

## **THE RESEARCH REPORT**

of International Laboratory of Decision Choice and Analysis  
on the project “Theoretical and numerical study  
of advanced mathematical models  
in the social, economic, political and financial fields”  
carried out within the framework  
of the Basic Research Program of the Higher School of Economics in 2014

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### **1 A BRIEF OVERVIEW**

The aim of the project is a theoretical and numerical investigation of advanced mathematical models in the social, economic, political and financial fields using the social choice theory, game theory, multi criteria decision making and data mining.

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

- study of heterogeneity of the Russian system of higher education;
- study of methods of analysis of patterns;
- numerical analyses of the behavioral model of a stock exchange by means of simulation modeling;
- study of ethnopolitical tension models;
- study of the properties of two-stage choice procedures;
- study of power indices in groups;
- construction and application of theoretical models for the calculation of the degree of the manipulability of known aggregation rules;
- efficiency analysis of banking and financial sectors of the economy;
- development of the theory of criteria importance in multi-criteria problems;
- theoretical and experimental studies on cluster analysis and automatic text interpretation;
- study of ranking procedures;
- development and study of applied game-theoretic models;
- study of the combining rules in the framework of evidence theory.

Several fundamental and applied results have been obtained in every direction of the project.

Members of the Laboratory published or submit 61 texts during the implementation of the project including:

- 2 monographs (textbooks) [Mirkin rus, Rubchinsky rus];
- 5 articles in peer-reviewed foreign journals;
- 5 articles have been submitted to peer-reviewed foreign journals
- 17 articles in edited volumes which indexed in WoS or Scopus;
- 11 articles in peer-reviewed Russian journals;

- 8 preprints of HSE or foreign university;
- 1 certificate of the World Intellectual Property Organization, Patent Scope.

## **2 MAJOR RESEARCH RESULTS**

The obtained results can be attributed to the following directions.

### **2.1 Research on the analysis of scientometric data**

In this area:

- a) Within the study of heterogeneity of the Russian system of higher education:
  - the model has been constructed of heterogeneity of the system of higher education. This model has been applied for 4-aggregated groups of programs: in medicine, technology, economics and management and agriculture;
  - the problem of the individual prestige of professions among applicants has been studied, as well as the attractiveness of these professions;
  
- b) Within the study of methods of analysis of patterns:
  - New computationally efficient methods has been developed of analysis of patterns such as linear pattern classification, ordinal-invariant and diffusion-invariant pattern clustering;
  - a comparison of new methods of the analysis of patterns with classical methods has been made.

The results of these studies are presented in [Aleskerov et al. b, Myachin].

### **2.2 Study of organizational models and mechanisms**

In this direction:

- a) a new game model of pork-barrel politics was developed in which a government official tries to improve her re-election chances by spending on targeted interest groups;
- b) mathematical models for finding optimal volumes of electricity production by base load electricity plants of regional electrical grids and optimal volumes of electricity to be stored were developed in the form of games of several players on polyhedral sets of player strategies for all groups of customers, electricity generators, and a transmission company, and verifiable sufficient conditions for Nash equilibrium points in the these games were established;
- c) a new mathematical model for finding an optimal strategy of moving empty railcars of a company possessing these cars was developed under uncertainty of the demand for the railcars from the potential cargo owners;
- d) an advanced model for finding an optimal schedule of moving cargo trains along single-track parts of a railroad was developed, along with a mathematical model for optimizing the functioning of a yard of a railroad, and both problems were mathematically formulated as Boolean programming problems;
- e) a new game model was developed for finding competitive tariffs for using railcars of a number (more than three) railcar owners in moving cargoes by cargo owners,

and verifiable sufficient conditions for Nash equilibrium points in this game were found.

The results of these studies are reflected in the papers [Maskin & Tirole, Belenky a, Belenky b, Belenky c, Belenky d, Belenky e, Belenky f].

### **2.3 Numerical analyses of the behavioral model of a stock exchange by means of simulation**

In this part:

- a) the set of experiments with the agent-based model of the stock exchange where agents are small and medium sized price-takers has been conducted;
- b) the agent-based model of the stock exchange with agents being price makers and internal price mechanism has been designed;
- c) the software for these agent-based models has been developed.

The results of this study were published in [Egorova a, Egorova b, Egorova c].

### **2.4 Study of ethnopolitical tension models, changing of electoral preferences and power indices in groups**

In this part:

- a) the comparative analysis of polarization indices in special cases was conducted;
- b) the database of Russian socio-economic and electoral data at regional and county level was collected;
- c) the analysis of correlations between socio-economic factors and electoral data has been carried at regional and county level;
- d) efficient algorithms for evaluation of power indices taking into account agents' preferences in collective decision-making bodies with rules satisfying anonymity were developed;
- e) a generalization for the mean theorem for the case of power indices taking into account agents' preferences and the case of rules that satisfy uniqueness condition was obtained;
- f) probabilistic voting systems that ensure the proportionality of agents' power to the number of agents' votes were proposed.

The results of this study were published in [Kamalova & Kostomarov (rus), Lipacheva (rus), Ushakov & Shvarts].

### **2.5 Construction and application of theoretical models for the calculation of the degree of a manipulability of rules for preference aggregation**

In this part:

- a) the software for estimating the degree of coalitional manipulability has been developed which allows to estimate the degree of coalitional manipulability of social choice rules in the cases of 4 and 5 alternatives;
- b) estimation of the degree of coalitional manipulability of social choice rules for the cases of 4 and 5 alternatives was conducted for small number of agents (between 3 and 25);

- c) the indices of coalitional manipulability for majority relation-based social choice rules for the cases of 3 alternatives were calculated and analyzed;
- d) a problem of evaluating coalitional manipulability of voting rules with infinite number of voters was analytically solved for positional voting rules and Coombs procedure;
- e) the literature on computational complexity of manipulation is reviewed.
- f) the following types of manipulation problems are considered: individual, coalitional, weighted coalitional, weighted coalitional manipulation with restricted number of candidates, and manipulation under uncertainty.

The results were included in [Veselova].

## **2.6 Efficiency analysis of banking and financial sectors of the economy**

In this part:

- a) a model of assessing the level of financial stability of the country (as an example of the country Israel was considered because of the availability of the largest time-series data) has been constructed;
- b) a comparison of the model with a set of indicators proposed by the IMF was conducted;
- c) a novel method has been proposed to evaluate how an individual financial institution can disturb the whole financial system. The method takes into account not only the interconnectedness of agents (as previous works did) but also their interaction intensities. The method was illustrated on the European Union level to find key countries-borrowers.

The results of this study were published in [Aleskerov et al. e, Penikas & Petrova, Selmier et al., Arzamasov & Penikas].

