JACOBS LEVY EQUITY MANAGEMENT CENTER
FOR QUANTITATIVE FINANCIAL RESEARCH

Investing in Global Equity Markets with particular Emphasis on Chinese Stocks

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Based on joint research with Professor Shijie Deng of the Quantitative and Computational Finance (QCF Program) at the Georgia Institute of Technology,

Harry Markowitz and Ganlin Xu of the McKinley Capital Management (MCM) Scientific Advisory Board,

and Rob Gillam, CIO, and Ziwei (Elaine) Wang, Quantitative Analysis, of MCM.

Research Conclusions:

1. Models Produce Statistically Significant Active Returns in Global, Non-US, and EM Markets using MVM59, MVTaR, and EAW Optimization Techniques!

2. The Public Form of Forecasted Earnings Acceleration, E', CTEF, Produces Statistically Significant Asset Selection (Stock Selection) in Global, Non-US, R3, EM, and JP using the Three Methods of Markowitz Optimizations!

3. Models Pass Markowitz-Xu Data Mining Corrections Tests in all Markets except China A Shares, where the time frame is too Short!

Questions to be Answered

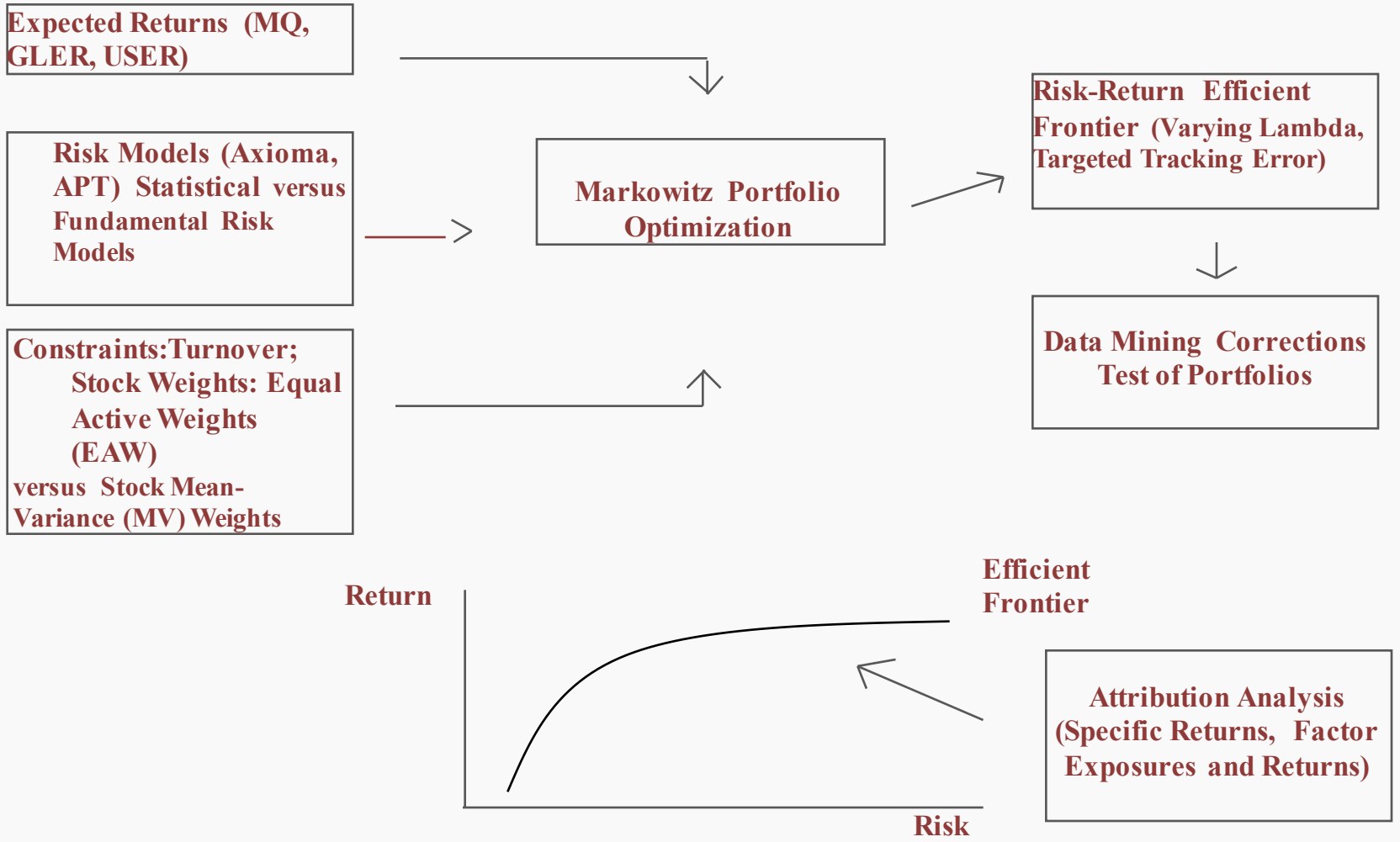
1. How is this analysis consistent with previous work in the literature?
2. What is the role of forecasted earnings in creating expected returns?
3. Can the models be implemented in the world of business?

Earnings Forecasting, Expected Returns, and Data Mining

Early Research Includes

- Cragg and Malkiel (JF 1968)
- Elton, Gruber, and Gultekin (MS 1981)
- Wheeler (1991)
- Brown (IJF 1993)
- Bloch, Guerard, Markowitz, Todd, and Xu (JWE 1993)
- Markowitz and Xu (1994)
- Blin, Bender, and Guerard (IJF 1998)
- Ramnath, Rock, and Shane (IJF 2008)
- Guerard, Rachev, and Shao (IBMJoR&D, 2013)
- Deng and Min(JOI, 2013)
- Guerard, Markowitz, and Xu (IJF, 2015)

Portfolio Construction and Modeling Process



Bloch et al. (1993) Stock Selection Model

$$TR_{t+1} = a_0 + a_1 EP_t + a_2 BP_t + a_3 CP_t + a_4 SP_t + a_5 REP_t + a_6 RBP_t + a_7 RCP_t + a_8 RSP_t + e_t \quad (1)$$

where: *EP* = [earnings per share]/[price per share] = earnings-price ratio;

BP = [book value per share]/[price per share] = book-price ratio;

CP = [cash flow per share]/[price per share] = cash flow-price ratio;

SP = [net sales per share]/[price per share] = sales-price ratio;

REP = [current EP ratio]/[average EP ratio over the past five years];

RBP = [current BP ratio]/[average BP ratio over the past five years];

RCP = [current CP ratio]/[average CP ratio over the past five years];

RSP = [current SP ratio]/[average SP ratio over the past five years]; and

e = randomly distributed error term.

Public Form of Stock Selection Model

$$TR_{t+1} = a_0 + a_1 EP_t + a_2 BP_t + a_3 CP_t + a_4 SP_t + a_5 REP_t + a_6 RBP_t + a_7 RCP_t$$
$$+ a_8 RSP_t + a_9 CTEF_t + a_{10} PM_t + e_t \qquad (2)$$

where: EP = [earnings per share]/[price per share] = earnings-price ratio;

BP = [book value per share]/[price per share] = book-price ratio;

CP = [cash flow per share]/[price per share] = cash flow-price ratio;

SP = [net sales per share]/[price per share] = sales-price ratio;

REP = [current EP ratio]/[average EP ratio over the past five years];

RBP = [current BP ratio]/[average BP ratio over the past five years];

RCP = [current CP ratio]/[average CP ratio over the past five years];

RSP = [current SP ratio]/[average SP ratio over the past five years];

CTEF = consensus earnings-per-share I/B/E/S forecast, revisions and breadth,

PM = Price Momentum; and

e = randomly distributed error term.

