



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

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

9-12 maja 2017, Zakopane, Polska

**THE 11TH PROFESSOR ALEKSANDER ZELIAS
INTERNATIONAL CONFERENCE ON**

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

May 9-12, 2017, Zakopane, Poland



XI MIĘDZYNARODOWA KONFERENCJA NAUKOWA IM. PROFESORA ALEKSANDRA ZELIASIA

Modelowanie i prognozowanie
zjawisk społeczno-gospodarczych
Zakopane, 9-12 maja 2017 roku

PROGRAM

Wtorek, 9 maja

- 16:00 – Odjazd uczestników konferencji autokarem do Zakopanego
- 18:30 – Zakwaterowanie w DW „HYRNY”, Zakopane, ul. Piłsudskiego 20
- 19:00 – 20:00 – Kolacja

Środa, 10 maja

- 8:00 – 8:45 – Śniadanie
- 8:45 – 8:55 – Otwarcie obrad – Prof. dr hab. Józef Pocięcha (Kierownik Katedry Statystyki)
- 8:55 – 9:00 – Wystąpienie Jego Magnificencji Rektora Uniwersytetu Ekonomicznego w Krakowie

Wykłady proszone (sesja w j. angielskim)

Przewodniczący obrad: prof. dr hab. Józef Pocięcha

- 9:00 – 9:45 – Prof. Tadashi Imaizumi
“On how to visualize asymmetries of large proximity matrix by asymmetric MDS”
- 9:45 – 10:00 – Dyskusja
- 10:00 – 10:45 – Prof. dr hab. Józef Dziechciarz
“Quality of the university. Some aspects of measurement, analysis and modelling”
- 10:45 – 11:00 – Dyskusja
- 11:00 – 11:30 – Przerwa kawowa

Sesja I: Contemporary problems of statistics (sesja w j. angielskim)

Przewodniczący obrad: prof. dr hab. Krzysztof Jajuga

- 11:30 – 11:50 – Prof. Andreas Geyer-Schulz, Tino Fuhrmann, Marvin Schweitzer,
Peter Kurz
“Collinearity in product configuration data”
- 11:50 – 12:00 – Dyskusja
- 12:00 – 12:20 – Prof. dr hab. Andrzej Sokołowski, dr Sabina Denkowska,
dr Kamil Fijorek
“Separability index for cluster analysis”
- 12:20 – 12:30 – Dyskusja
- 12:30 – 12:50 – Prof. UEK dr hab. Jerzy Marzec, prof. dr hab. Jacek Osiewalski,
dr Andrzej Pisulewski
“Economies of scope or specialization: new local measures”
- 12:50 – 13:00 – Dyskusja
- 13:00 – 14:00 – Obiad

Sesja II: Modelling economic processes (sesja w j. angielskim)

Przewodniczący obrad: prof. dr hab. Jacek Osiewalski

- 15:00 – 15:20 – Prof. dr hab. Aleksander Welfe
*“Real exchange rates, US dollar and crude oil price in tripolar
model”*
- 15:20 – 15:30 – Dyskusja
- 15:30 – 15:50 – Prof. UEK dr hab. Marek Dąbrowski, dr hab. Monika Papież,
dr hab. Sławomir Śmiech
“A statistically-based classification of de facto exchange rate regimes”
- 15:50 – 16:00 – Dyskusja
- 16:00 – 16:20 – Prof. PK dr hab. Viktor Shevchuk, dr Roman Kopych
*“Symetry of output effects of government expenditure and revenues
in Ukraine”*

16:20 – 16:30 – Dyskusja

16:30 – 17:00 – Przerwa kawowa

Sesja III A: Various problems of economic research (sesja w j. angielskim)

Przewodniczący obrad: prof. dr hab. Aleksander Welfe

17:00 – 17:20 – Prof. UEK dr hab. Marek Dąbrowski, dr Justyna Wróblewska
“Insulating property of the exchange regime in Central and Eastern European countries”

17:20 – 17:30 – Dyskusja

17:30 – 17:50 – Prof. dr hab. Anatolij Pilyavskyy, prof. William Aaronson Ph.D.,
ing. Liběna Černošská Ph.D.
“The Visegrad group of banks. Comparative performance for the period 2009-2013”

17:50 – 18:00 – Dyskusja

18:00 – 18:20 – Florian Zechser Ph.D., prof. Joachim Rojahn
“A market-implied approach to measuring corporate diversification”

18:20 – 18:30 – Dyskusja

18:30 – 18:50 – Prof. dr hab. Jacek Osiewalski, mgr Beata Osiewalska
“A bivariate model of the number of children and the mother’s age at first birth”

18:50 – 19:00 – Dyskusja

19:00 – 20:00 – Kolacja

Sesja III B: Zagadnienia analizy procesów ekonomicznych w Unii Europejskiej (sesja w j. polskim)

Przewodniczący obrad: prof. dr hab. Andrzej Sokółowski

17:00 – 17:20 – Dr Krzysztof Dmytrów, prof. US dr hab. Jacek Batóg
„Ekonometryczna analiza produktywności kapitału w krajach Unii Europejskiej”

17:20 – 17:30 – Dyskusja

- 17:30 – 17:50 – Dr Katarzyna Frodyma
„Analiza zmian struktury odnawialnych źródeł energii w krajach Unii Europejskiej”
- 17:50 – 18:00 – Dyskusja
- 18:00 – 18:20 – Dr hab. Monika Papież, dr hab. Sławomir Śmiech,
dr Katarzyna Frodyma
„Identyfikacja czynników wpływających na rozwój odnawialnych źródeł energii w krajach Unii Europejskiej z perspektywy 20 lat”
- 18:20 – 18:30 – Dyskusja
- 19:00 – 20:00 – Kolacja

Czwartek, 11 maja

- 8:00 – 8:45 – Śniadanie

Sesja IV A: Health care statistics (sesja w j. angielskim) Przewodniczący obrad: prof. dr hab. Anatolij Pilyavskyy

- 8:45 – 9:05 – Prof. dr hab. Natalya V. Kovtun, Zinaida Palian Ph.D.,
Igor M. Motyzuk Ph.D.
“Statistical analysis of trends and factors in cancer disease of women of reproductive age in Ukraine”
- 9:05 – 9:10 – Dyskusja
- 9:10 – 9:30 – Pavla Jindrová Ph.D., ing. Lucie Kopecká
“Assessment of risk factors of serious diseases In OECD countries”
- 9:30 – 9:35 – Dyskusja
- 9:35 – 9:55 – Eva Kotlebová Ph.D., prof. Erik Šoltés Ph.D.
“Application of bayesian methods in analysis of unavailability of health care In Slovakia”
- 9:55 – 10:00 – Dyskusja
- 10:00 – 10:20 – Ing. Lucie Kopecká, Pavla Jindrová, Ph.D.
“Comparison of mortality due to critical illnesses In EU countries”

10:20 – 10:25 – Dyskusja

10:25 – 10:50 – Przerwa kawowa

Sesja IV B: Problemy badań społeczno-ekonomicznych I (sesja w j. polskim)

Przewodniczący obrad: prof. dr hab. Marek Walesiak

8:45 – 9:05 – Prof. dr hab. Grażyna Trzpiot, dr Justyna Majewska
„Zastosowanie teorii wartości ekstremalnych do modelowania oczekiwanej długości życia”

9:05 – 9:10 – Dyskusja

9:10 – 9:30 – Prof. UEK dr hab. Marcin Salamaga
„Identyfikacja wzorców konsolidacji fiskalnej na przykładzie krajów UE”

9:30 – 9:35 – Dyskusja

9:35 – 9:55 – Prof. UEK dr hab. Stanisław Wanat, dr Krzysztof Guzik
„Niepewność struktury zależności a efekt dywersyfikacji ryzyka w Solvency II”

9:55 – 10:00 – Dyskusja

10:00 – 10:20 – Prof. UEK dr hab. Paweł Lula, mgr Urszula Cieraszevska,
mgr Monika Hamerska
„Analiza porównawcza wyników klasyfikacji bezwzorcowej artykułów naukowych przeprowadzona w oparciu o kody UKD oraz eksploracyjną analizę streszczeń”

10:20 – 10:25 – Dyskusja

10:25 – 10:50 – Przerwa kawowa

Sesja V A: Statistical methods and econometrics (sesja w j. angielskim)

Przewodniczący obrad: prof. dr hab. Józef Dziechciarz

10:50 – 11:10 – Prof. UEK dr hab. Daniel Kosiorowski, mgr Ewa Szlachtowska
“K-local median algorithm for functional data in empirical analysis of air pollution data”

- 11:10 – 11:15 – Dyskusja
- 11:15 – 11:35 – Dr Justyna Brzezińska, dr Aneta Rybicka
“Multivariate statistical analysis of air emission in EU”
- 11:35 – 11:40 – Dyskusja
- 11:40 – 12:00 – Dr Łukasz Lenart, dr Błażej Mazur
“Business cycle analysis with short time series: a stochastic versus non-stochastic approach”
- 12:00 – 12:05 – Dyskusja
- 12:05 – 12:25 – Dr Roman Huptas
“Linear autoregressive volume models for point and density forecasting of trading volume from the Polish stock market”
- 12:25 – 12:30 – Dyskusja

Sesja V B: Problemy badań społeczno-ekonomicznych II (sesja w języku polskim)
 Przewodnicząca obrad: prof. dr hab. Grażyna Trzpiot

- 10:50 – 11:10 – Prof. dr hab. Marek Walesiak
„Zastosowanie skalowania wielowymiarowego w pomiarze i ocenie spójności społecznej województwa dolnośląskiego w latach 2005-2015”
- 11:10 – 11:15 – Dyskusja
- 11:15 – 11:35 – Prof. UE dr hab. Małgorzata Markowska, prof. dr hab. Danuta Strahl
„Relatywny wskaźnik aktywności innowacyjnej firm dla województw Polski (WAI)”
- 11:35 – 11:40 – Dyskusja
- 11:40 – 12:00 – Dr hab. Sławomir Śmiech, dr Kamil Fijorek, dr hab. Monika Papież
„Przenoszenie zmienności pomiędzy cenami żywności a rynkiem energii, akcji, obligacji oraz kursem dolara. Wyniki na podstawie metodologii Diebolda i Yilmaza”
- 12:00 – 12:05 – Dyskusja

- 12:05 – 12:25 – Prof. UE dr hab. Grażyna Dehnel
„Estymacja GREG z uwzględnieniem transformacji odwrotnościowej w badaniach przedsiębiorstw”
- 12:25 – 12:30 – Dyskusja
- 12:30 – 13:30 – **Sesja plakatowa**
- Dr Jan Acedański
„Modele międzypokoleniowe z rynkiem nieruchomości: znaczenie kluczowych parametrów na wnioski wypływające z modeli”
- Dr Adam P. Balcerzak, dr Michał Pietrzak
„Wykorzystanie metody TOPSIS z uogólnioną miarą odległości GDM do oceny stopnia rozwoju gospodarki cyfrowej na poziomie polskich regionów”
- Dr Beata Bal-Domańska
„Klasyfikacja podregionów polski z uwagi na strukturę przemysłu”
- Dr hab. Jacek Białek
„Uogólnienie geo-logarytmicznej rodziny indeksów cen”
- Dr Justyna Brzezińska
“Multivariate statistical analysis of information society in Poland”
- Dr Marta Dziechciarz-Duda
„Społeczno ekonomiczne i demograficzne uwarunkowania zasobności materialnej polskich gospodarstw domowych. Wybrane aspekty”
- Prof. dr hab. Ewa Drabik
„Kilka uwag o inżynierii wstecznej, teorii kategorii, grach kwantowych i wybranych modelach fizycznych stosowanych w modelowaniu zjawisk ekonomicznych”
- Dr inż. Karol Flisikowski
„Przestrzenno-czasowe ujęcie międzysektorowej mobilności plac i zatrudnienia”
- Prof. US dr hab. Iwona Foryś, dr Barbara Batóg
„Dystans w kondycji rynku mieszkaniowego największych polskich miast w różnych fazach cyklu koniunkturalnego”
- Dr inż. Monika Hadaś-Dyduch
„Sztuczne sieci neuronowe jako jedna z metod łagodzenia efektów brzegów w analizie falkowej w badaniach wskaźników makroekonomicznych”

Dr Sergiusz Herman

„Specyfika branżowa spółek akcyjnych w Polsce a prognozowanie ich upadłości”

