

S. JEVONS, HARVEST FLUCTUATIONS AND BUSINESS CYCLE

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Explanations of cyclical fluctuations are among the most diverse, being included in a wide range of psychological, demographic, political, monetary, investment or under consumption theories. The aim of our work is the presentation of the theory developed in the second half of the nineteenth century by Stanley Jevons who explained economic fluctuations based on agriculture fluctuations. The sunspots were considered responsible for a cycle of approximately 11 years, fluctuations in agricultural crops being the ones that regularly altered the commercial “moods”. This commercial alteration and its effect on investment further multiplied crops fluctuations and determined a complete business cycle. Although we can not accept the explanation of a phenomenon as complex as the business cycle only through the solar influence on crops, approach otherwise extensively criticized, we consider presenting the analysis of Jevons at least one incursion into the theoretical, methodological, political and economic framework of the nineteenth century.

Key words: sunspots, harvest prices, business cycle

The evolution of economic activity has ups and downs. Periods of economic growth, of expansion are interrupted by crises and recessions. This sinuous evolution was not always considered cyclical, some economists regarding the outbreak of the crisis as some random, unexpected events.

Stanley Jevons was among the first economists who have sought an explanation for these economic fluctuations, considering that the cyclical alternation is a regular and predictable phenomenon. To demonstrate the cyclical character of economic fluctuations, Jevons identifies a link between solar cycles and agricultural crops, variations of the latter impacting the commercial activity and the economy as a whole. The logic of this theory of the solar cycle was based on the fact that sunspots affect sunlight which are responsible for harvest and thus for cereals' prices, which further affects trade and traders' confidence, causing fluctuations in economic activity. Solar cycle theory has been presented for the first time in 1875 before the British Association whose member S. Jevons was, being considered the first climate theory of the business cycle.

MATERIAL AND METHOD

In order to realize this paper we used the economic literature which treats the business cycles problems and the theories that try to explain them. Solar cycle theory is based on a statistical analysis of fluctuations in agricultural crops in the UK since 1701 and correlated with astronomical measurements of the sunspots. These data were

analyzed in the second half of the nineteenth century by S. Jevons and are the basis for the theory that we present here, being not exposed in our material. The methodology used included collecting and processing statistical data and their inductive interpretation. Our paper examines the conclusions reached by Jevons and the main criticisms which have been made.

RESULTS AND DISCUSSIONS

The psychological approach of the business cycle performed by John Mills, who leave unexplained the fluctuations in the traders' "moods", led S. Jevons, an adept of this theory otherwise, to seek a causal link between commercial activity cyclicity in the UK and another exogenous variable. In 1975 Jevons concludes that the fluctuations of harvest caused by solar cycles are responsible for altering the expectations of traders, this explanation being considered by him the missing link of the theory of business cycles. To sustain this point of view, S. Jevons tried to demonstrate that agricultural harvests and grain prices depend to some extent on solar periods, fluctuating with a periodicity equal to that of the solar cycle. Until 1978 Jevons worked on an empirical study in order to find the causal mechanism between harvest fluctuations caused by climatic causes and traders' expectations based on the cereals' price evolution.

The reasoning of the British economist was that bankers and traders are directly affected in their activity by the high or low prices of grain determined by their abundance or lack, the domestic demand for goods and services being clearly affected when individuals have no more financial resources after satisfying their primary needs with food. Droughts or floods, caused by solar activity, are those that directly affect agricultural crops and when they are compromised the prices of grains raise and the demand for manufactured goods declines, which basically means entering a downward trend of economic activity. In other words, the solar cycles determine climatic cycles which are responsible further for the harvest fluctuations and for the cereals prices cycles which affect cyclical the economic activity. Although convinced of the existence of such causal relationships, Jevons found difficulties to demonstrate it empirically.

