Mesoscopic Dynamics of Financial Markets

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Abstract

As of 2014, the World Bank estimated the global market capital value as US$63.3 trillion. This is an enormous amount and needs to be managed prudently. Yet, the Global Financial Crisis of 2007-2008 wiped out US$34 trillion (equivalent to the 2014 GDPs of the United States (US$17.4 trillion) and the European Union (US$18.5 trillion) combined) across global financial markets. The painful lesson we learned from this global financial crisis is that we need a deeper understanding of the financial system, to the point where we can forecast any impending crisis. In this talk, we will describe what we believe to the state of the art today, where we are able to detect precursors of the 2008 financial crash using the fusion-fission diagram that is a graphical summary of the dynamics of financial clusters. Furthermore, we also show that the financial crash can be predicted using a statistical physics fusion-fission model: The soup-of-groups (SOG) model. In this model we assume that a large number of adaptive traders form strategies clusters due to various cooperative and competitive factors. Traders in a strategy cluster act coherently and generate a continuous price movement. A market crash occurs when a giant strategy cluster disintegrated that rapidly drive the stock prices downwards. The forecasted crash times we obtained from the SOG forecasting model are ranged from end-October 2008 to mid-February 2009, compared to the actual crash times of 27 October 2008 (the 2008 October Crash) and 9 March 2009 (the Asian Correction). More importantly, the market risk via SOG forecasting model shows early warning from four to six months prior to the actual crashes.

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