PROCEEDINGS
of the 48th scientific meeting of the Italian Statistical Society

Editors: Monica Pratesi and Cira Pena
ISBN: 9788861970618
PLENARY SESSIONS

(A) E. Baldacci Financial Crises and their Impacts: Data Gaps and Innovation in Statistical Production.

(B) D. Dunson Probabilistic inference from big and complex data.

(C) S. Strozza Foreign immigration in Italy: a forty-year-old history.

SPECIALIZED SESSION (SPE)

(SPE-01) Inference, sampling and survey design

P. Conti Resampling from finite populations under complex designs: the pseudo-population approach. (Co-author(s): F. Andreis, D. Marella, F. Mecatti)

P. Righi A joint use of model based and design based frameworks for defining optimal sampling designs. (Co-author(s): P. D. Falorsi)

A. Ruiz-Gazen A unified approach for robustness in survey sampling. (Co-author(s): J. Beaumont, D. Haziza)

(SPE-02) Multivariate models for risk assessment

M. Billio A Bayesian nonparametric approach to macroeconomic risk. (Co-author(s): R. Casarin, M. Costola, M Guindani)

P. Cerchiello Bank risk contagion: an analysis through big data. (Co-author(s): P. Giudici, G. Nicola)

L. De Angelis A Markov-switching regression model with non-Gaussian innovations for systemic risk measurement. (Co-author(s): C. Viroli)

(SPE-03) Bayesian nonparametrics

D. Durante Bayesian Nonparametric Modeling of Dynamic International Relations. (Co-author(s): D. Dunson)

A. Guglielmi Bayesian autoregressive semiparametric models for gap times of recurrent events. (Co-author(s): G. Paulon, M. De Iorio)

A. Rodriguez Restricted Nonparametric Mixtures models for Disease Clustering. (Co-author(s): T. Xifara)
(SPE-04) Statistical methods for the analysis of gene-environment interaction in the study of complex pathologies

C. Angelini  An introduction to next generation sequencing for studying omic-environment interactions.

L. Calciano  Statistical approaches for the evaluation of genetic associations in complex diseases: the heterogeneity of asthma phenotypes. (Co-author(s): L. Portas, S. Accordini)

Y. Pankaj  Improved case-only approach to study genome-wide gene-environment interaction. (Co-author(s): S. Freitag-Wolf, A. Dempfle, W. Lieb, M. Krawczak)

(SPE-05) Nonlinear time series

M. Niglio  Probabilistic properties of Self Exciting Threshold Autoregressive processes. (Co-author(s): F. Giordano, C. D. Vitale)

T. Proietti  Optimal prediction of stochastic trends. (Co-author(s): A. Giovannelli)

H. Tong  On model selection from a finite family of possibly misspecified models. (Co-author(s): H. Hsu, C. Ing)

(SPE-06) Spatial analyses in demography

F. Heins  Measuring residential segregation with spatial indices: an appraisal and applications for the metropolitan area of Rome. (Co-author(s): F. Benassi, F. Lipizzi, E. Paluzzi)

A. Mazza  Immigrants’ settlement patterns in the city of Naples. (Co-author(s): G. Gabrielli, S. Strozza)

L. Natale  Native Immigration and Pull Factor Evolution in Italy: a Spatial Approach. (Co-author(s): A. Santacroce, F. G. Truglia)

(SPE-07) Recent developments in Volatility modeling

R. Casarin  Dynamic Model Averaging for Quantile Regression. (Co-author(s): M. Bernardi, B. Maillet, L. Petrella)

A. Rahbek  Testing volatility: consistency of bootstrap testing for a parameter on the boundary of the parameter space.


(SPE-08) Advances in ordinal contingency table analysis

L. D’Ambra  Dimensionality reduction methods for contingency tables with ordinal variables. (Co-author(s): P. Amenta, A. D’Ambra)

R. Lombardo  Modelling Trends in Ordered Three-Way Non-Symmetrical Correspondence Analysis. (Co-author(s): P. Kroonenberg, E. Beh)

M. Riani  Using Collapsing and Multiple Comparisons to Detect Association in Two Way Contingency Tables. (Co-author(s): S. Arsenis)
(SPE-09) Statistical models for directional and circular data

C. Ley
The WeiSSVM: a tractable, parsimonious and flexible model for cylindrical data.

G. Mastrantonio
The multivariate projected-skew normal distribution: Bayesian estimation and a hidden Markov model application.

A. Panzera
Circular density estimation via matching local trigonometric moments. (Co-author(s): M. Di Marzio, S. Fensore, C. C. Taylor)

(SPE-10) The interplay between frequentist and bayesian inference

C. Grazian
Classical inference for intractable likelihoods.

J. Hannig
Fusion learning for Interlaboratory Comparison. (Co-author(s): Q. Feng, H. Iyer, C. Wang, X. Liu)

F. Pauli
p-value in science: a review of issues and proposed solutions.

(SPE-11) Société Française de Statistique

B.H. Avner
Stochastic Block Model for Multiplex network: an application to a multilevel network of researchers.

Y. Bennani
Nonnegative Matrix Factorization for Transfer Learning. (Co-author(s): I. Redko)

T. Laloe
Detection of dependence patterns with delay.

J. Poggi
Disaggregated Electricity Forecasting using Wavelet-Based Clustering of Individual Consumers. (Co-author(s): J. Cugliari, Y. Goude)

(SPE-12) National accounts

A. Coli
The European Welfare State in times of crisis according to macroeconomic official statistics. (Co-author(s): E. Micheletti, B. Pacini)

C. Martelli
National Account and Open Data: a new semantic approach.

G. Oneto
New information contents of the National Accounts for the monitoring of the economic situation.

(SPE-13) Statistical tools for monitoring the educational system and assessing students’ performances

L. Grilli
Evaluation of university students’ performance through a multidimensional finite mixture IRT model. (Co-author(s): S. Bacci, F. Bartolucci, C. Rampichini)

G. Leckie
Monitoring school performance using value-added and value-table models: Lessons from the UK.

P. Sarnacchiaro
A statistical model to assess teacher performance. (Co-author(s): I. Camminatiello, R. Palma)
(SPE-14) Robust inference by bounded estimating functions

A.C. Monti  M Estimation based Inference for Ordinal Response Model.

