Math Methods – Financial Price Analysis

Spring 2016, Mathematics, G4075

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The dates of seminars

1. 1/22/2016;
2. 1/29/2016;
3. 2/5/2016;
4. 2/12/2016 (HW1 given out);
5. 2/19/2016;
6. 2/26/2016;
7. 3/4/2016;
8. 3/11/2016 (HW2 given out);
9. 3/18/2016;
10. 3/25/2016;
11. 4/1/2016 (Practical Project given out);
12. 4/8/2016;
13. 4/15/2016 (Practical Project presentations);
14. 4/22/2016 (Practical Project presentations).

SEMINAR TIME: Fridays, 5:00 PM – 7:20 PM
SEMINAR ROOM: 312, Mathematics Building
GRADE = ATTENDANCE (20%) + HWs (40%) + PROJECT (40%)
**Tentative subjects to be covered**


   References for “hedge funds, general”: Book15, Book18, Book29, Article3, Article102, Article103, Article104, Article114, Article116, Article121.


   References for financial data are the data providers: Bloomberg, CQG, CME, TickData.com, CRSP, etc.


   References for “random walk”: Book30.

following and mean-reversion properties through the Variance Ratio test. Examples from the
detailed measurements in the S&P 500 E-mini futures. Intra-day seasonality effects.

References for “deviations from Random Walk”: Book1, Book3, Book4, Book5, Article67,
Article68, Article111.

6. Response functions. Push-response functions (or push-response diagrams) and other response
functions. Mean-reversion and trend-following through the response functions.

References for “push-response diagrams”: Article43, Article44, Article45, Article46, Article113.

and Asymmetric Levy distribution functions. Analytical formulas relevant for Levy distribution
function: Asymptotical series expansion for the pdf for small fluctuations and for large
fluctuations limits; asymptotical behavior of structure functions (multi-scaling behavior or
intermittency). Direct measurements of Levy exponent in high-frequency price differences of
Inference of the Levy exponent from the scaling laws of structure functions of high-frequency
price differences for the S&P 500 E-Mini futures. Consistency of direct PDF measurements and

References for “Levy or power-law distributions”: Book1 (specifically), Book2, Book3, Book4
(specifically), Book21, Book22, Article11, Article21, Article31, Article37, Article41, Article50,
Article55, Article63, Article64, Article65, Article66, Article78, Article88, Article89, Article101,
Article111, Article 124.

8. Analogies between the high-frequency finance and the physics of fluid turbulence. Universal
scaling laws, fat tails, intermittency. Multi-scaling behavior: universal scaling laws in low-order
moments and divergence of high-order moments. Random-force-driven Burgers equation and
its similarity to the S&P 500 index.

References for “Analogies with Turbulence”: Book1, Book4, Book6, Book7, Article127, Article125,
Article17, Article18, Article19, Article48, Article126, Article128.

Brownian behavior: long memory of market order signs. Long memory of the absolute value of
price differences. LOB controversy: a strong predictability of market order signs, absolute value
of price changes and near absence of price predictability. Interplay between the supply and
demand. Universal scaling laws, power laws. Intra-day seasonality in the limit order books.
Introduction of “mu”-variable – a market order that takes a large fraction of immediately

References for “Limit Order Book Statistics”: Article12, Article22, Article51, Article52, Article53,
Article56, Article57, Article72, Article74, Article75, Article76, Article77, Article78, Article79,
Article80, Article81, Article87, Article93, Article94, Article95, Article97, Article98, Article99,
Article100, Article101.
   
   References for “Stock Prices Measurements”: Book1, Book5, Article32, Article34, Article35, Article42, Article43, Article44, Article45, Article46, Article47, Article67, Article68.

   
   References for “Fundamental Stock Data Analysis”: Article2, Article6, Article14, Article15, Article20, Article25, Article26, Article27, Article28, Article30.

   
   The main technical reference for “Trading Systems” is Book19 (a required reading). Recommended reading material: Book9, Book10, Book18, Article58, Article90, Article91, Article103.

   
   References for “Portfolio Optimization”: Book13, Book20, Article16, Article17.
Useful references (books) with # of citations¹ a/o 1/10/2010


¹ Citations are taken cumulatively from scholar.google.com.
Useful references (articles) with # of citations a/o 1/10/2010

114. Shamillia Sivathambu, “Behind the Rumors”, Profile of Ken Griffin of Citadel Investments, HFMWeek, Issue 29, April 2006. (citations: 0)
121. Katherine Burton, “Adapt or Die”, Hedge Fund Review, July 2004. (citations: 0)

Useful references (DVDs)


Financial analysis: What is it? Financial analysis can be defined as a process that evaluates businesses, budgets, projects, and entities for analysis purpose. This evaluation is done with the purpose of determining the suitability for investment by a business. Usually, the main purpose of financial analysis is to analyze the stability, solvency, liquidity, and profitability of a business. The Capital Asset Pricing Model (CAPM) refers to a model that delineates the relationship between risk and expected return and what is used in the pricing of risky securities. Moreover, financial statement analysis is a quantifying method for determining the past, current, and prospective performance of a company. Fixed Costs. Financial analysis involves using financial data to assess a company’s performance and make recommendations about how it can improve going forward. Financial Analysts primarily carry out their work in Excel, using a spreadsheet to analyze historical data and make projections.

Types of Financial Analysis. Using financial data to assess a company’s performance and make recommendations for the future. Home > Resources > Knowledge > Finance > Types of Financial Analysis. What is Financial Analysis? Mathematical finance, also known as quantitative finance and financial mathematics, is a field of applied mathematics, concerned with mathematical modeling of financial markets. Generally, mathematical finance will derive and extend the mathematical or numerical models without necessarily establishing a link to financial theory, taking observed market prices as input. Mathematical consistency is required, not compatibility with economic theory. Thus, for example, while a financial economist might Cost analysis is a comparison of costs. Costs used to prepare financial statements are not the same as those used to control operations. Costs may be controllable or non-controllable and are subject to time periods and constraints. Benefit Cost Analysis (BCA) is a decision-making tool used to determine the feasibility of a project or investment, or the probability of its success. BCA allows the manager to compare the ultimate cost(s) and benefit(s) of a proposed business activity or investment, prior to committing time and resources. Assessing benefit cost feasibility. Commonly used methods for measuring BCA, or economic feasibility, include the: Payback Method, which determines when an investment will pay for itself.