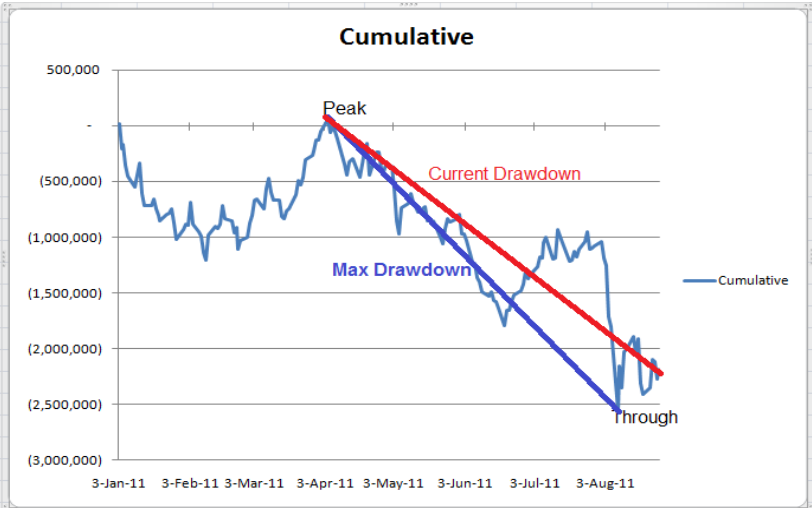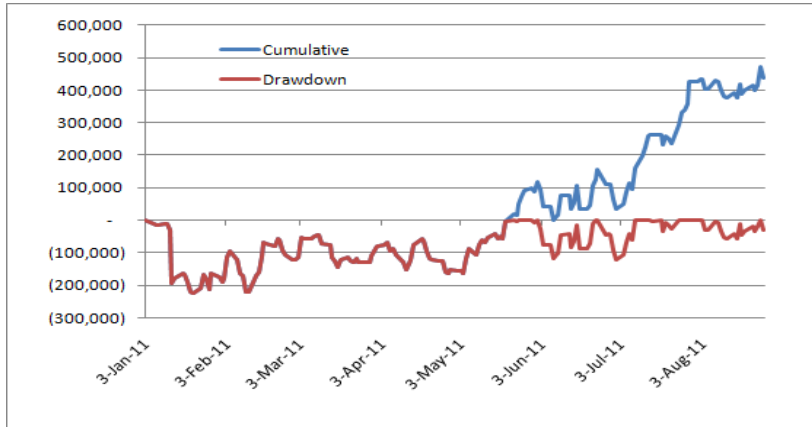# Risk and performance metrics

**Brief**

The following document contains a brief explanation of the risk and performance metrics[1] available in the Tungsten / Eze Software Group Tradar PMS Insight™ 4.x implementations.

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[1]The time series used to perform the calculations are defaulted to year to date (YTD) using daily return frequency.

**Metrics**

| | |
|---|---|
| Total P&L | Total cumulative P&L, calculation based off the Tradar P&L time series, e.g. a YTD P&L as of 2011-08-29 is defined as the change in price including realised and un-realised profit and loss for all positions from 2011-01-01 and 2011-08-29. |
| Actual/Realised Standard Deviation | Realised/Actual risk per risk bucket, represented as one standard deviation of risk using current sampling period (daily/weekly/monthly). |
| Estimated/Forecast Standard Deviation | Forecast risk per risk bucket, represented as one standard deviation/risk using current sampling period (daily/weekly/monthly). |
| Max draw down | Based off the realised P&L time series, max draw down is the max difference between peak and through of the cumulative P&L time series (blue line in the chart below).<br><br><br><br>The max draw down in the above example looks to be just north of -2,500,000.<br>In another example, the red line in the chart below shows the draw down time series with max draw down being around 215,000 for the example strategy.<br><br> |
| Max draw down days | Number of days between peak and through |

| Current draw down | Difference between the peak and the latest cumulative P&L. If not in a draw down, current draw down will be 0. |
|---|---|
| Current draw down days | Number of days between peak and current P&L. |
| Correlation | The Pearson correlation coefficient measured between the total portfolio P&L time series vs the risk bucket P&L time series. The risk bucket depends on grouping used, e.g. if grouping is strat, then the correlation is calculated for each strategy in the portfolio against the total portfolio. Dependent on the sampling used, defaulted to daily returns. |
| Volatility | Realised/actual risk/volatility per risk bucket, represented as annualised one standard deviation of risk. Calculation based on the Tradar P&L time series. |
| Skew | A measure of the asymmetry of the return distribution. Calculated using the realised P&L returns.  Also referred to as the third standardized moment. Negative skew tells us that there are more negative returns than positive, the negative tail is larger than the positive and vice verse. |
| Kurtosis | A measure of the "peakedness" of the realised P&L return distribution. A high value indicates that more of the return variance is the result of infrequent extreme deviations. Also referred as the fourth standardized moment. A Gaussian distribution has kurtosis = 0. |
| Sharpe | Using the realised P&L time series, the Sharpe ratio is a measure of annualized return / volatility. |
| Sortino | Using the realised P&L time series, the Sortino ratio is a measure of annualized return / downside standard deviation. |
| VAR Daily | Value At Risk, a forecast risk measure. Often denoted  with a confidence of 95% (returns are forecast to exceeding the calculated VaR 1 period out of 20). Trader PMS Insight risk module can chose from any of the four different models available in the Tungsten engine. |
| VAR Weekly (5 day) | Value At Risk, using weekly returns instead of daily, forecast risk will equal a five day horizon. |
| Marginal VAR | The change in VaR if the risk bucket is removed from the portfolio. A negative marginal VaR means that the risk of the total portfolio would increase by that amount if the bucket was removed and vice verse. |
| Delta | The sensitivity of the price of an option with the respect to the underlying asset. Delta is the first derivative and ranges between 0 and 1 for call options and 0 and -1 for put options. Often denoted in percentage points, e.g. a 25% delta option means a 1 dollar move in the underlying would change the price of the option by 0.25. |
| Gamma | Gamma measures the rate of change in the delta with respect to changes in the underlying price. Gamma is the second derivative of the value function with respect to the underlying price. |

| | |
|---|---|
| Vega | Vega is the sensitivity to changes in volatility of the underlying asset. Vega is expressed as the amount that the option will gain or lose as volatility rise or falls by 1%. |
| Theta | The sensitivity of the value of the option to the change in time. The change in time is one day. |
| Rho | A measure of sensitivity to the risk free interest rate (for the relevant term). |
| CR01 | Credit 01 - The effect of shifting the credit curve one basis point. This is configurable to be either average of +1/-1bp shift or simply +1bp or -1bp. |
| CR100 | Credit +1%. Shift the credit curve +1% (percentage move, i.e. a 500bp curve would be shifted to 505). |
| CR1000 | Credit +10% Shift of credit curve +10% (percentage move, i.e. a 500bp curve would be shifted to 550). |
| CR-100 | Credit -1%. Shift the entire curve -1% (percentage move, i.e. a 500bp curve would be shifted to 495). |
| CR-1000 | Credit -10%. Shift the entire curve -10% (percentage move, i.e. a 500bp curve would be shifted to 450). |
| DV01 | Rate 01 - The effect of shifting the interest rate curve one basis point. This is configurable to be either the average of +1/-1bp shift or simply +1bp or -1bp. |