

# HOW I BECAME A QUANT ?

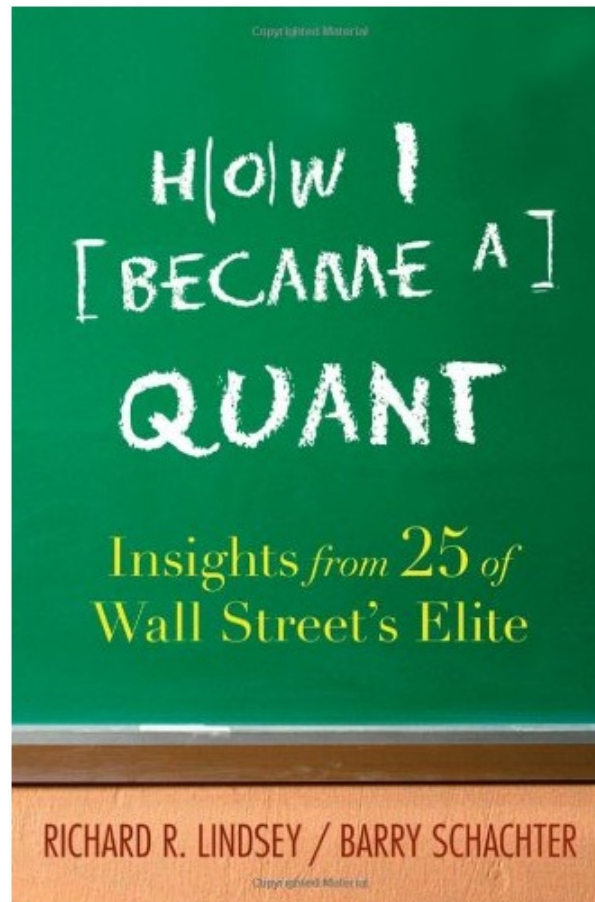
## Book Review

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### Abstract

This document comprises a brief summary of 25 quant stories mentioned in this book.



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## 1 David Leinweber



David Leinweber graduates from MIT and Harvard with a bachelors and PhD respectively. He lands up at RAND corporation to work on AI. After working many years on classified stuff, he moves to LISP machines Inc. Once the market turned harsh towards hardware firms, David moved to Inference Corporation, a software-only AI firm where he starts working on AI applied to finance. LISP, with its garbage collection mechanism is not really suited to real time financial trading applications. So, David goes on to start his own firm, Integrated Analytics where AI is used for stock picking. He launches, Market Mind, an AI based tool for equity trading. Soon after this startup success, he joins First Quadrant, a Quantitative investment management firm where his group starts managing \$6 Billion. After First Quadrant, he starts another firm Codexa which doesn't take off. Subsequently he lands up as a faculty at Berkley

### *Learnings*

- Markets are not instantaneously and perfectly efficient. Insights, and the ability to execute them rapidly in ever-faster electronic markets, will continue to be rewarded.
- There are secretive firms that consistently show up on lists of the highest-volume traders reported by the exchanges. Founders of these firms show up on lists of billionaires. Are they just the lucky typing monkeys? Are they the investment equivalent of the lady in Jersey who won the lottery three times? Probably not. They make too many separate bets, thousands every day. And they do too well, too consistently. To attribute their success purely to chance strains credulity.
- Stocks are stories, Bonds are mathematics
- The PhD quants think the technicians are essentially examining tea leaves and goat entrails. The technicians think that PhDs are hopeless geeks who wouldn't know a good trade if they sat next to it on a bus.

## 2 Ronald N. Kahn



This story is about the quant Ronald N . Kahn who is generally known amongst practitioners through his popular book, *Active Portfolio Management*. Kahn graduates from Harvard with a PhD and joins BARRA in

1970s , a firm that was revolutionizing the area of finance at that time. Kahn learns every thing about finance and quantitative applications to finance from BARRA. It was an ideal play ground for an academic as the team mostly comprised PhDs who walked away from their own field and came to finance. One of the leaders at the firm, Richard Grinold offers Kahn to sit through his course at Berkley. Soon, they start collaborating on many projects and one of their outputs is the book on active portfolio management. After doing tons of quant work at BARRA, Kahn joins BGI, following his boss steps. His experience at BGI managing money turned out to be an equally a rewarding experience. So, in one sense Ronald N. Kahn followed the ideal path for a quant, i.e , do research for a couple of years and apply quant techniques in managing money.

### *Learnings*

- Undergraduates learned from their professors. But the role of a graduate student is to teach their advisor new things. I wonder if such a thing should be applied to our usual work place reviews. Imagine that a yearly review is based on, not only the contributions that XYZ makes to the firm, but also on what his/her colleagues learn from him/her over the past one year. Imagine there was strong incentive system in firms to impart skills/knowledge to coworkers. Indeed such a place would be great place to work.
- Important communication should always be in writing and limited to one page
- Success in finance would require one to acquire much more intuition and insight into the basic problems faced by investors and to build up a toolkit for analyzing those problems.
- My approach to quant finance was very different from what a formal education in this area would involve. Basically, I tried to master specific areaslike interest rate optionsand then branch out and master new areas, through new projects. It was a patchwork quilt approach. I hoped I could build enough sufficiently large patches that they would eventually form a substantial quilt.
- Is quant revolution over ?. Certainly much of the relevant theoretical underpinnings are in place. At the same time, there exist even today significant issues in need of rigorous quantitative analysis. Present-day debates over liability-driven investing prove that fundamental issues remain unresolved among investment professionals Other areas worthy of further research include hedge funds and, more generally, optimal leverage and shorting. Between these remaining fundamental issues and the never-ending competition amongst active managers for out performance, the need for quants has never been greater. There is plenty more to do in this challenging, interesting, and rewarding field.

