



CRACOW
UNIVERSITY
OF ECONOMICS



**XII MIĘDZYNARODOWA KONFERENCJA NAUKOWA
IM. PROFESORA ALEKSANDRA ZELIASIA NA TEMAT**

**„MODELOWANIE I PROGNOZOWANIE
ZJAWISK SPOŁECZNO-GOSPODARCZYCH”**

8-11 maja 2018, Zakopane, Polska

**THE 12TH PROFESSOR ALEKSANDER ZELIAS
INTERNATIONAL CONFERENCE ON**

**“MODELLING AND FORECASTING
OF SOCIO-ECONOMIC PHENOMENA”**

May 8-11, 2018, Zakopane, Poland

Książka streszczeń
Book of abstracts

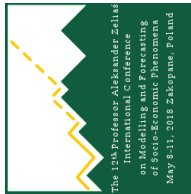
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red. Jadwiga Kostrzevska

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THE 12TH PROFESSOR ALEKSANDER ZELIAS INTERNATIONAL CONFERENCE ON
 MODELLING AND FORECASTING OF SOCIO-ECONOMIC PHENOMENA

MAY 8-11, 2018, ZAKOPANE, POLAND

PROGRAMME

Tuesday, May 8, 2018

4.00 pm	Departure for Zakopane by coach from the Building C of the University
6.30 pm	Lodging in Conference-Recreation Center HYRNY, 20 Piłsudskiego Street, Zakopane
7.00 pm–8.00 pm	Supper

Wednesday, May 9, 2018

8.00 am–8.45 am	Breakfast
8.45 am–8.55 am	Opening Address by Prof. dr hab. Józef Pociecha
8.55 am–9.00 am	Opening Address by authorities representative of Cracow University of Economics
THE FIRST INVITED PLENARY SESSION (session in English) – room A1	
<i>Chairperson: Prof. dr hab. Józef Pociecha</i>	
9.00 am–9.45 am	Prof. Dr Francesca Gresselin <i>Robust clustering methods for multivariate socio-economic data</i>
9.45 am–10.00 am	Discussion
10.00 am–10.30 am	Coffee break

SESSION 1A (session in English) – room A1		SESSION 1B (session in Polish) – room A2	
<i>Modelling of financial processes.</i>		<i>Statistical methods in international comparative analysis</i>	
<i>Chairperson: Prof. dr hab. Jacek Ostiewalski</i>		<i>// Metody statystyczne w międzynarodowych analizach porównawczych.</i>	
<i>Chairperson: Prof. dr hab. Czesław Domański</i>			
10.30 am–10.50 am	Prof. UEK dr hab. Marek A. Dąbrowski, dr Lukasz Kwiatkowski, dr Justyna Wróblewska	Prof. UEK dr hab. Sławomir Śmiech, Aleksandra Mucha	<i>Are uncertainty measures powerful predictors of real economic activity in the Euro Area? // Czy mierniki niepewności są dobrymi predyktorami realnej aktywności gospodarczej w strefie euro?</i>
10.50 am–11.00 am	<i>Sources of Real Exchange Rate Variability in Poland – Evidence from a Bayesian SVAR Model with Markov Switching Heteroscedasticity</i>	Discussion	
11.00 am–11.20 am	Prof. UG dr hab. Paweł Mitobędzki, dr Sabina Nowak	Dr Małgorzata Stec, dr Małgorzata Wosiek	<i>Evaluation of the Socio-economic Situation of European Union Countries, Taking into Account Accuracy of Statistical Data // Ocena sytuacji społeczno-gospodarczej krajów Unii Europejskiej z uwzględnieniem dokładności danych statystycznych</i>
11.20 am–11.30 am	<i>The Accuracy of Trade Classification Rules for the Warsaw Stock Exchange</i>	Discussion	
11.30 am–11.50 am	Prof. Ines Wiese, Prof. Karsten Luebbe	Prof. UEK dr hab. Marcin Salamaga	<i>An Application of Conjoint Analysis to Study Determinants of Polish Direct Investment located in European Countries // Wykorzystanie analizy conjoint do badania determinantów polskich inwestycji bezpośrednich lokowanych w krajach europejskich</i>
11.50 am–12.00 pm	<i>Behavioural Finance: The role of Gender and Narcissism on Risk Aversion</i>	Discussion	

12.00 pm–12.20 pm	Prof. UEK dr hab. Mateusz Papien, dr Błażej Mazur <i>A Family of Non-standard Bivariate Distributions with Applications to Unconditional Modeling in Empirical Finance</i> Discussion	Prof. UEK dr hab. Monika Papien, prof. UEK dr hab. Sławomir Śmiech, dr Katarzyna Frodyma <i>Is Development of the Renewable Energy Sector Critical for the Electricity Consumption-Growth Nexus in EU Countries? // Poziom rozwoju sektora OZE a relacje pomiędzy zużyciem energii elektrycznej i wzrostem gospodarczym w krajach UE</i> Discussion
12.45 pm–1.45 pm	Lunch	
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SESSION 2A (session in English) – room A1		
	<i>Modelling economic processes I</i> Chairperson: Prof. dr hab. Aleksander Welfe	SESSION 2B (session in Polish) – room A2 <i>Statistical methods in socio-economic investigations //</i> <i>Metody statystyczne w badaniach społeczno-ekonomicznych</i> Chairperson: Prof. dr hab. Andrzej S. Barczak
3.00 pm–3.20 pm	Dr Miroslava Chekh, Dr Natallia Cherkas <i>Production Fragmentation and Technological Transfer: Evidence from CEE Countries</i> Discussion	Prof. UŁ dr hab. Alina Jędrzejczak, prof. UŁ dr hab. Dorota Pekasiewicz, prof. dr hab. Wojciech Zielinski <i>Comparison of Parameter Estimators for the Dagum Distribution // Porównanie własności estymatorów parametrów rozkładu Daguma</i> Discussion
3.20 pm–3.30 pm	Discussion	
3.30 pm–3.50 pm	Prof. UEK dr hab. Marek Dąbrowski, prof. UEK dr hab. Monika Papien, prof. UEK dr hab. Sławomir Śmiech <i>Is There a Trade-off Between Monetary Autonomy and Exchange Rate Stability in Emerging Market Economies?</i> Discussion	Prof. dr hab. Wojciech Zielinski, prof. UŁ dr hab. Alina Jędrzejczak, prof. UŁ dr hab. Dorota Pekasiewicz <i>Estimation of Quantile Ratios of the Dagum Distribution // Estymacja ilorazu kwantyli rozkładu Daguma</i> Discussion
3.50 pm–4.00 pm	Discussion	

4.00 pm–4.20 pm	Prof. PK dr hab. Viktor Shevchuk, Dr Roman Kopych, Dr Marianna Golynska <i>Fiscal and Monetary Policy Effects in Ukraine: a SVAR Approach</i>	Dr hab. Beata Bieszk-Stolorz, dr Krzysztof Dmytrów <i>Application of the Survival Trees for Estimation of the Influence of Determinants on Probability of Exit from the Registered Unemployment // Wykorzystanie drzew przeżycia do oceny wpływu determinant na prawdopodobieństwo wyjścia z bezrobocia rejestrowanego</i>
4.20 pm–4.30 pm	Discussion	Discussion
4.30 pm–4.50 pm	Dr Błażej Mazur <i>Cyclical fluctuations of global food prices: a predictive analysis</i>	Prof. UL dr hab. inż. Jacek Białek <i>Comparison of Jevons and Carli Elementary Price Indices // Porównanie elementarnych indeksów Jevonsa i Carliego</i>
4.50 pm–5.00 pm	Discussion	Discussion
5.00 pm–5.30 pm	Coffee break	

Session 3 (session in English) – room A1

Modelling economic processes II

Chairperson: Prof. dr hab. Grażyna Trzpiot

5.30 pm–5.50 pm	Dr Katarzyna Leszkiewicz-Kędziór, dr Emilia Gosińska, prof. dr hab. Aleksander Welfe <i>Oil-based Products Pricing: An Application of Threshold Cointegrated VAR Model</i>
5.50 pm–6.00 pm	Discussion
6.00 pm–6.20 pm	Prof. dr hab. Jacek Osiewalski, prof. UEK dr hab. Anna Pajor <i>A Hybrid MSV-MGARCH Extension of the t-MGARCH Model</i>
6.20 pm–6.30 pm	Discussion

6.30 pm–6.50 pm	Dr Roman Huptas <i>The Impact of Intraday Trading Volume on Return Volatility on the Polish Stock Market</i> Discussion
6.50 pm–7.00 pm	
7.30 pm	Supper in <i>Bąkowa Zoehylina Niżnio</i>
Thursday, May 10, 2018	
8.00 am–8.45 am	Breakfast
THE SECOND INVITED PLENARY SESSION (session in Polish) – room A1 <i>Chairperson: Prof. UEK dr hab. Barbara Pawelek</i>	
8.45 am–9.30 am	Prof. dr hab. Grzegorz Kończak <i>Selected Non-classical Methods of Statistical Inference // Wybrane nieklasyczne metody wnioskowania statystycznego</i> Discussion
9.30 am–9.40 am	
SESSION 4A (session in English) – room A1 <i>Theoretical problems of statistics</i> <i>Chairperson: Prof. Dr. Karsten Luebke</i>	
9.45 am–10.05 am	Prof. UEK dr hab. Daniel Kosiorowski, dr Dominik Mielczarek, dr Jerzy P. Rydlewski <i>Outliers in Functional Time Series – Challenges for Theory and Applications of Robust Statistics</i> Discussion
10.05 am–10.10 am	Discussion
SESSION 4B (session in Polish) – room A2 <i>Statistical methods in finance // Metody statystyczne w finansach</i> <i>Chairperson: Prof. dr hab. Marek Waleściak</i>	
9.45 am–10.05 am	Prof. dr hab. Czesław Domański, mgr Robert Kubacki <i>Application of Differential Evolution Algorithm to Group Bank's Individual Clients // Grupowanie klientów indywidualnych banku algorytmem ewolucji</i> Discussion

10.10 am–10.30 am	Michael Thrun PhD <i>Cluster Analysis of the World Gross-Domestic Product Based on the Emergent Self-organization of the Databionic Swarm</i>	Prof. UEK dr hab. Stanisław Wanat, dr Krzysztof Guzik <i>Estimation of VaR Bounds under Dependence Uncertainty and Their Use for the SCR Calculation in Solvency II // Szacowanie ograniczeń VaR-u w warunkach niepewnej struktury zależności i ich wykorzystanie w szacowaniu kapitałowych wymogów wypłacalności w Solvency II</i>
10.30 am–10.35 am	Discussion	Discussion
10.35 am–10.55 am	Dr Katarzyna Bech-Wysocka, prof. Grant Hillier <i>Nonparametric Testing for Exogeneity with Discrete Regressors and Instruments</i>	Prof. PB dr hab. Joanna Olbryś, Michał Mursztyn <i>Assessing the Accuracy of Trade Side Classification Procedures. Methods, Data, and Problems // Badanie trafności procedur klasyfikujących transakcje. Metody, dane, problemy</i>
10.55 am–11.00 am	Discussion	Discussion
11.00 am–11.30 am	Coffee break	
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SESSION 5A (session in English) – room A1		
	<i>Statistical methods in economic investigations</i> Chairperson: Prof. dr hab. Anatolij Pilyavskyy	SESSION 5B (session in Polish) – room A2 <i>Selected problems of socio-economic research I // Wybrane problemy badań społeczno-ekonomicznych I</i> Chairperson: Prof. dr hab. Danuta Strahl
11.30 am–11.50 am	Prof. Dr. Andreas Geyer-Schulz, Martin Schweitzer, Peter Kurz <i>On the Econometrics of Data from Product Configurators or Conjoint Experiments</i>	Dr Krzysztof Dmytrów, prof. US dr hab. Jacek Batóg <i>Identification of Key Determinants of Companies Bankruptcy in the EU-15 Countries in Years 2008-2016 // Identyfikacja kluczowych determinant bankructwa przedsiębiorstw w krajach UE-15 w latach 2008-2016</i>
11.50 am–11.55 am	Discussion	Discussion

11.55 am–12.15 pm	Elena Sibirskaya PhD, Research officer Katerina Shestaeva, prof. UEK dr hab. Pawel Lula, Lecturer Evgenia Progonova <i>Anatomy of Entrepreneurial Activity and Challenges of the New Century</i>	Dr Jadwiga Kostrzewska, dr Maciej Kostrzewski <i>The Logistic Regression in Predicting Spike Occurrences in Electricity Prices // Model logitowy w prognozowaniu skoków cen energii elektrycznej</i>
12.15 pm–12.20 pm	Discussion	Discussion
12.20 pm–12.40 pm	Michael Thrun PhD, Prof. Alfred Ultsch PhD <i>Effects of the Payout System of Income Taxes to Municipalities in Germany</i>	Prof. dr hab. Grażyna Trzpiot, dr Justyna Majewska <i>The Health Transition and an Ageing Society – Example of Selected European Countries // Przejście zdrowotne a starzejące się społeczeństwo – przykład wybranych krajów Europy</i>
12.40 pm–12.45 pm	Discussion	Discussion

12.45 pm–1.45 pm

POSTER SESSION

- Dr Jan Acedański, dr Julia Włodarczyk
Demography, Retirement Age and Interest Rates in Poland // Demografia i wiek emerytalny a stopy procentowe w Polsce
- Dr Marcin Błażejowski, dr Paweł Kufel, prof. dr hab. Magdalena Osinska, prof. dr hab. Tadeusz Kufel
Robustness Analysis of the Business Cycle Modeling Using the Automated Threshold_Models.gfn Package for gretl // Analiza odporności modelowania cyklu koniunkturalnego za pomocą automatycznej procedury Threshold_Models.gfn dla programu gretl
- Dr Justyna Brzezińska, dr Aneta Rybicka, dr Marcin Pelka
Multivariate Statistical Analysis of Environmental Data // Statystyczna analiza wielowymiarowa danych ekologicznych
- Mgr Anna Chudzińska-Bator, prof. UEK dr hab. Mateusz Pipień
Modelling Intensity of EUR/PLN High Frequency Trade – a Comparison of ACD-type Models // Analiza intensywności handlu kursem EUR/PLN – porównanie modeli typu ACD
- Mgr inż. Marta Chylińska
Aluminium Price Discovery on the London Metal Exchange, 2007-2017 // Wycena kontraktów na aluminium na Londyńskiej Giełdzie Metali, 2007-2017
- Prof. UMCS dr hab. Radosław Mącik
Identification of Factors Affecting the Popularity of Cross-border Online Shopping in the European Union Countries // Identyfikacja czynników wpływających na popularność internetowych zakupów za granicą w krajach Unii Europejskiej
- Dr Artur Mikulec, dr Małgorzata Misztal
Firms' Duration Analysis in Lodzkie Voivodeship Using a Regression Tree Approach // Analiza trwania przedsiębiorstw województwa łódzkiego z wykorzystaniem drzew regresyjnych
- Dr Iwona Müller-Frączek
Dynamic Measure of Development // Dynamiczna miara rozwoju
- Mgr Aleksandra Pawłowska
Evaluation of Investment Support from Common Agricultural Policy with Propensity Score Matching Method // Ewaluacja działań inwestycyjnych Wspólnej Polityki Rolnej przy użyciu metody propensity score matching

