

TFG 2015 COO Survey: Valuation challenges in a global macro environment

It was assumed that the simplification of markets driven by the aftermath of the 2008 financial crisis would have reduced the complexity associated with portfolio valuation. Based on our experience at TFG Financial Systems we can see that is clearly not the case.

In response to this we decided to investigate, and used our 2015 Hedge Fund COO survey to see what are the main valuation challenges faced by the hedge fund management industry.

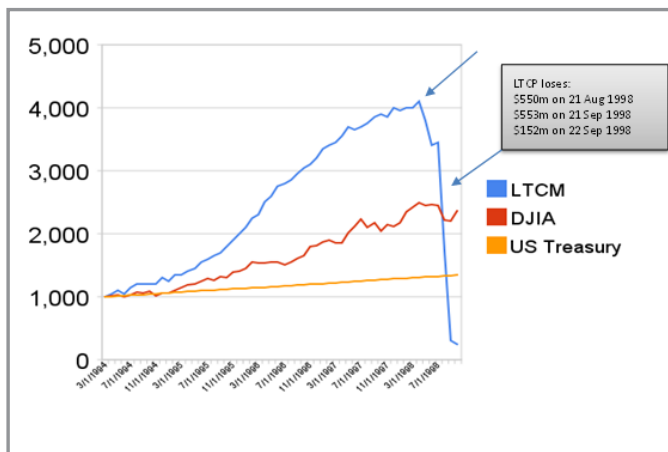


Chart: Value of \$1000 Invested in Long-Term Capital Management, the Dow Jones Index, and in Treasury bonds between 1994 and 1998

Why is it important?

Why are we interested in solving these challenges? Hedge Fund managers are risk takers, not accountants. We all know how to value our portfolio; in fact, there are many service providers who will do that for us.

Let us look historically at some of the market situations which highlight the need for good valuation.

Long Term Capital Management

It was recently written that the collapse of LTCM is now thought of as just a footnote in the history of financial markets. This is unfortunate as I believe many lessons were learnt, or at least many lessons were taught. For example, it was the first time we clearly saw that standard risk analysis is flawed (but not worthless).

Of course, we all know that "the market can stay irrational longer than you can stay solvent". Most risk models are predicated on the markets being efficient and rational. But, if they were, then we wouldn't be here. Over the last fifteen years, we have come to understand that risk management is an art not a science.

Importantly, in the aftermath of LTCM's collapse it was clear that mathematical models "may provide a greater sense of security than warranted, therefore, reliance on

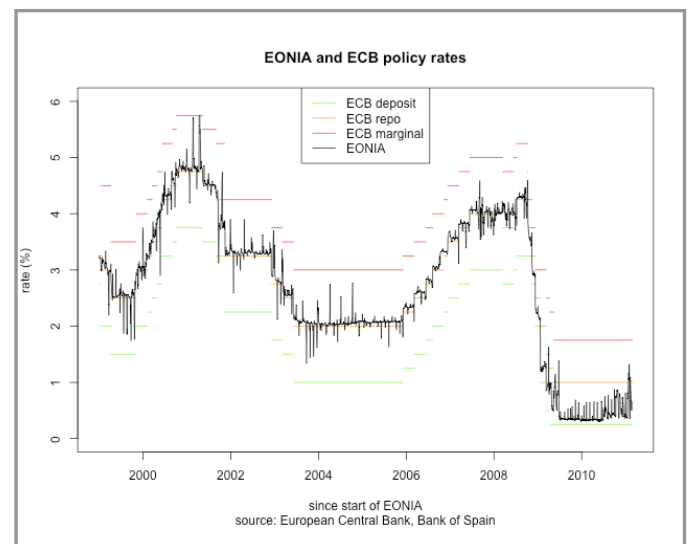
these models should be limited. But, if risk models don't work then what is left?

We have seen regulators push for exposure management: a key pillar of the recent rush of regulations is valuation, performed by the clearing house, a third party, as well as the counterparts to trades.

As with all broad sweeping regulatory enhancements, implementation is much harder than it seems.

EONIA

In 2005, the ECB hadn't raised rates for 2 years. Many measures on a portfolio that were dependent upon these rates would show that it had almost no risk.