Mgr Mateusz Jankiewicz, prof. UMK dr hab. Elżbieta Szulc

„Sytuacja na rynku pracy w średnich ośrodkach miejskich województwa kujawsko-pomorskiego a problem bezrobocia w województwie”

Mgr Tomasz Jastrzębski

„Ryzyko systemowe w sektorze bankowym: Podejście praktyczne”

Dr Marta Kuc

„Przestrzenne zróżnicowanie komponentów zrównoważonego rozwoju w regionach państw nordyckich”

Dr Marta Kuc, mgr Marta Gawlas

„Taksonomiczna analiza potencjału turystycznego polskich powiatów górskich”

Dr hab. Tomasz Kuszewski, dr Agata Sielska

„Źródło danych jako determinanta oceny sytuacji finansowej producentów rolnych”

Dr Łukasz Lenart

„Modele wygładzania wykładniczego ze zmiennymi w czasie okresowymi parametrami”

Dr Błażej Mazur

„Rozkłady prognoz dla finansowych dziennych stóp zwrotu: porównanie modeli typu GARCH oraz DCS”

Prof. UEK dr hab. Barbara Pawełek, mgr Dorota Grochowina

„Prognozowanie bankructwa przedsiębiorstw: zastosowanie metod losowych podprzestrzeni i lasów losowych”

Dr Michał Pietrzak, dr Bartosz Ziemkiewicz

„Zastosowanie pól losowych w ramach zagadnienia Modifiable Areal Unit Problem”

Mgr Dominika Polko-Zajac

„O porównywaniu populacji na podstawie dwóch zbiorów zmiennych”

Dr hab. Agnieszka Przybylska-Mazur

„Reguły wydatkowe w kontekście realizacji zrównoważonego budżetu”

Dr Aneta Ptak-Chmielewska

„Czynniki jakościowe w modelach statystycznych oceny ryzyka kredytowego przedsiębiorstw”

Mgr Angelina Rajda-Tasior

„Wybrane metody szacowania ryzyka dla przemysłu – przegląd i charakterystyka”

Dr Jerzy Rydlewski, prof. UEK dr hab. Daniel Kosiorowski,
dr Dominik Mielczarek

„Klasyfikatory SVM dla danych funkcjonalnych w monitorowaniu zachowań użytkowników internetu”

Dr Małgorzata Stec, dr Małgorzata Wosiek

„Statystyczna ocena zrównoważonego rozwoju województw Polski w aspekcie społecznym”

Dr inż. Jacek Stelmach

„O permutacyjnym rozszerzeniu testów pierwiastka jednostkowego”

14:00 – 15:00 – Obiad

15:00 – 19:00 – Czas wolny – (wycieczka)

20:00 – Uroczysta kolacja

Piątek, 12 maja

8:00 – 8:45 – Śniadanie

Sesja VI: Prognozowanie gospodarcze

Przewodnicząca obrad: prof. UŁ dr hab. Alina Jędrzejczak

9:00 – 9:20 – Prof.UEK dr hab. Barbara Pawełek

„Prognozowanie bankructwa przedsiębiorstw w kontekście zmian koniunktury gospodarczej”

9:20 – 9:25 – Dyskusja

9:25 – 9:45 – Dr Marcin Błażejowski, dr Paweł Kufel

„Prognozowanie procesów makroekonomicznych z wykorzystaniem autoregresyjnych modeli progowych TAR. Końcowe uwagi i podsumowanie pakietu Threshold_Models dla programu gretl”

9:45 – 9:50 – Dyskusja

9:50 – 10:20 – Przerwa kawowa

Sesja VII: Zagadnienia statystyki społecznej

Przewodnicząca obrad: prof. UEP dr hab. Grażyna Dehnel

- 10:20 – 10:40 – Prof. UŁ dr hab. Alina Jędrzejczak, dr hab. Dorota Pekasiewicz
“Analiza własności wybranych miar nierówności opartych na kwantylach i ich zastosowanie dla rozkładów dochodów w Polsce”
- 10:40 – 10:45 – Dyskusja
- 10:45 – 11:05 – Dr hab. Krzysztof Piontek, dr Radosław Pietrzyk, dr Paweł Rokita
„Pomiar ryzyka realizacji celów w planie finansowym gospodarstw domowych”
- 11:05 – 11:10 – Dyskusja
- 11:10 – 11:30 – Prof. UEK dr hab. Paweł Ulman
„Zagraniczne dochody gospodarstw domowych i ich determinanty”
- 11:30 – 11:35 – Dyskusja
- 11:35 – 11:55 – Dr Agnieszka Wałęga, dr Grzegorz Wałęga
„Modelowanie rozkładu spłat zadłużenia gospodarstw domowych w Polsce”
- 11:55 – 12:00 – Dyskusja
- 12:00 – 12:30 – Podsumowanie obrad i ogłoszenie wyników konkursu na najlepszy referat oraz plakat dla młodego pracownika nauki – Prof. dr hab. Józef Pociecha
- 12:30 – 13:30 – Obiad
- 13:30 – Odjazd autokarem do Krakowa

Strona internetowa : <http://www.konferencjazakopianska.pl/>



StatSoft

Firma StatSoft Polska ufundowała dwie nagrody. Jedną dla najlepszego referatu a drugą dla najlepszego plakatu przedstawionego na konferencji przez młodego pracownika nauki (magister lub doktor). Konkurs rozstrzygnie Komitet Naukowy Konferencji. **Nagrody im. Profesora Kazimierza Zająca** zostaną wręczone na zakończenie konferencji.



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MAY 9-12, 2017, ZAKOPANE, POLAND

PROGRAMME

Tuesday, May 9, 2017

- 16:00 – Departure for Zakopane by coach from the Main Building of the University
- 18:30 – Lodging in Conference-Recreation Center HYRNY, Piłsudskiego 20 Street, Zakopane
- 19:00 – 20:00 – Supper

Wednesday, May 10, 2017

- 8:00 – 8:45 – Breakfast
- 8:45 – 8:55 – Opening Address by Prof. dr hab. Józef Pociecha
- 8:55 – 9:00 – Opening Address by authorities representative of Cracow University of Economics

Invited Session (session in English)

Chairperson: prof. dr hab. Józef Pociecha

- 9:00 – 9:45 – Prof. Tadashi Imaizumi
“On how to visualize asymmetries of large proximity matrix by asymmetric MDS”
- 9:45 – 10:00 – Discussion
- 10:00 – 10:45 – Prof. dr hab. Józef Dziechciarz
“Quality of the university. Some aspects of measurement, analysis and modelling”
- 10:45 – 11:00 – Discussion
- 11:00 – 11:30 – Coffee break

Session I: Contemporary problems of statistics (session in English)

Chairperson: prof. dr hab. Krzysztof Jajuga

- 11:30 – 11:50 – Prof. Andreas Geyer-Schulz, Tino Fuhrmann, Marvin Schweitzer,
Peter Kurz
“Collinearity in product configuration data”
- 11:50 – 12:00 – Discussion
- 12:00 – 12:20 – Prof. dr hab. Andrzej Sokołowski, dr Sabina Denkowska,
dr Kamil Fijorek
“Separability index for cluster analysis”
- 12:20 – 12:30 – Discussion
- 12:30 – 12:50 – Prof. UEK dr dab. Jerzy Marzec, prof. dr hab. Jacek Osiewalski,
dr Andrzej Pisulewski
“Economies of scope or specialization: new local measures”
- 12:50 – 13:00 – Discussion
- 13:00 – 14:00 – Lunch

Session II: Modelling economic processes (session in English)

Chairperson: prof. dr hab. Jacek Osiewalski

- 15:00 – 15:20 – Prof. dr hab. Aleksander Welfe
*“Real exchange rates, US dollar and crude oil price in tripolar
model”*
- 15:20 – 15:30 – Discussion
- 15:30 – 15:50 – Prof. UEK dr hab. Marek Dąbrowski, dr hab. Monika Papież,
dr hab. Sławomir Śmiech
“A statistically-based classification of de facto exchange rate regimes”
- 15:50 – 16:00 – Discussion
- 16:00 – 16:20 – Prof. PK dr hab. Viktor Shevchuk, dr Roman Kopych
*“Symmetry of output effects of government expenditure and
revenues in Ukraine”*

16:20 – 16:30 – Discussion

16:30 – 17:00 – Coffee break

Session III A: Various problems of economic research (session in English)

Chairperson: prof. dr hab. Aleksander Welfe

17:00 – 17:20 – Prof. UEK dr hab. Marek Dąbrowski, dr Justyna Wróblewska
“Insulating property of the exchange rate regime in Central and Eastern European countries”

17:20 – 17:30 – Discussion

17:30 – 17:50 – Prof. dr hab. Anatolii Pilyavskyy, prof. William Aaronson Ph.D.,
ing. Liběna Černožorská Ph.D.
“The Visegrad group of banks. Comparative performance for the period 2009-2013”

17:50 – 18:00 – Discussion

18:00 – 18:20 – Florian Zechser Ph.D., prof. Joachim Rojahn
“A market-implied approach to measuring corporate diversification”

18:20 – 18:30 – Discussion

18:30 – 18:50 – Prof. dr hab. Jacek Osiewalski, mgr Beata Osiewalska
“A bivariate model of the number of children and the mother’s age at first birth”

18:50 – 19:00 – Discussion

19:00 – 20:00 – Supper

Session III B: Analysis of economic processes in the European Union (session in Polish)

Chairperson: prof. dr hab. Andrzej Sokółowski

17:00 – 17:20 – Dr Krzysztof Dmytrów, prof. US dr hab. Jacek Batóg
“Econometric analysis of productivity of capital in the European Union”

17:20 – 17:30 – Discussion

- 17:30 – 17:50 – Dr Katarzyna Frodyma
“Changes in the distribution of the renewable energy in the EU countries”
- 17:50 – 18:00 – Discussion
- 18:00 – 18:20 – Dr hab. Monika Papież, dr hab. Sławomir Śmiech,
dr Katarzyna Frodyma
“Determinants of the renewable energy development in the EU countries. A 20-year perspective”
- 18:20 – 18:30 – Discussion
- 19:00 – 20:00 – Supper

Thursday, May 11, 2017

- 8:00 – 8:45 – Breakfast

Session IV A: Health care statistics (session in English)

Chairperson: prof. dr hab. Anatolij Pilyavskyy

- 8:45 – 9:05 – Prof. dr hab. Natalya V. Kovtun, Zinaida Palian Ph.D.,
Igor M. Motyzuk Ph.D.
“Statistical analysis of trends and factors in cancer disease of women of reproductive age in Ukraine”
- 9:05 – 9:10 – Discussion
- 9:10 – 9:30 – Pavla Jindrová Ph.D., ing. Lucie Kopecká
“Assessment of risk factors of serious diseases in OECD countries”
- 9:30 – 9:35 – Discussion
- 9:35 – 9:55 – Eva Kotlebová Ph.D., prof. Erik Šoltés Ph.D.
“Application of bayesian methods in analysis of unavailability of health care in Slovakia”
- 9:55 – 10:00 – Discussion
- 10:00 – 10:20 – Ing. Lucie Kopecká, Pavla Jindrová Ph.D.
“Comparison of mortality due to critical illnesses in the EU countries”

10:20 – 10:25 – Discussion

10:25 – 10:50 – Coffee break

Session IV B: Problems of socio-economic research I (session in Polish)

Chairperson: prof. dr hab. Marek Walesiak

8:45 – 9:05 – Prof. dr hab. Grażyna Trzpiot, dr Justyna Majewska
“Application extreme value theory to model life expectancy”

9:05 – 9:10 – Discussion

9:10 – 9:30 – Prof. UEK dr hab. Marcin Salamaga
“Identifying patterns of fiscal consolidation on the example of EU countries”

9:30 – 9:35 – Discussion

9:35 – 9:55 – Prof. UEK dr hab. Stanisław Wanat, dr Krzysztof Guzik
“Dependence uncertainty and the risk diversification effect in Solvency II”

9:55 – 10:00 – Discussion

10:00 – 10:20 – Prof. UEK dr hab. Paweł Lula, mgr Urszula Cieraszevska,
mgr Monika Hamerska
“Cluster analysis of research papers based on UDC codes and exploratory analysis of abstracts. Comparative approach”

10:20 – 10:25 – Discussion

10:25 – 10:50 – Coffee break

Session V A: Statistical methods and econometrics (session in English)

Chairperson: prof. dr hab. Józef Dziechciarz

10:50 – 11:10 – Prof. UEK dr hab. Daniel Kosiorowski, mgr Ewa Szlachetowska
“K-local median algorithm for functional data in empirical analysis of air pollution data”