Regression Issues and Analysis

1. Financial data has Outlier issues and we use Robust Regression to estimate Expected Returns, using the Beaton-Tukey (1974) Bisquare Criteria. Ongoing research finds that the MM-Methods of Robust Regression using the Tukey Optimal Influence Function (1999) offer enhancements.

2. Multicollinearity exists in Financial data and we estimate total stock returns models using the Gunst et al. (1974,1976) Latent Root Regression (LRR) procedure on Robust-Weighted data, hence WLRR.

Research in “Threes”

Three Levels of Testing;

Three Methods of Markowitz Optimizations;

Three Testing Universes;

Three Research Conclusions.

Levels of Testing

Level 1. Information Coefficients, ICs;

Level 2. Markowitz Efficient Frontiers with Transactions Costs;

Level 3. Markowitz-Xu Data Mining Corrections testing

Markowitz Optimization Techniques

- 1. Mean – Variance Model using Total Risk (MVM59);
- 2. Mean – Variance Tracking Error at Risk (MVTaR);
- 3. Equal – Active Weighting (EAW);
- The Goal: Maximize the Geometric Mean (Latane, 1959; Markowitz, 1959 and 1976; and MacLean, Thorp, and Ziemba, 2011) and Sharpe Ratio.

We present evidence on three Modeling Universes:

1. In Guerard, Rachev, and Shao (2013) and Guerard, Markowitz, and Xu (2015), we used a Global Broad Universe, defined as all Companies on FactSet with Sales and Net Income, Two Analysts on I/B/E/S Database, Top 7500 stocks in terms of $USD, 1982-2011.

2. MSCI Index Constituents with FactSet Net Income and Sales Data and I/B/E/S coverage, 1/2003 – 5/2015.

3. Global Stocks with FactSet Net Income and Sales Data and I/B/E/S coverage, 1/2003 – 12/2015. China A Shares Stocks, 1/2009 – 12/2015.

Universe I:

1. In Guerard, Rachev, and Shao (2013) and Guerard, Markowitz, and Xu (2015), we used a Global Broad Universe, defined as all Companies on FactSet with Sales and Net Income, Two Analysts on I/B/E/S Database, Top 7500 stocks in terms of $USD, 1982-2011.

APT Optimization Techniques Test: Guerard, Markowitz, and Xu (2015)

Efficient Frontier of the Global Stock Selection Model with Various Portfolio Optimization Techniques
1999 -2011
APT Risk Model

Earnings Model or Component	Mean-Variance Methodology	Lambda	Annualized Return	Standard Deviation	Sharpe Ratio	Information Ratio	Tracking Error
GLER	M59	1000	15.84	24.97	0.590	0.78	13.11
		500	16.34	24.85	0.590	0.82	12.08
		200	16.37	24.38	0.610	0.85	12.68
		100	15.90	24.61	0.580	0.81	12.66
		5	10.11	19.36	0.440	0.51	8.81
Benchmark			5.59		0.240		
GLER	TaR	1000	16.10	21.93	0.660	0.94	11.18
		500	15.91	21.99	0.651	0.90	11.44
		200	16.09	20.95	0.691	0.97	10.83
		100	14.18	21.24	0.591	0.77	11.23
		5	8.51	20.03	0.344	0.33	8.75
GLER	EAWTaR2	1000	14.80	21.96	0.600	0.94	11.07
		500	14.30	21.65	0.590	0.80	10.87
		200	14.15	20.92	0.600	0.85	10.04
		100	13.49	20.82	0.570	0.80	9.84
		5	10.77	20.79	0.440	0.43	12.18

Axioma Attribution: WLRR Model in Guerard, Markowitz, and Xu (2015)

Attribution of FSGLER APT-Created Portfolios using Axioma World Fundamental Risk Model

Source of Return	Contribution	Avg Exposure	Hit Rate	Risk	IR	T-Stat
Portfolio	14.52%			21.25%		
Benchmark	1.51%			20.38%		
Active	13.01%			10.81%	1.20	4.34
Factor Contribution	7.87%			8.28%	0.95	3.43
Style	4.44%			7.47%	0.59	2.14
Exchange Rate Sensitivity	-0.07%	0.0281	51.28%	0.25%	-0.27	-0.98
Growth	0.33%	0.1589	64.74%	0.25%	1.30	4.68
Leverage	-0.59%	0.2732	41.67%	0.36%	-1.63	-5.88
Liquidity	0.30%	0.1223	51.92%	0.81%	0.37	1.34
Medium-Term Momentum	5.14%	0.4534	72.44%	2.29%	2.25	8.10
Short-Term Momentum	0.82%	0.0371	44.23%	1.33%	0.61	2.20
Size	0.69%	-1.0072	53.85%	6.28%	0.11	0.39
Value	2.67%	0.5142	66.03%	1.36%	1.96	7.05
Volatility	-4.85%	0.5467	36.54%	4.58%	-1.06	-3.82
Country	2.27%			2.59%	0.88	3.16
Industry	0.49%			2.38%	0.21	0.74
Currency	0.62%			1.35%	0.46	1.67
Local	0.08%			0.31%	0.24	0.88
Market	-0.02%			2.23%	-0.01	-0.03
Specific Return	5.13%			6.69%	0.74	2.66

Level II Test: Axioma Efficient Frontiers Test in Guerard, Markowitz, and Xu (2015)

Table 4: Axioma FSGLER Efficient Frontiers
1999 - 2011

Tracking Errors	Annualized Return	Standard Deviation	Active Return	Active Risk	Sharpe Ratio	Information Ratio	Number of Stocks
		Axioma Fundamental Risk Model					
3	4.87	18.78	3.59	3.50	0.259	1.027	309
4	6.22	19.40	4.94	4.79	0.326	1.031	254
5	7.90	20.22	6.62	6.11	0.391	1.083	227
6	7.90	21.20	6.62	7.24	0.373	0.913	211
7	9.09	22.10	7.81	8.38	0.411	0.932	195
8	8.54	23.05	7.26	9.42	0.371	0.771	226
9	10.45	23.30	9.17	10.06	0.449	0.911	238
10	11.62	24.18	10.35	11.05	0.481	0.936	229
		Axioma Statistical Risk Model					
3	8.79	20.63	7.51	6.00	0.426	1.253	411
4	9.86	21.79	8.58	7.73	0.453	1.110	323
5	11.92	22.51	10.64	8.95	0.530	1.189	275
6	13.00	23.20	11.72	9.95	0.561	1.178	247
7	12.03	23.83	10.75	10.95	0.505	0.983	232
8	12.35	24.93	11.27	12.09	0.504	0.932	225
9	12.71	25.48	11.43	12.93	0.499	0.884	222
10	12.68	26.00	11.40	13.47	0.488	0.846	227

Universe II: MSCI Index Constituents and Broad Global Testing

- Analysis is 12/2012 – 5/2015;
- MSCI Index Constituents with FactSet Net Income and Sales Data and I/B/E/S coverage.

