knowledge Discovery in Dynamic and Massive Networks";

28 November – F. Hubert (Humboldt-Universität zu Berlin) "Measuring bargaining power in networks";

16 September – F. Aleskerov and A. Lepskiy (Head and Deputy Head of DeCan Laboratory) "The University ranking on the results of entrance exams";

27 June – C. Sorokin (Senior Research Fellow, DeCAn Laboratory) "The role of the of information in conflict escalation" (join work with Prof. E. Winter (Hebrew University of Jerusalem));

17 June – W. Trockel (Institute of Mathematical Economics at Bielefeld University, Germany) "An exact non-cooperative support for the sequential Raiffa solution";

10 June – reports:

E. Kalugina (Research Intern, DeCAn Laboratory)"Generalized matchings: one-to-many";

I. Zakhlebin (Research Intern, DeCAn Laboratory) "The construction of alternative versions of economic competitiveness ranking of the world by the methods of the social choice theory";

Y. Veselova (Research Intern, DeCAn Laboratory) "On the representation of a threshold rule aggregation rules in the form of scoring";

S. Shvydun (Research Intern, DeCAn Laboratory) "Some procedures of choice and their properties";

3 June

V. Kostomarov (Research Intern, DeCAn Laboratory) "Axiomatic of the Esteban-Ray index polarization . Its use for the index Aleskerov-Golubenko**"**;

D. Mirishliand A. Mohovikov (Research Intern, DeCAn Laboratory) "Software implementation of a matrix-vector representation of uncovered and k-stable sets";

20 March – S. Shvydun(ResearchIntern, DeCAn Laboratory) "Ranking algorithms based on the idea of superposition, and their application to the problem of information retrieval";

14 February – E. Kataeva (Research Intern, DeCAn Laboratory) "Assessing the contribution of scientists using a threshold aggregation".

Over a period from January to December 2013, 11 sessions of the All-Moscow scientific seminar "Mathematical methods of analysis of optimal solutions in economics, business and politics" were held and the following reports were presented:

18 December – E. Gafarov (Institute of Control Sciences V.A. Trapeznikov Academy of Sciences) "Graphical method for solving combinatorial optimization problems";

16 October – G.W. Weber (Middle East Technical University) "Nonparametric Regression Splines for Regional Atmospheric Correction";

18 September – D. Shvarts (DeCAn Laboratory) "Power indices, which depend on the preferences of the participants – the axioms and methods of computation";

19 June – G. Agasandyan (CC RAS) "Continuous VaR criterion on the options markets";

13 June – W. Trockel (Institute of Mathematical Economics at Bielefeld University, Germany) "Axiomatization of discrete Rife solutions";

29 May – A. Tangian (Hans-Böckler-Stiftung and Karlsruhe Institute of Technology, Germany) "Macroeconomic analysis of Flexicurity with Regard to the Crisis";

15 May – F. Aleskerov and A. Myachin (DeCAn Laboratory) "Indicators of science, education and innovation activities: methods and tools for generating and processing data patterns";

25 April – H. Salonen (University of Turku, Finland) "Aggregating and Updating Information";

17 April – N. Zagoruiko (Institute of Mathematics SB RAS) "Function competitive similarity and compactness";

20 March – O. Evren (NSE) and S. Minardi (HEC Paris) "Warm-Glow Giving and Freedom to be Selfish";

16 January – A. Chekushin, M. Slivinsky (Wikimart) "Marketing Technology: measure, manage, analyze".

3.2   Participation in organization of conferences

Laboratory staffs were actively involved in organizing a number of conferences:

1. Second Russian Economic Congress, February 18-22, 2013, Suzdal, http://www.econorus.org/congress.phtml:

- Aleskerov F. – Deputy Chairman of the Program Committee, conference Coordinator;
- Belenky A. – Moderator of the Session;
- PenikasH. – Moderator of the Session;
- Karpov A. – Moderator of the Session;
- Karabekyan D. – Moderator of the Session.

