Cowell Fund

02/17/2024

Timeline

Week 6: Today’s Meeting

Week 7: 1-2 meetings with PM, 1 group meeting

Week 8: 1-2 meetings with PM, 1 group meeting

Week 9: Final group meeting

To do

Finish model development

Complete backtesting

Presentation for final meeting

Important Historical Papers

Portfolio Selection (Markovitz, 1952)

- There exists an optimal portfolio that minimizes risk → efficient frontier (see notes)

Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk (Sharpe, 1964)

- One efficient portfolio, beta, assumptions: risk-aversion, symmetric information

Efficient Capital Markets: a Review of Theory and Empirical Work (Fama, 1970)

- Efficient Market Hypothesis: weak, semi-strong, strong (see notes)

The Pricing of Options and Corporate Liabilities (Black & Scholes, 1973)

Does the Stock Market Overreact? (Bondt & Thaler, 1985)

- EMH does not hold; historical price info is not correctly priced by market → behavioral finance

What Happened To The Quants In August 2007?

Amir E. Khandani and Andrew W. Lo

Abstract

During the week of August 6, 2007, a number of high-profile and highly successful quantitative long/short equity hedge funds experienced unprecedented losses. Based on empirical results from TASS hedge-fund data as well as the simulated performance of a specific long/short equity strategy, we hypothesize that the losses were initiated by the rapid unwinding of one or more sizable quantitative equity market-neutral portfolios. Given the speed and price impact with which this occurred, it was likely the result of a sudden liquidation by a multi-strategy fund or proprietary-trading desk, possibly due to margin calls or a risk reduction. These initial losses then put pressure on a broader set of long/short and long-only equity portfolios, causing further losses on August 9th by triggering stop-loss and de-leveraging policies. A significant rebound of these strategies occurred on August 10th, which is also consistent with the sudden liquidation hypothesis. This hypothesis suggests that the quantitative nature of the losing strategies was incidental, and the main driver of the losses in August 2007 was the firesale liquidation of similar portfolios that happened to be quantitatively constructed. The fact that the source of dislocation in long/short equity portfolios seems to lie elsewhere—apparently in a completely unrelated set of markets and instruments—suggests that systemic risk in the hedge-fund industry may have increased in recent years.

Background

U.S. subprime mortgage market → Bear Stearns, sale of Sowood Capital Management

August 6th: unprecedented hedge fund losses in exchange-traded equities (long-short equity market neutral-strategies a.k.a. stat arb with little beta exposure

August 7th/8th: major losses

August 9th: S&P 500 loses 3%, market-neutral?

August 10th: rebound but funds cut risk exposures, so they missed reversals

Aftermath: 5-30% losses

Hypothesis

1. Losses initiated by rapid unwinding of one or more quantitative equity market-neutral portfolios, likely the sudden liquidation of a multi-strategy or proprietary-trading desk
2. The August 7-8 unwind caused equity funds to cut risk exposure (de-leverage) on August 8th and 9th
3. Reversal occurred on the 10th
4. Price-impact pattern suggests losses were short-term side-effects of a sudden/forced liquidation, not a fundamental breakdown of underlying economic drivers
5. Systemic risk has increased in recent years: increase in number of funds and AUM in TASS database, increase in absolute corrections in CS/Tremont indexes
6. Factors contributing to the magnitude of losses: growth in long/short equity assets and 130/30 funds (more recent), systematic decline in profitability, increased leverage, historical liquidity, crowded long/short equity category, unknown size and timing of new subprime mortgage problems

Terminology

Statistical arbitrage

- Highly technical short-term mean-reversion strategies involving large numbers of securities (hundreds to thousands, depending on the amount of risk capital), very short holding periods (measured in days to seconds), and substantial computational, trading, and IT infrastructure

Quantitative equity market-neutral

- Broader types of quantitative models, some with lower turnover, fewer securities, and inputs other than past prices such as accounting variables, earnings forecasts, and economic indicators

Long-short equity

- Equity portfolios that engage in shortselling, that may or may not be market-neutral (many long/short equity funds are long-biased), that may or may not be quantitative (fundamental stock-pickers sometimes engage in short positions to hedge their market exposure as well as to bet on poor-performing stocks), and where technology need not play an important role

Fourth category: 130/30 or active extension strategies

- Natural extension of a long-only fund where the long-only constraint is relaxed to a limited extent