Dr Małgorzata Ćwiek <i>Determinants of Digital Exclusion of Polish Households // Determinanty wykluczenia cyfrowego polskich gospodarstw domowych</i>	Dr Lukasz Pietrych <i>Identification of Deterministic Chaos in Economic Time Series on the Example of Prices of Selected Agricultural Products // Identyfikacja chaosu deterministycznego w ekonomicznych szeregach czasowych na przykładzie cen wybranych produktów rolnych</i>
Prof. US dr hab. Iwona Foryš, dr Barbara Batóg <i>Analysis of Transaction Prices on One of Housing Estates in Szczecin: Do the Buyers Differentiate Prices on Local Markets with Respect to the Kind of the Right to Own? // Analiza cen mieszkań na wybranym osiedlu w Szczecinie: Czy prawo własności i prawo spółdzielcze różnicują tendencje cenowe na lokalnych rynkach?</i>	Dr Michał Pietrzak <i>Composition of the Agricultural Macrorregions for the Eastern Part of Poland – Empirical Example of Aggregation Problem // Układ makroregionów rolniczych dla Polski wschodniej – empiryczny przykład problemu agregacji</i>
Dr Ewa Genge <i>Graphical Tools of Discrete Longitudinal Data Presentation in R // Metody graficznej prezentacji dyskretnych zbiorów panelowych w programie R</i>	Dr hab. Radosław Pietrych, dr hab. Paweł Rokita <i>Short-term and Long-term Risk Aversion in Life-time Financial Plan Optimization Process // Krótko i długoterminowa awersja do ryzyka w procesie optymalizacji planu finansowego</i>
Dr Justyna Góral, prof. dr hab. Anatolij Pilyavskyy <i>The Development Potential of Farms in the Context of Financial Aid // Potencjał rozwojowy gospodarstw rolnych w kontekście pomocy finansowej</i>	Mgr Dominika Polko-Zając <i>Comparing Populations Based on Distance Between Sets of Variables // Porównywanie populacji na podstawie odległości między zbiorami zmiennych</i>
Dr Sergiusz Herman <i>Application of Generalized Data Envelopment Analysis Model on Warsaw Stock Exchange // Wykorzystanie Uogólnionej Metody DEA na Giełdzie Papierów Wartościowych w Warszawie</i>	Dr Elżbieta Rogalska <i>Entrepreneurship Environment in Poland at NUTS 3 Level. Application of Taxonomic Measure of Development Based on Median Vector Weber // Warunki dla przedsiębiorczości w Polsce na poziomie NUTS 3. Wykorzystanie taksonomicznej miary rozwoju z zastosowaniem mediany przestrzennej Webera</i>

Mgr Mateusz Jankiewicz <i>Changes of the Consumption Structure in European Countries Considering Its Modernisation Process // Zmiany struktury konsumpcji w krajach europejskich w świetle procesu jej umowocześniania</i>	Dr Elżbieta Roszko-Wójtowicz, prof. UL, dr hab. inż. Jacek Białek <i>Application of the AG Mean Index for CPI Substitution Bias Reduction // Zastosowanie arytmetyczno-geometrycznego indeksu cen do redukcji obciążenia CPI z tytułu substytucji dóbr</i>
Dr Maciej Jewczak, dr Karol Korczak, dr Marek Melaniuk, prof. dr hab. Jadwiga Suchecka <i>Spatial Analysis and Assessment of Effectiveness of Selected Social Services // Analiza przestrzenna oraz ocena skuteczności świadczeń społecznych</i>	Dr Agata Sielska <i>Armed Conflicts and Multicriterial Evaluation of the Development of Country in a Long-term Perspective // Konfliktowy zbrojne a wielokryterialna ocena rozwoju kraju w perspektywie długookresowej</i>
Dr hab. Daniel Kosińtorowski, dr Jerzy P. Rydlewski, dr Dominik Mielczarek <i>New Proposal of Robust Classifier for Functional Data // Propozycja nowego odpornego klasyfikatora dla danych funkcjonalnych</i>	Dr Iwona Skrodzka <i>International Technology Transfer And Smart Growth of European Union Countries // Międzynarodowy transfer technologii a inteligentny rozwój krajów Unii Europejskiej</i>
Dr Marta Kuc, dr Aneta Sobiechowska-Ziegert <i>Standard of Living in Poland at Regional Level – Classification with Kohonen Self-organizing Maps // Sieci neuronowe w klasyfikacji regionalnej poziomu życia w Polsce</i>	Dr inż. Jacek Stelmach <i>On Stationarity of Changes in the Trends of Selected Refining Variables // O stacjonarność zmian trendów wybranych zmiennych rafineryjnych</i>
Dr Lukasz Lenart <i>Bayesian Estimation of Deterministic Cycle with Time-varying Amplitude // Estymacja bayesowska cyklu deterministycznego ze zmienną w czasie amplitudą wahań</i>	Dr Adam Suchecki <i>Spatio-temporal Decomposition of the Communal Budgets Expenses Growth on Culture in Poland in years 2003-2016. Implementation of the SSANOVA Model // Dekompozycja przestrzenno-czasowa wzrostu wydatków budżetów gmin na kulturę w Polsce w latach 2003-2016. Zastosowanie modelu SSANOVA</i>
Dr Lukasz Lenart, dr Justyna Wróblewska <i>Nonlinear Stochastic Cycle // Nielinowy cykl stochastyczny</i>	

<p>Prof. US dr hab. Iwona Markowicz, dr Paweł Baran <i>Analysis of Intra-community Supply of Goods Shipped from Poland</i> // Analiza wewnątrzspółnotowych dostaw towarów z Polski</p>	<p>Dr Marta Wajda-Lichy, dr Paweł Kawa, dr Kamil Fijorek, dr Sabina Denkowska <i>Trade Openness and Financial Development: Granger Causality Analysis for New EU Member States // Handel zagraniczny a rozwój rynków finansowych: badanie przyczynowości w sensie Grangera dla nowych krajów członkowskich UE</i></p>
<p>2.00 pm–3.00 pm Lunch</p>	<p>Dr Grzegorz Wałęga, dr Agnieszka Wałęga <i>Does Debt Improve Housing Conditions? Evidence from Polish Households // Czy zadłużenie poprawia warunki mieszkaniowe? Analiza na przykładzie Polski</i></p>
<p>3.00 pm–7.00 pm Guided tour</p>	<p>8.00 pm 10.00 pm</p>
<p>Ceremonial dinner (<i>Hyrny</i> Dining Hall) Continuation in <i>Hyrny Café</i></p>	

Friday, May 11, 2018

8.00 am–8.45 am	Breakfast
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	SESSION 6A (session in English) – room A1 <i>Social statistics</i> Chairperson: Prof. RNDr. Viera Pacakova, PhD
9.00 am–9.20 am	Prof. SGH dr hab. Michał Rubaszek <i>Reforming Housing Rental market in a Life-cycle Model</i>
9.20 am–9.25 am	Discussion
9.25 am–9.45 am	Prof. Erik Šoltés PhD, Tatiana Šoltésová PhD <i>Comparison of Income Poverty and Social Exclusion in EU in 2008 and 2016</i>
9.45 am–9.50 am	Discussion
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	SESSION 6B (session in Polish) – room A2 <i>Selected problems of socio-economic research II // Wybrane problemy badań społeczno-ekonomicznych II</i> Chairperson: Prof. dr hab. Wojciech Zieliński
9.00 am–9.20 am	Prof. dr hab. Marek Walesiak, prof. UEP dr hab. Grażyna Dehnel <i>Evaluation of Economic Efficiency of Small Manufacturing Enterprises in Districts of Wielkopolska Province Using Interval-valued Symbolic Data and the Hybrid Approach // Ocena efektywności ekonomicznej małych przedsiębiorstw przemysłowych w powiatach województwa wielkopolskiego na podstawie danych symbolicznych interwałowych oraz podejścia hybrydowego</i>
9.20 am–9.25 am	Discussion
9.25 am–9.45 am	Prof. UEP dr hab. Grażyna Dehnel, dr Lukasz Wawrowski <i>Robust Estimation of Revenues of Polish Small Companies by NACE Section and Province // Odporna estymacja przychodu małych przedsiębiorstw w przekroju sekcji PKD i województw w Polsce</i>
9.45 am–9.50 am	Discussion

9.50 am–10.10 am	Prof. UEK dr hab. Paweł Ulman, dr Tomasz Kwarciński <i>The Quality of Life in Poland and Germany</i>	Prof. dr hab. Renata Oczkowska, dr Sylwia Wiśniewska, prof. UEK dr hab. Paweł Lula <i>Automatic Identification of Competences Expected by Employers with the Use of Exploratory Text Analysis // Automatyczna identyfikacja kompetencji oczekiwanych przez pracodawców na podstawie eksploracyjnej analizy ofert pracy</i>
10.10 am–10.15 am	Discussion	Discussion
10.15 am–10.45 am	Coffee break	
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Session 7A (session in English) – room A1		
<i>Applications of statistical methods</i>		
Chairperson: Prof. SGH dr hab. Michał Rubaszek		
10.45 am–11.05 am	Prof. Dr. Antonina Yerina, Doc. Dr. Zinatta Palian <i>Estimation of Indirect Demographic Losses in Ukraine Due to Armed Conflict</i>	Session 7B (session in Polish) – room A2 <i>Applications of statistical methods. Zastosowania metod statystycznych</i> Chairperson: Prof. UEP dr hab. Grażyna Dehnel
11.05 am–11.10 am	Discussion	Prof. UE dr hab Małgorzata Markowska <i>Dynamic Measurement of Achieving Europe 2020 Goals in Smart Development, in Poland, Using Multidimensional Scaling Approach // Dynamiczny pomiar realizacji celów strategii Europa 2020 w zakresie inteligentnego rozwoju w Polsce, z wykorzystaniem skalowania wielowymiarowego</i>
11.10 am–11.30 am	Dr Justyna Góral, prof. zw. dr. hab. Włodzimierz Rembisz <i>Spatial Differentiation of Remuneration and Labor Productivity in Polish Agriculture</i>	Discussion
11.30 am–11.35 am	Discussion	Dr Łukasz Wawrowski <i>Temporal Models in Poverty Estimation // Dynamiczne modele w estymacji ubóstwa</i>
		Discussion

11.35 am–11.55 am	Prof. Dr. hab. Natalia Kovtun, Associate Prof. Igor Motuziuk PhD, Prof. Dr. hab. Anatoliy Pilyavskyy, Roman Ganzha <i>Cox Regression in Survival Analysis of Women with Multiple Malignant Neoplasms</i>	Dr Artur Lipieta <i>Statistical Analysis of Living Standards of the Population of Poland and other European Union Countries // Statystyczna analiza poziomu życia ludności Polski na tle krajów Unii Europejskiej</i>
11.55 am–12.00 pm	Discussion	Discussion
12.00 pm–12.30 pm	Summary Discussion led by Prof. dr hab. Józef Pociecha The announcement of the results of Professor Kazimierz Zając Competition for the best presentation and the best poster. The awards are sponsored by StatSoft Poland.	
12.30 pm–1.30 pm	Lunch	
1.30 pm	Departure for Cracow by coach	

Abstracts

Jan Acedański (University of Economics in Katowice, Poland)
Julia Włodarczyk (University of Economics in Katowice, Poland)

Demography, Retirement age and Interest Rates in Poland

In the paper, we study the macroeconomic consequences of projected demographic changes in Poland. We focus on declining natural rate of interest caused by the increase in the life expectancy and the drop in fertility. We develop a two-country version of the model proposed by Gertler (1999, CRCSP) and modified recently by Carvalho, Ferrero and Nechio (2016, EER). We calibrate the parameters to match the basic characteristics of the Polish economy and the euro area. EUROPOP2015 population projections published by Eurostat are used to set the parameters governing the demographic transition. We show that the rapid ageing projected in Poland is likely to result in reducing the interest rate gap between Poland and the euro area. However, the estimates are sensitive to the changes in the effective retirement age in the two economies.

Keywords: interest rate, demography, ageing, retirement age

Katarzyna Bech-Wysocka (SGH Warsaw School of Economics, Poland)
Grant Hillier (University of Southampton, United Kingdom)

*Nonparametric Testing for Exogeneity with Discrete
Regressors and Instruments*

This paper presents new approaches to testing for exogeneity in non-parametric additive error models with discrete regressors and instruments. Such testing procedures, which enables researchers to verify one of the crucial assumptions required for consistent estimation, are yet only available in the continuous regressors framework. An interesting feature of the models with discrete regressors is that under endogeneity the identifying power of a discrete instrument depends on the number of support points of the instruments relative to that of the regressors, a result driven by the discreteness of the variables. Observing that the simple nonparametric additive error model can be interpreted as a linear regression, we present two test-statistics. For the point identifying model, the test is an adapted version of the standard Durbin-Wu-Hausman approach. This extends the work of Blundell and Horowitz (2007) to the case of discrete regressors and instruments. For the set identifying model, the Durbin-Wu-Hausman approach is not available. In this case the test-statistic is derived from a constrained minimization problem. The asymptotic distributions of the test-statistics are derived under the null and fixed and local alternatives based on the Lindeberg-Feller CLT. The tests are

shown to be consistent, and a simulation study reveals that the proposed tests have satisfactory finite-sample properties. The practicability of the suggested testing procedures is illustrated in an application to the modelling of returns to schooling. The main interest lies in testing whether education is endogenous in the standard wage equation of two classic models: Card (1995) and Angrist and Krueger (1991).

Keywords: endogeneity, instrumental variables, nonparametric model, specification testing

Jacek Bialek (University of Lodz, Poland)

*Comparison of Jevons and Carli elementary
Price Indices*

Most of countries use either Jevons or Carli index for the calculation of their Consumer Price Index (CPI) at the lowest (elementary) level of aggregation. The choice of the elementary formula for the inflation measurement does matter and the effect of the change of the index formula was estimated by the Bureau Labor Statistics (2001). It was shown (Hardy et al., 1934) that the difference between the Carli index and the Jevons index is bounded from below by the variance of the price relatives. In this paper we extend this result comparing expected values of these sample indices under the assumption that price relatives are described by geometric Brownian motion.

