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SIS 2011 Statistical Conference

Alma Mater Studiorum - Università di Bologna

June 8, 2011 – June 10, 2011

Statistics in the 150 years from Italian Unification

Bologna, 8 – 10 June 2011

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Faculty of Statistical Sciences

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BOOK OF ABSTRACTS

SIS Intermediate Scientific Meeting, jointly organized by Istat and Bank of Italy, is devoted to Statistics as a tool for the analysis of economic, demographic and social phenomena that have been of interest for Italy from its unification. Methodological and applied aspects are considered both on an historical viewpoint and with nowadays and future perspectives.
The main topics of the Scientific Meeting are:

- the identity of the Country and its transformations;
- demography and population changes;
- the evolution of official statistics;
- information and tools for economic statistics: national accounts, economic time series, microeconometric data;
- Italian statistics within the national and international debate;
- how statistics methodology and applications respond to new technologies;
- the changes in the education system and in statistical learning.

Marco Albertini, *University of Bologna*

Changing Italian Families and Population Statistics: what we know and what we miss

Abstract
The last 150 years have witnessed marked changes in Italian families, under many different aspects - e.g.: the age at and the way in which young people leave the parental home; the relation between the organization of family and economy; the reproductive behavior, the levels and reasons of marital instability, the social norms about co-residence between generations and, more in general, intergenerational relations. When analyzing these changes, however, it is worth noting that: firstly, family change has been generally much slower than what is usually deemed in popular discourses about the family. Secondly, in most of the cases change has been non linear. Thirdly, the timing, extent and direction of these changes have been different across the different areas of the country and across different social classes. On the one hand, population statistics have contributed to document, study and measure these phenomena. On the other hand, the way in which statistics were collected, disseminated and made available to the scientific community have been largely influenced by family changes and by the desire of scholars of understanding the micro-level mechanisms behind social change. Thus, parallel to the development of research in the field of family studies, available population statistics have changed from macro-level data concentrating on essential characteristics and dynamics of the Italian population, to micro-level longitudinal data. The aim of the paper is twofold. The first part of the manuscript will provide a short overview of some of the most relevant family changes occurred in the last 150 years - as documented by available population statistics. Moreover, as far as available data allows it, variations across geographical areas and social classes will be considered. Secondly, by concentrating on the topic of intergenerational relations – i.e. co-residence arrangements between generations, parents-child contacts and exchange of support – the paper will further explore the existing relation between the evolution of population statistics and family change.

Rosa Arboretti Giancristofaro[1], Stefano Bonnini[2], Maria Iannario[3] and Francesca Solmi[1]
[1]*Universitry of Padova* [2]*University of Ferrara* [3]*University of Naples*
Permutation test approach for the analysis of rating data

Abstract
Questo lavoro riguarda un problema di verifica di ipotesi relativo a una metodologia finalizzata ad analizzare il comportamento di rispondenti in presenza di scelte multiple, denominata modello CUB. In particolar modo proponiamo un approccio non parametrico per verificare l'adeguatezza del modello stimato o confrontare modelli CUB nidificati quando la numerosità campionaria è bassa. Applicando test di permutazione multipli e tramite permutazioni vincolate dei dati è possibile ad esempio verificare l'influenza sulla variabile risposta di covariate di soggetto e/o di oggetto.

David Aristei and Bruno Bracalente, *University of Perugia*
Measuring Multidimensional Inequality: Methods and Issues in Empirical Analysis

Abstract
The analysis of multidimensional inequality in well-being has recently attracted a great amount of research, on theoretical as well as empirical ground. This paper examines first of all the principal measures proposed in the literature and used in empirical applications. The focus is mainly on measures based on the normative approach to inequality, as an extension of both Atkinson-Kolm-Sen and generalized Gini univariate indices (Tsui, 1995; Bourguignon, 1999; Gajdos and Weymark, 2005; Weymark, 2006; Decancq et al., 2009: Decancq and Lugo, 2010). Axioms, properties and parameter restrictions that characterize such multidimensional measures are outlined and discussed. Secondly, the qualitative and quantitative impact of different methodological choices in the empirical analysis of multidimensional inequality is examined. From this more practical point of view, the attention is mainly focused on the selection of variables to be used as proxies of the main dimensions of well-being and their measurement and on the presence of systematic distortions or other data quality problems. Furthermore, alternative variables' transformation and normalization criteria, weighting schemes and normative choices on the degree of substitutability among dimensions and on the degree of inequality aversion are presented and analyzed. In order to illustrate the impact of

these measurement problems and methodological choices on different multidimensional inequality indices, an extensive empirical analysis is performed considering the three dimensions of well-being (income, health and education) commonly used in empirical applications and using Italian data from the 2008 EU-SILC survey.

Alberto Baffigi, *Bank of Italy*

The new Italy's historical National Accounts (1861-2009)

Abstract

New historical data on Italy's national accounts ranging from the year of Unification until today have been produced by a team, coordinated by the Bank of Italy, with the collaboration of the Italian statistical office (Istat) and the Universities of Rome, "Tor Vergata", and of Bologna. Time series for the sources and uses side of national accounts, for agriculture, industry, services and total GDP at current and constant prices are presented. Our aim have been to provide a unified quantitative reference for Italy's economic history, with fully replicable procedures, complete documentation about sources, assumptions and methods.

Estela Bee Dagum, *University of Bologna*

The Concept of Variability in Time Series Analysis

Abstract

The presence of variability in time series analysis has been the source of many stochastic and deterministic models developed for its representation. Using the classical decomposition of a time series, the problem is to find the best estimates of the signal given the observations corrupted by noise . The best estimates are usually defined as minimizing the mean square error. We can observe the variability in the noise component as well as in the signal. The feasibility of the decomposition of a time series was proved in 1938 by Herman Wold who showed that any second-order stationary stochastic process can be decomposed in two mutually uncorrelated processes and , such that . is an infinite moving average where the ' s, are the innovations which follow a white noise (WN) process of zero mean, constant variance ,and zero auto-covariance . This component is called purely linear component since only one realization of the process is not sufficient to determine future values , without error. The component can be represented by a convergent infinite combination of sine and cosine functions with

stochastic amplitude which are uncorrelated white noise processes. The series is called the deterministic part because it can be predicted in the future without error from a single realization of the process by means of an infinite linear combination of past values. Wold theorem demonstrates that the property of stationarity is strongly related to that of linearity and provides a justification for autoregressive moving average (ARMA) models and some extensions, such as the autoregressive integrated moving average (ARIMA) and regression-ARIMA models (RegARIMA). In recent years, the variability of time series models for series observed daily, such as those in finance, biostatistics, weather ,and so on, has shown non-linear dependence of the level on previous data points. Whennnnn dealing with nonlinearities, one should make the distinction between: (1) Linear time series where shocks are assumed to be uncorrelated but not necessarily identically independent distributed (iid), and (2) Nonlinear time series where shocks are assumed to be iid, but there is a nonlinear function relating the observed time series and the underlying shocks. Among the most applied non-linear time series models are those representing changes of variance along time (heteroskedasticity). These models are called autoregressive conditional heteroskedasticity (ARCH) and the collection comprises a wide variety of representation (GARCH, TARCH, EGARCH, FIGARCH, CGARCH, etc). Here changes in variability are related to, or predicted by, recent past values of the observed series. This is in contrast to other possible representations of locally varying variability, where the variability might be modeled as being driven by a separate time-varying process, as in a doubly stochastic model.

Marco Bee, *University of Trento*
A maximum entropy approach to the measurement of market risk

Abstract
In this paper we use the Maximum Entropy (ME) distribution as a model for the log-returns of financial assets. The ME approach is a very flexible technique that maximizes Shannon's information entropy under moment constraints. The method provides a definition of the ``best'' distribution with theoretical moments matching the empirical moments and gives an operational way of finding it. This technique can also be used as a tool for accepting or rejecting the normality assumption commonly used in finance and risk management. These issues will be illustrated in a real data application with foreign exchange data.

Giampaola Bellini[1], Flavio Lupia[2] and Francesco De Santis[2]
[1]*ISTAT* [2] *INEA*

Water use for irrigation purpose in agriculture: the integration of a modelling approach and the Sixth Agriculture Census survey

Abstract

Irrigation represents in Italy one of the most relevant pressures on environment in terms of use of water as in other Mediterranean countries where hot and dry season might create conditions for requirements of additional water for the optimal growth of specific crops. To monitor the phenomenon several data have been collected by Istat during years through Farm structure survey - at census and sample level - as required by European regulation and for national interest. Nevertheless only poor data on water consumption are available at national level; in fact a settled methodology has not been available so far and surveys don't represent the proper statistical tool to acquire direct information on the amount of water used for irrigation. *MARSALa* (*Modelling Approach for irrigation wateR eStimation at fArm Level*) project was realized in the framework of the Eurostat Grant Programme 2008 (Theme "*Pilot studies for estimating the volume of water used for irrigation*") by the National Institute for Agricultural Economics (INEA). Istat cooperated and contributed to the implementation of the project since the beginning in several phases. Aim of the project was to design a methodology for the estimation of the irrigation water consumption at farm level in Italy by using, as a key source of information, the 6th General Agricultural Census 2010. The Census questionnaire has thus been integrated on the irrigation section in order to get the most appropriate variables necessary to run the model. The results will be available for each agricultural holding adopting the irrigation practice. The methodology grounds on the development and integration of three models dealing with the main aspects related to the farm irrigation water consumption: the crops irrigation demand, the irrigation systems efficiency and the farmer's irrigation strategy. Each model was developed by considering state-of-the-art methodologies as well as the available datasets (climate, soil, crops characteristics and statistics) in Italy, the expert knowledge and the nature of the information collected by the Census. The three models are implemented through the software application *MARSALa.NET* to provide the estimation of the farms irrigation consumption. *MARSALa.NET* has a client-server architecture and has several routines for pre-processing the required Census data as well as a set of biophysical databases containing data about crops phenology, soil and agro-meteorology. The study will focus on description of main data available on the irrigation

phenomenon, variables made available through Census and their processing in order to run the model.

Giampaola Bellini, Paola Giordano and Eleonora Di Cristofaro, *ISTAT*

Sixth General Agriculture Census: information needs on rural development and pressures generated by agricultural activity on the environment

Abstract

In the last decades the Italian agriculture has experienced profound changes due mainly to the EU policies. Particularly, the structure and role of National agricultural holdings has changed mainly in relation with policies implemented to promote rural development and the environment pollution and depletion prevention. The statistical tool considered more appropriate to collect information on some specific phenomena is the farm structure survey, and the one run in year 2010 represents the census version. Particularly, the new content of the sixth general Census questionnaire refers to pressures generated by agricultural activity, depending on how agricultural practices are realised and livestock is managed and raised. Such pressures create effects on environmental components, mainly air, water and soil. European Union, the scientific community and the public opinion require new statistical data to monitor the adoption and the effect of policies on natural resources management and protection. The Agriculture Census that is being run in year 2010 is mandatory and required by Reg.(EC) n. 1166/2008, referring to the institution of a statistical framework established to compare statistical data on farm structure and on agricultural production methods. The latter represented the most important change of this census and had a great impact in the implementation of the Census questionnaire. This regulation meets the needs of data collection on rural development (Reg. (EC) n. 1698/2005 and on rural development support by EAFRD. Moreover, Reg.(EC) n. 1166/2008 considers the implementation process of indicators for agro-environmental phenomena description (see also Irena project (*Indicator Reporting on the Integration of Environmental Concerns into Agriculture Policy*) by Eurostat working groups). Due to this project, EC adopted Com.(2006)508 with the identification and description of 28 agro-environmental indicators and their potential data sources. Finally, Census questionnaire fits with National and regional data needs too. Main objective of this work will be to give an overview on new census

variables and their use in defined agro-environmental indicators at international and national level.

Tiziano Bellini, *University of Parma*
Robust Macroeconomic Credit Stress Testing

Abstract
Stress testing has become an important topic in banking practice since the development of the risk management and the enforcement of international supervisory requirements. We start from Wilson (1997) approach in order to explicitly investigate the functional relationship between credit risk and macroeconomic factors in order to compute the Value at Risk (V a R) and the Expected Shortfall (ES) for banking credit portfolios. Highlighting the importance to estimate robust model parameters, we rely on the forward search (Riani et al:, 2009) using multivariate statistical tools ranging from regression, Box-Cox transformation, cluster analysis and Normal mixture random generations. We propose a framework where, employing the analysis of real macroeconomic Italian data from 1990 to 2009, we compute both V a R and ES of stylized banking credit portfolios emphasizing the role played by data analysis in order to identify effective scenarios for stress testing.

Rossella Berni, *University of Florence*
Robust design and optimization for response surfaces in the multiple response case: developments and critical aspects

Abstract
This paper deals with the response surface methodology in the multiple response case by considering the recent issues and the problems linked to the simultaneous optimization of several response variables taking into account the robust design approach. A brief literature review about dual approach and the multiresponse case with their differences and developments is presented. Furthermore, an empirical example is shown with transformed and non-transformed response variables.

Cristina Bernini, Andrea Guizzardi and Giovanni Angelini, *University of Bologna*

Developing a composite indicator of resident well-being: the case of the Romagna area

Abstract

There is a growing literature on the assessment of quality of life conditions and well-being in geographically and/or politically divided areas.. The paper proposes a new measure of well-being based on residents' satisfaction with specific life domains, leisure activities and satisfaction with life as a whole. The well-being index is constructed using a Weighted Sum Model, where the weights are calculated by DEA.

Annibale Biggeri, *University of Florence*

Statistics and Epidemiology

Abstract

The application of statistics to medical research on the etiology of diseases and their prevention has a long history in our country. We can simplify into three time periods: from the reunification on 1861 to the rise of fascism; the period between the two world wars; the emergence of modern epidemiology from 1945 onward. The first period is dominated by infectious diseases epidemiology and the foundation of experimental designs in Medicine. In the second period the totalitarian regime put emphasis on prevention and eugenetics; in the third period Italy contributed greatly to the rise of modern epidemiology and clarification of chronic diseases etiology. The first professor of medical statistics was GA Maccacaro in mid-sixties. The main achievement in epidemiological methods in the modern era of epidemiology, i.e. since late seventies, has been the great improvement in the design and analysis of case-control studies, and a notable contribution of Italian epidemiologists was on attributable risks estimates. This was in the tradition of social medicine and occupational epidemiology, which has a long history in our country. Currently, prospective cohort studies with biobank represent also formidable challenges in term of methodological aspects. Indeed, great emphasis was given to molecular and genetic epidemiology. This explorative feature of current epidemiological research is present also in environmental epidemiology and, broadly speaking, disease surveillance.

Luigi Biggeri, *University of Florence*

Perspectives of the statistical evaluation of the university education process and teaching

Abstract

The work presents the activity carried out by the Cnvsu (National University Evaluation Committee) on the evaluation of the efficiency of the educational course programs and of the quality of the teaching activity. A prospect of the future evaluation that need to be organized in the future will be also outlined.

Corrado Bonifazi, *CNR - National Research Council*

The long way of Italian migration statistics from mass emigration to mass immigration

Abstract

The last 150 years of Italian history include almost all the steps of the evolution generally recorded in a national migration system. In fact, for almost a century Italy had been one of the most important countries of emigration in the world, while in the last decades it has become one of the favorite destinations of international migration flows. At the same time, internal migration have reshaped the population geography of the country, moving people from mountains to plans and from rural to urban areas. As it is well known, migration statistics are strictly related to migration policies and largely influenced by changes in migration trends. In this respect, the Italian case is very interesting. As a matter of fact, in this large time span Italian migration statistics have undergone deep changes in definitions, sources and ways of collections. The paper wants to describe the main changes in Italian migration statistics, highlighting the relations between these changes and political and migratory contextual factors. Four main periods will be considered: the period of mass emigration (from 1860 to the First World War); the interwar period; the period of European labour migration (from 1946 to 1975); the period of mass immigration.

Giovanni Borga, Rina Camporese, Niccolò Iandelli and Antonella Ragnoli

New Technologies and Statistics: Partners for Environmental Monitoring and City Sensing

Abstract

Urban space is now interconnected thanks to data flows coming from a myriad of technological devices that can be instantly aggregated in a geographic database thereby providing a relevant representation of what is happening around us. Having this in mind, City Sensing can be described as an "immersive sensing" and a new and exciting opportunity to survey the territory and the environment. In combination with the Web 2.0 opportunities, City Sensing can be declined as Sensor Web, which monitors territory and environment in the style of social networking in a cooperative perspective. A recent technological research has produced sensors (mainly based on Micro-Electro-Mechanical System) and devices small enough to be wearable and at low cost. Such micro-sensors can measure various quantities by translating variations of physical parameters into electrical impulses (e.g. sound, acceleration, pressure, temperature, humidity, concentration of gases, magnetic fields, ...). The spread of these technologies has opened the door to new research experiences made by the NT&ITA Doctorate School and research group, such as the design of an integrated system of sensors for environmental and road traffic monitoring, widespread in the territory and based on WSN (Wireless Sensor Network), and the test of a prototype wearable multi-sensor with blue-tooth transmission. The informative value of these projects is completed only at the stage of communication, because data become information only when they are communicated, mainly through Geographic Web 2.0 platforms. The main advantages of such a framework are the widespread and numerous measurements at lower unit cost (versus the traditional highly precise, expensive and few in number measures) and also the near real-time friendly communication together with an interaction with citizens. There are, of course, some limits. First of all, data coming from actual low-cost sensors are usually affected by a greater error as compared to certified official instruments. Secondly, a huge amount of data can be easily and quickly produced; this can result in a sort of data overload, which is difficult to manage and interpret. Furthermore, the pressure for real time can lead to hasty and un-meditated elaborations. Statistics can offer some help to reduce the impact of those drawbacks with regard to measurement quality control and error estimates. In cooperation with Information Design discipline, statistics can offer possible solutions to a

significative data representation and synthesis. Some examples related to traffic, air quality and noise pollution will be illustrated, by comparing actual statistical indicators to indicators that could be obtained by using the emerging technologies described before. With regard to noise, a possible strategy to produce noise pollution maps will be discussed: a sample based on land cover information, small sensors survey integrated with spontaneous contributions of citizens, ex-post weight calibration, estimates of population exposures to noise pollution, micro-data and statistical syntheses diffusion on the web, interaction with citizens.

Maria Caterina Bramati *University of Roma La Sapienza*
Response burden reduction through the use of administrative data and robust sampling

Abstract
There are several reasons why robust regression techniques are useful tools in sampling design. First of all, when stratified samples are considered, one needs to deal with three main issues: the sample size, the strata bounds determination and the sample allocation in the strata. Since the target variable y, objective of the survey, is unknown, it is used some auxiliary information x known for the entire population from which the sample is drawn. This regression-based approach is highly sensitive to the presence of contaminated data. Indeed, the influence of outlying observations in both y and x has an explosive impact on the variances with the effect of strong departures from the optimum sample allocation. Therefore, we expect increasing sample sizes in the strata, wrong allocation of sampling units in the strata and some errors in the strata bounds determination. To show the advantages of the proposed method, an empirical illustration is provided for Belgian business surveys in the sector of Construction. It is considered a skewed population framework, which is typical for businesses, with a stratified design with one take-all stratum and L1 strata. Simulation results are also provided.

Andrea Brandolini, *Bank of Italy*
1 percent vs. 1 cent – Relative vs. Absolute Measurement of Income Inequality

Abstract
The empirical analysis of the personal distribution of incomes goes a long way back in economics, at least to the celebrated chapter on the

revenue curve in Pareto's *Cours d'économie politique*. A central theme in this literature has been the search of the best way to measure the inequality of the distribution. Many summary indices have been proposed and scrutinised, their underlying characteristics have been exposed and dissected. Preferences on which one is the most appropriate may vary, but a consensus has been reached that most alternative indices have a distinctive informational content, and that relying on a single measure is bound to provide a partial, if not misleading, view. The paper surveys some popular indices in order to illustrate their properties, using examples drawn from applications to Italian data. The paper concludes that the absolute/relative dichotomy is still an open issue, calling for further research in the literature on income distribution.

Silvia Cagnone *University of Bologna*, Irini Moustaki, *University of Economics and Business, Athens (Greece)*

A review of latent variable models for categorical longitudinal data

Abstract

The paper reviews latent variable models for categorical longitudinal data with reference to the item response theory (IRT) and structural equation modelling (SEM) framework. Within the SEM approach, two different approaches are illustrated. The first one, discussed by Joreskog (2002), can be viewed as a confirmatory SEM for longitudinal ordinal data. Differences in means and covariances of latent variables over time are evaluated by assuming measurement invariance of the corresponding loadings and by correlating the measurement errors over time. Ordinal variables are considered to be manifestations of underlying continuous variables. The second one (Muthén and Khoo,1998) consists of modelling individual response curves over time by means of latent variable growth models. The main feature of this class of models is that the parameter of the curve, random intercept and random slope, can be viewed as latent variables. Hence, model specification and parameter estimation are developed within the classical SEM analysis. Growth models allow for both time-dependent and time-independent covariates. A wide treatment of latent curve models within the SEM framework can be found in Bollen and Curran (2006), whereas key references of growth models in a multilevel perspective are Muthén (1997a) and Muthén (1997b). Within the IRT framework Dunson (2003) and Cagnone et. Al. (2009) discuss a latent variable model with time-dependent latent variables and item-specific random effects that account for dependencies

within and across time. Time-dependent latent variables are modeled with an autoregressive model.

