

# EXAMINING THE REVOLUTION:

HOW TECHNOLOGY IS CHANGING THE TRADING LANDSCAPE

R-Finance  
Conference  
May 11, 2012  
Chicago, IL  
Blair Hull



# INTRODUCTION

- Evolution of the trading business
- Role of Market Structure & the SEC, HFT, and the Flash Crash



# KETCHUM TRADING IS AN OPEN SOURCE SHOP

- R
- Python
- Linux



**Appreciate the contributions of Jeff Ryan, Paul Teetor, Brian Peterson, & Ruey Tsay**

**Packages: xts, xtime, indexing, sde, monomvn, lars, fUnitRoots, fGarch, manova, just to name a few**



# FIRST TRADING EXPERIENCE



**STRATEGY?**

A NEW YORK TIMES BESTSELLER

# BEAT THE DEALER



A  
WINNING STRATEGY  
FOR THE GAME  
OF TWENTY ONE

**EDWARD O.  
THORP**

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# THE NUMBERS:

- 60 hands/hour
- .008 advantage
- Average Bet \$100/hand
- \$48/hour



# PROBLEM - CAPITAL FLUCTUATIONS:

- Probability of Winning
- One Weekend 67%
- Two Weekends 75%
- One month 99%
- Information Ratio = 8-10
- Return on Capital and Labor





# PRINCIPLES:

- Get the edge and stay in the game
- Bet in proportion to your advantage and in proportion to your capital



# TRADING VS BLACKJACK

- Both require the same discipline
- While in a losing streak keep the faith
- Play in proportion to your capital
- Lose half, cut your size in half
- Double the bank, double the bet size



# SECOND TRADING EXPERIENCE



# TECHNOLOGY CHANGES:

- 1981 Don Stewart (Stewart Data) and Barry Hertz(Track Data)
- Prior to 1985 Exchanges prevented traders from having computers on the floor
- Even when we could have computers on the floor you couldn't connect to a real time data feed
- So we employed a human ticker



- 1990 Deutsche Terminbourse
- Europe moves to automate
- 1992? CME Globex
- 1998 ISE



# HULL TRADING - SEPTEMBER 1999

- 250 Employees
- 26 Exchanges
- 9 Countries
- 30,000 transaction/day
- Goldman Sachs



**IN 2000 I KNEW SPEED WOULD BE IMPORTANT.....**

**“If you have a mouse in your hand you are too late.”**

**Blair Hull**

**Futures Industry Magazine, Dec 2000**



# BUT I DIDN'T KNOW THAT:

- Direct access would be so important
- Queue position would matter
- Reg NMS would give advantages to speed
- ISO orders would be necessary





# REG NMS WAS PROPOSED IN 2005 AND IMPLEMENTED IN 2007

- Rule 611 banned “Lock Markets”
- One of the exceptions was an Intermarket Sweep Order (ISO)



- Assume the market for XYZ is 20.01 20.02 1,000 up and an institution wants to buy 10,000 at 20.02
- Institution buys the 1,000 at 20.02 and wants to pay 20.02 for another 9,000 but can't bid because he can't send a day ISO or prove he is not locking the other market
- HFT sees the 1,000 trade at 20.02 and sees the new 9,000 at 20.01. The institutional order has been slid back by the exchange a penny from 20.02 to 20.01. The HFT then steps ahead of the institution



- HFT gets superior queue position that he doesn't deserve



- There is some evidence that HFT profits took a large jump in 2007 after Reg NMS was implemented
- Direct Edge and Bats were created by HFT firms
- These new exchanges were SRO's but they were FOR-PROFIT entities and were incented to create order types and an environment that favors HFT