## **2.7 Development of the theory of criteria importance in multi-criteria problems**

The decision rule for groups of criteria of equal importance was investigated and generalized.

The results of this study were published in [Podinovski & Podinovskaia rus, Podinovski].

## **2.8 Theoretical and experimental studies on cluster analysis and automatic text interpretation**

In this direction:

- a) series of experiments were conducted to compare string to text similarity measure, used to automate categorization of research papers; it was shown that the annotated suffix tree similarity measure is more efficient than others;
- b) the development of the lifting method based on the maximum likelihood principle was continued;
- c) the development of the method for estimating a scientists' contribution according to the domain taxonomy was continued (some results for data analysis field were achieved);

- d) the construction of newspaper web-corpus was continued, the possibility to use some tools for syntactical analysis and part of speech disambiguation;
- e) series of experiments for measuring similarity between sentences in case of summarization task were conducted.

The results of this study were published in [Миркин, Mirkin, Mirkin & Shestakoff, Chernyak & Mirkin, Chernyak & Mirkin rus, Orlov & Mirkin, Chernyak et al., Amorim & Mirkin, Ilvovsky & Chernyak rus].

## 2.9 Study of ranking procedures

In this direction:

- a) A formal analysis of representativeness of aggregate rankings of journals in Economics, Management Science and Political Science has been conducted. The analysis was based on comparisons of Kendall's distances in the space of rankings. Results of comparisons have been aggregated on the principle of majority rule.
- b) It has been demonstrated that aggregate rankings reduce the number of contradictions and represent the set of single-indicator-based rankings better than any of the seven rankings themselves.
- c) For all three sets of journals it has been found that the best (from the point of representativeness) aggregate rankings are those based on the Copeland rule.
- d) The alternative methods of aggregation of basic variables of the Competitive Industrial Performance (CIP) index have been considered. Instead of using a cardinal aggregation function, ordinal ranking methods borrowed from social choice have been applied: either direct ranking methods based on the majority relation (e.g. the Copeland rule, the Markovian method) or a multistage procedure of selection and exclusion of the best alternatives, as determined by a majority relation-based social choice solution concept (tournament solution), such as the uncovered set and the minimal externally stable set. The same method of binary comparisons based on the majority rule has been used to analyse rank correlations. It has been demonstrated that the ranking is robust but some of the new aggregate rankings represent the set of criteria better than the original ranking based on the CIP.
- e) Different approaches (stochastic, fuzzy-set-theoretic, optimizational and some others) to the problem of defining an order on a set of histograms have been analysed.
- f) A new method of making binary comparisons of histograms has been developed. It is based on computing a minimal transformation of a given histogram into another given one.
- g) A ranking of the universities has been computed based on histograms of accepted applicants' national test scores.
- h) The sign invariance of results of binary comparisons of distorted histograms has been analysed by stochastic methods.

Some of these results have been reported in [Aleskerov et al. a, Bobrov & Lepskiy, Lepskiy a, Lepskiy b, Subochev & Zakhlebin].

## 2.10 Development and study of applied game-theoretic models

In this direction:

- a) a game-theoretic model of the co-authorship sharing problem is developed; the equal weights measure of coauthorship sharing is justified by showing equivalence with the Shapley value approach for sharing co-authors performance in specific games;
- b) constrained-stability concept was proposed; stable mechanism for many-to-many matching with exact quotas was developed;
- c) software was developed and computational experiments were conducted for comparison of different non-manipulable stable-mechanisms in case of preferences being semiorders.
- d) for a personnel selection problem a new mathematical model was proposed that includes the comparison of employers and candidates, different aggregation procedures and matching. In addition, there has been developed a software that implements the main idea of the model.

The results of these studies were published in [Karpov, Shvydun & Kalugina, Kiselgof, Biro & Kiselgof].

### **2.11 Study of the properties of selection procedures based on the superposition of choice functions**

In this direction:

- a) it was defined which of seven known choice procedures satisfy given normative conditions – rationality condition, monotonicity condition, strict monotonicity condition, and non-compensatory condition;
- c) a complexity of two-stage choice procedures as well as its runtime on real data were evaluated;
- d) a software that implement given choice procedures was developed.

These results are presented in the [Aleskerov et al. d].

### **2.12 Study of the combining rules in the framework of evidence theory**

In this direction:

- some general schemes were studied of aggregation of two belief functions into a single belief function;
- some sufficient conditions have been found of change of ignorance when evidences are combined with the help of various rules;
- it was shown that combining rules can be regarded as pessimistic or optimistic depending on the sign of the change of ignorance after applying of combining rule.

The results of this study were published in [Lepskiy c, Lepskiy c rus].

## **3 MAJOR ORGANIZATIONAL RESULTS**

### **3.1 Organization 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 2014, 30 sessions of the DeCAN Laboratory seminar and research seminar were held. The following reports were presented in particular:

November 24, – B. Tsvelikhovsky (Research Intern, DeCAN Laboratory, HSE) "Models of manipulability";

October 1, – A. Myachin (Research Intern, DeCAN Laboratory, HSE) "Latent Class Analysis";

August 27, – Y. Veselova (Research Intern, DeCAN Laboratory, HSE) "On the informational basis of social choice with the evaluation of opportunity sets";

July 3, – R. Kamalova, S. Shvydun (Research Intern, DeCAN Laboratory, HSE) "Analysis of electoral behavior";

July 2, – Y. Veselova (Research Intern, DeCAN Laboratory, HSE) "A behavioral perspective on social choice";

May 14, – Valery A. Topinsky (HSE, Yandex) "Optimal Reserve Prices in Asymmetric Auctions";

April 28, – D.C. Mueller (University of Vienna, Austria) "Rights, Religion, Riviera, and Roma";

April 19, – A. Bronevich (HSE) "Analysis of expert information from the viewpoint of the evidence theory";

April 8, – N. Lyalyaeva (bachelor, HSE) "Analysis of expert information on the prognostic value of the shares of Russian companies in 2013";

January 15, – Y. Veselova (Research Intern, DeCAN Laboratory, HSE) "The Computational Difficulty of Manipulating an Election".

Over a period from January to December 2014, 9 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:

November 19, – A. Akhremenko (HSE) "Efficiency, the choice of policy and growth under democratic and autocratic regimes: a formal dynamic model";

October 16, – I. Gilboa (HEC Paris/Tel Aviv University) "No-Betting Pareto Dominance";

September 17, – Emre Doğan (Research Fellow DeCAN Laboratory, HSE) "Absence-proofness: A new cooperative stability concept";

May 21, – U. Endriss (ILLIC, University of Amsterdam) "Voting as Selection of the Most Representative Voter";

May 14, – Efe Ok (New York University) "Decision-Making under Subjective Risk: Toward a General Theory of Pessimism";

April 23, – D.C. Mueller (University of Vienna, Austria) "Democracy and Citizenship";

April 16, – Y. Masatlioglu (University of Michigan, Ann Arbor, USA) "Limited Willpower";

March 19, – D. Golembiovskiy (ZENIT Banking Group) "Dynamic portfolio management options in the risk-neutral world";

February 19, – V. Podinovski (Leading Research Fellow, DeCAN Laboratory) "Potential optimality and potential non-dominated in problems of choice in partial preference relations".

