# Hypercubes

By

Paul Cottrell, BSc, MBA, ABD

Introduction

- Author
  - Complexity Science, Behavioral Finance, Dynamic Hedging, Financial Statistics, Chaos Theory

- Lecturer
  - Economic and Finance

- Proprietary Trader
  - Energy and Currency

- Dissertation
  - Dynamically Hedging Oil and Currency Futures Using Receding Horizontal Control and Stochastic Programming

Chaos Theory
and
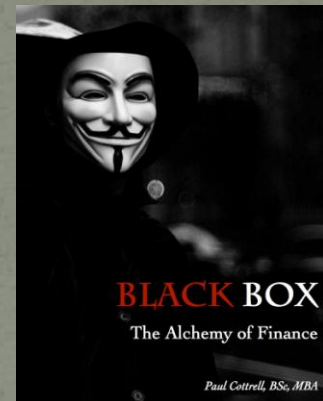Economic Emergence

Paul Cottrell, BSc, MBA
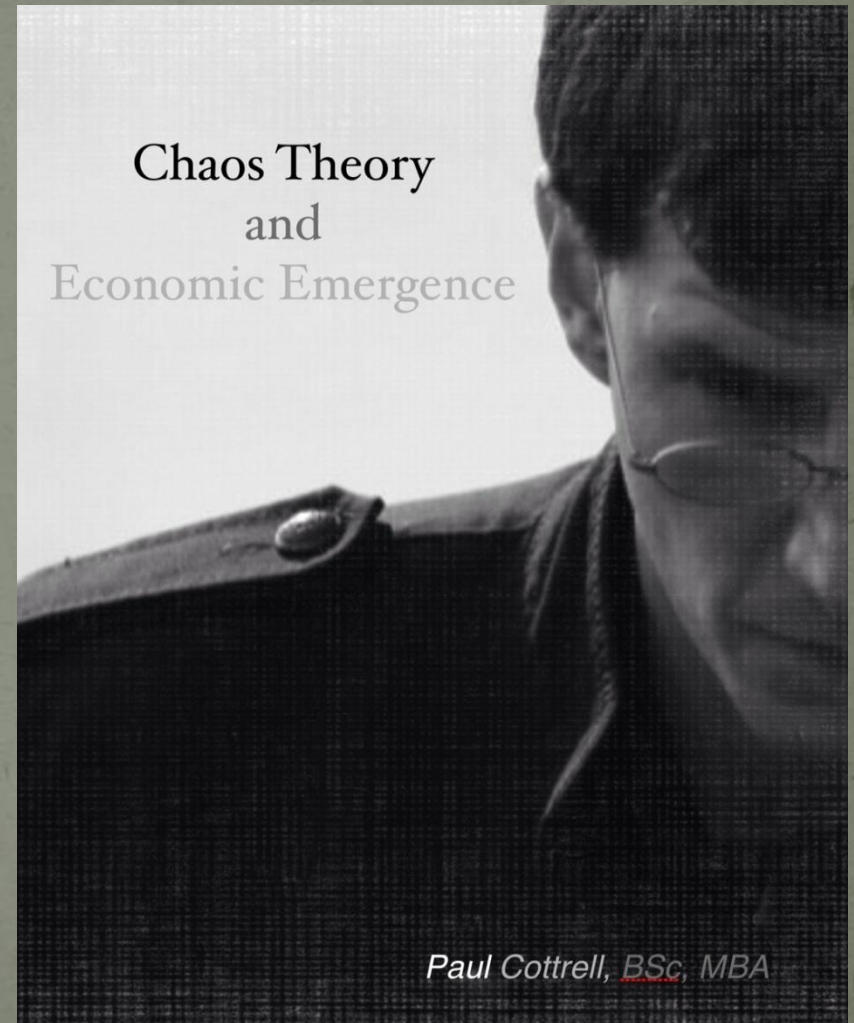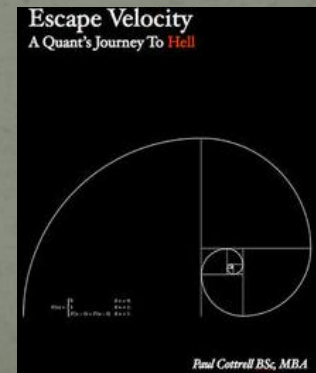
Books and Website

