

**CONFERENCE PROCEEDINGS
FULL TEXT PAPERS**

edited by

Albert Gardoń, Cyprian Kozyra and Edyta Mazurek



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APPLICATIONS OF MATHEMATICS AND STATISTICS IN ECONOMICS

2017

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SZKLARSKA POREBA, POLAND, 30th AUGUST – 3rd SEPTEMBER 2017



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Contents

<u>Foreword</u>	5
<u>Marek Biernacki: Comparison of Selected National Healthcare Systems' Efficiency</u>	7
<u>Beata Bieszk-Stolorz, Iwona Markowicz: The Assessment of the Situation of Listed Companies in Macrosectors in a Bear Market – Duration Analysis Models</u>	17
<u>Diana Bílková: Clusters of the Czech Regions and 31 Chosen European Countries According to the Wage Level, Wage Models and Gender Gap by the Czech Regions</u>	27
<u>Martin Bod'a, Mária Kanderová: Selecting a Small Portfolio of Equities: One-stop Shopping Approach to Screening</u>	43
<u>Adam Čabla: Right Tail of the Unemployment Duration in the Czech Republic</u>	59
<u>Magdalena Daszkiewicz, Edyta Mazurek: The Perception of Wroclaw as a Liveable City</u>	75
<u>Michal Demetrian, Rudolf Zimka, Emília Zimková: On Liu's Criterion in Asada's Model of Monetary and Fiscal Policy</u>	89
<u>Joanna Dębicka, Stanisław Heilpern: Investor's Expected Profit from Viatical Settlements</u> .	105
<u>Tomáš Fiala, Jitka Langhamrová: Pension Age Which Would Guarantee Stabilization of the Old Age Dependency Ratio</u>	117
<u>Samuel Flimmel, Matej Čamaj, Ivana Malá, Jiří Procházka: Comparison of Robust Methods for ARMA Order Estimation</u>	133
<u>Jan Fojtík, Jiří Procházka, Pavel Zimmermann, Simona Macková, Markéta Švehláková: Alternative Approach for Fast Estimation of Life Insurance Liabilities</u> .	145
<u>Kateřina Gawthorpe: Potential of Local Currencies in the Czech Republic: DSGE model</u> .	155
<u>Kateřina Gawthorpe, Karel Šafr: Regional & Multi-Sector Input-Output Model for the Czech Republic</u>	169
<u>Michal Gerthofer, Václav Sládek, Pavel Zimmermann: Estimation of Incurred but Not yet Reported Claims Based on Poisson Distributed Reporting Delay</u>	183
<u>Mária Grausová, Miroslav Hužvár, Zuzana Rigová: Efficiency Assessment of Slovakian Universities</u>	195
<u>Richard Horský: Non-stationary Stochastic Sequences as Solutions to Ill-posed Problems</u> .	207
<u>Samuel Hudec: Modelling the Force of Mortality Using Local Polynomial Method in R</u> ..	217
<u>Michaela Jirková, Petr Musil: Analysis of Economies of Scale in Czech Households Based on Different Approaches</u>	227
<u>Miloš Kaňka: Segmented Regression Based on the Principle of Cut-off Polynomials with a Solved Economic Example</u>	235
<u>Alena Kaščáková, Viera Mendelová, Gabriela Nedelová: Weighting Methods in Construction of Active Ageing Indicator</u>	247
<u>Katarína Kyseľová, Rudolf Zimka: On Bautin Bifurcation in a Monetary Dynamic Model</u> .	259

<u>Peter Laco, Martina Kallová: Factors Influencing Corporate Websites' Value</u>	275
<u>Ivana Malá: The Use of L-Moments in Modelling of Deprivation of the Population Aged over 50 in the Czech Republic</u>	285
<u>Agnieszka Marciniuk: Marriage Reverse Annuity Contract and Reverse Mortgage – Application of a Generalized Model of Reversionary Annuity</u>	297
<u>Luboš Marek, Michal Vrabec, Petr Berka: Are Wages in the Czech Republic and Poland Equal?</u>	307
<u>Petr Musil, Jana Kramulová, Jan Zeman, Václav Vrabec: Possible Extension of Regional Statistics – Households' Wealth – Methods and Preliminary Results</u>	319
<u>Katarzyna Ostasiewicz: Comparing Some Properties of Leftist and Rightist Measures of Inequality</u>	331
<u>Lucie Plzáková: Evaluation of Public Finance in the Tourism Sector at the Municipal Budget Level</u>	343
<u>Jiří Procházka, Samuel Flimmel, Matej Čamaj, Milan Bašta: Modelling the Number of Road Accidents</u>	355
<u>Agnieszka Przybylska-Mazur: The Brake Public Debt Rule as An Instrument to Stabilize the Debt – Results for Poland</u>	365
<u>Hana Řezanková, Zuzana Křečková: Selected Gender Gap Indicators – Comparison of V4 Countries within EU Context</u>	373
<u>Anna Sączewska-Piotrowska, Damian Piotrowski: Lifestyle Characteristics of Poor and Rich People in Poland</u>	387
<u>Karel Šafr, Jaroslav Sixta: Methods for the Estimates of Regional Economic Structures</u>	401
<u>Martina Šimková, Luboš Marek: Age Structure of Labour Force and Its Impact on Wages and Product</u>	419
<u>Ondřej Šimpach: Normality and Principal Component Approach Towards Fertility Time Series in Poland and Czechia</u>	431
<u>Jana Špirková, Igor Kollár, Gábor Szűcs, Mária Spišiaková: Valuation of Second Pillar Pension Products in Slovakia</u>	441
<u>Jana Špirková, Peter Laco, Pavol Král', Jana Štrangfeldová: Determination of the Optimal Premium for the Economically Active and Inactive Population in Health Insurance in Slovakia</u>	453
<u>Zdeněk Šulc, Jana Cibulková, Jiří Procházka, Martin Matějka: Comparison of Economic and Non-economic Datasets with Categorical Variables in Hierarchical Clustering</u>	461
<u>Lucia Švábová, Marek Ďurica: Application of Logistic Regression in Counterfactual Impact Evaluation of Graduate Practice Measure in Slovakia</u>	473
<u>Prokop Závodský, Ondřej Šimpach: Karl Czoernig and the State Statistics of the Habsburg Monarchy</u>	483

