ICOS2017

International Conference on Official Statistics

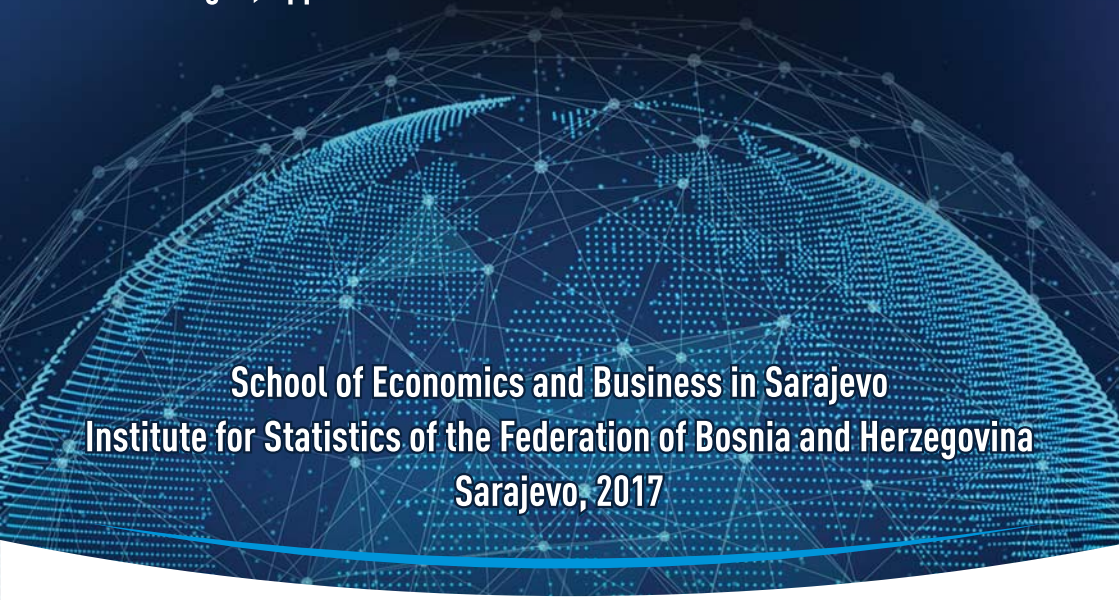
Book of Abstracts

of the ICOS2017- The International Conference on Official Statistics

Sarajevo, Bosnia and Herzegovina, March 30-31, 2017

CONFERENCE TOPIC:

Challenges, Opportunities and Future Directions in Official Statistics



School of Economics and Business in Sarajevo
Institute for Statistics of the Federation of Bosnia and Herzegovina
Sarajevo, 2017

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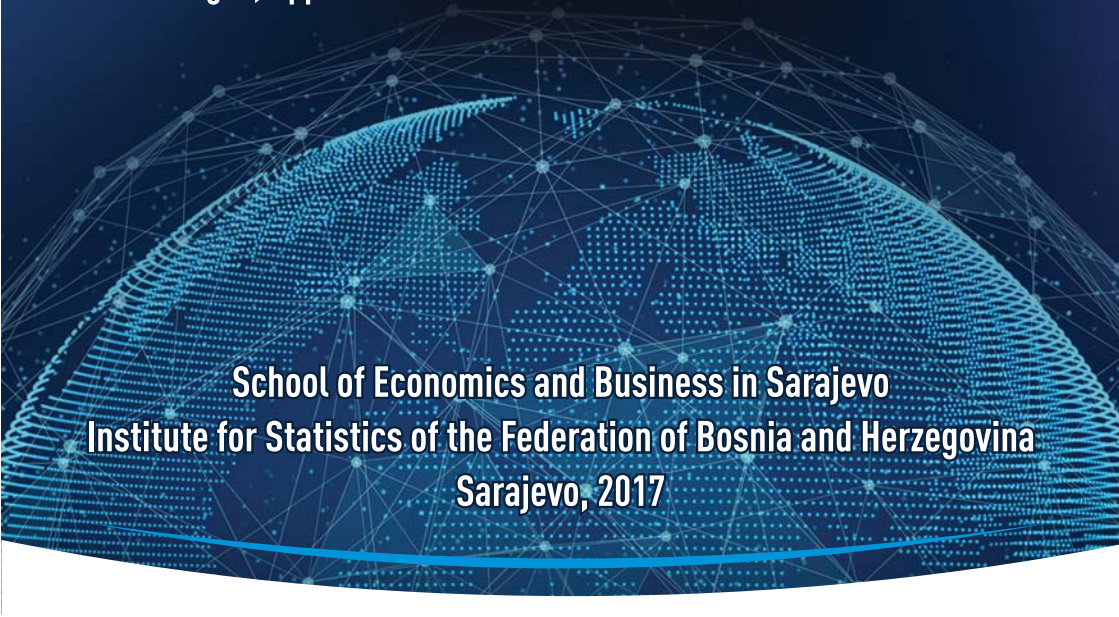

School of Economics and Business in Sarajevo
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Sarajevo, 2017

Focus and Scope of the Conference

The International Conference on Official Statistics; Challenges, Opportunities and Future directions (ICOS2017) is a joint initiative by the School of Economics and Business of the University of Sarajevo and the Institute for Statistics of the Federation of Bosnia and Herzegovina that aims to bring together academics, practitioners and data users to present their research, share their best practices, and discuss avenues for development of official statistics in Bosnia and Herzegovina and the region.

This inaugural international scientific gathering will be held in Sarajevo on 30 and 31 March 2017, and will aim to become a biennial event. It will include presentations by prominent international invited speakers, as well as high-quality research findings from applicants selected through rigorous manuscript review by the international Scientific Program Committee.

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DAY 1

Thursday, March 30, 2017

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Data as an ally in policy-making and development planning

STATISTICS IN BOSNIA AND HERZEGOVINA: PROFESSION AND SCIENCE

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ABSTRACT

The presentation consists of two parts and will highlight the importance of connecting Statistics as a science with application of Statistics and statistical analysis.

The word statistics is derived from the Latin word status (which means state) as the Statistics aim to collect and analyse significant country data. Governments should use statistics effectively and efficiently as a tool to analyse and evaluate policies and decision making. The importance of statistics exceeds the initial role and its application and has became inevitable and pivotal not only in economics but in many other fields.

In the first part of the presentation, the Statistical system of Bosnia and Herzegovina (B&H) will be described. It is organised according to the Law of Statistics of Bosnia and Herzegovina on both country and entity levels. There are three statistical institutes. At the state level it is the Agency for statistics of B&H. At the entity level it is the Federal Office of Statistics for the Entity of the Federation of B&H and the Republika Srpska Institute of Statistics for the Entity of the Republic

Srpska, but also other official institutions. The most significant publications of above mentioned three statistical institutes will be presented.The Central Bank of Bosnia and Herzegovina is a producer of official statistics at the level of B&H for statistics related to monetary and financial sectors, external sector statistics and government finance statistics.

In the second part of the presentation, the significance of statistics as a science will be explained and the education in statistical sciences of B&H universities will be explored and presented. The significance of theoretical and applicative approach in statistical education will be pointed out at different cycles of academic studies. Numerous authors from B&H have published books in this area and some of them will be presented. We will especially emphasize the significance of the relationship between science and practice in order to successfully respond to the very demanding task facing the statistical institutions and academic community in relation to statistics as a profession and science.

Keywords: statistical institutions, official statistics, statistical education

JEL classification: C1, C18, I23

ENHANCING STATISTICAL LITERACY AS A UNIQUE LANGUAGE FOR A BETTER WORLD

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ABSTRACT

In everyday life we are surrounded by information from opinion polls and scientific experiments designed to enable better understanding of the world around us. In the same time, the large quantity of available data does not always imply they are meaningful and useful. Conclusions based on these data might be wrong and misleading, too. Statistical literacy (SL) is a basic precondition for an educated citizenship in a technological democracy. Asking critical questions about possible risks reduces manipulation and citizens can develop a better-informed attitude toward their well-being, their health, democracy issues, etc.

In order to increase the quality of information based on statistical data and to increase the awareness of importance of statistics not only for scientists or economy, but also for the quality of life for ordinary people, SL gained lots of attention in the recent period.

H. G. Walles' views "statistical thinking…as necessary for efficient citizenship as the ability to read and write", while Gal (2002) defines SL as the ability to interpret, critically evaluate, and communicate about statistical information. From a broader

perspective, Vichi (2016) promotes SL as a lifelong learning activity needed for reaching better data and better lives. Recent papers are focused on statistical culture, analysing unused potential in enterprises (Dumičić, Žmuk, 2016), and treating statistical data as the universal language of the whole Europe (Bore, 2016). Complementary to that, SL improvement may prevent misuse of statistics, manipulation based on inappropriate presentation of statistical data and graphs, as well as trusting the biased data collected with poor background methodology.

Following that, SL has been recognised as a very important skill from the point of view of official statistical data producers, data users and educators, Shield (2002), but especially for: citizens - to be better informed and to practice democracy in a more efficient way; pupils/students - to gain more knowledge in different areas; educators - to spread knowledge useful for SL more efficiently; for managers - to improve their information based decision-making ability under risk and uncertainty; government policy makers - to better understand the trends if economy development indicators needed for creating efficient development measures; journalists - to better understand the reality and to properly inform the audience; professional statisticians and for scientists and researchers in different areas.

The promotion of SL has also been supported by many international organizations. On the global level, the UN initiative with the largest public impact was the introduction of The World Statistics Day in 2010 (20 October), while in 2016 the same date was established as The European Statistics Day. Within the project Portdata (Valente Rosa, 2016), Statistical Literacy Index (SLI) for measuring statistical literacy level was developed.

In line with that and opposite to the previously prevailing attitude "I hate statistics", social media have introduced an approach called "making statistics sexy" (H. Rosling's Gapminder, videos, blogs).

Therefore, the main goal of this paper is to increase the awareness of SL

importance and to promote the most relevant initiatives of increasing its level among all society segments.

Keywords: *statistical literacy, statistical thinking, statistics education, well-being, quality of life.*

JEL classification: A2, C, D83, I2, I3, N3

SDG INDICATORS AND IMPLICATIONS FOR STATISTICAL OFFICES

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ABSTRACT

In September 2015, Member States of the United Nations adopted a set of goals to end poverty, protect the planet, and ensure prosperity for all as part of a new sustainable development agenda. There are a total of 17 Sustainable Development Goals (SDGs) and 169 specific targets to be achieved over the next 15 years that seek to realize the human rights of all and to achieve gender equality and the empowerment of all women and girls. They are integrated and indivisible and balance the three dimensions of sustainable development: the economic, social and environmental.

Each Member State is encouraged to develop practicable and ambitious national responses to the overall implementation of sustainable development agenda based on existing planning instruments, such as national development and sustainable development strategies, as appropriate. Member States are also encouraged to conduct regular and inclusive reviews of progress at the national and subnational levels which should be country-led and country-driven.

The Member States, through the United Nations Statistical Commission's Interagency Expert Group on SDG Indicators (IAEG-SDGs) have agreed on 230 individual indicators to monitor the implementation of SDGs. The Commission has developed a three-tier system where Tier 1 includes indicators conceptually clear, with established methodology and standards available and data regularly produced by most of the countries. Tier 2 includes indicators that have a clear methodology and standards established but that are not regularly produced. Finally, Tier 3 indicators are those that have neither methodology, nor adequate standards developed or tested. The last tier classification contains 81 Tier 1 indicators, 57 Tier 2 indicators and 88 Tier 3 indicators. In addition to these, there are four indicators that have multiple tiers (different components of the indicator are classified into different tiers).