Keywords: CPI, Jevons index, Carli index

Beata Bieszk-Stolorz (University of Szczecin, Poland)

Krzysztof Dmytrów (University of Szczecin, Poland)

*Application of the Survival Trees for Estimation of the Influence
of Determinants on Probability of Exit
from the Registered Unemployment*

Survival trees are a very useful regression tool for modelling of relation between the survival time and the vector of covariates. They are the example of recursive binary partitioning, which goal is creation of the uniform subsets with respect to analysed response variables. Methods that are based on the trees, due to their non-parametric character, became very popular as an alternative to traditional methods. In presented analysis, the conditional inference trees were used. It is the non-parametric class of regression trees that can be used for all types of regression problems, including nominal, ordinal, numeric, censored as well as multivariate response variables and arbitrary measurement scales of the co-

variates. The goal of the research was estimation of the influence of gender, age and education on the probability of exit from the registered unemployment. Due to the fact that there were censored observations, survival analysis methods were used. Survival trees were built by means of the Kaplan-Meier estimators and the statistics of the log-rank test were used as splitting criteria. The two most numerous forms of deregistration from the labour office were considered – accepting a job and removal from the registry for reasons attributable to the unemployed person. It enabled to distinguish, on the basis of three analysed features, subsets of persons the most quickly and slowly accepting jobs and the most quickly and slowly resigning from the mediation of the labour office. The analysis was performed on the basis of individual data from the Poviát Labour Office in Szczecin. Calculations were performed in the R package partykit, using the ctree function.

Keywords: survival trees, Kaplan-Meier estimator, log-rank test, registered unemployment

Marcin Błażejowski (WSB University in Torun, Poland)

Pawel Kufel (WSB University in Torun, Poland)

Magdalena Osińska (Nicolaus Copernicus University in Toruń, Poland)

Tadeusz Kufel (Nicolaus Copernicus University in Toruń, Poland)

Robustness Analysis of the Business Cycle Modeling Using the Automated Threshold_Models.gfn Package for gretl

Robustness analysis of the automatic TAR modelling procedure implemented in gretl package for shifts of the threshold values is carry out by Monte Carlo simulations. In our approach we assume that the empirical threshold value is a priori unknown. To find it we check all possible combinations of quantiles at different lags of threshold variable. Model selection procedure is based on the Schwartz information criterion (BIC), but for the model to be considered, criteria such as the minimum number of degrees of freedom in each regime and the stationarity in each regime must be satisfied at the initial stage. In the simulations' scenario we assumed that the threshold value will be drawn from the uniform distribution defined on the interval which is a certain neighborhood of the selected threshold value (found in the model selection procedure) and the range of that neighborhood will be changing in 3 variants. The results of Monte Carlo experiments showed that the pro- posed procedure of automatic threshold model selection is robust against the interventions in the threshold value. The scale of intervention was of minor impact on the results.

Keywords: threshold models, robustness, gretl, business cycle

Justyna Brzezińska (University of Economics in Katowice, Poland)
Aneta Rybicka (Wrocław University of Economics, Poland)
Marcin Pelka (Wrocław University of Economics, Poland)

Multivariate Statistical Analysis of Environmental Data

One of the characteristics of environmental data is that many of them are mostly described by complex and large number of variables. To understand this phenomena it is necessary to analyze the relationship and association between them. In this paper we apply multivariate statistical methods for the analysis of environmental problems. Empirical part of this paper will present the application of several multivariate methods and graphical presentation using modern and advanced visualizing tools based on datasets and reports from the Organization for Economic Cooperation and Development (OECD). Presented analysis may be used in environmental practice and real life solutions. All calculations will be conducted in R software using.

Keywords: multivariate statistical analysis, OECD, environmental data, visualization, R programme

Miroslava Chekh (Lviv University of Trade and Economics, Ukraine)
Natallia Cherkas (Kyiv National Economic University, Ukraine)

*Production Fragmentation and Technological Transfer:
Evidence from CEE Countries*

Foreign direct investment inflow is traditionally considered as an important factor of structural changes and productivity growth in Central and Eastern European countries (CEECs) due to transfer of technologies and active participation in global value chains (GVC).

The aim of the article is to estimate influence of technological transfer on structural changes in CEECs. An empirical analysis of the impact of foreign direct investment and other indicators of technological transfer on the export structure was performed. We consider three export's groups of technology-intensive manufactures: high-, medium- and low skill and one export group of labor and resource-intensive manufactures. The analysis includes a panel framework covering seven CEECs (Croatia, Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia) over the period of 2001–2016. OLS with pooled data, panel data with fixed effects and dynamic panel-data model were used as principal methods. Our results mostly reflect the prediction of the Flying Geese Model (FGM) and GVC theory in terms of: (i) stimulating effect of foreign direct investment on high-skill and technology-intensive manufactures; (ii) significance of impact of technology

transfer through technological import growth for all export sectors; (iii) important contribution of EU integration to technological development of CEECs.

Keywords: technological transfer, export structure, production fragmentation, FDI, imports

Anna Chudzicka-Bator (Cracow University of Economics, Poland)

Mateusz Pipień (Cracow University of Economics, Poland)

*Modelling Intensity of EUR/PLN High Frequency Trade –
a Comparison of ACD-type Models*

In the paper a review of alternative parameterizations of the autoregressive conditional duration (ACD) models is presented. We consider several different specifications of the conditional mean of durations as well as the types of conditional distribution. We discuss relative predictive and explanatory performance of a class of competing specifications on the basis of the series of price and trade durations obtained for EUR/PLN exchange rate. To investigate relative performance we present detailed insight into the goodness of fit of estimated models on the basis of probability integral transformation (PIT).

Keywords: high frequency data, exchange rate, durations, ACD models, probability integral transform

Marta Chylińska (University of Gdańsk, Poland)

*Aluminium Price Discovery on the London Metal Exchange,
2007–2017*

The aim of the paper is to extend the analysis of aluminium price discovery on the London Metal Exchange (LME) beyond the 2007–2008 global financial crisis. To this end I estimate a VEC DCC-MGARCH model on the weekly sampled price series of spot and 3-month aluminium futures in the period 3 Oct 2007–27 Sep 2017 (10 years, 522 observations). I find that both prices exhibit a common stochastic trend and their spread have co-integrating properties. I reject the hypothesis stating that they equally quickly revert to the long-run equilibrium relationship. I also observe an increased conditional volatility of their returns during the crisis and after that a slightly decreasing albeit very close to unity their conditional correlation coefficient. Nevertheless I reject a constant conditional correlation hypothesis (CCC-MGARCH). More interestingly, I find that the term premium is likely to be proportional to the exchange rate of US dollar into British pound.

Keywords: aluminium futures, London Metal Exchange, VEC DCC-MGARCH

Malgorzata Ćwiek (Cracow University of Economics, Poland)

Determinants of Digital Exclusion of Polish Households

Inabilities to access or use information and communication technologies are regarded as a potential barrier for participation individuals in the information society and lead to digital divide. The study presents selected aspects of the digital inequity in Poland. The purpose of this paper is to identify socio-economic factors that favour digital divide of households in Poland.

Individual, non-identifiable data from the household budget survey carried out by the Central Statistical Office in Poland in the years 2012–2016 were used for the analysis.

Keywords: digital divide, digital development, information society

Marek A. Dąbrowski (Cracow University of Economics, Poland)

Lukasz Kwiatkowski (Cracow University of Economics, Poland)

Justyna Wróblewska (Cracow University of Economics, Poland)

Sources of Real Exchange Rate Variability in Poland – Evidence from a Bayesian SVAR Model with Markov Switching Heteroscedasticity

This paper investigates the sources of real exchange rate fluctuations in Poland in 2000–2016. The objective is to assess the relative importance of demand, cost and monetary shocks in driving the exchange rate in Poland before and during the global financial crisis. A two-country and two-good New Keynesian open economy model as developed by Engel and West (2006) is used as a theoretical framework. A Bayesian SVAR model with Markov switching heteroscedasticity is used in empirical part. The structural shocks are identified on the basis of the changes in volatility and named with reference to the sign restrictions derived from the economic model. We identify two regimes/states: one with high volatility and another one with low volatility. Estimated impulse response functions are in line with the theoretical model though uncertainty is rather large. The main finding is that the real exchange rate is mainly driven by monetary shocks and to a certain extent by (real) demand shocks. In turbulent times, however, the importance of monetary shocks for all variables increases substantially. In order to assess the insulating property of the floating exchange rate regime one needs to carry out a comparative analysis.

Keywords: real exchange rate, open economy macroeconomics, Bayesian MS-VAR models

Marek A. Dąbrowski (Cracow University of Economics, Poland)
Monika Papięż (Cracow University of Economics, Poland)
Sławomir Śmiech (Cracow University of Economics, Poland)

*Is There a Trade-off between Monetary Autonomy and Exchange Rate Stability
in Emerging Market Economies?*

The paper examines the consequences of a choice of the exchange rate regime in emerging market economies. According to the conventional open economy model one of the important advantages of the floating exchange rate regime is that a country can pursue an autonomous monetary policy. Using this insight Aizenman, Chinn and Ito (2013) constructed the indices that measure the trilemma aspects, including monetary independence. They demonstrated that emerging market economies have retained some degree of monetary autonomy. More recently, however, Rey (2016, 2013) questioned the validity of the trilemma arguing that ‘whenever capital is freely mobile, the global financial cycle constrains national monetary policies regardless of the exchange rate regime.’ Empirical evidence on the relevance on Rey’s ‘irreconcilable duo’ hypothesis for emerging market economies remain mixed. We use a ‘contagion’ empirical model of monetary policy developed by Edwards (2015) to examine whether the degree of ‘policy contagion’ is indeed unrelated to the exchange rate flexibility. We use a panel data on money market interest rates in Asian, European and Latin American emerging market economies. Updated de facto exchange rate regime classification developed by Ilzetzki, Reinhart & Rogoff (2017) is employed to proxy for the exchange rate flexibility. Our main finding is that in principle monetary authorities in emerging market economies retain influence on over domestic financial conditions, which is in line with findings of Disyatat & Rungcharoenkitkul (2016), although we employ a different approach.

Keywords: monetary policy, exchange rate regime, open economy macroeconomics, panel methods

Grażyna Dehnel (Poznań University of Economics and Business, Poland)
**Łukasz Wawrowski (Poznań University of Economics and Business,
Poland)**

*Robust Estimation of Revenues of Polish small Companies by
NACE Section and Province*

Sample surveys conducted by the Central Statistical Office are currently the main source of information about revenues earned by small companies. Given the sam-

ple size, sampling scheme and the estimation method used in the survey, reliable estimates can only be produced for domains at the level of country, province or section of business classification. The market economy, however, creates a demand for local level information about businesses and economic conditions, which is provided on a regular basis at short intervals.

The article describes an empirical study designed to test a small area estimation method. The goal of the study is to apply a robust version of the Fay-Herriot model, which, unlike the classical Fay-Herriot model, makes it possible to meet the assumption of normality of random effects under the presence of outliers. These alternative models will be supplied with auxiliary variables in order to estimate revenues of small businesses (with between 10 and 49 employees). Other sources of data used in the analysis include the DGI report, Poland's largest enterprise survey, and administrative registers. The study is expected to provide information about patterns and characteristics of the small business sector in Poland for territorial units on low level of aggregation.

Keywords: small area estimation, indirect estimation, robust Fay-Herriot model, administrative registers, business statistics

Krzysztof Dmytrów (University of Szczecin, Poland)

Jacek Batóg (University of Szczecin, Poland)

Identification of key Determinants of Companies Bankruptcy in the EU-15 Countries in Years 2008-2016

The article will present the results of analysis of distributions of selected economic and financial indicators of companies being in good condition and the ones that have become bankrupt in the EU-15 countries. Hypothesis about differences between these distributions will be verified. Supplementary analysis will consist of changes of these distributions in the analysed period and identification of key indicators in the context of bankruptcy forecasting. The source of data is the ORBIS database and the analysed period consists of years 2008–2016. Cluster analysis and linear discriminant function will be applied.

Keywords: companies bankruptcy, financial and economic analysis, cluster analysis, discriminant function

Czesław Domański (University of Lodz, Poland)
Robert Kubacki (University of Lodz, Poland)

*Application of Differential Evolution Algorithm
to Group Bank's Individual Clients*

Grouping methods are one of the most commonly used methods of data mining in banking. Their goal is to get to know client base better. In addition to cognitive values, they often constitute a starting point for subsequent analyzes. The aim of the article is to present the results of grouping individual clients of the bank with the differential evolution algorithm. This algorithm is an alternative to the commonly used k-means algorithm. Differential evolution algorithm is generating several competing solutions in one iteration. It allows to become independent of starting vectors and to be more effectively in searching for an optimal solution. Clustering was run with selected continuous variables characterizing all individual clients (deposit, credit and investment). The calculations were made using the proprietary computer program. The differential evolution algorithm itself has been enriched with a variable that allows the selection of the optimal number of clusters. Proposed solutions (chromosomes) in iterations were evaluated by the target function built on the CS measure proposed by Chou. The conducted analysis showed that the algorithm used correctly groups the bank's clients.

Keywords: clustering methods, differential evolution algorithm, CS measure

Iwona Foryś (University of Szczecin, Poland)
Barbara Batóg (University of Szczecin, Poland)

*Analysis of Transaction Prices on one of Housing Estates in Szczecin: Do
the Buyers Differentiate Prices on Local Markets with Respect to the Kind
of the Right to Own?*

Housing market participants are interested in dependency between price and attributes of apartments during every stage of business cycle. Therefore the results of researches on housing market dealing with dependencies between prices and attributes and the results of classifications of purchased apartments according to their attributes are very useful tool supporting decisions of housing market participants. One of the most essential attributes of real estate is the right to own. In case of apartments it could be property, limited rights in rem and law of obligations. The widest ones are property, co-operative title to premises, tenant law and rent.

The aim of the paper is comparison of transaction prices in case of two strong laws: property and co-operative title to premises in different stages of business

cycle on homogeneous housing estate. The key question is: do the buyers differentiate prices with respect to the kind of the right to own? The tendencies of average monthly prices of these two kinds of rights will be analyzed. The distributions of transaction prices in consecutive years will be assigned. The research is based on information concerning all transactions on local housing market in Szczecin in 2006–2017 found in notary deeds collected by Authors. The transactions were conducted on one of housing estate in Szczecin named “Zawadzkiego-Klonowica”. The choice of this housing estate was caused by its characteristics such as constant number of apartments and the same type and technology of buildings.

Keywords: housing market, transaction prices, cointegration

Ewa Genge (University of Economics in Katowice, Poland)

Graphical Tools of Discrete Longitudinal Data Presentation in R

Good graphical presentation of data is useful during the whole analysis process from the first glimpse into the data to the model fitting and presentation of results. The most popular way of the longitudinal data presentation is the separate (for each wave, in cross-sectional dimension) figures comparisons. However, plotting the data over time is useful in suggesting appropriate modelling techniques to deal with the heterogeneity observed in the trajectories.