Method

$$\omega_{it} = -\frac{1}{N}(R_{it-k} - R_{mt-k}) \quad , \quad R_{mt-k} \equiv \frac{1}{N}\sum_{i=1}^{N} R_{it-k}$$

Application of a Lehmann and Lo (1990) contrarian strategy to simulate returns

- For a collection of N securities, we derive the portfolio weight (w_{it}) of a security i at date t for some k>0 as an equal dollar amount of long and short positions, where the long positions are made up of "losers" (underperforming stocks, relative to some market average) and the short positions are made up of "winners" (outperforming stocks, relative to the same market average)
- This is a basic mean reversion strategy, known as a "contrarian" trading strategy that benefits from market overreaction (underperformance is followed by positive returns and vice-versa for outperformance)

August 7th, 8th, and 9th in 2007

Date	Deciles by Market Capitalization										All
	Smallest	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Largest	
7/30/2007	-0.07%	0.02%	1.96%	-0.36%	0.07%	0.23%	0.26%	0.38%	0.51%	0.18%	0.44%
7/31/2007	0.19%	1.10%	0.28%	0.55%	-0.63%	0.02%	-0.80%	0.49%	-0.31%	0.06%	0.36%
8/1/2007	1.53%	0.45%	-1.39%	0.35%	0.95%	-0.88%	-0.71%	-0.63%	-2.02%	-0.22%	0.11%
8/2/2007	0.88%	-0.76%	-0.12%	-0.67%	-0.94%	-2.70%	2.16%	1.53%	-0.74%	-0.19%	-0.30%
8/3/2007	-0.95%	-0.62%	-0.78%	0.06%	0.88%	0.01%	-0.62%	-1.09%	-0.57%	-0.68%	-0.02%
8/6/2007	-0.83%	-1.77%	-0.39%	-1.03%	1.37%	-1.37%	-1.19%	-0.72%	0.27%	0.77%	0.50%
8/7/2007	**0.75%**	**0.26%**	**-1.64%**	**-2.91%**	**-1.50%**	**-0.70%**	**0.36%**	**-1.02%**	**-1.72%**	**-0.67%**	**-1.16%**
8/8/2007	**0.88%**	**-1.33%**	**-2.59%**	**-3.65%**	**-4.27%**	**-2.16%**	**-2.23%**	**-3.46%**	**-1.26%**	**-1.48%**	**-2.83%**
8/9/2007	**0.91%**	**-1.86%**	**-3.87%**	**-2.77%**	**-3.18%**	**-3.95%**	**-3.27%**	**-4.33%**	**-2.58%**	**-1.31%**	**-2.86%**
8/10/2007	**-0.33%**	**3.65%**	**6.08%**	**7.90%**	**8.77%**	**7.67%**	**7.52%**	**6.70%**	**4.68%**	**2.39%**	**5.92%**
8/13/2007	1.36%	-0.31%	-0.63%	-1.07%	-1.55%	-0.22%	-1.29%	-2.01%	-2.14%	-1.25%	-0.76%
8/14/2007	1.16%	0.91%	-0.26%	0.34%	0.56%	-0.28%	0.69%	-0.29%	0.16%	0.17%	0.08%
8/15/2007	0.88%	1.19%	-0.61%	-0.58%	-0.17%	-0.97%	-0.24%	-1.34%	-0.57%	-1.18%	-0.38%
8/16/2007	-1.26%	-0.54%	0.15%	-0.59%	-0.60%	-0.99%	-1.73%	-1.27%	0.27%	-1.83%	-0.81%
8/17/2007	3.57%	2.49%	0.10%	1.26%	1.33%	-0.52%	0.12%	-0.39%	0.31%	0.11%	0.38%
8/20/2007	3.75%	1.75%	0.35%	1.35%	0.51%	0.44%	1.22%	0.56%	0.39%	1.17%	1.14%
8/21/2007	1.24%	0.11%	0.01%	-0.45%	0.02%	-0.63%	-0.08%	-0.05%	0.19%	0.11%	0.06%
8/22/2007	-0.85%	-0.31%	-0.52%	-0.51%	-0.17%	-0.83%	-0.18%	-0.56%	0.39%	0.09%	-0.38%
8/23/2007	-0.03%	0.70%	0.70%	-0.16%	0.38%	1.04%	0.26%	-0.33%	0.32%	0.31%	0.33%
8/24/2007	0.62%	-0.28%	-0.07%	0.23%	0.92%	-0.06%	-0.07%	0.09%	-0.35%	0.61%	0.43%
8/27/2007	1.10%	0.70%	0.11%	0.20%	1.25%	-0.16%	0.39%	0.71%	0.71%	0.03%	0.75%
8/28/2007	0.41%	0.32%	0.08%	-0.61%	-0.64%	-0.50%	-0.33%	-0.44%	-0.47%	0.25%	-0.76%
8/29/2007	1.45%	0.08%	1.27%	2.08%	1.94%	-0.53%	1.42%	1.60%	0.91%	0.98%	1.76%
8/30/2007	1.07%	0.04%	0.62%	0.40%	0.89%	0.10%	-0.03%	-0.04%	0.12%	-0.05%	0.50%
8/31/2007	1.69%	0.97%	0.95%	-0.55%	0.05%	0.52%	-0.08%	-0.67%	0.01%	0.14%	0.36%

