METHODS USED TO ANALYSE ECONOMIC VARIATIONS OF CHRONOLOGICAL SERIES

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Abstract: *Statistical data in chronological or dynamic series is different from the other data series ordered according to the time variable. This is the importance of studying the chronological series. One can determine the important role of the time factor in social economic phenomena as in other areas. In fact, in the economic and social life much of the data subject to research is constituted as chronological series. An important component of the chronological series along with trend, random and cyclical oscillations are seasonal oscillations. The article presents the methods by which seasonal oscillations can be analyzed.*

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Economic oscillations have the character of periodic series in the sense that they are repeated with greater or less regularity in each period, respectively in each year. The truly periodic series exists only theoretically, but seasonal variations are quite close to this model. The assumption that underlies the model of periodic series is that they are caused by systematic causes rather than by accidental causes. Numerous examples of economic variations can be quoted: sales of cars as well as refreshments, atmospheric precipitation, or temperatures recorded over a year, etc. The systematic causes of such variations are repeated periodically, although some deviations may occur. The analysis of seasonal variations is, in our view, of some practical interest. The

analysis allows, for example, to determine when stocks should be set up to change seasons. It allows to explain the variations in some areas of production, the movement of goods, etc. It should be noted that variations like seasonal or periodical variations can be found in some areas of economic life, for example in the field of energy production and consumption, and during a week or during a day. In Figure 1 is a simulation of statistical analysis of a time series.

Figure 1. Statistics solver from economic time series variations
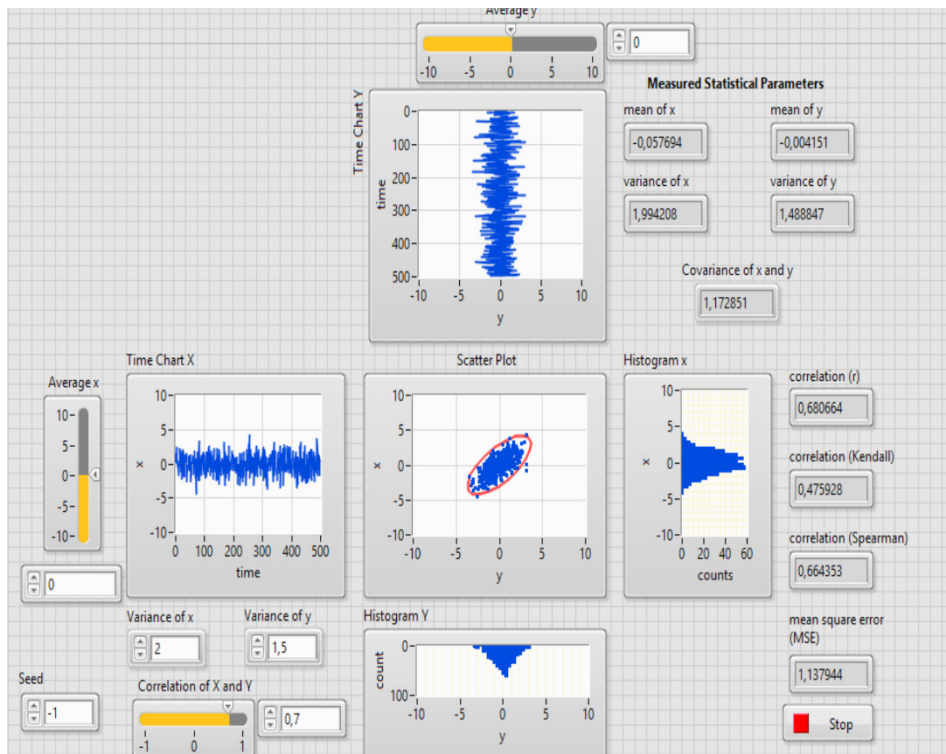
First, it is useful to recognize the magnitude of the variations, finding ways to measure them, and calculating a seasonality index valid for a whole series of annual periods. Second, it may be useful to know the evolution of mass phenomena with the elimination of seasonal variations. The idea behind the calculation of seasonal variations is the possibility and usefulness of determining that part of the annual total that is due to each of the twelve months of the year. The incidental factor that may occur in a given year is considered to be independent of the one that may occur the following year. If there is a

very rainy July in a year, this incident factor is considered to be independent of any factor that may happen in July of the following year or any other July. If they are summed up for July in a series of years, the perturbations caused by random factors will offset each other. If the trend is eliminated, what will remain will be the seasonal variation that can be expressed by an index or coefficient of seasonality.

