

PHYSICS AND FINANCE

RISK, REWARD & REALITY

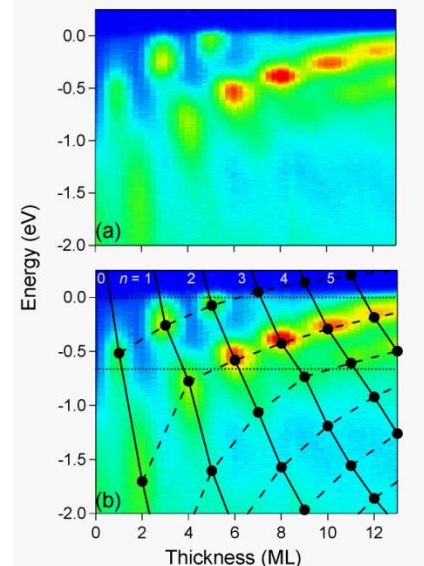
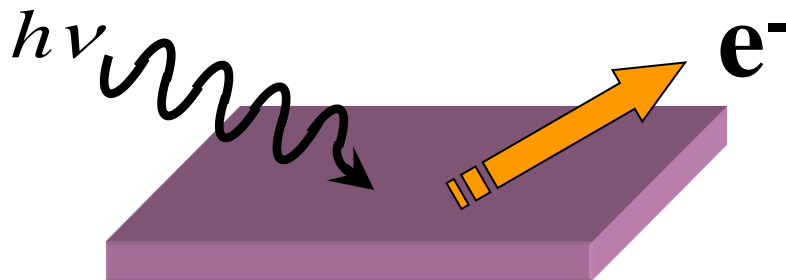
Dominic A. Ricci
Traded Risk Management
HSBC, New York

Overview

- **Background**
- **Current Occupation: Traded Risk Manager at HSBC**
- **Critical Skills & Knowledge**
 - Transferrable from physics experience
 - Self-education
 - Soft skills
- **Challenges Encountered During Search**
 - Motivation for shift
 - Financial industry structure
 - Quantitative roles in finance
- **Challenges Encountered During Career**
 - Corporate culture
 - “Quant” stigma

Road through Urbana

- Originally from Connecticut/NYC area
- B.Sc. in physics, MIT, 1999
- Ph.D. in physics, UIUC, 2006
- Experimental condensed matter with T.-C. Chiang
- Photoemission studies of nanoscale thin metal films on semiconductor substrates
- Tuning the quantum electronic structure via interfactants



What I Do Now: Risk Management

➤ Work for a large international bank



- Originally: The Hong Kong Shanghai Banking Corporation (1865)
- World's largest bank in terms of assets (\$2.7tr, 2012YE)
- Operates in 85 countries: EMEA 50%, Asia-Pacific 25%, Americas 25%
- Wholesale lending to multinational corporations

➤ Current Occupation: Traded Risk Manager

➤ What is “risk”?

- Willingness to accept exposure to potential failure in exchange for reward
- Types include: financial, political, operational, reputational

➤ What is “traded risk”?

- Loss exposure arising from market traded financial instruments
- Market risk: exposure to market factors (e.g. interest rates, stock prices)
- Counterparty credit risk: exposure to bilateral contract participant failure

What I Do Now: Risk Management

➤ Why does risk need to be “managed”?

- Senior management risk appetite: regulatory capital & economic loss
- Ensure that traders, management, & regulators are on same page

➤ How is traded risk managed?

- Translate management risk appetite into actionable framework for traders
- Coordinate between traders & senior management – business within appetite
- Assess effects of market & portfolio changes on the bank’s risk profile
- Evaluate new strategies, new products, new regulatory requirements
- Identify, measure, monitor, control
- Communicate info to disparate internal & external parties

Career Path

➤ **Calm Before the Storm: 2006**

- Junior market risk manager helping to support credit, equities, MBS
- Analysis & learning the ropes

➤ **Global Economic Crisis: 2007-2009**

- Dedicated responsibility for structured credit business
- Direct internal interactions
- Firefighting

➤ **Aftermath: 2010-2011**

- Senior risk manager covering all structured, complex & EM desks in NY
- Banking regulators
- Cleanup & simplification

➤ **Financial Industry in Transition: 2012-2013**

- Project management & managerial responsibilities
- Represent at industry meetings
- Evaluation & implementation of new regulatory requirements
- Restructuring businesses to be compliant

