

Quatrain

No Prophecy, Just Vision

3rd Quarter, 2011

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What Factors Into Ongoing Risk-Focused Dynamic Asset Allocation ?

- ❖ To what extent should asset allocation lead expectations (relative future value vs. relative value)?
- ❖ How can we navigate the risks of moving too soon or too late?
- ❖ Where do we have the most conviction?
- ❖ What information or signal would we need that would increase our conviction level?
- ❖ If we decide to change allocation, how should we size up exposures?
- ❖ And over what period of time?
- ❖ What structures would be appropriate for further allocation?

On a practical day-to-day operating basis, Quatrain's intuitive signals translate into definitive actions...

What leads to changing allocations dynamically and what drives the signals?

Quatrain simultaneously:

- ❖ Enables gradual, thoughtful risk allocation to tactically navigate evolving asymmetries in relative value vs. absolute risk.
- ❖ Accounts for potential downside correlations and evolving plausible downside.
- ❖ Allocates risk across dynamic risk-return tradeoffs with an objective to capture as much upside optionality (incremental positive skew) as possible from the risk budget.

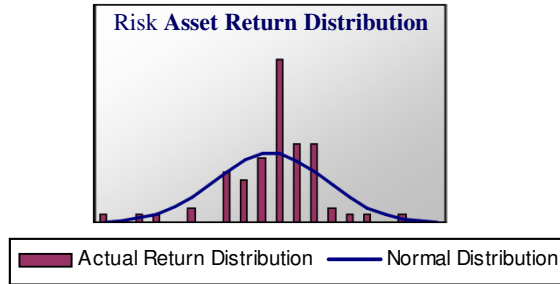
Result:

- ❖ An explicitly sized palette of risk-return tradeoffs with conviction for robustly informed decisions
- ❖ Sufficiently long lead time to rationally consider decisions and to take productive action

What is the Source of Quatrain's Unique Vision?

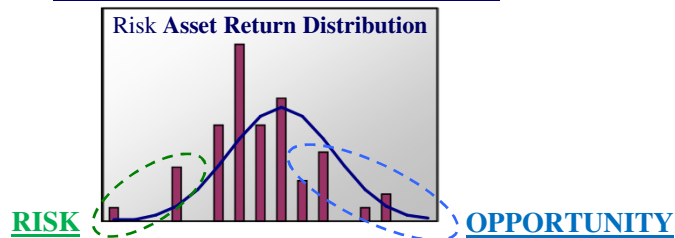
- Seeing the full spectrum of possibilities as they are forming new outcomes -

Embrace Reality of Asset Returns – Not “Normality” Fiction of MPT



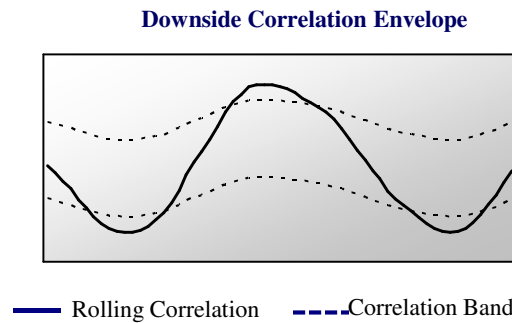
Fat-tails and skewed returns distributions are the reality..

Risk is Downside – Not Volatility



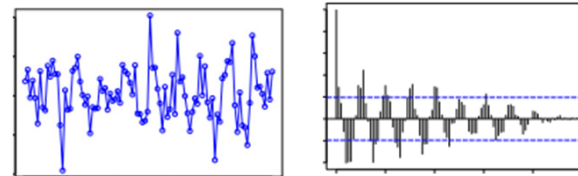
Decoupling Uncertainty from Risk
Upside opportunity is the good cholesterol while
potential absolute downside is the bad cholesterol

Correlations are Dynamic and Non-Linear



Evolving correlation trends within the context of dynamic historical correlations should be accounted for in the risk allocation
Possibility of negative co-skew and co-kurtosis (“joint” negative returns and volatility clustering) under extreme conditions is material in joint return distributions

Strategy Returns Exhibit Serial Correlation



Returns over time are not independent and identically distributed. Material serial correlation can exist (esp. in less liquid strategies) causing under-estimation of risk and over-estimation of risk-adjusted returns.