2. XIV HSE International Academic Conference on Economic and Social Development, 2-5 April 2013, NRU-HSE, Moscow, Russia, http://conf.hse.ru/2013/:

- Aleskerov F. – Deputy Chairman of the Program Committee, Head of a section, Chairman of session;
- RubchinskyA. – Chairman of session;
- Veselova J. – Chairman of session.

3. Conference AINT'2013 "Analysis of Images, Networks and Texts", Ekaterinburg, April 4-6 2013, http://aistconf.org/:

Chernyak E. – Secretary of the Organizing Committee, Executive Editor of the Proceedings.

4. The 1st International Conference on Information Technology and Quantitative Management (ITQM 2013), May 16-18, 2013, Suzhou, China, http://www.itqm-meeting.org/:

- Aleskerov F. – Member of the Program Committee.

5 Conference "Challenges of implementing Basel II and III in Russian banks," May 28, 2013, Financial University under the Government of the Russian Federation, Moscow, https://www.hse.ru/data/2013/05/29/1285020075/2013-05-28_Program.pdf:

- Penikas H. – Moderator of the Conference.

6. XLI International conference "Information technologies in science, education, telecommunications and business" (Spring Session) (Ukraine, Crimea, Yalta-Gurzuf, May 25 - June 4, 2013), http://www.gloriozov.com/

- Podinovski V. – Member of the Program Committee, Head of a section.

7. 26th European Conference on Operational Research, July 1-4, Roma, Italy, http://euro2013.org/

- Belenky A. – Chairman of session;
- Subochev A. – Chairman of session.

8. 7th Moscow International Conference on Operations Research, October 15-19, 2013, Moscow, Russia, http://io.cs.msu.su/new_conferences.html:

- Aleskerov F. – member of the Program Committee.

9. XLI International conference "Information technologies in science, education, telecommunications and business" (Autumn Session) (Ukraine, Crimea, Yalta-Gurzuf, October 2-10, 2013), http://www.gloriozov.com/

- Podinovski V. – Member of the Program Committee, Head of a section.

3.3 The development of scientific communication, including support of international scientific cooperation in the field of basic research

The development of scientific (including international) contacts was carried out in the form of participation of the staff of the laboratory that works on the project in a number of conferences. The list of presentations made at workshops and conferences is given in Annex 2.

3.4 Activities for staff development of the Laboratory

1. Junior Research Fellow of Laboratory D. Shvarts prepared and defended the PhD thesis"Power indices, which depend on the preferences of the participants – the axioms and methods of computation" (Supervision – F.T. Aleskerov).

2. A series of mini-courses of lectures were conducted. The list of mini-courses of lectures is given in Annex 3 (Table 1).

3. Chief Research Fellow of Laboratory Eric S. Maskin gave a series of lectures on the course "Mechanism design", May 14-15, 2013.

4. Senior Researcher of Laboratory C. Sorokin had a two-month internship in Hebrew University's Center for the Study of Rationality.

5. Research Fellow of Laboratory D. Karabekyan had a one-month internship in Department of Economics, Harvard University, USA.

6. Research Fellows of Laboratory D. Karabekyan, A. Karpov, Junior Research Fellow S. Kiselgof and Senior Researcher C. Sorokinparticipated in the work of 24th Jerusalem Summer School in Economic Theory, The Hebrew University of Jerusalem, http://www.as.huji.ac.il/schools/econ24.

7. Junior Research Fellow of Laboratory E. Chernyak participated in the work of 11th European Summer School on Information Retrieval, University of Granada, ESSIR 2013.

8. ResearchIntern of LaboratoryY. Veselova passed the advanced training course on the program "Academic Writing and related competence" at the Center for Academic Writing HSE.

3.5 Delivery of lectures to disseminate research results

1. Junior Research Fellow of Laboratory D. Shvarts gave a series of six lectures on the general theme of "Power index"at the International School-Seminar "Baikal's reading", Irkutsk, ISU, http://www.pribaikal.ru/igu-item/article/17362.html.