Giancarlo Carbonetti, Alessandra Fasano and Nadia Mignolli, *ISTAT*
Post Enumeration Survey of the Population and Housing Census: trends and future perspectives in Italy

Abstract
Targets. The present study focuses on the Post Enumeration Survey (in the following PES) of the Population and Housing Census and is part of a wider project concerning the retrieval and analysis of information related to all past Italian PES. In Italy, the most recent PES was carried out in 2001 with the main purpose of estimating and disseminating coverage errors, in order to give a quality measurement of the 14th Population and Housing Census itself. This research aims to examine all Italian Post Enumeration Surveys in detail, from the very first which took place in 1981, with a particular attention to their evolution over time, providing an elaborated analysis of the specific features characterising the stages of the production cycle: survey plannings, decisions on the sampling design, questionnaire building and changing scenary, monitoring phase during data collection.
Observation field and methods. In order to reach the objectives, specifications are provided on the main factors explaining the changes occurred in PES processes between Censuses and in different territorial frameworks. For this purpose, an overall outline is supplied by a detailed and comparative analysis at historical-statistical level, taking into account both the different PES strategies adopted in Italy over the years and an international comparison with PES carried out by some other Countries in more recent times. These facts are then used to identify the improvements achieved over time in terms of process and of unforeseen targets, to be possibly considered in the next future.
The present study is therefore divided into several levels related to the specific topics and factors defining the framework of the reference surveys: studying the production stages of previous Italian PES; identifying benefits and drawbacks within these stages and calculating direct and indirect quality indicators; analysing the international situation and legal framework related to these surveys and comparing it with the 2001 Italian survey; identifying remarks as starting points, assessments, warnings that could be useful to plan future surveys. More in detail, this research takes into account the following aspects within the reference PES: survey techniques and tools and their evolution over time;

sampling design (with a focus on sample size and allocation of sample units); estimation methods; evolution of monitoring stages/survey check; matching techniques/link to Census information; data processing methods; result accuracy and its evolution over time.
Final remarks. This study deals with analytical comparisons between the characteristics and the targets of the different PES, and the related Census development processes. The results achieved can then be useful in order to propose elements of reflection concerning the eventual planning of 2011 PES, also taking into account the remarkable impact deriving from the change in strategy adopted for the 15th Population and Housing Census in Italy. This strategy is completely different and for this reason it determines new possibilities to evaluate information, contents and results that can be derived from future PES.

Giancarlo Carbonetti, Luca Mancini and Luigi Marcone, *ISTAT*
Population censuses between tradition and innovation: Some evidence on the main drivers of change around the world

Abstract
The population census is a unique and fundamental source of information for a country. It orientates government policy planning, particularly the allocation of public resources between sectors and regions, and it represents a key point of reference for social scientists and practitioners. During the last decade the traditional population census model based on an exhaustive enumeration of individuals living in a certain country at a given time has been questioned on a number of accounts: its ability to portray in a snapshot populations which are increasingly mobile, its financial feasibility as budgets constraints become tighter, its public acceptability as respondents become increasingly weary of statistical polls and surveys. In response to these pressures a number of countries, including Italy, have been taking important steps towards reforming the traditional model with effect from the census round of 2010-2011. Under the impulse of international directives - such as the Regulation of the European Parliament and Council on population and housing censuses - and following in the footsteps of some countries which successfully pioneered it reform has been implemented along two main avenues: the construction of country-wide administrative archives combining individual-record information from different sources and the use of sampling to measure some key socio-economic characteristics of individuals and dwellings. The purpose of this paper is twofold: a) to classify and explain the main

methodological advances in population census matters observed internationally during the last decade, and b) to examine the main reasons behind the adoption of a certain strategy by National Statistical Institutes (NSI). The drivers considered include the state of public finances and budget constraints in connection to the financial sustainability of traditional censuses, the presence and nature of super-national and national legislation regulating census matters (e.g. constitutional vs ordinary law), the administrative organization (federal vs centralized state) and the geographical structure of a country's territory (landmass, population size and density, degree of urbanization), the presence and the degree of integration of administrative archives, the level of economic and political stability, the degree of ethnic and cultural diversity. The quantitative analysis will use data from most suitable sources and will seek to gauge the influence of each of these factors on the choices by NSIs to adopt a specific methodological framework. This study is expected to be relevant not only to better understand the reasons behind certain decisions but also to help evaluating the future developments of population censuses and those more relevant to the Italian case.

Arianna Carra and Elena Longoni, *ISTAT*
Relative poverty lines for Italian regions

Abstract
Usually, the relative poverty analysis in Italy is based upon an unique threshold established in order to the households consumptions expenditure. Every year, the national consumptions expenditure per capita gives the poverty line for a two members household and then, to determine the equivalence expenditure of households of different size, the *Carbonaro* scale is used. Nevertheless, several studies appear according to the criticism that in this way the differences in purchasing power and in consumption attitudes (that they may be present in the different geographic areas of the inland) are ignored. The aim of this paper is to build a specific relative threshold for any Italian region moving from the same expenditure data and to analyze the emergence of poverty related to these.

Sara Casacci, Adriano Pareto *Istat*

Quantification of Ordinal Variables: From the Estimation Based on Distributional Assumptions to Nonlinear Principal Component Analysis

Abstract

The solution to the problem of 'quantification', i.e., assigning real numbers to the qualitative modalities (categories) of an ordinal variable, is of primary relevance in data analysis. The literature offers a wide variety of quantification methods, all with their pros and cons. In this work, we present a comparison between an 'univariate' and a 'multivariate' approach. The univariate approach allows to estimate the category values of an ordinal variable from the observed frequencies on the basis of a distributional assumption (Torgerson, 1967; Hensler and Stipak, 1979). The multivariate approach simultaneously transforms a set of observed qualitative variables into interval scales through a process called 'optimal scaling'. A typical example of this approach is the Least-Squares Nonlinear Principal Component Analysis that maximizes the proportion of variance accounted for by the principal components in the transformed variables (Gifi, 1990). As an example of application, we consider the Bank of Italy data coming from the 2008 "Survey on Household Income and Wealth" in order to 'quantify' a self-rating item of happiness.

Maria Casalini and Anna Scattigno, *University of Florence*

Women in Modern Italy. A Long-Term Perspective

Abstract

The question why Italian women are different from European women in terms of job market participation and demographic behaviour is a central one but not yet resolved. We would like to widen the analysis by including a long-term historical dimension, focusing on two main issues. The first one, has its origin from the end of 19th century, and regards the "women question" and refers specifically to the total incommunicability between the feminist view and the contradictory strategy of the socialist party and the workers' movement. In the context of liberal Italy, the difference between the two grew and became an element of weakness for both. The diverging view is an "essential incommunicability" that remained constant in Italian history and formed the basis of the new contrast between neo-feminist positions and the women activists of left parties during the '70s.

The second issue concerns women's roles during and after the wars. The gender role dynamics were, under several points of views, similar in the first and second WW. Both war-time periods witnessed a tendency towards gender equality, but that were counteracted by a strong re-affirmation of gender differences and family gender hierarchy after the wars. Even if there were important steps made in terms of political rights (the abolition of marital authorisation in 1919 and the women's vote right in 1945), a model of "hegemonic masculinity" consolidated, with the consequence that women were expelled from the job market and – though intermittent – recuperation of fertility rates, all which were emblematic of the Fascist experience. There seems to be a quite clear link between the welfare policies of the more recent "Republic of political parties" and the historical disadvantage of Italian women, which ultimately lead to the extreme low fertility that we have witnessed over the last few decades.

Graziella Caselli, Viviana Egidi and Marco Marsili, *University of Rome La Sapienza*

La conquista della longevità in Italia: successi e insidie di un percorso lungo 150 anni

Abstract

L'Italia al momento dell'unificazione si collocava tra i paesi europei a più alta mortalità: la durata media della vita era leggermente superiore ai 30 anni, mentre nei paesi del nord Europa aveva già superato i 40 anni e in quelli dell'Europa centrale si approssimava rapidamente a questa soglia (Caselli, 1989, 1991, 1994, 1996; Caselli ed Egidi, 1991, 2011). Il nostro Paese superò la cosiddetta "età della pestilenza e della fame" (Omran, 1971) solo negli ultimi decenni dell'Ottocento: numerosi studi fanno coincidere con gli anni ottanta del XIX secolo il periodo in cui i livelli di mortalità iniziarono sensibilmente a diminuire, dando inizio al processo della transizione sanitaria, in ritardo di un secolo rispetto all'Inghilterra e più di mezzo secolo rispetto alla Francia. Fu solo verso la fine del secolo che l'andamento del fenomeno sembrò indirizzarsi verso una sicura diminuzione. Questa evoluzione continuò con ritmo accelerato negli anni successivi, interrotta solamente da alcuni eventi che colpirono il paese nei primi decenni del Novecento: lo scoppio della prima guerra mondiale, l'influenza di Spagnola del 1918, la seconda guerra mondiale e, anche, le circoscritte crisi di mortalità conseguenti ai rigidi inverni del 1900 e del 1929. Nonostante le grandi crisi, determinate dai due conflitti mondiali, dall'inizio del declino della

mortalità alla metà del Novecento la durata media della vita era già raddoppiata per gli uomini e più che raddoppiata per le donne (63 anni e i 67 anni, rispettivamente). Da allora, l'allungamento della vita è stato continuo, subendo un'accelerazione verso la fine degli anni settanta del Novecento. Oggi, le donne italiane con 84,3 anni di speranza di vita hanno sorpassato le svedesi e le danesi, sono seconde in Europa dopo le francesi e terze nel mondo dove le giapponesi detengono il primato. L'Italia si colloca ai livelli di sopravvivenza più elevati del mondo anche per gli uomini (79.1 anni), la cui speranza di vita alla nascita è molto prossima a quella della Svezia e del Giappone, paese quest'ultimo che si trova, anche per gli uomini, in testa alla graduatoria mondiale. In questo lavoro, il lungo cammino dell'evoluzione della sopravvivenza degli uomini e delle donne italiani viene letto alla luce delle tappe più importanti della transizione sanitaria, utilizzando le tavole di mortalità ricostruite dal 1861 (Natale e Bernassola, Caselli, Human Mortality Database, Istat) al 2008 e dati relativi alla mortalità per le principali cause di morte ricostruiti dal 1887 al 2008 (Caselli). Applicando il metodo di scomposizione di Pollard si stima che più della metà dei guadagni di sopravvivenza ottenuti nel primo secolo dopo l'Unità si sono realizzati grazie al declino della mortalità nei primi quindici anni di vita e che, considerato tutto l'arco della vita, circa il 70% dell'aumento della durata media della è da attribuire alla pressoché totale scomparsa della mortalità provocata dalle malattie di origine infettiva. Dopo questa prima fase, i maggiori guadagni sono stati ottenuti grazie alla dinamica favorevole della mortalità nelle età adulte e, a partire dagli ultimi decenni del secolo scorso, nelle età senili ed anziane, grazie alle quali l'allungamento della sopravvivenza è ancora in atto. Il riferimento alle cause di morte protagoniste delle recenti profonde trasformazioni consentirà di offrire un panorama ampio e molto articolato all'interno del quale leggere la storia demografica e sanitaria del passato e individuare le linee di tendenza future.

Cinzia Castagnaro, Antonella Guarneri, Sabrina Prati and Francesca Rinesi, *ISTAT*

Building a longitudinal database multi source: new challenges and opportunities

Abstract

In the recent decades an increasing demand for statistical information has been observed. At the same time new methodological tools have been developed. Among those special attention is given to data

integration methods that allow a better exploitation of existing sources. Record linkage techniques are widely used in several countries (mainly the northern European one) both for integrating existing sample surveys and for replacing them. A particularly relevant example of the application of these techniques to demographic data is provided by the Scottish Longitudinal Study (Hattersley L., Boyle P., 2007) whose aim is to reconstruct in a longitudinal fashion the life-course of a selected sample drawn by the Census by linking the main demographic events collected in the administrative sources at micro level. Moreover also health information are considered such as information on inpatients, day cases discharged from NHS hospitals and cancer registrations. The aim of this paper is to define the theoretical structure of a longitudinal database by considering all the sources available referred to the reproductive behaviour, maternal and perinatal health. This would make possible to shed light to the complex relations between all those aspects. A possible starting point is the first edition of the Sample Survey on Births, carried out by the Italian National Institute of Statistics (Istat) in 2003. The sample size equals to 50,000 women who had a child approximately 18-21 months before (10% of the total births in 2000-2001). This survey retrieves several information concerning both the socio-demographic, health and context variables. Our next step was to select all the relevant exhaustive administrative surveys enabling to recover the main health-related information, evaluating carefully the possibility to use sensitive personal information. Other sources of interest are represented by marriages, separations and divorces through which it is possible to reconstruct the different steps of family history. In this scheme the general aim is to study also the possible reversal of traditional family formation steps. Furthermore, it will be interesting also consider other aspects such as the internal mobility of individuals across the Italian territory. Till now we carried out some studies making use of record linkage applications and they supplied very good results in terms of positive predictive values. The creation of a new integrated database multi-source represents a real challenge for the future analyses because the possibility of adopting a longitudinal approach to study different aspects referred to a same population of interest and their evolution through time is nowadays still under construction due to the different peculiarities of each source considered. Among the several opportunities offered from the creation of this new database the choice to link administrative sources with sample surveys data allows to enlarge the overall information potential; furthermore thanking to its longitudinal nature it is particularly valuable for carrying out event history analyses.

Paola Cerchiello and Paolo Giudici, *University of Pavia*
Web survey methods of perceived quality of university teaching

Abstract
We present the most recent advances in terms of gathering and analyzing the perceived quality of academic teaching from students point of view. In particular we show how the web survey methods can improve the quality and robustness of collected data.

José Enrique Chacón, *University of Extremadura (Spain)*
Kernel Estimation of Multivariate Density Derivatives

Abstract
In questo intervento si introduce stimatori kernel di densità multivariata funzioni derivate utilizzando non vincolato (cioè simmetrica definita positiva) matrici di banda. Questi stimatori densità derivati sono stati relativamente meno ricercato quella degli analoghi densità loro estimatore. Un notevole ostacolo per il progresso è stato l'intrattabilità di analisi matrice quando si trattano derivate di ordine superiore multivariata. Abbiamo dimostrato che con un'alternativa vettorizzazione di questi derivati di ordine superiore, matematico difficoltà possono essere superate in un contesto elegante e unificato. Anche qui vi presentiamo la convalida incrociata e plug-in di metodi che consentano un automatico (dati-dipendente) la selezione della larghezza di banda della matrice all'interno della classe di matrici non vincolato. Illustriamo l'utilità dei nostri risultati con una domanda di stima pendenza, che porti ad un metodo di clustering automatico tramite l'algoritmo di spostamento medio. Questo è un lavoro congiunto con Tarn Duong (Institut Curie, Parigi) e Matt Wand (University of Technology, Sydney).

Daniele Checchi, *University of Milan*
Intergenerational Persistence of Educational Attainment in Italy

Abstract
In this paper we show that there is a reduction over time in the correlation coefficient between fathers' and children's schooling levels in Italy. However, we also show that there is still a persistent difference in the odds of attaining a college degree between children of college--educated parents and children of parents with lower secondary educational attainment. We present some evidence that the explanation

of these trends lies in the differential impact of liquidity constraints and risk aversion on parents with low educational attainment.

Bruno Chiandotto, *University of Florence*

Past, present and future of the statistical evaluation of university teaching in Italy

Abstract

Assessment and judgement of persons, institutions, procedures and results are usual activities, even if they are often carried out in an informal manner. As far as university education is concerned, formal assessment was introduced in Italy by law (law 168/89 and 537/93). Specifications as to what should be evaluated in the educational processes are contained in the *"Technical notes on data and information to be transmitted within 30th April of each year"* to the ***CNVSU*** (National Committee for the Evaluation of University Systems). In recent years, besides collecting, elaborating and transmitting the data requested by the Committee, many universities have defined and implemented information tools capable of satisfying the cognitive requirements of both the structures and the relative subjects therein. After a brief critical review of the laws and the systems of evaluation of university teaching undertaken in the last years in Italy, some suggestions will be given to increase the efficiency and the effectiveness of the processes of evaluation. In particular, will be discussed the *System of Statistic Information for the Evaluation of University teaching* ***(SIS-VALDIDAT)*** implemented by the Evaluation and Monitoring Group (***VALMON)*** of the University of Florence.

Bruno Chiandotto, *University of Florence*

Bayesian and non-bayesian approaches to statistical inference: a personal view

Abstract

Bayesian and non-bayesian approaches to statistical inference are discussed; logical consistency and success in practice are compared, giving particular attention to the emerging field of causal statistical inference and causal statistical decision theory. After a brief review of the evolution of statistical inference, as extraction of information and identification of models from data, the problematic issues of causal inference and causal decision theory will be reviewed taking the contributions of biometricians, econometricians, social scientists, philosophers of science

and scholars of artificial intelligence, into account. The aim is to provide some ideas for unifying the different approaches and for strengthening the future of statistics as a discipline.

Alfredo Cirianni and Laura Esposito, *ISTAT*

The use of administrative data for statistical purpose: the case of structural business farm statistics

Abstract

The RICA-REA survey aims to estimate the structural economical variables on business farm. This survey is composed by two different surveys: the REA survey estimates the structural business farm statistics and the RICA is an accounting survey in order to analyse the microeconomics aspects. ISTAT attends to the methodological aspects of the survey and INEA attends to the data collection on a sample of business farms. The REA survey is submitted to a Memorandum of Understanding signed by ISTAT, Regions, autonomous Provinces (Trento e Bolzano), Ministry of Agriculture and INEA: we don't have a specific EUROSTAT Regulation on structural business statistics, like for industry and services economical activities. The statistical variables are requested by National Account System (ESA95). Without a specific EUROSTAT Regulation, we can have less detail of statistical information, concerned structural business farm statistics. The RICA survey, instead, is requested by Regulation CE n. 781/2009, dated 27 august 2009. This regulation requires the micro-data of a sample of business farms of medium and big business size. The strategy is to analyse the RICA-REA variables which are present in administrative sources (Ministry of Finance, INPS, Chamber of Commerce), stratified in order to consider that different legal units have different administrative sources. The administrative information system of structural business farm statistics is projected by the integration of farm register with the information obtained by VAT annual declaration, IRAP declaration, UNICO declaration, INPS declaration, balance sheets. The administrative sources has the following goals:

1) introduce a benchmark for analyse influential outlier observations (macro-editing approach) and for calibration of sample weights;
2) release timeliness the estimates of economical variables (provisional estimations in 10 months instead of 18 months of RICA-REA estimations);
3) integration of total and partial no response of RICA-REA survey.

Marisa Civardi and Cesare Costantino, *ISTAT*

Extention of national accounting to include social and environmental aspects

Abstract

The idea of extending the system of national accounts to cover environmental aspects has been linked to the concept of sustainable development since the very beginning of statistical work on economy and environment, the crucial issue being the preservation of natural capital. Integrated environmental and economic accounting, in fact, has always been promoted as a tool for analyses in a sustainability perspective. The Brundtland report and the 1992 Rio Conference were initial milestones marking progress towards addressing economic and environmental issues through an integrated approach. Within official statistics, the 1993 SNA handbook itself – namely Chapter XXI – provided the first framework for the development of conceptual and methodological thinking in this field. Later on in the Eu, the development of environmental accounting has been driven, as for the political sphere, by the communications of the European Commission "Directions for the Eu on Environmental Indicators and Green National Accounting – The Integration of Environmental and Economic Information Systems" (1994) and, more recently, "GDP and beyond – Measuring progress in a changing world" (2009). At present, important directions are also being discussed as a follow up of the Stiglitz-Sen-Fitoussi report and within the OECD Global Project on Measuring the Progress of Societies. To look at current well-being and sustainability as distinct aspects is one suggestion emerging from the above initiatives among other things; this holds also for an integrated system of environmental-economic accounts, which can support analyses on both sides. At global level, following Chapter XXI of SNA 1993, the evolution of environmental accounting within official statistics is marked by the appearance in 1993 of the first handbook specific for this field, known as SEEA, replaced ten years after by SEEA 2003. Currently the latter is undergoing a revision process, as a result of which the same is going to be elevated to an international statistical standard in 2012, on a pair with SNA 2008. As concerns environmental accounting at Istat, initial directions were the result of the research effort carried out jointly with Feem at the beginning of 90ies (made available internationally in 1996 – "National Accounts and the Environment", Kluwer Academic Publishers). Those directions have kept being confirmed by main developments having taken place at international level and in particular within the European Statistical System. While contributing significantly

to international efforts, Istat's work has been driven by international developments in the political agenda much more than by demand expressed by national policy makers, despite the fact that a national debate around a bill on this matter has lasted a number of years in the last decade. Immediate prospects for future work at Istat are linked to the European Strategy for Environmental Accounting (ESEA) as well as to the forthcoming European regulation based on which the regular transmission of a first set of environmental accounting data to Eurostat is becoming mandatory. Reflections on possible ways to establish launching of press releases including relevant environmental accounting data together those based on GDP are also in Istat's agenda. The framework for developing further the overall work on environmental accounts at Istat will be strengthened with the adoption of SEEA 2012, as resulting from the revision currently going on. This is based on a process started with the identification of issues to be solved. A global consultation on the same issues and related proposed solutions is an essential part of the process.

François Clanché, *INSEE (France)*
Results and lessons of the recasting of the French census

Abstract
From 1801 to 1999, France organized periodic traditional censuses. Ten years ago, France decided a deep reform of its census: installation of annual surveys on a part of the territory, introduction of sampling in the large communes based on a statistical register of addresses, annual publication of detailed results using 5 annual surveys and administrative data. The device is now in order and provides regular results. Were the expected goals of the reform achieved? This paper discusses the successes and the difficulties compared with the objectives of the project with regard to costs, quality of the data, and freshness of information. It presents the defects and the risks that appeared during the installation and the new evolutions now considered.