E. Ruli Approximate Robust Bayesian Inference with an Application to Linear Mixed Models. (Co-author(s): N. Sartori, L. Ventura)

J. Valeinis Some robust methods using empirical likelihood for two samples. (Co-author(s): M. Velina, E. Cers, G. Luta)

SOLICITED SESSION (SOL)

(SOL-01) Subjective wellbeing and demographic events over the life course

G. Fuochi Cultural and institutional drivers of basic psychological needs satisfaction. (Co-author(s): P. Conzo, A. Aassve, L. Mencarini)

L. Mencarini Five reasons to be happy about childbearing. (Co-author(s): A. Aassve, F. Luppi)

B. Nowok Migration motivations and migrants’ satisfaction in the life course: A sequence analysis of geographical mobility trajectories in the United Kingdom.

A. Pirralha Does becoming a parent change the meaning of happiness and life satisfaction? Evidence from the European Social Survey. (Co-author(s): H. Dobewall)

(SOL-02) Statistics for equitable and sustainable development

E. di Bella Wellbeing and sustainable development: a multi-indicator approach to evaluate urban waste management systems. (Co-author(s): B. Cavalletti, M. Corsi)

C. Giusti Small Area Estimation for Local Welfare Indicators in Italy. (Co-author(s): S. Marchetti, L. Faustini, L. Porciani)

T. Laureti Does socio-economic variables influence the Italians’ adherence towards a sustainable diet?. (Co-author(s): L. Secondi)

F. Riccardini Sustainability of wellbeing: an analysis of resilience and vulnerability through subjective indicators. (Co-author(s): M. Bachelet, F. Maggino)

(SOL-03) New approaches to treat undercoverage and nonresponse

F. Andreis Methodological perspectives for surveying rare and clustered population: towards a sequentially adaptive approach.

E. Furfaro Dealing with under-coverage bias via Dual/Multiple Frame designs: a simulation study for telephone surveys.
D. Haziza  
Weight adjustment procedures for the treatment of unit nonresponse in surveys.  
(Co-author(s): É. Lesage)

E. Kabzinska  
Empirical likelihood multiplicity adjusted estimator for multiple frame surveys.  
(Co-author(s): Y. G. Berger)

(SOL-04)  
Statistical models and methods for network data

M. Cugmas  
Measuring stability of co-authorship structures in time.  
(Co-author(s): A. Ferligoj)

J. Koskinen  
A dynamic discrete-choice model for movement flows.  
(Co-author(s): T. Mueller, T. Grund)

G. Ragozini  
Prototyping and Comparing Networks through Archetypal Analysis.  
(Co-author(s): D. De Stefano, M.R. D’Esposito)

S. Zaccarin  
Modeling network dynamics: evidence from policy-driven innovation networks.  
(Co-author(s): A. Caloffi, D. De Stefano, F. Rossi, M. Russo)

(SOL-05)  
Recent developments in computational statistics

R. Argiento  
A conditional algorithm for Bayesian finite mixture models via normalized point process.

S. Favaro  
Thompson sampling for species discovery.  
(Co-author(s): M. Battiston, Y. Teh)

A. Mira  
An application of Reinforced Urn Process to advice network data.  
(Co-author(s): S. Peluso, P. Muliere, F. Pallotti, A. Loni)

N. Sartori  
Bootstrap prepivoting in the presence of many nuisance parameters.  
(Co-author(s): R. Bellio, I. Kosmidis, A. Salvan)

(SOL-06)  
Statisticians meet naturalists: issues on ecological and environmental statistics

F. Ferretti  
Estimating the abundance of wildlife ungulate populations in Mediterranean areas: methods, problems and findings.  
(Co-author(s): A. Sforzi)

M. Ferretti  
The monitoring of forests in Europe: methods, problems and proposals.

D. Rocchini  
The power of generalized entropy for biodiversity assessment by remote sensing: an open source approach.  
(Co-author(s): L. Delucchi, G. Bacaro)

(SOL-07)  
From survey data to new data sources and big data in official statistics

G. Barcaroli  
Machine learning and statistical inference: the case of Istat survey on ICT.  
(Co-author(s): G. Bianchi, R. Bruni, A. Nurra, S. Salamone, M. Scarnò)

S. Falorsi  
Forecasting Italian Youth Unemployment Rate Using Online Search Data.  
(Co-author(s): S. Loriga, A. Naccarato, A. Pierini)

B. Liseo  
Bayesian nonparametric methods for record linkage.  
(Co-author(s): A. Tancredi)
T. Tuoto  
Exploring solutions for linking Big Data in Official Statistics.  
(Co-author(s): L. Di Consiglio, D. Fusco)

(SOL-08) Symbolic data analysis methods and applications

E. Diday  
Explanatory and discriminatory power of variables in Symbolic Data Analysis.

M.B. Ferraro  
Fuzzy and possibilistic approach to clustering of imprecise data.  
(Co-author(s): P. Giordani)

L. Grassini  
Symbolic data analysis approach for monitoring the stability of monuments.  
(Co-author(s): B. Bertaccini, G. Biagi, A. Giusti)

M. Ichino  
Similarity and Dissimilarity Measures for Mixed Feature-type Symbolic Data.  
(Co-author(s): K. Umbleja)

(SOL-09) Compositional analysis

L. Crosato  
Forecasting CPI weights through compositional VARIMA: an application to Italian data.  
(Co-author(s): F. Lovisolo, B. Zavanella)