Foreword

The jubilee twentieth International Conference “Applications of Mathematics and Statistics in Economics” (AMSE 2017) was held in Szklarska Poręba, Poland, from 30th August to 3rd September 2017. The beginning of this conference series dates back to 1998. The first conference was organized by Prof. Miroslav Abraham from Matej Bel University in Slovakian village Liptovský Trnovec, in 3rd – 4th September 1998, with 23 papers presented by the staff of the Faculty of Economics of Matej Bel University in Banská Bystrica (Slovakia) and the Faculty of Informatics and Statistics of University of Economics in Prague in (Czech Republic). In 1999 a team of statisticians from Wrocław University of Economics (Poland) was invited by Czech colleagues to participate in the second conference. Since 2001, the conference has been organized periodically by the three centers mentioned above, but with active participation of scientists from other universities and other countries as well.

The topic of the 20th AMSE conference was very similar to the previous nineteen conferences: it was devoted to varied current problems of the applications of quantitative methods in economics. Since 2014, the papers presented on AMSE conferences have been included in the Conference Proceedings Citation Index of the Web of Science database and they are thematically divided into five sections:

- Macroeconomics, Public Economics and Methodological Issues of Economics
- Social Economics, Economic Sustainability and Demographic Economics
- Financial Markets, Risk Measurement and Insurance
- Microeconomic Issues
- Multidimensional Statistics in Economics.

The number of positively reviewed contributions published in the conference proceedings is equal to 40 and they have been prepared not only by authors from the three co-organizing universities, but also from other universities. Every paper has been reviewed by two reviewers, each from a different country, the author’s country excluded. Full text papers are available not only in conference proceedings published in the form of a compact disc, but they are also freely available on the conference website at <http://amse.ue.wroc.pl/proceedings2017.html>.

During the 20th AMSE conference some jubilee events were organized by the Organizing Committee under leadership of Dr. Beata Zmyślona. The special session devoted to the history of AMSE conferences was led by Prof. Walenty Ostasiewicz, chairman of Scientific Committee. The documentary film (available at <http://amse.ue.wroc.pl/>) prepared by team: Dr. Cyprian Kozyra, Dr. Beata Zmyślona and Prof. Joanna Dębicka (director), presented facts, photos, important persons and number of contributions prepared during twenty conferences by authors from different countries. Four persons participating in all 20 conferences were honored with the jubilee certificates: Prof. Richard Hindls and Prof. Stanislava Hronová (both from University of Economics, Prague), Prof. Rudolf Zimka and Ing. Peter Laco, PhD. (both from Matej Bel University, Banská Bystrica). The history of AMSE conferences organization by three universities could be summarized in the following table:

Matej Bel University, Banská Bystrica	University of Economics, Prague	Wrocław University of Economics
3 rd – 4 th September 1998, Liptovský Trnovec		
2 nd – 3 rd September 1999, Liptovský Trnovec		
31 st August – 1 st September 2000, Poprad	13 th – 14 th September 2001, Zadov	4 th – 7 th September 2002, Kudowa Zdrój
4 th – 5 th September 2003, Banská Bystrica	3 rd – 4 th September, 2004, České Budějovice	1 st – 2 nd September 2005, Wrocław
29 th August – 1 st September 2007, Poprad	31 st August – 1 st September 2006, Trutnov	27 th – 29 th August 2008, Wisła
25 th – 29 th August, 2010, Demänovská Dolina	27 th – 28 th August 2009, Uherské Hradiště	31 st August – 3 rd September 2011, Łądek Zdrój
28 th August – 1 st September 2013, Gerlachov	30 th – 31 st August 2012, Liberec	27 th – 31 st August 2014, Jerzmanowice
31 st August – 4 th September 2016, Banská Štiavnica	2 nd – 6 th September 2015, Jindřichův Hradec	30 th August – 3 rd September 2017, Szklarska Poręba

The conference was as usually a good opportunity not only to exchange opinions of scientists and specialists, but also to strengthen the friendship between the all participants, mainly representing three nations co-organizing this conference series. Moreover, the location of the conference makes it possible to search for some common cultural roots of Central European countries in addition to a common scientific ground. Despite rainy weather, which changed plans about trips, conference participants visited after scientific sessions: the crystal glass factory “Julia” in Piechowice, Szklarka Waterfall, railway trip and Jizera Mountains around Jakuszyce.

Finally, presenting this conference proceedings as a scientific fruit of AMSE 2017 conference, we would like to thank all the authors for their contributions and all the reviewers for many useful suggestions that have improved the quality of the papers. We should also like to thank members of Scientific Committee for their help in peer review process, and also Mr. Grzegorz Rogoziński and Ms. Beata Dębska for his work on graphic design of conference proceedings and website. We hope that next conferences, starting from announced by Czech colleagues AMSE 2018 in Kutná Hora, will be so fruitful as previous twenty.

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