Interview Workshop

Traders@SMU

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Agenda

- Core Interview Concepts
  - Quantitative Development
  - Quantitative Trading
  - Equity/Fundamental Research
  - Brainteasers

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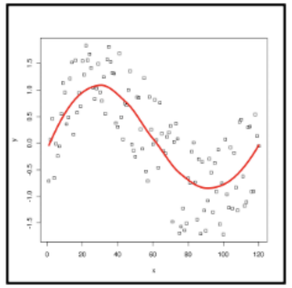
Quantitative Development

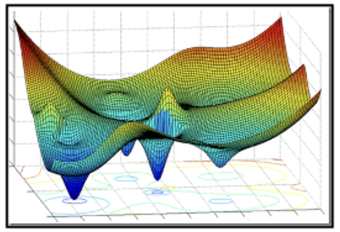
Fundamentals

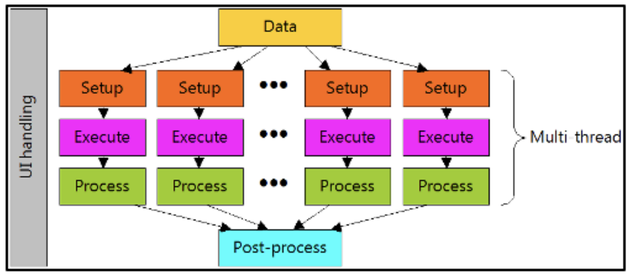
The applications of programming vary across firms and types of shops, but all rely on the same fundamental skills: Data Struc. & Algo's, Object Oriented vs Dynamic programming., OS & CLI

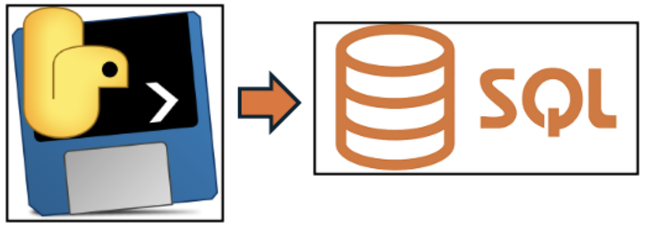
- Web Scraping & API's
- Version Control
- Multi - Threading
- Signal vs Noise proc.
- **Evolutions**
- Applied Stat. : Modeling
- Optimization *
- Time Series Anal.
- Back Office Automation

Exhibits of Application









Hedge Fund

- Data Pipelines: Python – SQL – PBI
- Analytics specific to Strategy:
  -Multi Strat, Single Strat, Fund B.U.
- Heavy Database knowledge

Sales and Trading

Emphasis on
Pricing connecting Excel functions that can help Traders quickly & Accurately price contracts upon request from clients

Quantitative - HFT

- Applied Stat. – Jamie Kopp
- C++ Low Latency prog.
- Heavy Operating Systems know.
- Multi Threading & Parallel proc.

Quantitative Trading

Core Skills:

- **Probability/Combinatorics**
- Brainteasers/Reasoning
- Market Making
- Statistics
- Financial Markets

Other Topics You'll Encounter

1. Mental Math Tests: Focused on operations on decimals, fractions, and some exponents
2. Aptitude Games: Games such as ballon popping or switching back and forth tasks
3. Numerical Sequences: Identifying the next number in a sequence
4. All the Above on a Phone Screen

Resume:

Your resume MUST show demonstrated interested in trading. Whether it's through **projects**, **research**, or **internships**. Competition is very high—a school and GPA is enough to get some through the door, this will not work in our case. Make bullets relevant to the **role you're applying to** and be prepared to **elaborate deeply** on them in interviews.

Key Duties:

- Execute/monitor models the team researched & developed
- Analyze statistics of models and equities, ensuring risk control
- Propose new trade ideas
- Provide liquidity
- Strictly monitor market conditions

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Probability for QT

Key Discrete Distributions

Binomial: $\binom{n}{k}p^k(1-p)^{n-k}$ →

- Dual outcomes

Poisson: $\frac{e^{-\lambda}\lambda^k}{k!}$ →

- Large # of n trials, small success of probability

Geometric (Bernoulli): $(1-k)^{k-1}p$ →

- # of trials until 1st success

Negative Binomial: $\frac{k-1}{r-1}p^r(1-p)^{k-r}$ →

- Counting trials until r successes occur

Key Continuous Random Distributions

- **Uniform:** $\frac{1}{b-a}$ →

All outcomes are equally likely

- **Exponential:** $f(x;\lambda) = \lambda e^{-\lambda x}$ →

Time between events, $\lambda = event\ frequency$

Bayes Theorem: $P(A|B) = \frac{P(B|A)\times P(A)}{P(B)}$

Other Crucial Models/Concepts:

- Markov Chains
- Monte Carlo Simulations
- Linearity of Expectation

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Equity/Fundamental Research

Core Skills:

- **Equity/Capital Markets**
- Financial Accounting
- Factor Analysis
- Forecasting
- Python/Data Manipulation

J.P.Morgan

North America Equity Research

Kraft Foods Group

This Was the Rorschach Test of Quarters -- Staying Neutral as Uncertainty Still Reigns

Neutral

KRFT, KRFT US

Price: $44.57

Price Target: $47.00

Food Manufacturing and Retail

J.P. Morgan Securities LLC

Price Performance

Kraft reported 3Q12 yesterday and provided sufficient fodder for a variety of interpretations to be made. Bulls can point to an improving gross margin and solid organic sales growth excluding SKU pruning. Bears can point to the inventory load and the muted 0.4% sales growth figure ex-pruning. Our view is that while the quarter was probably more or less in line with expectations, we find it difficult to draw solid conclusions given how many moving pieces were floating around. This uncertainty, plus the fact that the Street is already well ahead of guidance for next year (we think the $2.70 consensus may need to come down), lead us to maintain our Neutral rating.