J. A. Martín-Fernández  
Understanding association rules from a compositional data approach.  
(Co-author(s): M. Vives-Mestres, R. Kenett)

A. Menafoglio  
Object Oriented Geostatistical Simulation of Functional Compositions via Dimensionality Reduction in Bayes spaces.  
(Co-author(s): A. Guadagnini, P. Secchi)

V. Simonacci  
Fitting CANDECOMP-PARAFAC model for compositional data: a combined SWATLD-ALS algorithm.  
(Co-author(s): M. Di Palma, V. Todorov)

(SOL-10) Sustainable development: theory, measures and applications

F. Riccardini  
Measuring sustainable development goals from now to 2030.

F. Riccardini  
How the nexus of food/water/energy can be seen with the perspective on well-being of people and the Italian BES framework.  
(Co-author(s): D. De Rosa)

T. Rondinella  
An innovative methodology for the analysis of sustainability, inclusion and smartness of growth through Europe2020 indicators.  
(Co-author(s): E. Grimaccia)

P. Ungaro  
The Italian population behaviours toward environmental sustainability: a study from Istat surveys.  
(Co-author(s): I. Mingo, V. Talucci)

(SOL-11) Detecting heterogeneity in ordinal data surveys

E. Di Nardo  
CUB models: a preliminary Fuzzy approach to heterogeneity.  
(Co-author(s): R. Simone)

S. Giordano  
Modelling uncertainty in bivariate models for ordinal responses.  
(Co-author(s): R. Colombi, A. Gottard, M. Iannario)
M. Manisera  Treatment of “don’t know” responses in rating data: effects on the heterogeneity of the CUB distribution. (Co-author(s): P. Zuccolotto)

F. Pennoni  Modelling a multivariate hidden Markov process on survey data.

(SOL-12) Active ageing: age management and lifelong learning strategies

P. E. Cardone  Age management in Italian companies. Findings of two Isfol surveys. (Co-author(s): M. Aversa, L. D’Agostino)

A. Lorenti  Working after Retirement in Europe.

C. Polli  Older low-skilled workers and economic crisis in Italy. (Co-author(s): R. Angotti)

G. Rivellini  Population ageing and human resources management. A chance for Applied Demography. (Co-author(s): F. Marcaletti, F. Racioppi)

(SOL-13) Statistical models for evaluating policy impact

M. Bia  Evaluation of Training Programs by exploiting secondary outcomes in Principal Stratification frameworks: the case of Luxembourg. (Co-author(s): F. Li, A. Mercatanti)

G. Cerulli  Testing Stability of Regression Discontinuity Models. (Co-author(s): Y. Dongz, A. Lewbel, A. Poulsen)

R. P. Mamede  Counterfactual Impact Evaluation of Vocational Education in Portugal. (Co-author(s): D. Cruz, T. Fernandes)

G. Pellegrini  Italian public guarantees to SME: the impact on regional growth. (Co-author(s): M. De Castris)

(SOL-14) Usage of geocoded micro data in the economic analysis

M. Dickson  Spatial sampling methods with locational errors. (Co-author(s): D. Filipponi)

D. Giuliani  Spatial Micro-Econometrics Models with Locational Errors. (Co-author(s): S. Cozzi, G. Espa)


(SOL-15) Statistical models in functional data analysis

G. Adelfio  Space-time FPCA Algorithm for clustering of multidimensional curves. (Co-author(s): F. Di Salvo, M. Chiodi)

C. Miller  Functional data analysis approaches for satellite remote sensing applications. (Co-author(s): R. O’Donnell, M. Gong, M. Scott)

E. Romano  Order statistics for spatially dependent functional data. (Co-author(s): A. Balzanella, R. Verde)
L. M. Sangalli  
A penalized regression model for functional data with spatial dependence.  
(Co-author(s): M. S. Bernardi, G. Mazza, J. O. Ramsay)

(SOL-16) Forecasting economic and financial time series

G. Goracci  
Asymptotics and power of entropy based tests of dependence for categorical data.  
(Co-author(s): S. Giannerini)

M. M. Pelagatti  
Forecasting electricity load and price: a comparison of different approaches.  
(Co-author(s): F. Lisi)

G. Storti  
Flexible Realized GARCH Models.  
(Co-author(s): R. Gerlach)

(SOL-17) Immigrations and integration in Italy

O. Casacchia  
Minorities internal migration in Italy: an analysis based on gravity models.  
(Co-author(s): C. Reynaud, S. Strozza, E. Tucci)

C. Conti  
Growing generations and new models of integration.

N. Tedesco  
Measurement of segregation in the labour market. An alternative approach.  
(Co-author(s): L. Salaris)

L. Terzera  
Family behaviours among first generation migrants.  
(Co-author(s): E. Barbiano di Belgiojoso)

(SOL-18) Open data, linked data and big data in public administration and official statistics

G. Di Bella  
Linked Administrative Data in Official Statistics: a Positive Feedback for the Quality?  
(Co-author(s): G. Garofalo)

C. Martelli  
Generating high quality administrative data: new technologies in a national statistical reuse perspective.  
(Co-author(s): M. Calzaroni, A. Samaritani)

V. Santarcangelo  
An innovative approach about the analysis of quality and efficiency in Italian law.  
(Co-author(s): A. Buondonno, A. Romano, M. Giacalone, C. Cusatelli)

B. Squittieri  
Prato municipality experience towards a high integration between administrative and statistical data.

(SOL-19) Evaluation of prognostic biomarkers

F. Ambrogi  
Combining Clinical and Omics data: hope or illusion?.  
(Co-author(s): P. Boracchi)

L. Antolini  
Graphical representations and summary indicators to assess the performance of risk predictors.  
(Co-author(s): D. Bernasconi)

P. Chiodini  
Multivariable prognostic model: external validation and model recalibration with application to non-metastatic renal cell carcinoma.  
(Co-author(s): L. Cindolo)
Models for studying the mobility of students

**S. Balia**
Modelling inter-regional patient mobility: evidence from the Italian NHS. (Co-author(s): R. Brau, E. Marrocu)

**A. D’Agostino**
University mobility at enrollment: geographical disparities in Italy. (Co-author(s): G. Ghellini, S. Longobardi)

**M. Enea**
From South to North? Mobility of Southern Italian students at the transition from the first to the second level university degree.

