



SAID BUSINESS SCHOOL, University of Oxford

SEMINAR SERIES / HILARY 2011

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Seminar webpage:
www.cabdyn.ox.ac.uk/complexity_seminars.asp

Please note: although the seminar programme detailed was correct at time of printing, seminar arrangements are subject to change - for the latest information, please check the seminar webpage.

Thursday 10th March
(16.00pm - 17.30pm) James Martin Seminar Room

Professor Doyne Farmer
Santa Fe Institute

'Leverage Causes Fat Tails and Clustered Volatility'

ABSTRACT

We build a simple model of leveraged asset purchases with margin calls. Investment funds use what is perhaps the most basic financial strategy, called "value investing", i.e. systematically attempting to buy underpriced assets. When funds do not borrow, the price fluctuations of the asset are normally distributed and uncorrelated across time. All this changes when the funds are allowed to leverage, i.e. borrow from a bank, to purchase more assets than their wealth would otherwise permit. During good times competition drives investors to funds that use more leverage, because they have higher profits. As leverage increases price fluctuations become heavy tailed and display clustered volatility, similar to what is observed in real markets. Previous explanations of fat tails and clustered volatility depended on irrational behavior, such as trend following. Here instead this comes from the fact that leverage limits cause funds to sell into a falling market: A prudent bank makes itself locally safer by putting a limit to leverage, so when a fund exceeds its leverage limit, it must partially repay its loan by selling the asset. Unfortunately this sometimes happens to all the funds simultaneously when the price is already falling. The resulting nonlinear feedback amplifies large downward price movements. At the extreme this causes crashes, but the effect is seen at every time scale, producing a power law of price disturbances. A standard (supposedly more sophisticated) risk control policy in which individual banks base leverage limits on volatility causes leverage to rise during periods of low volatility, and to contract more quickly when volatility gets high, making these extreme fluctuations even worse. At the end of this talk I will present some preliminary thoughts on extending this approach to model the shadow banking system.