Autocorrelation trends and their effect on evolving risk-return tradeoffs should be identified

Quatrain – A Practical Tool for Translating Instinct into Action Leveraging the Full Breadth and Depth of the Asset Allocation Process

Quatrain is an incremental reallocator that simultaneously enhances “true” diversification and releases upside return potential

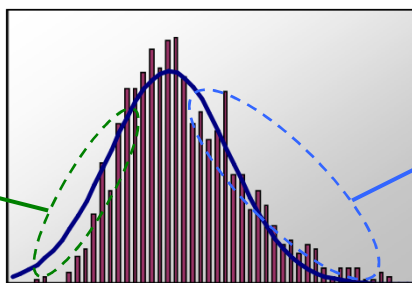
Downside correlation (“joint” negative returns) and fat tail risks are embedded in Quatrain’s risk allocator - investments presenting higher potential correlation on the downside tend to be penalized while investments potentially delivering consistent alpha tend to be favored.

The risk allocator focuses on attenuating losses rather than minimizing volatility – it does not shy away from investments with “positive tails”, upside volatility or positive skew.

Quatrain Portfolio

Mitigates potential downside tail risk by capturing dynamic correlation trends

Manages downside correlation signaled by co-skew, co-kurtosis, volatility autocorrelation and cross-volatility under extreme conditions

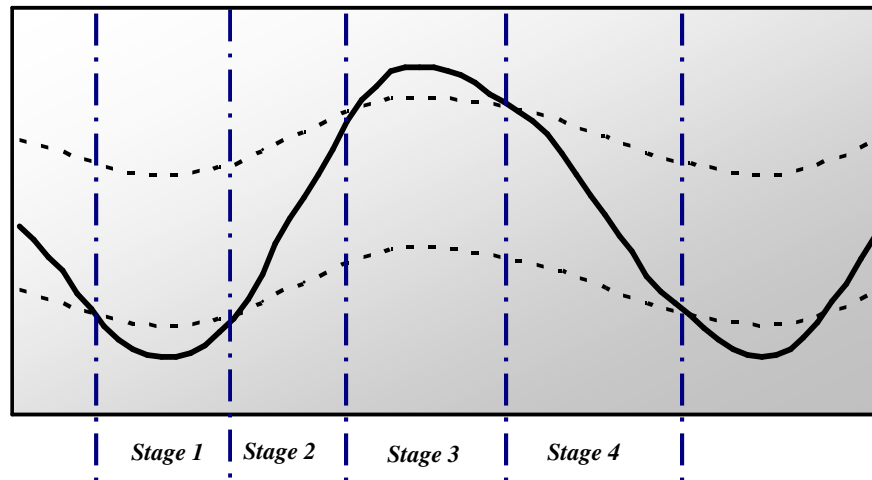


Releases Upside Potential of the Portfolio
By capturing positive optionality from asymmetric risk-return trade-offs

- ❑ Dynamic perception of potential downside correlations allows the risk allocator to actively dictate the relative attractiveness of assets
- ❑ Active tail risk management enhances portfolio reliability not just over but also within the investment horizon
- ❑ Integrating liquidity, leverage, factor, sector and other policy-dictated constraints within the optimization process allows for a holistic asset allocation discipline – in keeping with policies and objectives.

Correlation Perceptions Matter

If correlations degenerate (increase) materially during times of market stress, most diversification benefits vanish. Substantial benefits accrue from managing “correlation gamma” i.e. the high co-skew and co-kurtosis exhibited during market stress.



A dynamic analysis of historical correlations (specifically on the downside), along with a perception for where correlation trends may be potentially headed can materially improve “true” diversification, especially when needed most.

Stage 1	Correlations bottoming. Autocorrelations decay materially. ⇒ Gradual Reallocation towards Risk-Off environment
Stage 2	Markets enter stress period, correlations start to rise sharply. ⇒ Reconcile risk budgets and pinpoint attractiveness of evolving risk-return tradeoffs
Stage 3	Correlations peaking. ⇒ “Re-risk” towards attractive asymmetric opportunities in the context of increasing risk allocation
Stage 4	Markets recover, assets decouple and overall correlations relax. ⇒ Manage autocorrelation and cross volatilities.