The central principles of Agenda 2030 are "to leave no one behind" and "to reach first those who are furthest behind". To support these principles and monitor progress towards their achievements, SDG indicator reporting is encouraged to be done in disaggregated manner. The key levels of data disaggregation are: (where relevant) by wealth quintiles, sex, age, ethnicity, migratory status, disability and geographic location (as per the reporting domains), as recommended by the IAEG-SDGs.

Based on Member States commitments towards SDGs and expected country-level reviews, national statistical offices need to develop a system that will support regular data collection, analysis and reporting. Although the work of IAEG-SDGs will result in clearer and unified methodologies for data collection, it will remain the responsibility of each statistical office to adjust the methodology to local context and develop a costed action plan for measurement of selected indicators. Given the lack of financial and human resources faced by statistical offices in developing countries and countries in transition, it remains challenging how this process will be planned and implemented in order to show each country's contribution towards SDGs.

Keywords: *UNFPA, ICPD*

JEL classification: Y

Official statistics in the era of Big Data

PARABLES OF THE BIG DATA AGE

Ryan Kennedy

We live in a world in which individuals produce and record more data about their behavior than in any time before. Every day, humans now created 2.5 quintillion bytes of data, and it is estimated that 90% of the world's data created throughout history has been generated in the past two years. This has led some scholars to predict that big data will overturn our entire way of thinking about statistics. While big data does hold enormous promise, it has also raised new perils in its analysis. Issues of overfitting, sample bias, and even sabotage loom large in the big data arena.

This research looks at the promise of big data and its potential problems to produce more educated consumers of big data. Three main problems can arise in the analysis of big data. The first is "big data hubris," where the size of data is taken to be an adequate substitute for smaller, carefully collected data. Examples from disease detection, automated news reading programs, and city planning demonstrate that big data can be misleading when it is not paired with carefully collected "small" data. In addition, these examples show that assertions by scholars that causality is no longer important – that "correlation is enough" or "the data can speak for itself" – are misguided and potentially dangerous for analysts.

The second is what we call "blue team dynamics." Most big data sources are from what scholars have labeled "data exhaust" – the byproduct of systems whose essential operation is not about producing data. [Note for translation: "exhaust" in this case means the waste gasses or air expelled from an engine when it is used.] For example, the Google search engine is not designed to collect information about people's behavior, it is meant to drive advertising so Google can make

money. This means that the people who set up these systems are constantly changing them to meet goals that are, at best, only loosely related to the goals of the researcher. We have little understanding of what these changes do to the data generating process for big data. This can lead to large changes in the results from data tracking systems and misleading analysis.

The final problem we call "red team dynamics." As we become better at tracking big data systems, incentives arise for people to manipulate the signals from these systems. For example, news reports on how many Twitter followers a political candidate has, as well as Twitter's own recommendation algorithm, has led to candidates either creating fake accounts to follow them or purchasing so-called "bot" accounts to re-tweet their posts. Similar incentives arise whenever there is a material interest in the results of big data analysis. While a lot of work is going into detecting "bots" and adjusting results accordingly, being unaware of potential incentives for manipulation has led to problems for analysis of a range of systems, from crowd sourcing to urban planning.

In sum, while we think that big data is an invaluable source of information, researchers and consumers must understand the potential problems and take steps to remedy them. Big data is not a substitute for careful and well-reasoned research.

A MATTER OF TRUST

Carsten Zangenberg

ABSTRACT

National Statistical Institutions (NSIs) around the world are facing a number of new challenges. One is competition from other - often private - providers of facts. As a result, users have to navigate amidst an increasing amount of information. In this context, it is essential that NSIs find ways to communicate "official statistics" that guide users in choosing high and declared quality statistics. At the same time, users of statistics are demanding more and a greater variety of data. For several years, these new challenges have led to intensive discussions both within NSIs and internationally between NSIs on how to meet user demands with effectiveness and efficiency. One cornerstone in these discussions is quality of statistics.

Quality of statistics can be understood as "fitness for use". Statistics are produced to reflect important phenomena in society. Available sources are administrative data, other existing sources or traditional surveys. More recently, much discussion has been devoted to big data. The choice of source will affect the precision and validity we can achieve both in coverage and in the variables we choose to describe the phenomena we want to study and describe. The method of data collection and different respondents' ability to give the required information are important for the reliability of data. Hence, we need to make clear to the user the choices and assumptions we have made in presenting through statistics our version of reality.

Our framework for quality management is compliance with the principles of quality statistics laid down in the ESS Code of Practice. These principles guide us on institutional issues and on our production processes as well as our products. On the institutional level, principles are defined on independence, on commitment to quality, and on impartiality and objectivity. As regards processes, principles are provided on sound methodology, appropriate statistical procedures, non-excessive burden of respondents and cost effectiveness. Product quality is measured by relevance, accuracy and reliability, timeliness and punctuality, coherence and comparability, accessibility and clearance. All of these criteria form part of the code of practice. In addition, it is essential that sound procedures in communication processes ensure that statistical messages focus on substance and not on "noise".

For our users to determine whether a statistical product is of good quality – that is, fit for their purpose – data alone is not sufficient. To help users find and understand our statistical products, it is important that they are disseminated using modern information and technology services. It is also important to give users easy access to metadata such as documentation of statistics or user-oriented quality reports. Here, international standards are being developed for production processes (GSBPM) and for metadata (SIMS) that can offer guidance to statisticians.

For producers, the advantages of focusing on quality are good documentation practices and efficient ways of producing statistics that ensure good quality in every step. Moreover, using standard methods improves communication with other producers and makes it easier to share good practices.

Producing "official statistics" is no easy task which should be practiced with humility. International cooperation about quality management is essential for maintaining and strengthening the role of NSIs.

BIG DATA AND OFFICIAL STATISTICS

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ABSTRACT

In order to produce official statistical information, an approach based on harnessing all available sources (survey, administrative and new ones, including Big Data) is the optimal one, as it allows to improve quality of statistics (by providing auxiliary information useful to build and maintain better sampling frames, to use better calibration estimators, to control and validate survey data) and offers a potential for discovering new knowledge (new well-being indicators, new agriculture and environment statistics, new measures of consumers confidence and behaviour). But while survey data is under almost complete control of the statistician, administrative and Big data are not. Integration is the keyword: in many cases, survey data can be the bridge towards alternative sources, overcoming or limiting their usual drawbacks (representativeness or selectivity in first place, but also variability of the mechanisms of data generation and unstructured nature of data).

This new multi-source approach requires a shift in the paradigm of statistical inference. The traditional one followed by official institutions is based on design based survey sampling theory, model-assisted and/or model based inference. The new one (algorithmic-based inference) is derived by data science: the emphasis is on the exploration of all available data, seeking information that has not been extracted so far; models have to be evaluated no longer by their interpretability, but rather by their capability to correctly predict values at unit level, and to use them

for estimating the parameters of interest. This shift is in some way due, as current traditional methods in official statistics are suitable for data of small amount and high quality, while new sources are characterised by huge dimensions and unknown quality, and algorithmic-based inference is capable to handle these features, as they are usually based on approximate optimal techniques.

To illustrate the two different approaches that can be followed - the traditional one (design and model-based inference), and the algorithmic-based one - we take into consideration a given survey, the Survey on the use of ICT by Enterprises, carried out in all member states of the European Union. This survey produces sampling estimates regarding, among others, the characteristics of websites owned by enterprises: e-commerce, online job applications, link to social media, etc.

An alternative way to produce these estimates is to collect data by accessing directly the websites, processing the collected texts to individuate relevant terms, and modelling the relationships between these terms and the characteristics we are interested to estimate. This combination of web scraping, text mining and machine learning techniques allows to obtain estimates to be compared to the survey ones.

In terms of quality (accuracy), the impact of the new estimators on the Mean Square Error is both positive (reduction of the variability due to sampling variance, and of the bias due to total non-response and systematic response errors in the survey) and negative (model bias and variance).

Whenever the quality of estimates obtained by means of this new approach reveals to be not lower than the ones produced by the traditional process, the former has to be preferred, as it allows not only to produce aggregate estimates, but also to predict individual values, useful to enrich the information in registers.

Keywords: *Big data, data science, official statistics*

JEL classification: C18

Session 1a: Avenues in Data Analysis and Representation, Methods in Official Statistics

ADVANTAGES OF SYMBOLIC DATA ANALYSIS APPROACH IN OFFICIAL STATISTICS

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ABSTRACT

Official statistics plays a very important role in gathering and presenting data on practically all fields of our living, from demography, education, health, labour market and environment, to transport, international trade, tourism, small business and various macroeconomic areas. Such data enable systematic overview through tabular and graphical presentations, calculation of indicators, and last but not least their interpretation. As majority of users mainly use secondary data sources, that is already prepared data presentations, it is of crucial importance for these presentations to be prepared appropriately. Most institutions that report official data use standard statistical methods for presentation of the aggregated

data that are most often based on mean values (e.g. averages for numeric data or modes for categorical data).

The aim of our presentation is to explain the importance of inclusion of at least some information about variability of values into the aggregated data. In such a way we enable more accurate description of the original data and thus also help reducing the possibility of data manipulation and misinterpretation. Some of the possible usages of more modern data descriptions and analysis with the so called symbolic data analysis will be demonstrated on real data. We will analyse several of the often used data sources and comment on the current state of their data representation suggesting some ideas for improvement.

Symbolic data analysis enables richer data description of aggregated data through incorporation of data variability into data descriptions and representations as well as into their analysis. The users of the data treated using symbolic data analysis are thus provided with more thorough descriptions of the data and therefore equipped for more qualified inferences and interpretations.

Keywords: *symbolic data analysis, official statistics, aggregate data, variability, data representation*

JEL classification:

C18 Methodological Issues: General
C55 Large Data Sets: Modeling and Analysis
C8 Data Collection and Data Estimation Methodology • Computer Programs
C80 General
C81 Methodology for Collecting, Estimating, and Organizing Microeconomic Data • Data Access
C82 Methodology for Collecting, Estimating, and Organizing Macroeconomic Data • Data Access

METHODS OF DETECTING AND TREATING OUTLIERS USED IN REPUBLIKA SRPSKA INSTITUTE OF STATISTICS

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ABSTRACT

Non-sampling errors in surveys include all errors that can occur during data collection, data processing, estimation and analysis, except error that is related to the fact that a survey is conducted using probability sample. Having in mind number of possible sources of this types errors, it is not easy task to ensure a level of quality required by users and, at same time, to exploit available resources in most efficient manner and stay within predefined time/budget restrictions. To be able to respond to that challenge, process of production of official statistics

must include systematic approach to prevention, identification and treatment of errors that are occurring in survey operations other than sampling. Outliers, as a potential non-sampling error, might have significant influence on estimates produced on domains of interest of the survey, and must be identified and treated in proper manner. They might include errors from one or more sources or, on the other hand, be a result of true change in the phenomenon which is subject of the survey. Proper distinction must be made between the two situations in order to avoid serious bias in survey estimates. That process include not only checking internal consistency of data (usually implemented within data entry/collection solution), but also checking external consistency, by comparing collected data at unit level with historical data on same/related surveys and possibly with available administrative sources. To be able to combine multiple data sources with survey data, there is a need for implementation of a method that is simple enough and, at same time, that can in efficient manner identify highly influential observations, which are potential non-sampling error. Also, in some situations the only solution for treatment of identified error is recontacting of the unit and this fact should be taken into account if we want to stay within time/budget restrictions. This means that identification and minimization of influence of outliers on survey estimates is one of major challenges for statisticians.

