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Małgorzata Klaudia Guzowska

DEGREES

2003 – Ph.D., Mathematical Economy, University of Szczecin, Poland, Thesis title: “Application of non-linear difference equations as a tool for description and analysis of economic phenomena”

1996 – M.S., Mathematics, University of Szczecin, Poland,

ACADEMIC AND PROFESSIONAL EXPERIENCE

March 2015 - Visiting scholar positions, The Adam Smith Business School, University of Glasgow. Glasgow, United Kingdom,

2013 - present: Adjunct (Assistant Professor), Institute of Econometrics and Statistics, Faculty of Economics and Management, University of Szczecin, Poland

2010-2013 MDDP– Expert in Performance-Based Budgeting, expert adviser for Ministry of Finance, Ministry of Science and Higher Education, Ministry of Foreign Affairs, Polish Academy of Science, Supreme Chamber of Control

2012 The World Bank – Expert: expertise: „Analysis of public employment and wage developments and policies in 2007-2012 at the level of state budget in Poland”

October 2009- September 2010 – Visiting scholar positions, Department of Mathematics, Trinity University, San Antonio, TX, USA,

2009 The World Bank – Expert: expertise: “Analysis of public employment and wage developments and policies in 2002-2008 at the level of state budget in Poland and assessment of savings potential in state budget in 2009-2012”,

2008-2009 EIPA Antenna Warsaw - European Centre for Public Financial Management – Expert in Performance-Based Budgeting, expert adviser for Ministry of Finance, Ministry of Science and Higher Education, Ministry of Foreign Affairs, Polish Academy of Science, Supreme Chamber of Control,

2004 – 2010: vice-president of Institute of Economic, Analysis, Diagnosis and Forecast in Szczecin, Poland

2003 - 2013: Adjunct (Assistant Professor), Department of Econometrics and Statistics, Faculty of Economics and Management, University of Szczecin, Poland

2004 – 2013: Head of Unit of Application of Mathematics to Economics, (Department of Econometrics and Statistics, Faculty of Economics and Management, University of Szczecin, Poland)

1999 – 2000: Assistant (Teaching assistant), College “Oeconomikus”, Szczecin, Poland

1997 – 2003: Assistant (Teaching assistant), Department of Econometrics and Statistics, Faculty of Economics and Management, University of Szczecin, Poland

1997 – 1997: Assistant, West-Pomeranian Agency of Development and Education, Szczecin, Poland

TEACHING EXPERIENCE

Calculus, Linear Algebra, Mathematical Analysis, Numerical Methods, Mathematical Economy, Probability, Probability and Statistics, Differential Equations, Financial Mathematics, Real Estate Appraisal, Public Finance, Creativity.

REASEARCH INTERESTS

Dynamical Systems, Difference and Differential Equations and their Applications in Economics, Stochastic Difference Equations, Numerical Methods in Economics, Demographic and Socio-economic Analysis, Performance Based Budgeting, Efficiency and Productivity Analysis in Public Sector, Evolutionary Game Theory. Behavioural Economics.

Grants and Awards

2001 – 2002 System of monitoring of disabled people, KBN grant (State Committee for Scientific Research), executor

2002 - 2004 Analysis of distributions of values in actuarial and demographic issues, KBN grant (State Committee for Scientific Research), executor

1998 – University Rector's individual prize for the best assistant

2001 – "Golden Chalk 2001" – teaching award for Best Instructor

2002 – "Super Golden Chalk 2002" – teaching award for Best Instructor

2002 – Szczecin University Rector's individual prize of the Second Degree for didactic achievements

2003 – "Golden Chalk 2003" – teaching award for Best Instructor,

2004 – "Golden Chalk 2004" – teaching award for Best Instructor

2005 – "Golden Chalk 2005" – teaching award for Best Instructor

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2007 – "Golden Chalk 2007" – teaching award for Best Instructor

2008 – "Golden Chalk 2008" – teaching award for Best Instructor

2009 - "Golden Chalk 2009" – teaching award for Best Instructor

2009 – *The problem of equivalence of economics models with continuous and discrete time*, Ministry of Science and Higher Education grant in program "Support for International Mobility of Scientists"

2011 - University Rector's individual prize for the best scientist

2013 - "Golden Chalk 2013" – teaching award for Best Instructor

2014 – Dekaban-Liddle Senior scholarship, Glasgow University, Scotland.