## 3 Gregg E.Berman



This is the story of a quant who doesn't want to be called a quant. Quant is sometimes used pejoratively on Wall Street as in, 'He is ONLY a *quant*'. After graduating from Princeton with a PhD , Berman realized

that he was not cut out for academics. His first few jobs were at hedge funds where he wrote automated trading strategies for commodity futures and trades those strategies. In the first few years he was so fascinated by coding that he programmed even on 2 hour train daily commute. The years at hedge fund helped him understand markets, psychology of trading, the type of statistics that can be used, etc. . . He traded futures for a couple of years and did not particularly enjoy it during a bear market phase. He felt that trading was an activity where luck played a significant role in the success and his academic bent of mind, where hard work and smartness fetch results, was not accepting the vagaries of trading. He remarks,

I also found that that I had less of a stomach for the huge ups-and-downs of trading than I had previously believed. This was a hard lesson for me to acknowledge. After all, many people claim that if they just had some money to start with they could use it to make a fortune. Well, I had millions in potential capital at my discretion and was asked to do just that. But I couldn't. I very much wanted to, but I just couldn't come up with any systems or strategies that would make fortune in the commodities markets. The more I wracked my brain, the more I realized I liked the detailed analytical parts of my job much more than the trading parts

The big change in the career came when he moved to RiskMetrics and did a lot of quant work at JPMorgan. At JPMorgan he donned quite a few hats and became a true quant in Wall Streetish sense. The big takeaway from Berman's story is that quant is not a job but an attitude that one must develop, to do well in finance, and more so in today's tech driven finance.

## 4 Evan Schulman



This is the story of a quant, Evan Schulman, whose belief in efficient markets got strengthened in his initial years of work at a trust company analyzing pension accounts. After developing quant tools that helped portfolio managers focus on their stock selection, he came to believe that quantitative skills can improve trade processes, if not generate alpha. He subsequently joined Keystone group at Boston to develop quant stuff like 'Implementation shortfall' models.

After his stint at Keystone, he moved to Batterymarch and that was a key step in his career. At Batterymarch, the entire firm was working hard to lower commissions and to keep the market impact of trades to a minimum. Schulman executed the first program trade while at Keystone Funds. Lot of people on the Street know Schulman because of this first program trade thing. He not only helped computerize the firm-front, middle and back office-but also introduced an innovative trading system at Batterymarch. Schulman let brokers access its orders via computer to trade. He left Batterymarch to start Lattice Trading, a firm that offered an

electronic trading product that was a forerunner to today's algorithmic trading.

What was Lattice core idea ? It was multi-broker system to allow for the fact that institutions tended to use several brokers in the conduct of business. Lattice became very popular and was bought by State Street. Evan then left to start another firm , Upstream technologies in 1999. In his earlier firm, the work was mostly for the institutional side. At Upstream, he and his co-founder Mark Hoffman decided to apply the tools, discipline, quality control to individual accounts, even the small ones. Upstream uses quant stuff to work on individually managed accounts that dominate mutual funds. As Evan remarks

Optimization is ideal for the accounts of individuals.

Today, Upstream technologies is a success story on Wall Street.

### ***Learnings***

- A quant who believes in efficient markets can still add tremendous value to improving the investment process itself, be it on the institutional side or the retail side.
- Compound returns equal a function of the average return less half the variance. Meaning, the longer the time horizon, the greater the difference between arithmetic return and geometric return on investment
- Not all problems can be solved by throwing more bodies in to a mix. The performance and productivity of quants varies a lot. Sometimes just one or two quants can bring in radical changes to the business. I am reminded of Dragan Skoko and his tremendous contribution to the success of Batterymarch

## **5 Leslie Rahl**



Leslie Rahl graduates from MIT in 1972 with a degree in Electrical engineering and realizes that she has no aptitude for circuit boards, electricity, or the mechanical facets of electrical engineer's trade. In a totally random combination of events, she lands up in Citi and spends 19 years doing trading and risk management. Starting from a job of trading options for a prop book, she starts handling interest rate trading book and eventually swap business. In 1994, she leaves Citi to start her own company, Capital Markets Risk Advisors and since then has grown her company to a decent size on Wall Street.

Her belief is that models are useful for trading and not valuation. This comes from a quant who has traded for 19 odd years , so there could be a bias in her statement. What surprises me is that she starts a risk management company where you are typically valuing something under extreme events. So, how is that she has spent the last 15 years on something she doesn't believe. Anyways, when asked how she became a quant ? , she replies ,'I was born a quant' and adds that being a quant helped her not only with solving quantitative problems, but has taught her an analytic framework for problem solving that applied equally well to non quantitative problems

### *Learnings*

- It is better to run your own business / work for a smaller company/ startup than working in a big firm . When you count everything, Positives outnumber the negatives .

## 6 Thomas Wilson



Thomas Wilson, a graduate from Berkley and Stanford is not sure whether he would consider himself a quant or not. He believes in ‘asking the right question’ as being crucially important than any mathematical technique. You ask the right question and then go about looking/ creating/developing/copying the mathematical techniques to solve the question. He remarks

I put on the other end of the continuum individuals whose contributions were driven more by the question, or the intuitive interpretation of the observed economic and financial phenomena, rather than by the quantitative techniques that were used to represent their intuition. For individuals at this end of the spectrum, phrasing the question seemed more important than the techniques used to find the answer. In this camp, I put such individuals as Akerlof, Stiglitz, Lucas, Diamond, and Dybvig, individuals whom I judge to have contributed more through the intuition behind the question than the actual quantitative techniques they used. Who can argue that the intuition and insights behind Akerlof’s market for lemons outshadows the relative simplicity of the algebra used to prove the point?