2. Head of Laboratory F.T. Aleskerov gave a lecture on the theme "Theoretical and Applied Works of the International Department of Decision Choice and Analysis in the Higher School of Economics" on the seminar of logistic branch of Molde University.

3. Head of Laboratory F.T. Aleskerov gave a lecture on the theme "Theoretical and Applied Works of the International Department of Decision Choice and Analysis in the Higher School of Economics" on the seminar of SP HSE.

4. Head of Laboratory F.T. Aleskerov gave a lecture on the theme "Lobbying of interests in Parliament" within the "Open University" project at the HSE, Moscow.

5. Research Fellow of Laboratory D. Karabekyan gave a lecture on the theme "How describe the behavior of people economists?" within the "Open University" project at the HSE, Moscow.

6. Head of Laboratory F.T. Aleskerov gave a lecture on the theme "Power in groups with application to the distribution of power to IMF" on the seminar of the University of the Chinese Academy of Sciences, Beijing, China.

4. OTHER INFORMATION

On the whole, problems proposed in the projecthave been solved. At the same time, some problems should be formulated more precisely. A number of new problemsare stated and solved. Thus we believe that research in these directions should be continued.

Head of the Project   F.T. Aleskerov

ANNEX 1

Publications and papers, featuring the results of the project

[Abankina et al. a] Abankina I., Aleskerov F., Belousova V., Gokhberg L., Zin'kovsky K., Kiselgof S., Shvydun S. Typology and analysis of scientific and educational impact of Russian universities// Forsyth, v.7(3), 2013, pp.50-65. (in Russian)

[Abankina et al. b] Abankina I., Aleskerov F., Belousova V., Zin'kovsky K.,Petruschenko V. Evaluation of the impact of universities through the data envelopment analysis// Problems of Education, 2013, 2, pp.15-47. (in Russian)

[Aleskerov] Aleskerov F. Game-theoretical modeling: an attempt to briefly discuss the development and prognosis// Journal of the New Economic Association, 1(17), 2013, pp.181-184. (in Russian)

[Aleskerov & Karpov] Aleskerov F., Karpov A. A new single transferable vote method and its axiomatic justification// Social Choice and Welfare, March 2013, v.40, #3, pp.771-786.

[Aleskerov & Petrushchenko] Aleskerov F., Petrushchenko V. DEA by sequential exclusion of alternatives: Working paper// WP7/2013/02. – Moscow: Publishing House of the Higher School of Economics, 2013. –28 p.

[Aleskerov et al. a] Aleskerov F., Kamalova R., Holler M. Power distribution in the Weimar Reichstag in 1919-1933// Annals of Operations Research, 2013, pp.1-13.

[Aleskerovet al. a] Aleskerov F., Gokhberg L., Egorova L., Myachin A., Sagieva G. Pattern Analysis in the Study of Science, Education and Innovative Activity in Russian Regions// Procedia Computer Science. 2013, v.17, pp.687-694.

[Aleskerov et al. b] Aleskerov F., Mitichkin E., Shvydun S., Yakuba V. Super-threshold Procedures and Their Application to the Search Problem// Procedia Computer Science, v.17, 2013, pp.1121-1124.

[Aleskerov et al. c] Aleskerov F., Egorova L., Gokhberg L., Myachin A., Sagieva G. Pattern Analysis in the Study of Science, Education and Innovative Activity in Russian Regions// Procedia Computer Science, v.17, 2013, pp.687-694.

