PREDICTION of FINANCIAL CRISES: ECONOMIC GROWTH, BUSINESS CYCLES, BLACK SWANS and DRAGON KINGS

IDSY 210 2010 Spring

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Class time: MW 5-7pm
Classroom: OU207

Goal: The explanation of the world-wide crisis of financial markets and economies needs new explanations. Misleading concepts of the traditional economics (unbounded rationality, equilibrium theory, linear thinking, mild randomness) must be overcome by notions of complexity, such as bounded rationality, dynamic models, nonlinear thinking, and wild randomness. Elements of this new approach will be taught.

Prerequisite: ECON105 is recommended

Course structure:

Five big topics will be discussed. During the term it will be possible to make reports on readings.

Exam: There will be a sixty minutes long written midterm and an essay type final.

1. Adams Smith's Economics and Market Equilibrium

General equilibrium theory (Walras, Pareto). From linear to nonlinear world view.
From physicalism to self-regulating economic models.
Game theory. John von Neumann.

2. Complex Economic Systems, Chaos, and Randomness

Basic Dynamic Phenomena.
international trades: coupled oscillators.
Self-organizing economies and external (political) influences.
How to drive and stabilize economy: positive and negative feedback.
A little methodology: how to characterize the state and evolution of economic systems?
Traditional decision theory versus bounded rationality. Herbert Simon.
Market model of buying and selling: a cellular automaton model.


Price dynamics: truly random or deterministically chaotic?
Random walk. Gaussian distribution.
The Efficient Market Hypothesis.
Modern Portfolio Theory. Capital Asset Pricing Method. The Black-Scholes formula for option prices
Stock market crashes: large deviation from the Gaussian distribution.


Financial market data: non-Gaussian distributions.
Turbulence in nature and in the financial market.
Wealth and income distributions: the Pareto distribution.
The "Noah effect" and the "Joseph effect" in the market dynamics.

5. Black Swans, Dragon Kings, and Prediction of Crises

Extreme events are not exceptional. Power law distributions in natural and social systems.
Black Swan Theory: Rare events are unpredictable.
A generating algorithm (of self-organized criticality):
http://web.pdx.edu/~rueterj/courses/viewers/patterns/sandpile.html
Dragon King outliers: Paris and the distribution of the French city sizes.
Distribution of financial drawdowns.
Epilepsy, earthquakes and stock market crashes: uncompensated positive feedback.
Prediction of the end of financial bubbles.

Readings:

Didier Sornette: Dragon-Kings, Black Swans and the Prediction of Crises  
http://arxiv.org/pdf/0907.4290v1

**Grading:**

Grades are calculated based on class activities (15%), midterm exam (15%) and final (70%),