The main aim of this paper is to present the graphical tools for the heterogenous discrete longitudinal data sets analysis. We will focus on the most important features of the categorical longitudinal data – category sequences and their graphical presentation. We will present and compare the results for sequence index plot, sequence frequency plots, mean time plot, transversal state distribution plot, transversal entropy plot for the Polish household’s subjective assessment of the financial situation using mainly TraMineR (Gabadinho et al., 2017) package of R.

Keywords: longitudinal data, sequence visualization

Andreas Geyer-Schulz (Karlsruhe Institute of Technology, Germany)

Martin Schweizer

Peter Kurz

On the Econometrics of Data from Product Configurators or Conjoint Experiments

Data from product configurators or conjoint experiments consists of observations in a closed world. This implies that such data sets are collinear by design. When estimating inear part-worth utility or pricing models for such a data set, the com-

plete mathematical solution consists of a family of linear models, each of which expresses a measurement of part-worth utility/price change relative to a default configuration. More precisely, the family is represented as a default configuration and a permutation group on the attribute level. On the level of the pricing model, a group of linear matrix operators for the coefficients of the parameters exists which captures the mappings between the default configurations. In this contribution we show:

1. how to extract the partial preference order of product configurations of the consumer from this family of models,
2. how the partial preference order is exploited for the automating diagnostics on irrational behaviour as well as,
3. for the development of rank-based clustering methods for market segmentation.

Justyna Góral (Institute of Agricultural and Food Economics – National Research Institute in Warsaw, Poland)
Anatoliy Pilyavskyy (Lviv University of Trade and Economics, Ukraine)

The Development Potential of Farms in the Context of Financial Aid

The aim of the paper is to examine relation between productivity of agricultural farms, their return on sales and subsidy rate. Data from Eurostat and European FADN (RICA) database have been used. Data for the years 2010–2015 were analyzed. The changes in productivity of European farms were calculated using Malmquist indexes. Correlation coefficients and portfolio methods have been used, too. Portfolio methods form a link between productivity measures and viability ratios (Total Factor Productivity – TFP and return on sales). The authors have added a third variable – subsidy rate. A modified Boston Consulting Group matrix was obtained. The matrix helped to determine the competitiveness of European farms. The authors also verified the level of farm connection with the market and dependence of farms on subsidies. The impact of subsidies on the different component of TFP can be captured by a quasi-experimental method. The initial results confirmed positive effects of subsidies on technical change (component of TFP). It was initially noted that with the increase in the return on sales, the dependence on subsidies decreased.

Keywords: total factor productivity, return on sales, subsidy, agricultural farm

Justyna Góral (Institute of Agricultural and Food Economics – National Research Institute in Warsaw, Poland)

Włodzimierz Rembisz (Institute of Agricultural and Food Economics – National Research Institute in Warsaw, Poland)

Spatial Differentiation of Remuneration and Labor Productivity in Polish Agriculture

The aim of the article is to examine the relation and distribution of labor productivity (first variable) and remunerations in Polish agriculture (second variable) in a spatial layout. In addition, the authors wanted to find the reasons for the diversity of distribution of the two above-mentioned variables in the regional system. In relation to the theory of agricultural economics, these reasons include the technical equipment of labor factor with capital factor and farmland factor. These determinants also illustrate the agrarian structure, and more precisely – the factor structure in agriculture.

The analytical assumptions were verified empirically. Data from Eurostat and Local Data Bank (from Central Statistical Office of Poland) have been used. During empirical studies, Gini coefficients as well as regression and correlation analyzes were used. As a result, a higher variability of labour productivity was observed. It was result of higher variability of technical equipment of labor factor with capital factor and farmland factor in a spatial layout. It was important information for formulating future goals and assumptions of agricultural policy.

Keywords: labor productivity, remunerations, agriculture, Gini coefficient

Francesca Greselin (University of Milano-Bicocca, Italy)

Robust Clustering Methods for Multivariate Socio-economic Data

Finite mixture distributions have been receiving a growing interest in statistical modelling. Their central role is mainly due to their double nature: they combine the flexibility of non-parametric models with the strong and useful mathematical properties of parametric models. According to this approach, when we know that a sample of observations has been drawn from different populations, we assume a specific distributional form in each of the underlying populations. The purpose is to decompose the sample into its mixture components, which, for quantitative data, are usually modelled as a multivariate Gaussian distribution, and to estimate parameters. The assumption of underlying normality, besides the elegant analytic properties, allows also to employ the EM algorithm for the ML estimation of the parameters.

In this paper we review some recent results in the literature of mixture models, focusing on robust estimation methods and showing how effective are such pro-

posals for modelling socioeconomic variables. We will begin considering robust mixtures of Gaussian factor analyzers, particularly indicated for high dimensional datasets, whenever as in many phenomena, we may conjecture that a few unobserved (latent) features explain the many observed ones.

Afterwards, we present robust mixtures of regression, where a Gaussian distribution can be employed to model the explanatory variables, in view of obtaining better classification and to improve the quality of the estimation.

Finally, we venture into widening the fields of application of finite mixtures also to skew data, by adopting robust mixtures of skew Gaussian distributions.

The different approaches will be presented in view of clustering real data, namely tourism data, data on household consumption and income, bankruptcy data and other socio-economic variables. The emphasis of the presentation will be in providing evidence on how the robust estimation is useful in applications, showing that it offers improved results in classification, also in presence of disturbing noise or data contamination.

Sergiusz Herman (Poznań University of Economics and Business, Poland)

Application of Generalized Data Envelopment Analysis Model on Warsaw Stock Exchange

Fundamental analysis is the tool used by stock investors. The main aim of this is the estimation of financial conditions of companies. Companies' financial statements are the source of information. On that basis financial ratios, which are typical of different operations of these business, are estimated. Financial positions, which are included in financial statements, are also used to analyse the operations efficiency of companies obtained from parametric and non-parametric methods. Efficiency estimated using these methods is rarely used for assessing joint-stock companies. There are three main aims of research. The first of them is to research statistically significant relationship between operating efficiency of joint-stock companies in Poland and their stock returns on Warsaw Stock Exchange. The second aim of the research is to define determinants of operating efficiency of companies in chosen industries. The other aim is to verify if using information about operating efficiency of joint-stock companies with constructing stock portfolio may improve the investor's situation. Empirical studies were conducted on 72 joint-stock companies in Polish capital market. These companies represent following industries: construction, clothes and cosmetics sector, food and drinks sector. The calculations were performed using Generalized Data Envelopment Analysis Model.

Keywords: operating efficiency, stock returns, Data Envelopment Analysis, stock exchange

Roman Huptas (Cracow University of Economics, Poland)

The Impact of Intraday Trading Volume on Return Volatility on the Polish Stock Market

The information role of trading volume on price volatility has generated a lot of interest for a long time. The aim of this research is to empirically examine the influence of intraday trading volume on price volatility on the Polish stock market. Following Bessembinder & Seguin (1993), this study investigates whether the effect of intraday trading volume on return volatility is homogenous by dividing trading volume into its expected (anticipated) and unexpected (unanticipated) components and allowing each component to have a separable effect on return volatility. To model return volatility, the exponential generalized autoregressive conditional heteroscedasticity (EGARCH) structure is employed using expected and unexpected components of trading volume as explanatory variables. In order to define expected and unexpected trading volume variables, the autoregressive conditional volume (ACV) model of Manganelli (2005) is applied to describe the observed trading volume. The expected volume is defined as an estimate of the conditional expectation of volume whereas the unexpected volume is defined as ratio of observed volume to expected volume. To estimate considered model, Bayesian approach is adopted. The MCMC methods including Metropolis-Hastings algorithm are suitably used to obtain posterior densities of interest. An empirical study of the intraday volume-volatility relationship is performed for 15-minut intraday volume and return data from the Polish stock market, which is a leading stock market in Central and Eastern Europe.

Keywords: volume-volatility relationship, intraday data, EGARCH, ACV model, Bayesian inference

Mateusz Jankiewicz (Nicolaus Copernicus University in Toruń, Poland)

Changes of the Consumption Structure in European Countries Considering Its Modernisation Process

The aim of the article is to assess the diversity and changes in the structure of household consumption of European countries, with particular emphasis on the division into consumption of necessity goods and luxury goods in the years 1995–2016. The progressive process of modernising consumption in Europe causes a change in the consumption pattern. According to this process, the consumption of luxury goods plays a more and more significant role in the consumption structure. The conducted study is the basis for checking whether this process is reflected

in all European countries. In particular, this analysis is to check whether and to what extent there was an increase in the share of consumption of luxury goods in total consumption in each of the countries in the analysed period. The analysis of the diversification of the consumption structure in the countries in the entire period is carried out using the cluster analysis method that allows the identification of territorial units with similar characteristics in this matter. The study is supplemented with the analysis of the consumption structure in the European countries over the period 1995–2016, with the particular emphasis on the location factor.

Keywords: consumption structure, necessity goods, luxury goods, cluster analysis, consumption convergence

Maciej Jewczak (University of Lodz, Poland)

Karol Korczak (University of Lodz, Poland)

Marek Melaniuk (University of Lodz, Poland)

Jadwiga Suchecka (University of Lodz, Poland)

Spatial Analysis and Assessment of Effectiveness of Selected Social Services

The aim of the article is to implement a new approach to assess the effectiveness of selected social services on the example of statistical data from the Social Welfare Center in the city of Zgierz (Poland).

The analysis was conducted in two ways – it concerned: 1) spatial differentiation analysis and 2) the assessment of the effectiveness of granting social services. In most analyses of spatial distribution for the assessment of the intensity of the social assistance, the indicators compare the structure of people receiving benefits in relation to the total population.

The Authors propose the use of the Multiplicative Indicator of Poverty Intensity, which consists of 4 components: the number of people living on a given street, the number of beneficiaries of social assistance and the number and the amount of social services granted. Assessment of the effectiveness of social assistance is treated in an extended way than the commonly-used approach expressing the ratio of the number of beneficiaries in relation to the actual number of people in need. The dynamic approach was also taken into account, which allowed determining changes in the effectiveness of social assistance and residence allowances.

In conclusion, the interdependence of spatial analysis with the assessment of effectiveness was indicated. It is the basis for creating a more effective social policy.

Keywords: social welfare, benefits, social services, residence allowance, spatial analysis, effectiveness

Alina Jędrzejczak (University of Lodz, Poland)
Dorota Pekasiewicz (University of Lodz, Poland)
Wojciech Zieliński (Warsaw University of Life Sciences – SGGW, Poland)

Comparison of Parameter Estimators for the Dagum Distribution

The Dagum model is frequently applied to the analysis of income and wage distributions all over the world. It has many desirable statistical properties and turned out to be well fitted to empirical distributions in different divisions (by socio-economic groups, family types or geographical regions). The estimates of its parameters can be applied to the evaluation of numerous income distribution characteristics, including inequality, poverty and wealth indices, dispersion measures based on quantiles and concentration curves. They can also be used to compare income distributions in space and over time. The estimation of these characteristics needs reliable Dagum distribution estimates. The paper is devoted to the analysis of statistical properties of various estimators of the Dagum distribution parameters. In particular, the biases and mean squared errors of the estimators have been obtained. The results helped us formulate the conclusions on the efficiency of the proposed methods.

Keywords: size distributions, Dagum distribution, parameter estimation

Grzegorz Kończak (University of Economics in Katowice, Poland)

On Some Non-classical Methods of the Statistical Inference

Motto:

*“Statistics is more a way of thinking or reasoning
than a bunch of prescriptions for beating data to elicit answer”*

(C. R. Rao, *Statistics and Truth. Putting Chance to Work*,
World Scientific Singapore 1997)

Easy access to high-speed computers and data analysis programs has led to more and more people do statistical analyzes. Often these are people who have not the proper statistical knowledge. In such cases, the professional program is mechanically used by selecting a command from the menu and adding a comment to the results. Statistical methods, however, should not be used in a “mechanical” way. The right reference to these methods is inherently connected with the necessity of choosing the right solution and checking if the required assumptions are met. Statistics are in fact a way of thinking, which requires the researcher to

understand certain principles. Only the right approach to data analysis will lead to a reliable description of the reality that surrounds us.

Selected non-standard historical solutions of important social and economic problems based on data analysis will be presented. Against this background, examples of non-classical statistical methods will be presented with particular attention to methods of statistical inference. Will be discussed, among others the possibilities of using Monte Carlo methods such as bootstrap and permutation tests in forecasting and statistical inference.

Keywords: statistical inference, permutation tests, bootstrap

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Jerzy Rydlewski (AGH University of Science and Technology, Poland)

Dominik Mielczarek (AGH University of Science and Technology, Poland)

New Proposal of Robust Classifier for Functional Data

A variety of economic research hypotheses may be translated into a language of statistical discrimination analysis. The company's ability to adapt to changing environmental circumstances may be expressed in terms of a quality of a classifier used in a decision process by the company's management. The specific classifier is developed basing on company's experience expressed in the, so called, training sample, using statistical terminology. In practice, however, training samples contain outliers of various kinds, which influence the classifier quality. For this reason, robust classifiers, which are able to cope with various data imperfections, are especially desired. This paper focuses on robust classification issues for functional data. We present the state of art and indicate its consequences on the robust economic analysis. We critically discuss a concept of robustness in the context of classifier for functional data, and propose an original classification rule basing on support vector machine methodology. We show its selected properties and apply it to an empirical issue related to monitoring of electricity market.

Keywords: classifier for functional objects, electricity market, robustness, support vector machines classifier

Daniel Kosiorowski (Cracow University of Economics, Poland)
Dominik Mielczarek (AGH University of Science and Technology, Poland)
Jerzy P. Rydlewski (AGH University of Science and Technology, Poland)

*Outliers in Functional Time Series – Challenges for Theory and Applications
of Robust Statistics*

Many economic phenomena may be treated as functional time series – series of functions of a certain continuum representing, for example, time, temperature, interest rate, an aversion to risk, age of a credit applicant etc. Within this framework and assuming certain degree of regularity as to data generating processes, one can effectively model, conduct statistical inference and predict complex economic phenomena. Unfortunately, observed empirical data sets very often manifest departure from the assumed regularity and/or consist of outliers. As a consequence, it makes an application of functional generalizations of standard time series techniques rather problematic. It should be stressed however, that although that there are known effective techniques of coping with outliers in one- and multidimensional cases, the situation is far from satisfactory in classical time series setting. In the functional data analysis area we additionally face further completely new challenges for development of the appropriate robust statistical procedures. We face completely new classes of outliers in functional time series setup, and do not have in a disposal straightforward generalizations of simple outliers detection tools, i.e., boxplot or quantile – quantile plot.

This paper critically discusses the most promising, known from the literature approaches to analysis of robustness in the functional time series setup. We also propose our own method of detecting functional outliers appealing to the generalized Young inverse function. Theoretical considerations are illustrated by means of empirical examples taken from the economics.