Level I Test:
Information Coefficients

			Universe					
		Global ,					China	
Model	Global	Two Analysts	R3	EM	JP	China	Broad	
ALPHA	0.03	0.03	0.01	0.04	0.03	0.05	0.06	
(t)	2.29	2.68	1.37	3.86	-0.07	3.03	3.57	
MQ	0.05	0.06	0.05	0.07	0.03	0.08	0.07	
	5.18	6.26	4.46	7.35	1.74	4.81	5.03	
CTEF	0.04	0.05	0.04	0.05	0.03	0.06	0.05	
	7.05	8.95	6.13	8.10	2.36	4.18	4.11	
Regression Proprietary	0.06	0.06	0.05	0.08	0.07	0.06	0.06	
	6.46	7.00	4.59	8.55	5.67	5.14	4.95	
BP	0.00	0.01	0.01	0.00	0.04	0.00	0.01	
	0.26	1.03	0.71	0.07	3.86	-0.02	0.40	
EP	0.03	0.03	0.03	0.04	0.02	0.03	0.03	
	4.15	3.43	3.76	5.63	1.64	2.27	2.29	
PMT	0.05	0.04	0.02	0.05	0.03	0.04	0.02	
	4.60	4.59	2.61	5.36	2.54	2.64	1.39	
REG (Public)	0.03	0.05	0.04	0.05	0.05	0.04	0.04	
	5.85	8.24	5.82	7.27	4.71	3.41	3.77	
REG8F WLRR	0.02	0.03	0.03	0.03	0.05	0.01	0.01	
	3.07	4.27	4.35	4.22	4.28	1.04	1.04	

Optimization Assumptions

- 1. January 2003 – May 2015 Time Period of Analysis
- 2. Monthly Re-optimization; 8% monthly (buy) turnover;
- 3. Four percent Maximum Stock Upper Bound; 35 basis point Threshold Position;
- 4. 150 basis points of transactions costs each way.

- **We use APT and Axioma Risk Models and Optimizers.**

- ITG Estimates the Transactions Cost to be 45 basis points each way in our Public Model; 80 basis points in real-time Proprietary Model trading, 2011 – 2015. We are conservative in our assumption!

APT Mean-Variance Japan-only Optimization

Table 2A: ACW MVTaR					
Universe: MSCI All Country World Index-only Constituents					
Simulation Period: 3/ 2002 -12/2014					
APT Mean- Variance Tracking Error at Risk (MVTaR) Optimization					
	Geometric	Standard	Sharpe	Information	Tracking
Lambda	Mean	Deviation	Ratio	Ratio	Error
		Variable: MQ			
500	16.76	16.08	0.953	1.36	7.17
200	14.75	16.03	0.831	1.22	6.34
100	13.85	15.80	0.786	1.24	5.55
10	9.70	15.97	0.518	0.72	3.78
1	7.38	15.67	0.379	0.16	2.37
Benchmark	6.98	15.94	0.346		
		Variable: CTEF			
500	13.98	20.05	0.614	0.80	8.79
200	11.88	19.66	0.532	0.62	7.89
100	10.83	19.00	0.495	0.52	7.35
10	9.10	17.38	0.442	0.41	5.12
		Variable: ALPHA			
500	10.68	22.35	0.414	0.35	10.45
200	9.82	22.20	0.378	0.29	9.91
100	9.56	21.02	0.370	0.29	9.00
10	8.57	18.47	0.387	0.26	6.01
		Variable: REG8F WLRR			
500	10.74	22.56	0.410	0.29	12.81
200	10.32	21.72	0.409	0.29	11.65
100	10.55	21.47	0.425	0.32	11.15
10	7.62	19.62	0.347	0.15	8.72
		Variable: USER / **GLER**			
500	11.00	23.81	0.401	0.26	15.35
200	10.92	23.59	0.379	0.22	15.37
100	9.60	22.58	0.377	0.19	13.84
10	9.13	17.97	0.362	0.30	7.20

Table 2A: ACW MVTaR					
Universe: MSCI All Country World Index-only Constituents					
Simulation Period: 3/ 2002 -12/2014					
APT Mean- Variance Tracking Error at Risk (MVTaR) Optimization					
	Geometric	Standard	Sharpe	Information	Tracking
Lambda	Mean	Deviation	Ratio	Ratio	Error
		Variable: MQ			
500	16.76	16.08	0.953	1.36	7.17
200	14.75	16.03	0.831	1.22	6.34
100	13.85	15.80	0.786	1.24	5.55
10	9.70	15.97	0.518	0.72	3.78
1	7.38	15.67	0.379	0.16	2.37
Benchmark	6.98	15.94	0.346		
		Variable: CTEF			
500	13.98	20.05	0.614	0.80	8.79
200	11.88	19.66	0.532	0.62	7.89
100	10.83	19.00	0.495	0.52	7.35
10	9.10	17.38	0.442	0.41	5.12
		Variable: ALPHA			
500	10.68	22.35	0.414	0.35	10.45
200	9.82	22.20	0.378	0.29	9.91
100	9.56	21.02	0.370	0.29	9.00
10	8.57	18.47	0.387	0.26	6.01
		Variable: REG8F WLRR			
500	10.74	22.56	0.410	0.29	12.81
200	10.32	21.72	0.409	0.29	11.65
100	10.55	21.47	0.425	0.32	11.15
10	7.62	19.62	0.347	0.15	8.72
		Variable: USER / **GLER**			
500	11.00	23.81	0.401	0.26	15.35
200	10.92	23.59	0.379	0.22	15.37
100	9.60	22.58	0.377	0.19	13.84
10	9.13	17.97	0.362	0.30	7.20

Table 2B: Non-US MVTaR					
Universe: MSCI Non-US Index-only Constituents					
Simulation Period: 3/ 2002 -12/2014					
APT Mean- Variance Tracking Error at Risk (MVTaR) Optimization					
	Geometric	Standard	Sharpe	Information	Tracking
Lambda	Mean	Deviation	Ratio	Ratio	Error
			Variable: MQ		
500	17.05	18.08	0.863	1.41	6.99
200	15.31	18.19	0.763	1.28	6.43
100	14.59	18.16	0.724	1.29	5.74
10	11.52	18.19	0.554	1.00	3.25
1	7.65	17.47	0.356	0.14	3.20
Benchmark	7.21	17.70	0.327		
			Variable: CTEF		
500	14.73	22.23	0.598	0.84	8.96
200	12.11	22.05	0.484	0.56	8.81
100	10.66	21.60	0.427	0.43	8.09
10	8.85	20.13	0.369	0.30	5.40
			Variable: ALPHA		
500	10.66	24.05	0.384	0.32	10.74
200	11.29	22.65	0.436	0.45	9.10
100	10.66	21.60	0.427	0.43	8.09
10	8.85	20.13	0.369	0.30	5.40
			Variable: REG8F WLRR		
500	13.17	23.64	0.496	0.54	11.06
200	12.22	23.16	0.465	0.49	10.29
100	11.45	22.86	0.438	0.42	10.06
10	7.62	21.39	0.290	0.05	8.40
			Variable: USER / **GLER**		
500	10.38	24.52	0.365	0.24	13.37
200	11.92	22.81	0.460	0.46	10.33
100	11.89	21.39	0.489	0.39	7.89
10	9.28	20.21	0.388	0.30	6.98

Table 2C: R3 MVTaR					
Universe: Russell 3000 Index-only Constituents					
Simulation Period: 3/ 2002 -12/2014					
APT Mean- Variance Tracking Error at Risk (MVTaR) Optimization					
	Geometric	Standard	Sharpe	Information	Tracking
Lambda	Mean	Deviation	Ratio	Ratio	Error
		Variable: MQ			
500	9.70	17.16	0.482	0.30	8.58
200	9.42	16.78	0.476	0.28	8.04
100	9.37	16.37	0.485	0.31	7.08
10	7.56	15.61	0.393	0.08	4.84
1	6.65	14.70	0.355	-0.19	2.68
Benchmark	7.15	15.44	0.371		
		Variable: CTEF			
500	10.43	20.19	0.444	0.30	10.99
200	9.30	19.74	0.399	0.21	10.42
100	8.60	19.44	0.369	0.15	9.71
10	8.00	17.51	0.375	0.14	6.10
		Variable: ALPHA			
500	5.54	16.62	0.247	-0.18	8.87
200	6.12	16.38	0.286	-0.12	8.35
100	6.29	16.32	0.298	-0.11	7.64
10	6.39	15.52	0.320	-0.14	5.34
		Variable: REG8F WLRR			
500	7.02	29.81	0.188	-0.01	19.87
200	8.32	28.51	0.242	0.06	18.31
100	8.33	26.66	0.259	0.07	16.41
10	7.63	20.51	0.302	0.05	9.50
		Variable: **USER** / GLER			
500	10.06	21.12	0.409	0.24	11.93
200	10.57	20.81	0.439	0.30	11.49
100	9.91	20.54	0.416	0.26	10.94
10	7.92	18.69	0.347	0.10	7.42