Quatrain analyzes all potential correlations in the portfolio but the key concepts entrenched in Quatrain’s risk allocation and management can be illustrated by the above correlation corridor:

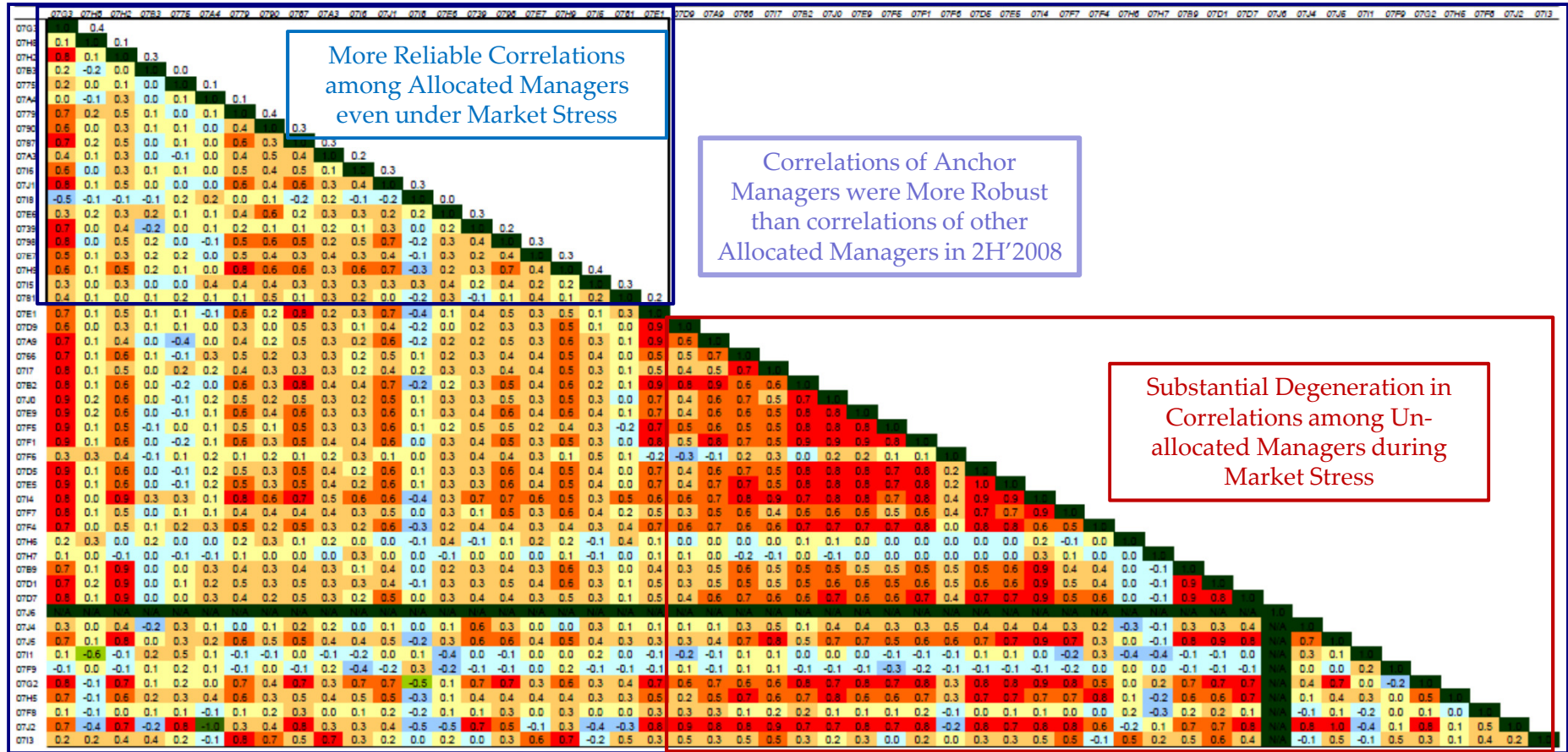
- ❑ Downside correlation trend and sensitivities are analyzed (as exemplified by the correlation corridor).
- ❑ Correlation increasing and hitting the upper sensitivity band calls for “de-risking” in anticipation of market stress.
- ❑ The signal is incremental and typically becomes more reliable as it gets stronger.
- ❑ Signal implementation materializes via increased or decreased relative attractiveness of the risk-reward offered by a particular investment.
- ❑ Aggregation of signals leads to changing risk perception at the portfolio level, materializing in de-risking or re-risking of the total portfolio