He is extremely honest in confessing that he has lesser mathematical expertise than the quants who get cited in finance papers, media. In his career, he has stumbled on three questions and has learnt/developed mathematical tools to answer the questions. In this book, Thomas Wilson lists some of the most important questions he has answered in his career.

- Market Risk Era ( Early 1990’s)
  - Is it possible to calculate VaR for nonlinear portfolios from local risk information that is readily available on the trading floor?
  - How many independent factors are practically required to capture the risk of a multicurrency fixed income trading book?
  - What happens to the tails of our VaR calculations if we have only estimates of volatilities and correlations and not their exact values?
- Credit Risk Era ( Late 1990’s)

- Do equity markets alone provide sufficient information to characterize the contemporaneous correlations between average sector default rates and migrations?
- How useful are other factors such as the level of real economic behavior as measured by GDP, interest rates as a surrogate for debt coverage, or foreign exchange rates for sectors with international competitors in explaining sector defaults and their correlations?
- Do equity markets, which react instantaneously to new information, effectively describe the auto-correlated time series properties of credit cycles?
- How can retail portfolios and large corporate exposures be integrated into the same portfolio model consistently?
- How can default only portfolio models be expanded to a mark-to-market approach comparable to market VaR?
- Strategy Debate ( Late 1990's to Today)
  - What are the inherent theoretical biases, and is it possible to make adjustments to correct for the biases?
  - What is the appropriate cost of capital, by line of business, if capital is allocated based on the standalone risk of each underlying business? And, what role does earnings volatility play in the valuation of a bank or insurance company?

*Learnings*

- Build your intuition before building your model
- Trust your intuition
- Challenge your intuition
- Be as good at your communication as you are at the theory
- The model is always wrong - but that doesn't make it useless.

## 7 Neil Chriss



This is the story of Neil Chriss, known for this book 'Black Scholes and beyond'. Neil Chriss received his PhD from Chicago University. In the initial few pages of this story, he gives a few reasons for leaving academia, especially leaving pure math for industry. He compares pure academic mathematicians to Explorers whereas applied mathematicians/practitioners to Mountain Climbers. Explorers take risk with out any guarantee that it will pay off. Mountain Climbers have a fixed goal, i.e the top of a mountain and thus spend their time getting there. Explorers have a different personality than Mountain Climbers, though in one's life it is very difficult to sometimes clearly demarcate one from another. In the case of Neil Chriss, he clearly says that he did not have that 'passionate,ever thinking,every imagining' mathematical interest.



After his PhD from Chicago, he moves to University of Toronto to join the math department. Here he develops an interest in derivatives and writes a paper on 'Option Pricing formula with volume as variable'. This paper gives way to interactions with Goldman team, mainly Derman and Kani from Quantitative Strategies group. He then ends up doing a summer job at Goldman and then receives a post doc at Harvard. However Wall Street appears more exciting to him and he thus leaves Harvard for a job at Morgan Stanley. At Morgan Stanley, he starts collaborating with leading quants like Robert Almgren, Peter Muller etc. He finally moves to GSAM (Goldman Sachs Asset Management) and starts managing money for the firm. He also becomes NYU Courant's math fin program director. This unique place offers him to meet many more quants like Jim Gatheral, Steve Allen, Peter Fraenkel, Nassim Taleb etc.

He ends his story with a prediction about the usage of quantitative techniques in finance. This book was written before the crash of 2008. So, the tone of the author is overtly optimistic in one sense where he predicts that quantitative asset management will dramatically change asset management business. Well, one might take that statement with a pinch of salt, after the massive beating that most of hedge funds took, in the past few years. Over all, I found the story of Neil Chriss very interesting as he has managed to do things in academia as well as Wall Street, despite declaring himself as a mountain climber. Well, he seemed to have climbed a lot of mountains to make up for not taking up an explorer's job

### ***Learnings***

- You have to deeply care about math to become a full time mathematician (Explorer)
- Came to know of this book titled, 'The Glass bead game'. Should read it someday
- You have to enjoy working with computers to become a productive quant
- Neil Chriss learnt probability, stochastic processes from scratch after joining as a faculty in math. It's never too late to learn stuff in one's life. You just have to have the right attitude.
- Take regular feedback of your work from other people
- Historically mathematicians had more interaction with the real world. Hence there is nothing to be embarrassed about leaving academics to pursue work in industry.
- Having a strong background in technology having had the experience of writing tens of thousands of lines of code was an advantage. To do anything large scale in quantitative finance requires good technology. Everything from the storage and retrieval of trade data to the execution of trades increasingly relies on technology that is efficient and reliable. Knowing how to build systems that work well now and can be maintained and grown is an important asset because as a business grows in complexity, the technology that drives it has to grow with it. It is all too easy to build a small system that works well but find that as it grows it grows out of control in complexity and becomes difficult to manage.

## 8 Peter Carr



After pursuing an undergraduate degree in accounting and economics from University of Toronto, Peter Carr heads to UCLA for a Phd in Finance and then follows it up with a Postdoc at Princeton. He mentions that his choice of UCLA was particularly helpful as it gave him time to pick up math and make up for his lack of formal training in mathematics. Obviously what he means by lack of enough math skills, is a relative statement. His time at Princeton proved important. His meeting with Dilip Madan changes his course of life and he heads to Wall Street and spends a successful quant career at Morgan Stanley, Bank of America and Bloomberg. His remarks about quants and quant career in general, are particularly encouraging. He remarks

Although many academics think otherwise, mathematical finance is in its infancy with lots of low-hanging fruit to savor. If you want to be a quant, my advice is to see it as a calling, not a job. The money is incidental. It comes and goes. A good idea never goes away and if you are lucky, you'll have a few before we all fade away into obscurity.