- Books
  - Chaos Theory and Economic Emergence
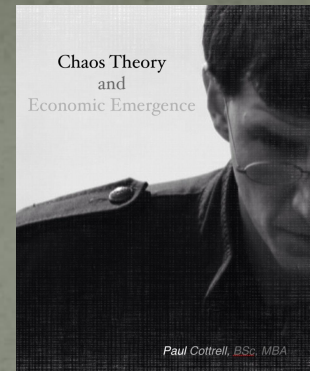
  - Black Box: The Alchemy of Finance

  - Escape Velocity: A Quant's Journey To Hell

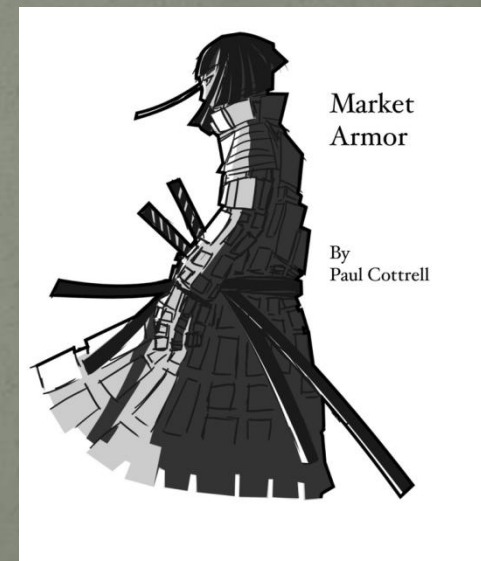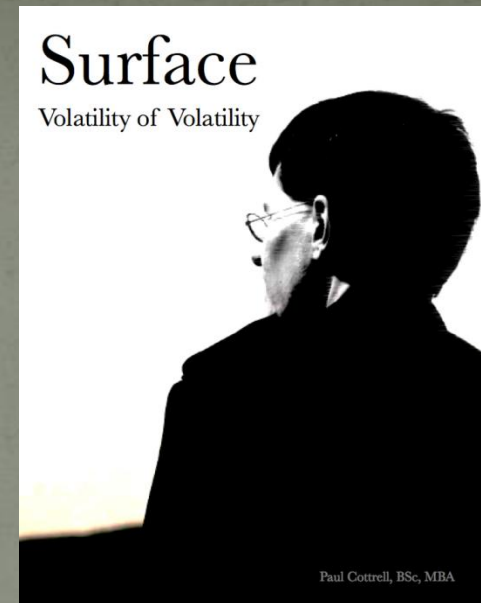- Website / Twitter / YouTube
  - www.the-studio-reykjavik.com
  - @paulcottrell
  - Paul Cottrell

