

20.8 “P&L” Volatility

The trading volatility of the previous Section is closely related to the “ultimate” or “big picture” variation the authors call “P&L volatility”. P&L volatility aims to account for all important factors impacting entire portfolios. Even in the case of a single trade, P&L volatility may include factors that are not accounted for within trading volatility. There may be mandate or other rules that alter the P&L of the trade beyond “normal” instrument considerations. These may include almost any real world factor such as:

- Although your trading is going well, the head of desk (your boss) instructs you to alter your trading due to factors impacting other traders (e.g. another trader or desk may have lost a great deal of money, and you are asked to cut back or whatever, as part of a policy to protect the firm’s overall P&L). This would alter your P&L beyond market/strategy factors specific to you.
- There will be correlation effects that, even in relatively homogeneous positions, introduce P&L effects not experienced with single trades.
- There may be “limit” issues on the portfolio that require rebalancing of a sort not arising in single position trading.
- A single trade is usually in a single currency. However, your trading operation may be domiciled in another country and so your P&L must be converted to the “head office’s” currency, thereby exposing the “ultimate” P&L to currency risk that “your” trade does not have on its own.
- Your firm may treat funding via a single central entity, which has its own style of funding/trading to accommodate the firm’s cost for all trades, including yours. You may then be assigned a funding cost that has a character different from that required by “your” trade. Thus, exposing “your” P&L to risks it may not otherwise have.
- ... etc.

Thus, while trading P&L can be thought of, roughly, as the P&L that would have made that one trade “work out well”, now the P&L volatility is a reflection of a big picture issue that incorporates many items that are not easily quantifiable in isolation.

Put differently, it is the entire P&L’s performance, and so it is the P&L’s volatility that is crucial, since ultimately that is what determines “how much *wedge* you take home at the end of the year”.

Thus, while there might be a chance, in principle, to relate (single instrument) trading volatility to some “classical” summary measure of price/returns volatilities, this will not be the case with entire position P&L’s. Position P&L vol requires an entire collection of measures addressing market, trader, strategy, mandate, and other factors.

Though, again, the overlap between the concepts of trading volatility and P&L volatility are considerable, and in some cases they may be synonymous.

Moreover, it will be shown that the analysis of P&L performance, such as the distribution of P&Ls, is a very important and useful tool not only for traders, but also sales staff, and senior management.

Aside: Everybody's job in a trading operation is to maximise the risk-adjusted holding period P&L.

P&L volatility is measured directly from the portfolio's performance via detailed audits. This is a fancy back-testing process that allows the analysis of what actually happened, where/why money was made/lost, and crucially, where/why more money might be made by adjusting the strategies/policies.

Forward-testing or forward looking analyses of position P&L also provide much insight into the value of strategies, structures, and risk/valuation.

That is, much as with prices and rates, trading also generates histories of P&L's. Now the analysis is directly on the P&L, rather than on outright prices or pay-outs. PaR-like analysis can be used also for forward testing to create a "expected P&L histories". Then, simulation and PaR, and actual/audited P&L can be analysed collectively for volatility assessment of "trading business" performance.

Chapter 21 provides a more detailed introduction to PaR. For the moment assume there exists a P&L history (real or created by expectations). This could be for your trading from the past year, or it could be the P&L history that you expect from a particular rebalancing strategy as applied to some complex structured or exotic position, or it could be a P&L history you estimate a client would experience if they bought some products from you, etc. Suppose that Figure 20.8 – 1 is a histogram of such a P&L history⁶⁰⁰. Those P&L's include the effect of all activity (such as rebalances, slippage, liquidity issues, etc.). That is, if there were M2M P&L's, say, every day, and there were many "paths" (either due to many historical segments, or many forward looking tests), then those P&L's can be "histogrammed" for each day over the entire holding period to produce a "mountain range of P&L's".

⁶⁰⁰ In fact, this histogram is the result of a PaR forward looking analysis for a very complex IR option structure that, amongst other things, provided for sequential ratcheted knock-out coupons on a long dated index amortising bond. It was the transactions costs for rebalancing the knock-out features that dominated the P&L performance.

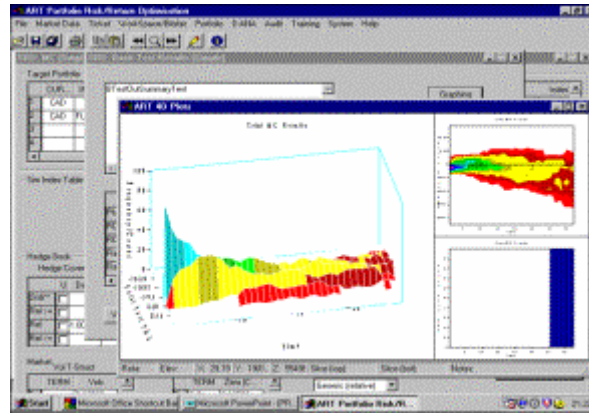


Figure 20.8 – 1. P&L distribution from a PaR generated “expected history” following a particular rebalancing strategy for a complex position. The “mountain range” is the P&L distribution over time, and the image to the top-right is the birds-eye view the mountain range. The birds-eye view shows that the distribution on the last day (i.e. at the right side of the graph) has a negative skew, and a negative average P&L.

Notice that this P&L distribution is skewed and the skew is against you (the “flamethrower” image in the top right is skewed to the negative/down). This result is typical of position analysis once transactions costs, liquidity, slippage, and other reality impact considerations are accounted.

Moreover, “traditional calculations” do not include these many real world effects, and they generally only produce a single expected value (that would correspond to the “average”). Here, it can be seen that while the “average” P&L may or may not be acceptable, certainly the massive “negative tail” must be a concern. It is exactly this type of “realism” and insight that “P&L volatility” analysis provides.

Now, the trader or senior manager may take some appropriate action. There are a number of approaches, and they may differ depending on the concern. One approach is to analyse the P&L distribution (i.e. the “P&L volatility”) for different strategies and market conditions, and then use that information to choose the combinations with the “best” risk-adjusted returns (this is a kind of “Efficient Frontier-like” optimisation as discussed in Chapter 21).

There are also “cheap & cheerful” approaches dealing with negative P&L skews. It would be “nice” if the P&L distribution was completely in the positive, but that is an “impractical dream”. However, it is possible to “*guestimate*” how much of the distribution may be “tolerated” to be in the negative. For example, suppose that only 20% of the area under curve is permitted to be in the negative (as judged from both the comfort factor with that probability of occurrence, and due to the actual level of losses that this implies). Now, simply shift the entire distribution to the right until that amount of distribution (or that loss