11:10 – 11:15 – Discussion

- 11:15 – 11:35 – Dr Justyna Brzezińska, dr Aneta Rybicka
“Multivariate statistical analysis of air emission in EU”
- 11:35 – 11:40 – Discussion
- 11:40 – 12:00 – Dr Łukasz Lenart, dr Błażej Mazur
“Business cycle analysis with short time series: a stochastic versus a non-stochastic approach”
- 12:00 – 12:05 – Discussion
- 12:05 – 12:25 – Dr Roman Huptas
“Linear autoregressive volume models for point and density forecasting of trading volume from the Polish stock market”
- 12:25 – 12:30 – Discussion

Session V B: Problems of socio-economic research II (session in Polish)

Chairperson: prof. dr hab. Grażyna Trzpiot

- 10:50 – 11:10 – Prof. dr hab. Marek Walesiak
“An application of multidimensional scaling to assess the measurement and the changes in the level of social cohesion of the Lower Silesia region in the period 2005-2015”
- 11:10 – 11:15 – Discussion
- 11:15 – 11:35 – Prof. UE dr hab. Małgorzata Markowska, prof. dr hab. Danuta Strahl
“Relative Index of Enterprise Innovation Activity for Polish Provinces”
- 11:35 – 11:40 – Discussion
- 11:40 – 12:00 – Dr hab. Sławomir Śmiech, dr Kamil Fijorek, dr hab. Monika Papież
“Volatility spillovers between food, energy, US dollar, bond and equity markets. Evidence from Diebold-Yilmaz’s approach”
- 12:00 – 12:05 – Discussion
- 12:05 – 12:25 – Prof. UEP dr hab. Grażyna Dehnel
“GREG estimation with reciprocal transformation for polish business survey”

12:25 – 12:30 – Discussion

12:30 – 13:30 – **Poster session**

Dr Jan Acedański

“Overlapping generation models with housing: impact of the key parameters on the models’ outcomes”

Dr Adam P. Balcerzak, dr Michał Pietrzak

“Digital economy in Polish regions. Proposal of measurement via TOPSIS with generalized distance measure GDM”

Dr Beata Bal-Domańska

„Klasyfikacja podregionów polski z uwagi na strukturę przemysłu”

Dr hab. Jacek Białek

“Generalization of the geo-logarithmic price index family”

Dr Justyna Brzezińska

“Multivariate statistical analysis of information society in Poland”

Dr Marta Dziechciarz-Duda

“Socio-economic and demographic factors of Polish households’ material wealth. Selected aspects”

Prof. dr hab. Ewa Drabik

“Several remarks reverse engineering, category theory, quantum games and selected physical models using inused for the purposes of modeling of the economic phenomena”

Dr inż. Karol Flisikowski

“A spatio-temporal approach to intersectoral labor and wage mobility”

Prof. US dr hab. Iwona Foryś, dr Barbara Batóg

“Distance between the biggest Polish cities according to the condition of housing market in different phases of business cycle”

Dr inż. Monika Hadaś-Dyduch

“Artificial neural networks as one of the methods mitigating the edge effect of the wavelet analysis in the study of macroeconomic indicators”

Dr Sergiusz Herman

“Industry characteristics of joint-stock companies in Poland and their bankruptcy prediction”

Mgr Mateusz Jankiewicz, prof. UMK dr hab. Elżbieta Szulc
“Situation on labour market in the medium-sized urban centres of the Kujawsko-Pomorskie Voivodeship and the problem of unemployment in the province”

Mgr Tomasz Jastrzębski
“Systemic risk in the banking sector: A practical perspective”

Dr Marta Kuc
“Spatial differences in sustainable development components in nordic regions”

Dr Marta Kuc, mgr Marta Gawlas
“Taxonomic analysis of Tourism Potential of Polish mountain counties”

Dr hab. Tomasz Kuszewski, dr Agata Sielska
“Source of data as a determinant of the assessment of agricultural producer’s financial situation”

Dr Łukasz Lenart
“Exponential smoothing models with time-varying periodic parameters”

Dr Błażej Mazur
“Density forecasting performance of alternative GARCH and DCS models for daily financial returns”

Prof. UEK dr hab. Barbara Pawełek, mgr Dorota Grochowina
“Forecasting the bankruptcy of companies: the use of the random subspaces and random forests methods”

Dr Michał Pietrzak, dr Bartosz Ziemkiewicz
“Considering the use of random fields in the Modifiable Areal Unit Problem”

Mgr Dominika Polko-Zajac
“On comparing populations based on two sets of variables”

Dr hab. Agnieszka Przybylska-Mazur
“Expenditure rules in the context of a balanced budget”

Dr Aneta Ptak-Chmielewska
“Qualitative factors in statistical models used for assessing credit risk of enterprises”

Mgr Angelina Rajda-Tasior
“Selection of the risk assessment methods for industry – review and characterization”

Dr Jerzy Rydlewski, prof. UEK dr hab. Daniel Kosiorowski,
dr Dominik Mielczarek
*“SVM classifiers for functional data in monitoring of the Internet
users behaviours”*

Dr Małgorzata Stec, dr Małgorzata Wosiek
*“Statistical evaluation of sustainable development of Polish
voivodeships in respect of social domain”*

Dr inż. Jacek Stelmach
“On the permutation extension of unit root tests”

14:00 – 15:00 – Lunch

15:00 – 19:00 – Guided tour

20:00 – Ceremonial dinner

Friday, May 12, 2017

8:00 – 8:45 – Breakfast

Session VI: Economic forecasting

Chairperson: prof. UŁ dr hab. Alina Jędrzejczak

9:00 – 9:20 Prof. UEK dr hab. Barbara Pawełek
*“Prediction of company bankruptcy in the context of changes in the
economic situation”*

9:20 – 9:25 – Discussion

9:25 – 9:45 – Dr Marcin Błażejowski, dr Paweł Kufel
*“Forecasting macroeconomic processes using threshold
autoregression. Final remarks on gretl’s Threshold_Models
package”*

9:45 – 9:50 – Discussion

9:50 – 10:20 – Coffee break

Session VII: Issues of social statistics

Chairperson: prof. UEP dr hab. Grażyna Dehnel

- 10:20 – 10:40 – Prof. UŁ dr hab. Alina Jędrzejczak, dr hab. Dorota Pekasiewicz
“Analysis of the properties of selected inequality measures based on quantiles with the application to the Polish income data”
- 10:40 – 10:45 – Discussion
- 10:45 – 11:05 – Dr hab. Krzysztof Piontek, dr Radosław Pietrzyk, dr Paweł Rokita
“Risk measurement for goals realization in a household financial plan”
- 11:05 – 11:10 – Discussion
- 11:10 – 11:30 – Prof. UEK dr hab. Paweł Ulman
“Household income from abroad and its determinants”
- 11:30 – 11:35 – Discussion
- 11:35 – 11:55 – Dr Agnieszka Wałęga, dr Grzegorz Wałęga
“Modelling the Distribution of Loan Repayments of Households in Poland”
- 11:55 – 12:00 – Discussion
- 12:00 – 12:30 – Summary Discussion led by Prof. dr hab. Józef Pocięcha
- 12:30 – 13:30 – Lunch
- 13:30 – Departure for Cracow by coach

Streszczenia/Abstracts*

* Streszczenia nie były zmieniane ani korygowane, a redaktorzy nie ponoszą odpowiedzialności za język w nich użyty.

The abstracts have not been amended or proofread and editors are not responsible for the language used in them.

Jan Acedański (Uniwersytet Ekonomiczny w Katowicach, University of Economics in Katowice)

Overlapping generation models with housing: impact of the key parameters on the models' outcomes

Overlapping generation models (OLG) with housing are used to analyse interactions between households of different age, housing market and the main macroeconomic aggregates like production, consumption, wealth distribution or interest rate. In the paper, we study sensitivity of these categories to changes in the main parameters of the models, especially the discount factor, the risk aversion parameter, demographic characteristics and housing market parameters. The baseline model is calibrated to match the key features of the Polish economy.

Beata Bal-Domańska (Uniwersytet Ekonomiczny we Wrocławiu, Wrocław University of Economics)

The classification of polish sub-regions in terms of industry structure

The purpose of the article is to present the classification of Polish sub-regions (NUTS-3) in terms of the level of industrialization as one of the components affecting the environment and regional competitiveness. The classification was conducted based on the data about the number of industrial enterprises, number of the employed in industry sector, gross value of fixed assets and the production sold with the focus on industrial processing enterprises and other industry sector sections (in line with Polish Statistical Classification of Economic Activities). The classification of sub-regions is the source of information about spatial diversification in the level of sub-regions' industrialization. Moreover, it can also provide useful contextual information for the broader spectrum of analyses e.g. in relation to environmental and social aspects in accordance with the stream of research on sustainable development. The level of industrialization in sub-regions (predominantly production methods and the characteristics of products) has direct impact on environment quality. The kind of the dominating type of industrial activity also remains the factor affecting regional competitiveness and economic efficiency. The research covered 72 Polish sub-regions in the period 2009-2015. The analysis was based on classification methods and linear ordering.

Jacek Bialek (Uniwersytet Łódzki, University of Lodz)

Generalization of the geo-logarithmic price index family

The paper presents a proposition of the geo-logarithmic index family generalization. It is shown that the Fisher and Walsh price indices are particular cases of this family and, under some assumptions, that the Törnqvist index can be its approximation. Due to the fact that the above-mentioned indices are superlative, they are best proxies for the Cost of Living Index (COLI). In practice, the Consumer Price Index (CPI), which is calculated by using the Laspeyres formula, is a measure of inflation but according to the economic approach in price index theory, a well-defined index should satisfy the Laspeyres-Paasche bounding test. In the simulation study we verify this test in the case of the generalized geo-logarithmic index family. The general conclusion is that values of almost all indices from the mentioned family are in the interval with bounds determined by the Laspeyres and Paasche price indices.

Key words: CPI, COLI, the Laspeyres index, geo-logarithmic price index family

Justyna Brzezińska (Uniwersytet Ekonomiczny w Katowicach, University of Economics in Katowice)

Multivariate statistical analysis of information society in Poland

Widespread access to high-speed Internet, user-friendly public e-services, increasing digital competence of the society are aims for the following years due to the reports published by the Central Statistical Office of Poland. They are included, inter alia, in the Operational Programme Digital Poland. The rapidly increase of significance of information and electronic services, and thus, of the application of information and communication technologies (ICT), in surrounding economy, public administration (central and local government) and in the everyday life of citizens has triggered a new transformation trend – a transformation towards the information society. This term describes a society for which the processing of information with the use of ICT solutions creates significant economic, social and cultural value. In this paper we present strategy, main aspects, vision and mission of the information society in Poland, as well as statistical analysis of information society in Poland using multivariate statistical methods. All calculations based on real data from Central Statistical Office are conducted in R software.

Justyna Brzezińska (Uniwersytet Ekonomiczny w Katowicach, University of Economics in Katowice)

Aneta Rybicka (Uniwersytet Ekonomiczny we Wrocławiu, Wrocław University of Economics)

Multivariate statistical analysis of air emission in EU

Air emissions accounts (AEA) record the flows of gaseous and particulate materials from the national economy into the atmosphere. After joining the atmosphere, the emitted substances are out of any human control and become part of natural materials cycles and may induce several types of environmental impacts. AEA present air emissions in a breakdown by emitting economic activity; the latter comprise production and consumption activities. Across the EU Member States, the contributions by the various economic activities and households to total national greenhouse gas emissions differ. These differences are, in part, due to different economic structures and different mixes of non-renewable and renewable energy sources. This paper presents multivariate statistical analysis of greenhouse gas emission (CO₂, N₂O, CH₄) based on data reported in annual greenhouse gas inventories from the European Union (EU) to the United Nations under the United Nations Framework Convention on Climate Change (UNFCCC). We present emission intensities by economic activity, greenhouse gases by type of gas among EU countries. All calculations will be conducted in R software.

Marcin Błażejowski (Wyższa Szkoła Bankowa w Toruniu, WSB University in Torun)

Paweł Kufel (Wyższa Szkoła Bankowa w Toruniu, WSB University in Torun)

Forecasting macroeconomic processes using threshold autoregression.