Giuliana Coccia and Alessandra Righi, *ISTAT*

A Review of Legal and Measurement Aspects of Child Labour in Italy

Abstract

Child labour is a very important subject both at international and national level. Several research on child labour have revealed that this phenomenon is rapidly evolving due to the evermore marked differences among the various Italian areas and among social groups. These trends are further amplified by the growing presence of foreign children who are involved in the worst forms of child labour. This paper first briefly describes the historical and legal context of child labour, before reviewing the relevant estimates carried out in Italy and their main features. It is rather difficult to compare the Italian quantitative studies conducted on child labour in the last decades, as definitions, the age-group reference population and methods used have been changing radically. Due to the survey techniques' limits and the difficulties of the survey topic, several analyses are carried out often at local level. Differences mainly regard the ages of the children taken as reference population; another important difference is due to consider all working children (e.g. children who work in a family/friend context though only for few hours a week and without being paid) or child labourers. However, studies on this matter do present some common elements. First the most used instrument for empirical researches is a questionnaire handed to students in class. A second common element of the empirical literature is the limited territorial validity of the researches carried out, as they cover municipal areas or even sub-municipalities (groups of schools). This aspect helps data collection and the creation of reference lists of the interviewees. But restricting the survey to small areas has led to statistical distortions in the quantification of the phenomenon at a national level. The areas with higher levels of school drop-outs were most frequently studied to find more easily the young persons who had entered the labour market. Nonetheless, these experiences have led to develop methodologies for analysing this topic and to identify the characteristics of economically active children. In addition to surveys occasionally carried out to estimate the incidence and main features of child labour, some sources also offer current data on it. Though able to quantify child labour only partially, these data allow monitoring some aspects of the phenomenon. In particular, important contributions come from the Ministry of Labour that produces annual data on the violations

of the norms relative to child labour, and from the figures on school drop-outs.

Renato Coppi and Paolo Giordani, *University of Rome La Sapienza*
Contributions of Italian statisticians to the development of multivariate data analysis

Abstract
The main contributions of Italian statisticians to the methodology of multivariate data analysis are investigated, focusing specifically on the development of techniques for coping with the extraction of information from complex data characterized by two or more variables or sets of variables as observed on one or more sets of objects. In particular the following types of methodological areas are considered: supervised and unsupervised classification, regression, factorial and scaling approaches. Methods for dealing with different sources of uncertainty associated with the procedures for drawing information from the data are examined with reference to: sampling uncertainty, model uncertainty, imprecision/vagueness of the data. The Italian contributions are discussed in the framework of various lines of research, including: analysis of contingency tables, asymmetric relationships among sets of variables, multiway data analysis, fuzzy and symbolic data analysis, textual analysis, stability analysis and model selection. Although the bulk of this study is devoted to the works appeared in the last three or four decades, some hints are given to the historical profile of the Italian school of Statistics. In this connection it is underlined that the more recent developments are characterized by specific traits of originality, which place the Italian contributions to the aforementioned fields of research somehow at the crossroads among the French, the Dutch and the Anglo-American schools of Statistics.

Riccardo Corradini, *ISTAT*
Bayesian Spatial Autoregressive Panel Data Models: an application on ISTAT Value Added provincial dataset using GNU Octave and Parallel Computing

Abstract
The policies of economic activity developed by European Union (EU) and the role played by regions and provinces as economic subjects have called for a larger set of disaggregated statistics at a macro, regional and

provincial level. This paper illustrates an innovative technique to analyze Provincial Accounts from a bayesian perspective. The aim of the article is to show how Spatial Bayesian Autoregressive Panel Data Models could be computed generating a huge amount of random draws cutting down hardware and software costs. The analysis is made considering the official Italian economic provincial value added data. Finally some conclusions are drawn on the comparative performances of distinct models proposed by literature. The computational burden of the various procedures is very heavy and the results are obtained by using parallel computing by GNU Octave as matrix programming scripting language installed on an heterogeneous GNU Linux computer cluster.

Franca Crippa, Patrizia Farina and Fulvia Mecatti, *University of Milan Bicocca*

A Special Gen(de)re of Statistics: Roots, Development and Methodological Prospects of a Gender Statistics

Abstract

The very expression *Gender Statistics* calls for a twofold interpretation: according to the popular mix-up of statistical methodology with its typical products such as indexes, tables and graphs (in Italian *Statistiche di Genere*) as well as from a broader and forward-looking perspective, which seizes upon the increasing demand of *gender sensitive* statistical information coming from society, official agencies, economy. Gender Statistics stands for itself as a proper independent field of statistics (in Italian *Statistica di Genere*) with its own objectives which cut across a large variety of applications in social, human and life science, in an emerging need of appropriate equipment of methods and dissemination tools, suitable for users with interdisciplinary background and skills. Although the collection and availability of good quality data separated for women and men represents the natural prerequisite, Gender Statistics looks further and beyond the mere data gender disaggregation, toward the systematic investigation of whatever study characteristic with the aim of untangling, highlighting, evaluating and understanding gaps and issues either based on gender - as a social structure – or sex – as a biological factor. First, the historical development of Gender Statistics will be tracked, from its roots in the seventies marked by the 1975 ONU International Year of Women, through the first and subsequent every five years World Women Conferences, underlining the fundamental 90's turn where the talking about women has quit in favour of a focussing on women *and* men - *i.e.* on gender – to the 1995

Beijin World Conference and the 2000 Millenium Declaration as major boost to the development and affirmation of a Gender Statistics. A critical review of the existing methodology and gender indicators will be given. On the basis of a discussion and comparison of the principal gender composite indicators supplied by international agencies and associations, it will be shown how the methodology underling the grand objective of measuring gender equity and producing world ranking is essentially fostered by a (often rough) linear combination of simple, mono-dimensional indicators, *i.e.* basic statistical tools such as ratio and proportion. Research perspectives will be finally outlined, focussing on the nobody-land in between the current simple and composite indicator methodologies. The potentiality of adopting classical statistical tools in Gender Statistics studies will be discussed. For instance, it will be the case of the use of traditional association analysis as a mean of interpreting *gender equity* in a data matrix as *statistical independence*, or the use of Gini index based on extending the notion of income inequality to the quantitative measure of gender gaps. Standard and more recent multivariate techniques for evaluating and ranking ordinal data will be also considered.

Rosa María Crujeiras, *University of Santiago de Compostela (Spain)*
Hypothesis testing for spatial data

Abstract
Analysis of spatial data is usually done considering simplifying assumptions about the dependence structure, such as stationarity or isotropy. Under stationary, the assessment of a certain parametric covariance model can be done using the spectral density. This approach from the spectral domain allows also for the comparison of different dependent structures or for assessing separability in spatio-temporal processes. Although the results in this framework are theoretically appealing, their practical used is limited since, regularly spaced data are required and the interpretation of the dependence in the spectral domain is not simple. In this work, we revise the existing literature on this topic, providing some real data examples and we also propose some testing methods for checking usual hypothesis in spatial analysis, such as testing a certain parametric model or assessing isotropy.

Miranda Cuffaro and Maria Davì, *University of Palermo*

Traps and Surprises in Long Time Series. Considerations on Italian Living Standards after Unification

Abstract

The paper has a twofold aim. On one side we want to examine the evolution of living standards of Italian population after the Unification, on the other side we try to detect the informative capacity of some historical series, supplied by Istat since 1861, in order to find adequate long-run relationships among the variables to be used for a further modelling. Notwithstanding the dynamics and the statistical characteristics of series have changed dramatically, both inside each series and among all the series, some interesting results have been drawn on the evolution of Italian living standards.

Luigi D'Ambra, University of Naples

Design, implementation and validation of a questionnaire for the evaluation of university teaching

Abstract

Il progetto di ricerca denominato "Progettazione, implementazione e validazione di un questionario per la valutazione della didattica erogata a studenti universitari" ha come obiettivo di:

1.progettare e costruire una scheda di rilevazione;

2. preparare una linea guida e delle relative istruzioni operative (*buona prassi*) per l'implementazione e la compilazione della scheda di rilevazione via *web*

Luigi D'Ambra[1] and Enrico Ciavolino[2]
[1]*University of Naples,* [2] *University of Salento at Lecce*

Recent developments in multidimensional analysis for customer satisfaction

Abstract

The paper intends to introduce some methodological evolutions in the field of Customer Satisfaction (CS) regards the following aspects: the unidimensionality evaluation of questionnaire, considering the Simple Component Analysis (SCA); the parameters estimation of Structural Equation Model (SEM), based on the Generalized Maximum Entropy (GME) method; the detection of relationship between categorical

variables, in the framework of Non Symmetrical Correspondence Analysis (NSCA).

Leandro D'Aurizio, *Bank of Italy*

L'esperienza della Banca d'Italia nella elaborazione a distanza di dati d'impresa

Abstract

La possibilità di eseguire elaborazioni personalizzate di tipo statistico-econometrico su appositi datasets tramite elaborazione a distanza permette grande flessibilità nella produzione e disseminazione dell'informazione statistica. L'infrastruttura adottata dalla Banca d'Italia consente lo sfruttamento dei dati d'impresa rilevati nelle sue indagini, pur mantenendo l'anonimato dei dati individuali. Il sistema si basa sulla piattaforma LISSY, già adottata dal Luxembourg Income Study (LIS) e da altri istituti di ricerca. La privacy delle imprese è protetta impedendo istruzioni di programmazione potenzialmente rischiose sotto questo profilo e impedendo la visualizzazione di dati individuali. La confidenzialità è inoltre protetta impedendo l'accesso a identificatori chiave e troncando le code destre delle distribuzioni di alcune variabili. La piattaforma permette l'accesso ai suoi servizi tramite email formato testo, in cui è da includere il programma. Mostriamo alcuni dati sintetici sull'utilizzo corrente della piattaforma e cerchiamo di delineare i futuri sviluppi che hanno la finalità di migliorare il livello di servizio, nonché di mantenere e migliorare la sua capacità di attrarre l'utenza più esigente.

Maria Letizia d'Autilia, *ISTAT*

The "shared statistics": a reformist project in the liberal age

Abstract

In Italy, the 1890's ended with the theoretical affirmation of marginalism and the start of Nitti's economic policy - a policy aimed at supporting the growth of modern industry as a condition for the civil development of the Country through the use of numerous and sometimes contradictory tools. Giovanni Montemartini's ideas and actions, a professor of political economy at the University of Pavia, was necessary to get to the heart of the productive system to analyse, check, evaluate, and probably also adjust it through constantly updated studies and data. In fact, it was important for industrialists, engineers and technicians responsible for production to use their diagnostic ability to create a statistic of the

industry. Montemartini introduced the method of "shared statistics" developed by those who created it. Influenced by the crisis of legitimacy involving the management classes towards the end of the 19th century, Montemartini started to elaborate –through statistics- a model of communicative action to share points of views and objectives of those working in the productive sector.

Maria Letizia d'Autilia, *ISTAT*
Tools of the history of statistics

Abstract
Presentation of the Istat historical projects to celebrate the 150th anniversary of the Unification of Italy. We will present: 1) an inventory of the Istat historical archive (1926-1980) with the short history of the Institution; 2) an updated bibliography of the history of statistics with a section devoted to the major historical journals from 1861 to 2011; 3) the project of the dictionary about biographical profiles of Italian statistics from 1861 to 2011.

Giuseppe De Blasio[1], Ciro Baldi[2], Grazia Di Bella[2], Annalisa Lucarelli[2] and Roberta Rizzi[2]
[1]*Italia Lavoro* [2]*ISTAT*
Turning the compulsory communication data into a statistical system: preliminary issues to set up an editing strategy

Abstract
The compulsory communications ((*Comunicazioni Obbligatorie,* from now on CO) system is a stream of declarations due by employers to notify the events of activation, termination, extension, or transformation of each employment relationship. Since March 2008 more than 70 millions communications have uninterruptedly flown into the national database managed by the Ministry of labour and social policy. Thanks to its wide coverage and rich variable set, these data opens the possibility to timely monitor the short term evolution of the labour market at a very detailed geographical level and with a considerable breakdown in terms of characteristics of the workers and of the employers. Moreover, by tracking the persons across their working life and the employers across the history of hirings and separations it can provide an immensely useful informative basis for complex analysis on the behaviour of the market and on the effectiveness of labour policies. In either ways it will greatly

enhance the support to the decisions of policy makers. To fully exploit the potential of this administrative source a set of procedures of data editing and treatment that takes into account the timeliness of the output and the need of ensuring a local level use has to be developed. These procedures must be able to construct and update information on complex statistical units such as employment relationships (jobs) between a worker and an employer and working histories of the workers. In this paper we discuss the main choices to be faced in order to design a process of check and editing responding to the requisites mentioned above. These choices regard: a) setting up checks on the raw declarations or on the data referred to the target statistical units (workers, employers and jobs); b) the editing strategy for the threefold key (employer id, worker id and starting date of the working relationship) necessary for reconstructing one of the main statistical units: the jobs; c)using auxiliary sources to continuously integrate and edit the administrative system (for instance the Business register to assign the Nace code) or rely on the information contained in the system itself; d) the degree to which different characteristics of a subject must be made consistent, the hierarchy of the variables and the use of longitudinal versus cross-sectional rules e) the role of legislation versus empirical evidence in setting up the edit rules) f) the way new information should update and modify the already acquired one and the related issue of revisions. Since the process of designing and implementing the procedures will require a considerable amount of resources the options of each choice have to be carefully evaluated.

Silvia Da Valle and Alessandro Valentini, *ISTAT*

How to increase statistical literacy in primary schools: the proposal of Istat in Tuscany

Abstract

In the last years Italian institutions are paying more and more attention to the growing of statistical culture with particular care to young generations. An example is represented by National Indications for *curricula* for the primary school, which make a specific reference to the acquisition of knowledge and abilities in statistics (i.e. managing statistical instruments like tables and graphs). Another signal comes from INVALSI, the institute voted to evaluate the quality of Italian instruction system. The institute introduced a specific set of questions in the area of statistics (named “data and previsions”) in the usual annual survey for the measurement of learning in mathematics of primary

school' students (2nd and 5th classes). Scope of the present paper is to illustrate the specific action plan organised in this framework by Istat - office for Tuscany - to support teachers in their statistical dissemination work with pupils. The idea is to offer to teachers new interactive working tools to use with children for a different a approach to learning: friendly presentations of main topics, simple exercises, new way of representing statistical information (i.e. animated graphs). The opportunity to have results of the tests back to each school from INVALSI give also the chance to evaluate the goodness of the method by comparing answers between classes that used the proposal and classed that do not.

Giuseppe De Blasio, Marco Lombardi and Enrico Todini, *Italia Lavoro*
Evaluation the labour policy through compulsory communications: the case of Labor Lab

Abstract
The availability of new administrative sources for the observers of the labour market, allows us to support policy-makers on the evaluation of labour policies. In this paper we present an experiment integrating the Lombardia region's data (LABOR LAB) from a regional project with administrative data. This paper considers an evaluation theoretical model of labour policy proposed by Italy Lavoro S.p.A. and adopted by the Lombardia region. The theoretical model is data independent, and it represents the conceptual level of the test plans. The experiment was aimed to test the ability of the model developed to provide input to the programming, management and evaluation of policies. The project had three areas of action: unemployed, atypical and redeployed workers. The project is based on the "dowry work" that the person can spend with the employment services accredited regionally (public and private), based on a list of services provided by the process of active employment policy. The employment services earn a portion of the total endowment for each service provided in a predetermined order: 1) Signing of agreement of service (PIP); 2) Processing PIP (Training); 3) Job placement. The first two steps are monitored through the administrative database of the project (LABORLAB) and the third one through the CCS. Each region has provided the required notices regarding hiring, conclusions, transformations and extensions of jobs at regional and work sites of all citizens of the region. In this experiment the statistical processing of administrative data is consistent with the procedures for

monitoring and commissioning data quality, currently deployed on the central node of the Compulsory Communications System (CCS).
Analysis of the integrated data (LABORLAB-CSS) showed that on 30th April 2010, 23,1% of the participants in the policy (corresponding to 2.316 subjects initiating a PIP) were found to have an employment contract. The number of contractors issuing the announcement was not homogenously distributed among the given targets. The majority of the people was in fact unemployed (72%) counting only a 24% of atypical workers and a 4% of redeployed workers. Furthermore, people mainly referred to the privately accredited services (84,2%) instead of the public employment services (15,8%). Both public and private developed an individual plan supplying professional training to most of the people (96%). However, the final integration results, coming from the official mandatory communication data, show an 8,4% more efficient management on the public side.

Riccardo De Bonis, *Bank of Italy*

The Eurosystem statistics: where we are and where do we go from here?

Abstract
The goal of the paper is to provide a summary of the harmonization process carried out by the Eurosystem, i.e. the European Central Bank (ECB) and the National central banks of the countries adopting the euro as the single currency, in the field of monetary, banking and financial statistics. Harmonization of statistics started at the European monetary institute, the precursor of the ECB, in the mid -90s. New statistics on monetary and credit aggregates and on bank balance sheets were produced since the start of the common monetary policy in January 1999. A few years later, harmonisation interested banking interest rates and quarterly financial accounts, as well as financial market statistics. More recently, it was the turn of mutual funds and special purpose vehicle data. Now, not surprisingly, the focus has shifted on data needed for macro-prudential supervision. Here, the institutional architecture is still in its infancy and there are several actors involved, first of all, the new European Systemic Risk Board, the independent EU body responsible for the macro-prudential oversight of the financial system. We provide a concise summary of the issues under discussion.

Giulia De Candia, *ISTAT*

Regional differences in infant mortality from the nineteenth to the twenty first century

Abstract

The analysis of infant, perinatal, late foetal and neonatal mortality rates, registered in the Italian regions from the end of the 19th to the beginning of the 21st century, shows large regional differences in levels and rates of reduction. This gap is accentuated with the passing of time, bringing out an unfavorable position of Southern Italy compared with the rest of the country, because in the South are concentrated geographical pockets of high mortality. Analysing the evolution of infant mortality over time and comparing different territorial realities, we propose some hypothesis about the factors that prevent the convergence to the minimum levels of infant mortality rate.

Stefano De Cantis and Mauro Ferrante, *University of Palermo*

Tourism statistics for local planning: challenges and proposals

Abstract

The increasing importance of tourism in many urban and rural areas has called into question the adequacy of official statistical sources for specific local needs. However, several problems affect actual official statistics in tourism which make them inappropriate for destination management purposes. The present work starts from a simple question about the actual number of tourists in a given destination by formalizing the answer through a conceptual model which links official statistics available at local level with the tourism trips undertaken in the destination considered. The relevance of several parameters and quantities is highlighted and some proposals for their estimate are made. The importance of other information at local level, given the changing nature of demand and the increasing segmentation of the holiday market, is addressed.

Daniela De Francesco, Simona Rosati, Cristiana Conti, Anna Maria Tononi, *ISTAT*

Statistical Information and Mass Media: the Diffusion of Census Data in the last 150th Years

Abstract

The dissemination of statistical data is a crucial factor in the portrait of social reality of a country. The mass media are able to influence the perceptions and the opinions of individuals about events and social subjects. This process has an unavoidable impact on the way civil society receives and interprets statistical information. In this context, the daily press combines each activity of diffusion of statistical data from 1861 to the present. Today the traditional mass media are in fact supported by the new media (i.e. social network, blog, online press, etc.). The aim of the paper is to observe how the statistical information is changed from the Unification of Italy to the present. According to this perspective, what comes out is an exploratory operation on the development of press citation, the contents of the information and the communication strategies used. In particular, the analysis will focus on the dissemination of census data which contains privileged statistical knowledge addressed to all citizens. The empirical part will be developed through the data analysis (i.e. text mining) with the use of the most important Italian newspapers.

Stefano De Francisci, Mara Cammarrota, Luciano Cavalli, Alessandra Ferrara, Michele Ferrara, Valeria de Martino, Antonio Pitrone and Stefania Rossetti, *ISTAT*

Visualization and storytelling of statistical data

Abstract

The availability of official statistics plays a fundamental role in our society. To have relevant, meaningful and accessible statistics is essential not only for all decision makers but also for all citizens who are affected by the policies. According to the Code of Practice for European statistics as regards dissemination, "European Statistics should be presented in a clear and understandable form, disseminated in a suitable and convenient manner, available and accessible on an impartial basis with supporting metadata and guidance", that is the principle of accessibility and clarity. In this view the National Institute of Statistics (Istat) proposed a new product, "*Noi Italia – 100 indicators to understand Italy*", containing a lot of indicators about the most important

thematic areas. The work is very important also in perspective of the celebrations for the 150th anniversary of Italian Unification, because it gives users the possibility of tracking various phenomena over time. *Noi Italia* represents an innovative product both from statistical and technological points of view. 120 statistical indicators have been calculated starting from basic data, coming from different sources and referring to 19 themes, related to economic, social, demographic and environmental fields. Such a set of indicators give users the possibility to understand the most important positive and negative aspects of Italy, comparing the national position with that of other European countries and highlighting regional differences in the Italian national context. *Noi Italia* is very innovative also from the technological point of view. A version as digital book has been released, through a Web application based on a GeoAnalytic Visualization tool, STATISTICS EXPLORER. It has been developed by the Swedish research center NcomVA, localized in Italian language and fitted to the purposes of *Noi Italia*. The tool takes full advantages of the latest trends and developments in the area of Web technologies and storytelling. Furthermore, a powerful and innovative data visualisation component (vislet eXplorer), based on widget technologies, offers a set of dynamic object enabling users to manage time series analysis, European comparisons, quick selection of territorial areas to which indicators are referred. Moreover, the online solution offers the possibility to link the graphical visualization of spatio-temporal data with free texts and share such a model with other users. The combination of dynamic graphs with interactive texts represents an effectiveness way to make sense to social and economic phenomena and explain them to the users. For all these reasons, it undoubtedly represents a meaningful step to turn data into knowledge. The main processes to produce the dynamic object (vislet) are: production of preliminary dataset, production of files in specific xml formats and integration of dynamic object (vislet) in a distributed Web environment. The Web site http://noi-italia.istat.it gives also the possibility to download tables and graphs. These objects are divided in three areas: graphs and tables related to European comparison; graphs and tables for Nuts2 level comparison within the Italian territory (together with maps related to the last available data); time series indicators related to the Nuts2 level.