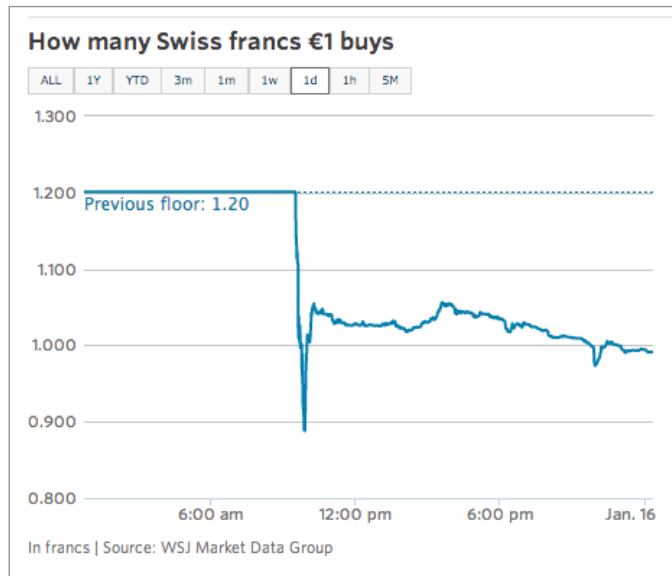
An unexpected statement in September 2005 sent the EURIBOR markets into a tailspin. Option positions that were locally delta neutral were suddenly showing extreme exposure. Even more disturbing, these very same options were completely illiquid as market makers increased spreads or focused on the options which were now at the money.

Suddenly, seemingly innocuous assumptions on the relationship between the underlying price and options on it were clearly wrong. Anyone continuing to hedge based on 'sticky volatility', 'sticky delta', or even more complex models such as SABR was probably nursing a pretty big hole in their PnL by the end of the year.

Considering exposure as a complex formula based on some derivation of the work of Robert Merton, Fischer Black and Myron Scholes doesn't give you the worst case. Sadly, the worst case happens more often than we would like. It's hard to imagine a risk model which would have worked. The only answer is risk governance, policies and procedures.

The Swiss Franc Float

Another lesson learned earlier this year, unfortunately, one which was taught very quickly. When the Swiss removed their currency's peg to the Euro, within minutes the exchange rate had moved from 1.20 to 1.05. Didn't we know this was going to happen? Couldn't we hedge for it? Of course we could have done. But taking risk is the portfolio manager's job. Asset Managers who didn't react quickly might have not only lost out but they also couldn't profit from the situation. "Am I short Switzerland?" has to be answered before I can ask "Do I still want to be short Swiss Francs?".



The joy of the carry trade is also a curse. A position that accrues slowly so often takes everything back in an instance.

There is an old adage: 'Risk is valuation twice'. With such a big move the valuation and so risk measurement of any non-linear position cannot be accurately approximated by using start of day numbers. This is where real time risk management is absolutely essential.

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Valuation Policy

Although risk management by draw-down limits, loss limits as well as risk measurement are important reasons for us to focus on valuation, managers also focus on it because their investors do. To be a credible manager you must understand your portfolio which starts by really understanding what it is worth. Here are a few quotes from our COO survey that came our way when the word valuation was mentioned:

"We align to counterparty as we use this for fund valuations".

"We prefer to match the market price as a true reflection of value".

"First onscreen market value, then counterparty and finally administrator".

"What you put in your valuation policy is how you sell your fund".

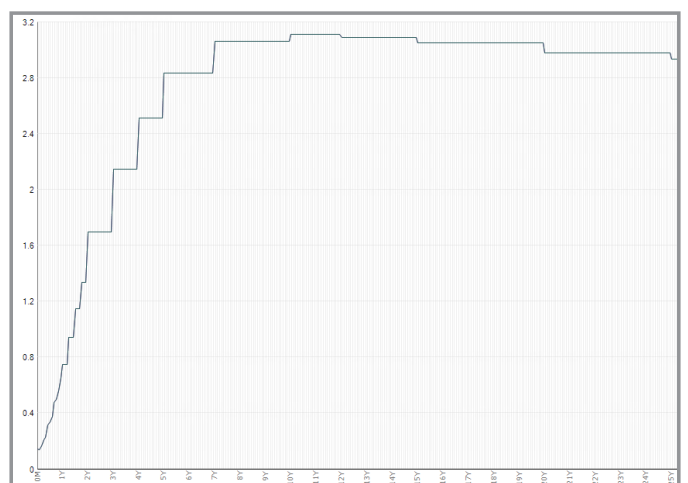
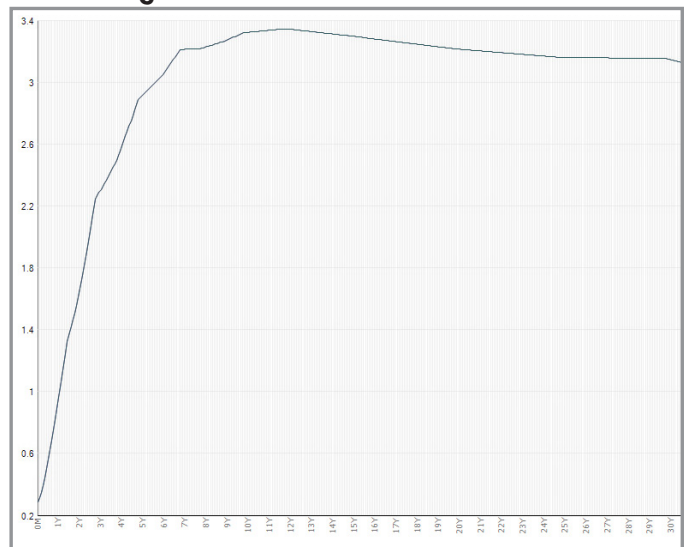
All of these show that valuation is a complex subject. After all, the funds value is how the manager gets paid.