### 3.2 Participation in organization of conferences

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

1. XV HSE International Academic Conference on Economic and Social Development, 1-4 April 2014, NRU-HSE, Moscow, Russia, <http://conf.hse.ru/2014/>:
  - Aleskerov F. – Deputy Chairman of the Program Committee, Head of a section, Chairman of a session;
  - Lepskiy A. – Chairman of a session.
  
2. The First International Conference on Analysis of Images, Social Networks and Texts (AIST) 10-12 April 2014, Yekaterinburg, <http://aistconf.org/>
  - Mirkin B. – Member of the Program Committee;
  - Lepskiy A. – Member of the Program Committee;
  
3. XLII International conference “Information technologies in science, education, telecommunications and business” (Crimea, Yalta-Gurzuf, May 22 – June 1, 2014), <http://www.gloriozov.com/>
  - Podinovski V. – Member of the Program Committee, Head of a section.
  
4. The Second International Conference on Information Technology and Quantitative Management (ITQM), 3-5 June, Moscow, <http://itqm2014.hse.ru/>
  - Aleskerov F. – Program/Conference co-Chair, Member of the Program Committee, co-Head of a special session;
  - Belenky A. – Member of the Program Committee, co-Head of a special session;
  - Lepskiy A. – Conference Vice Chair, Member of the Program Committee, co-Head of a special session;
  - Mirkin B. – Member of the Program Committee, co-Head of a special sessions;
  - Penikas H. – Member of the Program Committee, co-Head of a special session;
  - Shvydun S. – supervisor of conference site.
  
5. XII All-Russian Conference on Control Problems, Russia, Moscow, ICS RAS, 16 – 19 June 2014 <http://vspu2014.ipu.ru>
  - Aleskerov F. – Member of the Program Committee, Head of direction "System analysis and decision making in control", Head of the plenary session;
  - Belenky A. – Head of a section.
  
6. The 12<sup>th</sup> Meeting of the Society for Social Choice and Welfare, 18-21 June 2014, Boston, USA, <http://www.bc.edu/centers/ioa/scw14.html>
  - Veselova Y. – Head of a session;
  - Ivanov A. – Head of a session;
  - Kiselgof S. – Head of a session.



### **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 promotion and growth of the Laboratory members**

1. Junior Research Fellow of the Laboratory S. Kiselgof prepared and defended the PhD thesis “Generalized matchings under preferences are not linear orders” (Supervisor – 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 the Laboratory Eric S. Maskin gave a series of lectures on the course “Mechanism design”, May 15-19, 2014.

4. The members of the Laboratory participated in the work of Summer School of DeCAN Laboratory, June 5-6, 2014. The following lectures were delivered during the Summer School:

- A.V. Lotov – “Big Data: Learning and Choice Supported by Approximate Data Enveloping and Visualization”;
- S. Butenko – “Clique Relaxations in Networks: Theory, Algorithms, and Applications”.

### **3.5 Delivery of lectures to disseminate research results**

1. Head of the Laboratory F.T. Aleskerov gave a series of lectures on “Risk management models” for the master student of Molde University College – Specialized University in Logistics, Molde, Norway.

2. Senior Researcher of the Laboratory C. Sorokin gave a lecture on the topic “The quality of available information and the escalation of conflict” on the International School-Seminar "Baikal's reading", Irkutsk, Russia.

### **3.6 Participation in preparation of publication of conference proceedings**

1. The book “Clusters, Orders, and Trees: Methods and Applications (In Honor of Boris Mirkin's 70th Birthday)”, Springer Science+Business Media New York, eds. Fuad Aleskerov, Boris Goldengorin, Panos M. Pardalos, 2014, 404 pp.

<http://link.springer.com/book/10.1007%2F978-1-4939-0742-7>

– Aleskerov F. – editor of the book.

2. Proceedings of the 2<sup>nd</sup> International Conference on Information Technology and Quantitative Management, ITQM 2014, Procedia Computer Science, Elsevier, Volume 31, eds. Yong Shi, Alexander Lepskiy and Fuad Aleskerov, 2014, pp.1-1176.

<http://www.sciencedirect.com/science/journal/18770509/31>

- Aleskerov F. – editor of the conference proceedings;
- Lepskiy A. – editor of the conference proceedings.

#### 4 OTHER INFORMATION

Two Research Fellows (post-doc students) joined the project in last ??? months:

- Bora Erdamar, <http://www.hse.ru/en/org/persons/133062411>;
- Emre Doğan, <http://www.hse.ru/en/org/persons/133641226>.

On the whole, problems proposed in the project have been solved. At the same time, some problems should be formulated more precisely. A number of new problems are 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

