

An abstract on a scientific theme for the general public

The subject of this project is to optimise the measurement of the Consumer Price Index (CPI) which is a basic measure of inflation. The above-mentioned “optimisation” means the whole procedure that leads to the CPI bias reduction in a wide, multi-source sense, i.e. the consideration of the following CPI biases: a) commodity substitution bias; b) outlet substitution bias; c) new and disappearing goods bias; d) quality adjustment bias; e) formula bias. The author of the project plans research on the optimal choice of parameters in index formulas which approximate the superlative Fisher price index (best approximation of Cost of Living Index) and also research on the optimal system of weights and the delay parameter τ in the case of type-Laspeyres indices. The additional direction of the study is a construction of the new hybrid price index formula that would have virtues of component indices. On the one hand, the index would minimise the CPI bias and, on the other hand, it would not require frequently updated data. The next scientific aim of the project is the detection of all indicators which influence the size of the CPI bias, i.e. both internal indicators (such as price correlation and autocorrelation, price and quantity volatilities) and external indicators (such as the unemployment rate, GDP, etc.)

The analysed data (for Poland and the rest of the EU countries) will come from the Central Statistical Office of Poland and Eurostat. The author assumes that the data will form the lowest level of aggregation (it may generate some additional costs). The above-mentioned aims will be accomplished by using the following computer programmes: Statistica, Mathematica, Gretl and also R and BC++. Most of Monte-Carlo simulations will be done in Mathematica 12 and the author of the project plans to buy this mathematical (commercial) software.

The author is interested in the considered project as it has the interdisciplinary character due to the fact that it draws knowledge from the theory of economics, statistics, mathematics and probability. In particular, the project will use multivariate statistical methods (factor analysis, discriminant analysis, classification trees, PROFIT method, etc.), mathematical and probabilistic modelling (stochastic processes), and the economic approach in the price index theory (CPI, COLI, utility functions).

The final aim of the research is to develop the theory of economics and the practice of statistical agencies in the field of the CPI estimation. All considerations can be generalised for any price index formula, thus the project may provide an added value to the price index theory. It is expected that the considered project will be also important for the theory of probability since it will attempt to provide cumulative distribution functions (CDFs) for basic index formulas (finding CDF for any price index formula is a complex task for scientists since indices have quotient forms). The importance for the national economy may be also significant as the Central Bank in Poland uses the direct inflation strategy with the CPI as the referential benchmark.