

# QMS

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CAPITAL MANAGEMENT LP

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**Diversified Global Macro**

June 2011

1. QMS Capital Management Overview
2. Introduction to Managed Futures and Quantitative Investing
3. QMS Global Macro Strategy and Investment Process
4. Biographies of Senior Professionals

## **QMS Capital Management Overview**

- > QMS Capital Management LP offers expertise in quantitative investing, financial modeling, and risk management
- > QMS manages long-short alternative investment strategies in highly-liquid assets
- > QMS maintains a unique commitment to blending academic research and practitioner experience to offer best investment ideas and practices
- > QMS combines highly quantitative modeling skills, real-world experience, and financial/economic judgment
- > Research Triangle (Raleigh-Durham-Chapel Hill) location ideal for attracting/retaining top research talent and fostering innovation

## **Blend best practices of academic and practitioner experience**

- > Top academic research and training
- > Extensive investment management and trading experience
- > Rigorous quantitative and economic/financial training
- > State-of-the-art IT infrastructure

## **Multidimensional diversification**

- > Investment time horizons
- > Investment themes
- > Trading models
- > Asset classes

## **Trade in highly liquid markets**

- > Ability to enter/exit trades rapidly and in size
- > Minimal price impact of transactions

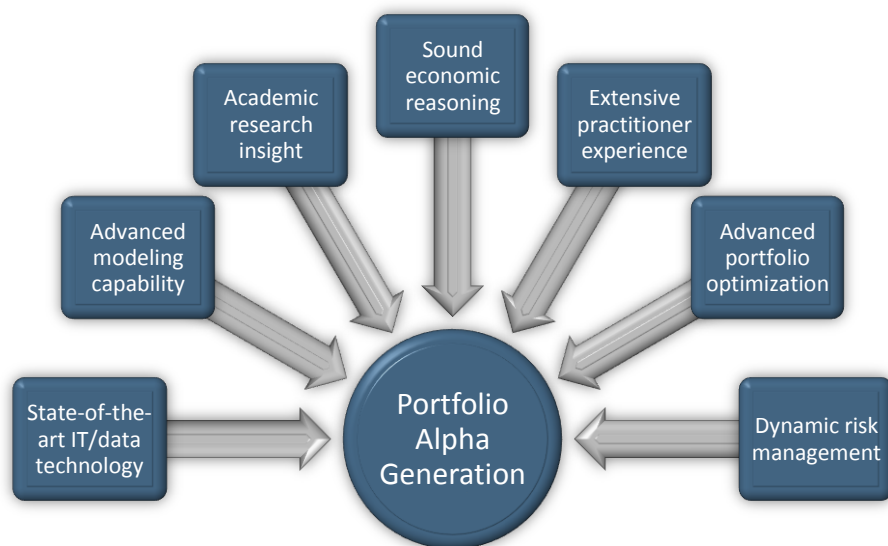
## **Build all analytics in-house**

- > Thorough understanding of all models used
- > Recognition of the limits of all models used
- > Sound economic reasoning behind all trading strategies

## **Employ thorough risk management**

- > Dynamic risk management tied to portfolio optimization
- > Use of both ex-ante and ex-post empirical techniques
- > Use of empirical results as a feedback loop to research

## QMS blends a broad spectrum of expertise and advanced analytic tools to exploit return opportunities



- > Ph.D. researchers
- > Over 40 articles published in leading academic/practitioner journals
- > Experienced investment personnel from top quantitative firms
- > Cooperative relationships with data providers
- > Access to unique data sets
- > Powerful parallel computing technology
- > Nimble data storage/retrieval capability

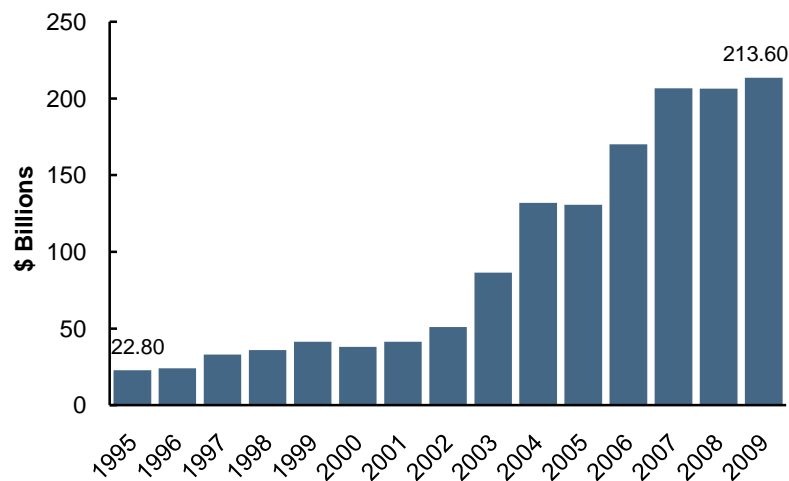


# **Introduction to Managed Futures and Quantitative Investing**

## Managed futures strategies are attracting increased attention from investors

- > Offer returns uncorrelated with traditional and alternative asset classes
- > Trade in highly liquid markets
- > Exchange-based trading minimizes counterparty risk
- > Managed futures typically synonymous with CTA (Commodity Trading Advisors)
- > Liquid Global Macro Strategies are similar to CTAs, but differ in important respects

### Growth of assets in managed futures



source: BarclayHedge

### Comparison of typical strategies

	CTA	Global Macro
<b>Instruments</b>	Global futures/forwards	Global futures/forwards
<b>Markets</b>	Currencies, commodities, fixed-income, equity indices	Currencies, commodities, fixed-income, equity indices
<b>Underlying Philosophy</b>	More technical	More fundamental
<b>Model Themes</b>	Self-reinforcing	Opportunistic
<b>Conceptual Theme Diversity</b>	Lower	Higher
<b>Time Horizon</b>	Short-medium term	Medium-long term
<b>Trading Tactics</b>	Trend following	Value investing
<b>Trade Timing</b>	Reactive	Anticipatory