Table 3: Daily returns of Lo and MacKinlay's (1990) contrarian trading strategy applied to all U.S. common stocks (CRSP share codes 10 and 11) with share prices above $5 and less than $2,000, and market-capitalization deciles, from Monday July 30, 2007 to Friday August 31, 2007.

August 1998

Long Term Capital Management (LTCM)

Russia defaulted on GKO government bonds → global flight to quality that widened credit spreads

This generated extreme losses for LTCM and other hedge funds and proprietary trading desks engaged in fixed-income arbitrage strategies

Widening credit spreads that generated margin calls is identical to subprime mortgage problems that affected Bear Stearns in 2007

However, we see that turmoil in fixed-income markets had little effect on long/short equity strategies

Daily returns

Table 2 shows historical returns for the model

We see that smaller market cap stocks have larger exploitable inefficiencies → greater return

However, this model ignores market frictions such as transactions costs, price impact, shortsales constraint, and other institutional limitations

Why quantitative strategies?

- Short holding periods, the rapid-fire implementation of trading signals, and the diversification of profitability across a large number of instruments

Year	Market Capitalization Deciles										All
	Smallest	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Largest	
	Average Daily Returns										
1995	3.57%	2.75%	1.94%	1.62%	1.07%	0.61%	0.21%	-0.01%	-0.02%	0.04%	1.38%
1996	3.58%	2.47%	1.82%	1.34%	0.84%	0.52%	0.19%	-0.11%	-0.04%	0.02%	1.17%
1997	2.83%	1.94%	1.34%	1.02%	0.62%	0.28%	0.04%	-0.12%	0.06%	0.14%	0.88%
1998	2.38%	1.45%	1.11%	0.62%	0.29%	0.03%	-0.04%	-0.12%	0.03%	0.10%	0.57%
1999	2.56%	1.41%	0.82%	0.38%	-0.01%	-0.11%	-0.21%	-0.35%	-0.01%	0.06%	0.44%
2000	2.58%	1.59%	0.92%	0.14%	0.03%	-0.02%	-0.14%	0.16%	0.00%	0.03%	0.44%
2001	2.15%	1.25%	0.57%	0.24%	-0.01%	0.06%	0.13%	-0.10%	-0.11%	-0.11%	0.31%
2002	1.67%	0.85%	0.53%	0.29%	0.28%	0.26%	0.28%	0.20%	0.11%	0.09%	0.45%
2003	1.00%	0.26%	-0.07%	0.04%	0.11%	0.20%	0.18%	0.15%	0.04%	0.05%	0.21%
2004	1.17%	0.48%	0.31%	0.38%	0.25%	0.29%	0.22%	0.15%	0.05%	-0.01%	0.37%
2005	1.05%	0.39%	0.13%	0.11%	0.09%	0.11%	0.05%	0.08%	0.01%	0.02%	0.26%
2006	0.86%	0.26%	0.11%	0.06%	0.05%	-0.02%	-0.02%	0.05%	0.06%	0.00%	0.15%
2007	0.57%	0.09%	0.08%	0.18%	0.16%	-0.08%	0.04%	-0.04%	0.00%	-0.04%	0.13%
	Standard Deviation of Daily Returns										
1995	0.92%	0.88%	0.81%	0.82%	0.78%	0.77%	0.73%	0.67%	0.63%	0.65%	0.40%
1996	1.07%	1.00%	0.79%	0.81%	0.88%	0.84%	0.90%	0.90%	0.83%	0.73%	0.48%
1997	1.04%	0.98%	0.96%	0.96%	1.12%	1.00%	0.91%	0.99%	0.98%	0.77%	0.68%
1998	1.59%	1.67%	1.23%	1.22%	1.57%	1.25%	1.29%	1.43%	1.08%	1.00%	0.84%
1999	1.66%	1.82%	1.44%	1.44%	1.79%	1.57%	1.71%	1.70%	1.57%	1.07%	1.02%
2000	1.57%	1.69%	2.06%	1.89%	1.76%	2.15%	2.18%	2.29%	2.44%	2.56%	1.68%
2001	1.33%	1.26%	1.46%	1.62%	1.65%	1.64%	1.83%	1.91%	2.28%	2.29%	1.43%
2002	1.17%	0.89%	1.14%	1.07%	1.25%	1.11%	1.30%	1.42%	1.50%	1.50%	0.98%
2003	1.11%	0.81%	0.95%	0.89%	0.86%	0.81%	0.77%	0.76%	0.75%	0.56%	0.54%
2004	1.35%	1.01%	0.87%	0.76%	0.76%	0.78%	0.80%	0.74%	0.69%	0.57%	0.53%
2005	1.35%	0.80%	0.89%	0.70%	0.77%	0.77%	0.65%	0.73%	0.57%	0.56%	0.46%
2006	1.07%	0.90%	0.83%	0.84%	0.70%	1.07%	0.68%	0.68%	0.64%	0.61%	0.52%
2007	0.96%	1.02%	1.00%	0.99%	1.06%	1.44%	1.00%	0.87%	0.67%	0.56%	0.72%
	Annualized Sharpe Ratio (0% Riskfree Rate)										
1995	61.27	49.20	37.79	31.26	21.49	12.68	4.62	-0.22	-0.54	0.87	53.87
1996	53.08	39.12	36.27	26.10	15.17	9.85	3.38	-1.89	-0.69	0.36	38.26
1997	43.15	31.19	22.00	16.66	8.67	4.45	0.74	-1.88	0.95	2.79	20.46
1998	23.61	13.78	14.22	8.09	2.92	0.39	-0.54	-1.32	0.43	1.58	10.62
1999	24.32	12.25	9.05	4.22	-0.11	-1.08	-1.93	-3.23	-0.09	0.82	6.81
2000	25.96	14.91	7.04	1.18	0.31	-0.18	-1.04	1.14	0.01	0.21	4.17
2001	25.56	15.68	6.15	2.30	-0.05	0.57	1.09	-0.79	-0.79	-0.73	3.46
2002	22.54	15.10	7.30	4.28	3.57	3.68	3.38	2.24	1.13	0.98	7.25
2003	14.32	5.19	-1.11	0.63	1.94	3.91	3.64	3.09	0.89	1.33	5.96
2004	13.76	7.55	5.60	7.96	5.11	5.90	4.27	3.20	1.12	-0.33	11.07
2005	12.33	7.72	2.26	2.42	1.95	2.29	1.31	1.74	0.36	0.62	8.85
2006	12.72	4.49	2.08	1.18	1.14	-0.26	-0.56	1.08	1.60	-0.03	4.47
2007	9.40	1.45	1.33	2.93	2.40	-0.84	0.69	-0.74	-0.05	-1.03	2.79

Table 2: Year-by-year average daily returns, standard deviations of daily returns, and annualized Sharpe ratios ($\sqrt{250} \times$ (average daily return/standard deviation)) of Lo and MacKinlay's (1990) contrarian trading strategy applied to all U.S. common stocks (CRSP share codes 10 and 11) with share prices above \$5 and less than \$2,000, and market-capitalization deciles, from January 3, 1995 to August 31, 2007.

