Econometric Analysis of the Long-term Elasticity of Import and Export. by Cointegration Approach

(Abstract)

Subject of discussion of the analysis is the long-term elasticity of the foreign trade[1] in relation to the currency exchange rate of six Central and Eastern European countries – the Czech Republic, Hungary, Poland, Slovakia, Slovenia, and Bulgaria.

Methods applied. The research is based on cointegrated analysis. For estimation of the long-term equilibrium ratio of foreign trade to currency exchange rate (import to exchange rate and export to exchange rate) is used the Fully Modified Ordinary Least Squares (FM-OLS) method of Phillips-Hansen.

Goal of the analysis. To ascertain the nature of the long-term equilibrium ratio of foreign trade to exchange rate for the period 1996-2000.

Significance of the research. It is related to the intensively ongoing process of globalization where the degree of elasticity of import and export can serve as an indicator for sustainability and competitiveness of the national economy. This issue is of substantial importance particularly for Central and Eastern European countries, whose economies are in a process of structural transformation and economic integration.

The significance of the results of the research is also linked with the sizable developments of the econometric theory. The cointegrated approach allows for analysis and interpretation of the long-term dependence between export and import on the one hand, and the currency exchange rate on the other.

Main sources of statistical information are the official publications of the International Monetary Fund and the Bulgarian National Bank. For estimation and testing of the models are used the following software products: *Statistica 5.1 (*www.statsoft.com)*, Microfit 4.0 (*www.intecc.co.uk/camfit)* and *Eviews 3.1 (*www.eviews.com)*.

Essence of the research

By means of linear adjustment models of import and export are calculated coefficients for estimation of the short-term and long-term elasticity of import and export in relation to the exchange rate. Stages of the analysis:

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[1] By foreign trade here is meant the volume of import and export.

1. Econometric methodology: integration, cointegration and estimation

A key issue for the estimation of the long-term dependences and the long-term coefficients of elasticity of foreign trade is the integration of variables. Its order is ascertained by means of the Dickey-Fuller and Phillips-Perron tests. After ascertaining the cointegration of variables, the FM-OLS procedure of Phillips-Hansen is used to estimate the long-term elasticity of foreign trade. And finally, in order to determine whether the linear or the linear-logarithmic form of the adjustment model of elasticity should be used, the Box-Cox test is applied.

2. Statistical data: main problems and solutions

1) The national statistical methodology of the Czech republic, Hungary, Poland, Slovakia, Slovenia and Bulgaria has changed several times during the analysed period. This makes it difficult to select proper data and to build comparable statistical rows with adequate length. That is why the latest data for the given period is used, based on the assumption that it is the best approximation to the actual volumes of foreign trade.

2) Quarterly data for the period 1999-2000 is used as an optimal solution concerning the length of statistical rows. Source of the data are the official publications of the IMF –*International Financial Statistics: Monthly* and *International Financial Statistics: Yearbook* for the period 1997-2000.

3. Tests for integration and cointergation of foreign trade and currency exchange rate

The choice of a linear-logarithmic model is made using the Box-Cox test. For estimation of the regression equation the golden search and iterative optimization method is applied. That allows for comparability of results (for the elasticity of foreign trade) with those of some developed countries, and also for treating the parameters as coefficients of elasticity and interpreting them in the sense of the Marshall-Lerner condition.

Because of the variety in the dynamics of statistical rows for the different countries investigated, more than one criterion is used – the Dickey-Fuller and the Phillips-Perron tests.

The cointegration of variables is ascertained by means of the Johansen test, where trace ststistics serve for an empirical LR-characteristic.

Econometric estimation of the long term elasticity of foreign trade

Firstly, the short-term manifestation of the elasticity of foreign trade in relation to the nominal and real currency exchange rate is ascertained. The parameters are estimated by means of Phillips-Hansen's FM-OLS.

Next, estimation of the long-term elasticity follows. This is done by means of a linear-logarithmic form of the adjustment model. It is observed, that the long-term elasticity is significantly higher than the short-term one, varying from country to country.

Conclusions

By means of:

1) the modified adjustment model of M. Khan and K. Ross, applied to ascertain the long-term equilibrium ratio between import and export on the one hand and the nomial and real currency exchange rate on the other, and

2) the estimation of the long-term elasticity of foreign trade to exchange rate using Phillips-Hansen's FM-OLS,

the following conclusions are drawn:

(1) For Central and Eastern European countries the long term elasticity of foreign trade significantly exceeds the short-term one. That is an evidence of accumulation of the effect in the long run and respectively – of long lasting influence of exchange rate over foreign trade;

(2) An exception to (1) is the long-term elasticity Slovenia, which does not exceed its short-term one. This is due to a strong j-effect;

(3) Most reliable are the results for Poland and Slovakia – respectively in the interval 0.46% - 1.28% for Poland and 0.38% - 1.52% for Slovakia;

(4) Except for the models with insufficient statistical reliability, the ascertained long-term coefficients are in the interval from 0.43% (Slovenia) to 1.94% (Czech republic).

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