There are several methods to calculate the seasonality index (coefficient). First, the Simple Media Method presents itself as it allows to explain the underlying idea of the other methods in a form elementary. It should be stressed that in practice the Simple Media Method uses less. If there is a monthly data series (for two years, the number of monthly data may be prolonged, the essence of the calculation procedures remaining the same).

Figure 2. Magnitude of the variations, finding ways to measure them, and calculating a seasonality index for a random series of annual periods
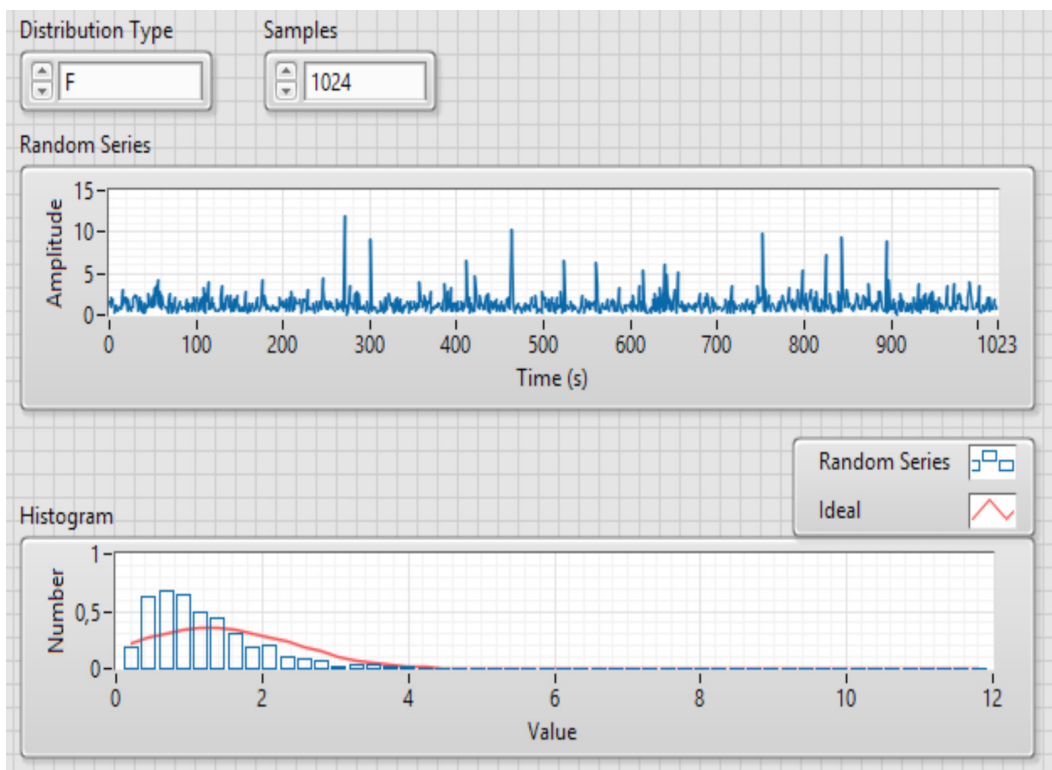
In order to have the effect of seasonality, the trend will have to be eliminated. The Least Squares Method is used for this purpose. An example is given in Table 1.