Ex-Ante Reallocation Scenarios Reveal and Capture the Benefits of Quatrain's Dynamic Vision

		Portfolio Allocation												
		Dec-04	Jun-05	Dec-05	Jun-06	Dec-06	Jun-07	Dec-07	Jun-08	Dec-08	Jun-09	Dec-09	Jun-10	
<p>Definitive Sizing with Conviction</p> <p>Nimble, Tactical Adjustments</p> <p>Anchor Managers Core Relationships</p>	Managers:	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
	07G8				10.0%	3.8%	2.2%	10.0%						
	07H8				10.0%	3.8%	2.2%	10.0%						
	07H2	5.3%	8.6%	7.3%	10.0%	3.8%	2.2%	0.7%	3.3%	5.6%	6.5%	6.6%	7.6%	
	07B3	2.2%	10.0%		6.2%	10.0%	9.3%	5.6%	10.0%	10.0%	10.0%	10.0%	10.0%	
	07T5	7.9%	6.1%	8.6%				1.1%	0.5%	8.3%	10.0%	10.0%	10.0%	
	07A4										1.4%			
	07T9	10.0%	9.3%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	
	07R0	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	
	07S7	6.6%	1.1%	8.4%										
	07A3				10.0%	9.0%	8.5%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	
	07I6	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	
	07T1	8.0%	10.0%	10.0%										
	07I8	10.0%	10.0%	5.2%						10.0%	1.3%	0.6%		
	07E6				0.1%	7.2%	10.0%			10.0%	0.1%	7.3%	6.0%	5.2%
	07S9	10.0%	6.4%	1.3%	3.7%	0.1%				2.5%	7.8%	9.0%	7.2%	
	07R8	10.0%	8.6%	9.2%	10.0%	10.0%	10.0%	10.0%	10.0%	8.2%	4.2%	10.0%	10.0%	
	07E7							10.0%	10.0%	10.0%				
07H9			10.0%	10.0%	10.0%	10.0%	10.0%	10.0%						
07I5	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%		
07S1				10.0%	10.0%		2.7%	3.8%	10.0%	10.0%	10.0%	10.0%		
Total Fund		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
<i>Gradually Evolving Strategic Vision</i>														
PORTFOLIO ALLOCATION SUMMARY														
Reference Return		15.0%	15.3%	15.7%	14.2%	12.5%	13.8%	13.6%	13.3%	12.8%	13.0%	13.2%	13.1%	
Reference Volatility		3.7%	3.9%	4.1%	5.4%	2.9%	2.7%	2.5%	2.8%	3.8%	4.5%	4.3%	4.6%	
Reference Sharpe Ratio		3.52	3.39	3.33	2.27	3.67	4.30	4.69	4.01	2.85	2.46	2.58	2.41	
Reference Alpha		12.1%	12.5%	12.8%	11.1%	9.2%	10.4%	10.3%	10.1%	9.9%	10.1%	10.4%	10.5%	
Reference Beta		0.07	0.09	0.09	0.06	0.06	0.06	0.05	0.05	0.04	0.03	0.05	0.05	
RISK PERSPECTIVES														
Confidence Level ⁽¹⁾ of Mfr. Return = 8%		97.1%	96.8%	97.0%	87.2%	94.1%	98.3%	98.8%	97.0%	89.8%	86.7%	88.4%	86.6%	
Confidence Level ⁽²⁾ of Mfr. Return = 10%		91.2%	91.1%	91.8%	78.2%	80.6%	91.7%	92.8%	87.9%	77.1%	74.7%	76.9%	74.9%	
Confidence Level ⁽²⁾ of Mfr. Return = 12%		79.1%	79.9%	81.8%	65.8%	66.4%	74.5%	74.4%	67.8%	58.6%	58.6%	60.8%	59.4%	
Minimum Intermanager Correlation		-0.26	-0.31	-0.21	-0.37	-0.31	-0.48	-0.41	-0.30	-0.21	-0.38	-0.40	-0.21	
Maximum Intermanager Correlation		0.57	0.59	0.69	0.58	0.56	0.57	0.51	0.49	0.60	0.62	0.59	0.59	
Average Intermanager Correlation		0.23	0.19	0.28	0.38	0.18	0.19	0.15	0.15	0.13	0.15	0.16	0.16	
DOWNSIDE RISK														
3 rd Reference Uncertainty Cushion™ ⁽¹⁾		3.9%	3.5%	3.4%	-2.0%	3.9%	5.6%	6.2%	4.9%	1.4%	-0.4%	0.2%	-0.7%	
5 th Reference Uncertainty Cushion™ ⁽¹⁾		-3.4%	-4.3%	-4.9%	-12.7%	-1.8%	0.1%	1.2%	-0.8%	-6.2%	-9.3%	-8.5%	-9.9%	
Reference Worst Best to Trough Drawdown™ ⁽⁴⁾		-3.8%	-3.9%	-5.2%	-2.5%	-2.6%	-3.0%	-3.0%	-2.7%	-5.5%	-7.7%	-8.2%	-8.8%	
Commodity Meltdown Scenario™ ⁽²⁾		-6.3%	-6.1%	-6.4%	-1.9%	-1.5%	-1.4%	-1.7%	-1.9%	-6.8%	-10.9%	-11.1%	-11.5%	
Prime and Worst Catastrophic Decline™ ⁽³⁾		-10.6%	-10.4%	-10.9%	-5.4%	-5.7%	-5.2%	-5.4%	-6.2%	-11.2%	-13.6%	-13.7%	-14.0%	
Estimated Trade Vacuum CME™ ⁽⁵⁾		-16.8%	-15.8%	-14.9%	-20.2%	-13.7%	-10.7%	-10.8%	-15.1%	-22.0%	-25.3%	-23.5%	-24.2%	
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 2px solid red; padding: 5px; text-align: center;">RISK - OFF</div> <div style="border: 2px solid blue; padding: 5px; text-align: center;">"RISK - ON"</div> </div>														