ORGANIZATION OF CONFERENCES AND WORKSHOPS

2015-ICDEA 2015 –Białystok, Poland

2013- Spring Workshop in Quantitative Methods and Risk – international workshop

2013 – PODE 2013 (Progress of Difference Equations) – international conference

1999,2001,2003, 2005 "Microeconometrics – theory and practice" – national conference

2002 "Capital market. Efficient investing" – international conference

MEMBERSHIP

1999 – present – Polish Statistical Association

2002 – present – International Society of Difference Equations (2015-2017 as a member Board of Directors)

2003 – present – Americana Mathematical Society

2011 – present - Italian Society for Chaos and Complexity

SELECTED RECENT PUBLICATIONS

Books and monographs:

- *Mathematics – theory and exercises for students of economics*, Edited by J. Hozer, EKOSTAT, Szczecin 1999. (in Polish)
- *Analysis of investments on the capital market in Poland in 1999 – Practical investor's tutorial, or how to multiply your money*. Edited by W. Tarczyński, Wydawnictwo Uniwersytetu Szczecińskiego, Szczecin 2000. (in Polish)
- *Analysis of participation of disabled people on the labour market on the example of West-Pomeranian voivodship*. Edited by J. Hozer, Rozprawy i Studia US (DXXIX) Nr 455, Szczecin 2003. (in Polish)
- *Public Sector Wages* in Public Expenditure Review, Volume I: Analysis of Social Sectors and Public Wages, Report No. 52536-PL, Document of the World Bank, January 2010.

Papers published or accepted for publication (in refereed journals and in refereed proceedings):

1. *Calculus of variation on time scales: Calculus of variation on time scales: application to economic models*, Advances in Difference Equations 2015: 203 (doi:10.1186/s13662-015-0537-0), (2015) (with A.B. Malinowska and M.R.S. Ammi)
2. *Ways of creating contracts in Agent – Principal model and propensity to risk*, Zeszyty Naukowe, Uniwersytet Szczeciński, nr 811. Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania, s. 53-62. (2014) (with M. Doszyń), (in Polish)
3. *The Analysis of the Public Policy of Paid Employment, Wages and Salaries in the Polish Administration in 2002 – 2011*, Management and Business Administration. Central Europe, Nr 2, Vol. 21 (2013). (with T. Strak)
4. *Measuring Efficiency of Courts with DEA – Exemplified by Civil Cases*, Actual Problem of Economics, Vol. 2, No 1 (2013). with T. Strak
5. *A Demographic Model of Immigration and Integration*, Prace Katedry Ekonometrii i Statystyki Nr26, ZN 731, (2012).
6. *Chaos, Bifurcation and Attractors in Logistic Competition Model*, Folia Oeconomica Stetinensia, Volume 10, Number 2, (2012).
7. *Dynamic Properties of the Discreet version of Goodwin's Growth Cycle Model*, Matematyka i Informatyka na usługach ekonomii. Modelowanie zjawisk gospodarczych- elementy teorii. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Poznaniu, Tom 211, (2011).