Alessandra De Rose and Donatella Strangio, *University of Rome La Sapienza*

The Italians abroad after Unification. The case of emigration in Brazil through unexplored sources of data

Abstract

The Italians have been involved in the most important emigration process in modern history: during the century just after the Unification around 26 million people left the country. Many of them reached the American lands. The demographic literature on this phenomenon is very reach and quite well statistically documented (see Birindelli&Nobile 1995 for a quite recent review), and much have been written on the effects of migration abroad on the Italian population. However, still the economic consequences need to be further exploited (Sori 1979). In this paper, we concentrate on the migration flows to Brazil. The occasion for this study has been the twinning between the city of Latina and that of Farrouphilla, in the State of Rio Grande do Sul, which gave us the opportunity to gather unedited piece of data. We will read this information together with data from the "Archivio Centrale dello Stato" and the "Archivio Storico della Banca d'Italia" in order to evaluate the economic implication of the Italian migration in that region of Brazil, both from the side of Italy and from that of the State of Rio Grande du Sol (Santoro de Constantino 2002).

Adriano Decarli[1] and Ettore Marubini[2]
[1]*University of Milan* [2]*INT, Milan*

The development of Biometry and Medical Statistics in Italy: a stimulating pathway

Abstract

The two disciplines developed in Italy during the XX century. Although this development was strongly influenced by the experience of the disciplines in the anglo-saxon context, it presents some original aspects. This talk will highlight the contributions of a few relevant researchers that have marked the Italian statistical world with their point of view and specific know-how, characterizing the evolution of Biometry and Medical Statistics in our country.

Loredana Degaetano, *ISTAT*

The evolution of statistic information on agricultural labour force through the agricultural censuses from 1961 to 2010

Abstract

The farming work is a productive factor that contributes decisively to characterize the structural setting, performances and internal and external relations of the agricultural holdings. It's also clear that agriculture over the years has undergone a complex process of transformation and redefinition of its social and economic roles. From separate sector it has become part of a wider agri-food system, and, above all, it has changed from a protected sector to a competitive one in the new context of the EU market. In this context, the deepening and adaptation of statistical information to each agricultural census, to be captured in farm work as a structural characteristic of the agricultural holdings, arise from the fact that it is a topic of absolute economic importance, especially in an economic and territorial context that sees the holdings' universe advanced more and more to positions of entrepreneurship. In fact, attention is paid on the fact that at this stage of transformation, which also affected all other EU countries apart from Italy, the multifunctional role of agriculture is becoming more important, through the development of new business functions, laying emphasis on the figure of the holder and the manager, and to continuously seek new ways of deployment of workers able to perform and carry out closely agricultural activities. Having these preliminary considerations, the main purpose of this paper is a brief analysis on the trend of the collection of statistical information on the holdings' work in 6 Italian agricultural censuses (1961-2010). The aim is to show how the agricultural management has actually changed in terms of entrepreneurship supported by a sufficient level of agricultural expertise and, especially, to identify and quantify the phenomenon of the appeal by the agricultural holdings to other workforce than strictly family, with particular reference to immigrants (new EU Member States and non EU). The paper will illustrates the evolution from 1961 to 2010 occurred in the information of Section Labour Force, specifically referred to in the holding's questionnaire of each census, by agreement between Istat, as owner of the census, and local organizations and institutional bodies, in order to respond as much as possible to users' needs, and to provide national and local framework as comprehensive as possible of the changed agricultural working reality in Italy. Regarding to the latter, the questions relating to the Section Labour Force of the questionnaires adopted in the various editions of agricultural censuses will be compared

highlighting, for those from 1961 to 2010, the strengths and weaknesses in terms of coverage and comparison of information with similar ones immediately of the previous census.

Stefania Della Queva[1], Flavio Verrecchia[1], Patrizia Grossi[1] and Gian Carlo Blangiardo[2]
[1] *ISTAT,* [2] *University of Milan Bicocca*

Foreign Entrepreneurship: a New Pillar of the National Entrepreneurial Vocation vs the Latest Shaky Employment

Abstract
For nearly a century and a half, since the first official investigation on the structure of the Italian industry (1876), censuses have provided manufacturing establishments as unit of analysis and survey. Yet again, administrative sources are utilized in order to study production units. Today it seems crucial to design and test new information domains. In this context, *le travails*, seems to be very interesting, both for the importance of the issue and the recent availability of new administrative sources. The aim of this paper is to study the potential of an approach that considers workers as statistical units within the processes of transformation of administrative data in statistical information. On the one hand, a change of perspective on the Business Register – ISTAT ensures existence, location and economic activity of entrepreneurs; on the other hand, it allows the retrieval of registry information. The exercise, on the Latest *Shaky* Employment, highlights the applicability of methods and prototypal system of classifications. A particular subset of workers, at this stage, will be used, i.e. foreign origin entrepreneurs (*non* partnership).

Giuseppe Della Torre, *University of Siena*

The Italian financial system between 1861 and the recent past: a statistic reading

Abstract
This work aims at a statistic reading of the Italian financial evolution between 1861 and the recent past. There are lots of scientific works on this argument which are based on Raymond W. Goldsmith's financial indicators (integrated by some other authors such as Ross Levine). These indicators refer to the financial dimension of the economic system (*"financial interrrelations ratio",* FIR); the distinction between the

systems bank or market oriented; the incidence of banking system's financial assets (i.e. loans by the banks and by the issuing banks) in comparison with financial markets' assets (i.e. shares and bonds); the comparison between public and private debt; and finally the distinction of companies' debts between shares, bonds and bank's loans. The statistical series that my work proposes have both important analytic and interpretative aims. Together with the individuation of the age-old topic of the correlation between financial development and economic growth, the aim is that of analyzing if and at what degree the stages of Italian economic growth – where the innovation in economic structure was very important (i.e. railways, large technological systems, and so on) – were accompanied by forms of financial system structure "market oriented", with a high degree of securities placement directly to final investors. While, other stages, when economic growth became routine, were characterized by "bank oriented" financial structures.

Alain Desrosières, *INSEE, France*

Commensuration and probabilism: two kinds of controversies about statistics, four examples

Abstract

The dissemination of the statistical method met two kinds of controversies during the last two centuries. The nature of the disagreements and the criticisms made of statistics varied widely, depending on what aspect of statistics was emphasized. Depending on the context and period, the controversy about statistics concerned either only measurement, commensuration, quantification, and the use of numbers (criticism 1), or the stochastic style of reasoning: Bernoulli's urn model, the law of large numbers, probability, inferential statistics (criticism 2). To describe the disputes of the time, these two aspects of the rise of statistics have to be distinguished, as different protagonists were involved in the different controversies and each was couched in its own distinct rhetoric. Four domains are discussed : the sampling method, the use of the average man and the philosophical problem "determinism versus free will", the quantification of economics, the statistics in public health and medicine.

Eleonora Di Cristofaro, Paola Giordano, Maria Antonietta Liguori, Maria Grazia Magliocchi and Paola Miceli, *ISTAT*

The Sixth Agriculture Census 2010: from Survey to Provisional Data

Abstract

The need for promptly monitoring a large data amount requires the use of statistical and IT tools. For the 6th General Agricultural Census, Istat has adopted, for the first time, a Census Management System (SGR) which allows, among other things, also implementation and, then, table analysis with data collected by online or paper questionnaire. Specifically, it's possible to analyze trend and results of the survey at regional and/or subregional level. As concern survey trend, it's possible: i. to monitor the amount of agricultural holdings included in SGR; ii. to get reports on the status of processing the questionnaire; iii. to show information on units which have overcome the check phase. Moreover, SGR allows the implementation of summary tables on the collection progress results by detected, not detected and inexistent holdings. These tables will allow comparisons with other variables as: Regional Archives, Special Lists, Eligibility and Total Surface classes of the pre-census list. The main aim of the present study is tables' analysis and implementation of appropriate indicators that will allow the identification of criticality and thus the formulation of better management strategy. In this way, it will be possible: i. to identify areas and/or phases of the survey which could be critical; ii. to adopt corrective measures acting on each single operator of the network and/or on territorial criticality. Moreover, for spatial and/or temporal analyses, will be calculated some indicators useful for comparison, understanding and discussion of survey results. Finally, as regard tables for main variables collected for agricultural holdings, it will be possible to verify their importance related to land use and livestock consistency by each territorial area. This work will give a description of all the variables and indicators used, together with a detailed presentation of data analyses.

Luca Enriques and Giovanni Siciliano, *CONSOB*

The Stock Exchange in Italy: a Long Term Perspective

Abstract

The paper analyses the long term dynamics of the Italian stock market, using new historical time series on share indexes and quoted firms. The data base allows to characterise the evolution of the stock market, as

well as to evaluate the impact of the most important policy choices made during the XX century. Finally the paper, following an historical perspective, investigates the causes of the late development of the stock exchange.

Patrizia Falzetti and Roberto Ricci, *INVALSI, Frascati (Rome)*
Micro data archives in educational measurement

Abstract
During the last decade the National Evaluation Institute for the Educational System (INVALSI) has realized several student outcomes surveys on some key competences. The surveys results provide a great amount of data that can be used at several levels. INVALSI intends to contribute to the dissemination of micro data and make them available to the research community and stakeholders in order to strengthen and enlarge the knowledge about the educational system outcomes. In order to present reliable results, INVALSI uses a detection method to clean the data from students and teachers cheating. The real issue is the diffusion of anonymous micro data. During the last years a too strict interpretation of the privacy laws has limited several research opportunities. In this paper we illustrate how to handle individual data and find a balance between the limitation imposed by the law and the necessity to realize and promote research about the educational outcomes. The INVALSI statistics service has also developed a system, available to the scientific community, to get aggregated and micro data, including social, cultural and economic covariates, in full observance of the privacy law. Over the last years, in an effort to provide comparable and reliable data, the survey methodology has been improved and new instruments have been integrated. In fact, INVALSI share similar key methodologies with the major international educational assessment organizations, such as OECD (PISA) and IEA (TIMSS, PIRLS). With the aim to enlarge the knowledge about the most relevant changes of our educational system, INVALSI is working on the possibility of anchoring the measurement scales of different surveys and linking the outcomes of each student, in order to open a longitudinal research perspective.

Davide Fardelli[1] and Domenico de Vincenzo[2]
[1]*ISTAT* [2]*University of Cassino*

Spatial Analysis in agricultural census data management: the distance counts

Abstract

This work focus the relevance of Geographical Information System (GIS) as research tool in supporting decisions. We try to answer to question, if GIS is an old tool or if it represents a new way to read and interpret geographical and statistical data. Numeric cartography is beyond the spatial data displaying, in fact it is useful also for the interpretation of data. This peculiarity was present in "manual" thematic cartography too, but it became prevalent in GIS. Indeed, GIS is a fastest, integrated and composite data analysis tool. The paper will present a methodology to analyze the production specialization in agriculture. This methodology, called *distance counts* (Un win, 1982) belongs to the "point pattern analysis" and, precisely, it combines both distance and density into a useful analytic device for the spatial analysis. We are going to apply this method to the agriculture sector: it can equalize more municipalities having different size and it can create functional areas to the local scale where there are prevalent crops. Every prevalent crops can be associate to production specialization in the reference area. This study will be applied to Lazio with data of Census of Agriculture, relating to the utilization of soil (*land use*). In this way, we are using a statistic methodology applied to GIS (informative system), in order to identify probable choices to adopt.

Alessandra Federici and Daria Squillante, *ISTAT*

Woman and victimization in the ISTAT Citizens' Safety Surveys: a gender story

Abstract

The objective and subjective approaches to *safety* often are considered antithetic: the fear of crime and the victimization risk; safety perception and the environmental decay; victims' characteristics and the criminality level. Nevertheless, focusing attention just on subjective or objective conceptual categories prevent a more wide "knowledge space" and an approach which consider and interlace many factors, analyzing and understanding connections and correlations. Moreover, a more comprehensive and complex approach also allows to over going a stereotyped approach to *gender safety*: in the "safety question", in fact,

women are always considered as potential victims, since their traditional role of weak, fragile and fearful subjects. But in the Italian actuality and context that passive position and condition is always true? A trend analysis of the three ISTAT waves on *Citizens' Safety Survey* (1997-'98, 2002 e 2008-'09) combines in a gender (feminine) perspective the subjective (being) and objective (having) aspects of safety: time spent not at home; daily life habits; the relationship with law enforcement; victimization experiences; diseases and blackmails at work: just some example of analysis to question Italian women as far as their (perceived) safety is concerned.

Silvia Figini, *University of Pavia*
Bayesian Extreme Value Analysis of operational risk data

Abstract
In this contribution we focus on operational risk data. We propose a Bayesian extension for extreme value models (EVT) using Markov Chain Monte Carlo algorithms. We investigate, with real examples, how Bayesian analysis can be used to estimate the parameters of EVT models, for the case where we have no prior knowledge at all and the case where we have prior knowledge in the form of expert opinion. In addition, Bayesian analysis provides a framework for the incorporation of information from external data into a loss model based on internal data; this is again illustrated using the data at hand. The results achieved underline that our proposal performs better with respect to classical EVT models in terms of value at risk and, consequently, capital at risk required to cover expected and unexpected losses.

Romina Filippini, Rosa Maria Lipsi, Giuseppina Ruocco, Michele Antonio Salvatore, Valeria Tomeo and Simona Toti, *ISTAT*
A multivariate analysis to compare the AGEA source and the 6th Agricultural census data: A case study

Abstract
The 6th Agricultural census was supported by a census list, derived from the integration of different administrative sources gathering information on the agricultural holdings. The editing and imputation processes will be supported by the available information from administrative sources in order to improve quality of final results. Particularly, for some specific variables (UUA: Utilised Agricultural Area; TA: Total Area of the

holding; Vineyard and Olive plantation areas), the comparison between census data and the administrative register managed by AGEA (Italian Paying Agency for Agriculture) is very important to evaluate census accuracy and consistency. The paper will describe preliminary results of the linkage between the census and the above mentioned source. Specifically, the main purpose is to investigate potential differences among the information derived from the two sources by applying a multivariate statistical analysis.

Barbara Fiocco and Vincenzo Lo Moro, *ISTAT*
"Il libro della Patria": the Italian Statistical Yearbook

Abstract
The Italian Yearbook is the most important and oldest publication of official statistics; it is the main "general annual publication" for the specific task to collect statistical data of heterogeneous topics such as to describe an overview representing the dynamics of demographic, social and economic life of the nation. In this paper, the analysis of the Yearbook, from the first volume (1878), allows to reconstruct not only the history of official statistics, but also, to some extent, the history of the events in the country. The method used is the "content analysis", carried out through two tests, one for the detection of the formal characteristics and structural content of the volumes and the other for the detection of characteristics of presentations. The analysis allows to understand successes, difficulties, shifts in focus, changing styles, new targets ... in a nutshell, as the official statistics has dealt with the historical events.

Roberto Fontana, *Politechnical University of Turin*
Computational aspects in orthogonal fractional factorial design generation

Abstract
Generation of orthogonal fractional factorial designs (OFFDs) is an important and extensively studied subject in applied statistics. In this paper we analyse computational methods that originate by the joint use of polynomial counting functions and algebraic strata.

Enrico Foscolo, Alessandra Luati, Alessandro Lubisco and Lucia Pasquini, *University of Bologna*

Models for repeat legal abortions

Abstract

This paper is concerned with the phenomenon of repeat legal abortion in Italy, during the last thirty years. Based on the Italian population of women that have taken from one to four voluntary legal abortions, we specify a stochastic model aimed at capturing the recidivism of the phenomenon. Specifically, we fit an integer valued Poisson autoregression model to the number of women that have had repeat abortions. The model is allowed to include covariates related to the socio-economic status of these women, such as, among the others, the education and the marital status.

Luisa Franconi, *ISTAT*

Experiences of microdata access at Istat and an overview of potential strategies

Abstract

Access to detailed integrated microdata coupled with a system of structured and standardised metadata is acknowledged to be a significant challenge faced by National Statistical Institutes (NSIs) worldwide. Recent developments in some countries have led to improved access, however, although considerable networking and information sharing is taking place amongst NSIs, progress in this domain is still not homogeneous. The final aim is to improve the relevance of statistical frameworks and standards, to harmonise methodologies and to share and connect infrastructures. The paper addresses the broad strategies adopted by statistical agencies to respond to the challenges of microdata access. The paper also discusses some of the specific improvements underway or under consideration at Istat. Potentials and limitations of the current framework are examined together with an analysis of costs and benefits both for users and data producers. Finally, the paper provides an overview of the projects currently carried out at international level in the field of access to microdata and the opportunities they will bring for national users.

Francesca Gallo and Pietro Scalisi, *ISTAT*

Definitional aspects and classification criteria of occupations in the 150 years of the Italian Republic

Abstract

Data collection on occupations performed by individuals has always caused difficulties since the first population census in 1861. The nature of the individual answers, which are not usually very informative of the actual work contents, are such to require the definition of a structure able to properly classify them. The aim of the paper is to present the development of the classification logic and structure starting from the first population census of 1861 to the forthcoming 2011 census.

Orietta Gargano and Tiziana Clary, *ISTAT*

The "administrative" territory starting from the Unification of Italy till nowadays

Abstract

For the first time in Istat was carried out a systematic and careful work of a full recovery of historical sources and documents of administrative acts from which follows the history of the administrative units (municipalities, provinces and regions) starting from the Unification of Italy. Data were collected and organized into an information system that provides integrated management and availability on-line.

Evolution of the territory. At the time of the Constitution of the Kingdom of Italy the territory was equal to that of current 59 provinces and 15 regions.. Municipalities were 7721. Total estimated area was 256.240 sq km. The framework has evolved in different historical periods. In 1866 the provinces were 68 to increase by 1 unit in 1870 with the annexation of Rome. In 1920 it was annexed the province of Trento and were set up 3 new provinces. In 1924, the provinces of Zara, Istria and Carnaro were aggregated and Italy reached its greatest territorial extent. This definitely will stabilize in 1947 following the sale agreed in the Treaty of Paris. Since then, national borders are consolidated and will only modify the internal composition of administrative units, in terms of number of provinces and municipalities.

The administrative changes. Over time, from an administrative standpoint, there has been a rather lively dynamics involved: the existence of the municipalities; the establishment of new municipalities, new provinces and new regions; the name changes that covers all the various types of administrative entities; changes in territorial districts of

municipalities (acquisition / disposal of portions of land). All occurred and recorded changes are bound to the existence of a formal act of legislation that establishes and identifies the beginning data. The variations are six different types: CS constitutions and / or acquisitions for the national territory; ES deletions; CE transfers and AQ acquisitions of land; AP variation in the composition of the provinces; CD name changes. The distribution of changes by type, year and territory has spatial trends and it's not uniform either in time or territory. The density is centered in the twenties, particularly in the north-east and with respect to the change of name. The phenomenon show, however, the downward trend after the war and in recent years we may see a degree of stability both in the distribution of administrative units and in their territorial composition.

Future prospects. The availability of information in an on-line system will be of great use to researchers and practitioners. It will be possible to know at every instant in time the exact consistency of administrative units and for each of them the 'n' changes made over time.

Last step, but not least, is the pursuit of one of the goals not yet realized: the unique statistical encoding of all administrative units, with reference to the relevant territory at the time of the change.

Orietta Gargano and Sandro Cruciani, *ISTAT*

The historical-statistical information system on administrative-territorial units of Italy since 1861 (SISTAT)

Abstract

1.The information content

SISTAT is the information system that certifies the territorial classifications on the basis of any change concerning the administrative-territorial units (UA) of Italy: municipalities, provinces and regions. The system allows the reconstruction of the administrative and territorial changes which have affected Italian territory starting from the constitution of the kingdom of Italy (17/03/1861). SISTAT is powered by the processing of administrative measures and contains a rich array of metadata, including the legislative acts which define the relevant changes. Documented changes are: the constitution of municipalities or provinces, or annexation by foreign state; suppression of municipalities or provinces, or transfer to a foreign state; change in territorial district (acquisition / disposal of portions of land, or both); changes of name (in the municipalities or provinces); change of membership (of a municipality to the province or region); change in composition of

provinces (acquisition / disposal of municipalities) and regions (acquisition / disposal of provinces). SISTAT then collects, in an integrated system, information on legislative sources and the characteristics of territorial administrations, thus providing to the research community and governments an important tool for analysis and evaluation. The system is able to provide, for each territorial-administrative unit, an integrated framework of the following:

1. Nomenclature and statistical coding of administrative units;
2. Type of change occurred;
3. Date and measure establishing a change;
4. Date and document of measure publication;
5. Starting date of administrative validity of the measure;
6. Digital copies in PDF format for legal acts concerning the administrative changes;
7. Surface data and resident population at census dates (legal population);

2.System functions

SISTAT allows data search through a series of functions that allow the user to explore the history of UA, documented trough the different possible changes occurred. These searches may be imposed constraints taking into account both the temporal and spatial criteria. As for as the choice of territory is concerned, it's possible to follow two ways:

a- the Hierarchical Search allows the user to query the system from top to bottom moving deeply towards the sub-area of administrative competence. Individual territories are ranked from largest to smallest: geographical areas, regions, provinces and municipalities.

b- the Free Search allows the user to query directly the UA of his own interest (municipalities; municipalities of provinces or regions; provinces; provinces of regions).

As for as the choice of time is concerned, user may set a period of interest (start-end date) or a single date. The default end date is the current date. All extracted data at each level may be downloaded in user files. Starting from next June, SISTAT will be accessible on the web.