Table 1: Monthly data series - many years

year	x	y	xy	X^2
1	-1	520	-1040	4
2	-2	560	-580	1
3	0	530	0	0
4	1	630	630	1
5	2	790	1520	4
Total	**0**	**3070**	**610**	**10**

N-polynomial Method - the most commonly used method for measuring economic variations. Since the variations have, by definition, a 12-month period, the 12-month moving averages are used. The mobile media method basically consists in calculating the seasonal components of the chronological series by dividing the trend into the total successive values of the series, with the coincidental incident factor being also eliminated.

Some complication in applying the method occurs because there is a 12-month period in the calculation of mobile environments (if the data they are working on are quarterly with a four-quarter period), there are apparent numbers. It will be a question of centralizing the first results obtained by calculating mobile environments (temporary mobile environments) to reach centred mobile environments.

Figure 3. Periodic product sales with trend removed using N-polynomial method
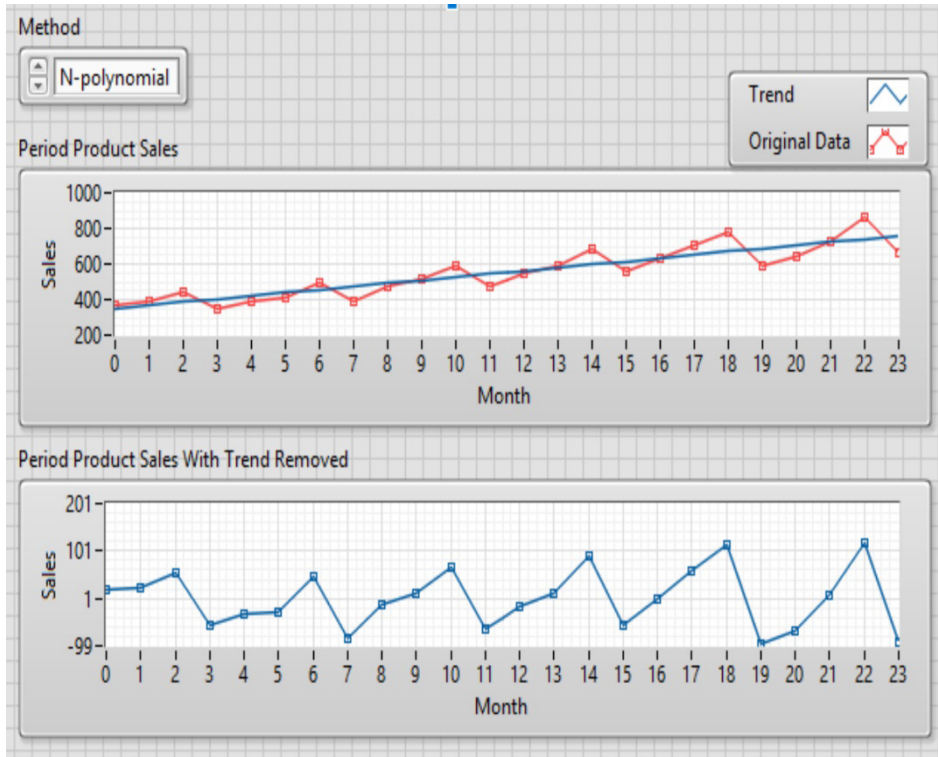
The use of statistical and econometric models in macroeconomic analyzes can be performed successfully using the exponential linear regression model, but because multiple variables are used in the evolution of the variable variables. In the case of this multiple exponential linear regression, it is necessary to identify the factors that we are considering and to be included in the reconnected model, following the same grappling procedure, establishing the correlogram to inventory the points cloud and the evolution of each variable , on the basis of which we will perform the data interpretation and moreover by establishing the value of the regression parameters to identify the intensity, the direction of influence or, in other words, the intensity of the correlation between the considered factors.