Final remarks on gretl's Threshold_Models package

The purpose of the paper is to predict macroeconomic processes described by threshold autoregression model using simulation based procedure developed in the gretl environment. The threshold autoregression models became popular while applying to the U.S. business cycle modeling by Tong (Tong, 1990). Since this time many applications and extensions were published. For Kremer et al., 2013 introduced a dynamic panel threshold model to estimate inflation thresholds for a long-term economic growth, to mention only a few. In our research, the focus is put on forecasting economic processes on the basis of TAR models in both ways: theoretical and practical. From theoretical perspective the problem

of forecasting the regimes and the value of the threshold variable were the issue to be solved, while practical perspective required to make it operational and efficient using gretl environment. As a result the *Threshold_Models* package was written and implemented.

**Marek A. Dąbrowski (Uniwersytet Ekonomiczny w Krakowie, Cracow
University of Economics)**

**Monika Papież (Uniwersytet Ekonomiczny w Krakowie, Cracow
University of Economics)**

**Sławomir Śmiech (Uniwersytet Ekonomiczny w Krakowie, Cracow
University of Economics)**

*A statistically-based classification of de facto exchange
rate regimes*

The Mundellian trilemma states that it is not feasible for a country to have unfettered capital flows, fixed exchange rate and retain monetary policy autonomy at the same time. The trilemma has been re-examined in recent studies: Rey (2013) claimed that there is ‘an irreconcilable duo’: ‘the global financial cycle constrains national monetary policies regardless of the exchange rate regime’, but Disyatat and Rungcharoenkitkul (2015) argued that ‘central banks, by and large, do retain substantial influence over local financial conditions.’ This paper investigates whether fixing the exchange rate constrains monetary policy as implied by the theory. The focus is on middle-income countries. First, we use de facto exchange rate regime classification to identify countries that peg their currencies. Then, conventional determinants of the interest rate, i.e. inflation and output gap, as well as some additional variables are used to estimate the monetary policy rule. The importance of the exchange rate regime is assessed thanks to the inclusion of interactive dummies in the regression analysis. The analysis is based on dynamic panel models in which the existing cross-sectional correlation is described using a few unobservable common factors. Given the relatively large spatial dimension and a small time dimension of the panel, the parameters are estimated with the common correlated effects estimator proposed by Pesaran (2006). Our main finding is that although the empirical evidence is mixed, it tilts the balance in favour of macroeconomic trilemma. ‘An irreconcilable duo’ hypothesis seems to be less plausible description of middle-income countries, perhaps because they are not as financially integrated with the world economy as advanced economies.

**Marek A. Dąbrowski (Uniwersytet Ekonomiczny w Krakowie, Cracow
University of Economics)**

**Justyna Wróblewska (Uniwersytet Ekonomiczny w Krakowie, Cracow
University of Economics)**

*Insulating property of the exchange rate regime in Central and Eastern
European countries*

One of the main theoretical reasons behind floating exchange rate regime is that it insulates output against shocks. Such an insulating property is the more important, the more inertia and stickiness is present in economic relations. This paper examines the importance of insulating property of flexible exchange rate in eight Central and Eastern European economies. All of them are middle-income countries that fit to the standard of a small open economy. Interestingly, they have adopted quite different exchange rate arrangements and some countries are at opposite poles of exchange rate regime spectrum. The analysis is based on a stochastic macroeconomic model that allows for real and nominal shocks and enables us to derive long-term zero and sign restrictions on the reactions of underlying macro variables to shocks. For each country a Bayesian structural vector autoregression model with common serial correlations is estimated on quarterly data from 1998-2015 period for relative GDP, interest rate differential, real exchange rate and relative price level. We use forecast error variance decompositions to identify the importance of individual shocks across countries. Then compare impulse response functions of relative output in order to discern the differences between floaters and peggers and in this way assess the magnitude of insulating property of flexible exchange rate regime. Our main finding is that although the empirical evidence is mixed, it lends non-negligible support to the hypothesis that the flexible exchange rate regime insulates the economy against shocks to a greater extent than the fixed exchange rate regime.

**Grażyna Dehnel (Uniwersytet Ekonomiczny w Poznaniu, Poznań
University of Economics and Business)**

*GREG estimation with reciprocal transformation
for polish business survey*

Economic changes have extended the scope of tasks for business statistics. An increase in the demand for statistical data delivered in short intervals, with improved accuracy and coherence can be observed. It determines the need for seeking methods of estimation aimed at increasing the use of administrative systems.

The actions undertaken are aimed at increasing effectiveness of estimates and extension of the scope of information both to the number of variables and the types of cross-sections in which data is published. The paper presents an attempt to estimate basic economic information about small enterprises by applying reciprocal transformation to one of the small area statistics methods - GREG estimation. Variables from the administrative registers will be used as auxiliary variables. The study is conducted in the joint cross-section of the province and economic activity classification.

Krzysztof Dmytrów (Uniwersytet Szczeciński, University of Szczecin)
Jacek Batóg (Uniwersytet Szczeciński, University of Szczecin)

*Econometric analysis of productivity of capital
in the European Union*

The research presents the results of analysis of capital productivity in the EU member countries in 2000-2014. On the basis of one-factor production function, changes of this variable have been calculated for both time series and cross-section data. Applied research tool enabled identification of regularities existing in particular countries, the aggregate, which the EU is, and across sectors. Obtained results have been compared with the results obtained after introduction of the second production factor – labour. Among the most important regularities are: significant influence of the economic crisis, that has begun in the 2007, on the decreasing trend of the productivity of capital in the EU member countries as well as the existence of high differences of this measure in the international and sector approach. Formulated conclusions can be the premises for potential investors, whose decisions are based on the analysis of potential return on the invested capital, and in wider sense they can inform about the future directions of capital flows and, as a consequence, about changes of employment level in the EU.

Keywords: productivity of capital, production function, European Union.

Ewa Drabik (Politechnika Warszawska, Warsaw University of Technology)

*Several remarks reverse engineering, category theory, quantum games
and selected physical models using inused for the purposes of modeling
of the economic phenomena*

Reverse engineering, also called back engineering, is the process of extracting knowledge or designing information from anything: mechanical device electronic components, computer programs, or biological, chemical matters, and – sub-

sequently – analyzing its components. Reverse engineering can be applied for the sake of creating artificial intelligence, e.g. when the used methods are based on very old games, such as Go and chess. Many generations of computers are able to play at the same level as human grandmasters. A computers' arrival at that level is due to imitation of human Go or chess play. A particular emphasis shall be placed upon the Go game, known for 5500 years. Invented in China, it may be classified as the oldest board game, having its ardent enthusiasts until present times. Old physical issues can be easily projected upon the modelling of new economic phenomena and quantum games. The aim of this paper is to discuss the applications of reverse engineering, traditional social games and other domains, such as quantum physics, category theory to the analysis of utterly new social as well as economic phenomena.

**Józef Dziechciarz (Uniwersytet Ekonomiczny we Wrocławiu, Wrocław
University of Economics)**

*Quality of the university. Some aspects of measurement analysis
and modelling*

The definition of the quality of the university performance requires in depth discussion leading to a consensus, to universal acceptance both inside the tertiary education system and the surrounding socio economic and political environment.

The conceptual base being increasingly accepted as common ground for the definition of the new role of universities in society is the concept of the triple helix. Spiral thread includes education, research and the social function (third mission) of the university.

The traditional type of tertiary education institution faces serious criticism. The main elements of this evaluation indicate outdated management style, the fragmented structure and a complicated hierarchy. Hyper dependence of state power, overregulated legal status, (central governmental, but especially the internal regulations), chronically deeply under-funded budget. Unhealthy interpersonal systems of utopian attempt to connect egalitarianism with a strong hierarchical structure.

The structural drawbacks are accompanied by mono-disciplinary narrow specialization; outdated approach to teaching and advancement of young researchers, totally ineffective system (often lack) of knowledge transfer with very few examples of world-class centres of excellence. That is why European policy, followed by national governments (including Polish) emphasize the need to modernize the university. This involves promoting three major reforms.

The first of them has been going on for some time. It consists of a radical curricula reform symbolized by the concept of the Bologna Process. Her priority is to raise education outcomes to a higher level. The ultimate task is to ensure the well-trained personnel for the needs of modern European society.

The evolution of the second helix's component (research) relies mainly on the financing and management reform. It is about the need to transform from the traditional (Humboldtian) university concept in the direction of a new type of university, towards the concept of entrepreneurial university.

Implementation of the concept of entrepreneurial university is impossible providing the current funding system. Necessary reform direction of the financing mode requires a change in philosophy, to abandon current policy of financing resources, towards modern mode of financing output (input oriented versus output oriented financing system). Output oriented financing system requires an appropriate output measurement system. There is necessity for output measurement system in all three components of university activities areas. Currently, only research has more or less accurate system of indicators to assess the results. Indicators of education performance evaluation and for the third mission of the university have yet to be designed.

**Marta Dziechciarz-Duda (Uniwersytet Ekonomiczny we Wrocławiu,
Wrocław University of Economics)**

Socio-economic and demographic factors of Polish households' material wealth. Selected aspects

The aim of the study is to identify differences in the structure of the individual elements of material wealth in Poland compared to other developed countries in two aspects: sources of financing of durable goods purchases in Polish households and in the process financial resources accumulation.

Wealth of households may be described by ownership of durable goods and the level of savings and debts. The structure of the individual elements of households' material wealth is closely linked to the phase of the life cycle of the family. In advanced market economies, e.g. in the US, the process of rapid accumulation of consumer durables possessions may be observed, usually associated with rising debt.

These processes are accompanied with permanent increase in financial resources, savings and capital investment in households' disposal.

In Poland, the ownership of consumer durables indicates that the mechanism of accumulation is similar to that in developed market economies. Household equipment is conditioned by the needs, to a lesser extent, financial abundance. If necessary,

the ability to purchase is supplemented by external sources of financing (loans and mortgages). It does not apply to luxury goods, where other mechanisms exist.

To identify differences in the structure of individual elements of material wealth in households, tools of descriptive statistics, nonparametric tests or techniques of multivariate statistical analysis to verification may be applied. For verification, publicly available databases containing information about households (e.g. Social Diagnosis) may be used.

Keywords: durable goods, households' affluence, households' endowment, households' material wealth.

Karol Flisikowski (Politechnika Gdańska, Gdańsk University of Technology)

A spatio-temporal approach to intersectoral labor and wage mobility

The article presents the spatio-temporal approach for intersectoral labor and wage mobility. Analyses of interindustry mobility were performed with the use of general entropy mobility indices (GEMM). Spatio-temporal approach was obtained thanks to the separate measurement of spatial autocorrelation and regression for each set of sectoral wage and employment structure and was conducted in each year of the research period separately. Calculations of economic distance were based on the level of GDP, whereas in the spatial regression data of previously calculated mobility indices were used. Because of the availability of homogeneous, highly aggregated sectoral data only for the period 1994-2011, the analyses were performed for 20 selected OECD countries.

**Iwona Foryś (Uniwersytet Szczeciński, University of Szczecin)
Barbara Batóg (Uniwersytet Szczeciński, University of Szczecin)**

Distance between the biggest Polish cities according to the condition of housing market in different phases of business cycle

The housing market is a local market. This statement means that factors influencing it are also local. From the point of view of real estate investors and analysts the pace of change on the individual markets is very important (especially on fast growing markets). In this situation the Warsaw agglomeration could be treated as a benchmark for other cities in Poland (comparison to capital city).

The aim of the paper is the comparison of the biggest housing markets in Poland according to their diversity in time. The analyses concern the prices of apartments on the primary and secondary markets in 2006-2016. This period includes different

phases of business cycle: boom in 2006-2008, fall in 2009-2012 and slow exit from deep crisis afterwards. The main research is conducted together with analysis of socio-economic environment of housing market. The level of diversification is analyzed by taking into account the distance from Warsaw housing market (pattern). The application of standardized measures also allows evaluation of changes of in time. The obtained results could be a hint in shaping of governmental housing policy in order to support the less developed housing markets.

Katarzyna Frodyma (Uniwersytet Ekonomiczny w Krakowie, Cracow University of Economics)

*Changes in the distribution of the renewable energy
in the EU countries*

The main research objective of the paper is to evaluate the changes in the distribution of renewable energy sources (RES) in the period between 1995 and 2014. The share of RES in total primary energy supply in the analysed period increase twofold (from 8% in 1995 to 16% in 2014). Thus, it might be interesting to check which types of RES develop more than others. Principal component analysis (PCA) is used to describe the share of different RES in overall renewable energy (RE) in EU member countries in the period between 1995 and 2014. The results of analysis for the year 1995 are compared with the results obtained for the year 2014, which indicates which RES gain in importance during the last 20 years. PCA also allows for describing RE development and identifying the direction of progress in this area, including progress resulting from technological advances. The main types of RES include: hydropower, wind energy, solar energy, tide, wave and ocean, biomass and renewable wastes and geothermal sources. Analysis demonstrates that three types of RES: hydropower, bioenergy and geothermal energy predominate in analysed European countries in 1995. During the next years the share of RE in the energy mix increases and the distribution of RES changes, with a notable increase of the share of wind and solar energy in the overall share of RES.