# DIVERSIFICATION BENEFITS OF CTA / GLOBAL MACRO

- > CTA and Global Macro strategies offer low correlation with other asset classes – but also with each other
- > Correlation among traditional asset classes increases during periods of market stress (e.g., 2008)
- > Many alternative strategies are not as uncorrelated with traditional assets as investors believe
- > Historically, even a naïve 50/50 combination of Global Macro and CTA strategies has offered an attractive return profile



QMS strategy spans both CTA and Global Macro, but tactically allocates based on economic environment

## Annual returns for traditional and alternative asset classes

	US Equity <sup>1</sup>	Int'l Equity <sup>2</sup>	US Bonds <sup>3</sup>	Cmmnty <sup>4</sup>	US REITS <sup>5</sup>	Long-Short Equity <sup>6</sup>	Fixed-Income Arb <sup>7</sup>	Global Macro <sup>8</sup>	CTA <sup>9</sup>	Global Macro + CTA <sup>10</sup>
1994	1.3%	7.8%	-2.8%	11.7%	0.8%	-8.1%	0.3%	-5.7%	12.0%	3.1%
1995	37.6%	11.2%	18.5%	8.9%	18.3%	23.0%	12.5%	30.7%	-7.1%	11.8%
1996	23.0%	6.1%	3.6%	17.0%	35.8%	17.1%	15.9%	25.6%	12.0%	18.8%
1997	33.4%	1.8%	9.6%	-8.2%	18.9%	21.5%	9.3%	37.1%	3.1%	20.1%
1998	28.6%	20.0%	8.7%	-30.5%	-18.8%	17.2%	-8.2%	-3.6%	20.6%	8.5%
1999	21.0%	27.0%	-0.8%	18.6%	-6.5%	47.2%	12.1%	5.8%	-4.7%	0.6%
2000	-9.1%	-14.2%	11.6%	24.2%	25.9%	2.1%	6.3%	11.7%	4.2%	8.0%
2001	-11.9%	-21.4%	8.5%	-22.3%	15.5%	-3.7%	8.0%	18.4%	1.9%	10.1%
2002	-22.1%	-15.9%	10.1%	23.9%	5.2%	-1.6%	5.8%	14.7%	18.3%	16.5%
2003	28.7%	38.6%	4.2%	22.7%	38.5%	17.3%	8.0%	18.0%	14.1%	16.1%
2004	10.9%	20.3%	4.5%	7.6%	30.4%	11.6%	6.9%	8.5%	6.0%	7.2%
2005	4.9%	13.5%	2.6%	17.5%	8.3%	9.7%	0.6%	9.2%	-0.1%	4.6%
2006	15.8%	26.3%	4.3%	-2.7%	34.4%	14.4%	8.7%	13.5%	8.1%	10.8%
2007	5.5%	11.2%	7.2%	11.1%	-17.8%	13.7%	3.8%	17.4%	6.0%	11.7%
2008	-37.0%	-43.4%	7.0%	-36.6%	-37.3%	-19.8%	-28.8%	-4.6%	18.3%	6.9%
2009	26.5%	31.8%	5.1%	18.7%	27.4%	19.5%	27.4%	11.6%	-6.6%	2.5%
Average	9.8%	7.5%	6.4%	5.1%	11.2%	11.3%	5.5%	13.0%	6.6%	9.8%
Std. Deviation	21.3%	21.8%	5.1%	19.6%	22.2%	15.4%	11.9%	12.0%	8.8%	5.8%
Correl to S&P 500	100.0%	80.9%	3.9%	22.2%	45.1%	80.5%	59.7%	45.4%	-39.5%	16.8%

1 S&P500

2 MSCI EAFE Index

3 Citi Broad Investment Grade Bond Index

4 DJ UBS Commodity Index

5 FTSE NAREIT US All REIT Index

6 Credit Suisse/Tremont Long-Short Equity Hedge Fund Index

7 Credit Suisse/Tremont Fixed-Income Arbitrage Hedge Fund Index

8 Credit Suisse/Tremont Global Macro Hedge Fund Index

9 Credit Suisse/Tremont Global Managed Futures Hedge Fund Index

10 Arithmetic average of Global Macro Hedge Fund Index and Global Managed Futures Hedge Fund Index

## Studies in various disciplines indicate statistical models outperform discretionary judgment

- > Medicine: Well-established dominance of actuarial over clinical diagnosis (Dawes et al. 1989)
- > Finance: Quant hedge funds have markedly outperformed non-quant hedge funds over multiple decades (Chincarini 2010)

## Quantitative strategies hold many advantages

DISCRETIONARY TRADING	QUANT TRADING
Limited scope of markets	Very broad global market scope
Often single-themed strategies	Ability to simultaneously and consistently execute multiple strategies
Behavioral biases (excessive trading, selling winners, hindsight bias, confirmation bias)	No behavioral biases – can profit from behavioral biases of others
Poor at distinguishing valid and non-valid predictors (lack of feedback)	Excellent at manipulating large data sets to uncover relationships
Inconsistent in applying own trading rules	Ultimately consistent
Under-diversified or naïvely diversified	State of the art portfolio optimization/diversification techniques
Often arbitrary/unjustified return target estimates	Return targets inferable from performance estimates of individual models
Risk management often arbitrary/suboptimal	Risk management explicitly tied to portfolio optimization
Requires <u>many</u> years of performance to validate trading skill	Rigorous out-of-sample testing provides early feedback
Trading costs often ignored/dealt with improperly	Trading costs explicitly and optimally accounted for in portfolio construction