Andrea Gavosto, *Fondazione/Foundation "Giovanni Agnelli"*

La valutazione delle scuole: un esperimento per l'Italia

Abstract

1. perché la valutazione indipendente del sistema scolastico è importante
2. confronto fra valutazione delle scuole e dei singoli insegnanti

3. la proposta della Fondazione Agnelli, basata su autovalutazione, ispezioni, calcolo del valore aggiunto e prosecuzione all'Università o nel mercato del lavoro
4. la sperimentazione condotta dal Miur

Rosa Giaimo, Giovanni Luca Lo Magno, *University of Palermo*

A distributional approach for measuring wage discrimination and occupational discrimination separately

Abstract

Numerous statistical methodologies regarding the study of discrimination are based on the well-known Blinder-Oaxaca (1973) decomposition. This divides the wage differential between men and women into one part, which can be explained by differences in individual characteristics, and another part, which is interpreted as discrimination. This decomposition ignores any distributional issues in evaluating discrimination, thus permitting, undesirably, compensation between positively and negatively discriminated women. Jenkins (1994) has criticized this aspect, instead preferring a distributional approach. Del Río et al. (2010), using a distributional approach, which hinges on the deprivational aspect of discrimination, adapts the Foster-Greer-Thorbecke (1984) class of poverty indices to the study of discrimination. Studies adopting the distributional approach pay little attention to the issue of the separate measuring of wage discrimination and occupational discrimination. Instead, our Paper uses the Foster-Greer-Thorbecke indices for measuring wage discrimination and occupational discrimination separately. Similar to the technique employed in the Brown-Moon-Zoloth decomposition (1980), we have thus used a multinomial model to estimate the theoretical distribution of women in occupation, in the absence of occupational discrimination.

Adriano Giannola, Antonio Lopes, Alberto Zazzaro, *University of Naples*

Bank deposits and loans in the Italian regions: a long term view

Abstract

We study the trends of bank deposits and loans in the Italian regions exploiting statistics since the 1940s. We compare the dynamics of bank aggregates across regions and assess their relation with the changes in real variables.

Massimo Greco, Cristiana Conti, Loredana De Gaetano, Daniela De Francesco, Daniela Fusco, Silvia Lombardi, Valerio Moretti, Federico Mortara, Giulia Mottura

Social media channels as drivers for the 6th Agricultural Census change

Abstract

The presence of National Statistics Institutes on Web 2.0 is a worldwide practice. Social media channels favor interactive and prompt communication of statistical information. Census surveys are featured by critical unforeseeable phases in ex-ante planning. On-line platform helps the effective management of data collection difficulties. In this way, communication dynamic becomes more transparent and favors the correct functioning of census operative phases on the basis of direct contact among operators, at all levels. The aim of this paper is twofold. Firstly, main changes due to the introduction of the use of Facebook in the Sixth Agriculture Census will be outlined. Users' experiences collected during the first phase of the survey are presented in a text analysis of contents of Census Facebook page. Secondly, an international benchmarking exercise will detect best practices implemented by National Statistics Institutes in the social media channels use for census surveys.

Leonardo Grilli, *University of Florence*

Specification issues in latent growth models with multiple indicators

Abstract

Latent Growth Curve (LGC) models aim at modelling change across time. Traditional LGC models are based on a single observed indicator, while here we focus on a multivariate extension, namely a LGC model with multiple indicators for modelling change across time of a latent factor which is measured by multiple items at different occasions. This model is also known as 'second-order LGC' or 'curve-of-factors'. When fitting LGC models with multiple indicators we need to account for both the interrelationships of the observed variables (indicators) within each occasion and the interrelationships of the same indicator across occasions in order to measure change in the latent variable (factor) across time. Here we consider a widely used form: the *structural model* specifies that the latent variable grows according to a random slope linear model, while the *measurement model* specifies that at each occasion the latent variable is measured by a conventional factor model

with time-invariant loadings. The specification of a multiple-indicator LGC model involves several interrelated choices. In particular, the features of the structural model, such as the functional form of the growth, are linked to the features of the measurement model, such as the correlation structure across time of the measurement errors. In this work we investigate the empirical implications of different specification strategies through an application to the change of student satisfaction about university courses. Specifically, we analyse student ratings collected in four academic years over the period 2005-2008, concerning 380 courses of the faculty of Economics of the University of Florence.

Renato Guseo, *University of Padova*
Diffusion of technological innovations: dynamic and static equilibria

Abstract
The catenary function has a well-known role in determining the shape of chains and cables supported at their ends under the force of gravity. This enables design using a specific static equilibrium. Its symmetric version, the catenary arch, allows the construction of bridges and arches exploiting the dual equilibrium property under uniform compression. In this paper we emphasise a further connection with well-known biological growth models and the related diffusion of innovation paradigms, e.g., logistic and Bass functions, that determine self-sustaining evolutionary growth dynamics in naturalistic and socio-economic contexts.

Riccardo Innocenti
La statistica ufficiale nei Comuni fra valutazione dei servizi e conoscenza dei territori

Abstract
La nuova dimensione della statistica ufficiale nei municipi si lega principalmente alla gestione degli archivi amministrativi disponibili, ma tende anche a svilupparsi, in un'ottica di politica della qualità, nella valutazione delle prestazioni e del gradimento dei servizi erogati ai cittadini. La contrazione delle risorse disponibili, la crisi della credibilità della statistica ufficiale, la ripresa dei ruoli gestionali da parte del personale politico rappresentano ostacoli allo sviluppo della funzione statistica rinnovata. La focalizzazione sulla dimensione finanziaria mette in secondo piano la dimensione della qualità, aprendo la strada alla

diffusione di informazioni statistiche surrogate, prive di requisiti di affidabilità, confrontabilità e coerenza. Il nuovo codice delle statistiche ufficiali italiane troverà nei comuni il vero banco di prova della sua efficacia e pervasività nella pubblica amministrazione italiana.

Francesca Lariccia[1], Eleonora Mussino[1], Antonella Pinnelli[1], Sabrina Prati[2], Francesca Rinesi[2], Salvatore Strozza[3]
[1]University of Rome La Sapienza [2]ISTAT [3]University of Naples

Record Linkage Between Italian Administrative Sources and Sample Surveys - How Much Information We Can Get? Three case studies

Abstract
The aim of Record Linkage is to join information referred to the same individual but stored in multiple datasets. Similarly to other data integration techniques, record linkage let a better exploitation of existing data by reducing both the respondent burden and the costs associated with the implementation of a new survey. Record Linkage techniques are commonly used in several disciplines (such as biology, economics, medical research, …) and performed by combining information gathered in two or more datasets that refer to the entire population or by linking survey data with an exhaustive source. At the same time multiple goals can be achieved by using data integration techniques. The most common of those are: duplicate record detection, building longitudinal datasets, validate new variables, study the relationship between variables collected in different datasets, estimate the unknown size of a population. Finally, both deterministic and probabilistic approach can be used. The present paper seek to highlight this complexity by illustrating the goals and the main results of three different case studies. All of these studies share: (1) the field of application (that is demography), (2) the originality of the studies since none of the corresponding research questions could be answered by using available (non-linked) data (3) one of the data source used to perform the linkage procedures. The latter is the Survey on Live Births: the individual form used to register every live birth delivered by the Resident Population includes several information on births (newborn's name and surname, sex, date and place of birth, and citizenship), parents (name, surname, date of birth, citizenship, and marital status) and the main details of the head of the household. Case study A: The aim of this research was to investigate the relationship between expected and actual fertility at individual level in the short run in Italy. By using deterministic record linkage procedures an ad-hoc

longitudinal dataset was built and this makes possible to answer to the research question posed. The data sources used are the Birth Sample Survey (run in 2003) and the Survey on Live Births (we considered the live births registered during the period 2003-2008). Case study B: the object of this work was to determine the relationship between socio-demographic variables and medical and health aspects related to pregnancy and delivery. In order to do so the linkage between three different data sources was needed. These are: the Certificates of Healthcare at Delivery (CeDAP), the Birth Sample Survey and the Survey on Live Births. In addition, the Record Linkage allowed us to control the quality of the information collected with the CeDAP and validate and correct selected variables. Case study C: the purpose of this research was to study the reproductive behavior of foreigners women who live in Italy at micro level using a longitudinal approach. In order to do so the linkage between the Survey on Live Births and the Register of Residence Permits for the period 2002-2006 had been performed. Note that in this work probabilistic record linkage techniques were used.

Silvia Lombardi[1], Stefania Della Queva[1], Davide Fardelli[1], Franco Lorenzini[1] and Fabio Sforzi[2], *ISTAT* [1] and *University of Parma* [2]

Chinese Entrepreneurship in Context: Sector Specialization, Geographical Agglomeration and their Effects on Italian Local Production Systems

Abstract

Chinese migration flow represents a relatively new phenomenon in Italy. Its entrepreneurial nature is reflected in massive flows Chinese businessman employed both in manufacturing and commercial activities, with a dense concentration in correspondence of some industrial districts. The aim of the paper is to shed some light on current Chinese distribution and specialization of economic activities across Italian regions and localities, in order to test interpretative research hypothesis on Chinese entrepreneurship models and identify agglomeration forces underlying the emergence of so-called Chinese ethnic businesses. Some reflections on the manufacturing and commercial attitude of Chinese entrepreneurship is also considered. The utilization of native-Chinese entrepreneurs as unit of analysis represents an innovative methodological contribution based on ASIA-ISTAT archives. The exercise of explorative analysis based on data processing and spatial analysis will finally highlight business migration patterns, which represent new socio-economic challenges for Italian local production systems.

Silvia Lombardi, Valeria Tomeo, *ISTAT*

Statistical issues in the Life Sciences industry: definition, data sources and industrial classifications

Abstract

The Life Sciences industry has a composite industrial structure, which comprises a set of high technology-driven sub-sectors interlinked among each other. Within international scientific community, it is widely acknowledged that biotechnology, pharmaceutical and biomedical industries (medical devices in particular) compose the Life Sciences industry. Despite the relevance that Life Sciences industry has acquired for its economic impact over the last decades, the lack of an official and shared statistical definition of Life Sciences does not allow for the provision of harmonized and aligned statistics at the international level. The primary issue is the difficulty to construct homogeneous databases on Life Sciences across different countries by referring to available standard classifications on activities (ISIC, NACE) and products (CPC,CPA) and their different versions. The aim of the paper is to provide a complete review at the international level of statistical data sources in the Life Sciences, and highlight existing activities and products classifications applied for its statistical identification. Distortions and inconsistencies will be considered as starting points for a broader reflection on prospects for Life Sciences definition and classification.

Franco Lorenzini[1], Fabio Sforzi[2] and Flavio Verrecchia[1], *ISTAT* [1] and *University of Parma* [2]

The alien character of local economies: micro-entrepreneurship inside the Origin-Destination matrix

Abstract

Since the late 1970s, scholars have paid increasingly attention to micro-entrepreneurship in Italy, together with the acknowledgement of Industrial Districts as a primary theoretic and empirical approach to local industrial development. Industrial Districts approach has explained the dependence of micro-entrepreneurship on industrial atmosphere of a place. However, little attention has been paid on the origin of micro-entrepreneurs, and to what extent they are natives or foreigners, who have migrated in the place and have set up their economic activities. Data collected in ASIA-ISTAT archives overcome such lack of information. The aim of this paper is to investigate the structure of local

micro-entrepreneurship in order to analyse (a) the extent of its natives/migrants entrepreneurs composition, and (b) which Italian regions and foreign countries such micro-entrepreneurs come from. The study uses an origin-destination matrix, which connects place of birth of micro-entrepreneurs and the place of localization of their firms. Places are defined on the basis of ISTAT Local Labour Systems.

Massimo Lori[1], Domenica Fioredistella Iezzi[2], Franco Lorenzini[1], Manuela Nicosia[1] and Sabrina Stoppiello[1]
[1]*ISTAT,* [2]*University of Rome Tor Vergata*

An application of Text Mining Technique for the census of nonprofit institutions

Abstract
The National Institutes of Statistics are increasing the use of administrative data routinely collected by organizations as part of their business or operational activities. As manner of fact, this huge amount of data is relevant whether transformed in statistics in order to build information systems or to use them as additional information during the whole statistical survey. Within the Italian nonprofit institutions Census, text data from the Italian Revenue Agency are being used in order to create the list. The paper explores the opportunity of using the text mining technique on the available data to build a classification of nonprofit organizations, which will also help to distinguish them from firms and public institutions. The paper illustrates the application of text mining during the whole process and highlights advantages and disadvantages of the technique.

Andrea Mancini, *ISTAT*

New strategies for the next Italian census: towards the use of a Multiple-Time Point Approach

Abstract
The main goal of the traditional census strategy so far adopted in Italy is the determination of the "legal" population. At the same time the census is instrumental to updating the municipal population registers, by writing off the records of those individuals who no longer live within municipal borders and registering those people who are long-term residents of the municipality but have not yet been added to the register. More integrated use of administrative data together with sampling strategies has been

planned for the next census round in order to improve field organization, quality and timeliness. Against the background of the main innovations implemented for the Italian 2011 Census, this paper aims to illustrate a proposal for a more radical long-term reform of the Italian Population Census which foresees a migration from the traditional single-time point enumeration-based approach to a Multiple-Time Point census based on population registers.

Luca Mancini, Marco Fortini, Luigi Marcone, Francesco Borrelli and Alessandra Ronconi, *ISTAT*

Assessing the effectiveness of administrative registers in managing under-coverage errors in a population census: evidence from the 2009 Italian Census pilot survey

Abstract

The 15th Italian Population Census to be held in October 2011 will be officially assisted for the first time in history by municipal population registers (*Liste Anagrafiche Comunali delle Famiglie e delle Convivenze* or LAC). Within the new census strategy, the use of auxiliary administrative registers (*Liste Integrative da Fonti Ausiliarie* or LIFA) to guide the post-enumeration field search of individuals not enlisted in the LAC of municipalities with more than 20,000 inhabitants is regarded as an important asset. Amidst these expectations, the purpose of this paper is to gauge the real potential of the LIFA – which include, inter alia, the National Tax Register (*Anagrafe Tributaria*) and the Residence Permits (*Permessi di Soggiorno*) – in fulfilling the task they are intended for. The analysis is relevant to inform the current internal debate at the Italian National Institute of Statistics on the effective gains from using the LIFA as well as on the criteria by which they should be compiled. The test is carried out by solving a record linkage (RL) problem between records from different data sources. In particular, individual records from a sample of municipalities which took part in the 2009 Census Pilot Survey are linked to corresponding records from the *Anagrafe Tributaria* and *Permessi di Soggiorno* using both deterministic and probabilistic RL models. Although there are significant differences between municipalities in the percentage of linkages, the preliminary results are encouraging and show that the LIFA could provide reliable guidance to locate some of the individuals which have been missed by the mail-out of census questionnaires. In line with previous studies, the findings also show that the LIFA will be particularly helpful in targeting the search to those individuals who are more likely to be missed in a

census, such as foreigners and the young. Finally, the analysis provides clear evidence that the LIFA cannot be used in isolation and need to be combined with other instruments in order to thoroughly tackle under-coverage errors.

Hans Manner[1], Carlos Almeida[2], Claudia Czado[2]
[1]*University of Colonia* [2]*Technical University of Munich*
Modelling time varying dependence using D-Vine SCAR models

Abstract
We consider the problem of modelling the dependence of large dimensional time series data. We build high dimensional time-varying copula models by combining pair-copula constructions (PCC) for the construction of flexible copulas with stochastic autoregressive copula (SCAR) models to capture dependence that changes over time. We show how the estimation of this highly complex model can be broken down into the estimation of a sequence of bivariate SCAR models, which can be achieved by using the method of simulated maximum likelihood. Further, by restricting the conditional dependence parameter on higher cascades of the PCC to be constant, we can greatly reduce the number of parameters to be estimated without losing much flexibility. We study the performance of our estimation method by a large scale Monte Carlo simulation. An application to a large dataset of stock returns illustrates the usefulness of the proposed model and compares it to the dynamic conditional correlation model.

Donata Marasini, *University of Milan "Bicocca"*
A look to Statistics from 1861 to 1981

Abstract
This paper aims to outline the development of Statistics from 1861 to 1981 with respect to its contents. The paper pays particular attention to some statistical topics which have been covered by basic introductory courses in the Italian Universities since the beginning of the Italian unification process. The study is limited to the 120-year period mentioned above as from the 80s Statistics has passed through a period of drastic change that deserves a separate discussion in itself. The review takes as its starting point the well-known book "Filosofia della Statistica" of Melchiorre Gioja. This volume was published 35 years before Italian unification but it already contains the fundamental topics

of exploratory and inductive Statistics. These topics give the opportunity to mention a few Italian statisticians who are considered the founders, although many others Italian scholars over time have contributed substantially to the development of this discipline. In particular, the attention is focused on four statisticians: Corrado Gini, well-known for its modern insights; Marcello Boldrini, a man of great culture, also in the epistemological field; Bruno de Finetti, founder of subjective school and Bayesian reasoning; Giuseppe Pompilj, precursor of random variables and sampling theories. After considering several reference books until the mid'90s, the paper browses the indexes of three well-known Italian handbooks that, although published in the 80s, deal with topics covered in some basic teachings of exploratory Statistics, Statistical inference and Sampling theory from finite population.

Donata Marasini and Piero Quatto, *University of Milan "Bicocca"*
A family of indexes for teaching evaluation. Experiences in Italian Universities

Abstract
In order to analyze the student ratings of university teaching, several indexes summarize the percentages of positive and negative responses in a single numerical value. Focusing on linear functions of response percentage, the paper studies some interesting families of indexes for the measurement of student satisfaction. Special attention is paid to relationships between these families and a particular family that arises in a natural way.

Bianca Maria Martelli[1], Giancarlo Bruno[1], Paola Maddalena Chiodini[2], Giancarlo Manzi[3] and Flavio Verrecchia[1]
[1]ISTAT, [2]University of Milan "Bicocca" [3]University of Milan
Fifty Years of Italian Sampling and Economic Cycle History witnessed by the Business Confidence Survey on Manufacturing Sector

Abstract
The globalization of economy and society requires an increasing demand of statistical information. Unification political processes – such as the one of Italy – and the establishment of international bodies - e.g. UN, UE, etc. - are among the events which have had a major impact on the increasing offer of statistics. In this paper the history of the Business

Confidence Survey on manufacturing sector is presented starting from the preliminary European project for harmonised statistics launched in the late fifties of the last century. Survey features are presented, focusing on the qualitative nature of the information collected, together with the main statistical synthesis obtained from the survey, the so-called *confidence indicator*. The increase of statistical accuracy in the sampling scheme and in the statistical techniques adopted to disseminate survey results is recalled, from the initial purposive sample and controls up to the present state of the art. Particular attention is given to the relatively recent role of the administrative archives used both as universe basis and inference control of sampling surveys. Emphasis is also given to the increasing use of IT and computer simulation in assessing the validity of sampling estimates. The crucial role of cyclical analysis is also stressed with regard to two aspects: (i) confidence has not a corresponding variable in the economic system - the survey validation can only be performed by verifying the performances of confidence in comparison with correlated variables (i.e. industrial production, GDP); (ii) confidence showed to have forecasting capability to the economic system.

Mariagiulia Matteucci and Marilena Pillati, *University of Bologna*

The Unity of Italy from the point of view of student performances: evidences from PISA 2009

Abstract

This paper investigates Italian student performances based on the 2009 edition of the Programme for International Student Assessment (PISA), a survey conducted by OECD in order to assess skills of 15-year-olds in schools with respect to reading, mathematical and scientific literacy. In particular, student outcomes are compared among different Italian regions, taking into account socio-economic background and school membership of students. The results show that, despite the existence of a unified educational system in Italy, regional differences are evident.

Matteo Mazziotta, Antonella Bernardini, Rosario Romeo and Lorenzo Soriani, *ISTAT*

The developments for the quality evaluation of the Italian agricultural censuses

Abstract

The six editions of the Italian Agriculture Census have ever photographed a reality of the country in constant motion. The Census methods have changed a lot during 60 years as well as methodologies for post-census surveys aimed at assessing the quality of the Census itself. In all the editions (from 1960 to 2010), Istat has certified the quality of the Census through the conduct of one or more post-census surveys that could measure the various distortions due to non-sampling error. The past experiences were so relevant that, for the Census 2010, the two major quality surveys that have ever been made in Agriculture are available for starting interviews.

1) The aim of the reinterview survey is to estimate the measurement error and its main components in relation to certain important variables selected by the census questionnaire. The survey, carried out on a sample of about 50,000 farms already recognized at the Census, is based on a reinterview performed with technical phone (CATI). The 27 variables selected by the Census questionnaire are: i) major crops, ii) the consistency of the main cattle-breeding, iii) family and other personnel employed in the farm in the year 2009-2010. The reinterview included about 50 questions, 27 of which involving reconciliation as part of the reinterview process.

2) The aim of the coverage survey is to estimate the number of farms actually exist in the reference time period of the Census (October 24, 2010) and the coverage rate defined as the ratio between the number of farms carried out in Census and the number of farms that actually exist. The coverage survey is based on a areal sample involving about 1500 cadastral maps of the land registers. The detection technique requires that the interviewer, from information on the owner of land parcels, discovers the farm and the conductor that are on sampled cadastral map.

The reference territory domains (for the 2 post Census surveys) are the whole national territory, the 5 geographic divisions, the 21 regions; furthermore, in order to estimate parameters at the provincial level small area techniques will be adopted. Finally, the aim of this paper is to analyze and to compare the different methods of the post Census quality surveys carried out during the 60-year history of the Italian Agriculture Census with a focus on the last experiences.