- [Aleskerov et al. a] Aleskerov F.T., Holler M., Kamalova R. Power distribution in the Weimar Reichstag in 1919-1933// *Annals of Operations Research*, 2014. 215(1), 25-37.
- [Aleskerov et al. b] Aleskerov F.T., Pislyakov V., Subochev A. Ranking Journals in Economics, Management and Political Science by Social Choice Theory Methods// Working papers by NRU Higher School of Economics. Series WP BRP "Science, Technology and Innovation". 2014. No. WP BRP 27/STI/2014.
- [Aleskerov et al. c] Aleskerov F.T., Froumin I., Kardanova E., Ivanova A., Myachin A.L., Serova A.V., Yakuba V.I. Heterogeneity of the educational system: an introduction to the problem// Working papers WP7/2014/03, 2014. – 64 p.
- [Aleskerov et al. d] Aleskerov F.T., Mitichkin E.O., Chistyakov V.V., Shvydun S.V., Iakuba V.I. Method for selecting valid variants in search and recommendation systems (variants)// World Intellectual Property Organization, Patent Scope, Publication Number WO/2014/148948, International Application Number PCT/RU2013/001180, Publication Date 25.09.2014, International Filing Date 27.12.2013.
- [Aleskerov et al. e] Aleskerov F., Andrievskaya I., Permjakova E. Key borrowers detected by the intensities of their short-range interactions// National Research University Higher School of Economics Basic Research Program Working Paper, Series Financial Economics, WR BRP, 33/FE/2014, 18 p.
- [Aleskerov et al. a rus] Aleskerov F. T., Holler M., Kamalova R. Power distribution in the Weimar Reichstag in 1919-1933// XIV April International Academic Conference on Economic and Social Development. Moscow, 2014, 449-457. (in Russian)
- [Arzamasov & Penikas] Arzamasov V., Penikas H. A financial stability index for Israel// *Procedia Computer Science*. Elsevier, 2014, 31, 985-994.
- [de Amorim & Mirkin] Cordeiro de Amorim R., Mirkin B. Selecting the Minkowski Exponent for Intelligent K-Means with Feature Weighting// *Clusters, Orders, and Trees: Methods and Applications*, Springer Optimization and its Applications, Springer, 2014, 92, 103-117.
- [Belenky a] Belenky A. Two Classes of Games on Polyhedral Sets in Systems Economic Studies// *Network Models in Economics and Finance*, Elsevier, 2014.
- [Belenky b] Belenky A. Games on polyhedral sets of connected player strategies for analyzing the competitiveness of railroad company in a cargo transportation marketplace// *IEEE Proceedings*, 2014.
- [Belenky c] Belenky A. Finding Optimal Production and Selling Strategies for an Electricity Generator in a Part of a Country's Electrical Grid// *Procedia Computer Science*. Elsevier, 2014, 31, 1150-1159.
- [Belenky d] Belenky A. Game-theoretic models for analyzing two public-private partnership problems// *International Journal of Industrial Economics* (submitted).
- [Belenky e] Belenky A. Finding optimal volumes of storing electricity by the customers in a regional electrical grid// *Applied Energy* (submitted).
- [Belenky f] Belenky A. A game-theoretic approach to estimating the scale of storing electricity in a regional electrical grid// *Applied Energy* (submitted).
- [Biro & Kiselgof] Biro P., Kiselgof S.G. College admissions with stable score - limits // *Central European Journal of Operations Research* (submitted).

- [Bobrov & Lepskiy rus] Bobrov R.A., Lepskiy A.E. Ranking universities according to the results of USE by means of fuzzy numbers comparison methods// Working paper WP7/2014/01, 2014. – 24 p. (in Russian)
- [Bronevich & Lepskiy] Bronevich A., Lepskiy A. Imprecision Indices: axiomatic, properties and applications// Int. J. of General Systems (after review).
- [Chernyak & Mirkin a] Chernyak E., Mirkin B. An AST Method for Scoring String-to-Text Similarity in Semantic Text Analysis// Clusters, Orders, and Trees: Methods and Applications, Springer Optimization and its Applications, Springer, 2014, 92, 331-340.
- [Chernyak & Mirkin b] Chernyak E., Mirkin B. A method for refining a taxonomy by using annotated suffix trees and Wikipedia resources// Procedia Computer Science. Elsevier, 2014, 31, 193-200.
- [Chernyak et al.] Chernyak E., Morenko E., Mirkin B. Conceptual maps: construction over a text collection and analysis// Analysis of Images, Social Networks and Texts Communications in Computer and Information Science, 436, 2014, 163-168.
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- [Clusters] Clusters, Orders, and Trees: Methods and Applications (In Honor of Boris Mirkin's 70th Birthday)// Springer Science+Business Media New York, eds. Fuad Aleskerov, Boris Goldengorin, Panos M. Pardalos, 2014, 404 pp.
- [Egorova a] Egorova L.G. *The Effectiveness of Different Trading Strategies For Price-Takers*// Working papers by NRU Higher School of Economics. Series FE "Financial Economics". 2014. No. WP BRP 29/FE/2014.
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- [Ilvovsky & Chernyak rus] Ilvovsky D. and Chernyak E. Systems of automatic text processing// Open Systems. DBMS, 1, 2014, 51-53. (in Russian)
- [Kamalova & Kostomarov rus] Kamalova R., Kostomarov V. Ethnic Heterogeneity: Main Notion and Measurement Problems// Report on XII All-Russia meeting on problems of control, 2014, 6208-6213. (in Russian)
- [Kamalova rus] Kamalova R. The Main Approaches to Measurement of Ethnic Heterogeneity// XV April International Academic Conference on Economic and Social Development. Moscow, 2015. (in Russian)
- [Karpov a] Karpov A.V. Apparentment incentives under the d'Hondt method// KIER Discussion paper. Kyoto institute of economic research, Kyoto University, 896, 2014.
- [Karpov b] Karpov A.V. Patient Mobility, Health Care Quality, Welfare and Regulation// Working papers by NRU Higher School of Economics. Series WP BRP "Economics/EC", 64, 2014.
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- [Kiselgof a] Kiselgof S. Matchings with Interval Order Preferences: Efficiency vs Strategy-proofness// Procedia Computer Science. Elsevier, 2014, 31, 807-813.
- [Kiselgof b] Kiselgof S. Generalized matchings for preferences represented by simplest semiorde: Stability and pareto optimality// Automation and Remote Control (trans. from russian), 2014, 75(6), 1069-1077.

- [Kiselgof rus] Kiselgof S.G. Matchings with preferences being simplest semorders: stability and Pareto-efficiency// *Avtomatika i telemekhanika*. 2014, 6, 103-114. (in Russian)
- [Lepskiy a] Lepskiy A. On the Stability of Comparing Histograms with Help of Probabilistic Methods// *Procedia Computer Science*. Elsevier, 2014, 31, 597-605.
- [Lepskiy b] Lepskiy A. On Comparison of Distorted Histograms// *Strengthening Links Between Data Analysis and Soft Computing Advances in Intelligent Systems and Computing*, 2015, 315, 159-166.
- [Lepskiy c] Lepskiy A. General Schemes of Combining Rules and the Quality Characteristics of Combining// F. Cuzzolin (Ed.): *BELIEF 2014*, LNAI 8764, Springer-Verlag, 2014, 29-38.
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- [Lepskiy b rus] Lepskiy A. The distribution of students enrolled in college on points USE, and ranking of universities// *Report on XII All-Russia meeting on problems of control*, 2014, 7919-7928. (in Russian)
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- [Lipacheva rus] Lipacheva A. Comparison of Polarization Indices in Special Cases// *Report on XII All-Russia meeting on problems of control*, IPC RAS, 2014, 6220-6226. (in Russian)
- [Maskin & Tirole] Maskin E, Tirole J. *Pandering and Pork-Barrel Politics*// Working Paper, Harvard University, 2014.
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- [Podinovskaia & Podinovski rus] Podinovskaia O. and Podinovski V. Information about the importance of criteria in multicriteria decision problems. I. The qualitative information. Equally important groups of criteria of equal importance// *Information technology modeling and management*, 2014, 1(85), 58-67. (in Russian)
- [Proceedings] *Proceedings of the 2nd International Conference on Information Technology and Quantitative Management*, ITQM 2014, *Procedia Computer Science*,