## Where do humans hold an advantage?

- > Capacity to observe/adapt
- > Situations when false-signals have high impact outcomes
- > Causality vs. mere correlation
- > Thematic idea development
- > Economic understanding

**Combining strengths of quantitative methods and human discretion is ideal – provided the right choice is made for each task**



Discretion	Quant
<ul style="list-style-type: none"> <li>• Creative development</li> <li>• Recognition of secular shifts and structural breaks</li> <li>• Sanity/reasoning checks</li> </ul>	<ul style="list-style-type: none"> <li>• Portfolio Construction</li> <li>• Risk Rebalancing</li> <li>• Trade timing</li> <li>• Opportunity scanning</li> </ul>

## **QMS Global Macro Strategy and Investment Process**

## Broad, diversified scope

- > QMS trading models span a wide spectrum of modeling paradigms and time horizons

## Unique skill sets

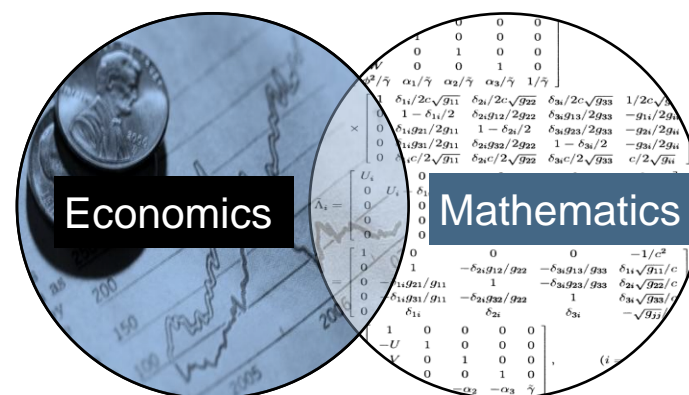
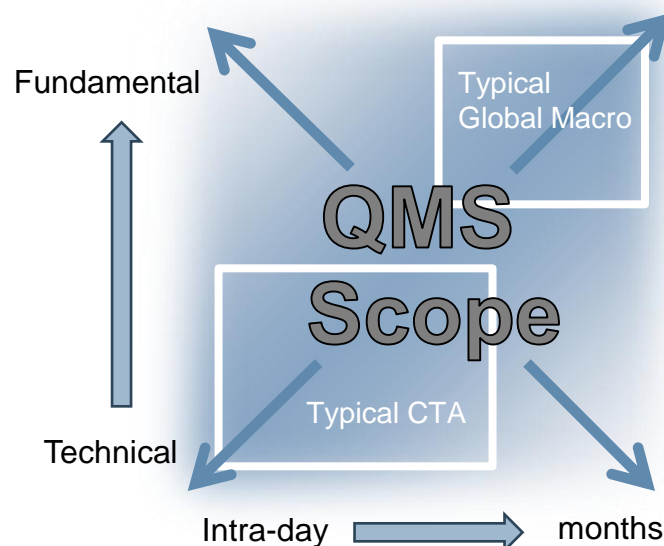
- > Application of academic research
- > Experienced practitioners
- > Extensive quantitative and economic training
- > State-of-the-art computing/automation technology

## Quantitative, NOT black box

- > Sound economic concepts expressed through quantitative algorithms
- > Thorough understanding of each model and its limitations guides the implementation
  - Certain economic environments are conducive/hostile to particular trading themes

## Advanced portfolio construction and risk management

- > Top-down macro factor timing
- > Thematic and model diversification
- > Advanced portfolio optimization
- > Rigorous, embedded risk management
- > Dynamic rebalancing



**QMS tradable universe is comprised of over 100 globally diversified, highly liquid forward and futures contracts**

- > Long or short trading in each contract
- > Contracts selected to ensure high portfolio liquidity
- > Each contract monitored in real-time for potential trading opportunities
- > Tick-by-tick data collected and stored in QMS databases for trading, research, and risk management