**F. Giambona**
Measuring territory student-attractiveness in Italy. Longitudinal evidence.

CONTRIBUTED SESSION (CON)

Bayesian statistics (1)

**F. Giummolè**
Reference priors based on composite likelihoods. (Co-author(s): V. Mameli, L. Ventura)

**B. Nipoti**
On Bayesian nonparametric inference for discovery probabilities. (Co-author(s): J. Arbel, S. Favaro, Y. W. Teh)

**R. Pappadà**
Relabelling in Bayesian mixture models by pivotal units. (Co-author(s): L. Egidi, F. Pauli, N. Torelli)

**C. Scricciolo**

Statistical modeling

**P. Faroughi**
A New Bivariate Regression Model for Count Data with Excess Zeros. (Co-author(s): N. Ismail)

**B. Francis**
Dynamic latent class profiles in cross-sectional surveys: some preliminary results. (Co-author(s): V. Hoti)

**P. M. Kroonenberg**
The use of deviance plots for non-nested model selection in loglinear models, structural equations, three-mode analysis.

**A. Lucadamo**
Variable selection through Multinomial LASSO for PCMR. (Co-author(s): L. Greco)

**O. Paccagnella**
Integrating CUB Models and Vignette Approaches. (Co-author(s): S. Pavan, M. Iannario)

Demographics and social statistics (1)

**D. Bellani**
Gender egalitarianism, education and life-long singlehood: A multilevel analysis. (Co-author(s): G. Esping-Andersen, L. Nedoluzhko)

**L. Colangelo**
Fear of Crime and Victimization among Sexual Harassed Women: Evidence from Italy. (Co-author(s): P. Mancini)
S. De Cantis
A survival approach for the analysis of cruise passengers’ behavior at the destination. (Co-author(s): M. Ferrante, A. Parroco, N. Shoval)

A. Di Pino
Retirement of the Male Partner and the Housework Division in the Italian Couples: Estimation of the Causal Effects. (Co-author(s): M. Campolo)

F. Lariccia
Many women start, but few continue: determinants of breastfeeding in Italy. (Co-author(s): A. Pinnelli)

(CON-04) Environmental statistics

F. Bono
Measuring sustainable economic development through a multidimensional Gini index. (Co-author(s): M. Giacomarra, R. Giaimo)

C. Calculli
Modeling multi-site individual corals growth. (Co-author(s): B. Cafarelli, D. Cocchi, E. Pignotti)

F. Di Salvo
GAMs and functional kriging for air quality data. (Co-author(s): A. Plaia, M. Ruggieri)

F. Durante
The Kendall distribution and multivariate risks.

(CON-05) Health statistics

E. di Bella
Dental care systems across Europe: the case of Switzerland. (Co-author(s): L. Leporatti, I. Krejci, S. Ardu)

F. Gasperoni
Multi-state models for hospitalizations of heart failure patients in Trieste. (Co-author(s): F. Ieva, G. Barbati)

F. Grossetti
Multi-state Approach to Administrative Data on Patients affected by Chronic Heart Failure. (Co-author(s): F. Ieva, S. Scalvini, A. M. Paganoni)

G. Montanari
Evaluation of health care services through a latent Markov model with covariates. (Co-author(s): S. Pandolfi)

(CON-06) Labor market statistics

A. Bianchi
Multifactor Partitioning: an analysis of employment and firm size. (Co-author(s): S. Biffignandi)

G. Busetta
Ugly Betty looks for a job. Will she ever find it in Italy? (Co-author(s): F. Fiorillo)

G. Busetta
No country for foreigners: an analysis of hiring process in Italian labor market. (Co-author(s): M. Campolo, D. Panarello)

F. Crippa
Know your audience. Towards a partnership between employers and university. (Co-author(s): M. Zenga)

I. Vannini
Online Job Vacancies: a big data analysis. (Co-author(s): D. Rotolone, C. Di Stefano, A. Paliotta, D. F. Iezzi)
(CON-07) Robust statistics


M. Musio  Renyi’s Scoring Rules.  (Co-author(s): A. F. Dawid)

A. Paganoni  Robust classification of multivariate functional data.  (Co-author(s): F. Ieva)

G. C. Porzio  A robust estimator for the mean direction of the von Mises-Fisher distribution.  (Co-author(s): T. Kirschstein, S. Liebscher, G. Pandolfo, G. Ragozini)

F. Palumbo  Robust Partial Possibilistic Regression Path Modeling.  (Co-author(s): R. Romano)

(CON-08) Sampling methods

A. Ghiglietti  Adaptive Randomly Reinforced Urn design and its asymptotic properties.

D. Marella  PC algorithm from complex sample data.  (Co-author(s): P. Vicard)


E. Pelle  The Rao regression-type estimator in ranked set sampling.  (Co-author(s): P. Perri)

M. Ruggiero  Modelling stationary varying-size populations via Polya sampling.  (Co-author(s): P. De Blasi, S. Walker)

(CON-09) Economic data analysis

M. Brunetti  Getting older and riskier: the effect of Medicare on household portfolio choices.  (Co-author(s): M. Angrisani, V. Atella)

