

Statistical study of external imbalances through bispecter analysis

In this article is described the study of external imbalances in the period 1992-2000 through bispecter analysis. On the first place the methodological problems concerning external imbalances are researched. On the second place is implemented a bispectral study for interpretation of the external imbalances. All valuations and tests are carried out through the statistical software Statistica 5.1.

I. Methodological problems in the process of studying the external imbalances

1.1 Range and measurement

External imbalances are a natural feature of the open economies, but there is not a synonymous definition that could explain them. The origin of the first problem is in the range of international transactions. After grouping them in independent and balancing ones we could consider an imbalance resulting from discrepancies between the receipts and payings on an independent transaction.

There are different concepts about the range of the independent and balancing transactions. Some of the most significant are the concepts of the trade balance and current account, the concept of the basis and total balance.

Taking into account the current economic situation in Bulgaria the most suitable for explanation of imbalances is the first concept.

1.2 Theoretical methods for studying external imbalances.

Problems of external imbalances, their sources, financing and behavior are explained by numerous economical theories.

According the classical method of absorption external imbalances result from discrepancies between the internal absorption consisting of internal and government consumption and investments on one hand and the national income on the other hand. This concept is the most expedient regarding the

current economic situation in Bulgaria, where international transactions with commodities are prevalent.

1.3 Theoretical model for studying external imbalances.

There is an imbalance when for a given period export receipts are different from import receipts, or an one-way alteration of external assets or liabilities or a combination of both exists.

The dependence between the current transactions is not immediately displayed, but after a period of time. The sources of these lags could be either micro- or macro economical.

By statistical study the balance of current transactions is measured through Net Commodities, Net Current Account, whereas external liabilities- through Gross National Debt, and external assets- through Gross Currency Reserves.

The analysis of the last through the absorption method proves the lack of chronic external imbalances.

Therefore the behavior model of imbalances reduces to studying of the relations between the receipts and payments on independent transactions, the lag and autolag.

II. Mathematical model of external imbalances and its informational cover

2.1 Autospecters and bispecters as mathematical models of dependencies

Taking into consideration the role of the factor lag in the above mentioned relations, its expedient to use specter and bispecter analysis to measure simultaneously the dependence and periodicity. According to the foundations of the specter analysis theory, the rates of the interrupted variable could be displayed as a leveled sum of the periodical functions $\cos (wt)$ and $\sin (wt)$, where w is the given frequency.

For the determination of the strongest correlated frequencies in the empirical statistical series the characteristics norm specter and spectral density are used. The norm specter is a function of the regressional coefficients. The spectral density is an average leveled value of the specter.

By bispecter analysis one of the variables is considered a factor, and the other-a result. The characteristics crossperiodgraph, crossspecter density, gain, phase specter are calculated as the co

relational dependence is measured in frequencies between 0 and 0,5 Hz.

2.2 Statistical information

The objective of the informational structure of the study are international transactions with commodities. In the period 1992-2000 the statistical methodology has changed several times, which hinders the building of large and quality dynamical statistical series.

III. Bispectral analysis of the external imbalances: results and analysis

3.1 Filtering of the statistical series and testing for white noise

For reliable results the problems of statistical series containing trends and the suitability of the empirical data for a mathematical modeling should be solved.

This is ensured by analysis of the autocorrelational and particular autocorrelational function, analysis of the periodicity and specter graphs, analysis of the linear diagram etc.

Trends are eliminated through differential filters.

3.2 Evaluation of the dependence between periodical components of the external imbalances through bispecter analysis.

Analysis shows that the prevalent part of the significant periodical components have close to 0,5 Hz frequencies. From economic point of view a trade cycle with such a wave length is possible. Thus the short-termed objective of economic residents to reimburse their investments in international trade could be easily explained.

The final conclusion states that external imbalances are natural for the open economies. Through bispecter analysis of dependencies between export, import and trade balance is deduced that there is no information about chronic external imbalances in Bulgaria.

Resumed and translated by Elena Pasheva.