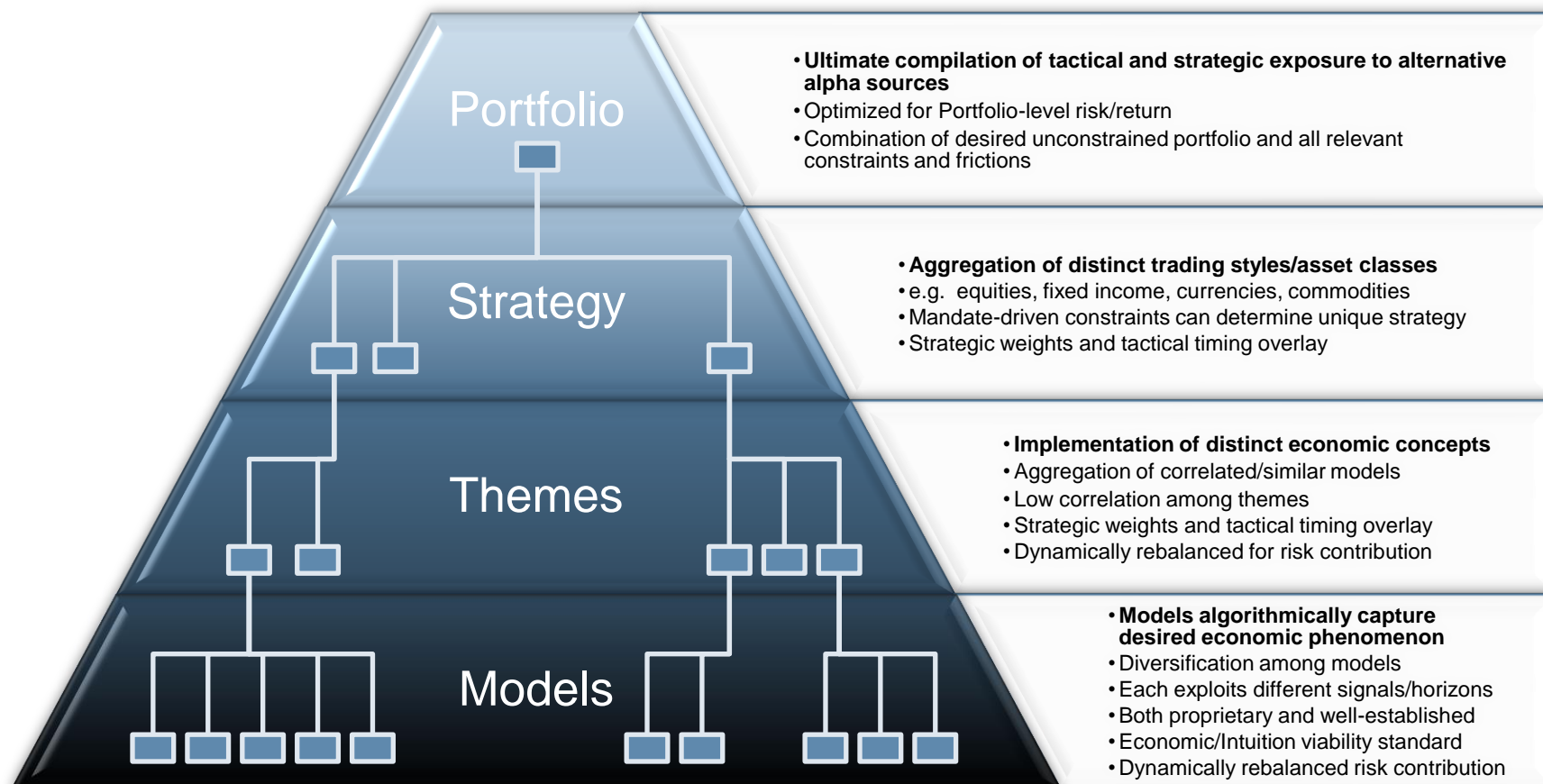
COMMODITY	FUTURES CONTRACTS
Energy	8
Base materials	9
Precious metals	6
Softs	7
Grains	5
Livestock	3

COUNTRY/REGION	EQUITY INDICES	RATE/BOND CONTRACTS	CURRENCY CONTRACTS
European Union	8	4	3
United States	4	6	-
Japan	2	2	3
United Kingdom	1	2	3
Brazil	1	-	-
Canada	1	2	3
India	1	-	-
Mexico	1	-	-
Australia	1	3	3
South Korea	1	-	3
Poland	1	-	-
Switzerland	1	2	3
Sweden	1	-	3
Norway	1	-	3
Taiwan	1	-	-
South Africa	1	-	-
Malaysia	1	-	-
Hong Kong	2	-	-
Singapore	1	-	-
New Zealand	-	1	3



# PORTFOLIO CONSTRUCTION HIERARCHY

**Hierarchical construction supports multiple levels of optimization/risk management**





# PORTFOLIO OPTIMIZATION

**Market frictions and uncertainty render traditional optimization practices inferior**

## TRADITIONAL MEAN-VARIANCE (MARKOWITZ) OPTIMIZATION IS NOT IDEAL

### Historical Data

- Returns
- Volatilities
- Correlations



### Maximize Portfolio Return

- For a given volatility level
- Subject to position-level constraints



### Efficient Frontier

- Computes asset weights for a given level of desired risk

## HAZARDS OF PRACTICAL IMPLEMENTATION

**Ignores uncertainty in inputs:** Projected returns and volatility are based on historical data

**Often suggests extreme holdings:** Large overweights to one or two assets

**Unstable:** "Optimal" portfolio can change wildly through time, leading to burdensome transaction costs

## A MORE APPROPRIATE SOLUTION: QMS OPTIMIZATION (EXTENSION OF BLACK-LITTERMAN MODEL)

### Theoretical Portfolio of Trading Strategies

- Constructed at Strategy, Theme, and Model levels
- Strategic weights
- Tactical/timing overlay
- Allocation to risk budget in multiple dimensions



### Unconstrained Portfolio of Assets

- Position sizes and direction for each tradable asset
- Correlation structure



### Reverse Optimization

- Impute expected returns for each asset in the portfolio



### Mean-Variance Optimization

- Current portfolio positions
- Implied Expected Returns
- Observed correlation & volatility
- Transaction costs (commissions, liquidity, market impact)
- Mandate constraints