Keywords: functional data analysis, functional time series, functional outlier

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The Logistic Regression in Predicting Spike Occurrences in Electricity Prices

Electricity supply and demand are subject to weather conditions (temperature, wind speed, precipitation) as well as daily, weekly or yearly seasonality due to e.g. an intensity of business activities. These features have a significant impact on the market and price behaviour. Especially because of the lack of storage capacity sharp movements of prices are more frequent and more violent on electricity market

than on the stock exchange or other commodity markets. An ability of modelling and forecasting jumps and spikes plays the crucial role in risk management.

In the paper, the logistic regression is employed to predict spike occurrences. We investigate the impact of fundamental variables such as demand, weather and seasonal factors, on spike occurrences. The point and interval theoretical probabilities are calculated. The classification accuracy is assessed by means of the sensitivity, the specificity, and the AUC measures. We detect spikes using a quantile analysis, a recursive filter of prices, a jump diffusion process and some non-parametric techniques.

Keywords: electricity price, jumps, spike prediction, logistic regression, DEJD

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Cox Regression in Survival Analysis of Women with Multiple Malignant Neoplasms

During past few years, the interval between the first and second reproductive cancer diagnosis has decreased in 6 times – from 11 to just 2 years while probability of surviving the next 3 years after 8.5 years past initial diagnosis has decreased from 0.995 to 0.562. Using performed analysis, this paper provides details of survival modelling for women with breast cancer with the aim to find the most significant factors affecting the likelihood of survival not by chance alone. The data used for research were obtained from Ukrainian National Institute of Cancer covering 1981–2016 period.

The modelling was performed using Cox regression with forward effect selection method and stay in p-value boundary equal to 0.15. The forward method firstly computes the adjusted chi-square statistics for each variable. Then, it examines the largest computed statistics and if particular one is significant, the corresponding variable is added to the model. Once the variable is entered, it is never removed from the model. 3 out of 4 factors that appeared to be significant according to forward selection method were confirmed as the significant ones by stepwise selection method.

The results of modelling proved the possibility of prediction the survival using certain set of disease features and subjects characteristics. Testing of global hypothesis for Beta resulted in rejecting of null hypothesis ($\text{Beta} = 0$) in favor of the alternative one ($\text{Beta} \neq 0$) thus it was confirmed that the models make sense and can be used to predict survival in women with breast cancer. According to

obtained results, the most significant disease features and subjects characteristics appeared to be: first diagnosis before 2008 and after 2008, relapses presence, treatment type and combination, first disease localization.

Keywords: Cox regression, forward method, survival analysis, breast cancer, multiple primary malignant neoplasms

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Standard of Living in Poland at Regional Level – Classification with Kohonen Self-Organizing Maps

The standard of living is spatially diversified (Malinowski, 2017) and its' analyzes enable shaping regional policy. Therefore, it is crucial to assess the standard of living and to classify regions due to the standard of living, based on a wide set of determinants. The most popular methods are those based on composite indicators, however, they are not ideal. Among the current critiques moved to the use of composite indicators is the normative nature of the weights, the drawbacks of the linear method of aggregation and the fact that composite indicators flatten alternatives and differences among analyzed objects (OECD-JRC 2008; Paruolo et al., 2013; Becker et al., 2017). Thus why more objective alternative solutions are nowadays gaining popularity.

The aim of this article is the regional classification of Polish NUTS-4 regions due to their standard of living using SOM – self-organizing maps – the model of a neural network mapping multidimensional space into a two-dimensional map of neurons. The article discusses also the comparison among results obtained using SOM and classic aggregation methods based on the composite indicator.

Becker, W., Paruolo, P., Saisana, M., & Saltelli, A. (2017). Weights and Importance in Composite Indicators: Mind the Gap, in *Handbook of Uncertainty Quantification*, Editors: Roger Ghanem, David Higdon, Houman Owhadi.

Carboni, O. A., & Russu, P. (2015). Assessing Regional Wellbeing in Italy: An Application of Malmquist-DEA and Self-organizing Map Neural Clustering. *Social indicators research*, 122(3), 677-700.

Malinowski, M. (2017). Przejrzyste zróżnicowanie poziomu życia ludności w ujęciu powiatów. *Wiadomości Statystyczne*, (2), 52-71.

Paruolo, P., Saisana, M., & Saltelli, A. (2013). Ratings and Rankings: Voodoo or Science?. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 176(3), 609-634.

Keywords: standard of living, neural networks, Kohonen self-organizing maps, regional analysis

Lukasz Lenart (Cracow University of Economics, Poland)

Bayesian Estimation of Deterministic Cycle with Time-varying Amplitude

The main goal of the paper is to discuss Bayesian estimation in a generalization of model proposed in by [1], where the autoregressive model with time-varying almost periodic mean function was investigated with constant amplitude and frequencies. Unfortunately, the assumption concerning constant amplitude seems to be too strong to describe the changing nature of the business cycle. Hence, we assume that the mean function depends on unknown frequencies (related to the length of the cyclical fluctuations) in a similar way as for the almost periodic mean function proposed in (Lenart and Mazur, 2016), while the assumption concerning constant amplitude was relaxed. More specifically, we assume that the amplitude associated with a given frequency is time-varying and is a linear spline. We obtain the explicit marginal posterior distribution for vector of frequency parameters in the approximate model. The simulation study shows that this posterior is still likely to be multimodal, but it seems that this multimodality is not as characteristic as in the model proposed in [1]. Finally, we consider real data example concerning monthly production in industry in selected European countries.

Lenart, Ł., & Mazur, B. (2016). On Bayesian Inference for Almost Periodic in Mean Autoregressive Models. *Przełąd Statystyczny*, 63(3), 255-271.

Keywords: deterministic cycle, time-varying amplitude, almost periodic mean function, Bayesian estimation

Lukasz Lenart (Cracow University of Economics, Poland)

Justyna Wróblewska (Cracow University of Economics, Poland)

Nonlinear Stochastic Cycle

The aim of this paper is to construct stationary nonlinear stochastic cycle model by utilizing the idea of linear innovations state space model. We construct nonlinear stochastic cycle model using the idea of deterministic cycle based on almost periodic function. The main properties in time domain and frequency domain for proposed nonlinear stochastic cycle model were shown. The amplitude and phase of such cycle are stochastic and are directly defined by the amplitude and phase components. Extensions to multivariate case are possible. Our proposition gives an alternative for popular stochastic cycle model, which can be reduced to linear ARMA model. During statistical inference, we do not need to use Kalman filter to compute the likelihood function, if we use state space models with single sources of error. However, the extension to classical state space model with few

sources of error are possible. The real data example has been presented in Bayesian framework.

Keywords: nonlinear stochastic cycle, linear innovations state space model, ARMA model

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Emilia Gosińska (University of Lodz, Poland)

Aleksander Welfe (University of Lodz, Poland)

Oil-Based Products Pricing: An Application of Threshold Cointegrated VAR Model

The introduction of a dummy variable into any CVAR equation (what is rather a common practice in many empirical works) must be reflected in the cointegration space otherwise it cannot be interpreted as the change of data generating process. This also applies to bivariate threshold models. However, the Hansen-Seo procedure, that has been so far used for estimation, does not allow the constant to be present (and adjusted) in the cointegrating vector. Therefore an appropriate modification has been proposed, and its application to the fuel pricing model demonstrated.

It was proved that at the wholesale level of distribution, both European and domestic, fuel price adjustments are symmetric, whereas the domestic wholesale price transmission to the retail price is the only one that is asymmetric. This result confirms that in the countries (especially new members of the European Union) where the fuel markets are affected by the asymmetry phenomenon, the petrol stations, not the oil companies, are most likely to be responsible for this situation.

Keywords: threshold cointegration, threshold cointegrated VAR, modified Hansen-Seo method, fuel pricing, asymmetric price adjustments

Artur Lipieta (Cracow University of Economics, Poland)

Statistical Analysis of Living Standards of the Population of Poland and Other European Union Countries

Poland has been one of the European Union countries for over 10 years. EU allocates huge funds for the implementation of common policies (including regional, cohesion, structural) aimed at improving upon life of its citizens and equalizing economic disparities between the Union regions and, as a result, between their inhabitants.

The paper presents the results of research on the living standards of the population of EU countries in the years 2004-2015. In our interest are the answers to the questions about the distance between the countries of Western Europe and the countries of Central and Eastern Europe (in terms of the living standard of the population) and the Poland's position among them. To reach the aims of the paper synthetic variable and methods of multivariate comparative analysis will be used.

Keywords: living standards, European Union, multivariate comparative analysis

Iwona Markowicz (University of Szczecin, Poland)

Pawel Baran (University of Szczecin, Poland)

Analysis of Intra-Community Supply of Goods Shipped from Poland

One result of creation of the EU (and its predecessor, the EC) is that all customs duties at the borders between EU countries were revoked. Thus, the Community has been deprived of a viable source of data on international trade. It became necessary to introduce a new, common system of statistics of trade in goods. This is why on January 1st, 1993 the Intrastat system was introduced in the whole area of the European Single Market.

Poland's accession to EU on May 1st, 2004 imposed new duties on every entity selling goods to or buying them from other EU member states. The obligation includes filling in Intrastat declaration, i.e. granting the National Fiscal Administration detailed information on trade in goods between member states. Statistical data on international trade collected in the process are then combined at Eurostat together with other countries' data. Sometimes data are incompatible. An example is the difference between two datasets: first of them containing data on intra-Community supplies (ICS) dispatched from Poland (collected at national level) and the second containing data on intra-Community acquisitions (ICA) originating in Poland (aggregated by Eurostat from other EU members data). The authors will have examined such differences on Combined Nomenclature chapter (2-digit) level for both total figures and divided by country. The next part of the survey is to classify countries by the structure of ICS from Poland. The goal of the article will be to point out the CN chapters with the largest differences between ICS and ICA from Poland while providing possible explanation. We need to stress out that we will base our whole work on public statistics only. The very same data serve as the basis for all knowledge on EU intra-Community trade.

Keywords: intra-Community supply, cluster analysis, public statistics

Malgorzata Markowska (Wroclaw University of Economics, Poland)

Dynamic Measurement of Achieving Europe 2020 Goals in Smart Development, in Poland, Using Multidimensional Scaling Approach

The relative composite measure for assessing the degree of realization of Europe 2020 strategic goals in the field of smart development has been proposed in the paper. Global trimmed standardization, weighing and distance matrix calculation leads to the application of Multidimensional Scaling approach. Two points are added to the data: a starting point, and a final goal based on Poland specific goals. The proposed measure is calculated as percentage ratio of a distance to a starting point and a distance between starting point and a goal. The empirical example deals with Polish provinces, covering 2005–2016 period. Time series of composite measure show the growing disparities between provinces. Forecasts based on trend extrapolation predict the year in which particular province is going to achieve the final goal, assuming the now observed speed of development.

Keywords: EUROPE 2020, strategic goals, smart growth, NUTS 2 regions

Błażej Mazur (Cracow University of Economics, Poland)

Cyclical Fluctuations of Global Food Prices: a Predictive Analysis

Forecasting of fluctuations in worldwide food prices is of considerable practical importance – however, it is also difficult, especially for longer horizons. Standard econometric models often fail to take into account non-seasonal cyclicity present in some of the series under consideration. In particular in many cases the models either assume mean-reversion (so the forecast paths stabilize at some value) or a random-walk type behaviour (so the forecast paths are determined by the last observation available). In other words, it is not easy to obtain forecasts that reveal future turning points (so are capable of forecasting of out-of-sample deviations from mean).

In order to deal with the issue we make use of Bayesian deterministic cycle models based on Flexible Fourier type representation in order to analyze the dynamics of FAO food price indexes. We focus on prediction of individual year-on-year growth rates in horizons ranging from one to twenty four months ahead. As the purpose of the paper is to analyze performance of density forecasts, we investigate log-predictive score as well as continuous ranked probability score. We find a clear pattern of fluctuations in dairy prices and a bit less-evident cyclical-like fluctuations in meat prices – so that the models with periodicity allow for improved.

Keywords: Bayesian inference, food prices, density prediction, cyclicity

Radosław Maćkik (Maria Curie Skłodowska University, Poland)

Identification of Factors Affecting the Popularity of Cross-border Online Shopping in the European Union Countries

The popularity of cross-border online purchases among consumers from EU countries is strongly diversified (ranging between 3% and 81% of Internet users). The level of Internet penetration in a given country and the level of involvement in online shopping measured by the percentage of online shoppers do not adequately explain the diversification of the percentage of cross-border online shoppers at EU countries level, explaining only up to 20% of the variance of this ratio.

The presented analyses are a side effect of the questionnaire and quasi-experimental research on the practice of geo-discrimination of Polish consumers in cross-border e-commerce. An attempt was made to explain the volatility of the percentage of cross-border online shoppers at EU countries level, separately for purchases made in EU and non-EU countries. Data used include the Eurostat relevant quantitative data (data series: isoc_ec_ibuy), supplemented with data from mystery shopping study commissioned by the European Commission, selected indicators characterising local B2C e-commerce markets, and qualitative variables – e.g. the neighbourhood of a large e-commerce market, a common official language with a neighbouring country, geographical location – including the insular nature of the country.

The low number of objects in the analysis (28 countries), not linear dependencies observed, the number of independent variables high relative to the number of analysed objects, and there is no natural clustering identified, the Classification And Regression Trees (CART) approach is a primary analytical method in proposed paper. The proposed approach proved to be effective and allowed to identify the main factors affecting the dependent variable.

Keywords: online cross-border shopping, B2C e-commerce, geo-discrimination, EU countries, CART analysis

Artur Mikulec (University of Lodz, Poland)

Malgorzata Misztal (University of Lodz, Poland)

Firms' Duration Analysis in Lodzkie Voivodeship Using a Regression Tree Approach

Enterprises' duration analysis is a set of statistical techniques dealing with duration time, i.e. the time to the occurrence of an event of interest, for example the liquidation of an enterprise, from its inception. The objective of such analyses is to look for factors (covariates) that significantly affect the duration of the enterprise. The use

of traditional statistical methods, e.g. regression analysis, is not possible in this situation due to the occurrence of the censored observations. The most popular statistical methods in duration analysis comprise: the Kaplan-Meier survival curves and Cox proportional-hazards regression model. As an alternative, survival trees (a regression tree approach) can be used. The model building process is based on recursive partitioning of the set of enterprises into homogenous subsets and the Kaplan-Meier estimate of the survival function in each terminal node is reported.

The article presents the results of enterprises duration time analysis in Lodzkie Voivodeship on the basis of data from the National Official Business Register REGON in the years 2010-2015 with the use of survival trees (the GUIDE algorithm – Generalized, Unbiased Interaction Detection and Estimation – Loh 2002). The results are compared with the analysis based on the Kaplan-Meier survival curves and Cox proportional-hazards regression model.