What better incentive is there than that?

Valuation Challenges

Portfolio managers need to see good valuation. They will have their risk budget removed based on valuations. Risk managers need good valuation to measure sensitivities and to be able to grasp the shape of the portfolio as a whole. Next, we will look at some of the challenges which TFG have worked on with our clients.

Discounting



LIBOR 3m, FFOIS. Source: TFG

The LIBOR bootstrapping method, learnt in our first interest rate swap class, is now almost ancient history - 2008 killed it, but it was being phased out even before then. Now we usually consider the discount rate to be the interest you earn or pay for any collateral on the position. So the discount rate is different depending on who the counterparty of the position is.

But, are we sure about this?

If I have a position in a swap, I can go to the market and ask for the offsetting position. They net off and I'm left with no exposure. Surely that is the correct value. My collateral is irrelevant, my discount function is irrelevant. It all comes down to what the market is willing to pay or receive from me to close the position.

This debate is still continuing. Of course, neither side is wrong. The first version gives me a number I can calculate. The second gives me a number I can only capture infrequently. The first version helps me understand my counterparty exposure as well as what the collateral is based on; but the second tells me how much I would make or lose if the position had to be closed.

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Curve Building

“The short end of the interest rate curve is stepped but the valuation models from LCH use a smooth curve. We had a big position in short 3m sterling which had a considerable impact on our p&l”

Source: TFG COO Survey, 2015.

We now use (at least) two curves to value a (formally thought of as simple) interest swap.

The organisations that provide the prices that we use to build the curves don't have the same collateral requirements as us. So the curves that they imply are based on their discount curves, not ours. The amount of modelling required increases: swap rates are idealised transactions; we need to know all of the details of those transactions before we can infer curves from them.

I often think about valuation as trying to match someone else's view; I suppose at the very least we have to understand it. As curve building becomes more complex, it gets more dependent on factors such as interpolation

methods, choice of input rates and discounting assumptions. All of which are pretty opaque and make significant differences.

The happy days when you could multiply the difference between your traded price and the market price by the $dv01$ are over.

Model Risk

Earlier, we have looked at interest rate swaps. However, they are not the only transactions that we have to be concerned about.

To value a complex, illiquid instrument we usually construct a portfolio of more simple, liquid instruments. If this portfolio has the same characteristics as the illiquid instrument then it should have the same price.

That is what we are doing when we calculate the value of an interest rate swap, we don't just explicitly work out the quantities required of each for the idealised swap trades we need to own to replicate the position that we have.

Let us move to another pretty standard instrument. The equity variance swap. The maths is pretty well understood. A portfolio of out-of-the money vanilla options with the same expiry as the maturity of the swap can replicate the pay-off. This should work, but does it?

We need an infinite number of options, with every possible strike price which is clearly unrealistic. Fortunately, mathematicians are very adept at working out what happens if we have only some of the required inputs. Interpolation, asymptotes, etc are all well-developed strategies for dealing with this problem. More concerning is that every position in this pretty large replicating portfolio has a bid-ask spread as well as a minimum tick size. Both pretty nasty problems that the model can't really solve.

The error margin on a valuation due to all of these is very large. So seemingly perfect models based on arbitrage principles can be systematically biased away from any tradeable price.

I could have picked on so many valuation models in so many different asset classes: currencies, credit, fixed income. When the spotlight is shone sufficiently brightly the cracks appear.

So, is the only answer to go to the market and ask? Not great if you want to perform sensitivity analysis. Also not great if, in times of stress, these prices are only available by human interaction.

So, we really have to understand the flaws of models: when they work, when they don't, how stable the error is and why it is caused. There are no easy solutions particularly when the input prices are becoming more fragmented, which takes us on to the next point.

Price Discovery

We have become used to swimming in a sea of prices: real-time, historical, theoretical, implied, end-of-day, settlement. Almost too much data to cope with. However, over the last 5-6 years, there has been a swift reduction in quantity (and some might say quality) of the data hitting our screens and systems.

I have a couple of scenarios that we have worked through:

How to value exchange trade options has been a topic full of uncertainty for as long as I have been working in finance. There are so many strikes of which only a few have a price. Sometimes, the exchange will give you a price that it uses for margin calculation, though not always, and it is not clear whether this is really a good estimate of the value of the position. There are no good answers. Only good questions that need thinking about.