Strong secular trend of declining average daily returns

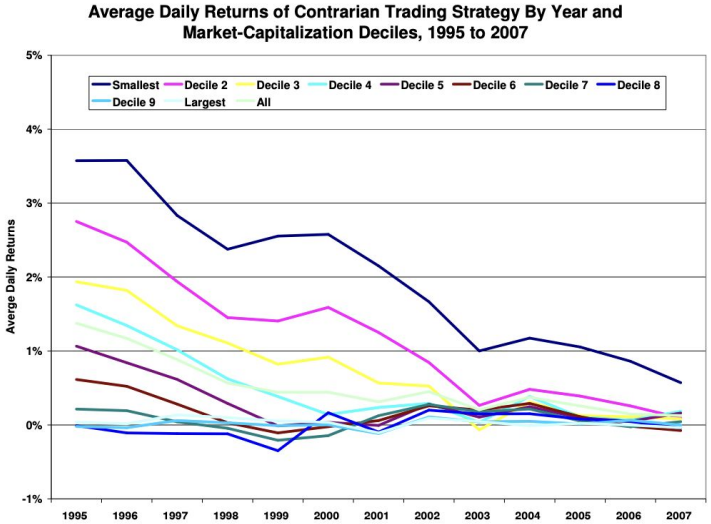

Figure 1: Year-by-year average daily returns of Lo and MacKinlay's (1990) contrarian trading strategy applied to all U.S. common stocks (CRSP share codes 10 and 11) with share prices above $5 and less than $2,000, and market-capitalization deciles, from January 3, 1995 to August 31, 2007.