[Aleskerov et al. d] Aleskerov F., Pislyakov V., Subochev A. Rankings of economic journals constructed by the Social Choice Theory methods// Working paper WP7/2013/03. – Moscow: Publishing House of the Higher School of Economics, 2013. – 48p. (in Russian)

[Aleskerov et al. e] Aleskerov F., Pislyakov V., Kataeva E., Pislyakov V., Yakuba V. Assessing the contribution of scientists using a threshold of aggregation//

Large-scale Systems Control/ Proc. Special edition 44 "Scientometrics and expertise in the science control": Moscow Institute of Control Sciences, 2013, pp.172-189. (in Russian)

[Aleskerov et al. f] Aleskerov F., Andriyevskaya I., Penikas G., Solodkov V. Analysis of mathematical models of Basel II (second edition). – Fizmatlit, Moscow, 2013. 295p. (in Russian)

[Aleskerov et al. g] Aleskerov F., Belousova V., Egorova L., Mirkin B. Analysis of patterns in statics and dynamics, Part 1: A literature review and specification of concept// Business Informatics, 3(25), 2013, pp.3-18. (in Russian)

[Aleskerov & Chistyakov] Aleskerov F.T., Chistyakov V.V. The threshold decision making effectuated by the enumerating preference function// International Journal of Information Technology and Decision Making, v.12, No.6, 2013, pp. 1-22. DOI:10.1142/S021962201300586

[Aleskerov & Subochev] Aleskerov F., Subochev A. Modeling optimal social choice: matrix-vector representation of various solution concepts based on majority rule// Journal of Global Optimization, v.56, Iss.2, 2013, pp.737-756.

[Belenky a] Belenky A. Three Quantitative Management Problems in Public Procurement and Decision Procedures for Their Analysis and Solving// Procedia Computer Science, v.17, 2013, pp.1142-1153.

[Belenky b] Belenky A. Game-Theoretic Models for Analyzing Two Public-Private Partnership Problems (to be submitted to International Journal of Production Economics in July 2013)

[Belenky c] Belenky A. Two Game Models in Systems Economic Studies, (to be submitted for publication in November 2013)

[Belenky b] Belenky A. Game-Theoretic Models for Analyzing Two Public-Private Partnership Problems (submitted to International Journal of Production Economics in October 2013)

[Belenky et al.] Belenky A., Doubson M., Larson R. A Boolean Programming Problem of Choosing an Optimal Curriculum for a College Student (to be submitted for publication in December 2013)

Blagoveschenskiy N.Y., Rubchinsky A.A. Cluster Analysis of Socio-Economical Data// Proc. of the XIV International Academic Conference on Economic and Social Development. – M.: 2013, Publ. House of HSE. (accepted for publication)

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[Zakharov & Schwartz] Zakharov AV, Schwartz DA. Axiomatic of non-cooperative approach to coalition games//Automatization and Remote Control (accepted, in Russian).

ANNEX 2

List of presentations made at workshops and conferences

1. 9th EBES Conference, January 11-13, 2013; Faculty of Economics, Sapienza University of Rome; Rome, Italy, http://www.voxeu.org/events/9th-ebes-conference-rome:

- Penikas H. Copula-Based Univariate Time Series Structural Shift Identification Test;
- Penikas H.(with Gomayun N., Titova Y.) Estimate of the Effect of Derivatives Usage by Public European Banks on Its' Value and Risk.

2. Second Russian Economic Congress, February 18-22, 2013,Suzdal,http://www.econorus.org/congress.phtml:

- Belenky A. Optimal allocation of financial resources in public procurement by mathematical programming techniques;
- Veselova Y. Comparison of the threshold rule and rank aggregation procedures;
- Penikas H.(with Gomayun N.)Study on the relationship the cost of public banks in Europe and the character of their operations with derivatives;
- Egorova L. (withGorbanI.) Behavioral models of stock exchange;
- KamalovaR. Power distribution in the Weimar Reichstag in 1919-1933;
- Karabekyan D., Aleskerov F., IvanovA. (with Yakuba V.)Coalition manipulability of ordinal decision rules;
- Karpov A.Generalized bankruptcy problem;
- Kiselgof S. Generalized matchings when preferences are semiorders;
- Myachin A., Aleskerov F., Egorova L. (with Gokhberg L., Sagieva G.)Analysis of the data on science, education and innovation, using the methods of analysis of patterns;
- Penikas H. Test for evaluation of structural shift in the one-dimensional time series, based on the models of "copula";
- SorokinC. Strategic waiting in the problem of optimal design of collective contracts;
- Subochev A., Zakhlebin I. Alternative versions of economic competitiveness ranking of the world, constructed with the help of the theory of social choice.