Paper describes the main methods of identification and treatment of outliers, which are commonly used in long-term surveys conducted in Republika Srpska Institute of Statistics. An overview of the Hidiroglou-Berthelot ratio method is given, which is applied to detect outliers in Structural Business Statistics and Labour Cost Survey. Also, brief description of the implementation of the method is given.

Keywords: *non-sampling errors, outliers*

JEL classification: C80, C83

METHODOLOGY AND APPLICATION OF FUZZY AND ALKIRE - FOSTER MULTIDIMENSIONAL POVERTY INDICES: CASE OF BOSNIA AND HERZEGOVINA

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Unlike standard unidimensional poverty indices, based mostly on monetary poverty measure such as income or consumption, multidimensional poverty indices can include numerous nonmonetary poverty indicators. In addition to multidimensional poverty indices obtained by generalization of standard unidimensional poverty indices (Foster – Greer – Thorbecke's indices), many authors (Ambrosio, Deutsch and Silber (2011); Betti, Chelli and Lemmi (2005); Alkire and Santos (2013)) emphasize the importance and advantages of Alkire – Foster (AF) and fuzzy multidimensional indices. This study utilized fuzzy and AF methodology to investigate poverty level in Bosnia and Herzegovina. In addition to consumption as monetary measure, we constructed AF and fuzzy indices by including the numerous nonmonetary measures that indicates dwelling quality, possession (of durable goods) and household structure (size, education and vulnerability).

The usage of fuzzy sets in poverty analysis is inspired by fuzzy sets theory and motivated by artificial classification in poor and non-poor population units. Instead of this classification, fuzzy indices are based on poverty membership function that reflects level of poverty. These indices allow the usage of all types of poverty indicators: binary, categorical and continuous. Two main approaches in determining fuzzy poverty indices are used: Totally Fuzzy (TF) and Totally Fuzzy and Relative approach (TFR). Some authors (Chelli and Lemmi (1995)) emphasize that TFR approach is less arbitrary due to defining poverty membership functions without predefined limits in the cases of categorical and continuous variables, which are required in TF approach.

AF method for construction of multidimensional poverty indices uses overlapping or multiple deprivations by included poverty measures. The unit will be considered as poor if the weighted sum of its deprivations is higher than predefined poverty threshold. After identification of poor units, information on the proportion of deprivations have to be aggregated for all units. The most commonly used and also the simplest index within the class of Alkire – Foster indices is the adjusted

headcount index M0, which is the product of multidimensional headcount index and the average proportion of deprivation for the poor units (intensity of poverty). Adjusted headcount index indicates incidence and intensity of poverty. Next index, M1 indicates incidence, intensity and depth of poverty, while M2 indicates incidence, intensity and depth of poverty and also inequality in distribution of selected poverty measures within population of poor units. AF poverty indices are important because they allow decomposition by subgroups and comparisons of poverty over time. Considering these characteristics of AF poverty indices, United Nations adopted this methodology for determination global Multidimensional Poverty Index, in 2010.

Fuzzy and AF multidimensional indices for Bosnia and Herzegovina are calculated based on data from Household Budget Surveys (2004, 2007 and 2011). Their advantage comparing to unidimensional poverty indices is inclusion of relevant nonmonetary poverty indicators, such as education, possession of durable goods, dwelling characteristics, household participation in the labor force etc. For certain cases, their values significantly deviate from the values of corresponding unidimensional indices. Unidimensional indices indicate deterioration of poverty in 2007 comparing to 2004 and 2011 while AF adjusted headcount index indicates the permanent improvement of poverty level in B&H and its parts. Also, determined fuzzy index indicates that Brčko District suffers from highest poverty level comparing to Federation of Bosna and Herzegovina and Republika Srpska in 2011, while unidimensional indices have the opposite direction.

Authors state that, creation of more efficient social policies and poverty reduction strategies is not sufficient to base exclusively on unidimensional indices that address just one dimension of poverty.

Keywords: *multidimensional poverty indices, fuzzy poverty indices, Alkire – Foster poverty indices*

JEL classification: I131, I132

COVERAGE ISSUES IN AGRICULTURAL SURVEYS IN THE REPUBLIC OF SERBIA

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ABSTRACT

The Statistical Farm Register (SFR) is the key element in the Agricultural Statistical System. The sampling frames for agricultural surveys are built using the data on agricultural holdings from the SFR, which means that well constructed and up-to-date register is the basis for setting up a coherent system of sample based agricultural statistics.

In the Statistical Office of the Republic of Serbia (SORS), initial Statistical Farm Register (SFR) has been constructed in 2013. Initial SFR included all agricultural holdings identified during the Agricultural Census 2012. Since 2014, SFR is updated using data from the Register of Agricultural Holdings of the Ministry of Agriculture and Environmental Protection, Bovine Register, data from Statistical Business Register and survey data. The main goal of updates is to allow tracking the changes in the holdings using different sources. The main issues in the updating procedure are establishing reliable links and consistency of the variable definitions between relevant sources. During the process of updating process, it is possible to encounter: splitting and merging holdings, holding ceased to exist

in one source and holding is active in another, holding exist in administrative source and not in SFR. Issues concerning updating SFR have impact on the coverage errors of the sampling frame.

The procedure for updating SFR from administrative sources has been written by Department of Agriculture in SORS, but it hasn't been officially verified by all parties involved. Updating from surveys has also been done, but appropriate procedure still hasn't been written. Some obstacles, their impact on coverage errors and ideas for solving them will be presented in this paper.

Keywords: *Statistical Farm Register, agricultural surveys, coverage errors*

JEL classification: C78

DETECTION AND TREATMENT OF OUTLIERS IN THE MONTHLY SURVEY ON THE TURNOVER IN INDUSTRY IN THE REPUBLIC OF SERBIA

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ABSTRACT

In this paper we discuss detection and treatment of outliers in the Monthly Survey on the Turnover in Industry, in the Republic of Serbia. A short review of the sample methodology for this survey is presented in this paper.

An outlying observation, or outlier, is one that appears to deviate markedly from other members of the sample in which it occurs. Outliers can have damaging effect on statistical analyses. They generally serve to increase error variance. In addition, they can seriously bias or influence estimates.

Current procedures for outlier detection in this survey include calculation of the share of the individual strata in the total sample variance. Data in those strata that have the highest share in the total sample variance are examined, and methodologist subjectively singles out the units with very unusual values of weighted turnover, and marks them as outliers. Not all detected outliers are treated. In choosing which of the detected outliers will be treated the methodologist follows some given guidelines, which are presented in the paper. Diverse nature of outliers makes systematic procedures difficult however one should try to be as consistent as possible in their detection and treatment.

Further, this paper presents the results of comparison of estimates from this survey, calculated with and without outlier treatment. From the analysis of the results we can see that treatment of outliers has positive effect on the estimates of coefficient of variation and decreases their value, but can introduce bias.

Since examination of data is susceptible to omissions and errors our goal was to introduce consistent methodology in outlier detection. Therefore, the last section of this paper discusses drawbacks of the methods in use and presents possible improvements with the introduction of the "quartile method" for detection of outliers. By trying out this method on the data from the survey for the first three months in 2016 we got very similar results as with examination of data. From this experiment we came to a conclusion that this method eases the detection by automating the process, standardises detections and eliminates errors that arise from examination of data and we plan to implement it in the future. This method, however, only automatizes the detection of outliers. The decision whether it should be treated or not is still left to the judgment of the methodologist.

Keywords: *outliers, detection, treatment, quartile method*

JEL classification: C89

Session 1b: Modernization in Official Statistics

COMPARATIVE STUDY OF METADATA IN OFFICIAL STATISTICS - WHAT HAS CHANGED SINCE 1905?

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ABSTRACT

This paper reports results of a comparative study about topics, classifications and variables used in Croatian official statistics at the beginning of 20th century as opposed to those used at the beginning of 21st century. Croatian official statistics can be dated back to 1875 when the Royal Statistical Office in Zagreb was founded. Statistical Yearbook of the Kingdom of Croatia and Slavonia for 1905 published by Royal Statistical Office in 1913 represents the most comprehensive and well-made statistical publication of that period which contains all of the statistical production for the years 1901-1905. Units of analysis in this study are statistical metadata found in the Yearbook for 1905 and statistical metadata from all statistical publications in 2015 produced by the current principal producer of the official statistics system in Croatia - Croatian Bureau of Statistics. Methods of comparative analysis and content analysis are used in two sets of data with several goals in mind. First goal is to determine which sector-specific statistics is the most represented in each of the time periods by qualitatively and quantitatively analyzing the metadata in statistical tables. Second goal is to list classifications and variables which have remained the same, or have experienced little modification,

during the period of 110 years. Final goal is to explore the metadata which existed in the past, but doesn't have it's contemporary equivalent. Special focus is given to group such metadata. First group is the metadata that disappeared because of technological and social changes in society resulted in extinction or marginalization of studied phenomena. Second group is those that disappeared because of the advances in statistical methodology and professional ethics. Third group is the metadata that doesn't exist anymore because doesn't reflect the values and interests of our contemporary society.

Keywords: classification, comparative analysis, content analysis, history of statistics, values

MODERNISATION OF BUSINESS STATISTICS: CHALLENGES AND OUTCOMES OF THE SLOVENIAN STATISTICAL OFFICE

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ABSTRACT

Business statistics are facing major challenges: the world economy has become global, more integrated. Development and growing importance of the service sector in recent years have led to increasing demands and needs for a separate and broader monitoring of services. At the same time there is strong pressure to cut red tape and reduce the burden on enterprises.

For business statistics to continue to be relevant to users, to also balance the needs for information between traditional statistical areas and the areas of emerging economic phenomena and at the same time reduce the burden on enterprises, it was necessary to begin to invest in an integrated approach and renovation. At the European level a special project was launched aimed to integrate the existing domain-specific regulations in business statistics by establishing a cross-cutting legal framework for the collection, compilation, transmission and dissemination of statistics related to the structure, economic activity, competitiveness, global transactions and performance of businesses. At the national level these resulted

in modification and modernisation of the current statistical methodology and processes as well as in the development of missing economic indicators in the field of business statistics.

The Slovenian statistical office responded to the challenges in different ways by adequately reflecting these new phenomena and requirements. Article illustrates the challenges we have been facing on this path, some results and solutions, which are already available and have recently been implemented in practice.

One of the main engagements done in recent years was to strengthen the role of the business register at the national level by setting up the new Statistical Business Register (SBR). The SBR with several functionalities is thus becoming the backbone of business statistics and has been regularly preparing the monthly and annual iteration. Other important tasks were the development of new economic indicators (e.g. index of service production, quarterly and regional business demography, trade by enterprise characteristics), modernisation of data collection by implementing electronic questionnaires and the rationalisation of the statistical processes.

In the context of monitoring the phenomenon of globalization, we start with the investigation of profiling and its testing in practice. Also connected with profiling was another technical challenge, i.e. setting up a new enterprise group register with examination of different administrative data sources for its purpose and establishing connections and data exchange with the European group register.

Although the modernisation of Slovenian business statistics started several years ago, some important and complex challenges are still in front of us. Modernisation and rationalisation of the intra-EU trade of goods statistics also through the implementation of new data source (i.e. micro-data on intra-EU exports from other member States) is definitely one of them.