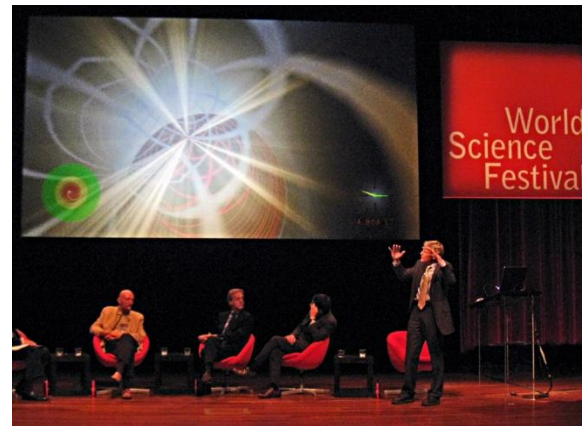
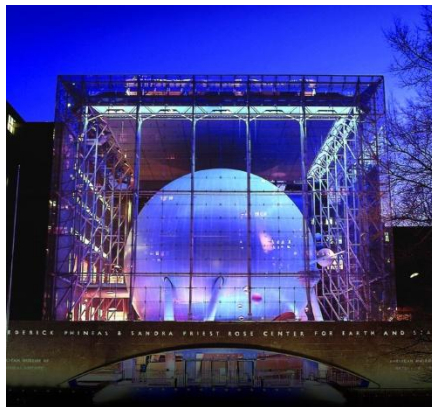
Reflections

➤ Intellectual Curiosity

- Subject matter
 - ❖ Dynamic complex real world system in action
 - ❖ Continual self-education & knowledge breadth expansion
- Operational environment
 - ❖ Standard responsibilities are mundane
 - ❖ Bureaucratic inertia – “if it seems to work, don’t question it”
 - ❖ Corporate politics

➤ Lifestyle

- Good compensation, but not “banker” levels - countercyclical
- High stress
- Freedom to enjoy science on my own: museums, NYAS, alumni offerings



Physics and Finance: Risk, Reward, and Reality
April 18, 2013

Skills & Experiences from Physics

- **Most Relevant Experience as an Experimentalist**



Skills & Experiences from Physics

Breaking Things



Skills & Experiences from Physics

➤ **Breaking Things**

- Understanding failure modes for financial products, markets, and strategies

➤ **Statistical Analysis & Data Handling**

- Basic statistics & probability – Value at Risk
- Regression & times series analysis

➤ **Project Design**

- Managing end-to-end path from question to answer

➤ **System Engineering**

- Flow control, dependencies, operational tests

➤ **Modeling & Simulations**

- Valuation & capital models
- Monte Carlo simulation

Skills & Experiences from Physics

➤ **Programming**

- Both in formal languages as well as in ad hoc packages

➤ **Technical Communication**

- Concise without losing relevant details

➤ **Logic & Critical Thinking**

- Problem solving
- Practical

Non-Physics Self-Education

➤ While Still at UIUC

- Financial market & industry structure – read the news
 - ❖ Major participants & what they do
 - ❖ Major products
- Financial engineering – audited classes & read books
 - ❖ Basic time value of money & discounting cash flows
 - ❖ Stochastic calculus & option theory

➤ While in the Financial Field

- Industry structure, continued
 - ❖ Banking systems & regulations
 - ❖ More financial markets
 - ❖ Trading “rules of thumb” & jargon
- Economics
- Specific applications of statistical analyses, modeling, simulations, etc

Soft Skills

➤ Non-Technical Communication

- Concise, but losing the relevant details, while still getting the point across
 - ❖ Non-quantitative personnel with important roles
 - ❖ Bullet points & hand waves

➤ People Skills

- Consensus building with all stakeholders
- Persuasion & compromise
- Ego management

➤ Short Horizon Time Management

- Flexibility & adjustment to changing priorities
- Grace under pressure

Challenges Encountered During Search

- 1. Motivation for Shifting from Science to Finance**
- 2. Financial Industry Structure**
- 3. Various Quantitative Roles in Finance**

Motivation to Shift Careers

➤ **Desire to Be Located in the Northeast**

- Family/friends
- Limited academic jobs, many in small college towns
- Most industry jobs on West Coast

➤ **Non-specialist Subject Matter**

- Specialization required for academia
- Breadth & moderate depth required for financial risk
- Focus constantly changing

➤ **Real World Implications**

- Extended time line for basic science research to affect everyday life
- Observe immediate impact of actions & decisions
- Tackling a subject – understanding the global economic system

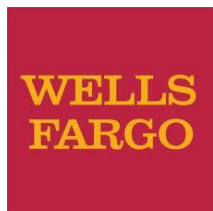
➤ **Lifestyle**

- Work/life balance
- Compensation

Financial Industry Structure

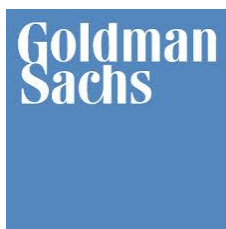
➤ Commercial Banks (US)

- National bank charter: can accept retail deposits & borrow from Fed Reserve
- Highly regulated with significant restrictions on activities



➤ Investment Banks

- General financial service firms
- Scope of activities determined by association with commercial bank & size
- Regulated by the Federal Reserve



- Not regulated by the Federal Reserve (yet)

