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A Spectral Analysis of World GDP Dynamics : Kondratieff Waves, Kuznets Swings, Juglar and Kitchin Cycles in Global Economic Development, and the 2008-2009 Economic Crisis



Date de mise en ligne : dimanche 8 mai 2011

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Cet article a déjà paru dans Structure and Dynamics - eJournal of Anthropological and Related Sciences - UC Irvine à l'adresse suivante : <http://www.escholarship.org/uc/item...>



Abstract : The article presents results of spectral analysis that has detected the presence of Kondratieff waves (their period equals approximately 52-53 years) in the world GDP dynamics for the 1870- 2007 period. To estimate the statistical significance of the detected cycles a new methodology has been applied. The significance of K-waves in the analyzed data has turned out to be in the range between 4 and 5 per cent. Hence, this spectral analysis has supported the hypothesis of the presence of Kondratieff waves in the world GDP dynamics. In addition, the reduced spectra analysis has indicated a rather high (2-3%) significance of Juglar cycles (with a period of 7- 9 years), as well as the one of Kitchin cycles (with a period of 3-4 years). Thus our spectral analysis has also supported the hypothesis of the presence of Juglar and Kitchin cycles in the world GDP dynamics. On the other hand, our analysis suggests that the Kuznets swing should be regarded as the third harmonic of the Kondratieff wave rather than as a separate independent eScholarship provides open access, scholarly publishing services to the University of California and delivers a dynamic research platform to scholars worldwide. cycle. This research suggests two interpretations of the current global economic crisis. On the one hand, the spectral analysis suggests rather optimistically that the current world economic crisis might mark not the beginning of the downswing phase of the 5th Kondratieff wave, but it may be interpreted as a temporary depression between two peaks of the upswing (whereas the next peak might even exceed the previous one). On the other hand, there also seems to be some evidence supporting another interpretation based on the assumption that the current world financial-economic crisis marks the beginning of the downswing phase of the 5th Kondratieff wave. The article also explores the world GDP dynamics before 1870 and finds that it does not appear possible to detect Kondratieff waves in the world GDP dynamics for the pre-1870 period, though for this period they appear to be detected for the GDP dynamics of the West. This suggests that in the pre-1870 epoch the Modern World System was not sufficiently integrated, and the World System core was not sufficiently strong yet - that is why the rhythm of the Western core's development was not quite felt on the world level. Only in the subsequent era the World System reached such a level of integration and its core acquired such strength that it appears possible to trace quite securely Kondratieff waves in the World GDP dynamics.