Michał Majsterek

Stochastic and deterministic co-movements. Comparison

Cointegration analysis has been part of the research literature for almost 40 years. The analysis of the behavior of variables in which a similar deterministic trend is rooted is also extensively covered in the literature. Other common features that cause imbalance of economic categories have so far attracted less attention. This leads to the interesting question about the degree to which studies in the three fields are substitutive or complementary, and what conditions must be met in order to undertake the appropriate analysis is purposeful. This analysis may concentrate both on stochastic (cointegration, co-stochastic cyclical, co-autocorrelation or other, seasonal cointegration less frequently used) and deterministic (co-trending, co-breaking and co-deterministic cyclical) co-movements.

Which type of analysis of common (not necessarily) dominant factors or the resulting analysis of movements should be chosen naturally depends on the time horizon which can be long, medium, or short, but a reliable study should not ignore any of these perspectives. This study has sought to demonstrate that the key role is played by the reduced rank of the most important matrices occurring in the appropriate representations of the VAR model or the isomorphic representations thereof. Another research goal was to show that the above-mentioned analyzes of stochastic and deterministic co-movements are largely complementary to each other. The analysis of similarities and differences between common stochastic and common deterministic behaviors is performed. The special attention is given to the role of full and reduced rank of crucial matrices in the analysis. It is worth noting that the role of many of these matrices changes depending both on the research horizon and the choice of factors dominating in the analysis. For example, the matrix of baseline common stochastic trends I(1) is commonly associated with the analysis of centrifugal behavior in the economy, while in co-breaking analysis it may play the role of the matrix describing the centripetal forces. The role of this matrix is similarly ambiguous in the analysis of cointegration in I(2) domain.

Multidimensional dynamic econometrics based on VAR models was selected for the study, because it contains tools enabling the comparison of different methods for analyzing common behaviors. Possible combinations of full and reduced ranks of the cointegrating matrix and the matrices of medium- and long-term relationships were considered and economically interpreted. The relationships between the matrices have been identified, and the iterative mechanism causing the system to return to equilibrium has been described.