Matteo Mazziotta and Adriano Pareto, *ISTAT*

Non-compensatory aggregation of social indicators: an icon representation

Abstract

Composite indices for comparing country performance with respect to multi-dimensional phenomena, such as development, poverty, quality of life, etc., are increasingly recognized as a useful tool in policy and public communication. Considerable attention has been devoted in recent years to the fundamental issue of compensability among the components of the index, and more and more often a non-compensatory approach has been adopted (e.g. the 'new' Human Development Index calculated by UNDP in 2010 is given by a geometric mean). In this paper, we consider a non-compensatory composite index, denoted as MPI (Mazziotta-Pareto Index) and propose an original graphical method, called "Traveller Icon" plot, for visualizing the index value for a set of statistical units. The MPI transforms the individual indicators in standardized variables and summarizes the data using an arithmetic mean adjusted by a 'penalty' coefficient related to the 'horizontal variability' of each unit. The basic idea of "Traveller Icon" plots is to represent each unit as a particular graphical object, a 'stickman with a sack', where the value of the arithmetic mean of the standardized values is assigned to the dimension of the 'stickman' and the value of the 'penalty' is assigned to the dimension of the 'sack'. The assignment is such that the overall appearance of the object changes as a function of the MPI values. Examining such icons may help to discover interactions between 'mean effect' and 'penalty effect' and identify specific clusters of units (e.g. units with high values of 'penalty' are represented by 'stickmen with a large sack', whereas units with low values are represented by 'stickmen with a small sack').

Matteo Mazziotta, Adriano Pareto, Valentina Talucci. *ISTAT*

Measuring social inequality in Europe from a multidimensional point of view

Abstract

The distribution of income has always played a central role in the measurement of social inequality, in fact from the studies of Pareto the phenomenon has been considered only one-dimensional. The aim of this work is to define and to measure a complex phenomenon like social inequality, both from a theoretical point of view and from a statistical

point of view. The approach is interdisciplinary: it is considered: a) the socio-economic theory, in order to find precursory concepts from the classical studies; b) methodological aspects, in order to define a precise model of empirical research; c) statistical measures in order to synthesize the phenomenon. The issues raised are different; first of all, the difficulty of arriving at a shared definition of social inequality but also building a solid and consistent empirical model with the theories mentioned. Regarding the theories, we have considered some classic and modern concepts on the study of the poverty and social exclusion. Besides, we have considered the phenomenon both in an economic key and in social aspects of family networks, employment, health and welfare. The problem is to redistribute fairly a lot of "things": income, resources, environment, education, social welfare services, health conditions etc. The most important problem is the identification of portions of population living in conditions not fair in relation to the "things" mentioned. Certainly one of the keywords for the study of these problems is the multidimensionality, as differentiation and integration of the phenomena investigated. This work is based on the material deprivations theory related to primary goods (Theory of Justice - Rawls, 2005) and Theory equality of basic capabilities (Sen, 1992). This paper wants both individuating a set of indicators able to represent social inequality (in a multidimensional point of view), and applying some composite indicators in order to implement ranking and to design a European geographic equity. The results obtained from the measurement phenomenon, with different methodologies, allow understanding the effectiveness of the indicators chosen and than the consistency with the theory asserted. The innovative contribution presented in this paper is both the selection of the variables like proxies of the social inequality and the choice of the composite indices that represent better the phenomenon. The domain is the Europe of 27 member countries. It is a secondary analysis of data in which the source is the Eurostat database where the set of indicators is standardized and harmonized at European level for the study of the “social and living conditions”. There is a special emphasis on the strategies of synthesis of these indicators, since the aim is to compare different models of aggregation (innovative vs. classical composite indicators) in order to verify the consistency of results and the validity of the indicators chosen. Besides, the aim is both providing some keys of interpretation of the phenomenon and finding some statistical tools as consistent as possible with the measurement of the social inequality.

Letizia Mencarini, *University of Turin*

The stalled revolution of Italian women, i.e. demographic behaviour between gender and generation

Abstract

Adopting a long term perspective there is no doubt by most objective measures, that Italian women's lives – as elsewhere in developed countries – have improved enormously. The expansion in women's opportunities through individual rights, health, education, the job market and so on, have certainly increased their welfare. Nevertheless, compared to other countries, one indicator stands out: the global gender gap places Italy at 74th position (2010), behind Romania and followed only by Malta, Greece and Albania. On the top of the list we find the Nordic countries. What is noticeable is that Italy has in fact lost ground over the last decade (it was ranked 72th only two years ago). This is because other countries – culturally similarly to Italy such as Spain – the participation of women in the job market and public life more generally, has increased steadily. The current situation of Italian women is peculiar in the European landscape not only for its low fertility and low job market participation rate, but also for the lack of any substantial change over the last decade. Several authors (e.g. Reher, Dalla Zuanna, Micheli) have argued that the Southern Mediterranean cultural, family and demographic model is historically different. The widely diffused familialism does not only affect behaviour at individual and family levels, but also at the societal level, maintaining both within and outside the family persistent gender inequality and inequity (McDonald). Other authors have pointed out that the prevailing welfare regime, job market structure and care systems impede the "quiet revolution", i.e. the revolution towards a more gender egalitarian family time (Goldin). Without substantial change in these respects, the gender revolution, as we have seen it in other countries, looks doomed. By analysing long-term socio-demographic indicators and focusing on the relative stagnation in the last decades, we aim to go beyond the traditional debate which tends to focus on continuity and the peculiarities of the Italian Mediterranean model *versus* the hypothesis of inevitable future convergence of socio-demographic behaviour. We bring to light the existence of a relatively recent new aspect of the Italian situation, which is in line with what Esping-Anderson refers to as the the "incomplete revolution". The revolution of women's roles has developed sufficiently, also in Italy, to change the behaviour in relation to education, marriage, parenting and employment, but the lack of reform of the welfare state to reconcile motherhood and employment has stalled in an incomplete

state. This situation produces social inefficiency through persistent low fertility and new inequalities and social polarisation of parents and their children by income and education.

Aurea Micali and Stefano De Francisci, *ISTAT*

Istat time series Compendium and Data Warehouse

Abstract

In order to celebrate the 150th anniversary of Italy's unification, Istat has launched a wide program within which the Compendium of historical statistics has a prominent role. The publication is the way through which Istat plans to deliver the most relevant data in order to analyze economical, social and demographic changes that took place in the country during last 150 years. Istat has produced similar publications in 1958, 1968, 1976, 1986, however the new Compendium's structure will be different in many respects. The 2011 Compendium will present time series according to their subjects, instead of data's source. It will contain new time series related to matter such as environment, social aspects and others that have only recently come to general attention. It will provide, when possible, breakdown by gender and region. It will also contains indicators (percentages, rates, etc.) to make time series easier to read. Data will be complemented with metadata regarding changes in methods and definitions that took place over time, in this respect the Compendium can be seen as a way to follow evolution of Italian statistics itself from 1861 up to now. Traditionally, Compendiums of time series were the only comprehensive source for historical data. Nowadays the increase in availability of data make it necessary to indentify the most relevant information to be printed and at the same time to save and disseminate a much bigger amount of information. In order to preserve both needs the decision was made to put in place an historical Data Warehouse. The classic principles of a Data Warehouse are based on some focus elements, like subject-orientation, integration, time-variability and non-volatility of the collection of data. In order to construct an historical overview about a Country, the adoption of such principles is very useful to aim the data modelling. In fact, data have to give information about a particular subject matter area, they have to be gathered from a variety of sources and merged into a coherent whole. Further, all the data must identify a particular time period and, at last, the data have to remain into the data warehouse stably. To reach these purposes, Istat has recently implemented a corporate statistical data warehouse (I.Stat), starting from a set of statistical software components

and services that OECD has developed for the delivery of its statistical data warehouse applications. I.Stat provides a single online platform where users can discover and access statistical databases. I.Stat offers a number of opportunities for improving data management and the users will be able to extract all the needed data and build customized tables. The adoption of such a corporate vision for data warehousing has provided the opportunity to put into place a specific environment to disseminate data referred to long time periods. So, in occasion of the celebrations for the 150th anniversary of Italian Unification, the use of the integrated platform of I.Stat will give the possibility to make available a wide collection of historical data, easily accessible and enriched with appropriate metadata, contributing in this way to turn all the available data into a better knowledge of our country.

Simone Misiani, *University of Teramo*

Genesis of the National income: the discovery of the Industrial Italian bounds from Census 1936 to the 50's

Abstract

This paper offers a short introduction to the Italian accounting history and discusses, particularly, on the origins of political decision. This essay analyses the preminent, but largely ignored, position occupied by the empirical statistical method in public discussion of the Italian income. The democratic decision had it's the beginning of the national accounting, but the revolution launched by research centres takes place in Italy without giving way to a liberal democracy, as it the case in United States. Istat is directly controlled by Fascism. Mussolini used statistics as a tool for totalitary control. But closer analysis of the story of this institution contradicts this assumption. There is a contradiction between the propaganda image of Fascism and the Istat direction line. Even in the present, after the Global Financial Economic Crisis 2007-2009, the Italian statistical thought became topical again. My research interests diverse fields of history and covers Economic and Business History and Cultural and Political History. The focus is the culture of National Accounting and the emergence of the "Southern Question" in Fascist Italy. Which role takes the invention of National Accounting in the Italy in the course of Fascism? A historical perspective, the awareness of several alternatives and the existence of no specific "better" theory but just the comprehension of the reasons and ways in which they emerged, acquiring new links and might be useful in creating new theoritical insight. The current lecture is studying how this whole

process has taken place as well as the factors that have slowed and conditioned it. There is a typical element characterizing the Italian case, accompanying the development phases and to a certain extent conditioning it: The political context of reference, that is to say the connection between the genesis of research institutes and Fascism. The Keynesian revolution launched by research centres takes place in Italy without giving way to a liberal democracy as it is the case in the United States and in the United Kingdom. This study is focusing on three particular cases that are relevant in various ways: the Comit research office in Milan, the research centre of Banca d'Italia and Istat. In all these cases we can note a spirit both public and close to the private sector. The statistics find Italy an industrial country, in the meantime, show the structural difference as far as Italy is concerned with the territorial aspect of growth. In Italy there is a "southern issue" that is getting worse as the gap between north and south keeps growing together with industrial development. Research institutes are founded in the northern regions of Italy, where production dynamism is higher. National Accounting expands rapidly - during the 1940s and 1950s - in the framework of developed industrial economies, with certain characteristics. The 30s and 40s of the 20th century witness the combination of extreme economic and political events (Word Wars, Great Depression), development of governmental intervention, and intellectual investments (cycle analyses, macroeconomics) that lead to the emergence of National accounting. The Promoters of empirical position tend to contrast them to the economic planning of Fascism and dictatorial regime.

Paola Monari, *University of Bologna*

The Semantic role of the variability in the development of statistical thought

Abstract

Since the birth of modern sciences, the development of statistical thought has run along the evolution of the semantic concept of variability. The variability of the natural and social phenomena was the true challenge that Galilean science has faced substituting the order of scientific laws to the apparent disorder of facts. Those laws tried to combine two objectives: the explanation of phenomena in a causal context, and the forecasting of unknown events already explained by those laws. The propositions of modern statistics have not always realized both objectives. In the XX century, the most revolutionary

scientific theories have been very powerful as explanatory models, but weak as predictive models with reference to single events. All this because the new theories were first of all statistical ones, for example, the theory of evolution for natural selection, the genetics of population or the quantum physics. Sciences learned to deal with statistic populations and collective properties. The intrinsic characteristics of this kind of laws were properties concerning a phenomenon as a whole, not its micro components that were seen as inessential. The scientific interest has shifted from the single one to the whole group by searching statistical regularities which are above all properties of the group. The proportion of birth sex in human species doesn't concern the single birth, the same it is for the second law of thermodynamics that doesn't deal with single molecules. The genetic theory of heredity too doesn't permit to state with certainty how the next individual will be. Here we can find the difference between the Newton's theory of heaven gravitation, which permits to forecast the single heaven events, and the genetic theory of population, which can state everything about genetic frequency of a group, but little can state about the single individual. To recognize statistical regularities, the size of observations has then to be extended until the underlying law will emerge by inertia. This size depends on the phenomenon variability, more variable is a phenomenon, larger the number of observations has to be. When phenomena interesting science are of "statistical" nature, then variability becomes the explanatory key and assumes its own semantic meaning. The distinction between population and sample tends to vanish, the same as the distinction between confirmation and confutation, in face of a statistical proposition. The analysis of phenomenal variability becomes the main objective of the scientific research, and the statistical methodology becomes the protagonist, not a simple tool of investigation. The statistical language becomes the language of these new theories, and the instruments of statistical methods used to analyze variability in all its facets, offer the interpretative key for many types of phenomena, for instance, the role of latent analysis for explaining psychological and social phenomena.

Isabella Morlini, Giacomo Stella and Maristella Scorza, *University of Modena and Reggio Emilia*

On reading speed and accuracy, to contrast dyslexic and normal children readers in Italy

Abstract

According to the Italian Parliament act that recognizes dyslexia as a physical disturbance, of neurobiological origin, dyslexic children in compulsory school should be early recognized, in order to asses a targeted intervention within the School and to start a teaching that respects the difficulty in learning to read, to write and to perform calculations. The diagnosis of dyslexia in primary school is currently based on a test that identifies children with impaired reading speed and/or accuracy on a list of words and on a list of nonwords. On the basis of the results of a survey on about 1500 students attending primary school, in this paper we analyze the distribution and we discuss the validity of the indicators currently used in this test (namely, the number of erroneous spelling and the number of syllables read in a second). We then propose a new screening procedure based on a test of spelling which is exactly 1 minute long. The actual tests are about 10 minutes long and this time length is one of theirs major flaws. Finally, in line with the belief that dyslexia has variable manifestation and that a dyslexic child may not have impaired performances in both reading speed and accuracy, we propose a new composite indicator which takes into account these two different aspects.

Mauro Mussini, Lisa Crosato, Paolo Mariani and Biancamaria Zavanella, *University of Milan "Bicocca"*

Linking Administrative Tax Records and Survey Expenditure Data at the Local Level

Abstract

In this work, we focus on the combination of administrative tax records and survey data collecting information on household expenditures. We consider two different data sources: the sample survey on family expenditures conducted by the Milan Municipality and the Chamber of Commerce of Milan (wave 2007-2008) and the tax register matched to the local population and family register in the data-warehouse AMeRIcA, concerning residents in Milan in 2007.

Manuela Nadalini, *University of Torino*, Alessandro Rosina, *Catholic University of Milan*

"Let us join in cohort": The generations of the change from the Italian unification until today

Abstract

The Italian demography has changed much more in these last 150 years than in all the centuries before. This change has taken place with timings and outcomes not strictly overlapping and converging with those observed in other industrialized countries. An analysis by generation and social class allows us to highlight some of the important Italian specificities in the diffusion of innovative behaviours and on the implications on the individual lives.

Manuela Nicosia[1], Stefania Della Queva[1], Franco Lorenzini[1] and Andrea Bassi[2]

[1] *ISTAT,* [2] *University of Bologna*

The Nonprofit Sector in Italy: Scope and Remit

Abstract

The nonprofit sector's statistics hardly provide a complete picture of the domain due to critical issues, such as, for instance, the need to deal with a wide range of organizations and activities. For this reason, the National Institute of Statistics (ISTAT) adopted the International Classification of Nonprofit Organizations (ICNPO) developed by the Centre for Civil Society at Johns Hopkins University in Baltimora, that ensures the cross-national comparison of data. Nevertheless, there is a need to contextualize the analysis for a better understanding of the sector at national level. Starting from the ICNPO and from the analysis of services provided by Italian nonprofit organinizations, the aim of the paper is to explore the weaknesses and propose new ways to represent nonprofit activities within the Italian context. The empirical part will be developed through the data analysis of voluntary organizations available in Istat archives.

Yarema Okhrin, *University of Augsburg (Germany)*
Dynamic Structured Copula Models

Abstract
There is increasing demand for models of time-varying and non-Gaussian dependencies for multivariate time-series. Available models suffer from the curse of dimensionality or restrictive assumptions on the parameters and the distribution. A promising class of models are the hierarchical Archimedean copulae (HAC) that allow for non-exchangeable and non-Gaussian dependency structures with a small number of parameters. In this paper we develop a novel adaptive estimation technique of the parameters and of the structure of HAC for time-series. The approach relies on a local change point detection procedure and a locally constant HAC approximation. Typical applications are in the financial area but also recently in the spatial analysis of weather parameters. We analyse the time varying dependency structure of stock indices and exchange rates. We find that for stock indices the copula parameter changes dynamically but the hierarchical structure is constant over time. Interestingly in our exchange rate example both structure and parameters vary dynamically.

Maria Gabriella Ottaviani, *University of Rome "La Sapienza"*
Teaching statistics in school mathematics: New Instructional resources and strategies needed

Abstract
The implementation of the new mathematics curricula in Italian secondary schools (*DPR 87, 88, 89* - March 15, 2010) provides an opportunity to discuss the teaching and learning of statistics. It particularly requires first to discuss the relevance of developing both mathematical and statistical literacy in schools, and secondly to reflect on some current recommendations to teach statistics in the school mathematics and challenges faced in the training of teachers. Differences between mathematical and statistical thinking suggest that, taking account of their specificities, it is possible to generate teaching strategies that allow the harmonious development of both mathematical and statistical thinking in school.

Michail Papathomas[1], John Molitor[2], Sylvia Richardson[2], Clive Hoggart[2] and Paolo Vineis[2]
[1]*Coventry University (UK)* [2]*Imperial College, London (UK)*
Bayesian profile regression and variable selection: an application to the study of lung cancer in a genome-wide association study

Abstract
Standard regression analyses are often plagued with problems encountered when one tries to make meaningful inference going beyond main effects, using datasets that contain hundreds of potentially correlated variables. We propose a method that addresses these problems by using, as its basic unit of inference, a profile, formed from a sequence of covariate values. These covariate profiles are clustered into groups using the Dirichlet process, and are associated via a regression model to a relevant outcome. The Bayesian clustering aspect of the proposed modeling framework has a number of advantages over traditional clustering approaches in that it allows the number of groups to vary, allows comparison of arbitrary subgroups of the data, can incorporate a priori known structures, uncovers subgroups based on their association with an outcome of interest and fits the model as a unit, allowing an individual's outcome to influence cluster membership. Different variable selection approaches are introduced and compared. Profile regression has been applied to a GWA study on lung cancer, in order to explore gene-gene and gene-environment interactions.

Silvana Patriarca, *Fordham University, New York (USA)*
Making Italy: Statistical Knowledge and the Risorgimento

Abstract
Building on my study of the statistical construction of the Italian nation in the nineteenth century, in my paper I will elaborate on the ideas that patriotic statisticians of the 1850s and 1860s (particularly Correnti, Maestri, Messedaglia, and some less known practitioners) shared about the function and role of statistics in the building of a liberal order and a nation-state. In the eyes of these practitioners, the circulation of statistics in the public sphere was an indispensable first step towards a more transparent working of power. But there was more: some of them also seemed to share a kind of utopian view of statistical investigations as providing a type of knowledge that would insure the harmonious functioning of different institutions and forces in the context of a free society. Their “trust in numbers,” to use the expression of Theodore M.

Porter, was extended - as we would expect - but did not translate in a technocratic vision. In fact, the observation of social facts and their "laws" helped to strengthen a liberal conception of society. Along with contributing to the liberal project, statisticians were also engaged in the construction of the nation. With regard to this aspect, I will elaborate on the relationship between the concept of population and the idea of an Italian people and society. Beside providing the inventory of the resources of the new nation (population being the most important of them), nineteenth-century statisticians contributed also to the elaboration of a cultural and ethnic idea of the Italian nation. In the publications of patriotic statistics of the 1850s, for example, views about what constituted a nation included not only language, but also race - although this was a more contested notion. The paper will conclude with some reflections on the coexistence of these practitioners' political engagement in the making of the Italian nation-state and their aspirations for a comprehensive and truthful knowledge of society. Although they did not hide their political motivations, they saw statistics as having its own autonomy as an administrative and scientific practice, a view that would be much put to the test in later years as knowledge became increasingly incorporated in the functioning of the modern state.

Fortunato Pesarin, *University of Padova*

Conditionality and Sufficiency Principles and the Permutation Testing Approach

Abstract

In recent years permutation testing methods have increased both in number of applications and in solving complex multivariate problems. A large number of testing problems may also be effectively solved using traditional parametric or rank-based nonparametric methods, although in relatively mild conditions their permutation counterparts are asymptotically as good as the best ones. When available permutation tests are essentially of an exact nonparametric nature in a conditional context, where the conditioning is on the pooled observed data which in the null hypothesis are a set of sufficient statistics for the underlying completely or partially unknown distribution. On the one hand, the application of the conditionality and sufficiency principles of inference provides the permutation approach with nice important properties. On the other, the reference null distribution of most parametric tests, with the exception of some simple situations, is only known asymptotically. Thus, for most sample sizes of practical interest, the possible lack of

efficiency of permutation solutions may be compensated by the lack of approximation of parametric counterparts. There are many complex multivariate problems (quite common in biostatistics, clinical trials, engineering, the environment, epidemiology, experimental data, industrial statistics, pharmacology, psychology, social sciences, etc.) which are difficult, if not impossible, to solve outside the conditional framework and in particular outside the method of nonparametric combination (NPC) of dependent permutation tests. Frequently parametric methods reflect in practice a modelling approach and generally require the introduction of a set of quite stringent assumptions, which are often difficult to justify. Sometimes these assumptions are merely set on an *ad hoc* basis. For instance, too often and without any justification researchers assume multivariate normality, random sampling from a given population, homoscedasticity of responses also in the alternative, random effects independent of units, etc. In this way consequent inferences have no real credibility. Indeed, these solutions in practice appear to be mostly related to availability of methods one wants to apply than to well discussed necessities derived from a rational analysis of reality. On the contrary, nonparametric approach try to keep assumptions at a lower workable level, avoiding those which are difficult to justify or interpret, and preferably without excessive loss of inferential efficiency. Thus, they are based on more realistic foundations, are intrinsically robust and consequent inferences credible. In addition, for instance, permutation comparisons of means or of other suitable functionals do not require homoscedasticity of the data in the alternative, provided that random effects are either non-negative or non-positive. However, my point of view is that a statistician should have in his tool-kit of statistical methods both the parametric, including the Bayesian, and the nonparametric, because in his life he has to confront with problems which are difficult, if not impossible, within a parametric approach and others which in turn are difficult, if not impossible, within a nonparametric approach. Examples of both such situations are also presented. In this presentation main properties of permutation methods derived by direct reference to conditionality and sufficiency principles are presented. Moreover, along with a discussion of the NPC method, a number of applications in experimental and observational situations are also presented (e.g. multi-aspect testing, multivariate stochastic ordering, robust testing, multi-sided alternatives, testing for survival functions). In addition, some theoretical properties specific to the NPC methodology are discussed, such as sufficient conditions for the ordinary consistency and for the finite-sample consistency.