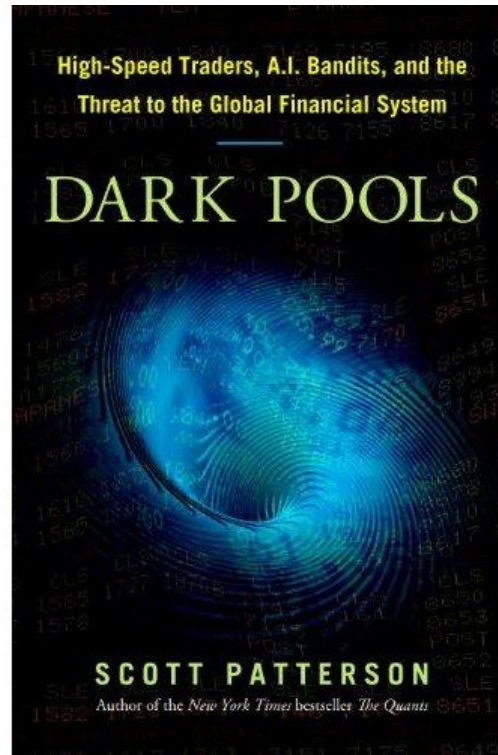
- One answer is suggested by Manoj Narang, June 2010
- Allow “locked markets”



A “locked market” is simply a market with a bid-ask spread of zero. Just as surely as a 1-cent spread is preferable to a 2-cent spread, a zero cent spread is superior to a 1- cent spread, and reflects greater price visibility and greater market efficiency



# TO BE RELEASED JUNE 12, 2012



# CONCLUSION

- **The SEC helped to create the problem of HFT & the Flash Crash**





# WHAT IS DIFFERENT ABOUT HFT?

**My hypothesis is that the strategy depends on  
Queue Position**

- **Getting to the front of the queue**
- **Cancelling when one loses the edge**



# FLASH CRASH



# **Exchange-Traded Funds, Market Structure and the Flash Crash**

**Ananth Madhavan**

**January 13, 2012**

**“Our results show the Flash Crash can be linked  
directly to current market structure”**

# WHAT STRATEGIES ADD VALUE TO THE MARKET?

- Some trading strategies contribute to the quality of markets and others do not
- Scalping strategies contribute less than fair value strategies
- “Hot Potato” strategies do not help
- Bring liquidity from one market to another helps market quality



# SPREAD NETWORKS

- Jim Barksdale
- 13.3 ms versus 15.9 ms
- \$300k/month - 5 year commitment
- 19-23 firms currently using
- $300 \times 20 \times 12 \times 5 = \$360$  million



# MICROWAVE TECHNOLOGY

- 18 months later
- Sub 9 ms
- 19 to 55 towers
- 7,000 towers between NY - CHI
- Frequency acquisition is important
- Less Reliable 98.0-99.9
- \$7 million to build, \$100k/month to maintain