**Andreas Geyer-Schulz (Karlsruher Institut für Technologie)Tino Fuhrmann (Karlsruher Institut für Technologie)
Marvin Schweizer (Karlsruher Institut für Technologie)
Peter Kurz (TNS Infratest Company)**

Collinearity in Product Configuration Data

In this contribution we analyze the role of collinearity in product configuration data. We link the choice of attribute coding to the observation of collinearity

and we show that under a coding which respects the closed world assumption the linear pricing model for a product configuration always expresses relative prices to an arbitrary default configuration. From a mathematical point of view, such a model consists of a family of pricing models which are equivalent with regard to the optimization criterium of the regression algorithm. 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. One consequence of this treatment is that the standard tests of the significance of a parameters are not invariant to changes in the default configuration whereas the statistics for the complete model are.

**Monika Hadaś-Dyduch (Uniwersytet Ekonomiczny w Katowicach,
University of Economics in Katowice)**

*Artificial neural networks as one of the methods mitigating the edge effect
of the wavelet analysis in the study of macroeconomic indicators*

For signal processing with wavelet transform, uses a pair of filters forming the so-called analysis filter bank. In the case of filters, whose length is greater than two, there is the problem of edge effects. The aim of the article is to present the so-called non-classical methods of mitigation “edge effects”. The method in contrast to previously used methods (eg. Zero-padding, Symmetrization, Smooth padding of order 1, Smooth padding of order 0), is based on artificial neural networks. Research presented in the article, based on series of presenting macroeconomic indicators. It should be noted that the right choice of a method of alleviating edge effects strongly influences on results of the further research, in particular to fit of the trend line to the empirical data and the prediction error.

**Sergiusz Herman (Uniwersytet Ekonomiczny w Poznaniu, Poznań
University of Economics and Business)**

*Industry characteristics of joint-stock companies in Poland and their
bankruptcy prediction*

The bankruptcy of companies is a characteristic of every developed market economy. The risk of bankruptcy is an object of interest for a wide group of stakeholders, including owners, employees, managers, creditors and suppliers. Negative consequences of bankruptcy led to many attempts to predict it. A dynamic growth of interest in this subject was encouraged in 1920s and 1930s which was the result

of the economic crisis at the time. The one of direction of research on predicting the bankruptcy of companies is building models depending on characteristics of the industry of researched companies. Due to a difficulty of gathering a research sample that is big enough, Polish researchers rarely try to build models depending on industries. There are only two examples of authors who have compared the choice of classification for industry models and a “general” model (which does not include the characteristics of industry) [Hołda 2006; Juszczak and Balina 2014]. There are two main aims of research. The first of them is to construct and estimate prediction error of industry and general models (which does not include industry characteristics of the researched companies). The other part of the dissertation also includes determinants of joint-stock companies bankruptcy in chosen industries. Empirical studies were conducted on 180 joint-stock companies in the Polish capital market. They represent three industries of the economy that is construction, manufacturing and trade. The calculations were performed using the bootstrapping method and the multivariate discriminant analysis.

**Roman Huptas (Uniwersytet Ekonomiczny w Krakowie, Cracow
University of Economics)**

*Linear autoregressive conditional volume models for point and density
forecasting of trading volume from the Polish stock market*

The trading volume is one of the key measures of liquidity on stock markets and plays a very important role in research on financial market microstructure. The main aim of our research is to apply Bayesian inference to forecasting intra-daily volume data using the linear Autoregressive Conditional Volume (ACV) models with different distributions for the error term, and to evaluate the quality of the volume forecasts obtained. In particular, a rolling window prediction study is performed for cumulative 5-minute traded volume data. We evaluate the multi-step-ahead point forecasts and one-step-ahead density forecasts of intra-daily volumes of representative stocks quoted on the Warsaw Stock Exchange, which is a leading stock market in Central and Eastern Europe. From the conducted research we conclude that the Bayesian ACV models significantly outperform such benchmarks as the naïve method and the Rolling Means approach. Moreover, the ACV model with exponential error distribution performs significantly better than its counterparts with more general innovation terms such as Weibull, Burr or the generalized gamma distribution. Our main finding from analysis of density forecasts is that in most cases the linear ACV models with the Burr and the generalized gamma distributions provide

significantly better density forecasts as compared to the linear ACV model with exponential innovations in terms of the log-predictive score.

Tadashi Imaizumi (Tama University)

*On How to Visualize Asymmetries of Large Proximity Matrix
by Asymmetric MDS*

MultiDimensional Scaling(MDS) models and related methods have been applied for analyzing proximity matrix of n objects. We try to understand the relationship of n objects in proximity matrix by embedding these objects as n points and a graphical display of n points. However, this proximity matrix may be asymmetric in some cases even removing data collection errors. These asymmetries will be found in, for example, the relationship between members of some organization, a brand switching data, the trading between nations, etc. Then we will assume that the asymmetries in data are meaningful. We need to develop a model and corresponding method of MDS for the asymmetric proximity matrix or matrices as Okada and Imaizumi(1987). However, the larger n is, the more difficult we understand in the display. And more essentially, it is more suitable that we assume the relationship between large n objects will be represented by groups. A new model and method are explained for analyzing a large proximity matrix. And an application to the real data on an economic activity will be shown.

Reference: Okada, A., Imaizumi, T., Nonmetric multidimensional scaling of asymmetric proximities. *Behaviormetrika*, No. 21, 81-96 (1987).

**Mateusz Jankiewicz (Uniwersytet Mikołaja Kopernika w Toruniu,
Nicolaus Copernicus University in Torun)**

**Elżbieta Szulc (Uniwersytet Mikołaja Kopernika w Toruniu, Nicolaus
Copernicus University in Torun)**

*Situation on labour market in the medium-sized urban centres
of the Kujawsko-Pomorskie Voivodeship and the problem
of unemployment in the province*

The aim of the paper is to analyse the spatial and spatio-temporal dependence in matters of situation on labour market of the Kujawsko-Pomorskie Voivodeship across municipalities in the period 2004-2015. With regard to the guidelines of the 2020 development strategy of the province and the 2020+ modernisation plan, it may be the basis for verifying whether, in the presence of the dependence, investing (e.g. through the growing number of enterprises) in development

of the individual medium-sized urban centres with the high level of unemployment, such as Włocławek, Grudziądz and Inowrocław, can significantly improve the situation in the whole province. The assessment of the situation on labour market for each of the municipalities will be made with the use of the taxonomic development measure. Spatial and spatio-temporal tendencies and dependence, in turn, are searched using the conception of spatial trends and spatial autocorrelation. Additionally, the spatial autoregressive models are estimated and verified. The empirical analyses will be supplemented by simulations of the labour market situation in the province resulting from the improvement of the situation in the selected urban centres.

Tomasz Jastrzębski (Uniwersytet Gdański, University of Gdańsk)

Systemic risk in the banking sector: A practical perspective

The financial crisis of 2008-2009 exposed the problem with Europe's growing level of debt at both macro and micro levels. Therefore, the European Parliament began to revise the regulations related to the functioning of the financial sector. The result of this work is introduced on 1st January 2014 package CDR IV / CRR, designed to increase safety of the financial system. The new regulations apply at a large extent to the capital adequacy of credit institutions and investment firms. This is particularly important from the point of view of measuring systemic risk of a financial market. The complexity and variability of the theoretical framework and methods of measuring systemic risk makes it extremely difficult to identify and quantify factors of systemic risk in the banking sector. Systemic risk is different from other types of risk, as it is identified by the effects and not the source. In connection with the introduction of new prudential regulations the question arises: how changing these legal terms will affect the level of sensitivity of exposure to the risk of entities from the banking sector? The aim of the article is the empirical verification of the effectiveness of the changes in the regulations on the example of selected banks of the Polish capital market. The instrument used in this verification is a synthetic indicator evaluating the level of risk exposure. It is designed as a function of many factors aggregated into a vector of random variables equated with the control variables of management process. Accordingly, the design of the components of this vector refers to fundamental characteristics of the probability distribution of this vector, such as the expected value and the variance and their ideal and anti-ideal levels.

Alina Jędrzejczak (Uniwersytet Łódzki, University of Lodz)

Dorota Pekasiewicz (Uniwersytet Łódzki, University of Lodz)

*Analysis of the properties of selected inequality measures based on quantiles
with the application to the Polish income data*

Quantiles of income distributions are often applied to the estimation of various inequality and poverty characteristics. The most popular synthetic inequality measures, including the Gini and Pietra indices, are based on the Lorenz curve, but also simple quantile ratios or quantile dispersion ratios can be utilized to compare incomes of different population groups. Some other measures of income inequality have been constructed using differences (or ratios) between population and income quantiles. Probably the first of such measures was the Holme's coefficient standardized by Bortkiewicz, which is based on the quantiles of order 0.5. The concentration curve and corresponding synthetic concentration coefficient proposed by Zenga, are also defined in terms of quantiles of a size distribution and the corresponding quantiles of the first-moment distribution. In the paper, selected inequality measures based on deciles and quintiles are considered. The main objective was to compare statistical properties of different estimation methods for quantiles, including Bernstein and Huang –Brill estimators, with the classical quantile estimator based on a relevant order statistic. Several Monte Carlo experiments have been conducted to assess biases and mean squared errors of quantile estimators for different sample sizes under the lognormal or Dagum distributions assumed as a population model. The results of the experiments have been used to the estimation of inequality measures in Poland.

Pavla Jindrová (University of Pardubice)

Lucie Kopecká (University of Pardubice)

Assessment of risk factors of serious diseases in OECD countries

Despite remarkable progress in health status and life expectancy in OECD countries over the past decades, there remain large inequalities across countries and also across population groups within each country. These inequalities in health status are linked to many factors, including differences in exposure to risk factors to health and in access to health care. The online OECD Health Database 2016 offers the most comprehensive source of comparable statistics on health and health systems across OECD countries. It is an essential tool to carry out comparative analyses and draw lessons from international comparisons of health care results. The aim of this article is based on mentioned database by application of appropri-

ate multidimensional statistical methods to assess the risks factors in relation to the morbidity and mortality due to selected serious diseases and quantify the impact of factors such as gender, age, income inequality, costs of treatment and selected characteristics of health systems in OECD countries.

Natalya V. Kovtun (Taras Shevchenko National University of Kyiv)

Zinaida O. Palian (Taras Shevchenko National University of Kyiv)

Igor M. Motyuk (Bogomolets National Medical University)

*Statistical analysis of trends and factors in cancer disease of women
of reproductive age in Ukraine*

Every historical epoch has a certain set of factors that regulate the size and composition of the population. The life span of modern mankind is largely dependent on endogenous factors, among them - the not infectious diseases, including cancer. In Ukraine, as in most developed countries, the main cause of death of women is cancer of the reproductive system. Besides the main decline of female population, including fertile age, there are experiences of the indirect losses - unborn children due to the final or temporary loss of female reproductive function because of this disease.

The paper analyzes the dynamics of cancer of the reproductive organs found in Ukrainian women and their survivals in the context of radiation effects of the Chernobyl nuclear power plant are analyzed in this paper. Last 25 years characterizes with increase relapse rate and also reduce six times the interval between the first and second diagnosis of cancer of the reproductive organs. So, if during 1981-2008 the period between the first and the second detection of cancer use to be more than 11 years, since 2008 and until now it has decreased to an average of 2 years. With the help of survival function it was found that the chance of living the next 3 years after 8.5 years after diagnosis of the first cancer to 2008 was 0.959, and after 2008, it was only 0.562. Also, it was found that the disease of breast cancer among women who received radiation during the Chernobyl accident at the age up to 30 had more aggressive form. Proved with the probability ($p = 0.000798$) that factors of survival of patients up to and over to 30 are fundamentally different and it should become the subject of a separate research. It can't be definite that the age of patients at the time of the Chernobyl accident affects their survival, as it was described in the scientific literature. Age difference is just a criteria of two clusters formation of women survival. Simultaneously the statistical significance level only confirms, that the hypothesis which the causal factors of differentiation survival of the two groups of women have

fundamentally different nature. The paper also attempts to estimate the magnitude of indirect demographic losses due to cancer suffering women of reproductive age. The study used statistics of the Ukrainian Institute of Cancer for the period 1981-2015 and the State Statistics Service of Ukraine.