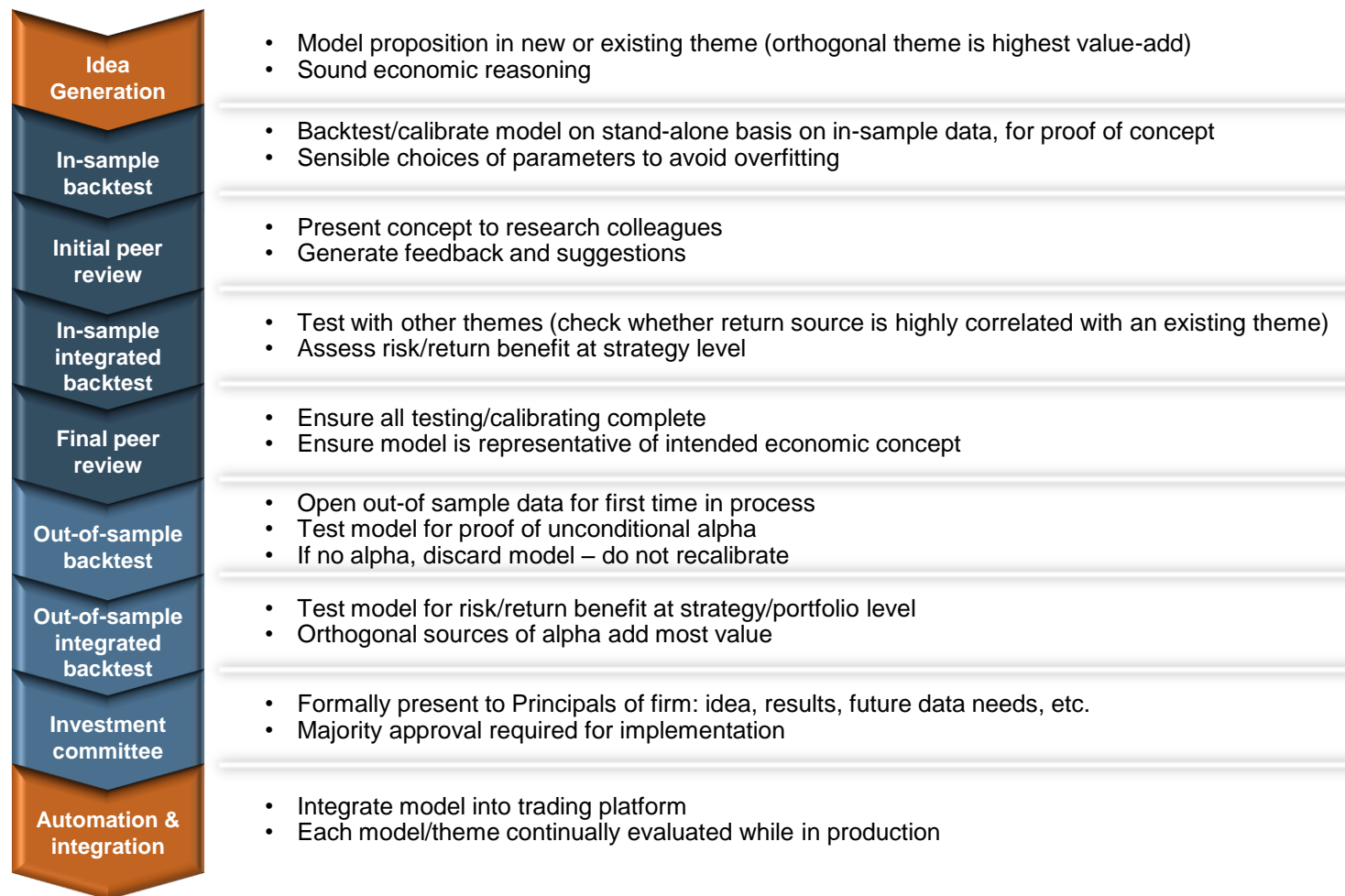
### Optimal Constrained Portfolio of Assets

## ADVANTAGES OF PRACTICAL IMPLEMENTATION

**More stable portfolio:** in rebalancing, the future optimal portfolio at any time is a function of the current portfolio (transaction costs)

**Greater true diversification among positions:** method will not peg portfolio to one or two historically 'superior' assets