E. Ciavolino  Modelling the Public Opinion on the European Economy with the HO-MIMIC Model.  (Co-author(s): M. Carpita)

G. D’Epifanio  Indexing the Worthiness of Social Agents. To norm index on conventional specifications.

G. Guagnano  An econometric model for undeclared work.  (Co-author(s): M. Arezzo)

M. Mussini  A spatial shift-share decomposition of energy consumption variation.  (Co-author(s): L. Grossi)

(CON-10) Quantile methods

M. Bernardi  Bayesian inference for L_p–quantile regression models.  (Co-author(s): V. Bignozzi, L. Petrella)

V. Bignozzi  On the L_p–quantiles and the Student t distribution.  (Co-author(s): M. Bernardi, L. Petrella)

M. Marino  M-quantile regression for multivariate longitudinal data.  (Co-author(s): M. Alfò, M. Ranalli, N. Salvati)
D. Vistocco  Comparing Prediction Intervals in Quantile and OLS Regression.  (Co-author(s): C. Davino)

(CON-11) Statistical algorithms

N. Loperfido  An Algorithm for Finding Projections with Extreme Kurtosis.  (Co-author(s): C. Franceschini)

L. Scrucca  Poisson change-point models estimated by Genetic Algorithms.

A. Stamm  Maximum Likelihood Estimators of Brain White Matter Microstructure.  (Co-author(s): O. Commowick, S. Vantini, S. K. Warfield)

(CON-12) Statistics for medicine

G. Barbati  Competing risks between mortality and heart failure hospital re-admissions: a community-based investigation from the Trieste area.  (Co-author(s): F. Ieva, A. Scagnetto, G. Sinagra, A. Di Lenarda)

C. Brombin  Evaluating association between emotion recognition and Heart Rate Variability indices.  (Co-author(s): F. Cugnata, R. M. Martoni, M. Ferrario, C. Di Serio)

M. Ferrante  Socio-economic deprivation, territorial inequalities and mortality for cardiovascular diseases in Sicily.  (Co-author(s): A. Milito, A. Parroco)

M. Giacalone  The use of Permutation Tests on Large-Sized Datasets.  (Co-author(s): A. Alibrandi, A. Zirilli)

(CON-13) Statistics for the education system

G. Boscaïno  Further considerations on a new indicator for higher education student performance.  (Co-author(s): G. Adelfio, V. Capursi)

C. Masci  Analysis of pupils’ INVALSI achievements by means of bivariate multilevel models.  (Co-author(s): A. Paganoni, F. Ieva, T. Agasisti)

A. Valentini  Promoting statistical literacy to university students: a new approach adopted by Istat.  (Co-author(s): G. De Candia, M. Carbonara)

(CON-14) Testing procedures

E. Cascini  A Reliability Problem: Censored Tests.

G. De Santis  Testing the Gamma-Gompertz-Makeham model.  (Co-author(s): G. Salinari)

M. M. Pelagatti  A nonparametric test of independence.

A. Pini  Functional Data Analysis of Tongue Profiles.  (Co-author(s): L. Spreafico, S. Vantini, A. Vietti)

A. Vagheggini  On the asymptotic power of the statistical test under Response-Adaptive randomization.  (Co-author(s): A. Baldi Antognini, M. Zagoraiou)
(CON-15) Time series analysis

C. Cappelli  Robust Atheoretical Regression Tree to detect structural breaks in financial time series. (Co-author(s): P. D’Urso, F. Di Iorio)

P. Chirico  Prediction intervals for heteroscedastic series by Holt-Winters methods.

M. Costa  Inequality decomposition for financial variables evaluation.

G. De Luca  Three-stage estimation for a copula-based VAR model. (Co-author(s): G. Rivieccio)

(CON-16) Forecasting methods

M. Andreano  Forecasting with Mixed Data Sampling Models (MIDAS) and Google trends data: the case of car sales in Italy. (Co-author(s): R. Benedetti, P. Postiglione)

V. Candila  Probability forecasts in the market of tennis betting: the CaSco normalization. (Co-author(s): A. Scognamillo)

S. Vantini  Daily Prediction of Demand and Supply Curves. (Co-author(s): A. Canale)

(CON-17) Bayesian statistics (2)

G. Marchese  Bayesian hierarchical models for analyzing and forecasting football results. (Co-author(s): P. Brutti, S. Gubbiotti)

L. Paci  Bayesian modeling of spatio-temporal point patterns in residential property sales. (Co-author(s): A. E. Gelfand, M. Beamonte, P. Gargallo, M. Salvador)

V. Vitale  Non-parametric Bayesian Networks for Managing an Energy Market. (Co-author(s): V. Guizzi, F. Musella, P. Vicard)

(CON-18) Business statistics

E. Bartoloni  How do firms perceive their competitiveness? Measurement and determinants.

C. Bocci  An evaluation of export promotion programmes with repeated multiple treatments. (Co-author(s): M. Mariani)

A. Righi  The inter-enterprise relations in Italy. (Co-author(s): A. Nuccitelli, G. Barbieri)

(CON-19) Clustering and classification

C. Drago  Dendrograms Stability Analysis of Sub-periods Time Series Clustering. (Co-author(s): R. Ricciuti)

G. Menardi  Stability-based model selection in nonparametric clustering.

T. Padellini  Topological signatures for classification. (Co-author(s): P. Brutti)
(CON-20) Demographics and social statistics (2)

M. Antonicelli  
Ecolabels: informin or confusing customers? Evidences form the agrifood sector.  
(Co-author(s): D. Calace, D. Morrone, A. Russo, V. Vastola)

B. Arpino  
What makes you feeling old? An analysis of the factors influencing perceptions of ageing.  
(Co-author(s): V. Bordone, A. Rosina)

G. De Santis  
A (partial) solution to the intractability of APC models.  
(Co-author(s): M. Mucciardi)

G. Gabrielli  
Partner reunification of first generation immigrants in Lombardy.  
(Co-author(s): A. Paterno, L. Terzera)

