# Risk management and Algos

*Dear readers, let us continue the journey of Quant…um leap by delving deeper into the world of Algo trading. Continuing to build momentum from my last article where I gave a detailed insight into alpha - generation, I would like to build upon the framework this month and talk about risk management in Algo trading. Most of the time I see Algo developers becoming so engrossed in getting the entry point right, that they forget that managing the trades is probably a more important task then merely entering into it. Yet again, risk management is one of the most under estimated topics when it comes to Algo – and yet in my opinion carries a far heavier weight than any other topics covered so far. As my Algo guru always use to say, you take care of the risk and return will be taken care of on its own.*

Like always, let me start this topic too with an As always, this newsletter begins with a small anecdote too. Actually this was the story which gave birth to the present form of high frequency trading as we know of in today's world. It was August 2007 and factor models were its peak. Factor models are type of models, where based on certain factors like Growth (EPS growth, Sales growth etc.) or Valuation (PE ratio, PB ratio), Technical Factors (RSI, Standard deviations from 200 DMA) etc. a set of stocks would be bought. The idea was that stocks belonging to same factors should outperform the broader market, whenever the factors are given more weight by global players and continues to keep outperforming the market. Tomi San, at our desk was a master portfolio maker based on Factor models. So strong were his analysis and his risk management using the MSCI BARRA, analytics tools that his book made more than USD 15 Mn. in a small span of Jan to Aug 2007 on a capital of USD 100 Mn. A 15% return in Japanese markets and that too in 8 months is unheard of. Tomi San was a happy man and so was our prop desk at Merrill Lynch.

17th August 2007 was the day, when something started happening to Tomi San's factor model book. On a single day it was down USD 1.5 Mn. No news in the market, market barely up for the day – and yet the book is deep down. Our MD calls for Tomi San and asks if everything was under control. Tomi San said "Yes". Next day on 20th Aug'2007 the book was down another USD 2 Mn. and on the 3rd day it was down another USD 3 Mn. In a matter of 3 days the book was down USD 6.5 Mn. Half the P&L was wiped off without any signs of market panicking or any news hitting any tape. By the time on 4th day – 22nd Aug our MD decided to unwind the book – the profit of USD 15 Mn. stood at USD 5 Mn. Words began to do round that Goldman and Renaissance technologies are unwinding their factor model books. It was only a matter of time before everyone realized that the Algo trade on factor models which our colleague Tomi San, was doing – was also being done by 200 other firms on the street.
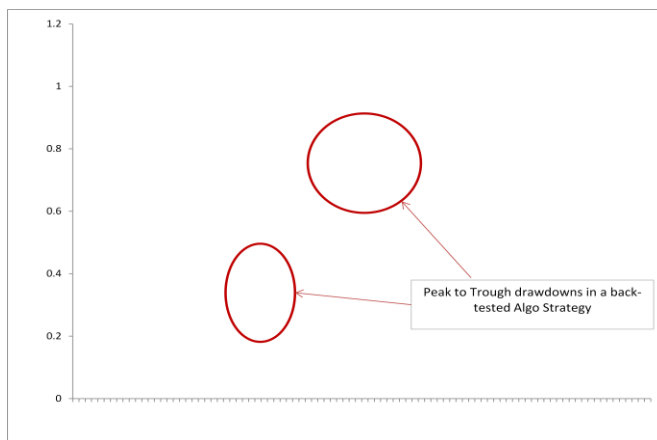
Everyone was sailing the same boat. One small hole in the boat, and everyone would want to jump out at the same time, remember Titanic! Unfortunately, in Algo trading, there is just too much of overcrowding effect whenever a strategy turns profitable. Slowly and steadily, the window available for everyone to make money either shrinks or the risk of holding such trades becomes enormously large. It was only after the quant meltdown of Aug'2007 that investors realized the real pain of holding portfolio for a larger period of time and high frequency trading became popular with investors – given its swift nature of unwinding the trades – whenever something drastic happens.

However high frequency is no respite either. As algos in HFT gained popularity the flash crash like that of 6th May'2010 in S&P started occurring. Again a classic example of overcrowding in Algo space, when all the models started exiting the e-S&P mini futures at the same time, at any price, causing wide spread crash in prices of many premium stocks. Flash crash like that of

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May'2012 and quant meltdown like that of Aug'2007, shows that risk is Algo trading are hidden beasts and can take wild forms, if not managed and tamed in the right fashion. Next comes the million dollar question on how to manage such risks.

If one trade goes bad, most algos would put a stop loss. If 2 trades go bad – there would be a stop loss for the 2nd one too. However, no algo / system every bothers about the fact that if 30 trades goes bad in a row and hits the stop loss – and there is a massive drawdown what to do next? That's the situation many algos develop when everyone exits from the boat at the same time. The answer to this lies in identifying not the trade level stop losses – but a portfolio level stop loss. All the back test in the world in algo trading is not worth a penny, if it cannot tell you the peak to trough drawdown which your portfolio is likely to suffer on running the strategy. The peak to trough drawdown which you have seen in the back test is one of the best indicator of the maximum fall out which you are likely to suffer in live time – while running the strategy.