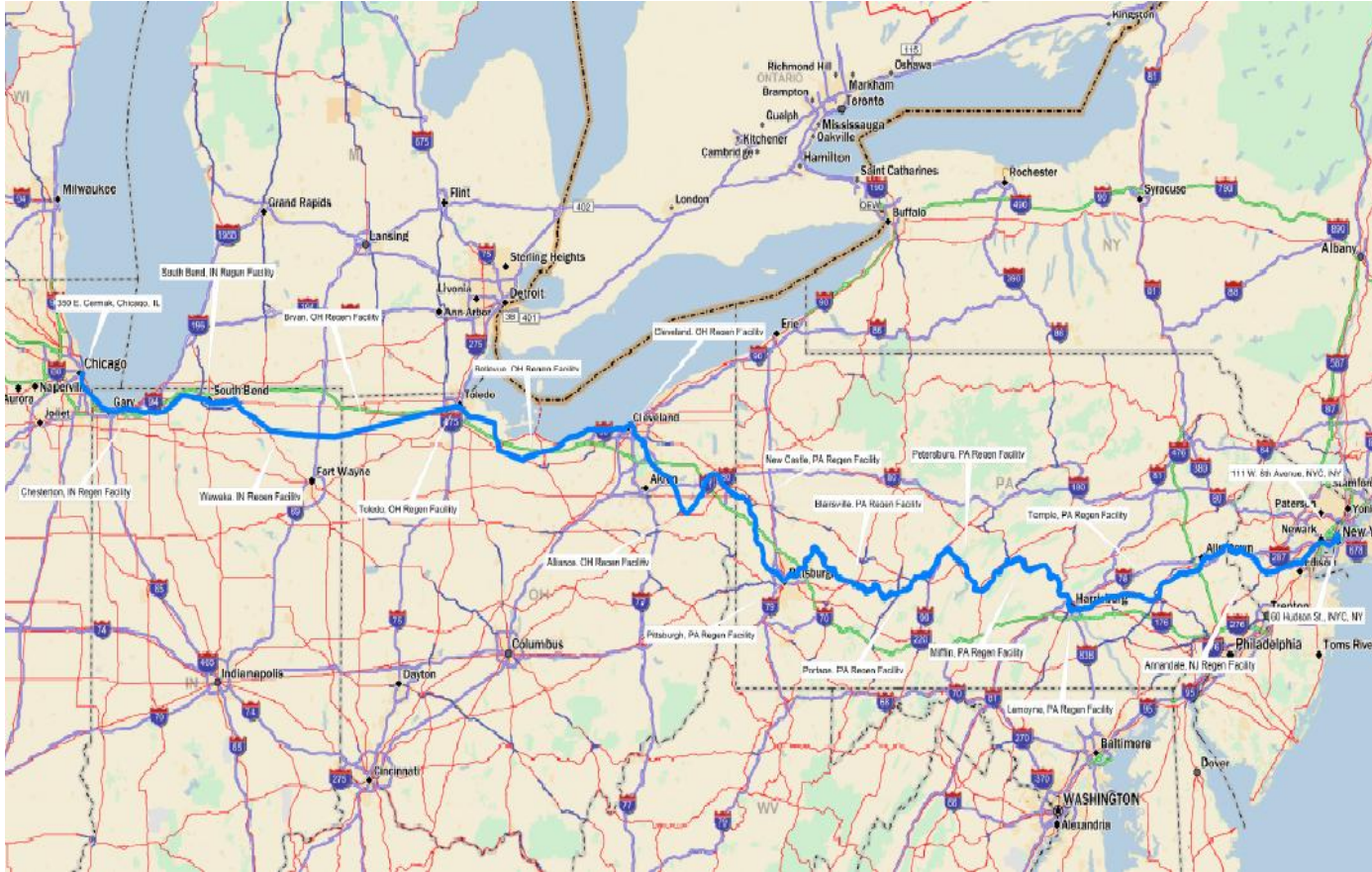


# CURRENT STATUS

- More than two in use
- 12 currently being built
- Multiple players building
- Multiple paths being built by some players
- Unlikely to be a monopoly
- Implies it is likely to be affordable
- Is the playing field becoming more level?