(CON-21) Statistical inference

E. Kenne Pagui  
Median bias reduction of maximum likelihood estimates in binary regression models.  
(Co-author(s): A. Salvan, N. Sartori)

N. Lunardon  
On penalized likelihood and bias reduction.  
(Co-author(s): G. Adimari)

A. Maruotti  
Population size estimation and heterogeneity in capture-recapture count data.  
(Co-author(s): O. Anan, D. Böhning)

(CON-22) Survey methods

A. Pinto  
Italian consumers’ food risks perception: an approach based on the correspondence analysis.  
(Co-author(s): E. Ruli, S. Crovato, L. Ventura, L. Ravarotto)

R. Salvatore  
Spatial-temporal multivariate small area estimation.  
(Co-author(s): F. Cappuccio)

D. Toninelli  
Is the Smartphone Participation Affecting the Web Survey Experience?.  
(Co-author(s): M. Revilla)

POSTER SESSION (POS)

M. Bernardi  
Non-conjugate Variational Bayes Approximation.  
(Co-author(s): E. Ruli)

M. Bernardi  
The Multivariate Fuzzy Skew Student–t distribution.

M. Bini  
Quality of Educational Services, Institutional Image, Students’ Satisfaction and Loyalty in Higher Education.  
(Co-author(s): L. Masserini, M. Pratesi)

L. Bisaglia  
Estimation of INAR(p) models using bootstrap.  
(Co-author(s): M. Gerolimetto)

D. Bossoli  
Effect of internet-based cognitive therapy on children anxiety disorders: results from a marginal logistic quantile regression.
<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Title</th>
<th>(Co-author(s))</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. Calì</td>
<td>Some mathematical properties of the ROC curve.</td>
<td>(Co-author(s): M. Longobardi)</td>
</tr>
<tr>
<td>M. Cannas</td>
<td>Machine learning for the estimation of the propensity score: a simulation study.</td>
<td>(Co-author(s): B. Arpino)</td>
</tr>
<tr>
<td>M. Cannas</td>
<td>An R package for propensity score matching with clustered data.</td>
<td>(Co-author(s): B. Arpino, C. Conversano)</td>
</tr>
<tr>
<td>A. Coli</td>
<td>Mapping local social protection data in Italy.</td>
<td>(Co-author(s): B. Pacini, A. Valentini, S. Venturi)</td>
</tr>
<tr>
<td>A. Cosma</td>
<td>Indirect inference for nonlinear panel data.</td>
<td></td>
</tr>
<tr>
<td>I. L. Danesi</td>
<td>Cluster Analysis of Transactional Data in the Frequency Domain.</td>
<td>(Co-author(s): F. M. Pons, C. Rea)</td>
</tr>
<tr>
<td>L. Gabrielli</td>
<td>Using purchase market behavior to estimate collective well-being.</td>
<td>(Co-author(s): G. Riccardi, L. Pappalardo)</td>
</tr>
<tr>
<td>F. Giambona</td>
<td>The Bifactor Item Response Theory Model for the analysis of repeated measurements. An application to the measurement of Italian households’ well-being.</td>
<td>(Co-author(s): M. Porcu, I. Sulis)</td>
</tr>
<tr>
<td>A. Lepore</td>
<td>A Bayesian short-term strategy for site specific wind potential assessment.</td>
<td>(Co-author(s): P. Erto, B. Palumbo, M. Lepore)</td>
</tr>
<tr>
<td>A. Magrini</td>
<td>Distributed-Lag Structural Equation Modelling: An Application to Impact Assessment of Research Activity on European Agriculture.</td>
<td>(Co-author(s): F. Bartolini, A. Coli, B. Pacini)</td>
</tr>
<tr>
<td>G. Mastrantonio</td>
<td>A multivariate circular-linear hidden Markov model for site-specific assessment of wind predictions by an atmospheric simulation system.</td>
<td>(Co-author(s): A. Pollice, F. Fedele)</td>
</tr>
<tr>
<td>F. Musella</td>
<td>Bayesian networks for supporting the digitization process in Italian schools.</td>
<td>(Co-author(s): S. Capogna, M.C. De Angelis)</td>
</tr>
<tr>
<td>B. Palumbo</td>
<td>Statistical approach in aerospace industry innovation.</td>
<td>(Co-author(s): P. Erto, F. Tagliaferri, G. De Chiara, R. Marrone, C. Leone, S. Genna)</td>
</tr>
<tr>
<td>B. Palumbo</td>
<td>Ship fuel consumption control and engineering approach to fault-detection.</td>
<td>(Co-author(s): P. Erto, A. Lepore, L. Vitiello, C. Capezza, D. Bocchetti, A. D’Ambra, B. Antonelli)</td>
</tr>
<tr>
<td>A. Petrucci</td>
<td>Small area model-based direct estimator for spatial data.</td>
<td>(Co-author(s): C. Bocci, E. Rocco)</td>
</tr>
<tr>
<td>F. Poggioni</td>
<td>Dynamic Quantile Lasso Regression.</td>
<td>(Co-author(s): L. Petrella, M. Bernardi)</td>
</tr>
<tr>
<td>A. Pramov</td>
<td>Confidence intervals for a partially identified parameter with bounds estimated by the minimum and the maximum of two correlated and normally distributed statistics.</td>
<td></td>
</tr>
</tbody>
</table>
I. Primerano  Semantic Knowledge Detection in Open-ended Questionnaire. (Co-author(s): G. Giordano)

G. Ragozini  A joint approach to the analysis of time-varying affiliation networks. (Co-author(s): D. D’Ambrosio, M. Serino)

M. Restaino  Non-parametric estimators for estimating bivariate survival function under randomly censored and truncated data. (Co-author(s): H. Dai, H. Wang)

G. Riccardi  Bayesian M-quantile regression in Small Area Estimation.

E. Ruli  Optimal $B$-robust posterior distributions for operational risk. (Co-author(s): I. Danesi, F. Piacenza, L. Ventura)