Keywords: business statistics, modernisation, globalisation, register, enterprise

JEL classification: M

POSSIBLE APROACH TO MODERNISE STATISTICAL SYSTEM OF BOSNIA AND HERZEGOVINA

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ABSTRACT

Today's national statistical institutes (NSIs) are facing many challenges, such as: rapidly changing technologies; emerging information needs and increasing demands of the public for timely, relevant, up-to-date statistics; reduced budgets for official statistics production but increased costs and quality problems; availability of new data sources (e.g. Big data, geospatial data), as well as occurrence of the new competitors in producing statistics. In order to gain a sustainable competitive advantage NSIs need to modernize their processes and technologies, increase skilled resources, tools, methods and standards, and adopt common solutions to meet new demands. As a part of the modernization efforts, process-oriented approach to statistical production has become very popular in recent years. Moving from the traditional current state to a more process-oriented organization is a complex, time consuming and costly (in terms of the time it takes and the needed investments in machines, tools and skilled labour) effort. In the process-oriented organizations the focus is placed on business

processes, improvement of interdepartmental and cross-functional interaction, with the goal to optimize the execution of the whole process by a thorough understanding of end-to-end processes and production system as a whole. One of the international standards supporting this modernization process is the Generic Statistical Business Process Model (GSBPM). Statistical institutes of Bosnia and Herzegovina adopted GSBPM as a part of their strategies, but the specific steps to its establishment have not been planned yet.

This paper focuses on elaboration of the possible approach for modernization of the statistical system through the implementation of the following steps in the statistical institutes: (1) assessment of the current situation in terms of establishment of the GSBPM, (2) initiation of a strategy and a project, mandated to propose and implement activities for the establishment of the GSBPM; (3) adoption of the tailor made GSBPM, (4) development of an IT tool supporting wok-flow, process management and monitoring, which includes (4.1) development of an IT tool unifying/standardizing the processing phases of the statistical process, (4.2) development of an IT tool for automation of the maintenance, and (4.3) development of an IT tool for the monitoring of the whole standardisation and automation processing, (5) development of the template for the detailed methodological descriptions and applications for all subject-matter domains, (6) preparation of the detailed GSBPM-based process documentations, (7) establishment of the GSBPM-based metadata system, (8) establishment of the GSBPM-based quality management system.

Modernization takes long time, so even the NSIs which are at most committed to streamlining the processes have not yet fully completed statistical workflow management systems, the end-to-end standardisation and automation of statistical processes. In this paper the modernization processing in a few countries (i.e. Croatia, Hungary) will be briefly presented too.

The adaptation of the international standards for the business processes and establishment of a coherent system, make the NSIs more efficient in comparing and integrating the international best practices and standards in the methodology, quality and IT fields, as well as in identifying further needs for harmonisation and development.

Keywords: *process-oriented approach, GSBPM, standardisation, automation*

SELECTIVE EDITING – NEW APPROACHES AT THE STATISTICAL OFFICE OF THE REPUBLIC OF SLOVENIA

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ABSTRACT

Data editing has always been considered as one of the most demanding and consequently most costly parts of the statistical process. Therefore, statistical

offices are putting a lot of effort into activities that would reduce costs and decrease the workload caused by this part of the process. Implementation of a selective editing approach is certainly one of the most commonly used means to achieve this goal.

The entire editing process should be designed in such a way that it focuses on the mistakes that actually affect the estimates. Selective editing approach aims to search for significant errors, accepting that the final data set still contains a number of errors with no effect on the final estimates. Its main purpose is therefore to reduce the amount of changes in the microdata, maintaining the acceptable quality of statistical results. This not only leads to a reduction of costs, but also to improved overall quality of the data.

The Statistical Office of the Republic of Slovenia has already been using the selective editing approach for some time. The problem of the current practice is that it is based on the so-called system of key respondents. Key respondents are the most influential units that are pre-selected to be treated differently in the data collection and data editing phases. Recently we have been trying to introduce a different approach, which would be based on the posterior information obtained in the data collection phase and on the appropriate implementation of the score function idea. With this approach, the number of errors that require manual attention is reduced.

The paper presents the results of the feasibility study carried out to investigate the possibilities of introducing the new approach and to explore possible benefits of the renewed system. Results of the feasibility study are followed by strategic outlines for further development.

Keywords: *selective editing, error detection, score function, statistical software*

JEL classification: C18, C81, C88

MONITORING AND EVALUATION: DEVELOPMENT INDICATORS

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ABSTRACT

Today, the concept of monitoring and evaluation has an important role in international development area. Monitoring and evaluation support for the improvement of performance and achievement of the results concerning the intervention of international organizations. International Development is monitored and evaluated by the actors in international arena via several tools including the indicators. At this stage, Statistics has a critical position since the actors in the international development arena need the data in order to measure the performance. Due to this huge demand, statisticians have to measure the indicators related to the development. However, how will statisticians be able to cover all data under this complicated and extremely diverse domain of factors? Therefore, Statistics is not only a tool for monitoring the achievement of international goals and targets but also it is a target itself under the Sustainable

Development Goals (SDGs). Within this context, a general framework on the concepts of monitoring, evaluation and indicators is outlined in this paper. While the indicators for the measurement are examined like the functions and types indicators; SDGs, their connection with Statistics and the importance of statistical community in the context of the 2030 agenda are explained. In the final part of paper, considering that Statistics is a development target, the indicators in Statistics area are focused as well as a statistical analysis on one of the indicators of the target 17.19 under the SDGs.

Keywords: *Sustainable Development Goals (SDGs), Indicators, Measurement, Statistics, International Development, International Aid.*

Note: The opinions and arguments expressed in the document are those of the author and do not necessarily reflect the official views of the Turkish Statistical Institute.

UTILIZATION OF BALANCED SCORECARD AS A MANAGEMENT TOOL IN STATISTICAL INSTITUES

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ABSTRACT

In the era of globalization, the social, economic and demographic fast changes made official statistics under increased pressure to provide more reliable, high quality and relevant statistical informations for the users of statistics. New modern approaches to strategic management in statistical institues are imperative to deal with challenges in this rapidly changing operating environment. Official statistics must produce information not data that will be valuable for customers, other users and tax payers. Adoption of modern management tools in statistical organizations can help them to face these challenges. An excellent management tool is Balanced Scorecard (BSC) model as a probative tool for achieving better performance and efficiency in both, private and public sector. BSC is a

measurement system, strategic management system and a communication tool. Balanced Scorecard was developed by Robert Kaplan and David Norton from Harvard Business School as a system of management and instrument of strategic planning. At the beginning BSC was used by the private sector but later it was translated and effectively implemented in public and nonprofit sector. BSC combines the strategy of an organization and its operational activities from four different perspectives: Learning and Growth Perspective, Internal Business Process Perspective, Customer Perspective and Financial Perspective. Application of BSC is much more challenging in public than in private sector because the public sector is much more service and knowledge oriented with less tangible desired outcomes. BSC must be modificated and adopted to fit organization to achieve success in tracking organizational performances and execute strategy. The purpose of the paper is to look at the Balanced Scorecard and discuss in what way it should be applied in official statistics. Methodology/design /data of the paper are based on extant literature on the Balanced Scorecard system and reports of BSC applications in other statistical institutes. Findings of this paper are that modificated BSC as a management system can help statistical institutes to face the challenges in this fast changing environment, manage necessary changes to satisfy all stakeholders and face with increased demands for high quality infomations. Utilization of Balanced Scorecard system in statistical institutes would be very useful in demonstrating accountability and showing real results of progress on important issues. BSC measures performances so donators can be sure they are supporting effective progress.

Keywords: *Strategic management, Modern management tools, Official statistics*

JEL classification: C40, C80, E01

DAY 2

Friday, March 31, 2017

- Issues in Economic and Financial Statistics
- Issues in Administrative and Social Statistics
- Session 2a: Economic and Finance Statistics
- Session 2b: Issues in Social and Welfare Statistics/Quality in Official Statistics

Issues in Economic and Financial Statistics

THE MACROECONOMIC IMBALANCE PROCEDURE AND SCOREBOARD: STATISTICS FOR POLICY MAKING

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ABSTRACT

The Macroeconomic Imbalance Procedure (MIP) is part of the European Semester which enables the European Union member countries to coordinate their economic policies throughout the year, addressing economic challenges. The MIP is a surveillance mechanism that aims to identify potential risks early on, prevent the emergence of harmful macroeconomic imbalances and correct the imbalances that are already in place.

The European Semester starts every year in autumn with the publication of the Annual Growth Survey, setting the general economic priorities for the European Union, and the Alert Mechanism Report (AMR). The MIP is supported by the analysis of a set of indicators, the scrutiny of which could trigger further analysis at country level. MIP indicators cover external imbalances, competitiveness positions and internal imbalances. Eurostat is in charge of producing the Statistical Annex to the AMR, a document covering the MIP indicators used in the economic reading.

The MIP scoreboard is the set of fourteen headline indicators accompanied by thresholds, intended to screen internal and external macroeconomic imbalances, covering a time span of ten years for the twenty-eight European Union Member States. It acts as a first filter in a broader process seeking to disentangle the existence and severity of macroeconomic imbalances in the European Union Member States, identifying countries and issues for which a closer analysis is deemed necessary. In this process, the scoreboard is used by policy makers, together with a set of auxiliary indicators, for their economic reading. MIP indicators are calculated from several statistical areas, following specific quality assurance frameworks, including national accounts, balance of payments statistics, price statistics, Excessive Deficit Procedure (EDP) statistics and labour market statistics.

Statisticians commit to supply policy makers with data of the highest possible quality, comprising data comparability across time and countries, which is essential for policy decisions at the European level. Eurostat and the European Statistical System (ESS) follow an encompassing quality management approach based on the European Statistics Code of Practice, including the statistical domains underlying the MIP indicators. The application of those principles in such domains guarantees a high quality of the data used in this policy exercise. Moreover, maintaining and improving quality is a permanent process and the ESS continuously enhances data quality of statistics underlying MIP indicators.

MIP indicators are disseminated in a dedicated section of Eurostat website available at: http://ec.europa.eu/eurostat/web/macroeconomic-imbalances-procedure/indicators. Data are presented together with a range of different tools tailored to different user profiles: metadata, legislation, background information, dashboards and publications.

Keywords: *policy indicators, macro-economic imbalances, quality, dissemination*

JEL classification: E02, E61, H12

LET THE DATA SPEAK!

USING DATA-DRIVEN CONTEXT AND BENCHMARKING TO TELL PERSUASIVE STORIES

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Statistics without context are like words without sentences. Sure you can say the word or the number, but they don't mean much. String the right words together and you can build a powerful statement that can transform human understanding. The same must be said with statistics. Putting statistics into a context and then adding benchmarking can transform statistics into stories. Producers and consumers of data need to grasp the language of story-telling through statistics and the role that context and benchmarking must play. This session will look at the elements of using context and benchmarking in global development data by using examples like the World Bank's Find Friends statistical database and Synthetic Control Method and how you can apply it to your own analysis.

Typically, when we want to understand how a country or a canton is performing we compare their economic performance with their near neighbors, as if geographical proximity is the defining characteristic of comparability. But is it? I will present a new tool that I have developed called 'Find my Friends', which can identify statistical similarities between countries across the globe, so it is easy to compare the macroeconomic, fiscal, debt and human development outcomes of your country with the relevant comparator countries.

The tool uses the largest ever assembled set of country databases to facilitate benchmarking of a country's performance with that of its actual peers – not just simply with its neighbours. Additionally, the tool can identify which countries with similar structural and economic conditions have performed better than your country, which can offer an entry point for asking how they managed that, despite having the same fundamentals.