1998 fixed-income losses don’t carry over to contrarian strategy

Date	Deciles by Market Capitalization										All
	Smallest	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Largest	
8/3/1998	3.35%	1.75%	1.68%	0.15%	3.25%	-0.33%	0.40%	0.06%	0.62%	0.16%	1.01%
8/4/1998	-0.29%	2.16%	1.64%	-1.35%	-1.18%	-0.51%	-0.82%	-0.07%	-1.22%	-0.16%	-0.18%
8/5/1998	2.75%	1.93%	0.68%	2.60%	2.04%	0.93%	-0.57%	0.38%	-0.59%	2.56%	1.27%
8/6/1998	2.25%	1.68%	2.01%	0.36%	0.17%	-0.33%	-1.35%	0.15%	0.85%	1.34%	0.66%
8/7/1998	3.05%	2.99%	0.79%	0.26%	-0.23%	0.03%	0.12%	0.39%	2.93%	-0.10%	0.67%
8/10/1998	3.48%	1.69%	1.53%	0.91%	0.48%	2.23%	1.03%	-0.23%	0.68%	0.27%	1.27%
8/11/1998	2.34%	1.72%	0.81%	-0.24%	0.60%	1.18%	-0.36%	0.79%	-0.29%	-0.14%	0.59%
8/12/1998	4.83%	2.88%	2.71%	1.31%	0.96%	0.58%	2.01%	0.93%	1.00%	0.68%	2.04%
8/13/1998	3.74%	2.24%	0.88%	2.72%	0.37%	0.39%	1.03%	0.48%	-0.11%	0.04%	1.33%
8/14/1998	2.25%	1.64%	3.57%	1.42%	-0.46%	-0.05%	0.66%	-0.07%	0.77%	-0.42%	0.94%
8/17/1998	**2.46%**	**2.48%**	**1.81%**	**0.11%**	**-0.32%**	**1.66%**	**-0.01%**	**-0.80%**	**0.11%**	**0.49%**	**0.96%**
8/18/1998	4.31%	1.85%	1.75%	3.86%	0.35%	-0.16%	-2.12%	0.03%	0.29%	0.12%	0.87%
8/19/1998	2.60%	2.15%	1.16%	0.45%	-0.65%	-0.36%	0.34%	-0.80%	0.06%	-0.13%	0.63%
8/20/1998	1.60%	3.04%	1.49%	0.42%	-0.64%	0.55%	0.87%	-0.61%	-0.55%	-1.47%	0.46%
8/21/1998	**2.26%**	**4.06%**	**2.18%**	**1.79%**	**1.03%**	**-0.06%**	**-0.28%**	**-0.51%**	**0.06%**	**-0.36%**	**1.04%**
8/24/1998	5.35%	1.84%	4.13%	0.63%	-0.83%	0.13%	-1.57%	-1.02%	-0.68%	0.73%	0.90%
8/25/1998	2.05%	2.19%	1.76%	0.85%	-0.45%	-0.34%	0.91%	-1.46%	-0.48%	-0.56%	0.36%
8/26/1998	4.02%	1.39%	1.78%	0.81%	-0.31%	0.06%	-0.43%	1.03%	-0.65%	-0.26%	0.61%
8/27/1998	1.69%	1.15%	0.24%	-1.16%	-2.02%	-0.47%	-1.54%	-1.91%	-0.63%	-2.20%	-0.78%
8/28/1998	2.52%	2.29%	1.33%	1.35%	0.11%	1.12%	-1.29%	-1.32%	-1.18%	-0.36%	0.39%