F. Schirripa Spagnolo  Estimating income of immigrant communities in Italy using small area estimation methods. (Co-author(s): N. Salvati, A. D’Agostino)

M. Soscia  The Switching Skew-GARCH Model. (Co-author(s): M. Bernardi, L. Petrella)

S. Spina  Inference on a non-homogeneous Gompertz process with jumps as model of tumor dynamics. (Co-author(s): V. Giorno, P. Román-Román, F. Torres-Ruiz)

G. Storti  Combining multiple frequencies in multivariate volatility forecasting. (Co-author(s): A. Amendola, V. Candila)


A. Vanacore  Statistics for knowledge improvement of an innovative manufacturing process and quality cost management. (Co-author(s): B. Palumbo, F. Del Re, P. Corrado, M. Lanza, G. La Sala, M. Mastrovita)

A. Vanacore  Statistics for Safety and Ergonomics in Design. (Co-author(s): A. Lanzotti, C. Percuoco, A. Capasso, F. Liccardo, B. Vifola)

L. Zanin  Modelling transition probabilities in a flexible hierarchical logit framework: evidence from the Italian labour market. (Co-author(s): R. Calabrese)
Multifactor Partitioning: an analysis of employment and firm size

Multifactor Partitioning: un’analisi dell’occupazione e della dimensione

Annamaria Bianchi, Silvia Biffignandi

Abstract
This paper discusses the effects of size on employment in Italy during the crisis started in 2008. The multifactor partitioning technique is proposed for the analysis. The approach is new in this application field and proves to be useful. The empirical investigation shows a heterogeneous behavior among classes, especially for micro-units.

Key words: Italy, shift-share, crisis

Introduction

Understanding the determinants of firm performance has been a very rich field of research for long time. To the best of the authors’ knowledge this is one of the few studies addressing this question in the recent economic crisis. This paper studies the effects of crises on employment and tries to understand whether the size of firms has an impact on employment changes. More precisely, we

1Annamaria Bianchi
Department of Management, Economics and Quantitative Methods, University of Bergamo; email: annamaria.bianchi@unibg.it

Silvia Biffignandi
Department of Management, Economics and Quantitative Methods, University of Bergamo; silvia.biffignandi@unibg.it

Paper supported by the ex 60% University of Bergamo, Biffignandi grant.
investigate whether micro, small and medium units were more negatively affected than large units during the crisis started in 2008. Indeed, recessions associated with financial and banking turbulence such as the recent one, can have disproportionate negative impacts on small businesses. They are more sensitive to changed financial conditions (Erixon 2009). Thus they can be more penalized.

The empirical analysis is carried out with reference to the Italian case, using data from the Italian Business Statistical Register of Local Units (ASIA – Local units), for the years 2007 and 2010. We propose to use the Ray-Srinath multifactor partitioning (MFP) model to study the size-growth relationship. This approach was first introduced by [7] and recently discussed by [6] and [8]. MFP is essentially an extension of shift-share analysis.

This is a novelty in the literature on this issue. Indeed, the most popular approach to study the relationship between size and employment change is to use firm-level data and to run a cross-section/panel regression of the growth in employment on enterprise size while including control variables [5]. A slightly separate literature analyzes the effect of firm size on employment changes at the regional level. In this case regional aggregated data are used. Usually, a firm related measure (e.g. the total number of small businesses in a region) is included as an explanatory variable in a regression for the employment in the region [2].

Data and methodology

The data source is the Italian Business Statistical Register of Local Units (ASIA – Local units), for the years 2007-2010. This database contains several variables for local units, including information on employment. The register records all local units operating in the manufacturing and services sectors. We consider businesses classified according to economic activity (one-letter classification in Ateco 2007 -- Italian version of the European classification Nace Rev. 2), macro-regions (Northwest, Northeast, Centre, South, and Islands, corresponding to Nuts1 areas), and size classes based on employment (0-9, 10-19, 20-49, 50 and more). Since the unit of analysis is the establishment and not the firm, we decided not to use the standard size class breakdown [4].

Table 1 reports employment distribution by size class and the corresponding net change occurred over the period 2007-2010. Differential changes are observed in different size classes.

<table>
<thead>
<tr>
<th>Class Size (Nr. Employees)</th>
<th>2007</th>
<th>2007-2010 change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-9</td>
<td>8,132,738</td>
<td>-239,468</td>
</tr>
<tr>
<td>10-19</td>
<td>2,049,544</td>
<td>-39,281</td>
</tr>
</tbody>
</table>
Multifactor Partitioning: an analysis of employment and firm size

<table>
<thead>
<tr>
<th>Size Class</th>
<th>Employment 20-49</th>
<th>Change 20-49</th>
<th>Growth Rate 20-49</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-49</td>
<td>1,924,464</td>
<td>-12,629</td>
<td>-0.66</td>
</tr>
<tr>
<td>≥ 50</td>
<td>4,187,744</td>
<td>-132,743</td>
<td>-3.17</td>
</tr>
<tr>
<td>Total</td>
<td>16,294,491</td>
<td>-424,122</td>
<td>-2.60</td>
</tr>
</tbody>
</table>

The observed changes are investigated by the MFP approach. MFP was introduced by [7] and later discussed by [6]. It is an extension of shift-share analysis. The advantages of the MFP methodology are that: it allows to identify the separate effects of size, business cycle, industrial composition, and regional advantages on employment growth for each size-class, it does not need the specification of a model, it is based on standardized rates rather than crude rates, and it only requires a small number of aggregated data.