There are also advanced statistical approaches to conduct benchmarking including Synthetic Control Methods. SCM is a new approach that has emerged only in the last decade by Abedie et al (2003, 2011) and has become increasingly popular, particular for its application in constructing counterfactuals in a quasi-experimental setting. I will demonstrate how we were able to estimate the economic impact of the Syrian Conflict by relying on Synthetic Controls to calculate Syria's counterfactual by way of benchmark countries. This approach to benchmarking allows policy makers to estimate the counterfactuals of different policy interventions including war.

Contextualization and Benchmarking are necessary in every analysis we undertake. The key is understanding how and when to use them. Otherwise we are just reporting numbers, but what we need is statistics that tell stories.

THE DEVELOPMENT OF THE GOVERNMENT FINANCE STATISTICS (GFS) IN SOUTH EAST EUROPE

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ABSTRACT

INTRODUCTION OF THE SECO-FUNDED GFS TECHNICAL ASSISTANCE PROJECT

The Switzerland-funded GFS implementation project supports the efforts of five countries in South East Europe—Albania, Bosnia and Herzegovina, Kosovo*, the former Yugoslav Republic of Macedonia, and Serbia—to strengthen the compilation and dissemination of their government finance statistics (GFS) according to international and European standards.

The project strengthens the ability of the authorities of the targeted countries to compile and disseminate GFS and related macroeconomic data. This enables better analysis and understanding of the respective country's economic developments and underlying fiscal position, and serves the formulation and implementation of appropriate macroeconomic policies and the identification

and assessment of fiscal risks. Having GFS according to European and international standards promotes fiscal transparency.

SECO'S INVOLVEMENT

The GFS implementation project is supported by the Swiss State Secretariat for Economic Affairs– SECO. Improving the compilation and reporting of fiscal data feeds into the broader agenda of SECO engagement in the region, covering the area of developing effective institutions and services, as well as transparent resource mobilization and reliable public financial management. As part of its larger program, SECO focuses its interventions in economic and financial policy on two areas of particular importance: reform of public finance and strengthening of the financial sector. Both are essential for a country's sustainable inclusive growth.

EU AMBITIONS

All countries hold aspirations to join the European Union (EU), with Albania, the former Yugoslav Republic of Macedonia, and Serbia already candidate countries. Candidate countries need accept the so-called EU acquis (a body of common rights and obligations that is binding on all the EU member states) before they can join the EU, as well as make EU law part of their own national legislation. This is also relevant for GFS which is covered, among others, in Chapter 17 (of 35) – statistics. Included in this is compliance EU requirements under the EU Excessive Deficit Procedure (EDP), and the comprehensive development of European System of National and Regional Accounts (ESA 2010).

COUNTRIES ALREADY HAVE FISCAL DATA

Developing GFS in these countries according to European and aligned international standards, such as the IMF Government Finance Statistics Manual (GFSM 2014), is not born in a vacuum. Ministries of Finance already produce fiscal data, most often within the context national budget of fiscal law. These laws often fit national budget policy purposes, of which the execution is reported to parliament. These fiscal data output were often designed outside the context of modern international statistical standards (ESA 2010 or GFSM 2014). Importantly, these fiscal data are used by the IMF as part of conducting its macroeconomic surveillance. When countries are engaged in an IMF program, the countries also provide tailored data to serve program needs.

WHY WOULD AVERAGE CITIZEN BE INTERESTED?

The average citizen does not have its finger on the national GFS pulse, often not fully understanding the concept. Government deficit and debt being the two main concepts commonly understood. However, other macroeconomic statistics that cover topics such as gross domestic product (GDP) growth, developments in the consumer price index (inflation), or unemployment (a social statistic), capture the imagination more.

Nonetheless, quite like these statistics, GFS impacts policy on an ongoing basis. Lack of sound GFS can even help trigger a social-economic-political crisis, with the Greece government debt crisis being a stand-out example of recent years. More often, weak fiscal data impedes transparency and the understanding of the impact of fiscal outcomes on the macroeconomic environment, and can therefore lead to inferior policy decisions. Conceivably public debt and cash managers are hampered to project future financing and liquidity needs. Members of parliament, civil society organisations, international partners, among others, lack insights, which could undermine confidence in policy discussions.

Cases illustrate where revisions of official data through improved adherence of international methodologies necessarily impacted policies, both in the private and public sector:

- Nigeria GDP estimate grew 80% after the 2014 revision
- Greece deficit was revised upwards by about 1,5% to 2% of GDP for each year 2006-2009

Comprehensive, consistent, and timely GFS helps decision making that impact daily lives. Sound fiscal policy is underpinned on fostering fiscal transparency and sustainability. Decisions on health care provision, strengthening education, expanding infrastructure, pensionable age, tax rates, total fiscal burden, etcetera are all informed by knowing in-depth the current state of play across the entire government. How and when to build a national highway network is, for instance, informed by knowing how the financing will impact government debt, but also how the investment will feed into the GDP measure, even helping inform the knock-on effects for the wider economy.

WHAT MAKES FOR HIGH QUALITY STATISTICS (WITH GRAPHICAL EXAMPLES)

Improving the fiscal statistics framework is a comprehensive endeavour, requiring ongoing and sustainable coordination between many different institutions, who act as data providers, compilers and users. Implementing international standards requires procedural steps, numerous conceptual and methodological questions and case-assessments. The goal of the national compilers is to develop GFS with four vital criteria in mind, that will allow for international comparability:

- Coverage
- Comprehensiveness
- Consistency
- Classification

ROLE OF STATISTICS OFFICE

To achieve high quality GFS, the national statistics office plays an essential role. Its independent status, supported by a national Statistics Law, often gives it comprehensive authority to collect, compile, and publish official data. Most often, the compilation of GDP, the fundament of macroeconomic statistics, falls within its remit. With GFS and its related outputs being a central component of the National Accounts – the need to compile GDP and GFS in an integrated and coordinated manner is apparent.

In the European context, statistics offices are most often responsible for methodological decisions in the compilation of ESA 2010, and thus GFS. Developing GFS in the region therefore asks for traditional responsibilities for compiling and publish fiscal data to be (partially) transferred to the national statistics office. Which, beyond the above-mentioned coordination efforts between institutions, also asks for increased and strengthened resources in national statistics offices, such as staff, IT-systems, technical knowledge, and project management skills. The independence of the national statistics office is as durable as its resources.

Issues in Administrative and Social Statistics

ADMINISTRATIVE DATA, LOW-COST AND SHORT DURATION EVALUATION, AND EVIDENCE-BASED POLICYMAKING: EXPERIENCE FROM MEASURE -BIH

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ABSTRACT

Administrative data refers to data collected for the administration of a program, it is usually collected for monitoring of government programs, targeting government interventions, and enabling regulation and auditing. These data, especially when linked across programs or to survey data, can sometimes make rigorous program evaluations more informative and less costly, while also providing strong empirical evidence for policymaking. Specifically, the advantages of using administrative data include time and cost savings, and the possibilities of obtaining accurate data and a large sample size at low cost. Because administrative data are already being collected, they can reduce or eliminate the need to collect data through additional monitoring activities or surveys. Administrative data are usually updated regularly, incorporating them into performance measurement and

program evaluations can enable a more timely response to implementation issues or faster analysis of key indicators. In addition, since administrative data typically cover the entire population of beneficiaries, they provide a large sample size and can be more accurate than self-reported survey data.

This paper illustrates how administrative data can be effectively incorporated into low-cost and short-duration rigorous evaluation and performance measurement in the area of international development through the experience of USAID/Bosnia and Herzegovina Monitoring and Evaluation Support Activity (MEASURE-BiH). Specifically, in the non-experimental impact evaluations of the two economic development activities funded by USAID- Fostering Agricultural Markets Activity (FARMA) and Fostering Interventions for Rapid Market Advancement (FIRMA), we combined BiH administrative databases of industrial company balance sheet and P&L data from the Agency for Financial and Information on Business (AFIP)/ Agency for Mediation, Information, and Financial Services of RS (APIF) with activity monitoring database to implement the difference-in-differences propensity score matching (DID-PSM) estimator, both evaluations were completed within 2 months, generating useful empirical evidence for USAID economic development program designs. We also highlight the complementary between administrative data and survey data in performance measurement by introducing the Judicial Effectiveness Index of BiH (JEI-BiH) development through MEASURE-BiH. The composite index tracks BiH judiciary performance in five important dimensions: efficiency, quality, accountability and transparency, capacity and resources, and independence and impartiality. In constructing the composite index, we combined three data sources (administrative data on the population of cases in BiH courts and prosecutor offices, public perception survey of BiH citizens, and survey of judges and prosecutors in BiH) to capture a comprehensive snapshot of the BiH judiciary.

While administrative data have many advantages in the building evidence for decision making, ensuring that they are accurate and reliable is more important

than their low cost. At the end, we discuss the tradeoffs analysts need to consider when using administrative data for monitoring and evaluation.

Keywords: administrative data, evaluation, measurement

JEL classification: C80 C31

NEW DIRECTIONS IN WELFARE MEASUREMENT IN THE WESTERN BALKANS

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ABSTRACT

As countries in the Western Balkans proceed on the path to accession to the European Union (EU), they need to strengthen their statistical tools for measuring poverty and social inclusion and align them to the requirements set forth by the European Acquis Communautaire. This is one of the major challenges facing Western Balkan countries in the area of statistics. A well-established set of indicators of social inclusion has been developed at the European level, and monitoring them is increasingly becoming a priority. Countries in the region have progressively developed statistical systems which are currently at different stages of transition to a full European model. While, ultimately, for full accession, conformity to European requirements is nonnegotiable in the long run, because of the characteristics of many of the economies in the Western Balkans, full compliance to EU-SILC introduces particular challenges for welfare measurement.

This presentation aims at illustrating two of the main challenges introduced by the adoption of the EU-SILC. Both of them are related to the move from a consumption aggregate, which was traditionally used in the region, to an income aggregate for welfare measurement. The first challenge, is the contrast between poverty measurement using consumption and an absolute poverty line, and

the at-risk-of-poverty indicator, based on an income aggregate and a relative poverty line. While in the first case the aim is to provide a measure of the ability of households to attain a minimum standard of living and it is appropriate to track improvements in time, in the second case the measure aims to identify households that are lagging behind in the distribution, regardless of their objective welfare level, and it is not well designed to track improvements in their objective living standards.

The second challenge discussed is related to the practical difficulties in measuring income. These lie primarily in the systematic underreporting of income due to the high level of informality in employment and the heavy reliance of own production of goods and services for own consumption. In addition, income is much more subject to seasonal fluctuations than consumption, for example, because of the interannual variation of cropping seasons and the occasional nature of many informal activities. Furthermore, where many of the income earning activities are small and informal, record keeping is not common, rendering difficult the proper estimation of net returns from both farm and nonfarm activities. Finally, the sensitivity of income information can potentially result in high nonresponse rates among nonrandom segments of the population, thus leading to potential estimation bias. All these difficulties highlight the need to adapt the collection of income information to local conditions in order to obtain a measure of welfare as accurate as possible.

Session 2a: Economic and Finance Statistics

ECONOMIC ACCOUNTS AS A TOOL OF AGRICULTURAL POLICY

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ABSTRACT

The contribution presents the Economic accounts for Agriculture (EAA) as a tool for the compilation of economic analysis and the agricultural policy-making at the county's or EU-28 level.

The legal background of the Economic Accounts for Agriculture and Forestry 97, Rev. 1, as a satellite accounts, are the classifications, definitions, and accounting rules of the European System of National Accounts (ESA). Compilation of the economic accounts for agriculture is one of the regular tasks of the Statistical Office of the Republic of Slovenia (SURS).