Table 2D: EM MVTaR					
Universe: MSCI Emerging Markets Index-only Constituents					
Simulation Period: 3/ 2002 -12/2014					
APT Mean- Variance Tracking Error at Risk (MVTaR) Optimization					
	Geometric	Standard	Sharpe	Information	Tracking
Lambda	Mean	Deviation	Ratio	Ratio	Error
		Variable: MQ			
500	21.51	21.96	0.914	1.37	7.87
200	18.44	22.40	0.759	1.16	6.63
100	17.29	22.44	0.707	1.10	6.00
10	13.65	22.58	0.541	0.72	4.10
1	11.19	22.34	0.438	0.18	2.72
Benchmar	10.71	22.78	0.408		
		Variable: CTEF			
500	17.07	20.36	0.582	0.67	9.46
200	15.84	19.58	0.558	0.60	8.60
100			DNF		
10	12.83	18.62	0.470	0.43	4.96
		Variable: ALPHA			
500	12.29	27.55	0.374	0.16	10.14
200	12.54	27.32	0.407	0.19	9.66
100	12.03	27.11	0.391	0.14	9.07
10	10.20	24.88	0.352	-0.09	5.90
		Variable: REG8F WLRR			
500	9.16	30.21	0.256	-0.08	18.60
200	12.54	27.32	0.407	0.19	17.86
100	7.10	29.16	0.180	-0.20	17.45
10	6.55	26.62	0.192	-0.30	13.74
		Variable: USER / **GLER**			
500	12.18	28.53	0.377	0.09	15.77
200	11.32	28.57	0.346	0.04	15.75
100	11.01	28.38	0.337	0.02	15.70
10	9.96	25.11	0.340	-0.08	10.09

Table 2E: CH MVTaR					
Universe: MSCI China Index-only Constituents					
Simulation Period: 3/ 2002 -12/2014					
APT Mean- Variance Tracking Error at Risk (MVTaR) Optimization					
	Geometric	Standard	Sharpe	nformatio	Tracking
Lambda	Mean	Deviation	Ratio	Ratio	Error
		Variable: MQ			
500	17.23	29.22	0.541	0.41	10.84
200	17.29	28.94	0.548	0.43	10.47
100	16.50	28.68	0.525	0.37	10.21
10	14.49	27.99	0.467	0.20	8.78
1	12.80	26.99	0.421	0.01	7.62
Benchmark	12.74	20.43	0.417		
		Variable: CTEF			
500	16.55	31.90	0.474	0.29	13.16
200	16.59	36.31	0.484	0.30	12.64
100	17.20	30.76	0.513	0.37	12.12
10	16.59	29.11	0.435	0.14	9.57
		Variable: ALPHA			
500	11.23	29.85	0.382	-0.13	11.52
200	11.43	29.73	0.337	-0.12	11.08
100	12.26	27.64	0.392	-0.06	8.41
10	12.23	26.73	0.404	-0.07	7.51
		Variable: REG8F WLRR			
500	13.42	30.38	0.396	0.05	13.58
200	13.36	30.04	0.397	0.06	13.07
100	13.47	29.55	0.408	-0.12	12.55
10	11.60	27.93	0.364	-0.15	9.52
		Variable: USER / **GLER**			
500	16.70	31.50	0.485	0.29	13.47
200	16.85	30.73	0.502	0.32	12.72
100	16.82	30.10	0.511	0.34	12.06
10	14.52	28.21	0.464	0.19	9.30

Table 2F: JP MVTaR					
Universe: MSCI Japan Index-only Constituents					
Simulation Period: 3/ 2002 -12/2014					
APT Mean- Variance Tracking Error at Risk (MVTaR) Optimization					
	Geometric	Standard	Sharpe	Information	Tracking
Lambda	Mean	Deviation	Ratio	Ratio	Error
		Variable: MQ			
500	5.66	16.02	0.201	0.28	7.79
200	5.22	16.34	0.232	0.25	6.31
100	5.25	16.41	0.233	0.27	6.65
10	3.10	16.68	0.100	-0.05	7.12
1	0.82	16.21	-0.038	-0.44	7.79
Benchmark	3.45	17.06	0.118		
		Variable: CTEF			
500	5.17	20.92	0.179	0.14	12.30
200	5.53	19.40	0.211	0.21	10.11
100	6.12	18.17	0.258	0.36	7.43
10	4.35	17.33	0.168	0.13	6.76
		Variable: ALPHA			
500	4.73	20.16	0.163	0.15	8.42
200	5.35	19.70	0.199	0.24	7.91
100	5.30	19.55	0.198	0.24	7.61
10	2.89	17.81	0.082	-0.11	5.15
		Variable: REG8F WLRR			
500	7.55	20.55	0.305	0.38	10.92
200	7.27	19.10	0.385	0.39	9.90
100	7.58	18.52	0.332	0.44	9.37
10	3.11	16.50	0.318	0.45	7.46
		Variable: USER / **GLER**			
500	8.66	19.29	0.375	0.59	8.82
200	8.62	18.67	0.385	0.64	8.14
100	7.89	18.37	0.352	0.62	6.41
10	7.41	17.08	0.350	0.62	6.41

Table 2H: China, Two Analysts MVTaR						
Universe: China Stocks with Two Analysts						
Simulation Period: 3/ 2002 -12/2014						
APT Mean- Variance Tracking Error at Risk (MVTaR) Optimization						
	Geometric	Standard	Sharpe	nformatio	Tracking	
Lambda	Mean	Deviation	Ratio	Ratio	Error	
		Variable: MQ				
500	18.74	29.02	0.596	0.53	13.08	
200	18.07	29.66	0.560	0.50	12.56	
100	16.79	29.53	0.520	0.43	11.65	
10	14.60	29.04	0.453	0.30	9.36	
1	10.62	28.48	0.322	-0.14	8.11	
Benchmar	12.74	20.43	0.417			
		Variable: CTEF				
500	17.49	32.93	0.487	0.35	16.41	
200	16.14	32.89	0.455	0.30	15.58	
100	15.91	32.62	0.443	0.30	14.02	
10	13.59	30.85	0.394	0.18	10.46	
		Variable: ALPHA				
500	12.84	32.83	0.347	0.06	18.07	
200	11.33	32.57	0.304	-0.03	16.58	
100	11.43	32.09	0.311	-0.02	15.12	
10	12.03	28.82	0.367	0.03	9.37	
		Variable: REG8F WLRR				
500	12.05	32.97	0.373	0.02	19.68	
200	11.92	32.09	0.322	0.01	18.10	
100	11.58	31.37	0.328	-0.01	17.02	
10	9.53	29.19	0.277	-0.20	11.08	
		Variable: USER / **GLER**				
500	17.31	31.75	0.510	0.32	17.32	
200	17.48	31.96	0.502	0.35	16.44	
100	17.31	31.64	0.501	0.36	10.45	
10	11.92	29.37	0.357	0.02	10.45	