Quatrain Perceived and Captured Reliable Correlation Patterns of Allocated Managers As They were Evolving in Advance of Market Stress

Manager Correlations - Inception to December 2008



The Fate of 2H'2008 Was Pre-determined Many Quarters in Advance by Quatrain - The Benefits of Sufficiently Long Lead Times to Support Good Decision-Making -

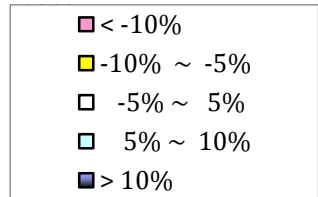
Allocated Managers fared better and proved more diversified in 2H'2008 under Market Stress

Anchor Managers fared better than other allocated managers in 2H'2008

Un-allocated Managers suffered higher downside and were much more correlated on the downside in 2H'2008 under Market Stress

	1H' 05	2H' 05	1H' 06	2H' 06	1H' 07	2H' 07	1H' 08	2H' 08	1H' 09	2H' 09	1H' 10
07G3			5.50%	9.92%	13.08%	11.77%	-4.38%	-38.41%	14.38%	30.53%	-10.95%
07H8	18.49%	248.47%	59.12%	-11.13%	17.79%	-41.65%	11.92%	-21.43%	-17.33%	38.25%	10.58%
07H2	15.48%	20.42%	12.40%	2.71%	14.39%	4.78%	16.76%	-60.45%	24.55%	23.89%	-4.75%
07B3	10.70%	-0.55%	5.14%	8.02%	15.38%	1.49%	2.77%	-1.65%	-1.71%	4.40%	3.14%
0775	3.10%	10.99%	4.67%	7.96%	5.22%	14.85%	-1.67%	1.77%	1.70%	4.75%	0.78%
07A4	0.99%	4.34%	1.35%	10.03%	9.93%	2.23%	1.67%	-0.86%	15.58%	-1.98%	-4.30%
0779	6.54%	10.90%	9.32%	7.32%	6.61%	-0.65%	-4.14%	-25.38%	8.95%	13.19%	6.49%
0790	4.51%	7.90%	9.66%	6.60%	15.35%	14.40%	7.93%	-9.36%	14.23%	11.77%	5.23%
0787	5.56%	7.08%	7.27%	15.33%	10.01%	-0.20%	-5.24%	-22.06%	21.07%	11.76%	-1.38%
07A3	5.75%	5.57%	9.40%	12.14%	11.05%	39.92%	0.72%	-14.96%	16.47%	12.54%	5.14%
07I6	4.45%	4.89%	8.99%	8.85%	8.51%	-0.51%	-0.36%	-8.93%	8.28%	9.96%	4.32%
07J1	6.67%	9.63%	8.73%	16.93%	11.43%	-7.04%	-7.92%	-29.63%	13.13%	29.63%	4.40%
07B8	4.00%	2.85%	1.36%	4.23%	6.20%	11.69%	5.05%	12.73%	-12.28%	-1.31%	-4.22%
07E6	2.33%	10.33%	5.32%	4.97%	21.37%	14.99%	-0.52%	-6.71%	0.80%	4.38%	2.90%
0739	-1.98%	-0.61%	3.21%	2.95%	1.49%	9.34%	2.50%	-7.99%	6.87%	10.02%	2.71%
0798	2.61%	2.84%	3.75%	5.31%	7.50%	2.69%	5.60%	-11.79%	14.13%	11.22%	1.97%
07E7	0.09%	6.79%	3.41%	5.80%	3.85%	5.83%	2.88%	-8.10%	-9.23%	21.40%	5.73%
07H9	0.43%	5.28%	5.82%	5.20%	6.77%	-10.61%	-8.93%	-58.50%	4.98%	41.76%	6.76%
07I5	-4.01%	6.15%	6.16%	10.56%	11.00%	5.71%	3.08%	-0.69%	8.99%	11.05%	1.77%
0781	2.09%	1.90%	2.38%	3.04%	2.88%	2.82%	1.65%	1.14%	0.36%	0.13%	0.07%