Lucie Kopecká (University of Pardubice)

Pavla Jindrová (University of Pardubice)

Comparison of mortality due to critical illnesses in the EU countries

Health is a precondition for economic prosperity in each country and citizens' health is also a core EU priority. Cancer, heart disease, diabetes, respiratory, mental and other chronic diseases represent great suffering to citizens and represent a huge cost to society and the economy. Huge differences in health and healthcare exist between and within EU countries and regions. The aim of this article is to present the results of application of multivariate statistical methods, such as correlation analysis, component analysis, cluster analysis and multidimensional comparative analysis and to provide an overview of the gravity of the situation in mortality from the serious diseases by the selected indicators, their various causal relations and regional differences and similarities in EU countries. The basic source of data is the database of the World Health Organization (WHO) for Europe.

**Daniel Kosiorwski (Uniwersytet Ekonomiczny w Krakowie, Cracow
University of Economics)**

**Ewa Szlachtowska (Akademia Górniczo-Hutnicza im. Stanisława Staszica
w Krakowie, AGH University of Science and Technology)**

*K – local median algorithm for functional data in empirical analysis
of air pollution data*

Novel tools offered by functional data analysis enables economists for enlarging a range of considered issues as well as for obtaining a new insight into classical areas of empirical economic research. In this paper we present a novel k – local functional median algorithm for functional data. We show its statistical properties as well as its usefulness in analysis of real data set concerning air pollution monitoring in małopolskie voivodship in Poland in 2016. We show an implementation of the algorithm within a free R package DepthProc and compare its properties with selected alternatives presented in the literature. Subject classification: JEL C38, C51, C87, AMS 62H30. Keywords: Functional Data Clustering, Functional Depth, Functional Median, Robust Clustering References: 1. Paindaveine, D.,

G. Van Bever, G. (2013), From Depth to Local Depth: A Focus on Centrality, Journal of the American Statistical Association, Vol. 108, No. 503, Theory and Methods, 1105–1119.

Eva Kotlebová (University of Economics in Bratislava)

Erik Šoltés (University of Economics in Bratislava)

Application of Bayesian Methods in Analysis of Unavailability of Health Care in Slovakia

Availability of health care affects the quality of life of the population and unmet needs of health care is an important indicator of poverty or social exclusion.

The paper deals with estimating the proportion of the population of the Slovak Republic who cannot afford necessary medical treatment mainly because of lack of money, but also for other reasons. In analysis, two sources of data were used: sample survey EU SILC and sample survey EHIS, both conducted by the Statistical Office of Slovak Republic. Since these sources of information were simultaneously used, it was appropriate to apply bayesian methods.

Marta Kuc (Politechnika Gdańska, Gdańsk University of Technology)

Spatial differences in sustainable development components in nordic regions

Geographical proximity, common historical roots and collaboration within the Nordic Council make the nordic countries, often wrongly treated as monoliths. However, in reality, nordic regions differ in terms of broadly defined socio-economic development. The aim of this study is to analyze the spatial differences in sustainable development components in nordic NUTS-3 regions in the period 2006-2014. Each sustainability pillar is measured using Pietrzak's spatial taxonomy measure of development. Analyzed problem seems to be important since the Nordic countries are currently implementing the Fourth Nordic Strategies for Sustainable Development. The conducted study can be used to make a preliminary assessment of the effectiveness of regional policy.

Marta Kuc (Politechnika Gdańska, Gdańsk University of Technology)
Marta Gawlas (Uniwersytet Pedagogiczny im. Komisji Edukacji
Narodowej w Krakowie, Pedagogical University of Cracow)

*Taxonomic analysis of Tourism Potential of Polish
mountain counties*

The main aim of this study is to group polish mountain counties in terms of their tourism potential in the 2000-2014 period. Analyzed regions differ strongly in terms of tourism potential. Tourism potential depends not only of geographical location but what is more important of different ideas about development and promotion of specific centers. It seems reasonable to carry out analyzes separately due to the hiking and separately due to winter tourism. The synthetic variable is used to approximate the tourism potential. Groups of counties are separated based on the value of synthetic measure and k-means method. The analysis is conducted on the basis of data from BDL GUS.

**Tomasz Kuszewski (Szkoła Główna Handlowa w Warszawie, SGH Warsaw
School of Economics)**
**Agata Sielska (Szkoła Główna Handlowa w Warszawie, SGH Warsaw
School of Economics)**

*Source of data as a determinant of the assessment of agricultural
producer's financial situation*

The aim of the paper is to examine whether the analysis of agricultural producer's income in 2004-2013 based on the different sources of data leads to noncontradictory conclusions concerning the changes of economic situation in agriculture. Data from the Central Statistical Office of Poland, Farm Accountancy Data Network (FADN), Research Institute for Economic Development of Warsaw School of Economics (IRG SGH) and results reported in the Social Diagnosis have been used. The changes in variables reflecting the agricultural producers' financial situation have been compared on the basis of the interpretation of graphs, correlation coefficients and distance measured in the Clark's metrics. Results from FADN may be considered the most consistent with other databases whereas results obtained by IRG SGH may be considered the most disparate.

Lukasz Lenart (Uniwersytet Ekonomiczny w Krakowie, Cracow University of Economics)

Exponential smoothing models with time-varying periodic parameters

In the literature there is a growing number of models with time-varying in time parameters. The purpose of this article is to show the reduced form for the linear innovations model with time-varying periodic in time parameters. It will be shown that when the state variables are eliminated from a linear innovations state space model with time-varying periodic in time parameters, a Periodic Autoregressive Integrated Moving Average model (PARIMA in short) with equality restrictions on parameters is obtained. This is the generalization for reduced form of the state space model with constant in time parameters. In particular, known models called: local level model, damped level model are generalized to periodic case. Finally, the real data example with macroeconomic data will be presented where the performance of competing models (based on Logarithmic Score) in pseudo-real forecasting exercise is used to assess the adequacy of a specific model.

Lukasz Lenart (Uniwersytet Ekonomiczny w Krakowie, Cracow University of Economics)

Błażej Mazur (Uniwersytet Ekonomiczny w Krakowie, Cracow University of Economics)

Business cycle analysis with short time series: a stochastic versus a non-stochastic approach

The idea of modelling of business cycle fluctuations using an autoregressive model with complex roots is well established in econometric analysis, including seminal works of Harvey among others. A process displaying such properties is sometimes considered within an unobserved-component model setup. It can be shown that such an approach induces a spectral density function showing a concentration of mass around a value (a frequency) related to the complex root. The resulting process, often referred to as a stochastic cycle model, corresponds to an ARMA process with equality restrictions on parameters. However, there exists an alternative approach where business cycles are generated by time-varying expected value driven by a deterministic function (a deterministic cycle approach). It is generally accepted that the deterministic cycle alone is not sufficient for description of actual business cycles due to its inflexibility. However, it is not clear that it is true for short time-series that are available for the emerging economies. In order to deal with

the problem we consider a general model that nests both stochastic and deterministic mechanism - therefore allowing for a formal comparison. The deterministic cycle is non-trivial since it is modelled using an almost-periodic function (represented as a Flexible Fourier form). The model discussed here has two additional features that are important for empirical research. Firstly, it can potentially display fluctuations with more than one frequency driving the business cycle. Secondly, as we make use of the Bayesian approach, the inferential uncertainty as to the frequency parameter (or the implied cycle length) can be fully described in a formal way. We illustrate the approach using quarterly GDP data from Polish economy.

Paweł Lula (Uniwersytet Ekonomiczny w Krakowie, Cracow University of Economics)

Urszula Cieraszewska (Uniwersytet Ekonomiczny w Krakowie, Cracow University of Economics)

Monika Hamerska (Uniwersytet Ekonomiczny w Krakowie, Cracow University of Economics)

Cluster analysis of research papers based on UDC codes and exploratory analysis of abstracts. Comparative approach

The scope of the presentation covers the topic of cluster analysis of research papers. In its consecutive parts the following issues are presented: 1. methods of similarity calculation between research papers based on UDC (universal decimal classification) codes, 2. methods of similarity evaluation of papers based on the results of exploratory analysis of their abstracts, 3. cluster analysis of research papers using above presented techniques, 4. comparative analysis of results, 5. correctness evaluation of methods proposed in the presentation.

Malgorzata Markowska (Uniwersytet Ekonomiczny we Wrocławiu, Wrocław University of Economics)

Danuta Strahl (Uniwersytet Ekonomiczny we Wrocławiu, Wrocław University of Economics)

Relative Index of Enterprise Innovation Activity for Polish Provinces

The aim of the paper is to propose the Relative Index of Enterprise Innovation Activity for Polish provinces. Calculations are based on data published in „Innovation activity of enterprises in 2013-2015” (Polish Central Statistical Office), which comes from the shorter version of Community Innovation Survey. Partial

indexes are calculated for investments in innovation, innovation activities, public support, cooperation in innovations and economic results, separately for industry and services, and finally the global index is presented. All variables are given as percentages. Indexes are calculated with classical approach assuming normalization of variables into $[0;1]$ interval, new iterative method which finds the best objects one by one starting from top of the ranking, and a point method. Some methodological problems are discussed in details, e.g.: – consequences of avoiding normalization when all variables are stimulants given in percentages – weighting systems in case of hierarchical variables with multiple choice – comparing rankings based on individual and composite variables Correlation analysis of variables, partial and global indexes is also provided as well as some econometric models explaining the effects of innovation activities.

Jerzy Marzec (Uniwersytet Ekonomiczny w Krakowie, Cracow University of Economics)

Jacek Osiewalski (Uniwersytet Ekonomiczny w Krakowie, Cracow University of Economics)

Andrzej Pisulewski (Uniwersytet Rolniczy w Krakowie, University of Agriculture in Krakow)

Economies of scope or specialization: new local measures

We present traditional measures of economies of scope and discuss their shortcomings. Whenever different products can be expressed in the same units (e.g., using constant, reference prices), one can consider increasing aggregate production through either an increase of only one product or a proportional increase of all products. The ratio of costs in these two situations defines our new class of indices. The proposed measures of economies of scope or specialization are illustrated using Bayesian inference in a translog cost frontier model for panel data. The first example relates to the 58 branches of one of Polish commercial banks, while the second example concerns Polish dairy farms.

Błażej Mazur (Uniwersytet Ekonomiczny w Krakowie, Cracow University of Economics)

Density forecasting performance of alternative GARCH and DCS models for daily financial returns

The objective of the research is to conduct an empirical comparison of predictive performance (taking into considerations density forecasts) of various GARCH-type

models for daily financial returns. In particular we include also more recent DCS-type models proposed by Harvey, 2013. One of the objectives is to compare predictive performance in the lower tail of the predictive distribution (i.e. risk evaluation). We make use of the Bayesian techniques that provide formal basis for construction of the whole predictive distribution that takes into account the inferential uncertainty resulting from parameter estimation. This is important since the models under consideration use non-standard conditional distributions (in particular generalized t) and description of estimation uncertainty for shape parameters of such distributions might be challenging. The specifications under consideration differ by the type of the conditional distribution and by detailed rule for dynamic updating of its parameters. We consider traditional GJR-GARCH and E-GARCH models as well as more recent Beta-t-EGARCH specification (see Harvey 2013) being an instance of a DCS model. The basic setup for the comparison is that of information updating and recursive forecasting – all the models are re-estimated as new observations are added to the sample. Therefore the comparison is based on out-of-sample predictive performance. In particular we compare the models by LPS and CRPS. We also investigate performance of risk indicators such as Value-at-Risk. The dataset under consideration is a series of daily returns from S&P500 index.

**Jacek Osiewalski (Uniwersytet Ekonomiczny w Krakowie, Cracow
University of Economics)**

**Beata Osiewalska (Uniwersytet Ekonomiczny w Krakowie, Cracow
University of Economics)**

*A bivariate model of the number of children and the mother's
age at first birth*

We formulate a joint statistical model of two important demographic variables: (i) the number of children born by a given woman and (ii) her age at the birth of her first child. The proposed specification is based on the so-called ZIP-CP model of bivariate Poisson-type regression, which enables to (quite easily) examine dependence between two count variables. In this model the number of children is a ZIP-type variable in the hurdle model version, while the conditional distribution of the age at first childbirth given the number of children is either a shifted Poisson distribution (when a woman has not have any child) or a truncated Poisson distribution (if a woman gave birth to at least one child). The expected values of all underlying Poisson distributions as well as the relation between both variables being modelled are functions of some socio-economic explanatory variables and the age of a woman.