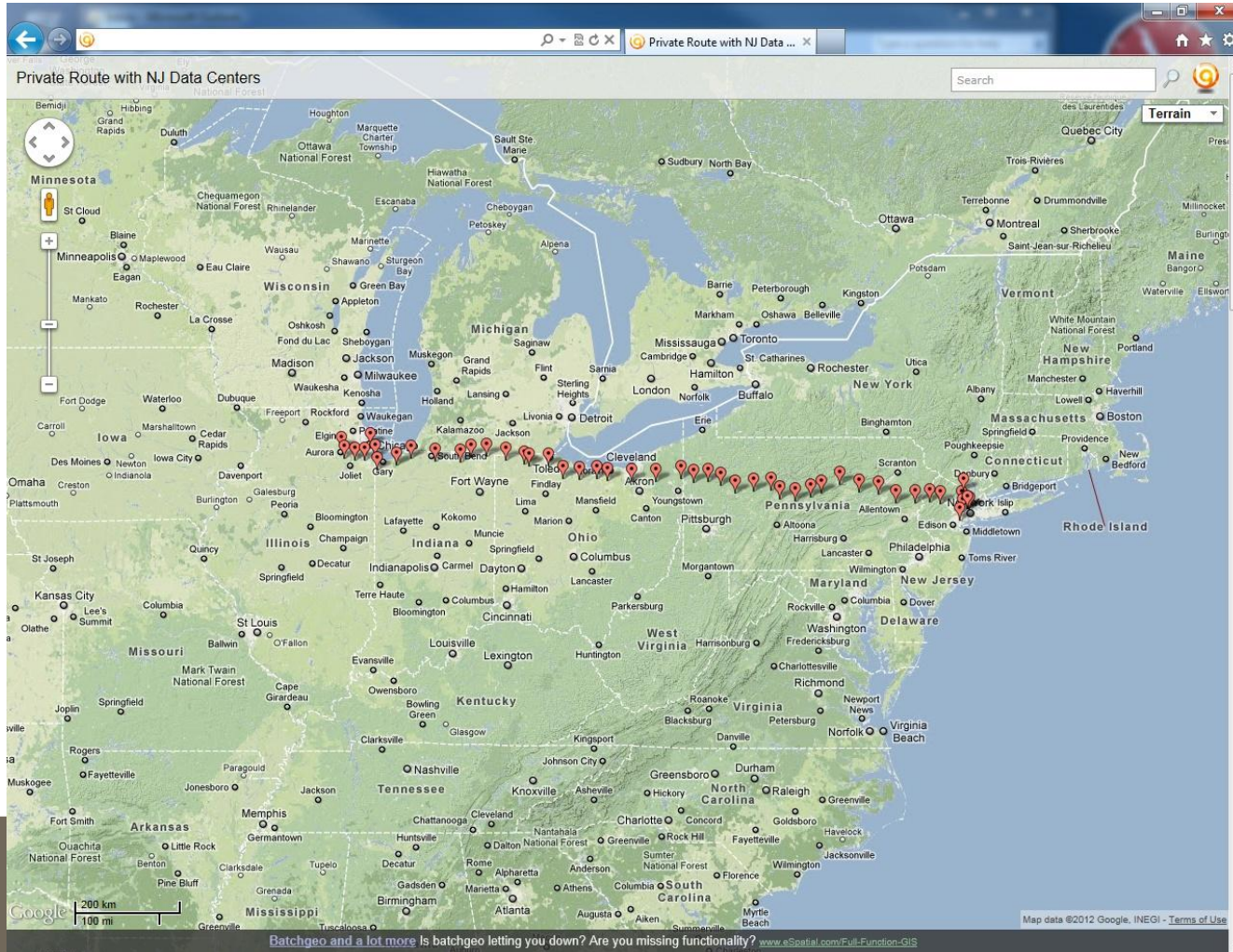


# PATH 1 - 15.9MS

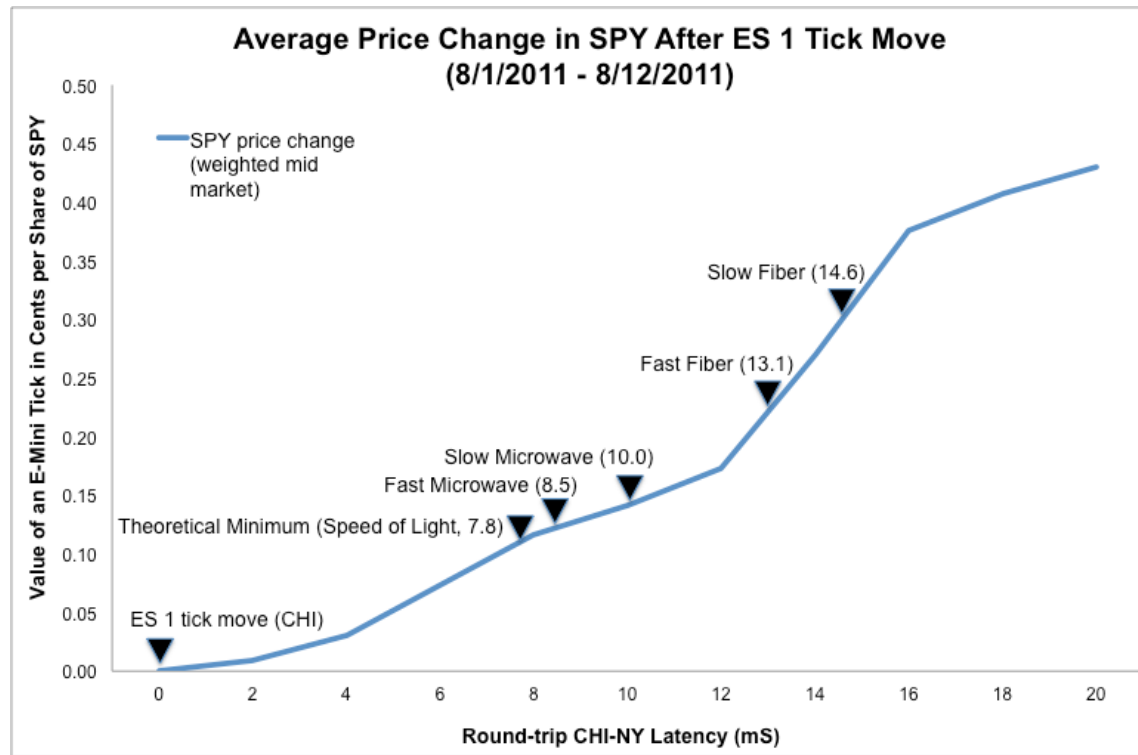




# PATH 2 SUB 9MS



# HOW MUCH IS SPEED WORTH?



# ARBITRAGE BY THE MOMENTS

- Mean (Delta One - Statistical Arbitrage)
- Variance( Vol Arb )
- Skew(Risk Reversals)
- Kurtosis(Out of the Money Options - Insurance)