# MODEL IMPLEMENTATION PROCESS



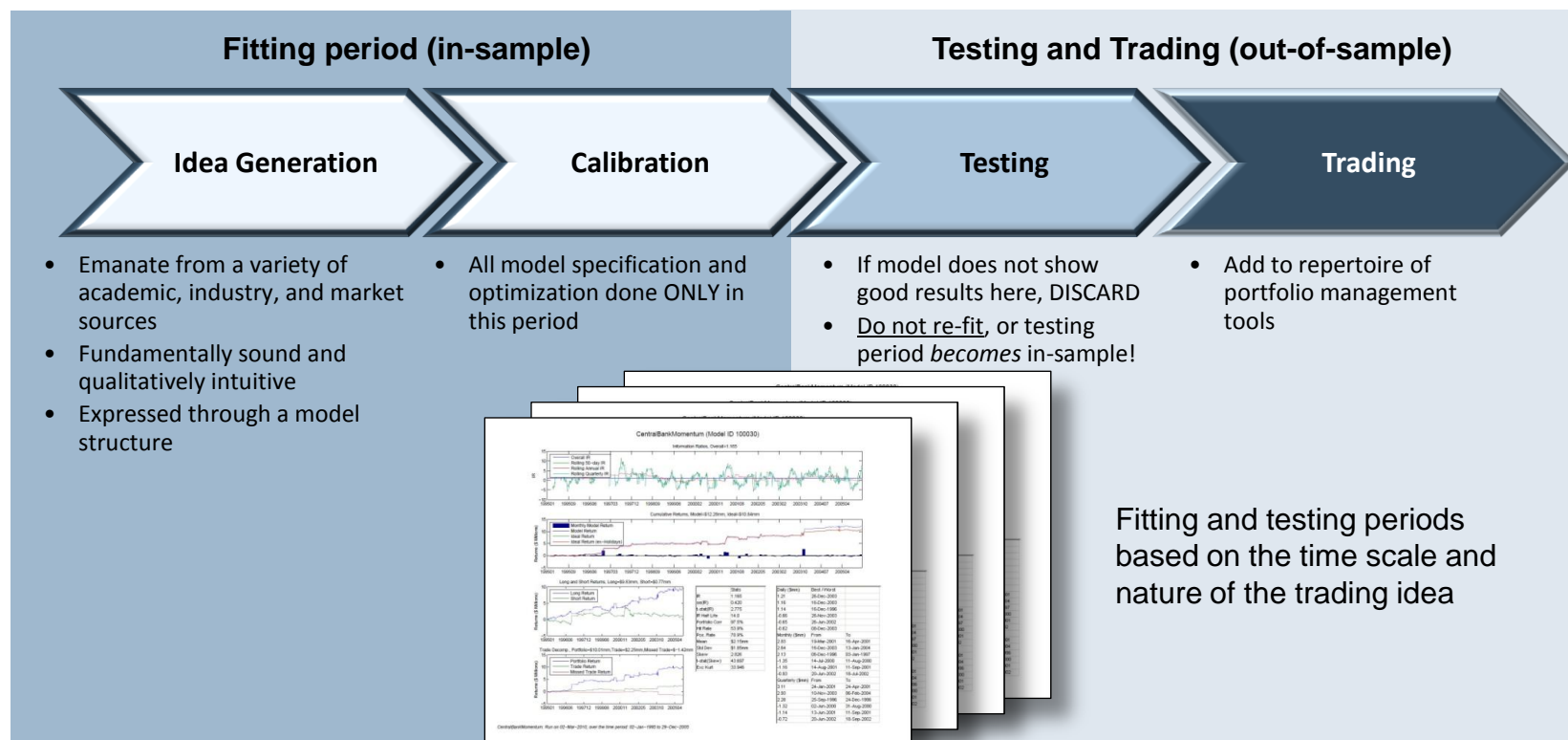
# BACK-TESTING PROCESS

## DATA SNOOPING BIAS

- > Endemic to back-testing in financial modeling
- > A primary cause of underperformance
- > When many models are tested on historical data, some will show “statistical significance” purely by chance – resulting in an unprofitable trading system in real time

## MINIMIZING DATA SNOOPING

- > Sound economic/fundamental reasoning for each tested idea
- > Strict separation of fitting and testing sample periods – true walk-forward testing
- > Intelligent choice of fitting and testing sample periods
- > Viability across a wide scope of markets/assets



# SAMPLE INVESTMENT THEMES

## CTA-type themes

### Time Series Momentum

Money flow can provide lengthy trends under certain circumstances. Trend-following investors can exacerbate autocorrelation.

### Cross-Sectional Momentum

Intra-asset relative performance often shows persistence over the medium term (chasing winners).

### Reversals

Immediate overreactions to positive or negative news can present opportunities for short-term trading.

### Yield

Risk premia and liquidity premia can be earned within or across instruments in certain environments. Identifying correct environments is critical.

### Business/Monetary Cycles

Strategies seeking to take advantage of predictable macro flows and monetary response to various stages of economic/business cycles.

### Value

Strategies seeking to profit from temporary dislocation between market prices and fundamental value.

### Cross-Market Flows

Returns and fund-flows to/from certain asset classes often has predictable, lagged, secondary effects on other markets.

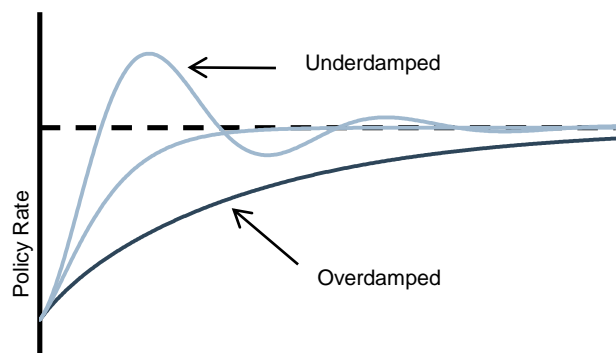
### Forecast Changes

Adjustments to economic forecasts are often not immediately priced into tradable assets, providing opportunity.

## Global Macro-type themes

## CENTRAL BANK MOMENTUM

- > Exploits an inefficiency in central bank policy
  - Short-rate moves occur gradually, in part to minimize disturbance (and in part for political reasons)
  - Effectively an overdamped process: artificially slow to equilibrate!

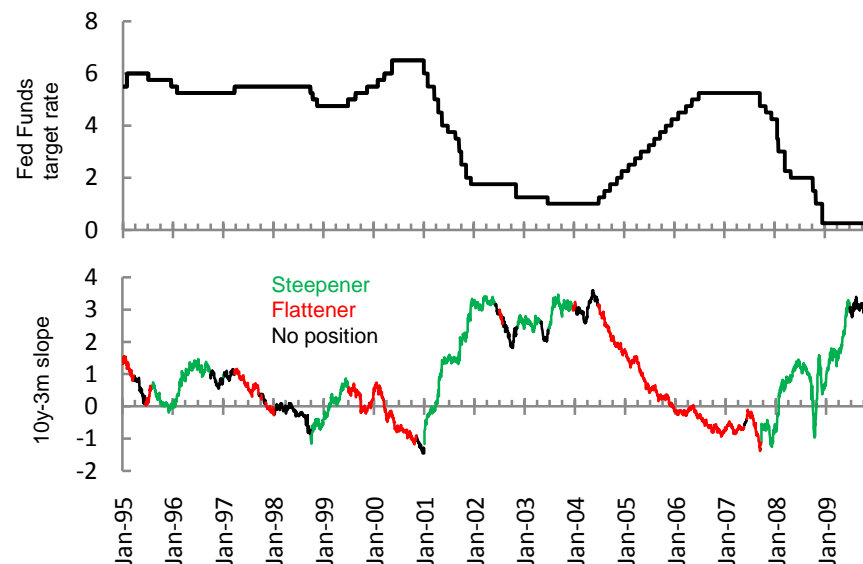


### Opportunity:

- > Policy rate changes (in many environments) likely to persist once commenced
- > Policy rate changes affects policy in other countries
- > Bet on predictive, persistent, changes in slope of yield curve within and across countries
- > Method avoids taking explicit duration risk