Indicative pricing is very useful but sometimes produces spurious results. We also work with people on the other side of the fence – in market making. The market makers skill is all about finding stable, yet hedge-able relationships between liquid bonds and less liquid swap rates. If the pricing is indicative, and is not tested (i.e. no one has traded the instrument) then these relationships become stale. But, imagine that you are valuing a position in a different relationship, maybe a swap spread. Then, if only one relationship is updated, you are left with completely incorrect valuations.

If you have positions based on the relationship between prices and are using indicative pricing for your valuation, you really must know how these prices are determined.

“Liquidity does appear structurally lower. We adjust our forward vol assumptions when sizing positions as a result.”

Liquidity

Let us think about swaption volatilities. We know a lot about which swaptions are traded, as many are cleared. There are some pretty liquid points on the surface. However, traditionally a surface has many, many points. It is three dimensions: option term, swap term and strike. You could easily build a surface with 15 points on each axis, that's more than 3,000 points. There is a good market in only a few percent of these points: and your position may have been one of these when executed; but now probably isn't. The rest are just interpolated and, as it is not possible to receive a feed of executable prices, when you try and touch it, these prices disappear.

Below is a graph of the “Treasury Flash Crash”, on October 2014 when the yield on the benchmark 10-year U.S. Treasury plunged before careering upward again on seemingly little news.



“Liquidity does appear structurally lower. We adjust our forward vol assumptions when sizing positions as a result” Source: TFG COO Market Survey, 2015

Bond Volatility

At the very time that price discovery is at its most difficult, price volatility is extreme. I suppose that is what markets do.

If we are lucky, we can find an executable price – but these are getting scarcer and carry more caveats. Many electronic markets are Request for Quote and are only giving us indicative prices. Theoretical or model prices are even more concerning. Isn't that where we started this discussion ?

So often we don't have any alternative, which is when the risk manager's toolkit is brought out and applied to the prices. More and more examination is put on the inputs to valuation models as well as the positions themselves.

OTC Clearing: the solution to all our problems.

Reduced counterparty exposure. Completely transparent market with a neat flow from execution facilities through to clearing houses with transaction reporting. Did I mention that they will value your portfolio as well? What a relief!

Of course, you need to match the clearer's valuation if you wish to perform sensitivity analysis. Yet another nail in the coffin for simple valuation of portfolios. Each Clearer is pretty transparent about how they value your positions. It is just that they use different methods and different prices (the LCH-CME spread is a hot topic at the moment).

How can there be a difference between the values of identical positions cleared by different clearing houses? They may have different collateral requirements, but not that different.

The prophets of doom are circling around the clearing houses. Is it possible to have a market place for clearers?

What happens if we are left with a monopoly? Are they different instruments?

You may choose to use your clearers valuation. It is unbiased, but is it really a good indication of value? The jury is definitely out on this.

My own view is that the clearer's value is used to determine collateral requirements. It is what they consider their exposure to be. This is not necessarily your exposure.

Real-time

Markets are becoming increasingly fast. And what was a complex instrument that took days to negotiate in the past, can be traded on an execution facility: we are seeing CTA's, traditionally organisations focused on futures and currencies, start to look at interest rate swaps.

A portfolio's exposure can change shape significantly very quickly. Every person interviewed said that real-time risk management was absolutely necessary.

Real-time software is completely different from standard software. Particularly if you need a credible solution to some or all of the problems we have discussed in this paper. It would be easy to descend into a computer science lecture, but not particularly helpful. There are a few issues we should highlight.

1. There is no benefit to having simple positions value every second if the positions that they hedge only update once a day.
2. You will have a lot of bad data.
3. Markets don't update in a synchronised fashion, there will be temporary inconsistencies which will render your results useless.
4. There are many different variables which need to be co-ordinated to ensure your systems are not only fast, but also efficient. These include: positions, prices, curves, surfaces, shocks and scenarios.

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Summary

Valuation may be your primary risk management tool, but traditional risk management tools are required for validating and understanding those valuations.

There is no true answer to what is the value, except at the point of transaction. Front office, risk management, and the fund valuation team need to make decisions and be able to credibly argue why these decisions have been taken.

Just as we learnt about the failings of risk management, we are now learning about the fallibility of valuation.

About the author

Martin Toyer has spent more than 15 years working providing technology solutions to the financial industry. He founded TFG in 2007 to focus on providing solutions to the risk management and operational needs of asset managers. Previously, Martin was a senior manager of a team of 12 developers at a tier 1 investment bank, where he was responsible for real time pricing of European bonds and non-exotic interest rate swaps; prior to that his team developed the risk analytics and systems used within the bank's global risk management systems area. In 2005 Martin was invited to help launch a global macro hedge fund; he helped design the in-house trading/operational platform and developed a suite of sophisticated risk tools. Martin holds a Mathematics degree from Brasenose College, Oxford University.