8. *The Influence of Subjective factors [Inclinations] on Solving Michał Kalecki's Basic Model*, Modelowanie zjawisk gospodarczych- elementy teorii. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Poznaniu, Tom 211, (2011). (with M. Doszyń)
9. *Bifurcation and invariant manifolds of the logistic competition model*, Journal of Difference Equation and Application, Volume 17, Issue 12, (2011), (with R. Luis, S. Elaydi)
10. *An examination of the efficiency of Polish public sector entities based on public prosecutor offices*, Operations Research and Decision, No 2 (2010). (with T. Strak)
11. *DEA method in examining the efficiency of Polish Courts*, Transformation in Business and Economics, Vol. 9, No 2 (2010). (with T. Strak)
12. *Preserving positivity in solutions of discretised stochastic differential equations*, Applied Mathematics and Computations, 217 (2010), p. 763-774. (with J.A.D. Appleby, C. Kelly, A. Rodkina)
13. *Non- standard method of discretization on the example of Goodwin's Growth Cycle Model*, Polish Journal of Environmental Studies, 18, No 5B (2009).
14. *Examining the Efficiency of Public Sector Units by Means of the DEA Method on the Example of Organisational Units of Prosecutor's Offices*, Finanse 2009, Teoria i Praktyka, Finanse Publiczne, Tom I, Szczecin 2009. (with T. Strak) (in Polish)
15. *Non – standard method of discretization on the example of Haavelmo Growth Cycle Model*, Folia Oeconomica Stetinensia, Volume 7, Number 1 (2008), p.45-55,
16. *On Polynomial Rates of Decay and Growth of Solutions to Nonlinear Difference Equations*, Revista de Matemática: Teoría y Aplicaciones 14(2) (2007). (with J. A. D. Appleby, A. Rodkina)
17. *Discrete Chaos in Economic Processes*, Ekonomia matematyczna- Prace Naukowe Akademii Ekonomicznej we Wrocławiu, Nr 1117, Wrocław 2006. (in Polish)
18. *Polish Banking Industry Efficiency: DEA Window Analysis Approach*, The International Journal of Banking and Finance, 3-4 (Special Issue): 15-31, 2005-2006. (with M. Kisielewska, J. Nellis, D. Zarzecki)
19. *Bubble Bifurcations in the Economic Models*, Zeszyty Naukowe US , Nr 394 , Prace Katedry Ekonometrii i Statystyki, Nr 15, Szczecin 2005.
20. *Efficiency of the Major Banking Players in Poland*, Czas na Pieniądz. Zarządzanie Finansami. Biznes, Bankowość i Finanse na rynkach wschodzących. Tom1, Uniwersytet Szczeciński, Uniwersytet Północnej Malezji, Szczecin 2005. (co-author: M. Kisielewska, J. Nellis, D. Zarzecki).
21. *Efficiency of the Polish Banking Sector - Assessing the Impact of Transformation*, Data Envelopment Analysis and Performance Management, Edited by Ali Emrouznejad and Victor Podinovski, Aston Business School, Aston University, Birmingham 2004, p. 163-170. (with M. Kisielewska, J. Nellis, D. Zarzecki)
22. *From Chaos to Order*. Interdyscyplinarne Wykorzystanie Metod Ilościowych, część druga. Uniwersytet Szczeciński, Katedra Ekonometrii i Statystyki, IADiPG, Szczecin 2004. (in Polish)
23. *Analysis of bifurcation and dynamic analysis of the Stutzer's model*, Zeszyty Naukowe, Prace KEiS: Metody ilościowe w ekonomii, Nr 345, Szczecin 2003. (in Polish)
24. *Estimation of quality of estimators of tail-thickness of distribution in the case of small sample*, Prace naukowe Akademii Ekonomicznej we Wrocławiu Nr 991: Inwestycje finansowe i ubezpieczenia – tendencje światowe a polski rynek, Wydawnictwo Akademii Ekonomicznej we Wrocławiu, Wrocław 2003. (with J. Purczyński, M. Mojsiewicz) (In Polish)