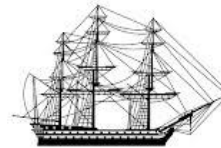


Financial Industry Structure

➤ Investment Managers

- Asset & securities management; mutual funds
- Paid for service, not profits

BLACKROCK



Vanguard[®]

➤ Hedge Funds

- Paid for profits & management service



➤ Exchanges & Clearinghouses



Financial Industry Post-Crisis Changes

- **Regulation of Commercial Banks**
 - Increased capital requirements
 - Proprietary trading banned
- **New Derivative Rules**
 - Many derivatives standardized & cleared
 - Reduced appetite for complexity
- **Increased Focus on Risk & Capital Governance**

Quantitative Roles in Finance

➤ Front Office

- Trading desk quantitative analyst
 - ❖ Valuation models
 - ❖ Trading algorithms (high frequency trading)
- Trading
- Research
 - ❖ Strategies for internal use or to sell to clients

➤ Control

- Risk management
- Risk control
 - ❖ Systems & data flow
- Model review & validation
 - ❖ FO model testing & reserve development
- Risk & capital methodology (traded markets & wholesale)
 - ❖ Regulatory capital methodology development

Quantitative Roles Current Trends

➤ Front Office

- Reduction in trading desk modelers
- Prop trading moving to unregulated companies
- HFT at broker-dealers & hedge funds

➤ Control

- Capital methodology teams expanded at commercial banks
- Formal risk function build up at funds & other firms
- Exchange & clearinghouses
- Reduction in derivative model reviewers

➤ Experience

- Many industry professionals on market
- Need to educate yourself for entry level positions

Challenges Encountered During Career

1. **Financial Corporate Culture**
2. **“Quant” Stigma**

Financial Corporate Culture

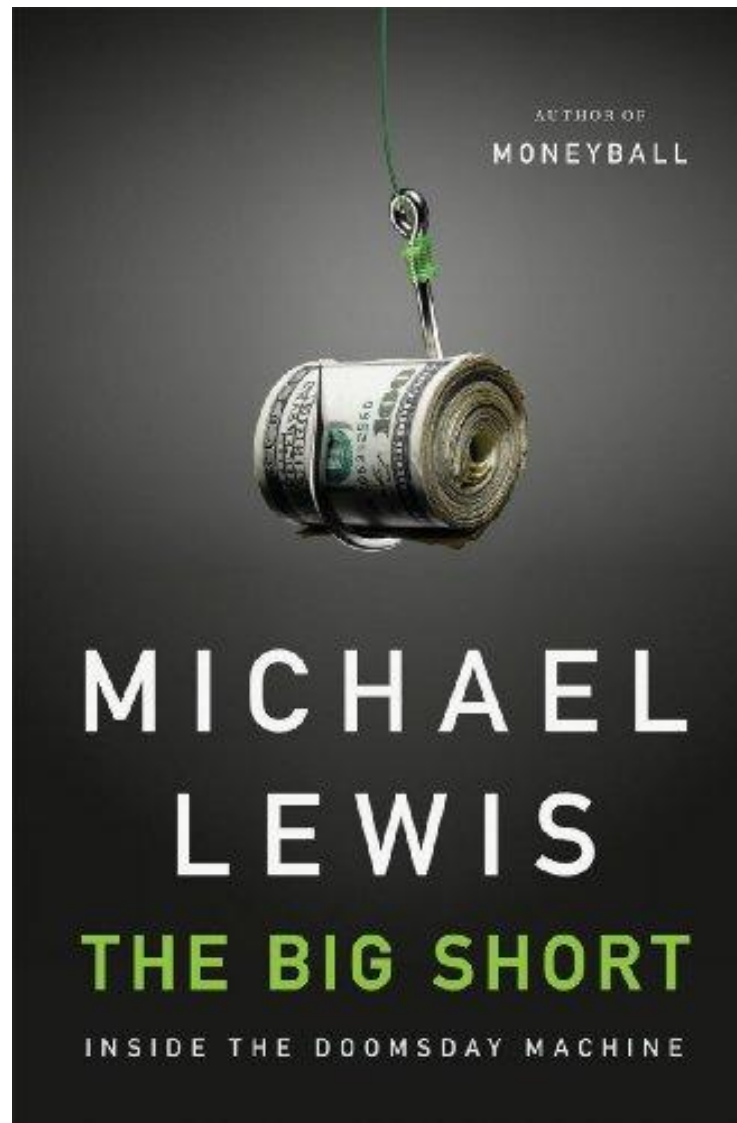
➤ Different Values

- Focus on delivery timeliness & bottom line
- Bureaucracy

➤ Non-Technical Management

- Limitations on quantitative understanding
- “Don’t say convexity”
- Communication skills are key

“Quant” Stigma



Combating the “Quant” Stigma

➤ Go Beyond Physics Credentials

- Easy to be trapped as a specialist
- Being “technical” or “good with numbers” should be part of your expertise, **NOT** your defining identity
- Necessary in any field outside academia, but especially so in finance