Figure 4. Predict results using exponential regression model
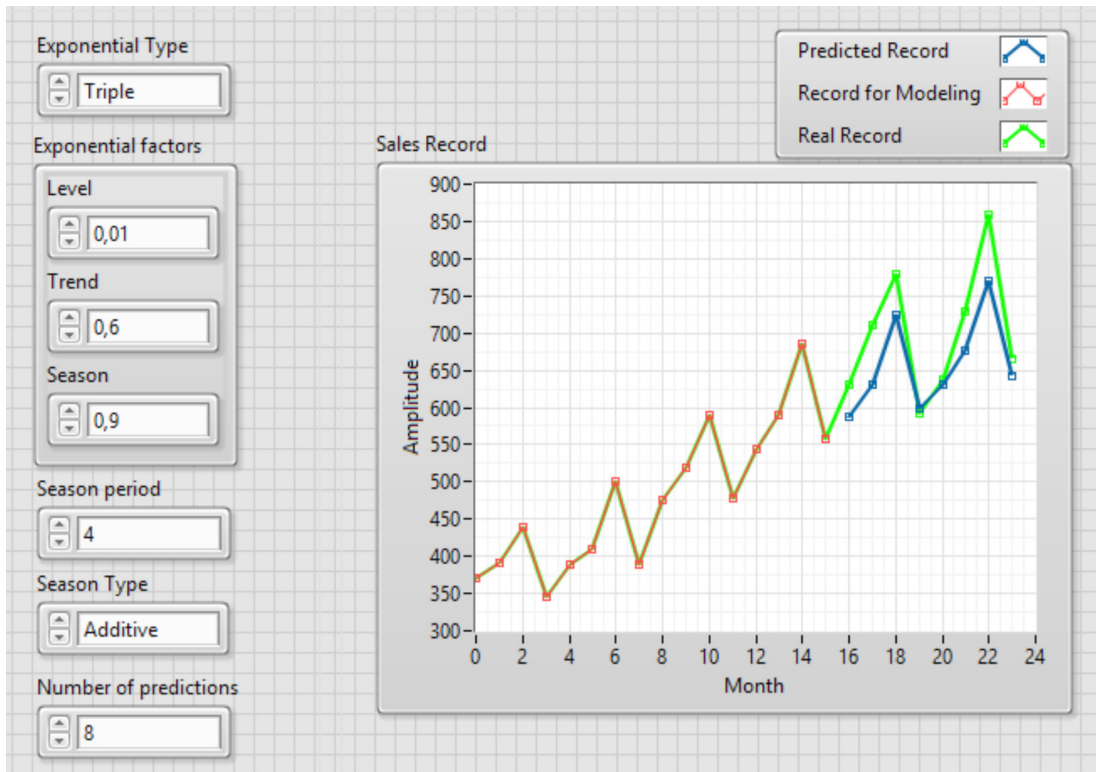
Conclusions

Studying socio-economic phenomena and processes in terms of their evolution over time is a necessity for economic agents, an important condition for substantiating economic decisions. In our opinion, a particular emphasis must be placed on the statistical analysis of the evolution of phenomena over time by processing the chronological series that show in the end the evolution of a phenomenon within a determined period of time.

References

Anderson, D., Sweeney D.,Williams T. (2008). *Statistics for Business and Economics*. Thomson South Western.

Andrei ,T. (2003). *Statistică şi Econometrie (Statistics and Econometrics)*. Bucharest: Editura Economica Publishing House.

Anghelache, C. (2012). *Seriile dinamice/cronologice (de timp) (Dynamic/ Chronological Series)*. Bucharest: Revista Română de Statistică (Romanian Journal of Statistics).

Cărbunaru-Băcescu, A. (2009). *Statistică-Bazele statisticii. (Statistics-Basics of statistics)*. Bucharest: Universitara Publishing House.

Isaic-Maniu, Al., Mitruţ C., Voineagu V. (2003). *Statistică (Statistics)*. Bucharest: Editura Universitară.

Ţitan E., Ghiţă S., Cărbunaru-Băcescu A. (2000). *Bazele statisticii (Basics of statistics)*. Bucharest: Meteora Press.

Voineagu, V., Lilea E., Goschin Z., Vătui M. (2005). *Statistică – Teorie şi Aplicaţii. (Statistics - Theory and Applications)*. Bucharest: Expert Publishing House.