25. *Application of the alpha-stable and GED distribution for modelling rates of return of the S&P 500 index*, Capital market. Efficient investing, Tom.1. Wydawnictwo Naukowe Uniwersytetu Szczecińskiego, Szczecin 2002. (with J. Purczyński) (In Polish)
26. *Application of taxonomic measure of development for analysis. Multidimensional analysis of poviats of West-Pomeranian voivodship*. Przegląd Statystyczny Województwa Zachodniopomorskiego, Zeszyt nr 2, s.41-49, Szczecin 2002. (with M. Łuniewska) (in Polish)
27. *Estimation of the parameters of a model in relation to pulse response, Tools for mathematical modelling*, Saint – Petersburg 2001. (with J. Purczyński) (in Russian)
28. *Non-linear difference equations as a tool of describing and analyzing of chaos in growth theory*. Theory and practice of differential equations, Sankt–Petersburg 2001.
29. *Dynamic analysis of neo-classical model of growth described by non-linear difference equation*. Dynamic econometric models, Toruń 2001. (with S. Grzesiak) (in Polish)
30. *Creation and decay of families in the Szczecin voivodship on the background of Poland within the years 1990 -1997*, Prace Katedry Ekonometrii i Statystyki Nr 9, Metody ilościowe w ekonomii, Zeszyty Naukowe Nr 306, Szczecin 2001. (with R. Kubicki). (in Polish)
31. *Comparison of maximum likelihood method and moments method with reference to estimation of geometrical parameters of geometrical Brownian motion*, Zeszyty Naukowe Nr 294 Prace KEiS US Nr 9. Szczecin 2000. (with J. Purczyński) (in Polish)
32. *Computer simulation of geometrical Winer's process*, Zeszyty Naukowe Nr 294 Prace KEiS US Nr 9, Szczecin 2000. (with J. Purczyński) (in Polish)
33. *Determining the transform function with the use of step response in the presence of noise*, Mathematical Research, v.6 Theory and practice of differential equations, Saint – Petersburg 2000. (with J. Purczyński)
34. *Estimation of parameters of the geometric Wiener process*, Rynek kapitałowy cz. 1, WNUS Materiały – Konferencje Nr 53, Szczecin 2000. (with J. Purczyński) (in Polish)
35. *Analysis of suicidal acts on the area of Szczecin voivodship*, Metody ilościowe w ekonomii, Zeszyty Naukowe US, Nr 269, Szczecin 2000. (in Polish)
36. *Analytical form of table of critical values distribution $D_n = \max(d_n^+, d_n^-)$* , Acta Mathematica Pomeranika, Nr 4, Zeszyt Naukowy US Nr 237, Szczecin 1999. (in Polish)
37. *Application of Monte Carlo methods for measuring of risk of exchange portfolio in the commercial bank*, Metody ilościowe w Ekonomii, Zeszyt Naukowy US Nr 233, Szczecin 1999. (with J. Maliszewski) (in Polish)

NON-PUBLISHED WORKS AND EXPERTISES:

- *Variant scenarios of development of social infrastructure of the West-Pomeranian voivodship*, Szczecin 2000. (with J. Batóg)
- *Future of Szczecin. Forecast of the labour market 2015. Structure, conditions, trends*. Szczecin 2000. (with Batóg J., Gazińska M., Mojsiewicz M., Bojanowska A.)
- *Elaboration of the system of evidence of disabled people on the area of West-Pomeranian voivodship*. Szczecin 2001. (with Batóg J., Gazińska M., Mojsiewicz M., Bojanowska A.)
- *Designing of software for computer database of disabled people*. IADiPG Szczecin 2001. (with J. Batóg, P. Baran, M. Gazińska)
- *Analysis of Family Policy Instruments in Selected OECD Countries*. Warszawa 2007.

- *Analysis of public employment and wage developments and policies in 2002-2008 at the level of state budget in Poland and assessment of savings potential in state budget in 2009-2012.* Warszawa 2009.
- „*Analysis of public employment and wage developments and policies in 2007-2012 at the level of state budget in Poland*”, Warszawa 2012.

PRESENTATIONS AT PROFESSIONAL MEETING:

- International Congress of Mathematician: Section 17 Applications of Mathematics in Sciences, Beijing, China, August 20 –28 2002. Posters: *“Methods of optimum choice of land use in rural areas”* and *“Non-linear difference equations in economics: controlling chaos”*, with Iwona Forys.
- The 7th International Conference on Difference Equations and Applications Hunan University, Changsha, China, August 11-17, 2002. Talk: *“The essence of stochastic disturbance in dynamic analysis of econometrics model described by non-linear difference equations”*.
- DMV-Meeting, Section Stochastic, Rostock University, Germany, 17th September 2003. Contributed talk: *Examination of the quality of tail index distribution estimators for small-sample size*, with Jan Purczynski.
- 8th International Conference on Difference Equations and Applications, Brno, Czech Republic, August 2003, talk: *Bubble bifurcation in the economic models*.
- Joint Mathematics Meetings, AMS Special Session on Discrete Dynamics and Difference Equations Baltimore, MD, USA, January 15-18, 2003, talk: *“Chaos controlling in economics model described by non-linear difference equation”*.
- 9th International Conference on Difference Equations and Applications, University of Southern California Los Angeles, California, USA, August 2 - 6, 2004, talk: *“Bubble bifurcation in the economics discrete systems- demographic model”*.
- Symmetries and Integrability of Difference Equations, Helsinki, Finland, Jun 19-26 2004. Poster: *“Bubble and bistability in economics model”*.
- Talk: *Bubble Bifurcation in the Economics Discrete System*, Difference Equations and Applications, 20-23.07.2006, Okayama (Japan).
- Talk: *A Stochastic Frontier Approach to Estimation of Efficiency for Large Polish Banks*, 2nd International Conference “Baltic Business Development”, Szczecin, Poland, September 3-5, 2006.
- Talk: *Stability of an Equilibrium Point of Economic Growth*, 15th International Conference on Difference Equations and Applications, 24-28.2006, Kyoto (Japan).
- Talk: *Difference vs. Differential Equations*, 12th International Conference on Difference Equations and Applications, Instituto Superior Técnico of the Technical University of Lisbon, 2007.
- Talk: *Non- standard method of discretization on the example of Goodwin's Growth Cycle Model*, 14th International Conference on Difference Equations and Applications, Jun 2008, Istanbul, Turcja.
- Talk: *Dynamic properties of the discreet version of Goodwin's Growth Cycle Model*, Progress on Difference Equations 2011, May 2011, Dublin, Irlandia,
- Poster: *Bifurcation and invariant manifolds of the logistic competition model*, Casablanca International Workshop on Mathematical Biology: Analysis & Control, July 2011, Casablanca, Morocco,

- Talk: *The Stability Problem of the Discrete Version of the Goodwin's Growth Model*, International Workshop on Nonlinear Maps and their Applications NOMA'11, September 2011, Evora, Portugal.
- Talk: *Neimark-Sacker Bifurcation in a Discrete-Time Goodwin Model*, PODE 2012, Richmond, USA.
- Talk: *Neimark-Sacker Bifurcation in a Discrete-Time Goodwin Model II*, ICDEA 2012, Barcelona, Spain.
- Talk: *Neimark-Sacker Bifurcation in a Discrete-Time Goodwin Model III*, MDEF 2012, Urbino, Italy.
- Talk: *Preserving positivity in solutions of discretised stochastic differential equations*, Haindorf Seminar, 06-09.02.2014, Hejnice, Czech.
- Talk: *Calculus of variations on time scales: applications to economic models*, 3rd International Conference on Dynamics, Games and Science February 17-21, 2014

EDITION AND REVIEWER ACTIVITIES

Journal of Management Mathematics

Fasciculi Mathematici

Advances in Difference Equations

Management and Business Administration. Central Europe

Journal: Control & Cybernetics

Journal of Difference Equation and Application

LANGUAGES:

Polish- Native language

English - excellent command

Russian - very good command

Italian - basic communication skills

Spanish - basic communication skills

REFERENCES

- Prof. Alexandra Rodkina, University of the West Indies, Jamaica, 876/977-1810, alexandra.rodkina@uwimona.edu.jm
- Prof. Józef Hozer, University of Szczecin, +48 91 444-2121, keis@uoo.univ.szczecin.pl
- Prof. Krzysztof Jajuga, Wrocław University, +48 71 368-0340 krzysztof.jajuga@ae.wroc.pl
- Prof. Saber Elaydi, Trinity University (USA), +01(210)999-8205, selaydi@trinity.edu
- Prof. Teresa Lubińska, University of Szczecin, +48 (91) 444 2145, tlub@wneiz.pl