### *Learnings*

- Academics use English words to describe mathematical concepts and that one should never confuse the everyday meaning with its mathematical definition.
- Read and work voraciously to make up for a lack of formal training. Sometimes you do a better job than people who are trained formally.

## 9 Mark Anson



With a PhD from Columbia University , Mark Anson proceeds to law school and then begins his career. While practicing law he realizes that his first love was always direct application of quantitative techniques and gets back to doing a quant role. One of his remarks he makes in this book, that needs to be kept in mind I guess by any aspiring quant is,

Quantitative skills are like a foreign language. The more you use the skills, the more honed they become. Conversely, failure to apply the skills on a regular basis leads to a slow dissipation

It is often that we learn some skill set/techniques in school or in a specific project and , we then move on. It is like storing something in the working memory and deleting it. Unless specific skills are put to repeated use in one form or the other, quants run a risk of losing them.

Mark Anson sees the uncertainty in the markets as a good breeding ground for sophisticated, innovative quant solutions. In the US context, he mentions that quant skills need to applied to avert the pension crisis, that will be a certainty by 2050, if nothings done in a proactive way.

### *Learnings*

- Be less concerned with dazzling audiences with quantitative skills or technical jargon and more concerned with understanding the empirical relationship between economic variables
- Math is a tool to apply to financial markets. You have decide whether you have to make it blunt or refined, based on the context, problem, etc.
- Traditional fundamental research will be less important in the future because the goal will not be to find undervalued stocks or bonds, but instead, to focus on financial outcomes.
- Love to embrace uncertainty as that is the reason quants are employed in the first place.

## 10 Bjorn Flesaker



Bjorn Flaseker starts off his quant story with a reference to Garbage Can Model and its relevance in a sell-side derivatives quant group. He remarks

I have personally found the Garbage Can Model to provide a useful framework for understanding and interpreting the behavior of organizations where I have worked, including, but not limited to, the importance of solutions looking for a problem, the importance of decision making opportunities, and the significant degree of randomness in actual choices made.

After doing Bachelors at Norway, he is told by his faculty members that he should look to do a PhD. Subsequently Flaseker joins UCLA for a PhD in finance. A chance attendance of a seminar on HJM model gives him a problem to work on , as a part of PhD thesis and so begins his quant journey. In his 5 years at Berkley, he meets a lot of other quant researchers (including his future wife). He subsequently moves to Illinois at Urbana-Champaign to take up a faculty job. During his stay at Urbana-Champaign, he works on various derivative models, early exercise models etc. In 1992, he gets a chance to present his work at Merrill and subsequently is offered a job. His quant career begins at Merrill and takes off.

### *Learnings*

- Collaboration matters. People matter in quant work (unlike the popular perception that quant is some lonely creature working on some arcane models)
- Revisit basics from time to time
- Make a business impact with your model from time to time. It need not be some sophisticated out of the world model. A straight forward model that solves a business problem is better than complicated pie-in-the-sky model.
- You never know when a model will become useful . In this context, the binomial trees that Flaseker worked on in the university was immensely helpful in making the first contribution at Merrill

## 11 Peter Jackel



Peter Jackel graduates with a PhD from Oxford, then ends up in a post-doc role at which point of time , he realizes that he had enough of short-term employment phase( post-doc). Typically as the post-doc position nears, one writes proposals for research grants, or looks for another post-doc position in some other university. Peter Jackel instead opts out of this race and looks out for a job in the industry. At the time of applying for these jobs, he claims that he had no knowledge of stochastic calculus, derivatives ,market knowledge etc. After a few interviews at various places, he lands up a job at Nikko securities where he is taken in as a model validation quant. He gets lucky here as he gets to meet Bruno Dupire and thus his real learning begins. In a matter of weeks , he learns about finite differencing solvers, forward Kolmogorov equations, Monte Carlo simulation techniques, and general derivatives replication theory..all the techniques that is today offered as a part of 18 to 24 month MFE program!. It is truly amazing that he learnt all of this in just a few weeks time.

Then after 17 months, Nikki securities goes through a major restructuring and he loses his job. This turned out to be another fortunate random event, as lands up in NatWest where he gets to meet Riccardo Rebanato. He learns a ton of stuff from him and implements a whole lot of model validation code. It is during this phase of life that he starts thinking about a proposal from John Wiley and sons , that he write a book on MonteCarlo

methods. Well, as it turns out he was not all that interested in it except that he wanted to dispel one myth that was prevalent amongst every one using monte carlo methods, i.e Sobol numbers. There was a opinion that was taken for granted that Sobol numbers are suitable only for low dimensional problems. However Peter Jackel found that he could easily scale the dimensionality problem by using suitable initial conditions . Sobol numbers were perfect for his back testing and this lead him to write a book on MonteCarlo, that is now the staple diet of any MFE program.

After another rejig of teams at NatWest, Peter Jackel is moved to front desk where he is a part of team which builds a structured product quant library from scratch. His 3.5 years of work of coding the library taught him many more things from an implementation perspective. This is kind of reminder to any quant who doesn't want to program. The real learning of quant fin comes from programming, is the biggest takeaway from this story.

### *Learnings*

- build your models transparently and to the highest standards so that you don't have to be afraid to be open about them; and bear in mind that you don't own the models you build for the company you work for in fact, as quants, we own nothing, not even the paper we write on. We deliver a service to our employers. The company may have to share part of what we develop with other teams in the company and is at liberty to do so. The company may be obliged to share what we are doing with regulators. Always be aware that what we develop and implement may be subject to scrutiny.
- anyone who wants to make it as a quant to spend some time in a model validation group: you get a lot more time to dedicate to analysis and learning than in the front office where there is a constant and relentless pressure for delivery of directly usable analytics
- Collaboration matters a lot in quant work
- Get the right balance between a general and a bespoke approach for any individual project
- Every thing you do as a quant is cumulative. No piece of code that you write is trivial. It will be used in some future work of yours. This also means that you should not be sloppy in your coding . Doing proper documentation matters. Following the right design pattern matters.
- Coding something from ground up is a wonderful experience and one must never hesitate to take up such a job, despite the risks that it might entail.