- Elsevier, Volume 31, eds. Yong Shi, Alexander Lepskiy and Fuad Aleskerov, 2014, 1-1176.
- [Rubchinskiy rus] Rubchinskiy A. Methods and models for management decision making. Tutorial and practical work for Academic Bachelor. URAIT, 2014. (in Russian)
- [Selmier II et al.] Selmier II, W.T., Penikas H., Vasilyeva K. Financial Risk as a Good// *Procedia Computer Science*. Elsevier, 2014, 31, 115-123.
- [Shvarts] Shvarts D. Axiomatics for Power Indices in the Weighted Games// *Automation and Remote Control*, 2014, 75, 345-357.
- [Shvarts & Zakharov rus] Shvarts D. and Zakharov A. Axiomatics for non-cooperative coalitional games// *Automation and Remote Control*, 2014. (accepted, in Russian)
- [Shvarts rus] Shvarts D. Axiomatics for Power Indices in Case of Voting with Quota// XIV April International Academic Conference on Economic and Social Development. Moscow, 2014, 449-457 (in Russian)
- [Shvydun & Kalugina] Shvydun S., Kalugina E. An Effective Personnel Selection Model// *Procedia Computer Science*. Elsevier, 2014, 31, 1102-1106.
- [Shvydun rus] Shvydun S.V. Two-stage choice procedures and its normative properties// Report on XII All-Russia meeting on problems of control, 2014, 7977-7985. (in Russian)
- [Subochev & Zakhlebin] Subochev A., Zakhlebin I. Alternative versions of the global competitive industrial performance ranking constructed by methods from social choice theory// Working paper WP7/2014/06, 2014.
- [Veselova rus] Veselova Y. The complexity of the sequence of rules of social choice// XIV April International Academic Conference on Economic and Social Development. Moscow, 2014, 431-438 (in Russian)
- [Ushakov & Shvarts] Ushakov M., Shvarts D. On calculation of the power indices with allowance for the agent preferences in the anonymous games// (submitted).
- [Zakharov & Sorokin] Zakharov A.V. and Sorokin C.S. Policy convergence in a two-candidate probabilistic voting model// *Social Choice and Welfare*, 2014, 43(2), 429-446.

## ANNEX 2

List of presentations made at workshops and conferences

1. 12th EBES Conference, Singapur, January 9-11, 2014,

<http://www.ebesweb.org/Conferences/Recent/12th-EBES-Conference-Singapore.aspx>

– Egorova L. “Agent-based Models of Stock Exchange: Analysis via Computational Simulation”.

2. Russian Subordinated Debt Conference, January 21, 2014; Societe Generale Corporate and Investment Banking; London, UK,

– Penikas H. “Build up of the Basel 3 framework in Russia”.

3. All-Moscow scientific seminar “Experts estimations and data analysis”, IPC RAS, February 26, 2014, Moscow, <http://www.ipu.ru/node/11663>

– Kamalova R. “Indices of ethnic heterogeneity: theory and applications”.

4. International School-Seminar "Baikal's reading", Irkutsk, ISU, March 21-28, 2014, <http://www.pribaikal.ru/igu-item/article/17362.html>.

– Sorokin C. “The quality of available information and the escalation of conflict”.

5. Seminar on "Mathematical Economics" in CEMI RAS, Moscow, March 25, 2014, <http://mathecon.cemi.rssi.ru/seminar.htm>

– Kamalova R., Lipacheva A. “Ethnic Diversity and Conflict: Theory and Empirical Research”.

6. XV HSE International Conference on Development Economics and Society, April 1-4, 2014, Moscow, <http://conf.hse.ru/2014/>:

– Veselova Y. “Modeling group preferences: IC, IAC, and IANC”;

– Penikas H. (with Arzamasov V.) “Construction of the integral index of financial stability in the absence of "learning": the case of Israel”;

– Penikas H. “Hierarchical copula in modeling market risk of the portfolio of shares”;

– Kamalova R. “The Main Approaches to Measurement of Ethnic Heterogeneity”;

– Lepskiy A. (with Bobrov R., Trifonova A.) “Comparing universities histogram points USE and study heterogeneity of universities”.

7. Multinational Finance Society Symposium, April 4-5, 2014; Multinational Finance Society; Larnaca, Cyprus,

<http://www.mfsociety.org/page.php?pageID=217>

- Penikas H. (with Titova Y.) “Modeling the Consequences of G-SIB Regulation”.
8. COST Action IC1205 on Computational Social Choice, April 9-11, 2014, Maastricht, Holland, <http://researchers-sbe.unimaas.nl/cost-maastricht2014/>
    - Veselova Y. “Comparing Probabilistic Models: IC, IAC, IANC”;
    - Tselikhovsky B. “On an Algorithm for Verification of Manipulability of Profiles for Positional Voting Rules”.
  9. International conference «The effective treasury: bank management within the bank», April 10-11, 2014, MSB Events, Moscow, [http://msbevent.com/bus\\_events.php?id=46&src=all-events.ru](http://msbevent.com/bus_events.php?id=46&src=all-events.ru)
    - Penikas H. “Evaluation of liquidity risk in the implementation of Basel III: open issues in the implementation of standards in Russia”.
  10. The First International Conference on Analysis of Images, Social networks and Texts (AIST), April 10-12, 2014, Yekaterinburg, <http://aistconf.org/>
    - Mirkin B. “Data Clustering: Some Topics of Current Interest” (plenary report);
    - Mirkin B., Chernyak E. (with Morenko E.) “Conceptual maps: construction over a text collection and analysis”.
  11. 12-th International Conference on Data Envelopment Analysis, Malaysia, Kuala-Lumpur, April 14-17, 2014, <http://deaconference.com/dea2014>
    - Aleskerov F., Petruschenko V. “DEA by sequential exclusion of alternatives”.
  - 12. 5th International Conference on Computers Communications and Control, May 7-9, 2014, Oradea, România, <http://univagora.ro/en/icccc2014/>
    - Aleskerov F. “Choice Procedures in Big Data Analysis” (plenary paper);
    - Shvydun S., Kalugina E. (with Beregovsky M., Lola I.) “A Computer System for an Effective Personnel Selection”;
    - Aleskerov F., Shvydun S., Kalugina E. “A Mathematical Model of an Effective Personnel Selection in Network Structures”;
    - Myachin A. “New high-precision efficient models of pattern analysis”.
  13. The 4th International Conference on Network Analysis, May 11-13, 2014, Nizhny Novgorod, Russia, <http://nnov.hse.ru/latna/conferences/net2014>
    - Egorova L. “The effectiveness of different trading strategies for price-takers”.
  14. XLII International Conference and XII International Conference for Young scientists “Information technologies in science, education, telecommunications and business”, Crimea, Yalta-Gursuf, May 2 – June 1, 2014, [www.glorioz.com](http://www.glorioz.com)