Table 2G: Global, Two Analysts MVTaR						
Universe: Global Stocks with Two Analysts						
Simulation Period: 3/ 2002 -12/2014						
APT Mean- Variance Tracking Error at Risk (MVTaR) Optimization						
	Geometric	Standard	Sharpe	nformatio	Tracking	
Lambda	Mean	Deviation	Ratio	Ratio	Error	
		Variable: MQ				
500	17.65	16.52	0.981	1.57	6.79	
200	16.06	16.62	0.881	1.37	6.61	
100	16.01	16.54	0.881	1.40	6.43	
10	13.26	15.86	0.740	1.33	4.72	
1	9.11	15.46	0.500	0.88	2.66	
Benchmark	6.98	15.94	0.346			
		Variable: CTEF				
500	15.61	20.23	0.701	0.92	9.40	
200	15.23	20.38	0.677	0.91	9.09	
100	13.68	20.30	0.604	0.77	8.70	
10	10.16	19.02	0.459	0.48	6.67	
		Variable: ALPHA				
500	9.00	24.14	0.314	0.15	13.73	
200	8.62	24.13	0.298	0.12	13.62	
100	9.34	23.77	0.333	0.18	13.23	
10	11.10	24.17	0.457	0.38	10.78	
		Variable: REG8F WLRR				
500	12.96	23.08	0.500	0.47	12.77	
200	12.14	22.91	0.482	0.43	11.92	
100	11.21	21.69	0.425	0.32	11.15	
10			DNF			
		Variable: USER / **GLER**				
500	13.13	19.80	0.591	0.67	9.14	
200	12.94	19.46	0.591	0.69	8.59	
100	12.52	19.79	0.560	0.59	9.34	
10	10.27	18.59	0.476	0.42	7.37	

Executive Summary
Barra Attributions, 1/2002 -12/2014
APT MVTaR Optimizations

	MQ		CTEF		GLER		ALPHA	
Universe	Total Active Returns (t)	Specific Returns (t)	Total Active Returns (t)	Specific Returns (t)	Total Active Returns (t)	Specific Returns (t)	Total Active Returns (t)	Specific Returns (t)
GL (ACW)	**9.08 (4.53)**	**4.12 (5.18)**	**8.25 (3.38)**	**2.84 (1.89)**	**5.96 (2.60)**	**2.82 (1.78)**	.31 (.56)	-.06 (0.30)
R3	2.22 (1.06)	1.67 (1.39)	2.11 (0.93)	1.19 (0.96)	**4.38 (2.32)**	**6.24 (4.54)**	-1.08 (-.40)	-.01 (.10)
JP	1.75 (0.81)	-.98 (-0.62)	2.06 (0.90)	**7.20 (2.65)**	**5.16 (2.32)**	**4.47 (2.40)**	1.88 (1.06)	0.37 (1.42)
Non-US	**8.09 (3.53)**	**3.77 (3.86)**	**4.88 (2.24)**	**8.81 (3.74)**	**4.70 (1.94)**	**10.77 (3.82)**	**4.07 (1.86)**	**3.02 (2.03)**
EM	**7.72 (3.50)**	**2.54 (2.17)**	**5.13 (2.23)**	2.24 (1.29)	0.61 (0.63)	4.07 (1.19)	1.82 (1.08)	-1.26 (-.18)
CH	**6.18 (1.66)**	1.82 (0.70)	4.51 (1.26)	1.97 (0.75)	5.60 (1.29)	3.53 (1.03)	-1.68 (-.44)	-1.68 (-.44)

What Drives Stock Selection in GLER? CTEF!

Level II: Global CTEF Attribution, APT Mean-Variance Markowitz Full Covariance Matrix (MVM59) Optimization

ATTRIBUTION REPORT

Annualized Contributions To Total Return

Source of Return	Contribution (% Return)	Risk (% Std Dev)	Info Ratio	T-Stat
1 Risk Free	1.37			
2 Total Benchmark	7.30	16.08		
3 Currency Selection	1.78	1.97	0.88	3.22
4 Cash-Equity Policy	0.00	0.00		
5 Risk Indices	10.33	5.81	1.58	5.76
6 Industries	-0.85	3.33	-0.15	-0.53
7 Countries	2.11	5.63	0.37	1.34
8 World Equity	0.00	0.00		
9 Asset Selection	4.44	3.19	1.26	4.57
10 Active Equity [5+6+7+8+9]	16.03	9.36	1.58	5.76
11 Trading				
12 Transaction Cost	-4.31			
13 Total Active [3+4+10+11+12]	13.99	9.84	1.37	4.98
14 Total Managed [2+13]	21.29	21.01		

Level II: Global WLRR Attribution, APT Mean-Variance Markowitz Full Covariance Matrix (MVM59) Optimization

ATTRIBUTION REPORT

Annualized Contributions To Total Return

Source of Return	Contribution (% Return)	Risk (% Std Dev)	Info Ratio	T-Stat
1 Risk Free	1.37			
2 Total Benchmark	7.30	16.08		
3 Currency Selection	2.29	2.38	0.93	3.37
4 Cash-Equity Policy	0.00	0.00		
5 Risk Indices	11.06	5.88	1.61	5.86
6 Industries	-0.21	2.88	0.03	0.12
7 Countries	3.70	7.26	0.51	1.85
8 World Equity	0.00	0.00		
9 Asset Selection	5.96	3.11	1.65	6.01
10 Active Equity [5+6+7+8+9]	20.52	10.78	1.71	6.21
11 Trading				
12 Transaction Cost	-4.42			
13 Total Active [3+4+10+11+12]	18.91	11.35	1.55	5.64
14 Total Managed [2+13]	26.21	21.33		

Level II: Global WLRR Attribution, APT Mean-Variance Tracking at Risk (MVTaR) Optimization

ATTRIBUTION REPORT
Annualized Contributions To Total Return

Source of Return	Contribution (% Return)	Risk (% Std Dev)	Info Ratio	T-Stat
1 Risk Free	1.37			
2 Total Benchmark	7.30	16.08		
3 Currency Selection	0.72	1.91	0.42	1.52
4 Cash-Equity Policy	0.00	0.00		
5 Risk Indices	9.52	5.12	1.70	6.17
6 Industries	-1.13	2.86	-0.33	-1.20
7 Countries	0.87	4.13	0.23	0.85
8 World Equity	0.00	0.00		
9 Asset Selection	4.16	5.46	0.72	2.63
10 Active Equity [5+6+7+8+9]	13.43	9.09	1.40	5.08
11 Trading				
12 Transaction Cost	-4.08			
13 Total Active [3+4+10+11+12]	10.43	9.47	1.09	3.98
14 Total Managed [2+13]	17.73	20.78		

Level III Test: Data Mining Corrections

Table 8: Data Mining Corrections Tests in Various Universes
MSCI or Russell Index Constituents, unless Specified
Period of Analysis: 2002 - 2014

Universe Name	F	Beta
Global_Lambda500	1.63	0.40
Russell 3000_Lambda500	2.30	0.60
China Broad_Lambda500	2.24	0.58
Non-U.S._Lambda500	1.52	0.47
Japan_Lambda500	1.73	0.44
Emerging Markets_Lambda500	1.51	0.35

Universe III:

Global Analysis is 1/2003 – 12/2015; FactSet Net Income and Sales Data and I/B/E/S coverage.