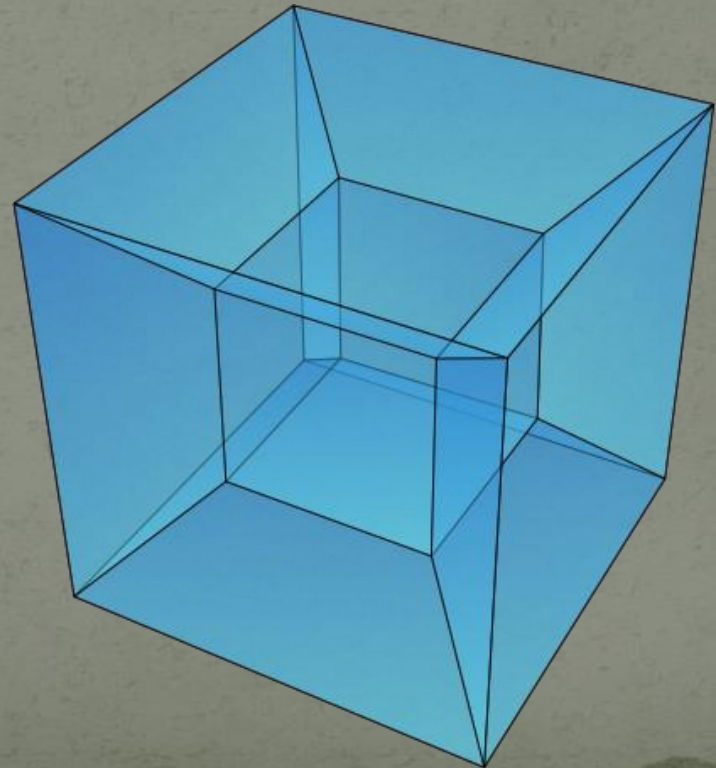# New Book Releases

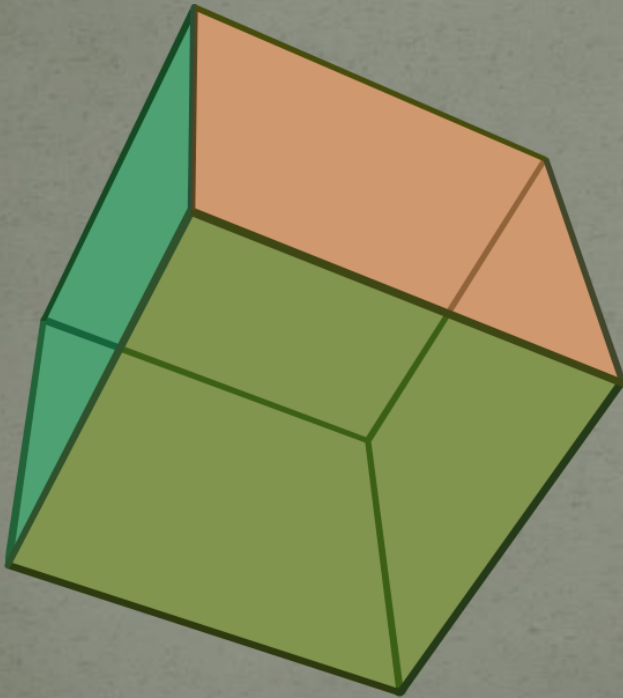- Books
  - Surface: Volatility of Volatility (2014)
    - Ph.D. Dissertation with volatility graphing

  - Market Armor (2015)
    - Chaos Theory
    - Complexity Science
    - Topographic Finance

  - Artificial Intelligence and Virtual Reality
    - AGI and New Visualizations for Finance

What is a hypercube

- Geometry that has n–dimensions.
  - Cube (3-cube) and Tesseract (4-cube) shown.

Other types of hypercubes

Petrie polygon Orthographic projections

Line segment	Square	Cube	4-cube (tesseract)

5-cube (penteract)	6-cube (hexeract)	7-cube (hepteract)	8-cube (octeract)