- Podinovski V. (with Podinovskaia O.) “Information about the importance of criteria groups in multicriteria decision problems”.
15. 4th Annual Conference C5: Risk Management in the Russian Banking Sector, May 28-29, 2014; Fitch Analytics; Moscow, <http://www.c5-online.com/RiskRussia>
- Penikas H. “Systemically Important Financial Institutions: The Expected Impact of Regulation in Russia”.
16. The Second International Conference on Information Technology and Quantitative Management, June 3-5, 2014, Moscow, <http://itqm2014.hse.ru/>
- Aleskerov F. “Choice Procedures in Big Data Analysis” (plenary paper);
  - Belenky A. “Finding Optimal Production and Selling Strategies for an Electricity Generator for a Part of a Country's Electrical Grid”;
  - Egorova L. “Effectiveness of different trading strategies for price-takers”;
  - Kiselgof S. “Matchings with Interval Order Preferences: Efficiency vs Strategy-proofness”;
  - Lepskiy A. “On the Stability of Comparing Histograms with Help of Probabilistic Methods”;
  - Mirkin B. “Data Clustering: Some Topics of Current Interest” (tutorial report);
  - Mirkin B., Chernyak E. “A method for refining a taxonomy by using annotated suffix trees and Wikipedia resources”;
  - Mirkin B. (with Orlov M.) “A concept of multicriteria stratification: a definition and solution”;
  - Myachin A. “Analysis of global data education and patent activity using new methods of pattern analysis”;
  - Shvydun S., Kalugina E. “An Effective personnel selection model”;
  - Penikas H. (with Arzamasov V.) “A financial stability index for Israel”;
  - Penikas H. (with Selmier II W.T., Vasilyeva K.), Vasilyeva K.) “Financial Risk as a Good”.
17. Conference on Optimization Control and Applications in the Information Age, June 15-20, 2014, Chalkidiki, Greece, <http://pardalos60.com/>
- Mirkin B. “Semi-average criterion for individual clusters: frameworks and methods” (invited report);
  - Myachin A. “Pattern Analysis and Its Application to Electoral Data in Russia”.
18. XII All-Russian Conference on Control Problems, June 16-19, 2014, IPC RAS, Moscow, Russia, <http://vspu2014.ipu.ru>
- Aleskerov F. “Selection model in the analysis of Big Data” (plenary paper);
  - Belenky A. “Solvability of games of three individuals on the set of related strategies and evaluation of the possibility of forming a public-private partnership to implement a set of large-scale projects”;
  - Egorova L. “Agent-oriented models of exchange”;

- Kamalova R., Kostomarov V. “Этническая гетерогенность: основные понятия и проблемы измерения”;
  - Lepskiy A. “Comparison of probability distributions: methods, properties, and applications” (plenary report of direction);
  - Lepskiy A. “The distribution of students enrolled in university at USE scores and ranking of universities”;
  - Lipacheva A. “Comparison of indices of polarization in some special cases”;
  - Podinovski V. (with Nelubin A., Podinovskaia O., Potapov M.) “The criteria importance theory: current status and trends of its further development”, (plenary report of direction);
  - Oleynik V. “The distribution of influence in the Verkhovna Rada of Ukraine (1990 - 2012)”;
  - Shvydun S. “The study normative properties of two-stage selection procedures”.
19. The 12<sup>th</sup> Meeting of the Society for Social Choice and Welfare, June 18-21, 2014, Boston, USA, <http://www.bc.edu/centers/ioa/scw14.html>
- Aleskerov F., Ivanov A., Karabekyan D., Yakuba V. “Manipulability of Voting Rules for Impartial Anonymous Culture and Multiple Choice”;
  - Aleskerov F., Ivanov A., Karabekyan D., Yakuba V. “Coalitional Manipulability of Majority Relation-Based Social Choice Rules”;
  - Veselova Y. “Comparing Probabilistic Models: IC, IAC, IANC”;
  - Kiselgof S., Sorokin C. “Matchings with exact quotas”;
  - Sorokin C. (with Zaharov A.) “Candidate utility invariance under stochastic voting”.
20. The 3<sup>rd</sup> Meeting of the EURO Working Group on Vehicle Routing and Logistics Optimization (VeRoLog), University of Oslo, Norway, June 22-25, 2014,
- Belenky A., Fedin G. (with Klimova N., Lebedeva O., Yunusova A.) “A large-scale fleet management problem”.
21. The 3<sup>rd</sup> International Symposium and 25<sup>th</sup> National Conference on Operational Research, University of Thessaly, Volos, June 26-28, 2014, <http://eccc2014.epu.ntua.gr/>
- Belenky A., Fedin G. (with Klimova N., Lebedeva O., Yunusova A.) “Optimally planning the use of railcars by a large railcar fleet management company”.
22. 89<sup>th</sup> Annual Conference of Western Economics Association International, June 27 – July 1, 2014, Denver, USA, <http://www.weai.org/AC2014>
- Aleskerov F., Ivanov A., Karabekyan D., Yakuba V. “Coalitional Manipulability of Social Choice Rules Based on Majority Relation”;
  - Aleskerov F., Ivanov A., Karabekyan D., Yakuba V. “Manipulability of Voting Rules under Impartial Anonymous Culture Condition and Multiple Choice”.

23. Annual MFS (Multinational Financial Society) Conference, June 29 – July 2, 2014, Prague, Czech Republic, <http://www.mfsociety.org/>
- Penikas H. (with Yevjanov T.) “Measuring Technical Efficiency for Banks in the Context of Russian and International Reporting Standards”;
  - Penikas H. (with Petrova A.) “An Empirical Analysis of Growth and Consolidation in Banking: A Markovian Approach for the Case of Russia”.
24. 1st European Conference on Data Analysis, July 2-4, 2014, Bremen, Germany, <http://ecda2014.eu/>
- Chernyak E. (with Yakovlev M.) “Using annotated suffix tree similarity measure for text summarization”;
25. World Finance Conference, July 2-4, 2014, Venezia, Italy, <http://www.world-finance-conference.com/node/10765>
- Egorova L. “Agent-based Models of Stock Exchange: Analysis via Computational Simulation”.
26. 20th Conference of the International Federation of Operational Research Societies, July 13-18, 2014, Barcelona, Spain, <http://www.ifors2014.org/>
- Veselova Y. “What are the rules of social choice can be simplified to the scoring rules?”;
  - Egorova L. “The effectiveness of trading strategies of small traders”;
  - Myachin A. “Method of pattern analysis: new algorithms”;
  - Shvydun S. “Two-Stage Superposition Choice Procedures and their Properties”.
27. International Conference on “Comparative Analysis of Business and Management”, 19 July, 2014, Kyoto, Japan, [http://www.ces.kier.kyoto-u.ac.jp/programme\\_en.pdf](http://www.ces.kier.kyoto-u.ac.jp/programme_en.pdf)
- Karpov A. “Comment on 2nd Session: Diversity, Innovation and Networks”.
28. International Workshop on Game Theory and Economic Applications of the Game Theory Society, São Paulo, Brazil, July 25-31, 2014, <http://www.iwgts.fea.usp.br/>
- Sorokin C. “The role of information in conflict escalation”;
  - Kiselgof S. “Matchings with interval order preferences: efficiency vs strategyproofness”.
29. Kyoto Institute of Economic Research Seminar, August 28, 2014, Kyoto, Japan, <http://www.kier.kyoto-u.ac.jp/jpn/Workshop2007-.html>
- Karpov A. “Russian enterprises meet sanctions”.