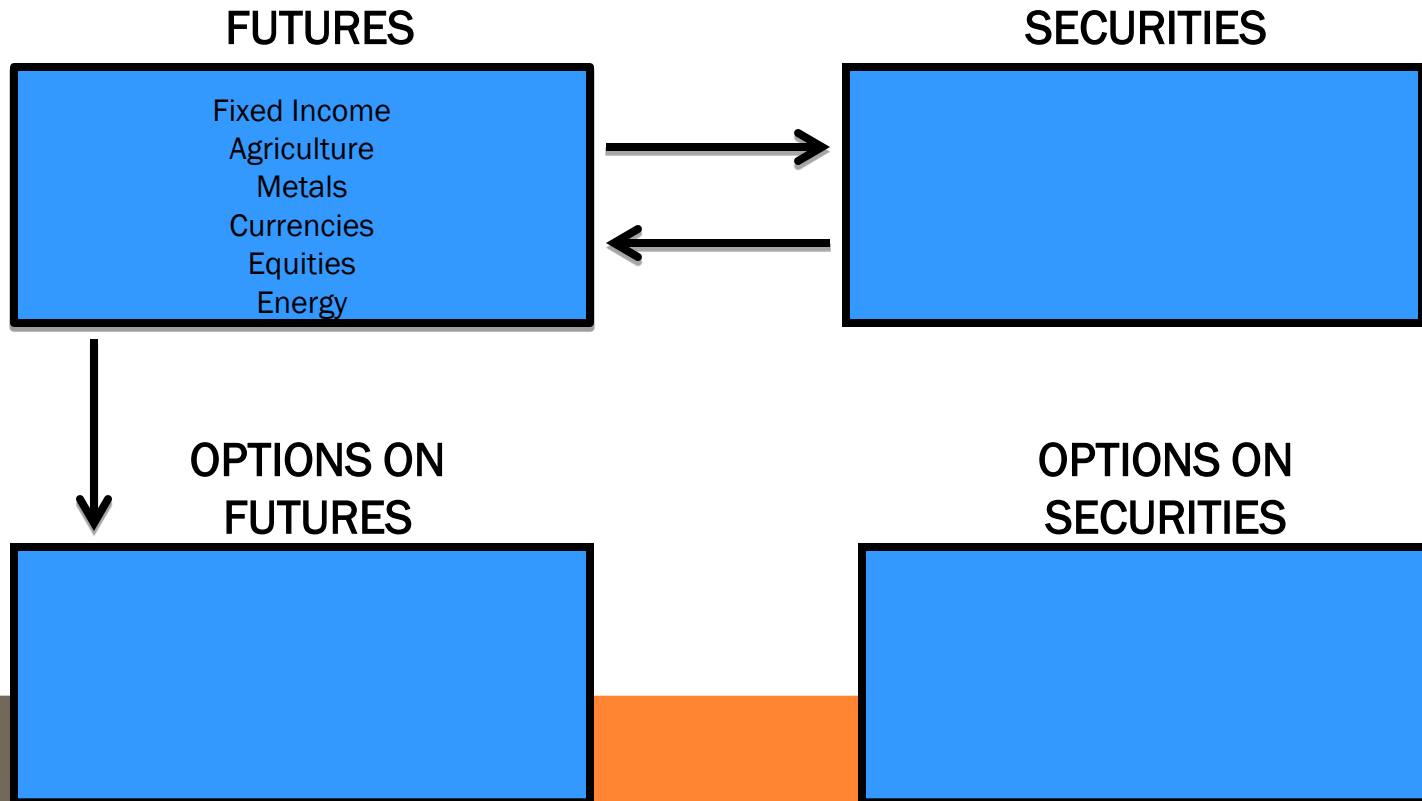


# FAIR VALUE TRADING

- Mathematical Expectation
- Risk Adjust
- Bid and Offer



# THE FOUR QUADRANTS



# GEOGRAPHY

Asia, Americas, Europe, South America



# MINIMUM COST FOR TRADING FIRM

- Lines \$20k
- Colo's \$50k
- Data \$15k
- Hardware \$10k
- People \$105k
- Total \$200k/month

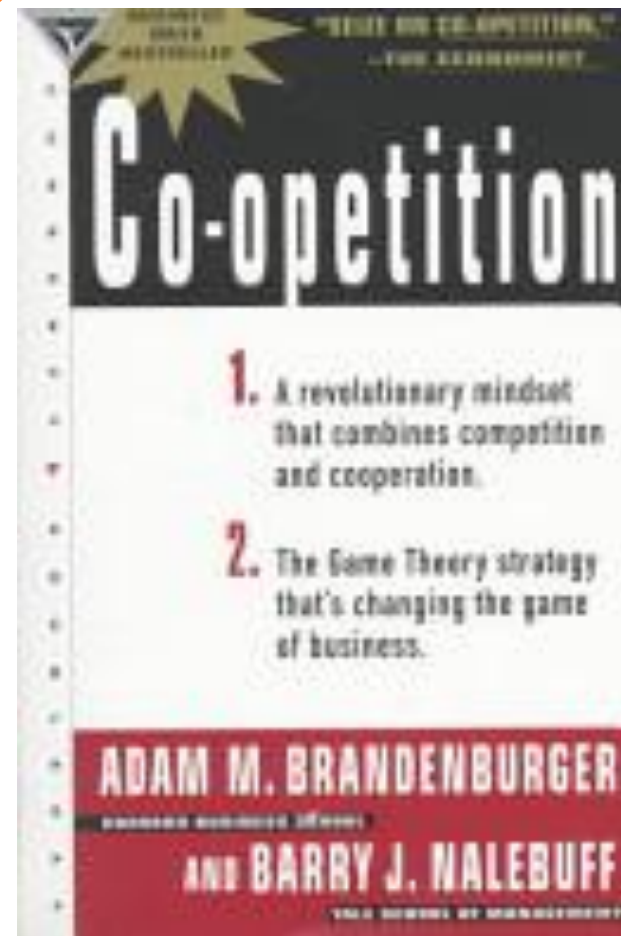


# HOW DOES A SMALL FIRM SURVIVE?





# CO-OPETITION



# COOPERATE ON?

- Reducing clearing costs
- Moving to higher tier rebates
- Infrastructure costs (colo and lines)
- Knowledge of exchange order types
- Exchange matching differences



# DON'T SHARE YOUR SECRET SAUCE...

- Specific algorithms regarding trading strategy
- The source of your alpha
- Trader ego's are large and they wouldn't copy you anyway
- I usually share because the strategy couldn't be replicated anyway



# MY CONCLUSIONS ABOUT SHARING...

- Do not share if you are making over \$100 million/year



# KETCHUM TRADING

- Supports trading teams with technology, infrastructure and capital
- Colocation at 350 Cermak, Aurora, and Carteret
- 14.6 ms line
- Sub 9 ms line in June test
- We give feedback and share ideas



# REQUIREMENTS

- Have a strategy that you believe will produce a sharp ratio  $> 4$
- Have a team of highly educated individuals... typically a trader, developer and a financial engineer
- Need low costs and speed
- Desire to collaborate



# CONCLUSIONS ABOUT TRADING

- The Trading Business is extremely competitive
- Technology advances come faster and faster
- Integrating information across asset classes and geography is becoming necessary
- Coopetition is a competitive advantage



# CONCLUSIONS ABOUT MARKET STRUCTURE

- **Flash Crash can be linked directly to current market structure, not just Waddell and Reed**
- **SEC should modify Reg NMS**