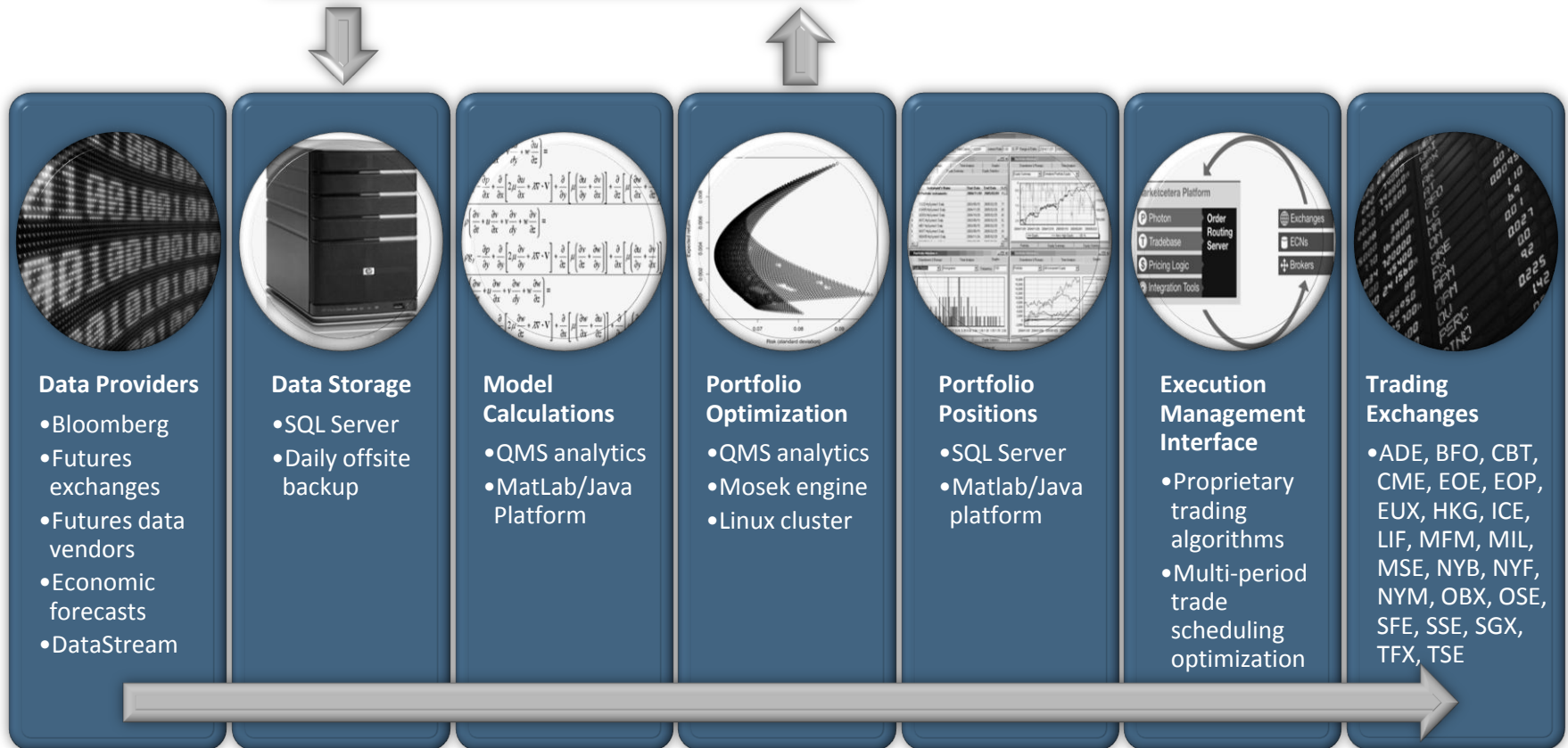
### Example: U.S. Central Bank (FOMC)

- > Long 10y-3m yield spread when increasing rate signal(s) observed
- > Short 10y-3m yield spread when decreasing rate signal(s) observed





### Model Backtest Loop





## Quantitative Investing has a significant requirement for high-speed, high-capacity computing

- > **Production and backtesting computing needs**
  - Many potential models
  - 15+ years of tick-by-tick data of 100+ financial instruments
  - 15+ years of simulated optimization/rebalancing
  - Capturing/processing of real time signals and prices
- > **Many investment managers have been slow to adopt latest technology**
  - Unfamiliarity with latest information technology
  - Difficult transition from existing infrastructure
  - Burdensome sunk costs from legacy systems

## QMS is dedicated to state-of-the-art IT infrastructure

- > **Recently built infrastructure, with latest technology**
  - No inefficient legacy systems
  - Expertise in latest data management and programming techniques
  - Efficient use of parallel computing technology
- > **Adoption of cloud computing leverages in-house technology**
  - Provides secure backup and reliable data redundancy
  - Boosts capacity for parallel computing tasks
  - Flexible variable-cost model facilitates continual upgrades

## QMS utilizes both onsite and cloud computing platforms

**Onsite cluster**  
(40+ Linux servers)



### Cloud servers

- Up to many thousands of CPUs in parallel
- Extremely fast speeds for parallel tasks
- Highly scalable
- Extremely reliable/secure
- Flexible capacity for dynamic workload
- Variable cost price structure
- Data redundancy for disaster recovery

## **Biographies of Senior Professionals**

## MANAGING PRINCIPALS

### **Michael W. Brandt, Ph.D.**

- > Michael Brandt is a Managing Principal at QMS Capital Management LP, where he is responsible for research, investing, business development, and oversight of investment strategies and strategic relationships. Dr. Brandt is a Professor of Finance at Duke University's Fuqua School of Business. His current research focuses on quantitative portfolio management, trading strategies, risk management, and financial econometrics, and his research has been published in many leading financial journals. Dr. Brandt has recently spent considerable time serving as a consultant to several large financial institutions, implementing quantitative trading and risk management strategies. He serves as an editor of several leading academic journals and is a Faculty Research Associate of the National Bureau of Economic Research. Prior to joining Duke University, he was a faculty member at the Wharton School of the University of Pennsylvania for six years, and previous to that he worked in research at J.P. Morgan Futures and J.P. Morgan securities, where he assisted in the early development of the risk management systems subsequently used as the basis for Risk Metrics. Dr. Brandt holds a Ph.D. and MBA in Finance from the University of Chicago and an M.S. in Economics from the London School of Economics.