3. Seminar on the economic-mathematical methods and models, St. Petersburg, February 27, 2013,http://emi.nw.ru/INDEX.html?0/konfsem/sem.htm:

- Aleskerov F. The power in Organizations: Theory and Applications.

4. Seminar on "Mathematical Economics" in CEMI RAS, Moscow, March 5, 2013, http://mathecon.cemi.rssi.ru/seminar.htm:

- Karpov A. (with Yurkov S.) Generalized bankruptcy problem.

5. Seminar Laboratory of game theory and decision-making EMR RAS, St. Petersburg, March 15, 2013,http://emi.nw.ru/INDEX.html?0/resume/yanovsk.htm:

- Shvarts D. Power indices, which depend on the preferences of the participants - axiomatic construction and methods of computation.

6. 10th Biennial Pacific Rim Conference, March 14-17, 2013, Tokyo, Japan, http://www.weai.org/PacRimConf:

- Aleskerov F., Egorova L. (with Gorban I.) The Optimal Threshold in the Event Separation Problem on the Stock Exchange;
- Karabekayn D. Utility models over price-cum-goods sets.

7. Workshop "Formal concept analysis meets information retrieval" at the European Conference of Information Retrieval ECIR 2013, HSE and Yandex Moscow, March 24, 2013, http://ecir2013.org/:

- Mirkin B., Invited Plenary Report "Key phrase to text similarity, clustering, and interpretation in hierarchical ontologies";
- Shestakoff A., Least squares consensus clustering: criteria, methods, experiments.

8. International Workshop "Baikal reading", Irkutsk State University, March 17-31, 2013, http://www.pribaikal.ru/igu-item/article/17362.html:

- Shvarts D., series of 6 reports on the general theme "Power indices".

9. XIV HSE International Conference on Development Economics and Society, April 2-5, 2013, http://conf.hse.ru/2013/:

- Aleskerov F. Kiselgof S., Shvydun S. (with Abankina I., Belousova V., Gokhberg L., Zin'kovsky K.) Typology of Russian higher educational institutions including indicators of research and innovation;
- Veselova Y. The complexity of the rules ordinal social choice;
- Penikas H. (with Gomayun N., Titova Y.) Study on the relationship the cost of public banks in Europe and the character of their operations with derivatives;
- Aleskerov F., KamalovaR.Power distribution in the Weimar Reichstag in 1919-1933;
- Karabekayn D., Ivanov A., (with Yakuba V.) Coalition manipulability of ordinal decision rules;
- Karpov A. (with Yurkov S.) Generalized bankruptcy problem;
- Kiselgof S., SorokinC.(withBoris A., Menyashev R., Chernina E., Dodlova M., Khmelnitskaya E.)Determination of tariffs for public transport modeling of the demand function. The case of commuter rail;

- Petruschenko V. (with Abankina I., Belousova V., Bonch-Osmolovskaya A., Ogorodniychuk D., Yakuba V., Zin'kovsky K.) Evaluating the effectiveness of universities using DEA and sequential elimination of alternatives;
- Rubchinsky A. (with Blagoveschenskiy N.) Cluster analysis of socioeconomic data;
- Subochev A. Measuring democracy: the aggregation of conflicting rankings of the world using the theory social choice;
- Shvarts D. Axiomatic for power indices in the problem of voting with quota.

10. Conference AINT'2013 "Analysis of Images, Networks and Texts", Ekaterinburg, April 4-6 2013, http://aistconf.org/:

- Chernyak E. Using the resources of the Internet for constructing of taxonomy.

