

# PHYSICS AND FINANCE

## RISK, REWARD & REALITY

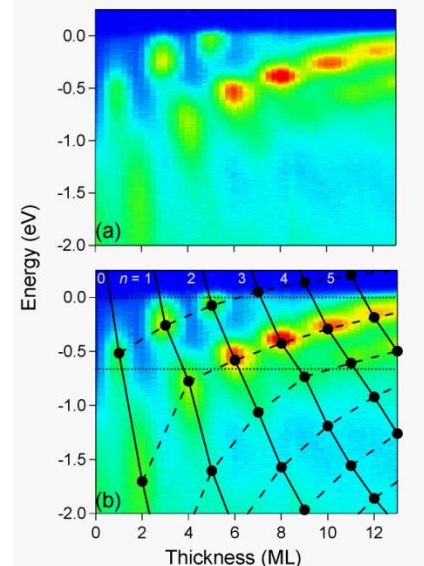
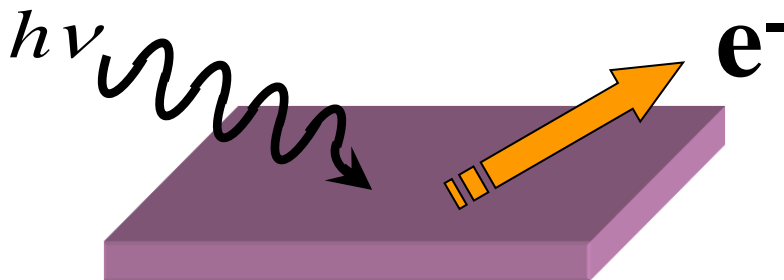
**Dominic A. Ricci**  
**Traded Risk Management**  
**HSBC, New York**

# 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

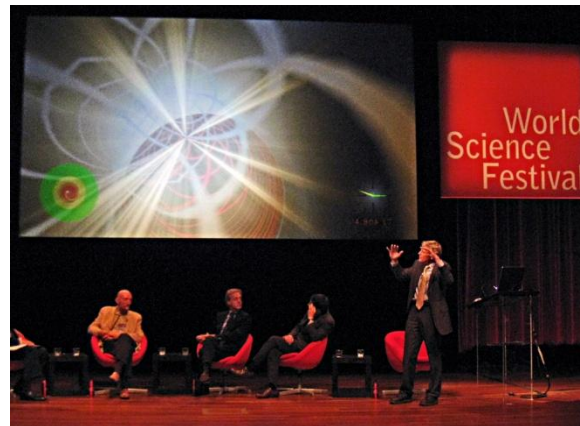
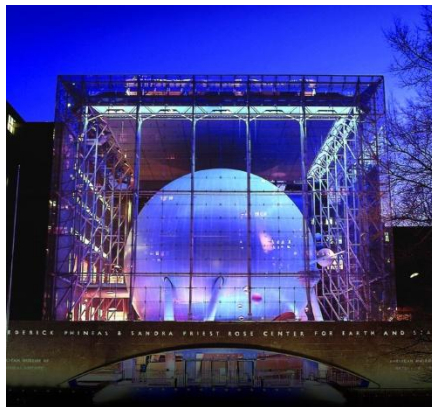
# Reflections

## ➤ 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

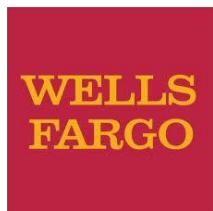
## ➤ **Lifestyle**

- Work/life balance
- Compensation

# Financial Industry Structure

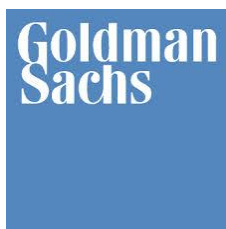
## ➤ Commercial Banks (US)

- 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)



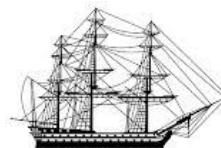


# Financial Industry Structure

## ➤ Investment Managers

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

**BLACKROCK**



**Vanguard**<sup>®</sup>

## ➤ 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

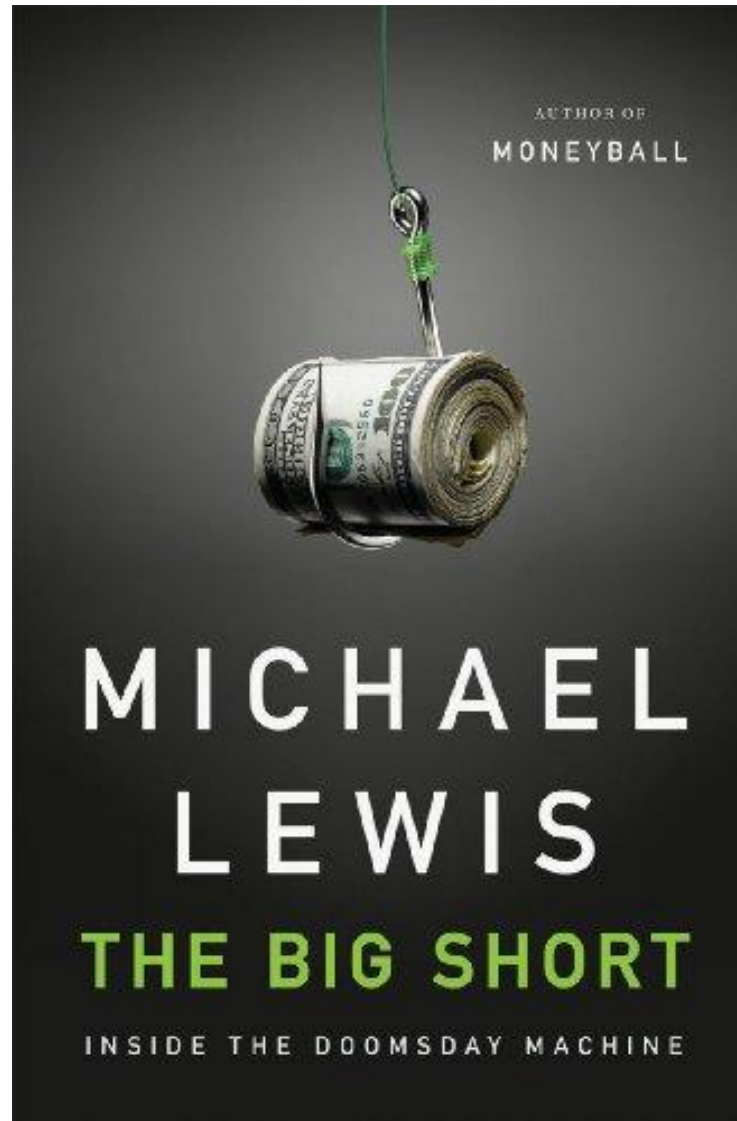
## ➤ Different Values

- 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