07E1	-2.06%	1.07%	0.22%	12.52%	4.59%	1.54%	-11.81%	-13.86%	0.58%	19.21%	-11.43%
07D9	-6.40%	3.17%	1.32%	13.70%	3.21%	0.70%	-11.06%	-14.68%	0.82%	21.67%	-6.92%
07A9	-0.50%	7.75%	4.52%	3.99%	9.65%	4.79%	-15.54%	-25.41%	14.67%	22.39%	3.43%
0766	8.94%	3.38%	3.66%	-2.40%	12.89%	23.02%	-1.53%	-46.34%	-3.99%	24.96%	-10.49%
07I7	14.33%	9.60%	15.32%	-0.34%	23.32%	45.52%	17.09%	-48.23%	-6.41%	17.98%	-16.79%
07B2	-0.02%	6.49%	4.93%	14.78%	8.92%	2.55%	-12.30%	-28.80%	13.68%	24.30%	-6.52%
07J0	-1.14%	18.64%	8.57%	10.45%	6.43%	5.17%	-5.56%	-27.66%	11.57%	17.93%	-5.60%
07E9	8.38%	20.79%	5.66%	12.37%	14.08%	-2.91%	-9.97%	-36.58%	19.92%	16.41%	-6.70%
07E5	0.99%	9.20%	10.00%	14.06%	9.59%	0.07%	-8.52%	-17.15%	7.29%	17.42%	-2.86%
07F1	0.99%	7.88%	7.75%	14.63%	12.73%	2.93%	-14.32%	-34.80%	17.60%	27.87%	-7.25%
07I6	8.28%	-1.06%	-1.06%	-4.29%	-0.32%	17.20%	21.36%	-21.60%	2.93%	28.90%	-5.49%
07D5	8.05%	29.33%	7.24%	21.84%	20.15%	13.79%	-12.16%	-48.89%	29.48%	31.90%	-7.52%
07E5	3.40%	24.40%	7.17%	21.96%	20.71%	10.96%	-9.18%	-52.20%	47.27%	36.86%	-9.61%
07I4				9.36%	19.89%	7.78%	-46.45%	-0.34%	15.72%	9.64%	
07I7	7.50%	37.46%	10.54%	18.14%	-7.02%	10.40%	-4.33%	-78.54%	51.96%	37.96%	5.02%
07F4		18.52%	0.76%	34.44%	23.04%	55.78%	-44.74%	-25.84%	20.50%	16.16%	0.51%
07I6	8.30%	4.75%	2.49%	6.10%	19.24%	11.62%	6.46%	-3.92%	-14.59%	-0.48%	6.92%
07I7	-6.39%	-24.65%	395.53%	-31.78%	4.11%	-7.74%	-1.68%	-19.67%	-23.40%	8.86%	5.99%
07B9	21.31%	31.34%	12.20%	-7.27%	13.93%	17.84%	-48.88%	-70.58%	11.51%	41.67%	-15.33%
07D1	3.72%	23.72%	-1.46%	-5.24%	16.46%	-0.06%	16.84%	-74.30%	25.64%	40.96%	-21.41%
07D7	16.98%	25.46%	15.91%	5.02%	21.88%	16.01%	14.17%	-56.50%	23.58%	29.48%	-14.13%
07I6											-8.04%
07J4	-0.82%	18.74%	18.71%	3.23%	1.68%	28.30%	10.84%	-5.34%	5.38%	17.69%	13.39%
07J5	1.62%	17.72%	19.19%	2.16%	7.46%	8.70%	20.61%	-49.72%	13.16%	19.39%	-3.65%
07I1							-4.48%	-1.29%	-4.07%	-2.96%	-2.88%
07E9			-8.57%	-3.28%	-1.32%	20.66%	11.63%	8.63%	-16.57%	-2.54%	8.66%
07G2			3.40%	7.88%	5.37%	0.15%	-1.81%	-25.37%	17.69%	17.22%	6.74%
07I5						16.05%	-3.74%	-11.31%	15.96%	7.14%	-5.08%
07E8		-5.21%	-9.59%	2.31%	3.34%	-0.64%	0.65%	3.69%	0.38%	4.83%	1.43%
07J2								-7.41%	13.70%	39.89%	6.50%
07I3						0.28%	2.86%	-24.21%	30.11%	23.50%	10.34%