11. Seminar on "Mathematical Economics", April 9, 2013, CEMI, Moscow,

http://www.cemi.rssi.ru/research/seminars/index.php?ELEMENT_ID=6848:

- Penikas H. (with Sirotkin) The problem of correlation of returns and risks of current and term instruments in the investment portfolio.

12. Workshop logistics department of the Molde University, Norway, April 12, 2013:

- Aleskerov F. Theoretical and Applied Works of the International Department of Decision Choice and Analysis in the Higher School of Economics.

13. Seminar at Washington University, St. Louis, April 10,2013, http://ese.wustl.edu/aboutthedepartment/Pages/ElectricalSystemsEngineeringDepartmentalSeminars.aspx:

- Belenky A. Solution Methods for Minimax, Minimaximin, and Game Problems on Polyhedral Sets in Economic and Social Systems.

14. Seminar of SPHSE, April 22, 2013:

- Aleskerov F. Theoretical and applied works in the International Laboratory of Decision Choice and Analysis.

15. Scientific seminar HSE-NES "Political Economy", Moscow, April 23, 2013, http://economics.hse.ru/demat/hmatec/news/81031910.html:

- Kamalova R. Power distribution in the Weimar Reichstag in 1919-1933.

16. Conference «IRB Day», April 25, 2013, company "Forecast", Moscow, http://irbday.prognoz.ru/2013:

- Penikas H. The strategic impact of bank regulation: the transition from the 192-T for Basel IV.

17. Seminar of the University of the Chinese Academy of Sciences, Beijing, China, May 14, 2013:

- Aleskerov F. Power in groups with application to the distribution of power to IMF.

18. InternationalConferenceAINL 2013: Artificial intelligence and natural language, Saint Petersburg, May 16-17,2013, http://ainlconf.ru/:

- Chernyak E.,Shestakoff A. (with Shall A., Dubov M., Levitsky N., Morenko E.)The project of creating a newspaper Internet-corpus.

19. The 1st International Conference on Information Technology and Quantitative Management (ITQM 2013), May 16-18, 2013, Suzhou, China,http://www.itqm-meeting.org/:

- Aleskerov F., Egorova L., Myachin A. (with Gokhberg L., Sagieva G.) Pattern Analysis in the Study of Science, Education and Innovative Activity in Russian Regions;
- Aleskerov F., Shvydun S. (with Mitichkin E., Yakuba V.)Super-threshold Procedures and Their Application to the Search Problem;
- Aleskerov F. (with Chistyakov V.) The Threshold Decision Making;
- Belenky A.Three Quantitative Management Problems in Public Procurement and Decsision Procedures for Their Analysis and Solving;
- Lepskiy A.Estimation of Conflict and Decreasing of Ignorance in Dempster-Shafer Theory;
- Podinovsky V.Potential optimality of Pareto optima;
- Penikas H. (with Merikas A., Merika A.) Dry Bulk Time Charter Rates Joint Return Distribution Modeling: Copula-Approach.

20. 5th Matching in Practice Workshop, Brussels, May 20-21, 2013, http://www.matching-in-practice.eu/events/fifth-mip-workshop/:

- Kiselgof S. Matching with preferences being interval orders: stability, efficiency and (or?) strategy-proofness.

21. The 3rd International Conference on Network Analysis, May 20-22, 2013, Nizhny Novgorod, http://nnov.hse.ru/en/latna/announcements/69995403.html:

- Aleskerov F., Egorova L., Myachin A. (with Gokhberg L., Sagieva G.) Pattern Analysis in the Study of Science, Education and Innovative Activity in Russian Regions.

22. VII International Conference "Integrated models and soft computing in artificial intelligence", Kolomna, May 20-22, 2013, http://imscai.rk9.bmstu.ru/:

- Lepskiy A. Estimation of the conflict and reduce ignorance in the Dempster-Shafer theory.