9-cube (enneract)	10-cube (dekeract)	11-cube (hendekeract)	12-cube (dodekeract)
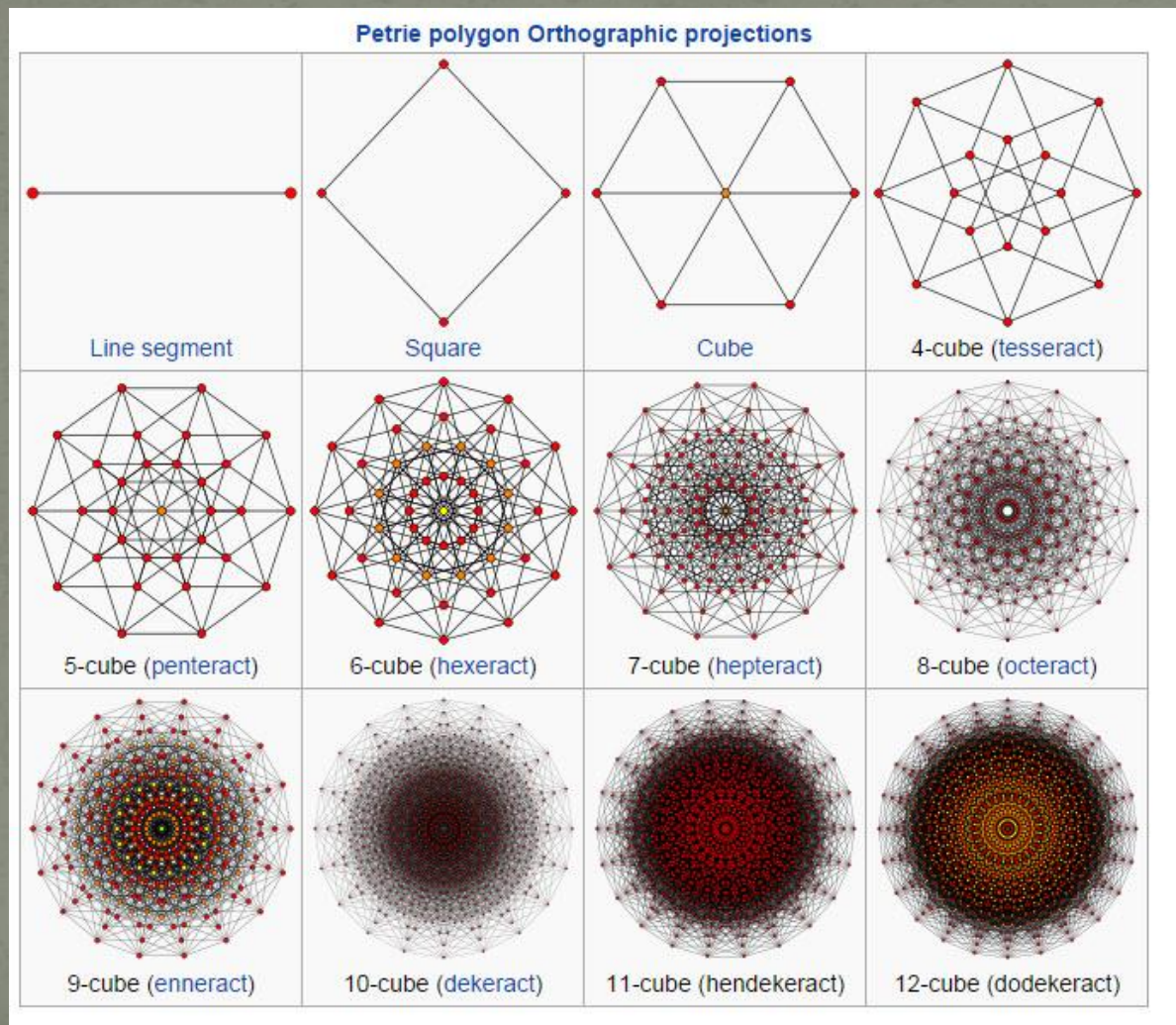
How hypercubes explain space inflation