EAA as the sequence of the mutually connected accounts incorporate the data of the basic observation units - agricultural holdings performing agricultural activities, defined in NACE classification 01 on Agricultural production, hunting and the related services. The data on EAA are compiled for the calendar year and present the agriculture as a "pure" activity.

In the article the data of the economic accounts for agriculture for Slovenia are analysed for the 2005–2015 period. The reasons for that are the changes of the agricultural policy for the 2007–2013 period, the reflection of the changes in economic accounts for agriculture and the availability of the EU-28 data from 2005 onwards.

The data of the production account, primary income account, entrepreneur account and the capital account at current and at constant prices enable the comparison of agriculture with the other activities and with the whole economy, accompany the production and intermediate consumption structure, volume and price movements, the structure and the division of factor income and gross fixed capital formation.

The contribution presents the analytical possibilities based on the data of agricultural production value, gross value added, factor income, gross capital formation in current and constant prices that are the base for the comparison of the agriculture with the total national economy, for time frame analysis of agriculture, for the monitoring of the structural changes between the years, for the international comparisons and for the calculation of income indicators.

The attention was put on the international structure of the factor income (agricultural activity, subsidies) of EU-28 as well as the participation on the factor income by the producer factors: labour input, land and capital.

The important item that influences the income indicators is employment expressed in annual work units (AWU) divided in paid and unpaid employment. The article presents the international comparisons of the employment as well as the important role of calculating the income indicators.

Keywords: *EAA, satellite accounts, factor income, subsidies in agriculture, employment in agriculture*

JEL classification: Q1

CAUSAL IMPACT OF PUBLIC REVENUES AND PUBLIC EXPENDITURES IN REPUBLIC OF MACEDONIA

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ABSTRACT

Analyzing the relationship between public revenues and public expenditures is vital for establishing appropriate fiscal policy crucial for appreciating the consequences of unsustainable fiscal deficits and as a result in addressing such imbalances due to the fact that fiscal policy is important tool for promoting price stability and sustainable growth.

The main purpose of this paper is to investigate the causal relationship between public expenditures and public revenues in the case of Republic of Macedonia, conducted through monthly data for the time period from 2000 to 2015, by using Granger causality and Vector Error Correction Model (VECM) tests

methodology. Data properties were analyzed to determine their stationary by using Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) test for unit root. Additionally, in order to test the causality between the series of public revenues and public expenditures, it's necessary to verify if the two series are cointegrated therefor Johansen test for cointegration is implemented. Moreover, for modelling variables in a manner that conquest inseverable characteristics of its time series, we use Schwarz Information Criterion (SIC) to properly define lag structure of the series. Although plenty of empirical research is available on revenue and expenditure relationship yet there is no consensus about the causal link between these variables. Indeed, it is noted unidirectional causal evidences from revenue to expenditure and from expenditure to revenue available in the literature and on the other side there exist some studies that claim bidirectional link between these variables.

Due to the available theoretical and empirical findings regarding the causal link between public revenues and expenditures both in developed and developing countries, an existing consensus regarding the nexus of these variables is not found so far. Moreover, based on the empirical side of causal link between public revenues and expenditures, there is no a discernable pattern among countries, thus demonstrating country specific analysis results. Despite the significance of a proper understanding of relationship between public expenditure and revenue in formulating fiscal policy, there is scanty empirical study for the case of Macedonia. Theory implies existence of three main hypothesis regarding the relationship of public revenues and expenditures: tax and spend hypothesis, spend and tax hypothesis and fiscal synchronization, while results regarding the case of Macedonia, are addressing to the second hypothesis, thus public expenditures granger cause public revenues for the analyzed time period 2000 – 2015.

In addition, this paper tries to add a solid contribution to the empirical debate of the causal link between public revenues and public expenditures by using data

from a transition country such as Republic of Macedonia, to be used as further recommendation regarding budget deficit planning policy for the future.

Keywords: *Public revenues, Public expenditures, Budget deficit, Granger causality, Vector Error Correction Model.*

JEL classification: E620

FORECASTING LABOUR PRODUCTIVITY IN THE EUROPEAN UNION MEMBER STATES: IS LABOUR PRODUCTIVITY CHANGING AS EXPECTED?

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ABSTRACT

In order to be competitive and to ensure economic growth a country should take care about its labour productivity development. Not only the labour productivity must be observed in present time but the projections of future trends and its developments must be conducted. Consequently, the aim of the paper is to propose different ways of forecasting labour productivity developments by using different statistical forecasting methods and by applying different approaches of the most appropriate statistical forecasting method selection.

In the paper are examined labour productivities, measured per employee and per hour worked, in the European Union (EU) member states in period from 1990 to 2016. In the forecasting analysis seven statistical forecasting methods have been used to forecast labour productivity for each EU member states separately and for the EU as whole. Overall three approaches to determine the forecast values of labour productivity have been used in the analysis. In the first approach the forecast values were determined by using statistical forecasting method with the lowest Mean Squared Error (MSE). In the second approach the forecasting was conducted based on data from 1990 to 2015. The statistical forecasting method with the closest forecasting value from 2016 to the real value from 2016 was used to determine labour productivity changes in the future. In the third approach, which was introduced in the paper, all seven statistical forecasting methods were used together to determine forecasts. The impact of each statistical forecasting method was determined by using MSE approach. The lower MSE of a statistical forecasting method is, the higher impact or the higher weight on the forecasts the statistical forecasting method will have. In order to make groups of the EU member states with different labour productivity level, statistical non-hierarchical clustering approach was used.

According to the labour productivity per employee measure, at standard forecasting approach, forecasts labour productivity will increase in 14 EU member states in the future whereas according to the labour productivity per hour worked

measure the labour productivity will increase in 18 countries. Similar, benchmark forecasting approach show labour productivity level increase in 18 EU member states. Weighting forecasting approach forecasted labour productivity decrease only in Luxembourg and in Spain. According to the weighting forecasting approach and the average labour productivity per employee trend value for low level labour productivity countries is 1,221.03 US$, for medium level labour productivity countries is 1,093.41 US$, and for high level labour productivity countries is –7.36 US$. These results are suggesting that countries with lower labour productivity level are going to have higher labour productivity increase per year than countries with higher labour productivity level. On that way, the differences in labour productivity between countries should be smaller.

In the future research labour productivity level convergence in the EU should be investigated. Furthermore, the labour productivity should be examined more detailed, i.e. on monthly base, to get better insight into labour productivity trends.

Keywords: *competitiveness, European Union member states, labour productivity, statistical forecasting methods, weighting*

JEL classification: C53, E24, J24

IMPACT OF SMALL AND MEDIUM ENTERPRISES ON GROSS DOMESTIC PRODUCT IN FEDERATION OF BOSNIA AND HERZEGOVINA FOR PERIOD 2011-2015

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ABSTRACT

Today's economy has changed significantly compared to previous decades, and is still changing rapidly. Due to the process of globalisation, new markets are opened, new technologies are developed and new knowledge is required. Small and medium enterprises (SMEs) are defined as the ones who are able to adapt to any market changes, which makes them more efficient, having low management costs. SMEs are not affected due to economic crises, such as big companies. Therefore, SMEs are more efficient and play major role in developing economies such as economy of the Federation of Bosnia and Herzegovina (FB&H). Apart from that, SMEs also play a significant role in creating Gross Domestic Product (GDP) in developed economies around the world. Most authors state their importance in solving problems such as unemployment, economic growth and adjustment to technology, and market changes. On the other hand, SMEs in developed economies have an influence on GDP around 90% and provide approximately

60-70% of the total number of employed people. The main goal of this paper is to explore and identify the current situation in FB&H in five year period and to enhance development of SMEs, which will lead to improved economic development and growth. Results and recommendations that will be given in the paper regarding situation of SMEs in FB&H can be used to advance all necessaries for development of SMEs, economic policy, growth and development of GDP. SMEs significant role also lies in development of urban and rural areas, as well as developing national economic growth. The European Commission and EU Member States have shown that SMEs are considered as a key element of Europe's competitiveness while being open to innovations. This paper aims at presenting the real situation in FB&H, which is one of the key elements in strengthening the economy and making steady progress. It will be shown where improvements can be made, and how to encourage people to take the step further and open new companies which will lead in a higher number of employees and improving growth of FB&H economy. Research data used for writing this paper were existing SMEs and entrepreneurs, non-observed economy excluded. The impact of compensation of employees in SMEs on total compensation in FB&H will be shown in the paper. Emphasis will be placed on encouraging people to make a decision of becoming entrepreneurs in our economy by taking the example of EU and other world economies being based on the SME sector. This paper aims to present the impact of SMEs on GDP in FB&H for the period 2011 - 2015, using comparative statistics and showing everyone the importance of SMEs. It will be used as a model for creating national policy for guidance and support to everyone who wishes to become an entrepreneur. These steps would highly motivate, inspire and trigger community to take matters into their own hands and be a part of creating something which will be beneficial not only for the individuals but also for the economy.

Keywords: SMEs, GDP, economic growth, FB&H

JEL classification: E00, G18, M21, O11

GOVERNMENT FINANCE STATISTICS IN BOSNIA AND HERCEGOVINA: HOW FAR HAVE WE COME

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ABSTRACT

Fiscal Reporting is the first principle of Fiscal Transparency according to the International Monetary Fund's Fiscal Transparency Code which comprises set of principles. Its main purpose is to present accurate picture of government finances and to provide markets, legislatures and citizens with the necessary information to hold the government accountable. Fiscal Reporting is expected to give a comprehensive overview of fiscal activities of the public sector, to provide frequent and regular information on relevant, internationally comparable and historically consistent basis. Fiscal statistics should be reliable, facilitate accountability, presented on comparable basis, compiled and disseminated in accordance with the international standards. The Analyses shows that there has been considerable progress in the development of official statistics in Bosnia and Herzegovina. Yet, National Statistical System (NSS) of Bosnia and Herzegovina is confronted with an increasing number of new requirements to align with international recommendations, standards and best practices. The purpose of this paper is to describe the international standards of government finance

statistics, analyse the existing system of production and dissemination of the official public finance statistics in Bosnia and Herzegovina, to compare the state of its compatibility with international standards and to point out challenges and future direction in this statistical area.

Keywords: *fiscal reporting, official statistics, international standards*

JEL classification: C82, E62

ALIGNMENT OF THE QUARTERLY FINANCIAL STATISTICS TO ANNUAL FINANACIAL STATISTICS DATA

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Statistical data are often compiled at different frequencies. When analysing high and low frequency data on the same variable one often encounters consistency problems. In particular, the lack of consistency between quarterly and annual data makes it very difficult for time series analysis. This paper discusses the processes and challenges for the alignment of the data from the quarterly and annual financial statistics surveys by industry .The process consists of three phases, the initial editing, to deal with large inconsistencies, a presentation of the methodology using the quarterly related series to interpolate the annual series, and an analysis of the results. In the initial editing phase the large differences are resolved by manually editing the input data and imputing for missing data. The statistical temporal disaggregation/ benchmarking technique used is based on the Fernandez optimisation method of allowing random drift in the error process. The main characteristic of this method is that quarter- to- quarter movements are preserved while quarterly-annual alignment is achieved. The diagnostics performed indicate that the Fernandez random walk model method produces plausible results.