Luisa Picozzi and Renato Filosa, *Istat*

The Italian national accounts: a review of major advances

Abstract

Starting from the mid 80's, and with an accelerated progression during the past several years, Istat has implemented a series of profound innovations to improve the quantity and quality of its sources of information, the methodologies employed in the production of data, economic and social, the quality and timeliness of the data it disseminates and to ensure transparency of all aspects of its work. Changes in the internal organization, the pervasive use of information technologies, the creation of verifiable archives and the upgrade of methodologies and classifications, allowed Istat to attain best practice standards. The purpose of the paper is to illustrate both this path and to focus on two major achievements: the establishment of a new fundamental approach to the production of annual National accounts (NA), and the creation of a methodologically correct platform for the estimation of quarterly national accounts (QNA). A final paragraph discusses outstanding issues and future work.In the first paragraph we discuss the major steps made to correct the weaknesses perceived by users during the '70 and to comply with the growing demand of reliable data for policy purposes and analysis. Following the recommendations made by the Moser Commission and international organizations key initiatives in this endeavour have been the creation of a new business register, the use of reliable surveys and benchmarks and of classifications capable of ensuring international comparability. As a result NA can now provide the basis for the monitoring of its economic and fiscal position to mention only two aspects of the Italian economic structure that are relevant to the participation of Italy to the activities of international bodies. In the second paragraph we will go into the details of the process that, started in 1987, represents the new foundations of NA estimates. A new methodology has been established for the use of a wide-ranging set of data sources (censuses, regular and ad hoc surveys, administrative data) to ensure comprehensiveness and reliability of the NA. Paramount importance had been the estimate of the underground economy (based on the matching of employment data collected through firms' and household's surveys and administrative sources). This innovative approach, after a thorough examination by international organizations, has been formally approved and is now recommended for its use at the international level. At the same time a series of other innovations have been implemented: the double deflation (routinely used in the calculation of value added of both NA and QNA), the use of

the Stone et al. method for the balancing of the accounts together with the regular use of Input Output and supply-use tables. In the third paragraph we discuss how the production of QNA has been organized for regular and timely publication. Starting from 1985, QNA estimates have been based on the setting up of an electronic archive (where both inputs and outputs are stored) and of an integrated procedure for the handling of indicators (treatment of outliers, calendar and seasonal adjustment). An innovative econometric approach to the reconciliation, at the annual frequency, of the differences between NA and indicators has been put in place to produce a large number of quarterly NA variables. While the basic features of the procedure established in 1985 are still in place, during the years innovations have been successfully introduced with the help of users and academic statisticians. More aggregates can now be accessible to users. In addition sectors accounts (Households, non-financial corporations and General Government accounts) have been recently made available. In the final paragraph we deal with outstanding issues and prospective work. Firms, particularly the small ones, feel that comprehensive surveys covering all aspects of their activity that are relevant for the estimation of NA are burdensome. This forces the use of a disparate set of alternative sources that, to mention only a few major problems, make it difficult to match different classifications and definitions. More importantly this approach creates non negligible informational gaps and makes it more difficult to estimate the economic results of conglomerates and multinational enterprises. Finally, attempts are made to develop estimates of non-financial assets by sector (one of the recommendation of the Moser Report), to ameliorate the reconciliation between real and financial accounts and to estimate the size of the illegal economy.

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An application of statistical matching techniques to produce a new microeconomic dataset on farming households' institutional sector in Italy

Abstract
In carrying out insightful analyses of distributive implications of alternative agricultural policy options, suitable microeconomic information on potential beneficiaries is needed. Two main characteristics seem to be relevant. First, the institutional sector of farming households needs to be properly placed within the economy-

wide income distribution, observing the total household income (Unece et al., 2007); second, information should be available to classify households both using information on the farm (such as size, product typology, management form) and information on well-being of the household itself (such as composition, age, education, health). The main sources of microeconomic information on the institutional sector of farming households, such as the Farm Business Survey (FBS) carried out by ISTAT or the European Farm Accountancy Data Network (FADN) , fail to comply with both these characteristics: their focus on technical aspects and the centrality given to income from farming makes these surveys suitable for analysis only within an industry (agricultural) perspective. This paper aims to propose a possible solution to this information problem. A new microeconomic database on farming households in Italy was created using statistical matching techniques (Rassler, 2002; D'Orazio et al., 2006). Information on total households' income and well-being gathered by the EU-SILC survey on living condition for Italy (ISTAT, 2010) was attached to the observations included in the FBS database for Italy. The new dataset, still representative of agriculture as an industry, also allows a proper statistical representation and socio-economic characterization of farming households as an institutional sector (Rocchi, 2010). The quality of the new microeconomic information was assessed analysing the distributive features of the current UE Common Agricultural Policy and the re-distributive impacts of a set of hypothetical reforms from an economy-wide perspective.

Jean-Michel Poggi *University Paris Descartes & University Orsay,*
Anestis Antoniadis, Xavier Brossat and Jairo Cugliari
Clustering functional data using wavelets

Abstract
We present two methods for detecting patterns and clusters in high dimensional time-dependent functional data. Our methods are based on wavelet-based similarity measures, since wavelets are well suited for identifying highly discriminant local time and scale features. The multiresolution aspect of the wavelet transform provides a time-scale decomposition of the signals allowing to visualize and to cluster the functional data into homogeneous groups. For each input function, through its empirical orthogonal wavelet transform the first method uses the distribution of energy across scales generate a handy number of features that can be sufficient to still make the signals well

distinguishable. Our new similarity measure combined with an efficient feature selection technique in the wavelet domain is then used within more or less classical clustering algorithms to effectively differentiate among high dimensional populations. The second method uses dissimilarity measures between the whole time-scale representations and are based on wavelet-coherence tools. The clustering is then performed using a k-centroid algorithm starting from these dissimilarities. Practical performance of these methods that jointly designs both the feature selection in the wavelet domain and the classification distance is demonstrated through simulations as well as daily profiles of the French electricity power demand.

Linda Porciani, *ISTAT*

Some aspects of socio demographic development in Tuscany from 1951 to 2001 according censuses data

Abstract

At the first post war census (1951), Tuscany was a quite rural area: for example in the province of Florence around a third of employees worked in agriculture; approximately 10% of people aged 6 and over was illiterate; only a home over two was served by drinking water. At the last census (2001), this framework changed deeply: each house has many services; most employees work in the tertiary sector; the education level has been grown. The aim of this paper is to give a contribution to the celebration of 150 years of unification of Italy analyzing the main aspects of the main socio-demographic changes in Tuscany during the last six decades. The study has been carried out on the basis of Census data, identifying a set of comparable indicators over time. The results provide a framework of the main social changes occurred in Tuscany population since the end of World War II, such as aging process, changes in female employment, changes in access to formal education, focusing on the different sub-regional area.

Theodore Mark Porter, UCLA - *University of California (USA)*

Practical Reason in a World of Variability: Reflections on the Rise of Statistics

Abstract

Statistics (*statistica*, *Statistik*) arose as a practical, empirical science, concerned above all with questions of state and administration. That is

how John Theodore Merz treated it in the chapter from his *History of European Thought* on "The Statistical View of Nature," written in the first decade of the twentieth century, just as the new mathematical field of statistics was coming into being. The word "probability," which by then was a well-established area of mathematics, had become prominent in the seventeenth century as an ideal of practical, non-demonstrative reasoning, reasoning that depended on empirical evidence and on the authority of the wise. From this standpoint, the history of statistical science appears as an effort, extending over several centuries, to make this kind of reasoning more rigorous on the basis of improved quantitative methods. During the first part of the nineteenth century, statistics was chiefly a social science. Like other versions of the science of society in this period, it was closely allied with practical activities. Its object, the state or (increasingly) *society*, was a bit amorphous. The statistical approach meant, first of all, the collection, classification, and presentation of numbers. This science dealt with variability by arraying numbers on the grid of numerical tables, and considering whether variables associated with unequal numbers or frequencies could be understood as causes. This kind of analysis made little use of *statistical* variation, and in the extreme case, Quetelet's influential ideal of *l'homme moyen*, variability was dismissed as meaningless error. The regularities of these collective numbers provided reason to believe that there was such a thing as *society* that was more than a sum of individuals. We might take statistical medicine, whose numbers were generally much smaller than census figures, as exemplary of a different use of variation. Here, statistical variability clearly had implications for the confidence a researcher could have in the reality of an apparent effect. Physicians did not typically know much about mathematics, but now and again researchers on disease or therapeutics used, for example, Poisson's formula to determine if a result could be clearly distinguished from chance. Probably the most statistical field of medicine was the treatment of the insane, which took place more and more in the burgeoning asylums of the nineteenth and early twentieth centuries. The idea of variability as playing an active role in constructing or changing the world we owe above all to Darwinian biology. Through the work of statistical writers of the late nineteenth and early twentieth century, especially the English biometric tradition, whose most prominent figures were Francis Galton, Karl Pearson, and R. A. Fisher, this kind of statistics formed the basis for a new mathematical discipline. This *statistics* combines the analysis of variability in the form of natural variation with the management and reduction of uncertainty.

Carla Rampichini, Fabrizia Mealli, *University of Florence*

Evaluating the effects of university grants using regression discontinuity designs

Abstract

The paper evaluates the effects of Italian university grants on student dropout. Applicants meeting some eligibility criteria receive a grant if their family economic indicator is below a threshold, so that the grant assignment rule defines a regression discontinuity design (RDD). After a brief introduction of RDDs, the particular RDD setting considered in the paper is formalized. A continuity test is presented, as well as additional ways to test the performance of alternative non-experimental estimators of programme effects away from the threshold. Difference-in-difference type assumptions are introduced to identify and estimate the effect away from the threshold. Empirical results show that, at the threshold, the grant is an effective tool to prevent students from low income families from dropping out of higher education. However, there is some evidence that the impact of the grant becomes smaller and not significant for poorer students.

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Population statistics in the changing context: data sources and demographic behaviors since the Italian unification

Abstract

The paper provides an overview of the different stages of the Italian history underlying the relation between population statistics and the changes occurred in the demographic behaviors since the Italian unification. A crucial point is linked to the role played by institutional organizations and their specific choices in terms of production of official statistics. The analysis is divided into four different historical periods: from the Italian unification to the First World War; the period between the wars; from World War II to the seventies; the last thirty years. In the first decades after the Unification, the relationship between the academy, population studies and official statistics is particularly relevant. The unitary structure leads to enhance the "political arithmetic" as a tool for the administration of the state with the aim of a description of the population in the essential features of its dynamics and resources. Between the two World Wars, a period that coincides almost entirely with fascism, the institutional structure of statistics is strengthened. At

the same time, we have a process of convergence between the scientific demography and the population policies implemented in the fascist regime. After World War II, the availability of institutional data focuses mainly on economic dynamics. The subsequent major transformations in the field of family and fertility behaviors (e.g. baby boom, divorce, internal migration) are pushing for further development in the population studies even though sources of data remain substantially unchanged in the last decades.Starting from the seventies, methodological and scientific advances lead to a rethinking of the creation and production of the data. Following the line traced by the paradigm shift (from macro to micro), it starts a new phase of data collection with the implementation of national socio-demographic sample surveys and the access to Istat microdata. In the last thirty years, the demographic changes undergo a further acceleration. Italy changes into a country of immigration, fertility continues to decrease and life paths become more and more complexes. At the same time, scientific research has made great strides and new explanatory approaches have been introduced in the last years. Both these aspects requires more detailed and more frequent information, an increasing demand that is not always satisfied by the availability of data.

Giulia Roli and Luisa Stracqualursi, *University of Bologna*

A propensity score matching method to study the achievement of students in upper secondary schools

Abstract

The investigation of the factors which may influence the achievement of students in the different levels of their education is a crucial topic in observational studies on individual learning experiences. Indeed, it may help to find important information for a better counselling of teachers towards the subsequent educational levels, as well as identify potentially critical groups of students at the beginning of the school year. In this paper, we consider a sample of around 2,000 students in the first year of the upper secondary schools of the province of Bologna in year 2007/2008. We aim at evaluating the effects of some family characteristics on the achievement of the students in terms of success or failure at the end of the school year. Indeed, several studies assert that family background, in terms of socio-economic indicators, and structure influence the educational attainment of students with different impacts among countries and levels of education (see, e.g., Lauer, 2003). We consider educational qualification of the mother and number of siblings as potential causal factors influencing the outcome. Indeed, in some

previous analyses (Mignani *et al.*, 2011 and 2010) these have been emerged as covariates highly associated to the educational attainment of the same group of students. In a second step, we further compare the achievements of students of upper secondary school in the city of Bologna with those in the other towns of the province. In the analysis, we employ a matching strategy to create treatment groups, corresponding to the values of the factor under study, with the same distribution of observed pre-treatment characteristics. We use estimated propensity score to select the observed pre-treatment covariates mostly correlated with the treatments (Rosenbaum and Rubin, 1983). In particular, the following pre-treatment variables are considered: sex, nationality, year of birth, type of school (academic, vocation or technical institute), educational qualification of the father, employment and marital status of parents. As a result, individuals are stratified in blocks according to the propensity score to obtain estimates of the average treatment effect (Rubin, 1974) using nearest neighbour matching.

Alessandro Roncaglia, *University of Rome La Sapienza*
Statistics and economics: a strong - and complex - nexus

Abstract
Statistics and economics are connected in a strong way. Moreover, such a nexus is a complex one, involving deep methodological issues. It has been interpreted in different ways, with heavy practical consequences. Three examples, drawn from economists' contemporary practice: Bacon's ants, spiders, and bees. Sylos Labini's economics school at the Rome Faculty of Statistics

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The Role of Women in the New Millenium Entrepreneurship

Abstract
In Italy today employment statistics show that the gender gap of participation in the labor market is declining, although significant differences still persist when compared to other European Countries. This is despite of a general context in which there has been an increase of flexibility in the forms and methods of employment. The raising of education levels throughout the last five decades represented an essential

step for women's access to occupations, including economic activities sectors and social positions that were once foreclosed. Today women are increasingly able to overcome the obstacle of vertical segregation and break through the *glass ceiling*, thus reaching top positions also in the business. In fact, the European benchmark shows how Italy simultaneously has the lowest employment rate within EU Countries, while it ranks among top positions in the female entrepreneurship. The aim of the paper is to study the transformational factors of the Italian entrepreneurial system from a gender perspective. According to this perspective, what comes out is an exploratory operation on the characteristics of women's entrepreneurial structure and the gender differences that still persist in the business world. ISTAT data on entrepreneurs will be used for this application.

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Collaboration between Istat and INAIL to improve statistics availability within the Occupational Information System

Abstract
This work regards the collaboration between Istat and INAIL in the circle of the project related to the Occupational Information System. The project of Occupational Information System is born from the opportunity, facilitated by the recent developments of the web technology, to make available and well connect occupation data collected by a consistent group of public subjects. The goal of the project is to share different information from various sources for reconstructing social and economic context in which occupations are developed in the national labour market. Institutional subjects that collect information on one or more occupations, or homogeneous groups of occupations, might participate to the Occupational Information System. The basic condition to enter the System is that occupation data are organized according to the current edition of the "Nomenclature and classification of occupation" (NUP06): this is, in fact, the standard by means of which information, made available from each subject, are connected and shared in the information System. In this case Istat provides the occupation data from the Labour Force Survey according to the NUP06, while INAIL provides statistics data on incidence and mortality for occupational injuries. Although the classification adopted by INAIL allows translating occupation data in terms of NUP06, some records could not include this information, since it is not compulsory to fill the item on occupation

when an accident at work is complained. In order to facilitate users' access to the net of the information System the two archives need to be comparable. For this reason the INAIL data have been subjected to a specific treatment to get occupation code according to the NUP06 and to correct item nonresponse. The aim has been reached through a mutual training course, characterized by a theoretical part followed by a stage of training on the job. The first part has treated the application-theoretical knowledge on: a) form and contents of the Classification of occupation; b) imputation methods for handling item nonresponse, in particular with respect to qualitative variables; the second has served to define and to implement an appropriate model of imputation for item nonresponse. In this work we present some preliminary experimental results putting more emphasis on problem concerning the use of probabilistic imputation methods, which are generally suitable for surveys, to the field of administrative data.

Fabrizio Rotundi, *ISTAT*

The Project for the implementation of a Risk management System in Istat (Italian Institute of Statistics)

Abstract

The project for the introduction of an organizational risk management system in Istat derives from the strategic objective that aims at the implementation of safety measures in Istat, including those for the management and development of tangible and intangible assets. The ultimate aim is to strengthen the leader position of the Institute, increasing the quality of statistical business processes by totally or partially removing the elements and events that might be an obstacle to stakeholders satisfaction. The standard that has been chosen is the Enterprise Risk management - Integrated Framework, developed by the *Committee of Sponsoring Organizations* (*COSO*), because it allows an incremental step by step approach. To provide strong backing, coordination and support for the implementation and experimentation of ERM, Istat created a Risk Management Committee, made up of people from across the organization in order to ensure that the efforts to implement ERM are embedded within Istat's core business activities and that the risk culture is communicated across the organization. In order to improve management culture and promote a common language and understanding throughout the organization, the Committee also developed a dedicated training program (for example it organized two seminars in March and November 2010) and guarantees continuing

communication and information across the organization also by means of a web site (http://risk.istat.it/). The ERM multidirectional, iterative process in 2011 will involve all sectors of the Institute: to the risk perception analysis, that every senior manager will have to do, follows events identification and risks assessment, done considering the likelihood and impact of events by using the Risk and Control Self-Assessment (RCSA) method, whereby the managers evaluate risks and controls with the help of the Committee. Afterwards, the management selects risks responses (avoiding, accepting, reducing, or sharing risk), the related risk performance indicators, and include them in ongoing management activities. In about 5 months, the achievements reached were: 2 training events delivered by professionals in the field to about 100 managers; the publication of various documents regarding the application of the ERM approach in Istat and of the experimental procedure; analysis of the risk perception of about 5 top managers; the completion of the organizational risk register for 2 core statistical business processes (general Census and ICT). The project was also recognized as a best practice by the University of Tor Vergata, Rome, Italy. An important goal which will be reached by the end of 2011 is the collaboration with the statistical quality audit offices in order to integrate the audit activities and the analysis of statistical risk and organizational risk.

Monica Russo, Francesca Inglese, Claudia De Vitiis, Stefano Falorsi, Alessandra Masi, Nicoletta Pannuzi and Isabella Siciliani, *ISTAT*
The survey design for a new survey on homeless population

Abstract
The traditional poverty estimates normally refer to the population living in private households and do not take into account the most extreme forms of poverty. The new survey on the homeless population has the twofold objectives of having a representation of: i) the dimension of the homelessness phenomenon and of the status and profiles of the homeless people in Italy; ii) the system of formal and informal services, both public and private, potentially able to meet the homeless people needs. The research project was developed in collaboration between the Ministry of Health, Labour and Social Policies, the Italian National Institute of Statistics (ISTAT), the Italian Federation of Organizations for the Homeless (Fio.PSD) and the Organization of the Italian Episcopal Conference (Caritas). The survey design consists of three operational steps. The first one is a census of the organizations, finalized

to have a map of the services potentially addressed to homeless people, conducted through a CATI survey and a "snowball" technique in order to reach the maximum number of organizations in the selected 158 main municipalities. The second step has been a detailed CAPI survey about the organizations which directly provide services to persons in difficulty. The final phase is a sampling survey on the homeless population conducted at the services places. The methodological approach to investigate the phenomenon is very complex because a sampling frame allowing direct access to homeless people is not available. Therefore, an indirect approach has to be used for the third phase, based on the identification of the homeless population through services. This methodological approach, known in literature as "indirect sampling", is based on the idea of using a sampling frame indirectly related to the target population. In this context the estimation approach is the "weight share method", based on the links connecting the two populations, homeless and services.

Maurizio Salusti, Vincenzo Pisapia, *SAS*
Social Network Analysis: Measures and Events with SAS

Abstract
One of major application of Statistical Analysis and Data Mining in marketing field is indicators calculation, able to predict an event probability for each single customer.
A recent approach is to manage influence measures existing among community members. The goal is to evaluate the contagion probability, coming from relational strength existing in the customer social net.
Customer information are represented as a "social net" made of connected objects that influence each other, instead of independent objects.
Groups of measures for each customer are calculated to describe this behavior:

- Position, role and strength measures
- Influence and relation of customers (having an event) with other customers (not having the same kind of event).

Recently many algorithms have been developed in order to obtain customer communities. These algorithms are known as SNA (Social Network Analysis) and are based on graph theory. On the other side, many useful measures can be calculated too to describe customer behavior inside the social net.

SAS has built a new powerful procedure allowing communities identification and measures calculation. It has been already applied successfully on huge amount of data.