30. 7th International Conference on Soft Methods in Probability and Statistics, September 22-24, 2014, Warsaw, Poland, <http://smmps2014.ibspan.waw.pl/>
- Lepskiy A. “On Comparison of Distorted Histograms”.
31. The 3rd International Conference on Belief Functions, September 26-28, 2014, Oxford, UK,  
<http://cms.brookes.ac.uk/staff/FabioCuzzolin/BELIEF2014/index.html>
- Lepskiy A. “General Schemes of Combining Rules and the Quality Characteristics of Combining”.
32. COST Action IC1205 on Computational Social Choice, October 20-22, 2014, Sibiu, Romania, <http://www.illc.uva.nl/COST-IC1205/Events/Action-Meetings/Sibiu-2014/>
- Shvydun S. “Properties of choice functions superpositions”.
33. VIII All-Russian Scientific Conference with international participation “Mathematical modeling of a developing economy, ecology and technology”, October 21-24, 2014, Moscow, [http://agora.guru.ru/display.php?conf=ecomod\\_ccas-2014](http://agora.guru.ru/display.php?conf=ecomod_ccas-2014)
- Aleskerov F. “Selection model in the analysis of Big Data” (plenary paper);
  - Myachin A. “Application of new methods for the analysis of patterns in the study of economic indicators in the Russian Federation”.
34. Seminar of Discrete Mathematics, Optimization and Decision, Pantheon-Sorbonne University, Paris, France, December 9, 2014,  
<http://ces.univ-paris1.fr/membre/seminaire/MDOD/indexEnglish.html>
- Aleskerov F. “A model of decision making on stock exchange”.
35. Economic Theory Workshop, Economic Department of the Pantheon-Sorbonne University, Paris, France, December 12, 2014,  
<http://www.parisschoolofeconomics.eu/en/research/seminars/economic-theory-201/>
- Aleskerov F. “On the analysis of demand on higher education with application to Russia”.

### ANNEX 3

#### Description of mobility

Table 1 “Incoming mobility”

#### Mini-courses

who visited	dates of visits	of which courses have been delivered	what are the results	what are the costs of the visits (rub.)
Prof. Yusufcan Masatlioglu (University of Michigan, Ann Arbor, USA; Sabanci University, Turkey)	14.04.14 – 18.04.14	Lectures on «Choice theory» (16 acad. hours)	Professional skill improvement, 28 participants	187 700
Prof. Denis C. Mueller (University of Vienna, Austria)	21.04.14 – 28.04.14	Lectures on «Democracy and Citizenship» (24 acad. hours)	Professional skill improvement, 29 participants	280 000
Prof. Efe Ok (New York University)	12.05.14 – 16.05.14	Lectures on «On incomplete preferences» (14 acad. hours)	Professional skill improvement, 27 participants	219 002
Prof. U. Endriss (ILLC, University of Amsterdam)	22.05.14 – 30.05.14	Lectures on «Computational Social Choice» (16 acad. hours)	Professional skill improvement, 26 participants	202 805
Summer School A.V. Lotov S. Butenko	05.06.14 – 06.06.14	“Big Data: Learning and Choice Supported by Approximate Data Enveloping and Visualization” “Cliques Relaxations in Networks: Theory, Algorithms, and Applications”	Professional skill improvement	30 000
Prof. Hannu Nurmi (University of Turku, Finland)	17.11.14 – 19.11.14	Lectures on «Rationality of Voting and Voting Systems» (38 acad. hours)	Professional skill improvement, 24 participants	146 070
Prof. Agnieszka Rusinowska, Prof. Michel Grabisch (Paris School of Economics - CNRS, Université Paris I Panthéon-Sorbonne)	02.12.14 – 06.12.14	Lectures on «An introduction to the Choquet integral» (22 acad. hours); «Strategic Network Formation and Network Allocation Rules» (22 acad. hours)	Professional skill improvement, 23 participants	486 670
Total				1 552 247

Table 2 “Outgoing mobility”

Who	which research centers, conference	dates of visits	Results	what are the costs of the visits (rub.)
S. Shvydun, A. Myachin		05.05.2014 - 12.05.2014	professional skill improvement	131 028
S. Kiselgof		16.05.2014 - 17.05.2014	professional skill improvement	6 670
V. Podinovsky		22.05.2014 - 01.06.2014	Participation in the conference with report, professional skill improvement	14 204
D. Karabecyan		06.06.2014 - 10.06.2014	Participation in the conference with report, professional skill improvement	62 917
B. Mirkin, A. Myachin		15.06.2014 - 21.06.2014	Participation in the conference with report, professional skill improvement	220 048
A. Ivanov, D. Karabecyan		17.06.2014 - 23.06.2014	Participation in the conference with report, professional skill improvement	178 773
S. Kiselgof, C. Sorokin		16.06.2014 - 04.07.2014	Participation in the conference with report, professional skill improvement	308 553
D. Karabecyan		26.06.2014 - 03.07.2014	Participation in the conference with report, professional skill improvement	70 583
A. Ivanov, D. Karabecyan		07.07.2014 - 13.07.2014	Participation in the conference with report, professional skill improvement	74 950
A. Belenky, L. Egorova, S. Shvydun, A. Myachin		12.07.2014 - 19.07.2014	Participation in the conference with report, professional skill improvement	322 984
F. Aleskerov		13.07.2014 - 15.07.2014	Participation in the conference with report, professional skill improvement	39 336
Y. Veselova		04.07.2014 - 19.07.2014	Participation in the conference with report, professional skill improvement	142 167
S. Kiselgof, C. Sorokin		23.07.2014 -	Participation in the conference with report, professional	216 238