China A Analysis is 1/2009 – 12/2015; FactSet Net Income and Sales Data and I/B/E/S coverage

MSCI Global Investible Index - Summary

February 2003 - December 2015

Axioma Worldwide Statistical Risk Model

Simulation	Annualized Portfolio Return	Annualized Portfolio Standard Deviation (%)	Beta	R^2	Information Ratio	Historical Tracking Error
GLER Factors	18.38%	15.99	0.91	0.81	1.29	7.18
MQ	19.14%	12.63	0.70	0.77	1.23	7.63
CTEF	17.96%	16.64	0.92	0.76	1.08	8.25
E'	16.36%	15.06	0.87	0.82	1.07	6.80
WLRR_15 Factors	18.28%	14.43	0.78	0.72	1.06	8.33
SP	17.92%	16.51	0.91	0.74	1.04	8.49
PM71	18.40%	17.21	0.93	0.72	1.02	9.14
ALPHA	17.52%	18.17	0.98	0.72	0.90	9.67
FEP1	17.51%	19.63	1.07	0.73	0.86	10.26
FEP2	17.90%	21.31	1.17	0.74	0.85	11.16
EP	16.13%	18.62	1.01	0.73	0.76	9.74
PMTREND	14.67%	15.08	0.83	0.74	0.69	8.11
OCFROIC	13.29%	14.76	0.85	0.83	0.67	6.55
DP	14.05%	15.02	0.84	0.77	0.66	7.69
CP	14.91%	16.79	0.90	0.71	0.65	9.27
BR1	15.49%	10.50	0.54	0.65	0.58	9.60
RV2	13.54%	16.19	0.89	0.75	0.57	8.28
REP	12.31%	14.02	0.82	0.84	0.54	6.23
RV1	13.26%	15.51	0.83	0.72	0.50	8.67
RDP	11.73%	15.04	0.88	0.84	0.48	6.23
BP	14.03%	19.68	1.01	0.65	0.47	11.67
BR2	14.07%	10.86	0.56	0.66	0.46	9.37
ROE_1YR	11.78%	13.25	0.78	0.86	0.46	6.05
ROA_3YR	11.45%	15.18	0.89	0.85	0.46	6.07
ROE_3YR	11.53%	13.25	0.78	0.86	0.42	6.06

ES	11.84%	16.02	0.90	0.77	0.40	7.81
NDR	11.57%	17.06	0.96	0.79	0.39	7.87
ROA_1YR	11.13%	14.91	0.87	0.84	0.39	6.23
ROE_5YR	11.28%	13.23	0.78	0.86	0.39	6.04
ROA_5YR	10.71%	14.77	0.86	0.84	0.31	6.38
ROIC	10.80%	14.21	0.82	0.83	0.31	6.47
RBP	11.01%	17.35	0.96	0.76	0.30	8.56
NCSR	10.99%	13.48	0.77	0.81	0.29	6.94
RCP	10.97%	15.98	0.87	0.74	0.27	8.44
CSR	10.60%	14.16	0.81	0.81	0.27	6.79
DR	10.27%	18.79	1.06	0.79	0.24	8.75
PM1	10.45%	14.69	0.81	0.75	0.21	7.88
RSP	9.74%	19.31	1.04	0.71	0.15	10.40
DI	9.45%	17.72	0.94	0.70	0.11	9.74
STD	10.79%	8.80	0.41	0.53	0.09	11.09
CSI	8.67%	17.54	1.01	0.82	0.07	7.53
Benchmark	8.17%	15.72%				

Where

EP = earnings per share/price per share;

BP = book value per share/price per share;

CP = cash flow per share/price per share;

SP = sales per share/price per share;

DP = dividends per share/price per share;

PMTrend = price momentum with market efect removed ;

PM71 = price momentum as $Price_{t-1}/Price_{t-7}$;

FEP1 = one-year-ahead forecast earnings per share/price per share;

FEP2 = two-year-ahead forecast earnings per share/price per share;

RV1 = one-year-ahead forecast earnings per share monthly revision/price per share;

RV2 = two-year-ahead forecast earnings per share monthly revision/price per share;

BR1 = one-year-ahead forecast earnings per share monthly breadth;

BR2 = two-year-ahead forecast earnings per share monthly breadth;

ROE_1Yr = one-year return on equity;

ROE_3Yr = three-year return on equity;

ROE_5Yr = five-year return on equity;

ROA_1Yr = one-year return on total assets;

ROA_3Yr = three-year return on total assets;

ROA_5Yr = five-year return on total assets;

CTEF = equally-weighted FEP1, FEP2, BR1, BR2, RV1, and RV2;

MQ = proprietary model;

E' = proprietary forecasted earnings acceleration;

REP = EP / average 60 months previous EP;

RBP = BP / average 60 months previous BP;

RCP = CP / average 60 months previous CP;

RSP = SP / average 60 months previous SP;

RDP = DP / average 60 months previous DP;

ALPHA=MCM proprietary price momentum;

WLRR_15Factors = expanded GLER model with STD, MCMALPHA, PMTrend, ROIC;

ROIC = return on invested capital;

CSR = common stock repurchased;

CSI= common stock issued;

NCSR = net common stock repurchased;

DR = debt repurchased;

DI = debt issued;

NDR = net debt repurchased.

China A Shares Index - Summary

January 2009 - December 2015

Axioma Worldwide Statistical Risk Model

Simulation	Annualized Portfolio Return	Annualized Standard Deviation (%)	Beta	R^2	Information Ratio	Historical Tracking Error
E'	26.99%	27.24%	0.93	0.92	1.39	7.65
CTEF	27.53%	29.27%	0.98	0.89	1.24	8.81
GLER	29.08%	28.70%	0.93	0.83	1.09	10.14
FEP2	25.20%	33.56%	1.10	0.85	0.81	10.51
WLRR_15VAR	24.58%	27.85%	0.91	0.85	0.75	10.27
RDP	25.11%	29.97%	0.97	0.82	0.73	10.77
FEP1	24.16%	32.99%	1.08	0.85	0.71	10.77
RSP	23.65%	32.09%	1.05	0.85	0.66	11.14
CP	22.29%	31.09%	1.03	0.87	0.63	10.52
DP	22.77%	27.35%	0.90	0.86	0.61	9.78
EP	23.90%	32.78%	1.05	0.82	0.60	11.82
RV2	21.48%	25.87%	0.87	0.89	0.60	9.17
RCP	22.05%	30.07%	0.98	0.84	0.55	11.64
RV1	20.19%	26.52%	0.89	0.90	0.50	8.89
STDEV	23.49%	22.39%	0.66	0.68	0.42	16.03
RDR	19.18%	33.50%	1.12	0.88	0.40	11.61
RDI	18.73%	33.51%	1.11	0.87	0.34	11.58
OCFROIC	18.89%	25.82%	0.86	0.87	0.34	10.28
MQ	20.80%	22.26%	0.71	0.80	0.33	13.16
SP	18.46%	32.87%	1.09	0.87	0.31	11.19
BP	19.42%	32.27%	1.04	0.82	0.31	12.72
REP	19.90%	29.53%	0.95	0.82	0.29	10.38
BR1	22.29%	23.92%	0.68	0.64	0.28	16.88
PM1	20.46%	28.48%	0.88	0.75	0.26	13.55
RBP	20.11%	29.17%	0.92	0.78	0.25	11.48
RCSR	22.29%	23.46%	0.61	0.53	0.24	19.63
RNCSR	22.08%	22.70%	0.60	0.56	0.23	18.96
RCSI	22.22%	21.79%	0.57	0.54	0.22	19.20