## 12 Andrew Davidson



This story of Andrew Davidson, is filled with the theme, 'I am not a quant' in almost every other sentence that he writes. Having an undergraduate education from Harvard and MBA from Chicago, Andrew Davidson's first job was Exxon. The bureaucracy got to him and he left the firm to work at

Merill and finally started his own company Andrew Davidson & Co. The story is about Andrew's skepticism about models used in the mortgage industry. He cites specific instances where disregarding theory sometimes better. He points at a number of places where he does not possess the skills of a true quant and in fact reveals in the fact that it is not needed to survive and make a successful quant career!

***Learnings***

- How traders and other participants describe the operation of the market, and how it truly operates, are two different things.
- A clear conceptual picture often is better solution than a mathematical model that misses a key component

## 13 Andrew B. Weisman



After graduating from Columbia with a PhD, Andrew B Weisman's takes up a consulting job with Lehmann where he immediately realizes the big gap between theory and practice. In this book he remarks

I had my first epiphany as a quant researcher; it consisted of the fundamental realization that most of the trading that occurs on an interbank trading desk takes place on a timescale that, for the most part, defies fundamental economic analysis. In truth, longer-term market convictions based on well-structured, defensible analysis are apt to get in the way. Such speculative activity is more akin to playing Pong.<sup>1</sup> It is primarily a reflexive activity, with the trader operating under no imperative to distinguish Margaret Thatcher from Terry Hatcher. In many cases, doing so would have been a tall order.

There is one statement that he makes which left me little surprised. Andrew remarks

The market tends to place a significant premium on complexity. Basically, one should never explain a simple concept or procedure in simple terms, or it will be robbed of its marketability. Keep the curtain firmly in place and crank the devil out of your thunder machine

Why have a curtain ? Why should one not be transparent about the model ? Somehow makes me feel little uncomfortable as the above statement asks you to remain secret about your model. As long as the strategy is making money, shouldn't it be good enough to market it to clients ?

***Learnings***

- Mean Variance Optimization in its plain form is dangerous and should not be used for portfolio allocation
- VaR is an ordinal measure and not a cardinal measure. It is easy to confuse between the two and sleep in peace until one day when the portfolio evaporates. Much like the thanksgiving turkey mentioned by Taleb, which until the day of its death feels good about the fact that it is fed healthy food on a regular basis.

## 14 Clifford S. Asness



At the outset, Clifford Asness , says ‘Luck’ has played a significant role in his success. After graduating with a PhD from Chicago, he joins GSAM and starts working on building portfolio models as well as managing money. Within a few years with 4 models, his group starts managing \$7 billion. Humbly, he attributes the good chunk of initial success at GSAM to luck. Subsequently he leaves GSAM to start AQR with a \$1 Billion. The first two months of his startup are some of the worst times for the fund. The billion dollar fund loses 60% and has a huge drawdown. Subsequently Asness reins in the risk exposure of the fund and makes it a sustainable venture during the troublesome times. Rest is history. Today AQR is a huge success story with assets close to \$40 Billion. In this book, Asness dispels a lot of myths surrounding quants such as

- Quants are data miners
- Quants use blackboxes
- LTCM’s blowup shows the limit of Quantitative investing
- Quants are driving with rear-view mirror

### *Learnings*

- Being in industry, managing money does not mean, you don’t publish stuff. Keep publishing articles / opinions / models regularly.
- Never be afraid to call a bluff a bluff.

## 15 Stephen Kealhofer



This is the story of a quant and an entrepreneur. Like other stories mentioned in this book, there are random events that shape this quant’s story. Stephen Kealhofer’s story starts off with a decision to move to Berkley as a faculty where he starts working on ‘default probability’ models. The second significant event that happens in his life is a consulting assignment that involved developing a statistical rating model that Oldrich Vasicek had developed. This project helped him in getting in a good understanding of the practical difficulties of implementing models. The third significant event happens when he is consulted for analyzing Junk bond cases. This assignment resulted in creating a good database with variables that could be used to estimate the empirical default probabilities. The fourth significant event was meeting Mac

McQuown who became the co-founder of Stephen's startup , KMV corporation. The other co-founder was the legendary Vasicek himself. There is sometimes a myth that quants are these nerdy people who work with formulas and not good business people. Vasicek is a brilliant counter case for such a notion. Vasicek's model is something that any quant learns in his 101 course. The fact that the team was instrumental in building a company like KMV that ultimately got sold off to Moody's speaks volumes about the success quants can have in entrepreneurial ventures. Nowadays with most PhDs directly going in to quantitative money management, we might see many more quentrepreneurs . I loved this story because it actually talks about the hardships a quant startup goes through in explaining the work they do to , established institutions and adding practical value to the business. The fact that the trio built a company based on a model is something that any quant can take inspiration from and remind himself from time to time, that , *One has to integrate whatever quantish stuff that he/she does with the business problem.* Pie-in-the-sky work is good but one should also focus on doing quant that is relevant to the business.