Keywords: enterprises, duration analysis, recursive partitioning method, survival trees

Paweł Miłobędzki (University of Gdańsk, Poland)

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The Accuracy of Trade Classification Rules for the Warsaw Stock Exchange

We evaluate the accuracy of tick and reverse tick classification rules for the Warsaw Stock Exchange. In doing so we use the transaction data on stocks from the large cap WIG20 index from the period May-September 2017. We find that both rules exhibit a low accuracy. The tick rule correctly identifies only 25.35 per cent of transactions initiated by buyers and 25.95 per cent of transactions initiated by sellers. The reverse tick rule performs even worse identifying as much as 16.66 and 16.67 per cent of such transactions accordingly. The reason for low accuracy is that the stock prices remain unchanged at about 70 per cent of all transactions. We also show that in case both classification rules are modified to account for either the preceding or following transactions price changes their accuracy significantly increases.

Keywords: accuracy of trade classification rules, tick rule, reverse tick rule, market microstructure, Warsaw Stock Exchange

Iwona Müller-Fraćzek (Nicolaus Copernicus University in Toruń, Poland)

Dynamic Measure of Development

The article presents a possible using of the author's method – normalisation with respect to the pattern – in construction of synthetic measure. When a stim-

ulant (destimulant) is normalized, for each object the share of its distances from the maximum (minimum) in the total distance from the maximum (minimum) of all objects is determined. Such transformation meets the requirements of normalisation – deprives variables their units and unifies their ranges. Normalisation with respect to the pattern has properties suggested in the literature – preserves skewness, kurtosis and the Pearson correlation coefficients. Moreover, although the current data are the sole data used to convert variables, normalized diagnostic variables are comparable across time. This feature gives an advantage of pattern normalisation over other methods in dynamic analysis of complex phenomena. The article uses normalisation with respect to the pattern in construction of Hellwig's measures of development. Since normalized diagnostic variables become destimulants with a minimum value equals 0, the pattern used to construct a synthetic measure is constant over time. The theoretical considerations are illustrated by an empirical example.

Keywords: synthetic measure, aggregate variable, composite indicator, normalisation, standardisation

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Automatic Identification of Competences Expected by Employers with the Use of Exploratory Text Analysis

Exploratory text analysis allows to identify semantic components present in processing documents. For every component it is possible to describe its character and to evaluate its importance. Using the approach presented above for automatic analysis of job offers it is possible to discover components which are common for all texts and to estimate their importance in every offer. Unfortunately, semantic components obtained with the help of text mining algorithms usually do not reflect competences crucial for a given position.

In the paper authors are going to present a method which will be able to discover in job offers semantic components corresponding to professional, social or personal competences. Also methods of competence description and evaluation of their importance will be proposed.

Keywords: competences, the Latent Dirichlet Allocation Model, job offer exploratory analysis

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*Assessing the Accuracy of Trade Side Classification Procedures.
Methods, Data, and Problems*

Trade side classification algorithms enable us to assign the side that initiates a transaction and distinguish between the so-called buyer- and seller-initiated trades. According to the literature, such classification is essential to assess both market liquidity and dimensions of market liquidity based on high frequency intraday data. The main problem is that trade and quote data is not publicly available for many stock markets and researchers have to utilize indirect methods to infer trade side. The aim of this paper is to investigate methods, data, and major problems in assessing the accuracy of trade side classification algorithms. We evaluate and compare four most frequently utilized procedures using intraday data for 105 companies from the Warsaw Stock Exchange (WSE). Moreover, an analysis of the robustness of the results is provided over the whole sample period from January 2, 2005 to December 30, 2016, and three consecutive sub-periods of equal size, covering the pre-crisis, crisis, and post-crisis periods. The empirical experiment shows that the Lee-Ready (1991) algorithm and tick rule perform better than other methods on the WSE, regardless of the choice of the sample.

Keywords: market microstructure, high frequency data, trades, quotes, trade side classification procedures

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Anna Pajor (Cracow University of Economics, Poland)

A Hybrid MSV-MGARCH Extension of the t-MGARCH Model

In modelling of financial time series, hybrid MSV-MGARCH models were introduced in order to exploit advantages of both model classes: flexibility of the MSV class and relative simplicity of the MGARCH class. A parsimonious hybrid MSF-SBEKK specification proved useful in multivariate modelling of returns on financial and commodity markets. Any MSF-MGARCH specification amounts to using a conditionally normal MGARCH process and multiplying its conditional covariance matrix H_t by such positive random variable g_t that $\ln(g_t)$ follows a Gaussian AR(1) process with autoregression parameter ϕ . If $\phi = 0$ then such MSF-MGARCH specification reduces to the MGARCH process with the conditional distribution being a continuous mixture of multivariate normal distributions with covariance matrices $g_t H_t$ and g_t log-normally distributed.

In this paper we propose a natural hybrid extension of conditionally Student t MGARCH models. New models are obtained by multiplying matrix H_t by random variable g_t coming from such latent process (with autoregression parameter φ) that, for $\varphi = 0$, g_t has an inverted gamma distribution and leads to the t -MGARCH specification, where the conditional distribution can be represented as a continuous mixture of multivariate normal distributions with covariance matrices $g_t H_t$ and an inverted gamma distribution of g_t . If $\varphi \neq 0$, the latent variables g_t are dependent, so – in comparison to the t -MGARCH specification – in the new models of the observed time series we get an additional source of dependence and one more parameter. Using the Bayesian approach, equipped with MCMC simulation techniques, we show how to estimate the new MSV-SBEKK model. We present an empirical example that serves to illustrate the hybrid extension of the t -SBEKK model and its validity.

Keywords: Bayesian econometrics, Gibbs sampling, time-varying volatility, multivariate GARCH processes, multivariate SV processes

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Is Development of the Renewable Energy Sector Crucial for the Electricity Consumption-growth Nexus in EU Countries?

The aim of the study is to assess the impact of development of the RE sector in the EU on the relationship between renewable and non-renewable electricity consumption and economic growth in the period 1995-2015. The study is divided into two stages. In the first one, two groups of EU member countries are identified with reference to the level of development of their RE sectors. Their identification is based on three variables: employment, turnover and investment in the RE sector. In the second stage, the panel VAR models are applied to investigate relations between renewable and non-renewable electricity consumption and economic growth.

The results reveal that the level of development of the RE sector is crucial for linkages between electricity consumption and economic growth. In group of countries with a relatively high level of development of the RE sector, renewable electricity consumption and economic growth are mutually dependent. Additionally, the increase in economic growth leads to a short-term increase in renewable electricity consumption. The advancement of renewable electricity sector and the rise in renewable electricity consumption is helpful to the increase in economic activity, at the same time. Renewable electricity consumption plays a significant role in the process of economic development in countries with a relatively high

level of development of the RE sector. In the remaining countries electricity consumption and economic growth are independent and do not affect each other.

Generally, the results suggest that in order to expect positive impact from renewable sector to economy sufficient investments into renewable energy have to be done. If the RE sector is small than it tends to have negative impact on economy.

Keywords: renewable electricity consumption, economic growth, EU countries, panel VAR

Aleksandra Pawłowska (Institute of Agricultural and Food Economics – National Research Institute in Warsaw, Poland)

Evaluation of Investment Support from Common Agricultural Policy with Propensity Score Matching Method

The study refers to the microeconomic producer theory as a framework and the expected positive relationship between investments, but also subsidies on investments and labour productivity, as a basis of farmers' income from work. It results from the assumption that for a single farm the employment of the labour factor is constant, so the increase in the use of (physical) capital factor should imply an increase in the technical equipment of labour and, consequently, lead to increased labour productivity. These processes rely on investments made by farms (producers). The increase in labour productivity could be also supported by implementation of relevant policy instruments.

The aim of the paper is to evaluate the impact of subsidies from Common Agricultural Policy on an increase in labour productivity on Polish farms. The applied research tool is propensity score matching method, based on so-called counterfactual results, i.e. potential results possible to be achieved, if the status of treating the given object was different than observed. The study uses data from the Farm Accountancy Data Network for individual Polish farms for 2008–2015.

Keywords: farms, labour productivity, agriculture policy, propensity score matching

Lukasz Pietrych (Warsaw University of Life Sciences – SGGW, Poland)

Identification of Deterministic Chaos in Economic Time Series on the Example of Prices of Selected Agricultural Products

It is widely accepted that the economy belongs to very complex, self-organizing systems whose behaviour seems to be chaotic and unpredictable. Therefore, in order to describe the dynamics of these systems, scientists postulate the need

to include both deterministic and stochastic aspects in economic research. However, previous research has not yielded unambiguous results as to the existence of non-linear deterministic chaos in economic systems. On the other hand, there are no premises to state that the economy is a linear system. Therefore, it can be concluded that non-linearity can be detected in economic systems. Due to the specific nature of economic data (short time series and their non-stationarity) in the case of economic systems, it is difficult to prove this.

This article reviews the conducted research on identifying deterministic chaos in economic systems. A statistical analysis of economic time series presenting prices of selected agricultural products was also carried out. The main goal is to determine the premises for inference about the nature (deterministic or stochastic) of the process under investigation.

It should be noted that although many papers have been written on this subject, this is still an important and unresolved research problem. Therefore, it seems justified to identify the nature of processes in the sector of the economy which is agriculture using many methods that are independent of each other.

Keywords: deterministic chaos, time series

Michał Pietrzak (Nicolaus Copernicus University in Toruń, Poland)

Composition of the Agricultural Macroregions for the Eastern Part of Poland – Empirical Example of Aggregation Problem

The focus of the work is on the problem of the Modifiable Areal Unit Problem (MAUP). The Aggregation Problem being one of the aspects of the MAUP issue will be investigated in the paper. The subject literature indicates that the Aggregation Problem is related to the possibility of obtaining different results depending on the adopted composition of territorial units for the same level of aggregation. The objective of this paper will be to consider the Aggregation Problem based on an empirical example, regarding an alternative way of determining agricultural macroregions for the eastern part of Poland. The implementation of the research objective will consist in determining the appropriate composition of territorial units for the purpose of analysing economic phenomena related to the situation of agriculture in Poland. Due to the assumed objective, the author proposed a two-step procedure, the application of which will allow the Aggregation Problem to be solved positively. According to the proposed procedure, the boundaries of agricultural macro-regions were determined based on the analysis of the agrarian structure at the district level (NUTS4). The analysis of the agrarian structure carried out in the paper allowed the determination of homogeneous agricultural macroregions in terms of the development and culture of agriculture. The research is funded by

the National Science Centre, Poland under the research project no. 2015/17/B/HS4/01004.

Keywords: spatial econometrics, Aggregation Problem, agrarian structure, Modifiable Areal Unit Problem

Radosław Pietrzyk (Wrocław University of Economics, Poland)

Paweł Rokita (Wrocław University of Economics, Poland)

Short-term and Long-term Risk Aversion in Life-time Financial Plan Optimization Process

In life-long financial plan optimization in personal finance, the one of the objectives is to accomplish all financial goals of a person or household, whether short-term or long-term ones. Another objective is to maintain consumption of the household on an acceptable level and sometimes also to obtain a desired growth rate of consumption. An a very important objective is also to preserve desired standard of living in all phases of the life cycle (so that the periods of surpluses were not followed by periods of shortfalls). All of these objectives, if treated literally, assume that people are able to think of those of their financial goals that are to be accomplished in decades since the present moment in the same manner as of the ones that are planned for the nearest future. And they also imply an assumption that decision makers are able to make long-term forecasts with a similar precision as short-term ones. Consistently, this would mean that they use the same risk models to describe risk of not-achieving of short-term and long-term goals. This, however, is not true. In fact, people tend to think of their financial situation in a rather short-term perspective (Ballinger et al., 2003; Carbone & Hey, 2004; Carbone & Infante, 2012), whereas they need a life-long plan indeed. Amongst other reasons, the last is necessary for a successful accomplishment of their retirement goal. In this research we propose an approach that allows to accommodate these perspectives. One of the main instruments to do this is are risk aversion measures that express risk aversion towards short-term and long-term threats separately.

Ballinger, T. P., Palumbo, M. G., & Wilcox, N. T. (2003). Precautionary saving and social learning across generations: an experiment. *The Economic Journal*, 113(490), 920-947.

Carbone, E., & Hey, J. D. (2004). The effect of unemployment on consumption: an experimental analysis. *The Economic Journal*, 114(497), 660-683.

Carbone, E. & Infante, G. (2012). *The Effect of a Short Planning Horizon on Intertemporal Consumption Choices*. LABSI Working Paper.

Keywords: financial planning, financial plan optimization, risk aversion, financial plan risk

Mateusz Pipień (Cracow University of Economics, Poland)
Błażej Mazur (Cracow University of Economics, Poland)

A Family of Non-standard Bivariate Distributions with Applications to Unconditional Modeling in Empirical Finance

We develop a class of parametric bivariate distributions that are capable of accounting for non-standard empirical properties that are evident in some financial time series. We aim at creating a parametric framework that allows for serious divergences from the multivariate Gaussian case both in terms of properties of marginal distributions and in terms of the co-dependence pattern. We are particularly interested in obtaining a multivariate construct that allows for considerable degree of heterogeneity in marginal properties of its components (like tail thickness and asymmetry). Moreover, we consider non-standard dependence patterns that go beyond a linear correlation-type relationship. In order to achieve flexibility we make use of marginal distributions that belong to generalized asymmetric t class analyzed by Harvey and Lange (2017), allowing not only for skewness but also for asymmetric tail thickness. We illustrate flexibility of the resulting bivariate distribution and investigate its empirical performance examining unconditional properties of bivariate daily financial series representing dynamics of stock price indices and the related FUTURES contracts.

Keywords: financial time series, skewness, fat tails, multivariate distributions

Dominika Polko-Zajac (University of Economics in Katowice, Poland)

Comparing Populations Based on Distance Between Sets of Variables

In economics also in other researches it is often a need to detect the differences between multidimensional populations. The paper concerns the problem of comparing such populations using distances between two analysed sets of objects characterized by many variables. In order to identify differences permutation tests were used. The method is illustrated by analysing economics data sets. Included empirical example contains data from Social Diagnosis study. All calculations were performed in R program.

Keywords: multidimensional data, distance approach, permutation tests, Monte Carlo study

Elżbieta Rogalska (University of Warmia and Mazury in Olsztyn, Poland)

Entrepreneurship Environment in Poland at NUTS 3 Level. Application of Taxonomic Measure of Development Based on Median Vector Weber

After successful transformation all Central European economies face a challenge of avoiding middle income trap. Many international studies indicate that regional sustainability and good quality of entrepreneurial environment have crucial role in obtaining that aim. These factors are especially important for Poland, which on the one hand, is the biggest country in the region, thus the economy with big potential of taking advantage of economies of scale, but on the other hand, which is considered as the country facing the problem of regional divergence and significant regional disparities. As a result, the main aim of the article is to analyze the factors influencing entrepreneurship in Poland at NUTS 3 level. The entrepreneurial environment is considered as a multiple criteria phenomenon, thus it is analyzed based on 5 criteria. In this context the choice of variables describing entrepreneurship conditions at NUTS 3 level was the biggest limitation of the research. Due to availability of data it was possible to conduct dynamic research for the years 2010–2015. In the research taxonomic measure of development was assessed with application of Hellwig method based on median vector Weber. The obtained values of taxonomic measure of development enabled to group the NUTS 3 regions into typological classes. For this purpose method based on arithmetic average and standard deviation was applied. The analysis indicates that relatively stable disparities at regional level in regard to entrepreneurial conditions can be considered as a significant problem for regional policy in Poland.