BR2	20.62%	23.59%	0.68	0.65	0.19	16.51
ES	16.56%	31.21%	1.04	0.88	0.18	10.20
ROA_5YR	19.99%	26.11%	0.75	0.65	0.16	16.57
RNDR	16.41%	31.19%	1.04	0.87	0.15	10.42
ROA_3YR	19.41%	24.82%	0.72	0.67	0.12	15.74
ROE_5YR	16.32%	26.43%	0.84	0.80	0.00	12.10
ROE_1YR	15.72%	26.80%	0.84	0.78	-0.01	12.93
ROA_1YR	16.58%	25.18%	0.73	0.67	-0.03	16.02
ROE_3YR	16.04%	25.76%	0.82	0.80	-0.03	12.06
PMTREND	14.58%	27.40%	0.83	0.72	-0.06	15.26
ROIC	14.59%	26.32%	0.79	0.71	-0.11	14.97
PM71	10.86%	27.01%	0.76	0.63	-0.20	18.13
ALPHA	6.96%	27.44%	0.72	0.54	-0.38	20.38
Benchmark	12.80%	28.10%				
Where	FEP1 = one-year-ahead forecast earnings per share/price per share;					
	FEP2 = two-year-ahead forecast earnings per share/price per share;					
	RV1 = one-year-ahead forecast earnings per share monthly revision/price per share;					
	RV2 = two-year-ahead forecast earnings per share monthly revision/price per share;					
	BR1 = one-year-ahead forecast earnings per share monthly breadth;					
	BR2 = two-year-ahead forecast earnings per share monthly breadth;					
	PM71 = price momentum, $Price_{t-1}/Price_{t-7;}$					
	CTEF = equally-weighted FEP1, FEP2, BR1, BR2, RV1, and RV2;					
	MQ = proprietary model;					
	E' = proprietaty forecasted earnings acceleration;					
	REP = EP / average 60 months previous EP;					
	RBP = BP / average 60 months previous BP;					
	RCP = CP / average 60 months previous CP;					
	RSP = SP / average 60 months previous SP;					
	RDP = DP / average 60 months previous DP;					
	MCMALPHA=MCM proprietary price momentum;					
	WLRR_15Factors = expanded GLER model with STD, MCMALPHA, PMTrend, ROIC;					
	ROIC = return on invested capital;					
	CSR = common stock repurchased;					
	CSI= common stock issued;					
	NCSR = net common stock repurchased;					
	DR = debt repurchased;					

Research Conclusions:

1. Models Produce Statistically Significant Active Returns in Global, Non-US, and EM Markets using MVM59, MVTaR, and EAW Optimization Techniques!

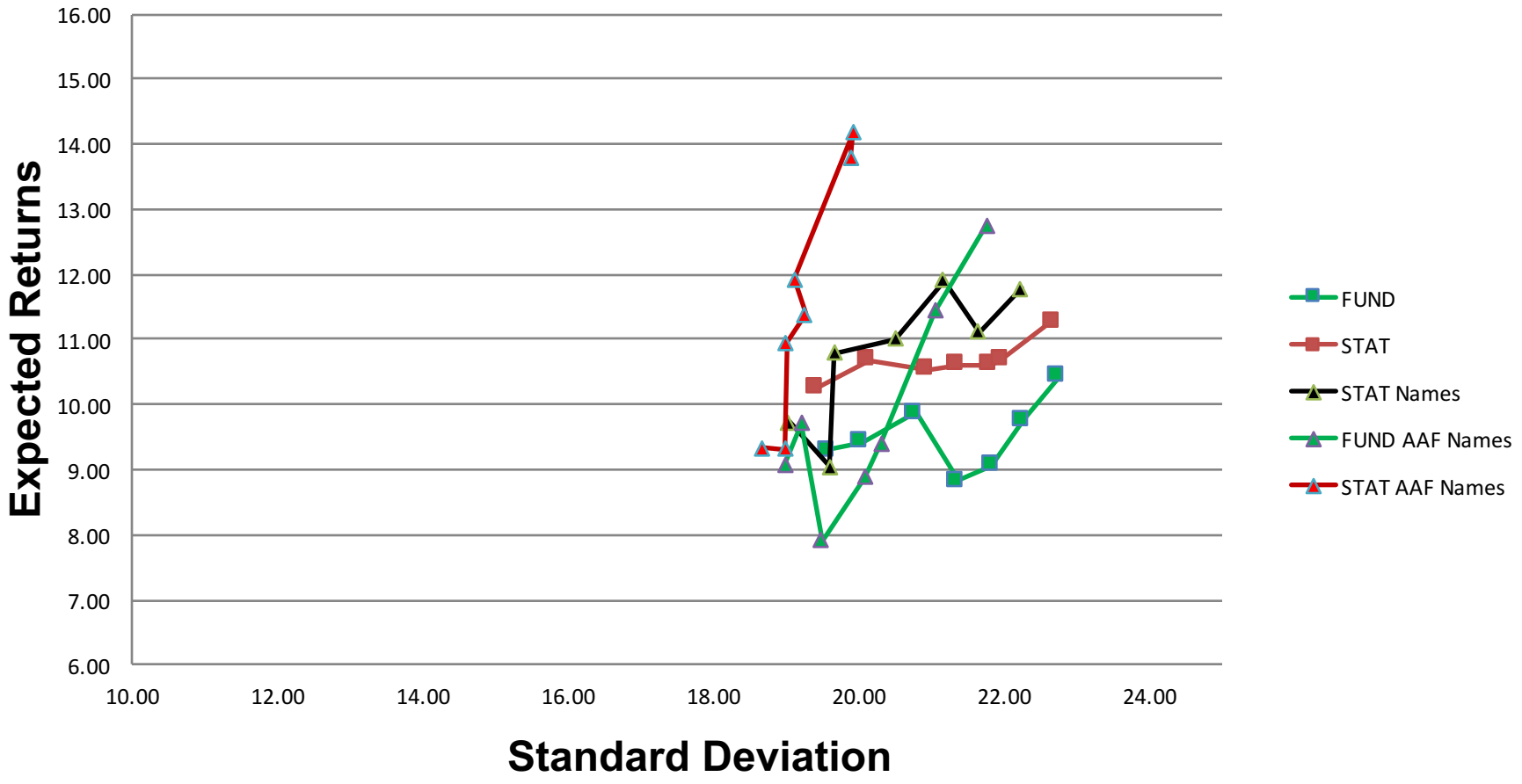
2. The Public Form of Forecasted Earnings Acceleration, E', CTEF, Produces Statistically Significant Asset Selection (Stock Selection) in Global, Non-US, R3, EM, and JP using the Three Methods of Markowitz Optimizations!

3. Models Pass Markowitz-Xu Data Mining Corrections Tests in all Markets except China A Shares, where the time frame is too Short!

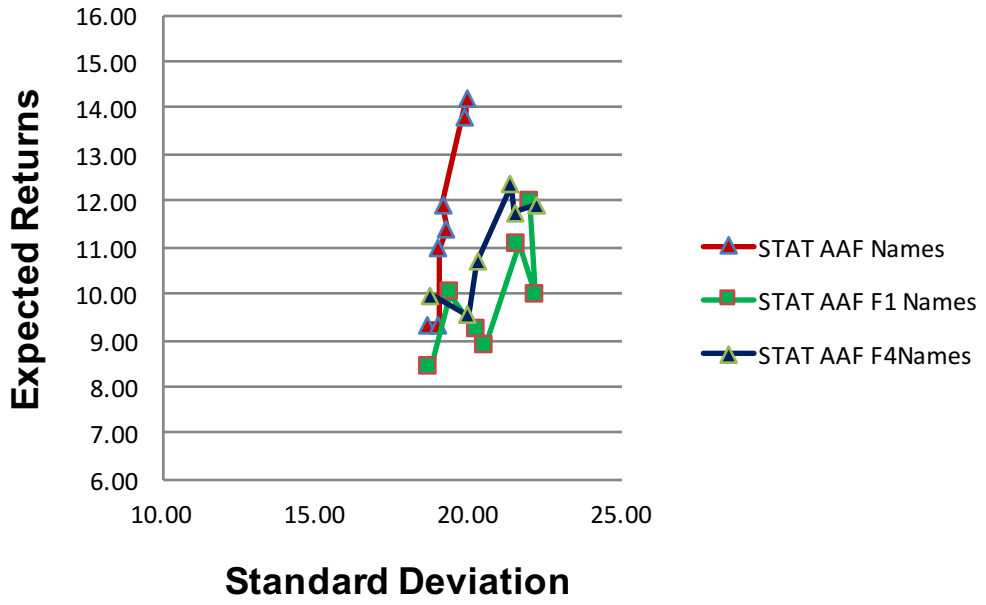
Supplemental Analysis

- 1. Guerard and Gultekin WRDS USER Model Update, 1999 – 9/2014;
- 2. Guerard, WLRR and Tukey 99 Robust Regression Updates.
- 3. Benjamini, Hochberg, Yekutieli (BHY) Data Mining Test