Keywords: *disaggregation, benchmarking, optimisation, Fernandez random walk model*

Session 2b: Issues in Social and Welfare Statistics/Quality in Official Statistics

GENDER INEQUALITY AND FERTILITY RATE IN BOSNIA AND HERZEGOVINA

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ABSTRACT

Purpose. This research paper analyses the relationship between gender gap and fertility rate. The paper is considering opportunity cost of being employed for women and having more than one child in Bosnia and Hercegovina (BIH). It is assumed that women at a fertile age want to have more children than they do.

Methods and Data. Research analyses the correlation between Gender Inequality Index (GII) and total fertility rates. GII goes from 0 (the lowest inequality) to 1 (the highest inequality). GII is divided in deciles. For each decile the median total fertility rate is calculated for countries which belong to a particular decile.

The comparative method was conducted for 37 European countries in order to establish the correlation between changes in gender gap for employment rates and fertility rate in a ten year period.

The paper compares women's wages and cost of kindergartens and babysitters in BIH.

The data that were used come from statistical offices in BIH (Census 2013 and statistics on demography trends in BIH, Federation BIH, Republika Srpska and Brcko District, Labour Force Survey, Household Budget Survey), UN (GII and total fertility rate worldwide), EUROSTAT (changes in employment rates by sex and fertility rates). Total fertility rates for BIH, FBIH, RS and BD that are based on the Census 2013 were calculated by the author. The provision of women's average wage is calculated by the author. It is calculated based on the weighted average of net wage for the five sectors where most of the women are employed. This covers 74% of total employed women.

Results. The curve that shows the median of total fertility rates and GII deciles is U shaped. Countries in the lowest decile or gender inequality have a higher median fertility rate than countries that belong to second decile of GII. BIH belongs to second decile and has a lower fertility rate than the median total fertility rate (1.25 versus 1.5).

The analysis of changes in gender gap employment rates and fertility rates showed that most of the European countries, 23 out of 35, are faced with a simultaneous increase in fertility rate and decrease in gender gap, BIH included. For those 23 countries the curve is concave. Sperman's rank correlation coefficient for all 35 countres is 0.443 (p-value=0.443).

Public kindergartens are the cheapest option for households. On average, the public kindergarten expenditure for one child takes 20% of the average women's income and almost 40% for two children. The second option is baby sitters and private kindergartens which cost about 80% of women wage. Although there is a third option, grandparents, the paper does not discuss it.

Conclusion and policy implication. Considering the current situation in BIH, the decreasing gender gap in employment could decrease fertility rate. Other policies must be introduced such as increasing capacities for public kindergartens and making them more affordable for families with more children.

Keywords: *gender gap, fertility rate, employment, education*

JEL classification: J11, J13, J16, J21

REGRESSION ANALYSIS OF THE EFFECTS OF SOCIOECONOMIC AND DEMOGRAPHIC CHARACTERISTICS ON STUDENTS' ACADEMIC ACHIEVEMENT

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ABSTRACT

During the history of education the researchers have tried to determine which variables have an impact on the academic achievement of students, and how to make the education system more efficient. It is known that one of the most influential variables on academic achievement is IQ. Many researches focused on the impact of IQ on academic achievement, discovered that about 20% of the variance of success in the exam it is explained with the IQ, while the remaining 80% of the variance of success in the exam is explained by other variables.

This paper examines the influence of selected socioeconomic and demographic variables on the success of students at the Department of Professional Studies, University of Split, Zagreb Teaching Centre, on the colloquium of business statistics in the 2nd semester, the academic year 2009/10. Independent variables in the model are: the percentage of students' presence at lectures and exercises, the amount of time spent in studying for the exam, gender, age, employment status, personal conditions for learning and parenting status. The dependent variable is the number of points achieved at the colloquium. The research included the sample of 230 students, and data were collected from the survey questionnaire and official records from a database of students at the Faculty. Using statistical programs SPSS20 and EViews3, the multiple linear regression model was developed with the number of points at the colloquium as the dependent variable, and with other variables being independent. The validity of the model was tested by regression diagnostics procedures, and no problems were found.

The research results confirmed some assumptions. The regular attendance of students at both lectures and exercises has a positive influence on the number of points at the colloquium. Positive impact on the success of the colloquium was confirmed for the variable the time spent studying, too. Also, students who have rated their own learning conditions by grades good (3) and very good (4), on a scale from 1 to 5, had significantly better results than other students. The

other variables such as: age, gender, employment and parenting did not shown to be statistically significant.

Keywords: *education, higher education, liner regression model, regression diagnostics model validation*

JEL classification: C20, C52, I21, I23

POVERTY AND INEQUALITY IN BOSNIA AND HERZEGOVINA: INCOME OR CONSUMPTION APPROACH – DOES IT MATTER?

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Household Budget Surveys (HBS) are conducted in Bosnia and Herzegovina since 2004 and are still a basis for poverty assessment in the country. Household final consumption expenditure is a monetary measure used for the estimation of living standards and poverty in Bosnia and Herzegovina. Unlike Bosnia and Herzegovina, since 2003, European Union member states conduct Surveys on Income and Living Conditions (EU-SILC) and use it for poverty and living standards measurement on the basis of household income as a monetary measure.

HBS surveys were conducted in Bosnia and Herzegovina four times: in 2004, 2007, 2011 and 2015. This paper is based on HBS data from 2011 because data from 2015 are still not available for researchers. The aim of this paper is to determine differences in size, depth and severity of poverty, as well as in size of inequality in the country and its regions: Federation of Bosnia and Herzegovina, Republika Srpska and Brčko District, both by measuring poverty by using household consumption expenditure approach and by using household income approach.

In accordance with the requirements of Eurostat, data collection on household incomes was significantly improved in the Household Budget Survey conducted in 2011. Data collected within this survey were used in this paper to estimate the total household income in line with EU-SILC regulations and methodology. On the basis of these estimates, we will examine whether the existing measures of poverty and inequality in Bosnia and Herzegovina were underestimated. Considering that household consumption expenditure in Bosnia and Herzegovina is supported by remittances which are not registered, neither in bank transfers nor in Household Budget Survey, loans for consumption purposes and/or by informal incomes, we will test the assumption that household consumption expenditure is significantly higher than household income. Based on this fact, the question arises: is the measurement of poverty and inequality based on consumption expenditure an adequate approach?

In this study, for the purpose of comparison of poverty and inequality we will use indicators based on consumption and income approach. We will use Foster–Greer–Thorbecke poverty indices (headcount index, poverty gap index and poverty severity index) and Gini and Theil indices as inequality measures. We expect that poverty and inequality measures based on income will be higher in comparison to those based on consumption expenditure. It will be a clear sign that the poverty in Bosnia and Herzegovina is significantly underestimated due to inadequate monetary measure of wellbeing and that it is urgently needed to fully harmonize poverty assessment method to EU requirements and standards, i.e. to conduct full-scale EU-SILC.

Keywords: poverty, inequality, income, consumption expenditure

JEL classification: I131, I132

MECHANISMS OF QUALITY ASSURANCE AND IMPLEMENTATION OF THE EUROPEAN STATISTICS CODE OF PRACTICE IN THE REPUBLIKA SRPSKA INSTITUTE OF STATISTICS

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ABSTRACT

The entire process of producing official statistics in the Republika Srpska Institute of Statistics is guided by the quality of statistical processes, services and products as a core issue of acquiring and preserving the credibility and confidence of users in statistical information. The commitment to quality is the guiding principle in a number of activities under the plan of harmonisation of statistical practices with the European Union countries. By accepting the principles of the European statistics

Code of Practice (ESS CoP) and through resolute commitment to following the quality criteria of the European Statistical System, the Institute has engaged resources in the development of mechanisms and tools for quality assurance. In the process of creating preconditions for the introduction of a quality management system, for continuous assessment of the degree of implementation of the Code of Practice in the Institute as well as for the development of appropriate tools for quality measurement, the Quality Assurance Framework of the European Statistical System (ESS QAF) is extensively used as a document that identifies the activities, methods and tools that statistical institutions can take in order to achieve full compliance and implementation of the indicators of the CoP.

ESS Quality Assurance Framework was used as a basis for the first self-assessment of the compliance of the Institute's practice with European statistics Code of Practice, which was done in 2012. As a result of this process, a document named "Implementation of the European Statistics Code of Practice at the Republika Srpska Institute of Statistics - self-assessment and future activities" was created and published. The documents outlines the quality aspect of the implementation of current and planning of future statistical activities and contains findings of the self-assessment and planned improvement activities for each principle and indicator of the Code.

Involving users in the process of survey design in order to ensure the relevance of statistics, gathering information about the user's preferences and level of satisfaction, modernisation of planning and monitoring performance by means of Performance Assessment Framework (PAF), regularly reporting on data quality in line with the ESS Standard for Quality Reports (ESQR), the introduction of innovative solutions for the collection and dissemination of data and increase of the visibility of official statistics - these are the activities that are undertaken by the Institute to adhere to the joint strategic response of the ESS (ESS Vision 2020) to the challenges that official statistics is facing.

Keywords: *official statistics, data quality, monitoring tools, user orientation, relevance*

JEL classification: H83, L15

ABOUT THE QUALITY OF THE 2013 CENSUS OF POPULATION, HOUSEHOLDS AND DWELLINGS IN BOSNIA AND HERZEGOVINA: BASIC EVIDENCE FROM THE POST-ENUMERATION SURVEY

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ABSTRACT

Census of Population, Households and Dwellings in Bosnia and Herzegovina was conducted in the period 01-15 October 2013. It was the first census of population after 22 year-long gap in collecting demographic data on the basis of full coverage. The main aim of the Census was to get basic statistical data on socio-economic and demographic characteristics of the population that should be used in policy making as well as for statistical purposes.

Statistical offices in Bosnia and Herzegovina prepared and conducted all census activities in line with international standards and recommendations. However, almost all main issues of the census were significantly politicized during the preparation of census activities, during data collection and especially in the phase of data processing and analysis. In that way, the census was given many non-statistical characteristics: it was presented to Bosnian public by various interest groups as politically important activity, as a population register or a source of data, which could be used for tax policy or property management, etc. Bosnian population showed a lack of confidence in statistical offices and their official census public campaign and did not behave according to the census as the pure statistical activity. It resulted in non-typical coverage errors in census data, especially in terms of over-coverage.

In order to measure the quality of the Census data, the Post-enumeration survey (PES) was conducted in the period 02-10 November 2013. In 240 randomly selected enumeration areas, about 12,000 households or approximately 38,000 people were re-enumerated. The objective of the Post-enumetarion survey is to provide indicators of the census quality in terms of its coverage and content.

In this paper, we will show how the Post-enumeration survey was designed and conducted and which statistical models and methods were used for linkage of census and PES data and for the analysis of census quality. The Dual System Estimation (DSE) method will be described and how it was adjusted by implementation of the Latent Class Analysis method in order to properly consider non-typical over-coverage errors and to produce standard indicators of census coverage quality. In addition, several indicators of census content quality will also be described and calculated. In conclusion the overall evaluation of the quality of 2013 Census of Population, Households and Dwellings in Bosnia and Herzegovina will be done as well as some proposals for future work.

Keywords: *census, quality, coverage, content*

JEL classification: J100, J110

EFFECTS OF PERCIPITATION AND TEMPERATURE IN AGRICULTURAL PRODUCTION – CASE OF REPUBLIC OF MACEDONIA

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ABSTRACT

The main purpose of this paper is to determine the contribution of temperature and precipitation on the agrarian economy in Republic of Macedonia. In order to examine the impact of fluctuations of climate change in the economy of Republic of Macedonia, it is incorporated a regression analysis, as well as Granger Causality Analysis is applied in order to examine the causal relationship of temperature and precipitation on agrarian economy in the case of Republic of Macedonia, where the analysis covers the time period from 1991-2015. So far, results from many papers have indicated climate change as a statistically proven factor to substantially influence the economy in European countries, particularly when this relationship is analyzed in long run period.