### ***Learnings***

- Always keep in mind that model /quant work has to deliver business improvement / business value. One cannot divorce the modeling aspects of the problem from the nature of data available , nor from the business context the model would be used
- Even if you are not completely certain about it, take a position and start exploring the position. It is similar to "having a map is better than no map" situation where having a map will motivate people to explore.
- Finance is a beautiful field. It touches everything, so it is a license to explore the world
- There is more data in finance than any field I can think of. One of the many great things about markets is that they generate large amounts of high-quality data about the actions of people. Finance is a beautiful field. It touches everything, so it is a license to explore the world
- The path from data analysis to the implementation of business ideas is incredibly fast. In biotechnology, it is measured in decades; in finance we do it in months or even weeks.
- If you can deduce something useful, you get paid.

## **16 Julian Shaw**



I found the story of Julian Shaw as one of the best quant stories in the book. After completing a PhD from University of Toronto, Julian Shaw loses interest in pure mathematics. He takes up job at Gordon capital as he needed a better job than teaching math or computer science in his university. He has a very unique experience at Gordon capital which was populated by market makers, option traders, basically risk takers. Nobody was interested in quant stuff like risk management. Julian Shaw applies his quant skills and brings to the attention of the management of a trader using wrong vol estimates to price and subsequently trade. His work is not so well received in the beginning. However when the trader loses his money, then people



start taking notice of him. But Julian Shaw sadly remarks , ‘Risk management’s role should come before the trade goes haywire and not after’. In any case, Gordon Capital blows up and he moves CBIC, another firm where nobody wanted to listen to quant saying the positions carry a huge risk. So, Shaw leaves CBIC very quickly and through a random head-hunter call, lands up at Barclays. He then writes about a few war stories at Barclay that make an interesting read.

### *Learnings*

- Finance is more than just pricing models and arbitrage, more than picking up dimes in front of steam-rollers and sweeping up golden crumbs. Finance is concerned with the way people organize production and distribution, which is a prerequisite for human welfare.
- The hardest part of quantitative analysis is framing the problem in the first place. Many quants aren’t good at this, partly because they don’t think it’s their job. They want the PDE or whatever to be served up to them on a plate. Solving PDEs is a useful skill, but there is a lot of good software to do that. There is no good software for identifying options embedded in deals defined by verbose legal documents
- Most of JP Morgan quants have ditched complex multivariate stuff to simple historical simulation to capture VaR. This makes it easy to communicate to the trader. However there is an entire debate about whether VaR is good absolute measure of risk at all. Consensus is that it is merely a relative measure
- A crude but transparent risk system is more effective in practice than a sophisticated but opaque system!
- The quantitative firepower applied to problems in finance is inversely proportional to the amount of money at stake.
- Many quants from the physical sciences are too lazy or arrogant to learn some econometrics
- Unlearn two attitudes to become a good quant.
  - The first attitude is that specialization is good. Bad quants pretend they are still physicists or mathematicians or whatever; they can’t be bothered learning new tricks from other disciplines, and they never learn much finance. ‘If all you’ve got is a hammer everything looks like a nail.’
  - The second attitude to unlearn is the assumption that the failure of people to understand what you are saying proves how smart you are. In academia, one only cares what the other specialists in one’s own field think. By contrast, in a financial institution nothing you do counts for anything unless you can convince the (usually) intelligent but nonmathematical people in charge to do something different from what they would have done otherwise. Despite Poincare’s famous maxim that one doesn’t really understand a mathematical theorem until one can explain it to the first person one meets on the street, most mathematicians can’t even explain their theorems to other mathematicians! And they are proud of it!
- Quantitative finance is a craft and a trade. It is barely engineering, and it is certainly not a science. Good quantitative finance can be summed up as the art of leaving things out, plus the art of selecting the right tools.
- The test of a model is its ability to hedge a real portfolio in the markets
- One can’t be an expert at everything but one does need to understand the essence of a wide range of mathematical and statistical techniques. It is rare that one needs to invent completely new techniques; usually you can find a problem with the same mathematical form, often in an apparently unrelated discipline. The art of the quant is to find appropriate tools and bolt them together to create an effective solution to the problem at hand.
- If you want to be more than a technician, you will have to learn some finance; finance is not a corollary (trivial or otherwise) of any mathematical science.

- Interview Tip : think up one money-making idea and be prepared to defend it. This will generate a lot more interest at your interview than the Malliavin calculus!
- Go through Peter Carr's FAQ's in Option Pricing Theory to see where you stand as far as understanding options theory is concerned.
- If you want to make your mark, find a really big financial problem and create a quantitative framework for dealing with it. You will need some imagination.

## 17 Steve Allen



After graduating from Columbia and NYU Courant, Steve Allen joins Chase Manhattan bank to work in their operations research department. Till then he had never worked with computers and so he taught himself languages needed for the job. The first year at Chase was frustrating for his team as there was a distinct lack of management interest in their quantitative skills. Despite the obvious discontentment in the environment, Steve Allen stuck to his job and started utilizing the time effectively. He learnt to code, take up special classes in the evenings to learn bond mathematics, interact with traders to suggest tweaks in their existing formulas, etc. Basically he kept his mind active.

Soon, things started changing at Chase when a new management comes in that is more interested in quantitative techniques. Steve then gets to use MonteCarlo simulations etc not for their finance department but to improve their operations. After spending quite a number of years in Operation research, he moves on to building an analytic and modeling support for the firm's traders and this he does it for 10 years. He self-learns differential equations, option theory and a lot of math that he never had a chance to learn. These 10 years proved to be extremely useful in Steve's career as he developed modeling + reporting skills that became valuable to Chase traders. These 10 years of effort (it reminds me of Malcom Gladwell's observation of the time to become an outlier) helped him in launching a successful risk management career.