- **What the bulls may have seen.** 1) The top line beat, up 3.0% versus the Street's 1.6% forecast. 2) The gross margin was much better than expected, at 33.3% excluding hedging gains versus last year's 30.9%. 3) Guidance was maintained for next year, suggesting that management's visibility remains clear. 4) Volume and pricing rose simultaneously. 5) The quality of the quarter seemed solid, with ad spending and the SG&A margin up.

- **Investment thesis.** We hold a Neutral rating on the KRFT shares. We appreciate the strategy of CEO Tony Vernon and team to become a low cost producer that markets brands with great equities. We have no doubt that he is taking the company in the right direction. However, with a premium valuation already in the stock and earnings estimates well above guidance for next year, we see limited upside in the near term.

- **Valuation.** We use a 50% P/E EV/EBITDA methodology. Normally for a company with KRFT's top line growth algorithm (low single digits), we might attach a peer multiple. But because KRFT has meaningful cost savings programs ahead and sports a hefty 4.5% dividend yield, we think a premium is warranted. We thus attach a 2x premium to the group's 15.0x P/E multiple and 1x to the group's 9.0x EBITDA multiple. These 17.0x P/E and 10.0x multiples atop our estimates of $2.93 in 2014E EPS and $3.6B in EBITDA lead us to model $47 fair value as of December 2013. Thus our target price for that date remains $47, about 5% higher than the current price. Though this implies a healthy ~10% return over the next year, we see better upside in some other names we cover.

- **Risks to rating and price target.** Upside: 1) Input costs could rise, 2) Ad spending may not drive sales growth as high as expected, 3) Private label pricing could become more competitive. Downside: 1) Input costs could fall, 2) Ad spending may drive sales growth higher than expected, 3) Private label pricing could become less competitive.

Buy vs Sell Side

Buy Side: Hedge funds and asset management firms. Own internal research teams who produce reports for PM's. Not publicly available.

Sell Side: Investment banks. Distributes to sales and trading clients, incentive for clients to use the bank so they receive a fee.

The Interview Process

1. Initial HireVue or aptitude test
2. First round HR Behavioral screen
3. Super-Days: Back-to-back with analysts, VPs and PMs/MDs

- **HR:** Looking for a person who is collaborative, adaptable, can work under pressure, and is creative. Have unique questions ready for all interviewee types

What to Review

- What affects a company's financial performance
- How to manipulate specific metrics to forecast results
- **Asset classes/products**
- **Rates**
- What's driving markets now
- How to arbitrage opportunities

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How to Approach Brainteasers

Why Interviewers Ask Brainteasers

- Test Logical reasoning under pressure
- Evaluate your structured thinking process, not just the final answer
- Gauge calmness, creativity, and communication

Interview Tips for Brainteasers

Think aloud
— your interviewer can't read your mind.

Don't freeze! Start anywhere logical, even if incomplete.

If you're stuck, reframe: "Let's consider a simpler case..."

5-Step Framework to Tackle Brainteasers

1. **Clarify the Question**

Repeat the question in your own words—Ask clarifying questions ("Can I assume X?" Or "is randomness involved?")

2. **Break it Down**

Identify key variables or constraints.
Break the problem into smaller, manageable chunks.

3. **Talk Through Your Thought Process**

Be verbal: "Here's what I'm thinking..."
Explain your assumptions and logic clearly.

4. **Estimate or Iterate**

Make a first attempt, even if it's rough.
Interviewers care about direction more than perfection.

5. **Sanity Check + Final Answer**

Pause to check if your answer makes sense
If time allows, refine or stress test your logic

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Brainteaser

I give you a shuffled deck of 14 cards which contain exactly one card from each rank and a Joker. You win $100 if you flip over the King, Queen, & Jack but if at any point you have flipped over the Joker, the game ends and you win nothing.
How much would you be willing to pay, to play this game?

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Answer

- The only cards that influence the outcome of the game are the King, Queen, Jack, & Joker so only these 4 cards need to be considered.
- You lose the game if the Joker comes before any one of these three royal cards, so the probability of you winning is the same as the probability the Joker is selected last among these cards. The probability any 1 of the 4 cards is last is 1/4 .
- Your expected earnings from playing this game is 1/4·100 so you should be willing to pay up until $25 dollars for this game.

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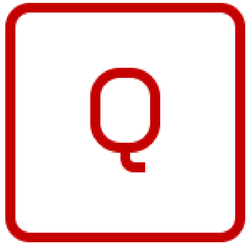
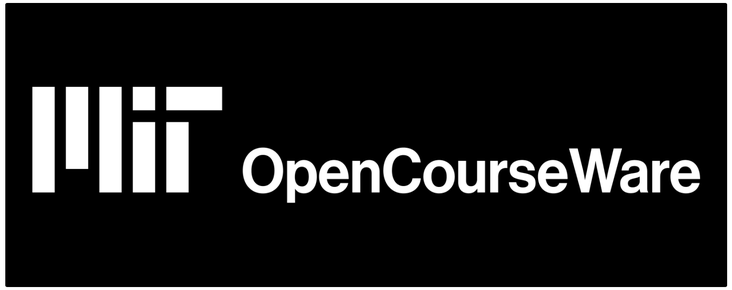
Resources for Prep





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