Keywords: entrepreneurship, multiple-criteria analysis, taxonomic measure of development, median vector Weber, NUTS 3, Poland

Elżbieta Roszko-Wójtowicz (University of Lodz, Poland)
Jacek Bialek (University of Lodz, Poland)

Application of the AG Mean index for CPI Substitution Bias Reduction

The Consumer Price Index (CPI) approximates changes in the costs of household consumption assuming the constant utility (COLI, Cost of Living Index). In practice, the Laspeyres price index is used to measure the CPI despite the fact that many economists consider the superlative indices to be the best approximation of COLI. The Fisher index is one of the superlative indices and additionally it satisfies most of tests from the axiomatic price index theory. Nevertheless, the Fisher price index makes use of current-period expenditure data and its usefulness in CPI measurement

is limited. Lent and Dorfman (2009) show that a weighted average of the arithmetic and geometric Laspeyres indexes (the so called AG mean index) used as a proxy for the Fisher formula can provide a simple alternative to the Lloyed-Moutlon index. To use the AG mean index in practice we have to approximate the right parameter being in the index's body. Theoretically, the parameter should not change rapidly over time since it denotes the elasticity of substitution. In the paper we apply the AG mean index for the Fisher index approximation using CPI data from United Kingdom and Bulgaria. The main aim of the paper is to research how fluctuated is the estimated parameter and how strongly it depends on the level of data aggregation.

Keywords: CPI, COLI, the Fisher index, the Laspeyres index, the AG mean index

Michał Rubaszek (SGH Warsaw School of Economics, Poland)

Reforming Housing Rental Market in a Life-cycle Model

Housing rental market share in most countries around the world is low. We explore the reasons behind this underdevelopment with a survey conducted among a representative group of 1005 Poles. It turns out that strong tenure preferences of households toward owning can be attributed to both economic and psychological factors. Building on these findings, we develop a life-cycle model and evaluate the effect of the following reforms aimed at improving the functioning of the rental market: (i.) changing the quality of rental services, (ii.) reducing the risk of investment in rental housing and (iii.) removing fiscal incentives for owning. The results indicate that the reforms, if introduced simultaneously, would significantly increase the rental market share.

Keywords: housing rental market, survey data, counterfactual simulations

Marcin Salamaga (Cracow University of Economics, Poland)

An Application of Conjoint Analysis to Study Determinants of Polish Direct Investment Located in European Countries

The purpose of this article is to identify main factors determining the choice of Polish FDI (foreign direct investment) destination in Europe. The research includes the cost factors, market factors, efficiency factors, law factors, social factors, and political factors that may be important in the search for the beneficiaries of FDI. The basic research method used in the paper is the conjoint analysis. Its application allows to estimate the respondents' utilities, which enabled calculating the relative

importance of each variable representing the determinants of the choice of Polish FDI destinations. In addition, estimated part-worth utilities enabled segmentation of the enterprises according to similar preferences of the selection of FDI location factors. In the analysis was used data from a survey conducted among companies, that invest abroad or plan this form of investment.

Keywords: foreign direct investment, conjoint analysis, analysis of variance, k-means method

Viktor Shevchuk (Tadeusz Kościuszko Cracow University of Technology, Poland)
Roman Kopych (Ivan Franko Lviv National University, Ukraine)
Marianna Golynska (Lviv University of Trade and Economics, Ukraine)

Fiscal and Monetary Policy Effects in Ukraine: a SVAR Approach

This paper investigates the impact of fiscal and monetary shocks on output (GDP) growth, producer price inflation (PPI) and the current account in Ukraine by using a SVAR model. Using quarterly data for the 2000–2016 period, it is found that the budget surplus is expansionary and anti-inflationary, with an improvement in the current account. The tightening of monetary policy, as measured by a decrease in the money supply in respect to the equilibrium trend, is associated with improvement in the current account on impact and a positive monetary surprise in the real sector that is reversed in the middle run. Also, anti-inflationary properties of monetary policy are rather weak. On the whole, the SVAR model produces main impulse response functions in line with the predictions of the dependent economy model, with financial constraints in the real sector and money-based expectations of the exchange rate. Among other results, the evidence does indicate that a higher PPI makes a positive contribution to the current account, while there is a negative effect upon GDP growth. There is a favourable temporary effect of the current account upon GDP growth, with a weak reverse causality running from the latter to the former. Monetary policy has standard anti-inflationary response, but it is procyclical in respect to GDP. Also, it is worth noting that budget deficits are associated with an increase in the money supply. On the other hand, fiscal policy is independent of all endogenous variables.

Keywords: budget balance, money supply, current account, output gap, inflation

Elena Sibirskaya (Plekhanov Russian University of Economics, Russia)
Katerina Shestaeva (Plekhanov Russian University of Economics, Russia)
Pawel Lula (Cracow University of Economics, Poland)
Evgeniia Progonova (Higher School of Economics, Russia)

Anatomy of Entrepreneurial Activity and Challenges of the New Century

In recent years, research on entrepreneurship is undoubtedly among the most dynamically developing areas of socio-economic sciences. This is confirmed by the number of publications devoted to this problem, the number of participants in the discussion areas related to entrepreneurship and entrepreneurial activity, the growing list of profile international conferences and journals. However, along with the difficulties of legitimizing entrepreneurship, prospects for the development of research on entrepreneurial activity remain vague. The changed methods and structure of research of entrepreneurial activity are related to the fact that Russia is developing the statistical methodologies necessary for solving the tasks of Russian statistics in order to harmonize it with international standards, in particular with the OECD standards, improving the system of national accounts, population and health statistics, preparation of methodological support for the development of basic input-output tables, development of labor force statistics, quality of life and household surveys of their farms. In order to act in business logic that would ensure timely and reliable statistics on entrepreneurship, we consider it important to conduct a study of entrepreneurial activity as a response to the challenges of the new century. From this point of view, this statistical study of the anatomy of entrepreneurial activity can be considered an integral element in assessing the development of the economy and a unique response to the challenges of the new century.

Keywords: Statistics, entrepreneurship, entrepreneurial activity, economics, challenges

Agata Sielska (SGH Warsaw School of Economics, Poland)

*Armed Conflicts and Multicriterial Evaluation of the Development of Country
in a Long-term Perspective*

Armed conflicts have a significant impact on economics, although their indirect influence is difficult to assess. Indirect effects of the conflict can occur both before and after the conflict and result from changes in the allocation of resources, which in turn results i.e. from a shortage of investment. The influence of conflicts is not always assumed to be negative, as they may contribute to the improvement of effectiveness.

In the paper methods of constructing multi-criteria rankings were used to assess welfare in selected countries in the period 1810–1980. In the next step, evaluation results were analysed for the relationship between the occurrence of conflicts and welfare.

Due to the change in the nature of armed conflicts in the analyzed period three sub-periods were specified: before 1910, 1910–1940 and after 1940. Results depend on the assumptions, i.e. the methods used to construct rankings and the assumptions regarding the relevance of criteria.

Keywords: multicriteria rankings, development, welfare, armed conflicts

Iwona Skrodzka (University of Białystok, Poland)

International Technology Transfer and Smart Growth of European Union Countries

Smart growth it is growth based on two driving forces: knowledge and innovation. One of the important factors of this growth is undoubtedly the transfer of technologies, which includes, but is not limited to, the disclosure of results from research and development, the licensing or assignment of intellectual property rights related to such results, exchange of information, education and training, and joint ventures (OECD definition). Technology transfer is a process which takes place in a variety of economic conditions, among different groups of entities, and by means of various channels. International technology transfer concerns technology which was invented in a country other than the one in which it is implemented. The aim of the study is to analyze the impact of international technology transfer on smart growth of European Union countries in 2010-2015. Due to the non-measurability of both categories, the research used the soft modelling method, which enables the measurement and analyzing of relationships between latent variables (unobservable).

Keywords: international technology transfer, smart growth, European Union, soft modelling

Małgorzata Stec (University of Rzeszów, Poland)

Małgorzata Wosiek (University of Rzeszów, Poland)

Evaluation of the Socio-economic Situation of European Union Countries, Taking into Account Accuracy of Statistical Data

The aim of this paper is to evaluate the socio-economic situation of EU countries in 2016, taking into consideration accuracy of statistical data. The study used ten

variables defining the socio-economic situation of EU countries. Linear ordering of EU countries was made using the zeroed unitarisation method. An assessment of the impact of uncertainty in the measurement of diagnostic variables on the value of a synthetic measure was also carried out. For this purpose, a procedure using the Monte Carlo method was proposed. The results indicate that the accuracy of statistical data may influence the results of the linear ordering of EU countries.

Keywords: European Union countries, synthetic measure, Monte Carlo method

Jacek Stelmach (Polwax S.A., Poland)

On Stationarity of Changes in the Trends of Selected Refining Variables

Forecasting time series representing macroeconomic variables becomes increasingly difficult. These variables, often correlated with each other are influenced with political and social decisions, climatic disasters or warfare. The phenomenon of globalization has increased the impact of these factors, the effect of which is temporary or permanent change of correlation between these variables – making it difficult to make management decision based on forecasts. More effective may be trend forecasts. The article presents an analysis of selected, most important refining variables in the last 25 years, in particular their stationarity. Changes in the properties of these series, in particular their trends related to global crises in the analyzed period were identified.

Keywords: time series, stationarity, unit roots tests

Adam Suchecki (University of Lodz, Poland)

Spatio-temporal Decomposition of the Communal Budgets Expenses Growth on Culture in Poland in Years 2003–2016. Implementation of the SSANOVA Model

Starting from 1989, political transformation and decentralization of public administration as well as Poland's accession to the European Union in 2004 had a significant impact on the cultural sector and forms of its organization and financing. In accordance with the process of decentralization of public administration in Poland, many tasks previously carried out by state authorities were transferred to the local level. One of the most important changes in the methods of financing and managing local authorities was the transfer of tasks related to culture and national heritage to a set of projects implemented by local governments. As a result of the decentralization process, territorial self-government units in Poland gained significant autonomy in defining the goals of their budget expenditures on culture. At the same time, they were required to cover these expenses from their own income.

The article presents an analysis of expenditures on culture covered by the municipal budget (by region), taking into account the structure of cultural expenditure by type, in the years 2003–2016. The analysis of the dynamics of changes in the share of communal budget expenditures on culture according to 4 categories of expenditures (sectors) and 16 regions was made using the dynamic modification of Knudsen's regression model of share transfers proposed by Berzeg. The results of the estimation of the appropriate SSANOVA model allow to divide the overall volatility of the total expenditure on culture into parts resulting from changes in the growth rate: (1) domestic, (2) sectoral, (3) regional, and (4) taking into account fixed time dimension effects.

Keywords: spatial shift-share analysis, cultural economics, public finances, communal budgets

Ślawomir Śmiech (Cracow University of Economics, Poland)
Aleksandra Mucha (Cracow University of Economics, Poland)

Are Uncertainty Measures Powerful Predictors of Real Economic Activity in the Euro Area?

In the paper we propose and collect measures that are related to different aspects of economic uncertainty and examine their predictive power for real economic activity in the Euro Area. The set of uncertainty measures investigated includes: the European News Index, Economic Policy Uncertainty index, uncertainty indices related to the global financial and commodity markets, and the Euro Area industry uncertainty measures calculated using business surveys provided by the European Commission. Macroeconomic activity indicators used in the study describe production, investment and unemployment. The analysis covers quarterly data from 2000 to 2014. The study is based on the rolling scheme and different specifications of VAR models. Two main conclusions can be drawn. First, uncertainty measures are, to a great extent, independent of one another. Second, some uncertainty indices perform well in forecasting economic activity indicators. It seems, however, that the best strategy is to apply forecast averaging techniques and to combine information provided by all uncertainty indices.

Keywords: uncertainty measures, the Euro Area activity, forecasting

Erik Šoltés (University of Economics in Bratislava, Slovakia)
Tatiana Šoltésová (University of Economics in Bratislava, Slovakia)

Comparison of Income Poverty and Social Exclusion in EU in 2008 and 2016

Poverty, material deprivation and joblessness are serious problems to which the European Union still has to pay close attention since, according to the European Commission, meeting the Europe 2020 strategy goals in the area of poverty and social exclusion seems improbable. The aim of the article is to map a spatial distribution of income poverty and social exclusion from point of view of three-dimensional concept including poverty, material deprivation and joblessness in EU-28 in 2016 (the most recent available data from EU-SILC survey and selected statistics provided by Eurostat). For that purpose, multivariate statistical methods were used, such as correlation analysis, factor analysis and cluster analysis. Results gained for year 2016 are compared to the reference year 2008 (the most recent data available when the target for Europe strategy 2020 was adopted (in 2010)). The paper puts emphasis on the visualisation of results obtained by statistical methods, therefore, the analyses were carried out by means of SAS JMP.

Keywords: poverty and social exclusion, income poverty, material deprivation, joblessness, cluster analysis

Michael Thrun (University of Marburg, Germany)

Cluster Analysis of the World Gross-Domestic Product Based on the Emergent Self-Organization of the Databionic swarm

Cluster analysis is a task of unsupervised classification which seeks high-dimensional structures if natural clusters exist in data. The Databionic swarm (DBS) can adapt itself to structures of natural clusters characterized by distance and density based structures resulting in a topographic map and clustering (Thrun, 2018). It is the first swarm-based technique that shows emergent properties while exploiting concepts of swarm intelligence, self-organization and game theory (Thrun, 2018). DBS was applied on the World GDP dataset (Leister, 2016) which was constructed by selecting the purchasing power parity converted gross domestic product (GDP) per capita for the years:1970-2010. The dynamic time warping distances were used to compute the optimal alignment between time series (Giorgino, 2009).

The number of clusters was derived from and the quality of the clustering and were verified by the topographic map which is a 3D representation of data structures. A clear cluster structure is also shown in heatmap and silhouette plot.

The rules deduced through CART show that the clusters are defined by the WTC-event occurring 2001. In its aftermath, the world economy was experiencing its first synchronized global recession in a quarter-century (Makinen, 2002). Therefore, the first cluster consists mostly of not-affected African and Asian countries and a second cluster consists of American and European countries, which were affected.

Giorgino, T. (2009). Computing and visualizing dynamic time warping alignments in R: the dtw package. *Journal of statistical Software*, 31(7), 1-24.

Leister, A. M. (2016). Hidden Markov models: Estimation theory and economic applications. Dissertation, Marburg, Germany.