Steve Allen's attributes his success to the environment as he says that it was environment that changed where quantitative techniques became more prominent in the area of trading and risk management. After a successful 35 year stint in the industry, Steve Allen became the program director for MFE at NYU courant. Does he think the field has become matured and there is no opportunity to be creative? . He quips

If you want to have a good career, you had better find a way to be creative; it's unlikely that your personality will be charming enough to induce an employer to pay you well for routine performance. But I add that creativity takes many forms it consists not just of finding some new mathematical solution but also of discovering new ways to communicate results and build consensus.

### ***Learnings***

- Keep learning . Steve Allen's attitude can be inferred from this remark '*I enjoyed an advantage in having to struggle to come up the curve mathematically. It put me in a good position to figure out how to educate others who were finding the new concepts difficult.*'
- Always have a vague sense of outcome so that you don't become too theoretical, to the point that you miss the fact that you are modeling in finance-a social science.
- Crunching numbers is a good thing and it is better to show results to traders than talk about some arcane mathematical concept that they would be least likely to be interested in.

## **18 Mark Kritzman**



Mark Kritzman graduates with a degree in economics and joins investment advisory department that managed asset allocation of pension fund clients. Here he comes across mean variance optimization technique that appeals to him as a method for asset allocation. He then gets an MBA from NYU to sharpen his quant skills. Post this, he moves on to the investment department of AT&T. This was a great place for Mark as he could interact with top notch people in the research team of AT&T. He moves to Banker's trust and then eventually starts his own firm. As of the book's publication, his firm Windham Capital Management, managed \$30B of assets. He cites three main things that helped him develop quant skills.

1. First is AT&T research team where his one-one conversations / discussions with Bill Sharpe, Harry Markowitz, Bob Merton, Steve Ross, Jack Treynor, and Fischer Black helped him immensely in developing financial intuition.
2. Starting up a new firm gave him a ton of learnings as he had to develop many applications himself
3. Contributing editor for Financial Analyst Journal role helped him get better at communicating difficult concepts in easy terms, devoid of jargon and symbolism.

Mark gives a list of problems that he solved in his quant career. The readings give an idea of the kind of problems that one needs to tackle in the industry to make a mark.

### ***Learnings***

- Mathematical proficiency will not be sufficient to guarantee a successful career as a quant, especially as these skills become more commoditized. The successful quant should combine mathematical proficiency with an appreciation for economic and financial theory, and he or she must know which questions are really important

## 19 Bruce I. Jacobs and Kenneth N. Levy



This is a unique story of 2 quants who are managing billion dollar funds. These funds have close to 83 accounts totaling \$9B as of 2010. If you read this story it does not sound like as you are reading the story of businessmen. If you ignore the fact that they are managing money, the activities the two quants mention in the book could as well be of 2 social scientists in a research lab.

Bruce gets a PhD from Wharton and ends up as a faculty at Wharton. He meets Ken while Ken is doing his doctoral education at Wharton. During 1970s, almost everyone in academia believed in 'Efficient market hypothesis' and so Bruce ends up choosing PhD topic on the same. Bruce gets a little let down by the ivory tower thinking at academia and joins industry. He joins Prudential where he meets Ken again and this random event changes both their lives forever. Neither of them believed in Efficient market hypothesis and soon they started Jacobs Levy Equity Management in 1986. At one point in time before the crash of 2008, they were managing \$20B. That's quite an achievement. From 0 to \$20B in 24 years with focus on quant research is amazing. Their investment approach was based on market complexity. Their focus on Kaizen approach to quant can be inferred from their remark

Once modeled, return-predictor relationships are likely to change over time. The world is constantly evolving, and old inefficiencies can disappear, giving way to new ones. Merely tilting a portfolio toward historical anomalies does not produce consistent performance. It takes ongoing research on new inefficiencies, new sources of data, and new statistical techniques to keep an investment approach in synch with evolving opportunities.

While most of the then investment managers were using historical data, these quants believed that history was merely one realization from many that could have happened. So, they build a simulator that takes in to account possible alternate histories, alternate correlations etc and start managing their fund. They call this process 'disentangling'. Well you can call it i guess, sophisticated bootstrapping, in today's world. First three years of the firm, they earned hardly anything. They did research, wrote papers and got them published. So, this is a kind of startup where founders wrote papers instead of thinking about money, sales, marketing etc. Why did they do it? Why couldn't they do it in academia itself? I have no answers but I guess the fact that you are in a startup makes one that much more focused on what they are doing things, than let's say a rather relaxed university setting. Basically they spent their first three years doing multi-variate analysis. Its actually very praise worthy that they started off doing focused multivariate analysis before even thinking of the usual stuff in a startup. Wow. these guys rock...I mean, you come across some people, who just write some ill researched trading strategy/portfolio management strategy and then start a firm, and then morph in to sales people. They come with fancy brochures and lot of ENGLISH. So, for all such people, this story should be a telling reminder that 'Doing homework matters in Quant'. You just can't start a firm in a garage, build a fancy site and start pitching. Might work for other areas but definitely not for a quant shop.

In this case, the quants got their initial clients based on their published research articles on portfolio disentangling. It was difficult to convince the normal investors to put in money and so they found few pension managers willing to take that risk. Today their average account size runs in to 100 million dollars. They did a

lot of research and tried them out in the market. I guess that's a big advantage of being in a smaller organization where things are nimble. They were among the first pension funds that shorted assets and soon they did a ton of quant stuff on long-short strategies and incorporated the same in to their investment strategies. With \$20b in AUM, they also took time out to write three books that are popular amongst investment practitioner community. After reading this story, I was amazed what these two quants have done.

*Learnings*

- Spend time in understanding concepts / techniques clearly
- Always simulate and backtest. Historical data is merely one realization
- It is possible to do extensive research even when you are managing money. So, this notion that sometimes we carry as traders being sharp , quick and quants being slow is not that universally applicable. These two quants show that managing money and doing research can happily coexist.