**Monika Papież (Uniwersytet Ekonomiczny w Krakowie, Cracow
University of Economics)**

**Sławomir Śmiech (Uniwersytet Ekonomiczny w Krakowie, Cracow
University of Economics)**

**Katarzyna Frodyma (Uniwersytet Ekonomiczny w Krakowie, Cracow
University of Economics)**

*Determinants of the renewable energy development in the EU countries.
A 20-year perspective*

The main research objective of the paper is to identify the factors determining energy policy in the EU countries in the middle of 1990s. This objective is achieved in two stages. During the first one, we describe the distribution of energy sources in 26 EU countries in 1995 using PCA. We find four main principal components distinguishing countries in terms of using energy sources in 1995, and we use them during the second stage of our study as potential determinants of renewable energy development. We also consider several factors related to energy security, environmental concerns, economy and politics. Using two methods for variable selection, namely, the best subset regression and the lasso method, we demonstrate that the present (in 2014) share of RES in the energy mix significantly depends on the condition of the EU countries in the middle of 1990s. Our study reveals that the distribution of energy sources in 1995 is the main determinant of renewable energy development. Countries without their own fossil fuel sources are the ones which develop renewable energy the most. Other factors affecting RE development include: GDP per capita, the Shannon–Weiner index (SWI) concentration of the energy supply, and the cost of the consumption of energy obtained from fossil fuels in relation to GDP.

**Barbara Pawelek (Uniwersytet Ekonomiczny w Krakowie, Cracow
University of Economics)**

*Prediction of company bankruptcy in the context of changes in the economic
situation*

The papers on the prediction of company bankruptcy emphasise that there is no uniformity of a research set. To predict the threat of company bankruptcy, the authors use methods based mainly on the data extracted from the financial statements of companies. If gathering of a sufficiently large set of information for one year is not possible, a database is built on the basis of the financial data for a few years. The economic conditions of business activities change over time.

Therefore, the researchers have made attempts to study the impact of changes in the economic situation on the results of the predictions of company bankruptcy. The presented work is placed within this trend of research. The purpose of the work is to compare the predictive capacity of selected bankruptcy prediction models built on the basis of financial data derived from various years, with the predictive capacity of a corresponding aggregate model consisting of models built on the basis of data referring to individual years. The analysis uses the financial data of companies operating in the industrial processing sector in Poland in the years 2005-2008. The research covered selected data classification methods such as: k-Nearest Neighbors, support vector machine, bagging, boosting, random forest, neural network, naive Bayes, logistic regression and linear discriminant function. The predictive capacity of the constructed models was assessed on the basis of a test set and by means of the v-fold cross validation. The following measures were used, among others, for measurements of the predictive capacity accuracy rate, sensitivity, specificity, Brier score and AUC. The calculations were performed in the R programme.

**Barbara Pawelek (Uniwersytet Ekonomiczny w Krakowie, Cracow
University of Economics)**

**Dorota Grochowina (Szkola Główna Handlowa w Warszawie, SGH
Warsaw School of Economics)**

*Forecasting the bankruptcy of companies: the use of the random subspaces
and random forests methods*

The subject matter of the paper falls into the mainstream of research on an important economic issue, which is the bankruptcy of companies. The issues related to the bankruptcy of companies have been widely discussed in the economic literature. Works are being continued on the methodology of forecasting the bankruptcy of companies, including the use of Data Mining methods for this purpose. The purpose of the paper is to present the results of empirical studies on the usefulness of the random subspaces and random forests methods for forecasting the bankruptcy of companies in Poland. Both of the aforementioned methods belong to the multi-model approach to data analysis. The random subspaces method relies on the random selection of variables, while the random forests methods uses both the random selection of variables, as well as the random selection of observations. The study has considered two variants of the random forests methods, i.e. Forest-RI and Forest-RC. The analysis was performed for balanced and unbalanced sets of companies. The usefulness of the random subspaces and random forests

methods for forecasting the bankruptcy of companies was assessed based on the values of the classification efficiency measures for companies from the test part of the input set of objects and using v -fold cross validation. The basis for building the set of objects was a set of companies active in the industrial processing sector in Poland in the years 2013-2014. The financial data were taken from the Emerging Markets Information Service website. The computations were done in the R program.

**Michał Bernard Pietrzak (Uniwersytet Mikołaja Kopernika w Toruniu,
Nicolaus Copernicus University in Torun)**

**Bartosz Ziemkiewicz (Uniwersytet Mikołaja Kopernika w Toruniu,
Nicolaus Copernicus University in Torun)**

*Considering the use of random fields in the Modifiable
Areal Unit Problem*

In the article we consider the use of random fields theory for the needs of the “Scale Problem” issue. The Scale Problem is defined as a volatility of the results of analysis as a result of a change in the aggregation scale. In the case of the scale problem empirical studies should be conducted with application of simulations. Within the simulation analysis the realisations of random fields referred to irregular regions will be generated. First, the internal structure of spatial processes will be analysed. Next, we consider the theoretical foundations for random fields relative to irregular regions. The accepted properties of random fields will be based on the characteristics established for economic phenomena. The outcome of the task will be the development of a procedure for generating the vector of random fields with specified properties. Procedure for generating random fields will be used to simulations within the scale problem too. The research is funded by National Science Centre, Poland under the research project no. 2015/17/B/HS4/01004.

**Michał Bernard Pietrzak (Uniwersytet Mikołaja Kopernika w Toruniu,
Nicolaus Copernicus University in Torun)**

**Adam P. Balcerzak (Uniwersytet Mikołaja Kopernika w Toruniu, Nicolaus
Copernicus University in Torun)**

*Digital economy in Polish regions. Proposal of measurement via TOPSIS with
generalized distance measure GDM*

Investing in digital infrastructure and building effective digital economy is currently considered as a basic condition for keeping international competitiveness

of developed economies. In the case of developing countries in some economic models it is considered as a factor that can help to avoid middle income growth trap. From the regional perspective developing digital economy can support the process of convergence and closing development gap between the regions. As a result, a comparative research concerning the development level of digital economy is an important scientific task. In this context, the aim of the article is to assess and compare the development level of digital economy in Polish regions (NUTS 1). The digital economy is commonly considered as a multiple-criteria phenomenon. Thus, an approach based on TOPSIS method with application of generalized distance measure GDM was used in the analysis. Seven diagnostic variables concerning digital infrastructure and level of its utilization were used. The research was conducted for the years 2012-2015 with application of Eurostat Data. The conducted analysis confirmed relatively quick progress in the field of building digital economy obtained by Polish regions.

Anatoliy Pilyavskyy (Lviv University of Trade and Economics)

William Aaronson (Temple University, USA)

Liběna Černohorská (University of Pardubice)

*The visegrad group of banks. Comparative performance
for the period 2009-2013*

The presentation studies the technical efficiency as well as the total factor of productivity changes differences between banks of the Visegrad group (V4) of four Central European States (Czech Republic, Poland, Hungary and Slovak) for the period 2009-2013. Our results showed that average technical efficiency (for all banks) trended upward during the study period. This increase efficiency is not common for all banks in the Czech Republic, Poland, Hungary and Slovak. We found that efficiency for Czech, Polish and Slovak banks increase during research time. Development of efficiency Hungarian banks has on the contrary a downward trend from 0.882 in 2009 to 0.856 in 2013. We also founded that the Total Factor of Productivity (TFP) changes across all countries was relatively stable in 3 of the 4 observation periods. However, there was a substantial decline in TFP in 2011-12. Examination of the trends for each of the countries showed that Hungary overly influenced the sample mean. The TFP remained stable during this period for all Poland and Czech Republic, declined slightly for Slovakia, but declined precipitously for Hungary in 2011-12.

Krzysztof Piontek (Uniwersytet Ekonomiczny we Wrocławiu, Wrocław University of Economics)

Radosław Pietrzyk (Uniwersytet Ekonomiczny we Wrocławiu, Wrocław University of Economics)

Paweł Rokita (Uniwersytet Ekonomiczny we Wrocławiu, Wrocław University of Economics)

*Risk measurement for goals realization
in a household financial plan*

When constructing financial plans for a households, it is very important to be able to incorporate into the model the risk related to realization of financial gals. The risk should be used as one of the plan optimization criteria. The value function (goal function of the optimization procedure, usually based on some utility function or functions) should play the role of an integrated measure of success, that takes into account both the natural tendency of a decision maker to short-term planning and the need of long-term planning, that is – planning for the whole life cycle of the household, working into the plan multiple financial goals set by the household. It is also important to consider all its important constraints and many different types of risk. There is a need of risk measures that would address risk of short-term and long-term goal realization and could be used in a coherent way in an optimization procedure. The solutions proposed in the existing literature on this subject do not take into consideration the potential conflict between short-term risk minimization and minimization of the risk that the household will not succeed in a full realization of its whole-life financial plan. The work takes up the discussion on augmentation and modification of the known concepts in the area of household financial planning to overcome the problem that has been pointed out here.

Dominika Polko-Zajac (Uniwersytet Ekonomiczny w Katowicach, University of Economics in Katowice)

*On comparing populations based on two sets
of variables*

In an economic and social studies it is often necessary to test the differences between the two sets of variables. Multidimensional comparisons allow researchers to a thorough analysis of the studied phenomenon. The article concerned the problem of comparing multidimensional populations using canonical correlation analysis. In order to identify differences between the analyzed sets of variables permutation

tests were used. These tests do not require additional assumptions about the form of the distribution in the population; are suitable for small sample sizes and are robust to outliers. The properties of these tests were characterized using a computer simulation in R program.

Agnieszka Przybylska-Mazur (Uniwersytet Ekonomiczny w Katowicach, University of Economics in Katowice)

Expenditure rules in the context of a balanced budget

Expenditure rules that are one of the types of fiscal rules are important in budgetary policies. They facilitate to maintain a stable budget in accordance with the adopted strategy in the medium and long term, they allow to coordinate the budgetary expenditure and they enable mitigate the effects of negative shocks associated with budgetary revenue. In the article we analyze the expenditure rules in the context of a balanced budget based on the theory of common-pool problem.

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Qualitative factors in statistical models used for assessing credit risk of enterprises

Credit risk is a key risk in banking activity. Statistical models used in assessing credit risk of enterprises are based on financial data from financial statements of entities. However in case of small and medium enterprises qualitative factors are more important in assessing credit risk. In this paper the most frequently used qualitative factors in assessing credit risk of small and medium enterprises were discussed. Using statistical methods like logistic regression qualitative factors were analysed, their assessment, the way they are included in the credit risk model. The combination of qualitative assessment (qualitative factors) and quantitative assessment (financial ratios) was presented. The sample of small and medium enterprises supplied by one of the Polish banks was utilized. The research hypothesis was verified: including the qualitative factors in the credit risk assessment model for enterprises increases the predictive power of the model.

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*Selection of the risk assessment methods for industry – review and
characterization*

The new version of ISO 9001: 2015 regulates the requirements for a quality management system with increased importance given to risk and employing the Plan-Do-Check-Act cycle at all levels in the organization. For this purpose, any organization which applied the ISO 9001 standard requirements to their quality management systems must identify and assess the risks in each process and make a plan to minimize its impact. Risk analysis is a process that helps to identify and manage potential problems but also it gives the opportunities and possibilities for organization what exactly is a continues improvement process. This article describes the selected tools to identify the risks in the industry. It presents their characteristics in a practical applications. The proposed classification was selected by the possibility of their use and application, the level of difficulty in their implementation and also potential benefits with them. A practical problem for many organizations is to choose the appropriate method which will be adequate and subsequently allows for a reduce the risks involved. The problem is complex because most of the methods to risk assessment is financial or emergency but there are only a few methods which could be able for the industrial areas

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*SVM classifiers for functional data in monitoring of the Internet users
behaviours*

Novel tools offered by functional data analysis offers various methods especially adequate for monitoring phenomena appearing within the new economy, which are described by means of functions of a certain continuum. We mean here, among others, fraud detection in credit card transactions, electricity demand or the Internet traffic monitoring. In this paper we focus our attention on a concept of classifier for functional data induced by the general support vector machines methodology. We, among other, study robustness, computational complexity and consistency

of the classifiers using analytical as well as empirical arguments. We compare their properties with their alternatives presented in the literature using real data set and concerning behaviours of users of a big Internet service divided into four subservices. Keywords: classifier for functional objects, data depth, the Internet service, management, support vector machine classifier JEL Classification: C14, C22, C38 References: 1. Anagnostopoulos C., Tasoulis D.K., Adams N.M., Pavlidis N.G., Hand D.J., (2012) Online linear and quadratic discriminant analysis with adaptive forgetting for streaming classification, *Statistical Analysis and Data Mining*, 2012, 5, 139–166. 2. Kosiorowski, D., Bocian, M. (2015), Functional Classifiers in management of the Internet service, *The 9th Professor Aleksander Zeliaś International Conference on Modelling and Forecasting of Socio-Economic Phenomena*. 3. Lange, T., Mosler, K., & Mozharovskyi, P. (2014). Fast nonparametric classification based on data depth. *Statistical Papers*, 55(1), 49-69.