Makinen, G. (2002). *The economic effects of 9/11: A retrospective assessment*. Library of congress washington dc congressional research service.

Thrun, M. C. (2018). *Projection Based Clustering through Self-Organization and Swarm Intelligence* (A. Ultsch & E. Hüllermeier Eds.), dissertation, Heidelberg: Springer.

Keywords: machine learning, cluster analysis, swarm intelligence, visualization, self-organization

Michael Thrun (University of Marburg, Germany)

Alfred Ultsch (University of Marburg, Germany)

Effects of the Payout System of Income Taxes to Municipalities in Germany

In this paper, the methods and possibilities of data mining for knowledge discovery in economic data are presented using the example of the German system of allocating tax revenues to municipalities. In this system several layers of administration and legislation are involved, thereby hindering an easy comprehension of the system (Rehm et al., 2010). National legislation demands that the funding a municipality receives from the state as a share of income tax revenues (output of the system) should be a fixed proportion of the total income tax yield of each municipality (input to the system). A data mining examination of the input/output for all municipalities in Germany was performed. The municipal income tax yield (MTY) transferred from the taxpayers to the state, and the ratio (R) of the payments the municipality received from the respective state governments (ITS) to MTY was calculated. Using a package for empirical data analysis (Ultsch et al., 2015), it was found that R is normal, MTY log-normal, and, surprisingly, ITS is bimodal distributed. The density of the ITS vs MTY was analyzed with a two-dimensional Gaussian mixture model. Results are, that the system operates in two modes: municipalities receive either a large share (high quota) or a small share (low quota) of the input. In general, municipalities located in eastern Germany receive a low quota of 10% and less, while municipalities in western Germany (except some

rural municipalities) are usually allocated a relatively high quota of 15% (Ultsch and Behnisch, 2017).

Rehm et al. (2010). *Kommunal финанzen*.

Ultsch, A., & Behnisch, M. (2017). Effects of the payout system of income taxes to municipalities in Germany. *Applied Geography*, 81, 21-31.

Ultsch, A., Thrun, M. C., Hansen-Goos, O., & Lötsch, J. (2015). Identification of molecular fingerprints in human heat pain thresholds by use of an interactive mixture model R toolbox (AdaptGauss). *International Journal of Molecular Sciences*, 16(10), 25897-25911.

Keywords: machine learning, Gaussian mixture models, density estimation, statistical analysis, income tax

Grażyna Trzpiot (University of Economics in Katowice, Poland)

Justyna Majewska (University of Economics in Katowice, Poland)

The Health Transition and an Ageing Society – Example of Selected European Countries

Population ageing is a natural and inevitable process in each country with a highly developed economy. Countries from the western part of Europe have been struggling with this challenge from a long time, and Poland must be properly prepared for this challenge. In Poland, in 2014 little over 22% of people were over age 60. According to NSO of Poland projections by two decades this ratio is going to double. Such an age structure of population has serious economic and social consequences – for pension system and health protection above all.

Changes in mortality and disease profiles in conjunction with progress in health and socio-economic development allow for analysis of an epidemiological transition, and in broader notion – health transition.

The aim of this article is to analyze the health status and mortality causes among people aged 70 years and over in selected European countries that are in different stages of health transition. In article selected health measures and method of decomposing differences in expected life expectancy are used.

Keywords: health transition, ageing, life expectancy, DALYs

Pawel Ulman (Cracow University of Economics, Poland)
Tomasz Kwarciński (Cracow University of Economics, Poland)

The Quality of Life in Poland and Germany

Research on the quality of life in individual societies is a demanding task both in terms of theory and practice of measurement. In order to measure the quality of life, qualitative and quantitative data will be used. The qualitative data can be acquired by asking the respondents to report on their level of happiness. The quantitative data have to be related to different aspects of human life, important for the participants.

Due to the fact that Poland aspires to be economically developed country, it appears to be important to compare the quality of life of Polish citizens with the quality of life in a developed country like Germany. The aim of the paper is to investigate whether the quality of life evaluation scheme in Poland is similar to the scheme in Germany.

The results of statistical comparative analysis of the quality of life in Poland and Germany using qualitative and quantitative data taken from EQLS (European Quality of Life Survey) will be presented. Furthermore, the findings from the analysis of the variation in quality of life assessment based on the answers to the question regarding the level of happiness as well as obtained on the basis of aggregate measure (taking into account various aspects of human life) will be discussed.

The aggregate measure of quality of life will be constructed on the basis of the TFR (Total, Fuzzy and Relative) approach. This approach can be used to the research on the quality of life and facilitate the comparison of a subjectively determined quality of life with the results of aggregate measurement of quality of life. The factors of quality of life which are the most divergent from subjective perception of happiness will be indicated. Finally, in order to measure the diversity of these assessments the mobility index will be used.

Keywords: quality of life, happiness, well-being, mobility index

Marta Wajda-Lichy (Cracow University of Economics, Poland)
Pawel Kawa (Cracow University of Economics, Poland)
Kamil Fijorek (Cracow University of Economics, Poland)
Sabina Denkowska (Cracow University of Economics, Poland)

*Trade Openness and Financial Development: Granger Causality Analysis for
New EU Member States*

Traditional approach to trade and finance linkage indicates their complementarity, however causalities between these two variables are ambiguous.

The purpose of this paper is to investigate Granger causality between trade openness and financial development in 11 new EU member states. The annual

data for the period 1995-2015 comes from WDI database. Openness is measured as a sum of exports and imports to GDP, exports to GDP and imports to GDP. Financial development is proxied by domestic credit to private sector and domestic credit provided by financial sector (both measures as percentage of GDP).

The results show statistically significant causalities from trade openness to financial development in half of analysed countries with the estimated coefficients being negative. The linkages from finance to trade were in majority of countries statistically not significant regardless the proxies considered.

The empirical findings are no coherent with theoretical approach. However, they are consistent with empirical results obtained e.g. by Bordo & Rousseau (2011), who found that finance and trade reinforced each other before 1930, but these effects did not persist after the Second World War. While Bordo and Rousseau papers deals with OECD countries, our paper contributes to the wide strand in finance-trade nexus literature by focusing on emerging markets.

Keywords: trade openness, financial development, finance-trade nexus, Granger causality

Marek Walesiak (Wroclaw University of Economics, Poland)

Grażyna Dehnel (Poznań University of Economics and Business, Poland)

Evaluation of Economic Efficiency of Small Manufacturing Enterprises in Districts of Wielkopolska Province Using Interval-valued Symbolic Data and the Hybrid Approach

The article describes a hybrid approach to evaluating economic efficiency of small manufacturing enterprises (employing from 10 to 49 people) in districts of Wielkopolska province. The analysis was based on data prepared in a two-stage process. First, a dataset of 2162 observations was obtained for three metric variables describing economic efficiency of small manufacturing enterprises. These unit-level data were aggregated at district level (NUTS 4) and turned into interval-valued symbolic data. Economic efficiency of small manufacturing enterprises was evaluated using a hybrid approach combining multidimensional scaling and linear ordering. In the first step, multidimensional scaling (see: Borg & Groenen, 2005; Mair et al., 2017) is applied to obtain a visual representation of objects in a two-dimensional space. In the next step, a set of objects is ordered linearly based on the Euclidean distance from the pattern (ideal) object. The proposed approach provides new possibilities for interpreting linearly ordered results of a set of objects.

Keywords: small enterprises, interval-valued symbolic variables, multidimensional scaling, composite measures

Grzegorz Wałęga (Cracow University of Economics, Poland)
Agnieszka Wałęga (Cracow University of Economics, Poland)

Does Debt Improve Housing conditions? Evidence from Polish Households

The present paper aims to validate the role of debt in improving housing conditions in Poland. It is common knowledge that consumer debt, especially mortgage is a major factor of quantitative and qualitative changes of household living conditions in the field of housing. Housing conditions are among the one of commonly investigated aggregative social data in many aspects. A neglect area in this field are research on the role of indebtedness in changing housing conditions. Recent significant increase in household debt is a good opportunity to investigate its relationship with household conditions. We use a data from household budget survey conducted by Polish Central Statistical Office in the years 2005–2015. Using micro level data we assess various symptoms (diagnostic features) related to both the size of the flat and its quality. We have adopted the mathematical theory of fuzzy sets to construct a multidimensional index to examine housing conditions. Similarly to the analysis of the risk of poverty, the hazard indicator for poor housing was calculated for each household. On average, we found improvement of housing conditions in Poland after accession to the European Union. As expected, our research demonstrate that indebted households have better quality of housing. This demonstrates how important debt is in the financing of consumption.

Keywords: housing conditions, household, indebtedness

Stanislaw Wanat (Cracow University of Economics, Poland)
Krzysztof Guzik (Cracow University of Economics, Poland)

Estimation of VaR Bounds under Dependence Uncertainty and Their Use for the SCR Calculation in Solvency II

Risk measures are the main tools for managing financial risk in banks and insurance companies. From the regulatory point of view, they are used in order to calculate regulatory capitals, the purpose of which is to guarantee solvency. In turn, from a risk management perspective, they are the basis for making decisions and limiting risk exposure to an acceptable level, according to the available economic capital.

In practice, Value at Risk (VaR) is a widely used risk measure. The problem of estimating this measure for aggregated risk, i.e. the risk for which the losses are modelled by the sum of random variables, will be discussed in this paper.

In case of estimating VaR for aggregated risk, we usually know the one-dimensional marginal distributions of variables but we do not know the dependence

structure among them. In such conditions, VaR cannot be determined, it is only possible to specify its bounds. The purpose of this paper is to discuss the issue of estimating VaR under dependence uncertainty (i.e. incomplete information regarding the dependence structure among random variables or a lack thereof). This problem has been discussed in recent years in (Puccetti & Rüschendorf, 2012, 2014; Embrechts et al., 2013; Puccetti et al. 2013; Bernard et al., 2015, 2016), among others.

In particular, we shall present selected methods of estimating the VaR bounds depending on the information regarding the dependence structure in this paper. We shall also discuss the possibility of using them to estimate Solvency Capital Requirements and the diversification effect in Solvency II. A relevant analysis shall be conducted for actuarial risk in non-life insurance.

Keywords: dependence structure, Solvency Capital Requirements, risk aggregation, VaR bounds

Lukasz Wawrowski (Poznań University of Economics and Business, Poland)

Temporal Models in Poverty Estimation

Counteracting poverty is one of the objectives of the European Commission clearly emphasized in Europe 2020 strategy. Conducting appropriate social policy requires knowledge of the extent of this phenomenon. Such information is provided through surveys on living conditions conducted by among the others Central Statistical Office. Nevertheless, the sample size in this studies allow precise estimation of poverty incidence only at very general level – the whole country, regions and voivodeships. Small sample size at lower level of spatial aggregation results in large variance of obtained estimates and hence less reliable. To obtain information in sparsely represented territorial sections methods of small area estimation are used. Using the information from other sources, such as censuses and administrative registers it is possible to estimate with smaller variance than in the case of direct estimation.

This research attempts to estimate the poverty incidence in the poviats of Poland. This estimation will be possible through the use of data from different sources describing living conditions of households and the use of small area estimation models with temporal autocorrelation. As a result estimates for previously unpublished level of aggregation will be obtained.

Keywords: small area estimation, poverty incidence, temporal models

Ines Wiese (FOM University of Applied Sciences, Germany)
Karsten Luebke (FOM University of Applied Sciences, Germany)

Behavioural Finance: The Role of Gender and Narcissism on Risk Aversion

Gender and narcissism are supposed to influence decision making and risk taking – an important topic within Behavioural Finance (see e.g. Brunell & Buelow, 2017). We enrich the debate by an empirical analysis of the link within a sample of young German professionals studying while working. For narcissism the Single Item Narcissism Scale (SINS, Konrath et.al., 2014) is used whereas for risk aversion different measurement scales (e.g. Grable & Lytton, 1999; Holt & Laury, 2002; Beierlein et.al., 2014) are evaluated. For modelling the link between narcissism and risk aversion and the maybe moderating effect of gender classical Regression Methods as well as Observation Oriented Modeling (Grice, 2011; Sauer 2017) are applied.

Keywords: behavioural finance, narcissism, data analysis

Antonina Yerina (Taras Shevchenko National University of Kyiv, Ukraine)
Zinaida Palian (Taras Shevchenko National University of Kyiv, Ukraine)

Estimation of Indirect Demographic Losses in Ukraine Due to Armed Conflict

Any military actions lead to population losses. Direct losses – killed and dead as a result of armed confrontation, forced emigration, as well as the loss of residents through the alienation of the territory in which they remained. The estimate of the extent of direct demographic losses could partly be done by current accounting and more completely – by census. But any statistical survey is not able to determine the size of indirect losses – the number of unborn children due to the hostilities. In this case, it's possible to apply statistical modelling.

Ukraine suffered significant human losses, through the annexation of Crimea and the escalation of armed conflict in the Donbass. According to the United Nations, the total number of killed (both of military and civilian sides) reached 10,225, and wounded - 24,541 persons, as a result of hostilities from April 2014 to August 2017. The military mobilization, large-scale emigration, worsening of living conditions violated the natural replacement regime and the sex ratio, especially in the reproductive age, which adversely affected the intensity of marriages and childbearing. All these processes actualize the problem of estimating indirect demographic losses.

In this article we presented the results of statistical estimation of the impact of armed conflict on reduction of the number of births using the Interrupted ARI-

MA model $(0,1,1)$ $(0,0,1)$ 4, which also takes into account the seasonal character of childbearing. The model allows us to conclude with a probability of 0.99 that the number of births in Ukraine only in the second quarter of 2014 (start of intervention of time series) decreased by 9749 people, through the annexation of the Crimea and the armed conflict in the Donbass.

Continued hostilities, worsening of medical-demographic and socio-economic situation as in combat zone, as well as generally around Ukraine, gives reason to anticipate a further increase in indirect demographic losses.

Keywords: indirect demographic losses, armed conflict, interrupted ARIMA

Wojciech Zieliński (Warsaw University of Life Sciences – SGGW, Poland)

Alina Jędrzejczak (University of Lodz, Poland)

Dorota Pekasiewicz (University of Lodz, Poland)

Estimation of Quantile Ratios of the Dagum Distribution

Inequality measures based on ratios of quantiles are frequently applied in economic research. Simple quantile measures of income inequalities may be considered supplementary to the popular Gini and Zenga indices. In the paper a confidence interval for such measures, assuming the Dagum distribution, is constructed. The ends of the confidence interval depend on an unknown shape parameter of the underlying income distribution model. In applications this parameter must be estimated from the data. The constructed confidence interval was applied to the analysis of income inequality in Poland. The quantile-based inequality measures have been estimated for the Polish macroregions (NUTS1), on the basis of micro-data coming from the Household Budget Survey 2015.

Keywords: Dagum distribution, income inequality, quantile ratios