## 20 Tanya Styblo Beder



After graduating from Yale, Tanya Syblo Beber takes up a job in the M&A department at First Boston. She tries returning to Yale for a PhD but that never materializes. Instead she gets involved at a swap trading desk . After a few years at the desk, she starts a risk management consulting start up and runs it for about 13 years. Somehow this story sounds like an detailed CV rather than giving any pointers/cues for aspiring quants.

## 21 Allan Malz



Allan Malz story can be summarized in one phrase, ' Being at the time place at the right time'. He was at the Fed during the Golden Age of Supervision, at RiskMetrics during and after the technology bubble, and at a hedge fund during what may prove the heyday of hedge funds. So, as one would guess, he attributes his quantdom to the way he responded to random events than anything else

## 22 Peter Muller



Peter Muller is a star quant on Wall Street, who struck it big with his team, ‘Process Driven Trading’ at Morgan Stanley. After graduating with a math degree from Princeton, he heads to California and ends up at BARRA, a startup that was doing innovative modeling stuff headed by Barr Rosenberg , a Berkley Professor. He meets Richard Grinold at BARRA and gets the financial intuition needed for any math nerd to make sense of the markets. Peter Muller wants to do a PhD , while at BARRA. However after attending a few classes at Berkley decides that industry provided many more interesting problems and challenges than academia. Once BARRA became huge, the start up culture was lost and Peter Muller developed Poker skills. He gets an idea of starting a fund based on BARRA’s models, but applied to trading. Luckily he finds himself at Morgan Stanley and gets the authority to start a prop trading desk. And they rest is history. Peter Muller’s PDT is one of the most successful trading desks in the world and nobody knows how they operate to this day. In this book, though, Peter promises to write a book someday titled,‘How I became a trader ?’.

## 23 Andrew J. Sterge



Andrew J. Sterge graduates from Princeton with a Phd in mathematics and heads out for his first job at CoreStates Financial Corp in Philadelphia, where he learns the first and probably the most important lesson for trading, ”Cut your losses”. He then joins Cooper Neff, an options trading firm where he interacts with Richard Cooper and Roy Neff, whom he calls the most important people in shaping him as a quant. Over a period of time Cooper Neff morphs in to a HFT firm and this is the place where Andrew finds the work challenging , fun and thus ends up contributing massively to the P&L of the book. Cooper Neff gets acquired by BNP and Andrew spends another successful career in quant trading at BNP. Currently Andrew works at AQR as VP. One of his statements in the book, captures his focus and drive in becoming a successful quant trader

A big part of becoming a quant was the hunger I had to improve my life, both literally and figuratively

This quant story is interspersed with a ton of lessons and pointers to aspiring quants and traders. Here are a sample

***Learnings***

- Quant is not a destination but a process
- You have got to be a voracious reader of market microstructure , trading strategies , everything that is related to markets. This will give you an immense edge in trading.
- Read ‘The Microstructure of Securities Markets’ book
- Start working and start playing with tick data. You have got to store, clean , manage, view, analyze, visualize tick data. These skills are essential to become a good hft trader. Also, It is a prerequisite for building market microstructure models.
- You cannot make yourself a successful quant with out implementation. The greatest research in the world does no good if it cannot be implemented
- Effective implementation requires a lot of courage on the quant’s part. A quant must take responsibility for his work and live the P&L day to day. Handing a model off to a trading desk to then go work on another project is a subtle way a quant tries to gain a free option: Take all the credit if the model works, blame it on traders if it does not. Working every day with traders, making their pain and the firm’s pain your own, and putting yourself at risk for possible failure, is your only hope if you want to be really great in this business.
- you cannot just take your backtests to a bank and ask them to give you the money. Implementation takes a Herculean effort from many people.
- Becoming a quant is most of the times a team effort
- Prices are determined by agents acting in their singular self-interest. The only way anyone knows a fair, equilibrium price has been established is for prices to overreact in both directions. I have set out to profit by making this process more efficient. In the two areas I really know anything about, options pricing and market microstructure, I read virtually every book and article published on those subjects and then find things to exploit that are not written about. Lastly, no model or mathematical insight can make money on its own. One needs a team that collectively understands every aspect of running a trading business. Becoming a quant is not an individual sport.

## 24 John F ( Jack) Marshall



This is the story of a quant who is deeply influenced by his childhood incident of visiting commodity futures trading floor. So, he does his bachelors at Fordham and then works as a commodity trader

for 8 years. Subsequently, he gets a PhD and lands up in St Johns University. The highlight of Marshall's career is founding IAFE ( International Association of Financial Engineers) . They say that one wrong doing can erase all the good things that one does. In this case, even though this story is presented in this book, John Marshall was accused of insider information scam by Securities and Exchange Commission. He was accused of passing inside information about a multibillion-dollar corporate takeover to a professor at Pace University. The Pace professor, Alan L. Tucker, made more than \$1 million trading on the tips in 2007, according to the S.E.C. The Justice Department convicted John Marshall and put him behind bars. Such a horrendous ending to an illustrious quant career.



## Authors

Finally the authors of this nice collection of quant war stories

Richard R. Lindsey is president and CEO of the Callcott Group, LLC, where he is responsible for directing research activities and advisory services. He is the Chairman of the International Association of Financial Engineers. Dr. Lindsey served as the Director of Market Regulation for the U.S. Securities and Exchange Commission (SEC) and as the Chief Economist of the SEC. He was a finance professor at the Yale School of Management before joining the SEC. He has a BS in Chemical Engineering from Illinois Institute of Technology, an MS in Chemical Engineering from Berkeley, an MBA from the University of Dallas, and a PhD in Finance from the University of California, Berkeley.



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