Antonio Schizzerotto, *University of Trento*
Long-term variations of the Italian class structure

Abstract
The paper deals with changes in the size of social classes recorded in Italy since the mid Fifties of the XX century. Using census and panel data, the paper shows that the process of occupational upgrading, that characterised our country for a definitely long period, began to slow down its pace around the Eighties. This process affects mainly white collars class and managerial positions. These changes, together with a reduction of the petty bourgeoisie belonging to the tertiary sector and the widening of both professional and low skilled non manual positions, suggest that Italian class structure is experiencing a retrenchment of middle classes and the appearance of a new segment of proletariat, made up by incumbents of non manual unskilled occupation in the tertiary sector, who is replacing the traditional manual skilled and unskilled workers of the industrial sector.

Birgit Schrödle, *University of Zürich (Switzerland*)
Assessing the impact of network data on the spatio-temporal spread of infectious diseases using INLA

Abstract
Networks of moving individuals like traded animals between farms represent a potential risk for the spatio-temporal spread of an infectious disease. To assess this relationship, we propose a hierarchical Bayesian, parameter-driven model for multivariate time series of counts, where the disease incidence is governed by a latent autoregressive process. A specific emphasis is on the direct inclusion of network data into the model. Furthermore, we present ready-to-use software based on integrated nested Laplace approximations (INLA). INLA is a recently proposed approach for approximate Bayesian inference in latent Gaussian models. Competing models will be compared by evaluating their predictive performance as to one-step-ahead predictions using proper scoring rules. The impact of cattle trade on the spatio-temporal spread of Coxiellosis in Swiss cows, 2004-2009, is finally investigated.

Maria Rita Sebastiani, *University of Rome "La Sapienza"*

Normalized multiple variability indices for statistical rates: studying the global demographic convergence

Abstract

We aim to introduce and use some suitable statistical methods for studying in a multidimensional viewpoint the global demographic convergence of the populations towards a common pattern, that is the focus of the demographic transition theory. Let consider a set of k variables each observed on n populations across time. Many demographers have empirically tested the convergence using statistical indices of variability (the so-called "σ-convergence"). If the variability is low, it means that the populations converge towards a common profile. Conversely, if the variability is high, it means that the populations are quite different from each other and therefore the convergence is not achieved. All the existing studies focus on a unidimensional viewpoint, testing separately the convergence of each variable at a time. Recently, in aim to afford the problem in a multidimensional viewpoint, we proposed a new absolute multiple variability index. Specifically, since the demographic transition theory refers to the changes of births, mortality and age structure over time, we considered the crude birth rate, the crude death rate, the infant mortality rate and the aging index. Then, as the variables are statistical rates, we defined suitably the variance and covariance matrix **S**. Assuming that the variables are independent, we took the trace of **S** (by symbol, tr(**S**)) as absolute multiple variability index. It measures the average distance of the n populations from the common profile. In aim to evaluate the degree of the convergence, we applied a linear normalization procedure to the absolute index, obtaining a normalized one that takes values comprised between 0 and 1. Here, we propose other two absolute indices that summarize the overall variability of the n populations k-variates, specifically the determinant of **S** and the determinant of the correlation matrix **R** (by symbols, respectively, det(**S**) and det(**R**)), that is constructed starting by **S**. For normalizing det(**S**), we determine its maximum and minimum values and then we apply a linear normalization procedure. We also demonstrate that det(**R**) varies between 0 and 1. Here we apply both the normalized indices for testing the demographic convergence of the European populations towards a common pattern, comparing the results with those obtained by means of normalized tr(**S**)). The proposed methodology can be also applied to other kinds of rates and variables with suitable modifications.

Colomba Lina Sermoneta and Romana Roccaldo, *ISTAT*
New techniques to collect and process agricultural data

Abstract
As society transforms and is transformed by new technology, so there are new ways in which researchers collect and analyse data and new forms of data to collect. This paper focuses on the contributions in this issue examining these developments. The spread of the Internet makes available new ways of collecting data and new settings in which to collect it.
The parallel growth of photographic technology means that images can be used both as sources of data and as tools for data collection. However, such developments raise issues about the way researchers collect, process and publish data and how they produce high quality analyses. The digital form now makes possible new ways of creating, processing and analysing such data. There is now a range of such technologies and, in response to demand, software developers are still adding new features and functions into a software that researchers need to understand. The diversity of software means that there is a need for standards for storing and exchanging data and analyses.
This paper will explore two new techniques to collect and process data in order to get high quality information in a quicker way. The first one is based on an electronic model developed in PHP and sent via the Internet to a system of data acquisition and storage on land surface and crop production. The data, sent by a group of experts, are divided by provinces and month of issue (estimative collection), the system is called STIMA. The second technique is based on aerial photography and data are issued in a bulletin called AGRIT. A frame of dots which includes the major Italian crops is photographed, location data is sent from a GPS satellite and after combining it with data collected on field, land surfaces and productions are estimated.
In this paper the two techniques and relative data will be compared in parallel for three years and at the same time similarities and differences will be assessed and highlighted.

Debora Slanzi, *University of Venice "Ca' Foscari"*

The Evolutionary Design of Experiments in high dimensional settings

Abstract

In several research areas, such as biology, chemistry or material science, experimentation is complex, high dimensional, and may be extremely expensive, so an efficient plan of experimentation is essential to achieve good results and avoid unnecessary waste of resources. In this work we address the experimental design of high dimensional spaces by developing a sequential procedure based on the evolutionary paradigm where the information from an initial set of data is detected and processed by a particular class of statistical models. This computational procedure derives an experimental design in which a small number of trials will produce a set of "intelligent data".

Carmela Squarcio and Sandra Maresca, *ISTAT*

The improvement on production matrix in the Italian national accounts revision 2011

Abstract

The enterprise market production matrix is estimated differently depending on branch or product. In general, the matrix is constructed by allocating the output of each branch to the cells of the corresponding column. The procedure by column is the most important since the production matrix identifies the share of secondary output on the overall branch production and assigns it to the specific products. The estimation is based on Istat annual surveys on enterprises: large enterprises business account survey (SCI), small and medium sized enterprise survey (SME), industrial production survey (PRODCOM) and on enterprises' statistic-based tax assessment (SDS). The procedure used by the Italian National Accounts to construct the market production matrix is based on revenue items as surveyed by SCI and SME surveys, so as to identify goods produced and services supplied by each enterprise. In particular, for small and medium service enterprises the information has been integrated with SDS fiscal data. This document describes and analyses the impact of the new methodology that introduces fiscal data to estimate enterprise market production which will be used for the next general revision of national accounts.

Daria Squillante and Alessandra Federici, *ISTAT*

Gender EmancipA(c)tion (1945-2011) - An Italian History through Women's Eyes

Abstract

During the last 65 years of Italian History (1945-2011) women have experimented an extraordinary deep (r)evolution, consisting on the empowerment of consciousness, gender culture and political practices to conquer a different and respected "core position" in the society, moving from material conditions of life and symbolic roles traditionally considered both "natural" and "motionless", towards the convinced and passionate request of a social and symbolic identity connoted by a new organization of public/private gender balances, rights and relationships. The ardent Feminine and Feminist Movements for Resistance during the WWII, for the Suffrage battle, for legal, labour, cultural equality, for fighting violence against women are all extraordinary phases for a social and personal *gender renewal* tended to redefine "gender differences" not in terms of "power asymmetries" - as in a patriarchal culture of domination – but in terms of "different eyes and hands" together fundamental, *since* their difference, for a new way of managing public/private relationships between genders and building a better society. Statistics about the multidimensional aspects of the Italian society tells this story of a "Gender EmancipA(c)tion".

Sabrina Stoppiello, Franco Lorenzini and Massimo Lori, *ISTAT*

Local Welfare and the Partnership between Public and Nonprofit Institutions

Abstract

Data from Census of industry and services carried out in 1991 and 2001 allow to detect the main changes of Italian society, and in particular those related to the social protection system transformation, thanks to the survey of public and private institutions. According to this, the aim of the paper is to describe the social services system at local level, taking in consideration the level of coverage of the social services demand and the role played by different actors (public, private, nonprofit). Moreover, the analysis intends to verify empirically whether the development of nonprofit institutions in Italy occurred in cooperation or in competition with the public sector. For this purpose, data from both census of industry and services and municipalities' social spending will be analyzed.

Giovanna Tagliacozzo, Isabella Corazziari and Daniela Panaccione, *ISTAT*

The experience of judicial criminal statistics

Abstract

The gathering of judicial criminal statistical has begun since the last decades of 1800. The first statistics were about reported crimes to judicial authority and about convicted persons. At the beginning of '50s police data began to be collected. All of the data mentioned above are collected from different administrative sources that were continuously improved and changed over time. Changes are due to both modification of criminal laws and proceedings and changes in the administrative management of data. In particular, in the last years important improvements were required in how to collect and process information electronically. The direct extraction of data from administrative electronic database has widened the information contents, allowing for example the possibility to include the collection of misdemeanors' data, or allowing to better qualify crimes detailing them more, and to code places at a municipality detail's level. In the next future it will possible to integrate some type of crime of particular interest with some information about the context of the crime and also with important information about the victim (gender, victim-perpetrator's relationship, if the victim is a physical person or a legal entity). Also from the data analysis point of view, the improvement of informative, flexible and innovative data warehouse will make it possible to focus the attention and interest on the crime event instead of the author, on the offended part or on the process as a whole, depending on the interest and required knowledge.

Cristiano Tessitore, Graziella Sanna, Luca Faustini and Alessandro Valentini , *ISTAT*

Changes in the geographical distribution of inhabitants in the Municipalities of Tuscany during the last 150 years: some empirical evidences

Abstract

In 1861 around 1.9 Millions of inhabitants lived in Tuscany. Actually this number is nearly doubled (3.6 Millions). Variations were not homogenous in the whole region: for instance, during the last 150 years the population of Florence (regional capital, and capital of Italy since 1865 to 1871) grew about 400%. Vice-versa the number of residents in

the historical town of San Miniato remains nearly unchanged. The aim of this paper is to quantify the extent of modifications in population density considering both the geographical and administrative perspective. This permits to compare how the residential profile of Tuscany people changed over years. The analysis are performed following three steps: (i) removing (via statistical procedures) perturbations due to transformations in the administrative boundaries; (ii) classifying Municipalities according to administrative and geographical criteria such as the so called "crown" (where towns are grouped in provincial capital, neighbors of provincial capitals, and others) or altimetry (from the geographical point of view); (iii) linking administrative and geographical features of towns to their population changes. Data census about legal population are employed with a particular focus on the post-war period (1951-2001).

Marco Trentini[1] and Luigi Riva[2]
[1]*Municipality of Brescia* [2] *University of Brescia*

La statistica del comune nella Repubblica federale. Suggerimenti da un'esperienza

Abstract
La Carta delle autonomie non apre una nuova stagione riformatrice, almeno per quanto riguarda la statistica pubblica locale. La scomparsa della funzione statistica tra le funzioni istituzionali del comune nella Repubblica federale, può esser vista come un riconoscimento della onnipresenza della statistica quale naturale supporto ai processi decisionali. La nota si diparte da questa considerazione e illustra l'auspicabile ruolo della statistica pubblica a supporto dei processi di gestione, programmazione e pianificazione del "nuovo" comune.

Paolo Valente, UNECE - *United Nations Economic Commission for Europe, Geneva (Switzerland)*

Innovative approaches to census-taking: overview of the 2011 census round in Europe

Abstract
In the course of the year 2011 almost all European countries will conduct the population and housing census. About half of the countries in Europe are conducting the 2011 census using a methodology alternative to the traditional census, in most cases for the first time. In general, the

alternative methodologies adopted are based on the use of data from registers, either as the only source of census data, or in combination with other data sources. There are also innovative methods that do not make use of registers, like the French "rolling census". This paper discusses the reasons that pushed many countries to consider alternative census methodologies. An overview of the different alternative approaches to census-taking developed in Europe is presented, with an attempt to evaluate the implications in terms of data quality, costs and organization.

Erasmo Vassallo, *University of Palermo*

GDP Density Disparities in Old Europe: Theil Decomposition in Cross-Country Historical Perspective

Abstract

The political, social and economic aspects of Old Europe have experienced profound changes over the last century. The levels and variations of GDP provide a good, though partial, representation of these changes with specific reference to the economic development. According to historical data, GDP shows strong increases in Europe; among these countries also Italy. But, what can we say about the cross-country income inequality? In this paper, we analyze cross-country disparities of GDP density from 1870 to 2008 in fourteen western European countries. In particular, we use a Duro-Esteban decomposition of the Theil index to identify the separate contribution of GDP per capita and population density to the inequality; the correlation of these two components and the changes over time appear interesting also for the implications of the growth theory.

Grazia Vicario, *Politechnical University of Turin*

Geometrical product specification and verification: Kriging-based sequential inspection plans

Abstract

Manufactured parts are inevitably affected by form and size errors, assessed against dimensional and geometrical tolerances. Thus, it is mandatory to construct inspection plans for checking the fulfilment of the parts to dimensional and geometric specifications, for testing and verifying compliance with tolerances. At present, the ISO Technical Committee (ISO/TC) 213 is working on standards concerning Geometrical Product Specification (GPS) in modern industry, aimed at

providing a comprehensive set of operations to control most characteristics. In the paper, a flatness tolerance problem is considered, one of the simplest and among the most widely used form tolerances, quite representative of other types of tolerances for the task of analyzing verification methods. It defines a zone between two parallel planes within which a surface must lie [ISO 1101]. As a consequence, only few points, outer and inner ones, are relevant in verifying flatness. In order to detect the relevant points, an inspection of the whole surface is virtually required, therefore ISO/TS 12781 prescribes, in addition to the traditional flatness symbol, the clear statement of cut-off wavelength, in order to define the amount of information theoretically needed. Nevertheless sampling density required in ISO standards is quite high, ways too expensive to be applied in industrial practice. Different devices and methods may be used to inspect manufactured parts. Coordinate Measuring Machines (CMM) are one of the most widely used device in industry because of their flexibility and adaptability; they may supply verification of a broad range of characteristics. The rationale of a CMM is peculiar to statistics; in fact the CMMs probe the manufactured part surface only in a few points, i.e. in a sample. Moreover, the inspection plan specifies which are the probed points and which is the probing order, i.e. the experimental design. Of course, the aim of the engineers is an accurate estimate of possible deviations of the manufactured part from the nominal specification by probing the smallest number of points, because experimental runs are expensive and time consuming. In these circumstances, the set up of designs with the least possible size is attractive. Several experimental strategies may be applied to select the points of the surface to be measured, and several approaches to data analysis may accordingly be resorted to. In the paper, the. algorithm aimed at obtaining a fairly "good" inspection design, that links a reasonable number of points to be probed together with an efficient estimate of the flatness tolerance value, is based upon the use of Kriging models, and on a sequential selection of the points to be probed by the CMM. Kriging models were extensively used to predict spatial data in geostatistics (Krige D.G., 1951); recently, their use is strongly suggested to approximate the output of Computer Experiments (Sachs et al., 1989a; 1989b). Once more, Kriging models have been adopted in industrial metrology to drive the online construction of sequential designs for inspecting industrial parts on CMM (Pedone et al., 2009). In the typical inspection plan, the points to be probed are decided prior to the experiment, according possibly to an efficient design. In a sequential plan, the design setting is adaptively selected and it is based on the acquired information from data up to that time. The design is stopped

when enough information has been collected for the purpose of the experiment. The uncertainty of Kriging predictions is considered in the choice both of the initial inspection design (Pistone G., Vicario G., 2010), and of the selection of the subsequent points to inspect. Comparison of operating characteristics of Kriging using different correlation functions and different criteria for selecting the successive inspection points is possible. Correlation functions are selected taking into account both the technological signature of the surface analyzed and the estimated variogram; Gaussian, exponential, and general exponential functions have been considered. Criteria for selecting the successive inspection point can be based on least squares or minimum zone methods, two methods mainly used, for tolerance estimation. This allows to evaluate tolerances predicted on a set of candidate points. Thereafter, the next point to be probed can be selected where the maximum increment of tolerance value is expected, rather than where the prediction error is maximum. The paper discusses, on the basis of experiments performed, different approaches to use of Kriging models.

Andres Vikat, UNECE - *United Nations Economic Commission for Europe, Geneva (Switzerland)*

Gender and social relationships: advancing knowledge for policy making

Abstract

Social science research regards gender as a socially and politically constructed concept that is a central organizing principle of all social relationships. This includes the relationships between women and men, the relationships between generations, the organization of families, networks of people, education and work, as well as preferences and values. Recent changes in all these domains have significant repercussions for society and pose challenges to public policy. Official statistics are among the important sources of information on the changes and their repercussions, and for designing and monitoring policy. The United Nations Economic Commission for Europe (UNECE) has been implementing a multi-year programme on engendering national statistical systems, has provided methodological and training material and is hosting a statistical database on gender issues. The paper will illustrate how this has advanced national statistical systems and knowledge on gender relations, and suggests ways for further development in this regard. The aggregated information in statistical databases allows analyzing societal-level (macro-level) processes. To

improve understanding of the developments and to have a possibility to capture causal links, analysis of behavioural mechanisms at the micro-level of individuals and households is also required, preferably in an internationally comparable manner. In response to such analytic needs, UNECE has launched the Generations and Gender Programme of longitudinal surveys. The paper will highlight some key findings from studies based on this programme. It will also demonstrate the advantage of close links between statisticians, researchers and policymakers for the use of statistics and research in policymaking.

Sara Viviani, Dimitris Rizopoulos and Marco Alfò, *University of Rome "La Sapienza"*

Local sensitivity of shared parameter models to nonignorability of dropout

Abstract

This paper deals with the sensitivity to the assumption of ignorability of the dropout process in Shared Parameter Models, by measuring local sensitivity through the Index of Local Sensitivity to Non Ignorability (ISNI). We investigate the behavior of the maximum likelihood parameter estimates for the longitudinal process in a neighborhood of the missing at random assumption when two different parameterizations are adopted and propose suitable approaches to define a relative formulation of the ISNI. The performance of the relative formulation is studied in a simulation study by varying the number of repeated measurements per individual, the random effects covariance structure, the random effects distribution and the survival model formulation. The approach is also discussed in an application to a benchmark dataset.

Angelo Zanella[1], Grazia Vicario[2]
[1]*Catholic University of Milan,* [2]*Politechnical University of Turin*

Statistical Quality Control: Development of Constructs and Methods. The role of the Italian Statistical Society

Abstract

The paper briefly discusses the evolution of the concept of "quality", firstly linked to an assessment of the characteristics of the products in order to verify compliance with product specifications. Since the fifties, it was evident that the Quality construct cannot be represented and

measured by means of the observation of a few indices; in fact, the Quality has to be considered as a kind of overall ”imprint” on the product left by an appropriate production system as a whole. Hence, fundamental steps in achieving the goal of “High Quality” are a careful process design, a suitable raw material selection, a proper management of the manufacturing process and its statistical control, etc., which imply a very large number of operations, in particular of managerial type. Thus, starting from the initial proposals of W.A. Shewhart, which favored technical and manufacturing aspects and had a wide spread in the period between the two World Wars, leading thanks to J.M. Juran to a new statistical discipline named Statistical Quality Control (SQC), we arrive at the Total Quality Management (TQM), whose first ideas were put forward by W.E.Deming, when acting as an USA’s consultant to the Japanese Industry after 1945. TQM represents an overall paradigm of Quality, which suggests a rational and integrated combination of all types of choices and decisions, the technical as well as the economic and financial ones, and of the managerial strategies too, related to Quality, which have in the personnel involvement its focal point**.** The original CQS was chiefly concerned with a unique indicator of *an objective type*, say for simplicity, the fraction of units *p* nonconforming to specifications – which gave rise in the sixties to the Zero-Defects Programs, now supposed to be less important owing to the new technologies. Also the new SQC, apt to comply with the new Quality paradigm, has found a possible unitary reference characteristic in the Customer Satisfaction, which , however, is only a latent variable, i.e. it is not directly observable, and, thus, it is obviously related to a subjective and psychological evaluation. Also the class of goods, for which the assessment of the Customer Satisfaction is particularly relevant, has enlarged since it now includes the services, some of which of capital importance like Medical Care, Education, Transport. The Italian Statistical Society (SIS) has been present in the area of Statistical Quality Control through the *Working Group on Technology and Industry* which has been active from 1990 to 2002, when it was replaced by the elected *Coordination Group on Statistics for Companies,* from 2003 to 2008. This paper intends to offer an outline of the contributions, of Italian Statisticians in the framework of the new ideas and statistical methods concerning Quality Control, from the nineties onward, especially in connection with the Proceedings of the Meetings of the above SIS- Groups.

Michele Zenga, *University of Milan "Bicocca"*

On a new inequality curve based on the ratios between lower and upper arithmetic means

Abstract

Recently Zenga (2007) proposed a new inequality curve *I(p)* based on the ratios between the lower mean and the upper mean. The behaviour of *I(p)* is not preestablished as it happens for the Lorenz curve *L(p)*. The ordinate of *I(p)* is mathematically related to the ordinate of the Lorenz curve *L(p)*. By averaging *I(p)*, the new synthetic index I is obtained. Polisicchio (2008) has shown that only a "particular" Pareto distribution (the one with $\theta = 0.5$ and suitably truncated) has point measure *I(p)* uniform for $0<p<1$. The *I(p)* curve has been applied on many empirical income distributions (Zenga, 2007a, 2007b; Maffenini et al., 2010) as well as on many theoretical models (Polisicchio et al., 2008). The inferential properties of the synthetic index I have been analyzed by Greselin and Pasquazzi (2010) and Greselin et al. (2010). Radaelli (2007, 2010) has decomposed by subgroups the uniformity index U=1-I. In this paper a decomposition of I, according to the contribution of different income sources to the inequality of total income, is proposed.