23. Moscow Seminar "Expert evaluation and data analysis", Moscow, Institute of Control Sciences, May 22, 2013, http://www.ipu.ru/node/11663:

- Aleskerov F., Kataeva E. (with Pislyakov B., Yakuba V.)Assessing the contribution of scientists using a threshold aggregation;
- SorokinC. The model of political competition with correlated probabilistic voting.

24. I International workshop «Quantitative analysis in political science», Moscow, HSE, May 22-24,2013, http://www.hse.ru/quantitative/:

- Aleskerov F. Voting power indices and the distribution of power in Weimar Republic parliament.

25. XLI InternationalConferenceIT + S&E`13 «Information technologies in science, education, telecommunications and business "(May session), Ukraine, Crimea, Yalta-Gursuf, May 25 - June 4,2013, http://www.gloriozov.com/:

- Podinovsky V. (with Potapov M.), Plenary Report "The method of weighted sum of criteria in multicriteria decision-making problems".

26. Conference"Challenges of implementing Basel II and III in Russian banks," May 28, 2013, Financial University under the Government of the Russian Federation, Moscow,https://www.hse.ru/data/2013/05/29/1285020075/2013-05-28_Program.pdf:

- Penikas H. The discussion of recommendations for the development of plans for self-improvement in the European banking regulator.

27. International Conference on Computational Linguistics "Dialogue" Bekasovo, May 29 - June 2,2013, http://www.dialog-21.ru/:

- Chernyak E. Computationally refining of a russian-language taxonomy using Wikipedia.

28. 2nd International Banking Conference and Exhibition, June 6, 2013, CIS Bankers, Kiev, Ukraine:

- Penikas H. Pan-CIS regulator creation| Benefits from Basel II and III perspectives.

29. 3rdInternational Conference of the Financial Engineering and Banking Society (FEBS), June 8, 2013; Laboratory of Excellence for Financial Regulation (LabExReFi), ESCP Europe Paris campus; Paris, France,http://www.febsociety.org/past-events/febs-2013/overview.aspx

- Penikas H. (with Gomayun N., Titova Y.) Research of derivatives as the public European banks value determinant.

30. Network Models in Economics and Finance Conference 2013, June13-15, 2013, Athens, Greece, http://nnov.hse.ru/en/latna/conferences/nmef2013

- Egorova L., Penikas H. (with Bondarenko A.) The agent-based simulation of the stock exchange behavior.

31. 7th Annual International Conference on Mathematics Education & Statistics Education, June 17-20, 2013, Athens,

Greece,http://www.inomics.com/economics/conferences/2012/8/2/7th-annual-international-conference-mathematics-education-statistics-:

- Belenky A. Tools for Developing Optimal Individual Curricula for College Students.

32. 7[th]International Conference "Game Theory and Management"GTM2013, June 26-28, 2013, St. Petersburg, Russia http://www.gsom.spbu.ru/gtm2013/

- Savina T.The strategies that dominate any evolutionary opponent in infinitely repeated games.

33. 20[th]Annual Conference of the Multinational Finance Society, June 30 – July 3, 2013, MFS; Izmir, Turkey,

http://www.mfsociety.org/modules/modConferences/uploadFiles/miscFiles/1371869863-MFC2013-Sessions-Website-w-Abstracts_2013-06-22.pdf

- Penikas H. (with Gomayun N., Titova Y.) Research of Hedging and Trading Derivatives Impact on Public European Banks' Value and Share Performance: Panel Data Approach.

34. 26[th]European Conference on Operational Research, July 1-4, Roma, Italy,http://euro2013.org/

- Veselova Y. Noncompensatory scoring rules and threshold aggregation;
- Bondarenko A., Egorova L., Penikas H. The agent-based simulation of the stock exchange behavior;
- Belenky A. An approach to designing a mechanism for forming public-private partnerships;
- Myachin A. Pattern analysis in the study of science, education and innovative activity in Russian regions;
- Kiselgof S. Efficiency vs strategy-proofness in matching markets with interval order preferences;
- Sorokin C. Strategic delay and optimal contracts for teams;
- Aleskerov F., Zakhlebin I., Subochev A. Alternative versions of the Global Competitiveness Ranking: a Social Choice approach.