Guerard and Gultekin: WRDS USER Model Updates with Axioma Statistical and Fundamental Risk Models, 1999- 9/2014



Guerard and Gultekin: WRDS USER Model Updates with Axioma Statistical Risk Models with 1, 4, and 15 Factors



Factor Attribution: Factor Contributions

Portfolio: WLRR
Benchmark: MSCI_ACWI
Period: 1997-01-31 to 2015-06-30 (Monthly)
Risk Model: WW21AxiomaMH
Base Currency: USD
Return Scaling: Annualized (Geometric)
Risk Type: Realized Risk
Long/Short: Long Only

Source of Return	Contribution	Avg Exposure	Hit Rate	Risk	IR	T-Stat
Portfolio	**21.85%**			**16.45%**		
Benchmark	**6.46%**			**16.07%**		
Active	**15.39%**	**0.00%**		**10.98%**	**1.40**	**6.01**
Specific Return	**8.51%**	**0.00%**		**6.50%**	**1.31**	**5.61**
Factor Contribution	**6.88%**	**0.00%**		**12.92%**	**0.53**	**2.28**
Style	**2.20%**	**-0.0123**		**8.63%**	**0.25**	**1.09**
Exchange Rate Sensitivity	-0.06%	0.0685	47.51%	0.23%	-0.28	-1.18
Growth	0.12%	0.0900	57.47%	0.24%	0.48	2.07
Leverage	0.02%	0.0276	47.06%	0.25%	0.07	0.30
Liquidity	-1.17%	-0.3814	38.91%	0.94%	-1.24	-5.34
Medium-Term Momentum	1.73%	0.2523	61.99%	1.65%	1.05	4.50
Short-Term Momentum	-1.23%	0.0804	39.82%	1.61%	-0.76	-3.28
Size	-1.58%	-1.1142	52.04%	7.29%	-0.22	-0.93
Value	4.15%	0.9910	66.06%	2.50%	1.66	7.13
Volatility	0.23%	-0.0267	47.96%	3.43%	0.07	0.29
Country	**2.79%**	**-0.17%**		**6.43%**	**0.43**	**1.86**
Industry	**0.15%**	**-0.17%**		**3.56%**	**0.04**	**0.18**
Currency	**0.32%**	**0.03%**		**2.01%**	**0.16**	**0.68**
Local	**1.42%**	**3.25%**		**2.25%**	**0.63**	**2.69**
Market	**0.01%**	**-0.17%**		**0.06%**	**0.18**	**0.79**
Sectors	**0.15%**	**-0.17%**		**3.56%**	**0.04**	**0.18**

Factor Attribution: Factor Contributions

Portfolio: Tukey99

Benchmark: MSCI_ACWI

Period: 1997-01-31 to 2015-06-30 (Monthly)

Risk Model: WW21AxiomaMH

Base Currency: USD

Return Scaling: Annualized (Geometric)

Risk Type: Realized Risk

Long/Short: Long Only

Source of Return	Contribution	Avg Exposure	Hit Rate	Risk	IR	T-Stat
Portfolio	**23.25%**			**16.08%**		
Benchmark	**6.46%**			**16.07%**		
Active	**16.79%**	**0.00%**		**11.10%**	**1.51**	**6.49**
Specific Return	**10.24%**	**0.00%**		**6.98%**	**1.47**	**6.30**
Factor Contribution	**6.55%**	**0.00%**		**12.46%**	**0.53**	**2.25**
Style	**2.46%**	**0.0400**		**8.43%**	**0.29**	**1.25**
Exchange Rate Sensitivity	-0.04%	0.0450	47.96%	0.19%	-0.19	-0.83
Growth	0.21%	0.1232	62.90%	0.24%	0.85	3.63
Leverage	0.06%	0.0442	48.87%	0.26%	0.24	1.04
Liquidity	-1.14%	-0.3937	39.37%	0.95%	-1.20	-5.13
Medium-Term Momentum	1.56%	0.2421	61.99%	1.67%	0.93	3.99
Short-Term Momentum	-1.20%	0.0786	39.82%	1.69%	-0.71	-3.03
Size	-1.44%	-1.1034	52.04%	7.19%	-0.20	-0.86
Value	4.26%	1.0235	66.06%	2.58%	1.65	7.07
Volatility	0.19%	-0.0196	47.51%	3.29%	0.06	0.25
Country	**2.47%**	**-0.11%**		**6.44%**	**0.38**	**1.64**
Industry	**-0.79%**	**-0.11%**		**3.54%**	**-0.22**	**-0.96**
Currency	**1.10%**	**0.03%**		**2.04%**	**0.54**	**2.31**
Local	**1.31%**	**3.53%**		**2.16%**	**0.61**	**2.61**
Market	**-0.01%**	**-0.11%**		**0.08%**	**-0.08**	**-0.34**
Sectors	**-0.79%**	**-0.11%**		**3.54%**	**-0.22**	**-0.96**

Benjamini and Hochberg (1995) and Benjamini and Yekutieli, (2001) Tests, Referred to as BHY in Campbell and Liu (2014a).

			M	24	Month	141	C(M)	3.776	
C(M)			T=	141	Information Ratio	t-statisitcs	p-value	adjusted P	adjusted t
1.000	1	MV_NORCESL500USER90			1.116	3.827	0.000	0.014	2.527
1.500	2	MV_NORCESL200USER90			0.956	3.277	0.001	0.040	2.104
1.833	3	MVDMC_USER-200			0.807	2.767	0.004	0.113	1.607
2.083	4	MVDMC_CTEF-200			0.776	2.659	0.005	0.114	1.606
2.283	5	MVDMC_EWC-200			0.730	2.501	0.008	0.137	1.506
2.450	6	MVDMC_BR1-200			0.636	2.180	0.017	0.251	1.160
2.593	7	MVDMC_RV2-200			0.574	1.966	0.027	0.315	1.012
2.718	8	MVTAR_ES-200			0.569	1.951	0.028	0.315	1.012
2.829	9	MVDMC_RV1-200			0.516	1.768	0.041	0.413	0.824
2.929	10	MVDMC_CP-200			0.501	1.717	0.046	0.413	0.824
3.020	11	MVDMC_EP-200			0.359	1.232	0.111	0.790	0.267
3.103	12	MVDMC_RDP-200			0.354	1.214	0.115	0.790	0.267
3.180	13	MVDMC_SP-200			0.340	1.165	0.124	0.790	0.267
3.252	14	MVDMC_BR2-200			0.338	1.158	0.126	0.790	0.267
3.318	15	MVDMC_DP-200			0.300	1.027	0.154	0.790	0.267
3.381	16	MVDMC_FEP1-200			0.299	1.025	0.155	0.790	0.267
3.440	17	MVDMC_FEP2-200			0.213	0.731	0.234	0.790	0.267
3.495	18	MVDMC_BP-200			0.160	0.549	0.292	0.790	0.267
3.548	19	MVDMC_PM71-200			0.118	0.403	0.344	0.790	0.267
3.598	20	MVTAR_FGR1-200			-0.034	-0.116	0.546	0.790	0.267
3.645	21	MVDMC_PM-200			-0.043	-0.148	0.559	0.790	0.267
3.691	22	EAWTAR_FGR2-200			-0.171	-0.588	0.721	0.790	0.267
3.734	23	EAWTAR_FGR1-200			-0.188	-0.645	0.739	0.790	0.267
3.776	24	MVTAR_FGR2-200			-0.237	-0.813	0.790	0.790	0.267

Guerard,Markowitz, and Xu, "The Role of Effective Corporate Decisions in the Creation of Efficient Portfolios",
IBM Journal of Research and Development, 58, (July, August 2014), 6.1 -6.11.

Disclosure

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