Jevons initially tried to prove the existence of a 11 years cycle, on the basis of grain prices evolution, since the astronomers of his time believed that solar activity known a complete cycle every 11.1 years. The main difficulty of this approach has been to demonstrate the existence in the United Kingdom of a cyclical fluctuation in the grain prices having 11 years, in correlation with the cyclical solar evolution. The lack of clear evidence for such a correlation has been put by the British economist on the perturbing influence of other social, economic and political factors. To sustain empirically his theory, Jevons turn to data on grain prices from the XIII and XIV centuries, considering them less affected by the influence of factors mentioned above and hoping thereby to obtain a clear record of a cyclical correlations. The author assumed that the period of 11 years for the solar cycle calculated for the nineteenth century is also valid for previous centuries. The method used by Jevons assumed the inclusion of price series for the main crops in a grid of 11 years. Analysis of this grid convinced him about the existence of a 11

years business cycle, the prices series for cereals seeming to have the same evolution. Encouraged by the results obtained, Jevons extends his analysis to the nineteenth century, but this time he can only identify the existence of business cycles of 10.8 years. Not to leave out by these results, the economist explained the difference on the influence of endogenous factors on the business cycle, particularly those related to the psychology of individuals.

Convinced of the existence of business cycles of the same amplitude with the solar cycles, Jevons made a list of crisis between 1701 and 1878, but has the unpleasant surprise to find that astronomers revised their initial opinion and sustain the existence of a solar cycle of 10.45 years. In this situation, Jevons had to "revise" his own data on business cycles. The final list with the crisis in Great Britain was as follows: 1701, 1711, 1731-1732, 1742, 1752, 1763, 1772-1773, 1783, 1793, 1804-1805, 1815, 1825, 1836-1839, 1847, 1857, 1866 and 1878 [2]. One aspect that raised a first question is related to the determination of the cyclical peaks and to the characteristics of crisis from different periods. Jevons sought with eagerness to prove the existence of crises there where were no data to confirm them and even to show their recurrence at fixed intervals, each time trying to justify those few months more or less than the expected date for the outbreak of the crisis.

Despite Jevons' belief on the existence of a causal relationship between solar cycles and business cycle, his theory has failed to convince, more than that, it being severe criticized. Most often Jevons is blamed for developing its inductive reasoning on unsubstantiated evidence, using elements from outside the economy to explain an economic reality, the business cycle. At the same time is called into question the accuracy of the data on commercial crises in the UK, Jevons having used any decline in the economic activity to support his conviction. The hostile attitude of his contemporaries Jevons can also be explained through the methodology which the latter used. The most common methods of analysis used in the nineteenth century were deductive, starting from general valid truths, while Jevons used an inductive reasoning, using the external statistical evidence [3].

Summing all the criticisms made, the interdependence theory between solar cycles and economic fluctuations developed by Stanley Jevons is often indicated as a speculation and not a scientific product, a deficient use of correlation and causality (the correlation between two elements does not imply the causality between them). However, despite the lack of statistical evidence and a rigorous analysis, Jevons's theory is one of the first attempts to explain the cyclicity in general and not some particular business cycles. His work represents important steps in Econometrics through the uniformity in statistical evidence and the use of induction as a means of generalization of a theory based on the particular evidence.

CONCLUSIONS

Stanley Jevons was a supporter of the idea that fluctuations in the economy are determined by natural, exogenous causes. The major difficulty has been to prove with empirical data this idea, but mostly its theoretical basis. Despite

numerous criticisms generated by the solar determination of the economic fluctuations, this approach has kept its place among the cyclical theories, boosting future research.

The evolution of plants and animals is carried out in close correlation with solar activity and how this evolution influences finally the amount of food offered and its prices, we can not deny the existence of a climatic influence on economic activity as a whole. But explaining such a complex phenomenon as the business cycle on the basis of sunspots causes today smiles. This not only due to a lower share that agriculture has in the Gross Domestic Product of a country, but rather because of the multitude of factors and processes contributing to the cyclical evolution of the economy. Monetary policy, budgetary policy, the foreign trade, investors expectations are just some elements that contribute generously to the sinuous, cyclical evolution of the economy.

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