movie up to 6 dimensions

to 10 dimensions

Hypercubes in finance

- If 3 variables are not fully describing the market we need higher dimensions
  - The help get closer to explaining the dynamics of a financial system
  - Price and time is not enough for understanding the financial markets
    - We usually use multiple indicators
      - Moving averages, fib. sequences, strength indicators
    - In quant modeling
      - Possible variables
        - Time, price, drift, volatility, jump diffusions, correlations, etc.
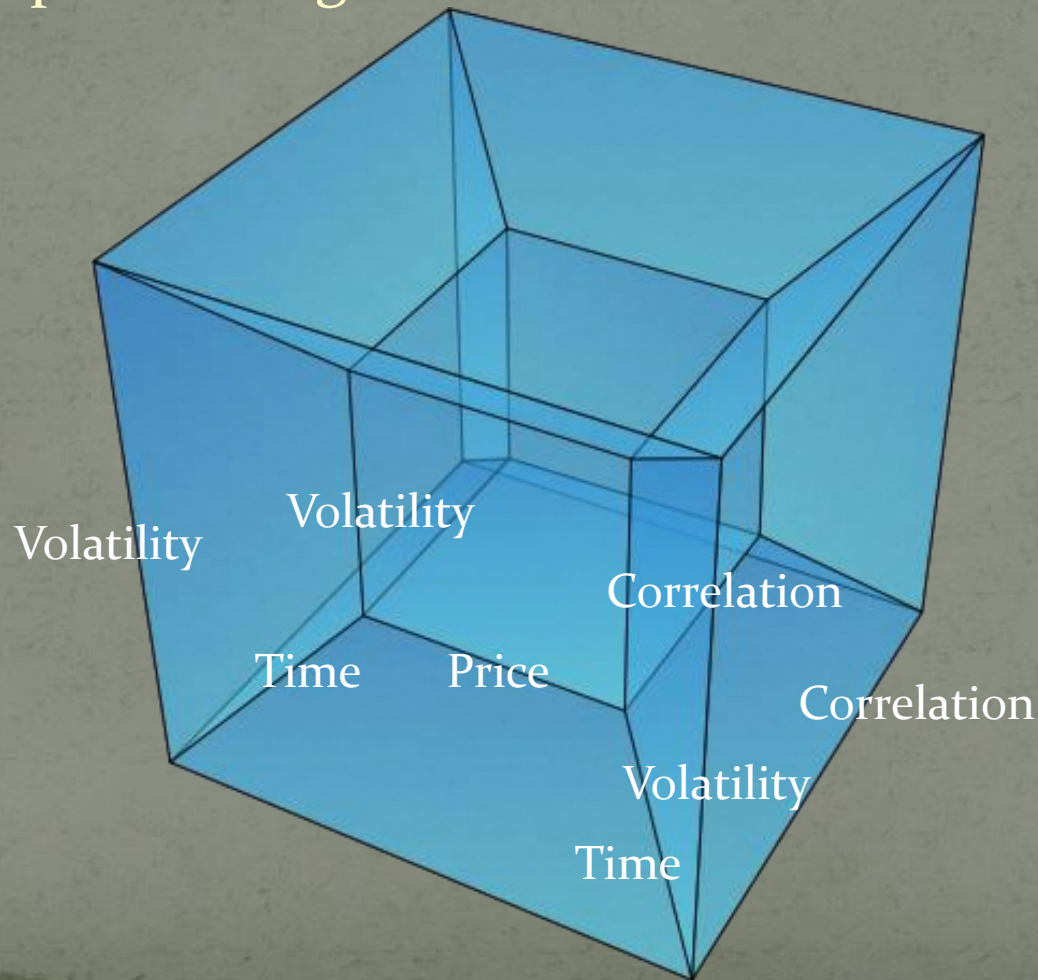
Hypercubes with price charts

- Traders need to visualize the multiple variables of the market
  - This is what I call market telemetry
- A simple example is the standard technical trader price chart

Hypercubes with higher dimensions

- Example of using a tesseract in finance.

Examples of hypercubes and hyperfaces

- Correlation, Price, Volatility
- Correlation, Time, Volatility
- Price, Time, Volatility
- Correlation, Price, Time

- Correlation, Price
- Correlation , Volatility
- Price, Time
- Volatility, Price

Financial Hypercubes