The components identified by MFP are defined according to the following equation:

\[ r_{kk} = r_{kk} \text{national effect} + (\hat{r}_{kk} - \tilde{r}_{kk}) + \sum_{j} \frac{E_{ijk}}{E_{kk}} (\hat{r}_{jk} - \tilde{r}_{jk}) + \sum_{i} \frac{E_{ijk}}{E_{kk}} (\hat{r}_{ij} - \tilde{r}_{ij}) + \text{INT}_k. \]

where \( r_{kk} \) (\( \hat{r}_{kk} \)) is the crude (standardized) rate of size \( k \), \( r_{kk} \) (\( \hat{r}_{kk} \)) the overall crude (standardized) rate, \( \hat{r}_{ij} \) the standardized rate of industry \( i \), \( \hat{r}_{jk} \) the standardized rate of region \( j \), \( E_{ijk} \) the number of employment in industry \( i \), region \( j \) and size \( k \) at time 0, \( E_{kk} \) the number of employment in size \( k \). Refer to [7] for the analytical definition of standardized rates and interactions.

The national effect is the change in a size class that would have occurred if the class had grown at the national rate. It measures the effects of macroeconomic fluctuations on change. The allocation effect measures the extent to which location of economic activity enhances national rates. The size component captures the pure effect attributable to size, freed from the effects of industry-mix, regional distribution and business cycle. This component reflects the size competitive position and can be attributed to size advantages or disadvantages. The industry-mix effect measures the proportion of change attributable to the industrial composition within each size class. A size class with a concentration of fast-growth industries will have a favourable industry-mix effect. The region-mix effect captures the proportion of change which can be ascribed to the regional distribution of firms within each size class. Further, four interaction effects are identified: industry-region, industry-size, region-size and industry-size-region. Each region has specific resources and locational attributes that have a differential value for each industry according to its needs. The industry-region interaction is an aggregate measure of such specific advantages within each size class. The industry-size interaction reflects internal economies of scale, while the region-size interaction measures external economies of scale. Finally, the industry-size-region interaction is a very specific agglomeration economy measure.

Results
The results of MFP are summarized in Table 2. They show that next to the national growth effect, size and industry-mix effects dominate employment changes across firm size-groups. This underlines that employment dynamics, and in particular units’ size structure, are not only related to the macroeconomic cycle, but also and especially to the structural characteristics of the industrial system. A differential behavior of micro-establishments with respect to all types of establishments larger than 10 employed persons is observed. Micro-establishments show a negative size effect and a net positive component for the industry composition. Larger establishments have opposite components, respectively.

Table 2. Partitioned rates (%) of employment growth by size-class, 2007-2010

<table>
<thead>
<tr>
<th>Growth Effect</th>
<th>1-9</th>
<th>10-19</th>
<th>20-49</th>
<th>≥50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment growth 2007-2010</td>
<td>-2.94</td>
<td>-1.92</td>
<td>-0.66</td>
<td>-3.17</td>
</tr>
<tr>
<td>Industry-mix</td>
<td>1.26</td>
<td>-1.07</td>
<td>-1.54</td>
<td>-1.22</td>
</tr>
<tr>
<td>Regional distribution</td>
<td>0.10</td>
<td>-0.03</td>
<td>-0.10</td>
<td>-0.13</td>
</tr>
<tr>
<td>Size</td>
<td>-1.92</td>
<td>2.07</td>
<td>3.77</td>
<td>0.97</td>
</tr>
<tr>
<td>Industry-size interaction</td>
<td>-0.23</td>
<td>-0.59</td>
<td>-0.47</td>
<td>-0.93</td>
</tr>
<tr>
<td>Industry-region interaction</td>
<td>0.04</td>
<td>-0.03</td>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td>Size-region interaction</td>
<td>-0.02</td>
<td>-0.003</td>
<td>-0.15</td>
<td>0.19</td>
</tr>
<tr>
<td>Other</td>
<td>-0.04</td>
<td>-0.12</td>
<td>-0.04</td>
<td>0.07</td>
</tr>
</tbody>
</table>

National growth rate effect=2.60; Allocation effect=0.46

Looking at the other size-classes, it appears that the industry-mix has a negative impact on the performance. Indeed, it seems also to drag down the otherwise positive size effect for these establishments (adding the pure size component and the industry-size interaction).

Turning to the size effect, micro-establishments seem to be affected more importantly than larger establishments, that seem to be better able to absorb the cyclical variation.

The highest positive size effects are detected for small-medium establishments, whereas for the largest establishments this effect declines (+0.97) and in combination with the industry-mix effect (-0.93) it declines almost to zero, whereas the regional effect (adding the size-region interaction effect +0.19) increases it again. It seems that the benefits due to size for large units are offset by the negative trend.

Conclusions

The paper shows that the MFP approach can be useful in analyzing size effect on employment changes. This method allows to disentangle the portions of employment change attributable to different sources, namely business cycle, size, industrial composition, regional distribution and interactions among them. Looking across different size-classes, findings show that besides national growth effect, size and industry-mix effects are crucial in explaining employment change.
The analysis highlights differential results for micro units. The bad performance of micro units (-239,468 employed persons between 2007 and 2010) is not due to their industry-mix, which is positive, but to a very negative size-class effect. These results confirm that micro-establishments are more sensitive to financial restrictions and markets shutdown during crisis periods.

Turning to large units, when looking at crude rates, they seemed to be the worst performing ones. After separating the effects, their size has a positive contribution. MFP shows that the negative performance of large economic units in terms of employment change (-132,743) is due to the national effect, an unfavorable industry composition at the beginning of the period and diseconomies of scale (industry-size interactions).

Medium-sized economic units appear to register a little decline in employment, when looking at crude rates. MFP shows that they have the highest positive size effect, and a negative industry-mix and size-industry interaction.

Deeper insights on the economic analysis and on shift share indicators are provided in the full paper.

Further research will be carried out to find confirmation of the results and further elements for the interpretation of the behaviors identified through analyzes, using data on enterprises and possibly analyses of economic performance of enterprises.

References