Performance Heat Map



“Peeling the Onion”

- Crafting Quatrain Scenarios toward Decisions and Actions -

	Update Existing Portfolio Vision and Unconstrained Vision	Step-by-Step Overlay of Constraints	Recommendations – with Conviction – To Decision Makers
Identify	Evolving Risks and Opportunities	1) Impact of Discretionary vs. Non-discretionary Constraints 2) Policy Impact	Identifying Risk Regime: Risk-on, risk-off, neutral
Size	Allocation preferences for each risk budget	Adjustments necessary to meet risk budget and constraints	Sizing of specific associated allocation actions
Preview	Propensity for risk-on, risk-off and neutral	Conviction to be risk-on, risk-off and neutral Action options	Policy recommendations, if any

A Preview of the Broader Quatrain Value Palette

- ❖ Incorporate tactical views, asymmetries and management directives into a holistic asset and manager allocation risk palette over the short, intermediate and long term
- ❖ Explicit sizing suggestions taking into account policy risk and allocation budgets, as well as liquidity / leverage / allocation constraints
- ❖ Quantify alpha of Quatrain dynamic reallocation at both the asset class and manager level
- ❖ Strategic suggestions towards a risk management autopilot, keeping tail risk hedging to an efficient minimum
- ❖ Incorporating sizing and structuring of tail risk hedges into the asset allocation as required. E.g. if one can identify long volatility-gamma investment and the corresponding asymmetric payoff (say a 6-8x payoff if there is a low probability tail risk event corresponding to 20% downside in the broad market within a short time), such an investment can be sized efficiently to contain downside within a customized risk framework.