Due to the main objective to determine a long relationship between of temperature and precipitation in agrarian economy in Republic of Macedonia for a time period of 25 years, regression analysis and Granger Causality test is used so it can outcome the results of the analysis in Republic of Macedonia for the given time period. Moreover, in order to analyze the causality between temperature and precipitation and agricultural production we use the Granger Causality Analysis, so to accept or not the null hypothesis regarding temperature and precipitation not to granger cause agricultural production as a percent of GDP in Republic of Macedonia for the analytical time period. Although there exist many scholars that have been dealing with this issue in many regions worldwide, in Republic of Macedonia still there is a gap regarding the effects of temperature and precipitation in the agrarian economy in Republic of Macedonia as well as the causality of temperature and precipitation, therefore results from this paper will make a solid contribution to this issue in Republic of Macedonia as well as can contribute to existing theoretical and empirical findings so far for many regions worldwide. Indeed, this paper tries to analyze in a quantitative form the relationship between climate change and agrarian economy of Republic of Macedonia in the long run, where as the findings show that economic fluctuations in the long term are induced through climate change.

Developing countries like Republic of Macedonia have adopted strategies and policies that must be implemented, since of the noticeable impact of climate change as a potential damaging factor and therefore we emphasized the climate change as an integral element taking into consideration during the planning, designing and implementing development activities, where the results of this paper can be taken as further consideration from the government of Republic of Macedonia.

Keywords: *temperature, precipitation, agricultural production, Granger causality, regression analysis*

JEL classification: O44, Q1, Q5, Q54

NON OBSERVED ECONOMY (NOE) WITHIN HOUSEHOLD SECTOR – FEDERATION OF BOSNIA AND HERZEGOVINA

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ABSTRACT

The main purpose of national accounts is to offer an exhaustive description of an economy. So, the main goal of compiling statistics is to cover as much as possible the productive activities that belong to production boundary. Exhaustiveness in coverage of national accounts is an important quality aspect. Lack of coverage in national accounts could lead to inconvenient situations to both the users and the national accountants themselves. Some implications of incomplete coverage of Gross Domestic Product (GDP) are: misleading information on the level of GDP, distortions within internal consistency of the national accounts, biased growth rates, biased international comparability, misleading information on structure of economy. Non-observed economy (NOE) refers to all productive activities that may not be captured in the basic data sources used for compiling national accounts.[1] Estimates of non-observed economy improve exhaustiveness

[1] http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Non-observed_economy_(NOE)

in coverage of national accounts. According to recommendations gained from EUROSTAT-OECD (Organisation for Economic Co-operation and Development) Project, Institute for Statistics of Federation of Bosnia and Herzegovina (FIS) has been working on adjustments of GDP for NOE. In line with improvements that were made (regarding NOE estimates) through the International Monetary Fund (IMF) Project during 2014 and other improvements, revised data on GDP and Gross Value Added (GVA) for the period 2005 - 2013 have been published at the level of Federation of Bosnia and Herzegovina (FB&H) and at the state level. Adjustments that were made, before and through IMF Project, are the most significant in household sector. Therefore, non-observed economy estimations within household sector in FB&H is the subject of this paper. Applied adjustments have improved quality of the national accounts, have made positive effects on international comparability, and have laid a basis for economic policy, decision making, development of macroeconomic analysis and reducing the gap between the production and the expenditure GDP (calculated on the state level). The Labour Force Survey (LFS) method is methodologically recognized method of calculation of NOE and therefore it is a good basis to build upon and improve the estimate of NOE within household sector in the future, but this method is still not used for the improvements of quality assessments of NOE in FB&H. Also, estimates of illegal activities (which are predominantly linked to the household sector) as well as adjustments regarding agriculture within the household sector (individual agricultural holdings) are the other possible basis for improvements of the assessment of NOE and, consequently, of the quality aspect of national accounts.

Keywords: GDP exhaustiveness, adjustments, illegal activities, quality of national accounts

JEL classification: E26, O17, J21, J31, H26

STATISTICAL ANALYSIS OF BIHAĆ TERRITORY SOIL CHEMICAL COMPOSITION DATA FOR CREATION OF SOIL COMPOSITION PROFILES

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ABSTRACT

As of the beginning of 2016, Federation of Bosnia and Herzegovina (FB&H) has 428.000 ha of arable land and gardens, out of which 197.000 ha (46.02%) are sown,

meaning that more than a half (54.98%) of available arable land remains unused in (FB&H). Una Sana Canton (USC), one of the agriculturally most significant cantons of FB&H, has arable land area of 198.000 ha, more than a half of which remains unused. Regardless, USC is the most prominent producer of several fruit and vegetable sorts in FB&H, such as raspberry, strawberry, chestnut, walnut etc. By the end of 2014, USC was yielding 96.11% fresh strawberries and 78.81% fresh raspberries in FB&H, with annual export revenues of more than 450,000 BAM. It is known that agricultural production depends on many factors and soil chemical composition which affects agricultural product quality and quantity. Since each plant needs for different chemical components, we aim to find best locations in terms of soil chemical composition for strawberries and raspberries production, focusing on USC as the most prominent producer. Therefore, the chemical composition data which include pH, humus, calcium carbonate, nitrogen, phosphorus and potassium variables were collected in form of 226 samples from 29 different locations in Bihać territory (courtesy of Agricultural Institute of USC - AIUSC). According the information obtained from AIUSC, the most suitable location for raspberries and strawberries should have the following soil composition profile: pH=6-6.5, humus≥3.5, calcium carbonate>0, nitrogen>0.25, phosphorus>10 and potassium>20 measuring units. All data were applied to SPSS program and analysed in order to determine the locations which have the highest and lowest values for each of the six variables. As a result of detailed statistically analysis of soil composition of the locations, Bugar (westernmost area of Bihać municipality) has been identified as the location with soil chemical composition profile most suitable for production of strawberries and raspberries. The soil chemical composition profiles can serve as a valuable guidance to producers and agricultural institute of USC in terms of starting new crops, managing and planning production by minimize the production risks. The soil location profiles will significantly lower investments in soil preparation for the given fruit/vegetable sort. In addition to that, potential investors can utilize these findings for more strategic investments in terms of location, sort and soil preparation requirements.

The research suggests that Federal Institute of Statistics develops a database of soil composition profiles applying the methodology presented in this research and include the soil composition data in statistical yearbooks. Such data ought to be made public and updated yearly, using the data obtained from agricultural institutes of each canton, providing a valuable basis for further development of agriculture in FB&H.

Keywords: *agricultural production, soil, chemical composition, soil composition profile, soil composition statistics*

JEL classification: Q15, Q24

THE EFFECT OF CAPITAL FORMATION ON ECONOMIC GROWTH IN IR IRAN: TESTING VARIOUS THEORIES WITH A LONG-RUN ARDL MODEL

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ABSTRACT

Purpose of the research: This paper examines the relationship between capital formation and economic growth in IR Iran during the period 1974-2014. Considering unique structure of Iranian economy developed mostly on oil product export by five-year plans under certain period of sanction. We should be able to compare different economic growth theories (marxian, keynesian and neo-classical) in order to define long-model based on capital, labor and technology.

Methodology: We use 11 variables grouped in main factors in growth models – capital, labor and technology. For establishing long-run equilibrium to explain effects on GDPpc we deployed ARDL model. For testing stationary of variables under ARDL we used AFD (Augmented Dickey-Fuller) test. All variables has been taken in form of logarithm showed as non-stationary on first difference. Since FDI

inflow has some negative values, we exchange value with 1, but with only one year outside "dummy" period we assumed that is the best solution. As dummy variable we use periods 1978-1988 which represent Iraq-Iran war. ARDL models are selected by AIC (Akaike info criterion) and SC (Schwarz criterion). Small series suggest that we should take maximum of 2 lags.

Results: Our long-run model is employed to examine capital formation to economic growth. Since only four variable shows as significant at level 5%, we expand our criteria at level of 10% since we disposed with small sample. As capital from external sources we choose realization of export of goods and services, where 1% increase lead to 0,16%, while net FDI inflow shows significance at 5% but low impact (-,006). Real exchange rate as variable that shows changes in foreign capital value take 0.04% in positive direction but only at level of 10%. Inflation shows great negative impact (-0,10) and high significance. Internal sources of capital boost economic growth with expenditures of government 0,22%, while other variable shows insignificances. Technology cooperation grants shows similar results, positive (0.07) and sig¬nificant relationship at level of 10%. Highest significance shows labor force with the same high negative effect, greater than all capital variables together. This should suggest high insufficient of capital in IR Iran.

Keywords: *IR Iran, ARDL model, economic growth, capital formation, transition*

JEL classification: C32, E17, O01, P20

FINANCIAL ANALYSIS OF THE PHARMACEUTICAL COMPANIES IN THE WESTERN BALKAN REGION

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ABSTRACT

The topic of the research is "Financial Analysis of the Pharmaceutical Companies in the Western Balkan Region". Although the pharmaceutical industry of the Western Balkan countries in on a very small scale when compared globally, it is interesting to observe the differences among the countries. The countries and the companies can learn from each other in order to improve certain parts of their business. The purpose of the research is to analyze the financial ratios of the pharmaceutical companies and recognize the trends, differences and similarities. The countries included in the analysis are: Bosnia and Herzegovina (B&H), Macedonia, Croatia, Serbia and Slovenia. The most important difference among countries is that Croatia and Slovenia are members of the European Union, while the rest three countries strive to become the members, and are on their ways in the integration process.

Throughout the research we use data and inference to analyze the performance of the five companies in the time frame of 2012-2014. The time frame considered is due to the available access to the data. Selected companies are: Alkaloid JSC (Macedonia), Bosnalijek JSC (B&H), Galenika JSC (Srbia), Jadran Galenski Laboratorij JSC (Croatia) and Krka JSC (Slovenia). The companies were carefully selected based

on their position in the market, share in the industry and available access to the financial statements.

Financial statements and notes to the statements of the five companies provided the data for the calculations and were used as a primary source of information in this paper. Additional sources used include various textbooks and articles that aided with the interpretation of values calculated. The focus is primarily on the following indicators: liquidity ratios, asset management indicators, debt management indicators, profitability and market value indicators. The method of research in this paper includes the collection of data, presentation of data in the form of tables and graphs, and finally analysis and interpretation of results.

Some of the important conclusions will be summarized. The largest company according to the number of assets, equity, net income and sales is Krka JSC, followed by Alkaloid JSC. On the other hand, Bosnalijek and Galenika JSCs have the lowest number of assets. However, Galenika JSC is heavily indebted and faces serious financial problems. While Galenika JSC faces liquidity problems and is insolvent, other four companies are liquid, meaning they can settle their obligations. Observing the performance indicators we can conclude that Krka JSC had the best results overall, being followed by Alkaloid JSC. Generally, Bosnalijek and JGL JSCs are similar regarding the performance indicators and they took the middle spot. However, Galenika JSC by far reached the worst performance indicators, signaling that important changes in the company's operations have to be made. Another conclusion is that companies could use the asset base more efficient.

This analysis is useful, but analysts should always be aware of different issues that may arise and make adjustments as necessary. Hence, ratio analysis which is conducted in a mechanical and unthinking manner is dangerous since it can provide over- or under-estimated judgments.

Keywords: *financial statements, joint stock company, ratio analysis, performance, efficiency*

JEL classification: L25

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