		02.08.2014	skill improvement	
A. Lepskiy		26.09.2014 - 28.09.2014	Participation in the conference with report, professional skill improvement	65 180
S. Shvydun		19.10.2014 - 23.10.2014	Participation in the conference with report, professional skill improvement	10 700
Y. Veselova		25.11.2014 - 27.11.2014	Participation in the conference with report, professional skill improvement	30 000
D. Bolkunov		07.12.2014 - 11.12.2014	Participation in the conference with report, professional skill improvement	70 000
Total				1 964 330

№	Публикация и ее библиографическое описание**	Статус публикации (подготовлена к печати, направлена в журнал, принята к печати, опубликована)	Код рубрикатора		Тип публикации (препринт ПФИ, статья в зарубежном реф. журнале, статья, глава в монографии, монография)	Язык публикации	Ключевые слова (на языке публикации)	Примечание
			ГРНТИ (обязательно)	Иной рубрикатор (по желанию)				
1	Cordeiro de Amorim R., Mirkin B. Selecting the Minkowski Exponent for Intelligent K-Means with Feature Weighting// Clusters, Orders, and Trees: Methods and Applications, Springer Optimization and its Applications, Springer, 92, 2014, 103-117.	опубликована	28.23.25		статья в сб. трудов конференции	английский	cluster analysis, feature weighting	
2	Mirkin B., Shestakov A. A Note on the Effectiveness of the Least Squares Consensus Clustering// Clusters, Orders, and Trees: Methods and Applications, Springer Optimization and its Applications, Springer, 92, 2014, 181-185.	опубликована	28.23.25		статья в сб. трудов конференции	английский	consensus clustering, cluster analysis	
3	Chernyak E., Mirkin B. An AST Method for Scoring String-to-Text Similarity in Semantic Text Analysis// Clusters, Orders, and Trees: Methods and Applications, Springer Optimization and its Applications, Springer, 92, 2014, 331-340.	опубликована	28.23.25		статья в сб. трудов конференции	английский	string to text similarity, suffix trees	
4	Chernyak E., Morenko E., Mirkin B. Conceptual maps: construction over a text collection and analysis// Analysis of Images, Social Networks and Texts Communications in Computer and Information Science, 436, 2014, 163-168.	опубликована	20.19.27		статья в сб. трудов конференции	английский	conceptual maps, suffix trees	
5	Chernyak E., Mirkin B. A method for refining a taxonomy by using annotated suffix trees and Wikipedia resources// Procedia Computer Science, 31, 2014, Procedia Computer Science, 31, 2014, 193-200.	опубликована	20.19.27		статья в сб. трудов конференции	английский	taxonomy refinement, utilising Wikipedia, suffix trees	
6	Orlov M., Mirkin B. A concept of multicriteria stratification: a definition and solution// Procedia Computer Science, 31, 2014, 273-280.	опубликована	28.23.25		статья в сб. трудов конференции	английский	stratification, multicriteria problem	
7	Podinovski V.V. Decision making under uncertainty with unknown utility function and rank-ordered probabilities// European journal of operational research. 2014. DOI: 10.1016/j.ejor.2014.05.023	опубликована	28.29.03		статья в зарубежном реф. журнале	английский	decision analysis under uncertainty; utility theory; incomplete infor-	



							mation	
8	Belenky A. Finding Optimal Production and Selling Strategies for an Electricity Generator in a Part of a Country's Electrical Grid// Procedia Computer Science, 31, 2014, 1150-1159	опубликована				статья в сб. трудов конференции	английский	
9	Aleskerov F.T., Pisyakov V., Subochev A. Ranking Journals In Economics, Management And Political Science By Social Choice Theory Methods// Working papers by NRU Higher School of Economics. Series WP BRP "Science, Technology and Innovation", 2014, WP BRP 27/STI/2014.	опубликована	12.21.65	JEL: C65		препринт ПФИ	английский	journal ranking, bibliometric indicators, impact factor, Hirsch index
10	Egorova L.G. The Effectiveness Of Different Trading Strategies For Price-Takers// Working papers by NRU Higher School of Economics. Series FE "Financial Economics", 2014, WP BRP 29/FE/2014 .	опубликована	28.17.19	JEL Classification : G020, G170		препринт ПФИ	английский	agent-based system, simulation, stock exchange, trading strategies
11	Karpov A. Equal weights coauthorship sharing and the Shapley value are equivalent// Journal of Informetrics, 2014, 8(1), 71-76.	опубликована	12.01.73			статья в зарубежном реф. журнале	английский	Shapley value, Collaboration, coauthorship
12	Myachin A. Analysis of global data education and patent activity using new methods of pattern analysis// Procedia Computer Science, 31, 2014, 468-473.	опубликована	83.35.29			статья в сб. трудов конференции	английский	pattern analysis; linear pattern classification; data analysis
13	Penikas H.I., Petrova A. An Empirical Analysis of Growth and Consolidation in Banking: A Markovian Approach for the case of Russia// International Journal of Computational Economics and Econometrics, 2014, 4(1/5), 112-129.	опубликована				статья в зарубежном реф. журнале	английский	Markov process, banking consolidation, cluster analysis, transition matrix
14	Selmier II W.T., Penikas H., Vasilyeva K. Financial Risk as a Good// Procedia Computer Science, 2014, 115-123.	опубликована				статья в сб. трудов конференции	английский	Financial Risk
15	Arzamasov V., Penikas H. A financial stability index for Israel// Procedia Computer Science, 2014, 985-994.	опубликована				статья в сб. трудов конференции	английский	financial stability
16	Lepskiy A. On the Stability of Comparing Histograms with Help of Probabilistic Methods// Procedia Computer Science, 31, 2014, 597-605.	опубликована	28.29, 27.43.51			статья в сб. трудов конференции	английский	comparison of histograms, stability of comparison
17	Shvydun S., Kalugina E. An Effective Personnel Selection Model// Procedia Computer Science, 2014, 31, 1102-1106.	опубликована	27.35.33			статья в сб. трудов конференции	английский	personnel selection problem; aggregation matching; employer; candidate.
18	Kiselgof S. Matchings with Interval Order Preferences: Efficiency vs Strategy-proofness// Procedia Computer Science, 2014, 31, 807-813.	опубликована	28.29			статья в сб. трудов конференции	английский	
19	"Clusters, Orders, and Trees: Methods and Applications (In Honor of	опубликована	28.23.15			сб. трудов	английский	cluster analysis

	Boris Mirkin's 70th Birthday)", Springer Science+Business Media New York, eds. Fuad Aleskerov, Boris Goldengorin, Panos M. Pardalos, 2014, 404 pp.				конференции	кий		
20	Proceedings of the 2nd International Conference on Information Technology and Quantitative Management, ITQM 2014// Procedia Computer Science, Elsevier, Volume 31, eds. Yong Shi, Alexander Lepskiy and Fuad Aleskerov, 2014, 1-1176.	опубликована	28.29		сб. трудов конференции	английский	information technology, quantitative management	
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