35. The 24[th]Stony Brook Game Theory Festival of the Game Theory Society, International Conference on Game Theory, July 8-12, Stony Brook, NY, USA http://www.gtcenter.org/

- Kiselgof S. Matching with interval order preferences: stabiliy and Pareto-efficiency.

36. International Conference «Mathematical Modeling and Computational Physics», Dubna, Russia, July 8 – 12, 2013,http://mmcp2013.jinr.ru

- Rubchinsky A. Volatility in Classification.

37. 9[th]Spain-Italy-Netherlands Meeting on Game Theory (SING9), Vigo, July 8-10, 2013,http://sing9.uvigo.es/

- Belenky A. Finding equilibria in a class of two- and three-person games on polyhedral sets in analyzing large-scale economic systems.

38. Conference of the International Federation of Classification Societies (IFCS 2013), July 14-17, Tilburg, The Netherlands, http://ifcs.boku.ac.at/tiki-index.php

- Shestakoff A. Least squares consensus clustering: criteria, methods, experiments.

39. ICCOPT, Lisbon, July 27-August 1, 2013, http://eventos.fct.unl.pt/iccopt2013

- Belenky A. Application of Continuous Optimization Techniques for Calculating Equilibriums in Large-Scale Three-Person Public Procurement Games.

40. 8th Conference of the European Society for Fuzzy Logic and Technology (EUSFLAT-13), September 11-13, 2013, Milano, Italy, http://www.ir.disco.unimib.it/eusflat2013/

- Lepskiy A. About Relation between the Measure of Conflict and Decreasing of Ignorance in Theory of Evidence.

41. XLIIInternationalConferenceIT + S&E`13 "Information technology in science, sociology and business" (Autumn Session), Ukraine, Crimea, Yalta-Gursuf, October 2-10,2013, http://www.gloriozov.com/

- Podinovsky V. (with Nelubin A.) The potential non-dominated in choise problems.

42. 7[th]Moscow International Conference on Operations Research, October15-19, 2013, Moscow, Russia, http://io.cs.msu.su/new_conferences.html:

- Petruschenko V. Data Envelopment Analysis by sequential exclusion of alternatives;
- Podinovsky V. Plenary report "Theory of the importance of criteria: current status";
- Podinovsky V. (with Nelubin A., Podinovskaya O.) Matrixordinaldecisionrulesinthecriteriaimportancetheory.

43. 1st Reading the memory of Prof. B. Ovsievich "Economic-mathematical research on mathematical models and information technology", October21-23, 2013, Saint-Petersburg Institute for Economics and Mathematics,

http://emi.nw.ru/INDEX.html?0/konfsem/Konf2013.htm

- Penikas H. (with Sirotkin I.) Simulation of optimal hedge ratio, taking into account the risks of day and intraday trading positions.

44. Research and practical conference "Econometric methods in the study of global economic processes", October 29, 2013, MSIIR (University) of the MFA of Russia, Moscow http://www.mgimo.ru/news/announce/document242183.phtml

- Penikas H. The appearance of the dead-weight loss when used individual intrabank (IRB) evaluation models of credit risk for Basel II.

45. Center for Rationality of Hebrew University of Jerusalem, Mathematics and Economics Seminar.

– Sorokin C. The role of information in an escalation games.

46. Game Theory seminar at the Technion University, Haifa, Israel.

– Sorokin C. Policy convergence in a two-candidate probabilistic voting model.

47. 5th International Conference on Pattern Recognition and Machine Intelligence, December 10-14, 2013, Kolkata, India,

http://www.isical.ac.in/~premi13/index.html

– Lepskiy A. (with Bronevich A., Umansky V., Yakushev D.) Recognition of Cross Profiles of Roadbed Based on Polygonal Representations.