Marcin Salamaga (Uniwersytet Ekonomiczny w Krakowie, Cracow University of Economics)

Identifying patterns of fiscal consolidation on the example of EU countries

The fiscal consolidation is based on efforts to balance the revenue and expenditure of the public budget. This can be achieved through reducing public spending or increasing the taxes. Fiscal consolidation has very important macroeconomic consequences in the long and short term. The aim of this article is to find patterns of fiscal consolidation in EU countries. The basis of the study are matrices of public revenue and expenditure in the EU countries. To detect patterns of the fiscal consolidation will be applied multivariate statistical methods: correspondence analysis, cluster analysis and index of matrix similarity. In addition, there will be analyzed macroeconomic effects of fiscal consolidation. The study used data from Eurostat.

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Symmetry of output effects of government expenditure and revenues in Ukraine

This paper empirically analyzes fiscal policy effects in Ukraine, using the vector error correction model (VECM). For quarterly data of the 2000–2016 period,

we find a robust positive impact of both government expenditure and revenues upon output in Ukraine. As the former result has familiar Keynesian properties, the latter one is of unmistakable Non-Keynesian flavor. Otherwise the fiscal policy transmission mechanism exhibits several standard features (e.g., as an increase in government expenditure after a positive shock to government revenues or widening of the budget deficit following an interest rate hike). Our results reflect the prediction of the Mankiw-Summers model that tax cuts could be restrictionary under (i) strong demand for money of consumption expenditure combined with (ii) the inverse link between investments and interest rate (both relationships are confirmed for Ukraine with the 2SLS estimates for two sets of sub-samples). The results suggest feasibility of revenue-based austerity policies in Ukraine, as higher tax rates and better tax collection may contribute to economic growth even in the short run. The findings also imply that the real exchange rate depreciation brings about a decline in output and a symmetrical decrease in either government revenues or government expenditure. Also, there is a rather strong inverse relationship between interest rate and output.

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Separability Index for Cluster Analysis

A new separability index for groups obtained in cluster analysis has been proposed in the paper. It is assumed that the number of groups and object assignments are given. The main idea is based on the squared euclidean distance between each object and the closest one belonging to different group. Sum of these distances should be normalized, e.g. by within groups sum of squares. The proposed measure can be used also for overlapping or fuzzy clusters.

The distribution of measure under null hypothesis of multivariate normal distribution is presented. The results of simulation studies under different models of separability are given. The proposed measure is compared to Calinski-Harabasz, Krzanowski-Lai and Rousseeuw indexes.

Malgorzata Stec (Uniwersytet Rzeszowski, University of Rzeszów)

Malgorzata Wosiek (Uniwersytet Rzeszowski, University of Rzeszów)

*Statistical evaluation of sustainable development of Polish voivodeships
in respect of social domain*

Sustainable development is a strategic concept, in which the process of integrating political, economic and social actions occurs, taking into account natural balance and stability of basic natural processes, in order to guarantee possibilities of fulfilling basic needs of separate societies or citizens not only of the contemporary generation, but future generations as well. The purpose of the article is statistical evaluation the level of sustainable development of Polish voivodeships in respect of social domain, with particular emphasis on the region of Podkarpackie. Based on statistical indicators characterizing the sustainable development with reference to social domain, synthetic measures for Polish voivodeships were calculated. The rank is prepared using the dynamic approach of the General Distance Measure (GDM) method by M. Walesiak. The study was conducted in the years 2005-2015. The results confirm the diversity of Polish regions in social terms of sustainable development.

Jacek Stelmach (Polwax S.A.)

On the permutation extension of unit root tests

Construction of time series models requires identification of the order of integration. In addition to most common analyzing of sample autocorrelation and partial autocorrelation functions, unit root tests are usually carried out. A power of such tests is limited when Φ parameter is close to unity. Other factors influencing the power of these tests are the existence of autocorrelation or non-linear trend. The question is whether it is possible to achieve higher power with permutation tests in which the critical region is defined directly from empirical distribution of test statistics while a test is carried out. This paper presents the results of simulation carried out for most widely used unit root tests and its permutation analogues.

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*Volatility spillovers between food, energy, US dollar, bond and equity markets.
Evidence from Diebold-Yilmaz's approach*

The reasons for the surge in food prices in 2007 and 2012 are still a controversial issue. Literature offers plausible explanations, which include: financialization, depreciation of US dollars, or the tighter connection between food market and energy market (biofuels).

The aim of the study is to investigate volatility spillovers between returns of food, energy, US dollar and equity markets. It is based on weekly series of volatility of corn, wheat, US dollar, crude oil, SP500 and bonds futures covering the period from 1983-04-04 to 2016-04-10. We base our analysis on forecast-error variance decompositions in a generalized vector autoregressive framework, which are invariant to the ordering of variables, as proposed by Diebold and Yilmaz (2012). The data are studied in rolling subsamples, since the evolution of relationships is expected. Taking into account a large number of parameters in the models in single iterations, lasso estimation methods are used. The results of the study reveal that the total as well as directional volatility spillovers change in time. In recent years, spillovers from the equity market increase significantly, but the largest part of volatility of food forecast-error variance decomposition comes from food.

Keywords: volatility spillovers, agricultural commodity, biofuels, lasso, financial markets

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*Application Extreme Value Theory to model
Life Expectancy*

Mortality projections are crucial in many areas. More recently, ageing populations in developed nations have been exerting pressure on the viability of pension and

social security systems and there has been heightened interest from demographers, actuaries and policy-makers in the modelling and forecasting of mortality. Oeppen and Vaupel (2002) introduced the term Best Practice Life Expectancy, referring to the maximum life expectancy observed among populations at a given age. We apply principles from the statistical theory of Extreme Values and the notion of best practice life expectancy. We apply the method to data and forecast life expectancy at birth.

Paweł Ulman (Uniwersytet Ekonomiczny w Krakowie, Cracow University of Economics)

Household income from abroad and its determinants

The article aims to identify and show the scale and significance of foreign sources of income of Polish households on a budget as well as on the financial situation of these households. Average incomes and expenses of households have increased significantly after the Polish accession to the European Union. In a large range the growth was dictated by the rising wages resulting from changes in the Polish labor market, on the other hand, transfers of income from abroad. An important issue is therefore to determine the importance of this type of revenue for the economic situation of households in Poland. The individual data of the household budget surveys of 2015 are used to achieve this purpose. New variables allowing primarily on the assessment of the financial situation and economic households were introduced in subsequent editions of this survey. In addition to information about the level of income from various sources (including 12 categories of income from abroad) collected data also refer to the direct assessment of the impact of income from abroad on the financial situation of the household. In addition, a wide collection of other information about the economic and financial situation allow for a comparative analysis of households in this area. For the statistical analysis, theoretical models of income distribution including the Burr family are used – they allow to characterize the distributions of income from abroad, the total income of these households that have incomes from abroad compared to households without such income. Models for censored data applying in order to identify the determinants of income from foreign sources are also used as well as the correspondence analysis to study the impact of income from abroad for the purchase of durable goods.

Marek Walesiak (Uniwersytet Ekonomiczny we Wrocławiu, Wrocław University of Economics)

An application of multidimensional scaling to assess the measurement and the changes in the level of social cohesion of the Lower Silesia region in the period 2005-2015

Social cohesion is the ability of territorial communities to ensure the welfare of all its members, the reduction of social stratification and avoid polarization (A new strategy for Social Cohesion, 2004, p. 3). According to evaluation of the social cohesion of the Lower Silesia region in cross-counties in the years 2005-2015 the variables of the following areas: income and economic activity of the population, living conditions of the population and the availability of services and public space were taken into account. To assess the measurement and the changes in the level of social cohesion of the Lower Silesia region in cross counties in the period 2005-2015 multidimensional scaling and Theil measure were applied.

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Dependence uncertainty and the risk diversification effect in Solvency II

Estimation of the diversification effect on “the actual level” is determined by the right method of modelling dependencies between risk factors. Poorly identified dependence structure leads to estimating the effect of diversification on the wrong level, which may result in overestimation or underestimation of the capital requirements and significantly affect the functioning of the insurance company and its solvency. In the standard model proposed in Solvency II system, variance-covariance method is used for aggregation of capital requirements, in which dependency is modelled using only linear correlation coefficients. From a methodological point of view, the method of variance-covariance is correct when capital requirements are determined for risk factors, which are subjected to multi-dimensional normal distribution (or elliptical). In the case of the insurer’s risk analysis, this assumption is rarely met. This means that in the discussed standard model of Solvency II diversification effect is estimated using dependence structures that cannot properly describe the relations between risk factors. This raises a question of how reliable is a diversification effect estimated in this way? At the beginning of the lecture,

briefly described will be the method for determining solvency capital requirements used in Solvency II and the role of dependencies in the correct determination of diversification effect. It will be followed by an attempt to perform analysis of the sensitivity of the diversification effect for dependence structure. Discussed case will be the one in which dependence structures will be characterized by the same correlation matrices.

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*Modelling the Distribution of Loan Repayments
of Households in Poland*

Since the beginning of the twenty-first century is observed rapid growth of household debt in Poland. Households more often use credit to cover current expenditure and the purchase of durable goods. The consequence of this is an increase in the share of expenditures for the loan repayments in households' budgets. The purpose of the article is the choice of theoretical models which reflect possible best explanation of distribution of debt repayments (credit and loans) by households. Right-sided asymmetry in the distribution of debt repayments justifies the adaption in the study theoretical distributions, which are used in the analysis of the distribution of wages and income. The most widely used distributions as Burr (type III and XII) and the log-normal distribution were tested for compliance estimation of position, diversity and inequality measurements with the empirical distribution of debt repayments. The source of data were individual information about the monthly repayments on debt acquired as part of the household budget survey in Poland in 2015. The results indicate the usefulness of the application of theoretical distributions modelling income distribution in modelling distributions of debt repayments.

Aleksander Welfe (Uniwersytet Łódzki, University of Lodz)

*Real exchange rates, US dollar and crude oil price
in the tripolar model*

The foreign exchange rates of the currencies of the non-euro EU member states show strong dependence on the behaviour of the euro, because the states' balance of payments is determined by a high share of intra-EU trade. The Polish currency

(the zloty) is used to demonstrate that the exchange rate is also influenced by credit default risk premiums and the euro-dollar changes, so the tripolar model is an appropriate analytical framework. The empirical results of the research support the hypothesis that in the long run the euro-dollar real exchange rate is determined by the real crude oil prices and in the short-run by the parity of the real risk-free interest rates. The propagation of shocks is traced using an impulse-response analysis based on the cointegrated SVAR model.

Florian Zechser (FOM Hochschule)

Joachim Rojahn (FOM Hochschule)

*A market-implied approach to measuring
corporate diversification*

A large part of the standard literature on the diversification effect concludes that diversified companies trade at a significant discount compared to focused firms. However, there is a great deal of variation in the way corporate diversification is measured which causes doubts about the correct measurement technique. Traditionally, corporate diversification is measured using business count measures such as the number of business units or Berry-Herfindahl indices. These measures are widely criticized for their dependency on segment data and Standard Industrial Classification codes. Therefore, business count measures are silent for interaction effects between different lines of operations if they are not reported as segregated segments. In this article, we introduce a market-implied diversification measure which is based on the idea of the modified Berry-Herfindahl index, but uses standardized regression coefficients to group a firm's business units into homogenous groups. The coefficients are obtained through forward step-wise regressions within which a firm's stock market return is regressed against a set of ten STOXX® EUROPE 600 sector indices. Thereby, we assume that the degree of diversification is likely to be a function of the amount of unsystematic variation. Using a representative sample of firm listed in the STOXX® EUROPE 600 index over the years 2006 to 2015, we compare our measure to commonly used business count measures.