Peak to Trough drawdowns in a back-tested Algo Strategy

The chart above shows one such example of a trend following strategy called, samTREND developed by out Algo strategy team. As evident there are 2 large peak to trough falls in the strategy. However the larger one (the top one) is almost a fall of Rs. 6.5 Lacs from peak

to trough. Hence, in a worst case scenario if we had started this strategy in Jan'2011, the drawdown which I would have likely incurred in the strategy would have been about 6.5 Lacs. This becomes the peak to trough drawdown of the strategy. If in running live, I see a large drawdown say 20% more than 6.5 Lacs ~ 7.8 Lacs, then I should probably shut my strategy down, as the chances of this loss widening increases a lot more – given that there might be other Algos trying to exit the strategy or someone has just pressed the panic button. The peak to trough drawdown is more of your strategy level stop loss, rather than the trade level stop loss. It is far more comforting to an investor to know that the maximum loss he can see is of certain X value in running an Algo strategy, then not know how much could be the maximum loss. Hence, peak to trough drawdown plays a vital role (more than Sharpe ratio perhaps), in indentifying the soft spot where if your Algo falls into trouble – then we know when to stop the Algo and when to stick around with it. One more word of caution here is that, if there is no guiding factor like portfolio stop losses etc. then more often than not, we end up taking decisions on emotional basis – which is even more catastrophic, as these decisions often lead to unwinding the Algo – just when it would start making a dearth of returns for you and your investors.

Another important aspect in deciding stop losses in trades, while doing an algo trade it to keep the volatility of the asset into consideration. If you place say a 2% stop loss – in Aluminium and Natural Gas, which is likely to get trigger faster? Aluminium almost on an average day hardly moves by 2% and Natural Gas moves 2% every hour. Hence, the chance of getting your stop loss triggered in Natural Gas is far higher than Aluminium. Hence, if the stop losses for each trade you are doing is not adjusted for volatility then you would end up cutting away a good trade at a stop loss and carrying a bad trade – till the stop loss is hit!

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Once again, the beauty of an Algo strategy lies in that it can help in back testing these aspects and fine tune the ideal volatility gap which should be given to each asset class to move sufficiently – rather than unwinding the trades in an abrupt manner.

To conclude, I would like to add that risks are usually of 2 kinds in Algo strategies - Systematic and Non-systematic risks. Systematic risks are the once which we know of in advance – like trades going against us, portfolio level losses exceeding the normal levels, software / system crashes, models not running as per the specifications of the back test etc. These are the risks which we are aware of and can tackle their occurrence in advance, so that they don't end up eating on the Algo strategies performance. However, there are a 2nd sect of non-systematic risks in Algo trading which occurs mostly because of reasons beyond our control, like too many people running the same algos, too many computers doing the same trades, too much of math chasing too few a money – in which case algos more often than not fails. These risks goes beyond the capacity of single trader or algo desk and one must always be prepared for such non-systematic risks of failure, if the algos become too popular on the street.

*The Quant…um leap journey will continue in the coming months with more sections, more insights and more leaps… Let the journey be the destination!*

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## About Samssara Capital Technologies LLP

Samssara Capital Technologies LLP ("Samssara") is an investment solutions firm focused solely on developing automated algorithmic and quantitative trading and investment strategies. It was launched in 2010 by a team of IIM Ahmedabad and IIT Bombay graduates - Rajesh Baheti, Manish Jalan and Kashyap Bhargava. Samssara caters to its clients' needs of providing an alternative asset management vehicle, with the focus on 100% automated and quantitative trading strategies.

Samssara's products vary from pair trading (statistical arbitrage), factor models, Nifty Index beating products to very high frequency trading strategies. The team at Samssara works on mathematical models and statistics that identify repetitive patterns in equity, commodity and currency markets. The addressable market for Samssara is global - as the firm can develop and build models which can function in both developing markets with limited competition and developed markets with strong competition. Samssara's client base includes the leading international and domestic banks, international and domestic stock brokers, family offices, corporate treasuries and HNIs.

### *Profile of Manish Jalan*

Manish Jalan is the Chief Strategist and Director of the Algo trading firm Samssara Capital Technologies LLP. Prior to his new found Indian venture, Manish was a Quantitative Prop Trader in Tokyo, with Merrill Lynch Prop Desk handling USD 100 Mn. portfolio. Manish has worked closely with many Indian brokers and numerous International banks in algorithmic trading, trend following strategies, statistical arbitrage, factor modeling and back testing. Manish is a B.Tech and M.Tech from IIT Bombay in Mechanical Engineering.

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