REVELATION
INVESTMENT RESEARCH, INC.

Alternative Measures of DRA's Return and Risk Prediction Capability

Client Question

How well does Downside Risk Alert work as a predictor of cap weighted returns, median returns, volatility risk, and risk-adjusted returns?

RIR Reply

Downside Risk Alert's objective is to forecast the relative riskiness of individual stocks over the next 3-24 months. To measure DRA's effectiveness as a risk predictor, one must first define risk. Volatility is commonly used, but it measures return dispersion, i.e., makes no distinction between positive and negative outcomes. Nonetheless, high volatility stocks are more likely to underperform by a meaningful amount over typical 1-12 month evaluation horizons. The probability of losing money or trailing a benchmark are other ways to define a stock's risk. Predicting return *direction* is far more valuable and difficult than predicting return dispersion. RIR usually takes on the more challenging task and highlights DRA's ability to predict relative returns using Information Coefficients (i.e., correlation between stock rankings and subsequent returns) and fractile-rank average returns. While these statistics ignore a stock's size, volatility, and other risk attributes, "equal weighted" metrics are simple, robust, and quantify the basic ability of a model or factor to rank-order future stock returns.

In this brief, we apply several additional performance metrics to provide an expanded perspective into DRA's ability to predict returns, risk, and risk-adjusted returns. We ran our tests on the MSCI IMI U.S. members (excluding REITs) which contains 2200 – 2400 large, mid, and small cap stocks at each point in time back to November 2001. We ranked stocks into deciles and compiled performance statistics over subsequent 3 and 12-month holding periods.

The top panel of Table 1 shows DRA's return prediction in familiar terms – equal weighted total and excess returns. The next two table rows summarize DRA's average performance in periods where the universe return is positive and negative. Here we see that <u>DRA's return prediction is modestly positive in up markets, but extraordinarily strong in down market periods when investors tend to be more risk averse</u>. The middle panel in Table 1 shows DRA performance using market cap weighted returns. Note that DRA's excess returns are very similar on a cap-weighted or equal weighted basis.

The median returns and hit ratios (i.e., % of stocks outperforming the universe) in Table 1's lower panel provide new perspective into DRA's nature. First, note that the median universe return is far lower than the universe average return (equal or cap weighted), particularly over 12-month holding periods. This positive skewness in average returns reflects the fact that stock returns in a period can exceed 100% but can't fall below -100%. Second, note the huge spread in median returns across DRA deciles vs what we saw for average returns, with the largest differences in deciles 9 and 10. DRA tends to rank volatile stocks poorly, and Table 1 shows that these stocks underperform collectively (on average) and most underperform individually (see hit ratios). However, DRA's worst decile 'portfolios' have significant positive skewness, i.e., a few large outperformers tend to raise decile 9 and 10's average returns well above their median returns (particularly in up markets). Risk-averse investors should avoid holding these stocks, but short-sellers should apply additional screens to control volatility and skewness when selecting potential shorts from among these underperforming stocks.

Table 2 shows that DRA is a fantastic predictor of future individual stock risk. <u>Future return betas and price volatility are well below market averages for DRA's better-ranked stocks, and betas and volatility ramp up exponentially among DRA's worst-ranked stocks</u>. Table 3 shows that DRA performance is also extremely strong on a risk-adjusted basis. <u>DRA decile 'portfolio' alphas (i.e., beta-adjusted returns) are large and statistically significant across the board</u>. DRA decile portfolio Sharpe Ratios (i.e., return over risk-free rate per unit of volatility) also are far higher for better-ranked stocks than for worse-ranked stocks.

<u>In conclusion, DRA is a strong predictor of relative returns, and an extraordinary predictor of relative risk and risk-adjusted returns</u>. Clients who favor DRA's better-ranked stocks have a great head start in building equity portfolios that beat benchmarks on both an absolute and risk-adjusted basis.

