IMPLEMENTATION OF VECTOR AUTO-REGRESSION MODELS IN TOURISM: STATE OF THE ART ANALYSIS AND FURTHER DEVELOPMENT

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SUMMARY

Purpose

The dissertation focuses on time series analysis and is based on several research strategies and methods.

The methodology used in the research process was published in four papers as part of international scientific journals indexed in the Web of Science database. Since tourism is one of the most lagged industries in science there is need for new and innovative approaches in key tourist sector determinants modelling and forecasting.

This doctoral thesis introduces an extension of time series methodology that focuses on investigating and testing the normal distribution of residuals, as a key adequacy prerequisite of econometric models. This issue has not systematically been considered in quantitative approaches in tourism.

The motivation for research of the doctoral thesis are multidimensional: to filter previous research on time series in tourism and to theoretically and empirically improve and redesign time series methodology and methods for tourism. Both issues were successfully presented in one of the published papers. Finally, tourism forecasts should be based on reliable models as evident, from the most recent shocks, ex-ante tourism forecasting has to be considered crucial in evaluating model efficiency.

The dissertation aimed to research and develop appropriate econometric models able to capture the specifics of multiple interactions in the tourism market. The research seeks to develop econometric models for the Republics of Slovenia and Croatia, two countries whose economic development is predicated on tourism.

Four goals and four specific objectives have been specified during the research process: 1) To introduce an improved time series approach in cointegrated panels. The first specific objective (SO1) is to test at least ten econometric modelling structures that reduce cycle breaks. 2) To examine previous theoretical thinking regarding the cointegration of time series, cross-sectional data, and panels. The second specific objective (SO2) is to outline at least 250 previous empirical studies for the tourism industry. 3) To examine cointegration in tourism data for Slovenia and Croatia. The third objective (SO3) is to model at least three econometric time series equations and mathematical theorems/ lemmas for the tourism industry. 4) To improve and better understand unit root tests in tourism. The specific objective (SO4) is to approach the design of at least three stable and innovative models.

Methodology

The research relies upon econometric modelling in time series and panels as well as misspecification tests implementation. The study is primarily oriented to the hypotheses testing on a reliable modelling procedure.

The research methodology is based on time series and the vector autoregression model (VAR) implementation. Moreover, the cointegrated VAR and the error correction model (ECM) are used. The Granger causality is used to identify trends to determine the direction of the hypothesised research problems. Overall, the study uses regression analysis and summary descriptive statistics. The sensitive analysis relies on panel regression. Summarizing, the added value of the doctoral thesis can be reflected in investigating the normal distribution of time series residuals to obtain accurate results for interpretation and prediction.

Findings

The most significant research results include time series and panel testing and modelling based on research hypotheses. The main hypothesis (an innovative approach to cointegration, based on empirical evidence for Slovenia and Croatia, which provides unbiased, accurate and validated results for tourism development) was confirmed.

The first published paper investigates the possibility and accuracy of using time series data in forecasting tourism demands. The theoretical added value provides ex-ante research results regarding the consequences of the most recent pandemic. The empirical part of the paper discusses the direction of daily Slovenian and Croatian COVID-19 infections and tourist arrivals. Hypothesis 1 the tourism industry in Slovenia has developed rapidly and is expected to continue growing in a positive and sustainable direction without seasonal fluctuation, and 2, the tourism industry in Croatia has a long tradition and opportunity to grow at unprecedented rates hitherto. Volatility in the Croatian tourism industry is significant and has a high standard deviation; were confirmed.

Additionally, the modelling strategy was introduced in one of the published papers. The results emphasized a significant influence on tourism demand and, depending on the modelling methodology, the existence of an impact on tourist arrivals of chosen determinants.

Moreover, two published papers discussed the direction of economic impacts on tourist arrivals and vice versa. The decisive significance of productivity to real gross wages with a rise in tourist arrivals was confirmed. Furthermore, prices in tourism based on short-run effects and two cointegrated relations were modelled and forecasted. It can be concluded that tourism demand, approximated by tourist arrivals, is volatile on different determinants which were previously not researched or tested by reliable econometrics. Therefore, the set goals and specific study objectives were achieved.

The originality of the research

This doctoral thesis generated several significant outputs: i) a systematic analysis of different existing cointegration approaches, process modelling, implemented models and methods, ii) an applied multi-year data analysis for two countries, iii) a new collection of considered variables, iv) guidelines and recommendations for tourism researchers and practitioners, e.g. for the development of quantitative models that allow tourism to make reliable conclusions based on secondary quantitative data.