### **Adil Nathani**

- > Adil Nathani is a Managing Principal at QMS Capital Management LP, where he is responsible for risk management and firm operations. Most recently, Mr. Nathani served as the Chief Risk Officer for Citigroup's Latin American franchise (where he was a member of the Executive Committee), as well as Chief Risk Officer for Citigroup's Global Structured Credit business during the recent financial crisis. He came to Citigroup as a Partner at Old Lane. Prior to 2006, he spent 12 years at CDC Investment Management/Capital Markets NA and its successor organizations, where he served as a Group Executive and board member and was responsible for various business lines within fixed-income trading. Prior to CDC, Mr. Nathani led a team conducting arbitrage strategies in fixed-income markets for Normandy Asset Management. He began his investment management career at Smith Breeden Associates and AMBAC. He earned an MBA from Duke University, which he attended as an Aga Khan Foundation scholar, and where he currently serves on the advisory board of the Center for Financial Excellence.

### **Peter D. Nolan, Ph.D., CFA**

- > Peter Nolan is a Managing Principal at QMS Capital Management LP, where he is responsible for business development, structuring, marketing, and oversight of investment strategies and strategic relationships. He has extensive experience in non-linear modeling, alternative investment structuring, credit valuation, and risk management. Prior to joining QMS Capital, he was a Principal at Smith Breeden Associates and served in various capacities associated with alternative assets – including development of valuation and risk models, investment vehicle structuring, trading, and marketing. Previously, Dr. Nolan was a Senior Research Engineer for Exxon Mobil Corporation and earned an MBA from Duke University. He also holds an M.S. and Ph.D. in Chemical Engineering from The University of Texas at Austin, where he was a Dreyfus Foundation Fellow for his work in molecular physics.

## PRINCIPALS

### **Daryl N. Caldwell**

- > Daryl Caldwell is a Principal at QMS Capital Management LP, where he is responsible for developing various portfolio optimization and quantitative trading strategies as well as managing portfolio risk. Prior to joining QMS Capital, he was a Portfolio Manager for the Canada Pension Plan Investment Board's (CPPIB) global market neutral equity strategy, working in both portfolio management and quantitative research. During his time at CPPIB, Mr. Caldwell was responsible for designing and implementing quantitative absolute return strategies, optimal signal construction methods, dynamic factor weighting research, capacity research, and various portfolio optimization techniques. Previously he worked in the market risk group at Bank of Montreal, where he analyzed interest rate, foreign exchange and equity risks for several of the bank's portfolios. Mr. Caldwell holds dual Masters degrees in Statistics and Mathematical Finance from the University of Toronto, where he also earned a degree in Electrical Engineering.

### **Richard W. O'Brien**

- > Richard O'Brien is a Principal at QMS Capital Management LP, where he is responsible for implementing trading and risk management platforms and executing quantitative trading strategies. Mr. O'Brien has extensive experience managing quantitative portfolios as well as designing algorithmic trading systems. Prior to joining QMS Capital, he worked for AQR Capital in Greenwich CT, where he was responsible for implementing quantitative trading strategies and trading global investment portfolios comprised of long-short equity, currencies, swaps, futures, and sovereign credit derivatives. Previously he managed relative value fixed income positions for Simplex Asset Management in Tokyo and Princeton, NJ. Mr. O'Brien holds dual degrees in Economics and Computer Science from Amherst College and has studied at the London School of Economics.

## RESEARCH CONSULTANTS

### John R. M. Hand, Ph.D.

- > John Hand is a Research Consultant for QMS Capital Management LP, where he advises on accounting based strategies. Dr. Hand is the H. Allen Andrew Distinguished Professor at the Kenan-Flagler Business School at UNC Chapel Hill, and Associate Dean of the Master of Accounting Program. Dr. Hand was a pioneer in documenting the inefficiency of the U.S. stock market with respect to accounting data, winning the 1988 American Accounting Association manuscript competition for his paper "A Test of the Extended Functional Fixation Hypothesis" (*The Accounting Review*, October 1989). He has since published widely in top accounting, entrepreneurship and finance journals. His current research focuses on novel accounting-based trading strategies and understanding decay in the alpha present in existing accounting signals. Before joining UNC Chapel Hill, Dr. Hand was a faculty member at both the University of Chicago and Yale University. He holds a Ph.D. and MBA in Accounting from the University of Chicago and a First Class BSc in Accounting and Economics from Bristol University (UK).

### Alessandro Beber, Ph.D.

- > Alessandro Beber is a Research Consultant for QMS Capital Management LP, where he is responsible for developing macro trading models. Dr. Beber is a professor of Finance at the University of Amsterdam and a research affiliate of the Center for Economic Policy research. Prior to joining the University of Amsterdam, he held research or teaching positions at the Wharton School of the University of Pennsylvania, Columbia Business School, HEC Lausanne, and London Business School. Dr. Beber's expertise lies in financial econometrics, quantitative asset management, risk management, and derivatives. His current research is at the intersection of empirical asset pricing, liquidity, and macroeconomics and has been published in leading financial journals. Dr. Beber holds a Ph.D. in Economics and Management from St. Anna School of Advanced Studies in Italy.

### Mike Aguilar, Ph.D.

- > Mike Aguilar is a Research Consultant for QMS Capital Management LP, and is principally charged with developing high-frequency, event-driven trading strategies. Dr. Aguilar is a lecturer of economics at the University of North Carolina at Chapel Hill and has authored articles in a number of academic and professional publications. His research areas are applied macro and financial econometrics, with a recent focus on volatility modeling, asset contagion, and factor dynamics. Prior to joining UNC at Chapel Hill, he was the Economic Strategist for J & W Seligman & Company, Inc. Dr. Aguilar holds a Ph.D. in Economics from UNC at Chapel Hill.



For more information on strategies and services offered by QMS Capital Management, please contact:

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