Table 1: Measures of DRA's Prediction of Relative Returns

Predictive Power Metric	12 Month Holding Periods											3 Month Holding Periods										
	1	2	3	4	5	6	7	8	9	10	Univ	1	2	3	4	5	6	7	8	9	10	Univ
Avg EqWtd Total Return%	14.5	14.6	14.7	14.4	13.6	13.3	12.5	11.4	9.6	8.6	12.7	3.8	3.8	3.7	3.6	3.3	3.3	3.0	2.3	1.7	1.1	2.9
Avg EqWtd Excess Return%	1.8	1.9	2.0	1.7	0.9	0.6	-0.2	-1.3	-3.1	-4.2		0.8	0.9	0.7	0.6	0.4	0.3	0.1	-0.7	-1.2	-1.9	
Avg EqWtd UpMkt Excess Ret%	0.3	0.5	0.6	0.6	0.0	0.0	0.0	-0.3	-0.7	-1.0		0.1	0.1	0.0	0.0	-0.1	0.0	-0.1	-0.3	0.1	0.3	
Avg EqWtd DnMkt Excess Ret%	6.1	5.8	5.7	4.8	3.5	2.1	-0.6	-4.0	-9.8	-13.0		2.4	2.5	2.3	2.0	1.3	1.0	0.4	-1.4	-3.9	-6.4	
Avg CapWtd Total Return%	12.9	10.4	10.8	10.6	9.7	9.8	8.4	7.9	7.5	6.8	10.1	3.0	2.7	2.5	2.3	2.2	2.1	1.7	1.5	1.2	0.6	2.3
Avg CapWtd Excess Return%	2.9	0.3	0.7	0.5	-0.4	-0.2	-1.7	-2.1	-2.6	-3.3		0.7	0.4	0.2	0.1	0.0	-0.1	-0.5	-0.7	-1.1	-1.6	
Median Total Return%	12.8	12.0	11.7	10.9	9.7	9.1	7.9	5.1	2.2	-4.6	8.6	3.3	3.2	3.0	2.8	2.5	2.4	2.0	1.1	0.1	-1.5	2.2
Median Excess Return%	4.1	3.4	3.1	2.3	1.1	0.4	-0.8	-3.5	-6.4	-13.3		1.1	1.0	0.8	0.6	0.3	0.2	-0.2	-1.1	-2.1	-3.7	
Avg Hit Ratio%	51.7	50.4	49.7	48.5	46.9	45.9	44.2	41.5	39.3	35.5	45.4	52.0	51.4	50.4	49.9	48.8	48.4	47.4	45.6	44.5	42.3	48.1

Table 2: Measures of DRA's Prediction of Relative Risk

Risk Metric	12 Month Holding Periods										3 Month Holding Periods									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
Beta	0.80	0.81	0.85	0.88	0.88	0.95	1.02	1.13	1.23	1.44	0.84	0.85	0.87	0.88	0.89	0.95	0.98	1.09	1.23	1.42
Stdev Total Return%	26.4	29.5	31.9	35.2	37.0	38.8	42.5	50.0	53.8	72.6	12.7	13.8	14.9	15.6	16.1	17.5	18.9	20.9	24.6	31.1

Table 3: Measures of DRA's Prediction of Risk-Adjusted Relative Returns

Risk-Adjusted Power Metric	12 Month Holding Periods										3 Month Holding Periods									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
Alpha%	4.4	4.3	3.9	3.3	2.4	1.1	-0.5	-2.9	-6.1	-9.8	1.3	1.4	1.1	1.0	0.7	0.5	0.1	-0.9	-1.9	-3.1
T-Stat Alpha	12.1	12.0	11.9	9.8	8.7	4.0	-1.8	-7.8	-8.9	-10.3	7.3	8.2	8.2	7.2	5.3	4.1	1.2	-6.2	-7.3	-6.7
Sharpe Ratio	0.51	0.45	0.41	0.36	0.32	0.29	0.23	0.16	0.07	-0.03	0.30	0.28	0.25	0.23	0.20	0.18	0.16	0.10	0.05	-0.03