8/31/1998	3.31%	1.79%	0.51%	-0.36%	-3.44%	-1.97%	-3.08%	-4.47%	-2.73%	-2.82%	-1.62%
9/1/1998	4.96%	4.42%	6.04%	4.67%	9.06%	6.68%	6.71%	6.67%	4.90%	6.10%	6.59%
9/2/1998	4.43%	2.74%	1.90%	0.82%	-1.33%	0.25%	0.86%	-0.39%	0.45%	0.33%	0.63%
9/3/1998	**3.89%**	**3.78%**	**2.08%**	**2.09%**	**0.23%**	**-0.03%**	**0.79%**	**0.15%**	**0.51%**	**0.76%**	**1.41%**
9/4/1998	5.10%	3.95%	2.09%	0.75%	-0.33%	-0.84%	-1.33%	-1.61%	-1.15%	-3.68%	0.26%
9/8/1998	3.53%	3.40%	3.82%	0.57%	0.60%	0.82%	1.35%	1.05%	0.97%	3.73%	2.08%
9/9/1998	1.99%	3.62%	1.38%	1.15%	1.12%	1.66%	1.70%	2.10%	2.32%	2.92%	2.42%
9/10/1998	4.26%	2.68%	0.08%	2.05%	0.96%	-0.27%	0.64%	-0.86%	-0.67%	-2.16%	0.29%
9/11/1998	3.34%	3.17%	2.15%	0.77%	0.20%	0.50%	-0.95%	1.28%	-0.18%	0.15%	1.24%
9/14/1998	3.53%	3.58%	1.54%	0.83%	-0.20%	-0.42%	-0.47%	-0.50%	0.02%	-0.23%	0.33%
9/15/1998	3.62%	2.36%	1.34%	0.77%	-0.17%	-0.98%	-0.52%	-1.15%	-0.95%	-0.63%	0.14%
9/16/1998	2.71%	3.33%	0.89%	1.48%	0.58%	0.83%	0.00%	0.05%	1.53%	-0.04%	1.01%
9/17/1998	3.70%	2.24%	1.54%	1.56%	-0.95%	0.23%	1.10%	-0.40%	-0.86%	0.38%	0.79%
9/18/1998	4.01%	3.94%	2.67%	1.27%	2.55%	1.20%	-1.17%	-1.41%	-0.51%	-0.45%	1.07%
9/21/1998	3.22%	1.28%	1.86%	-0.61%	-0.87%	-0.09%	-2.22%	1.08%	-0.47%	-0.32%	0.19%
9/22/1998	3.26%	2.15%	1.68%	1.76%	-0.21%	-0.16%	-0.62%	-2.06%	-1.46%	0.16%	0.42%
9/23/1998	4.24%	2.16%	0.78%	-1.66%	-0.34%	-2.33%	-3.08%	-3.27%	-0.60%	-0.42%	-0.71%
9/24/1998	**2.54%**	**1.47%**	**3.13%**	**1.60%**	**0.63%**	**-0.38%**	**-0.06%**	**-0.27%**	**0.59%**	**1.63%**	**1.21%**
9/25/1998	2.28%	3.27%	0.16%	0.86%	0.28%	-0.90%	-0.66%	0.67%	1.16%	0.36%	0.61%
9/28/1998	4.24%	1.24%	1.81%	2.64%	0.52%	-1.30%	0.47%	-1.58%	-0.59%	0.16%	0.60%
9/29/1998	2.75%	1.48%	-0.07%	0.81%	-0.83%	-1.61%	-1.58%	-0.83%	-1.19%	-0.83%	-0.29%
9/30/1998	2.98%	0.41%	0.33%	-0.96%	0.01%	-1.00%	-1.78%	-0.41%	-0.10%	-0.74%	-0.33%

Total assets, expected returns

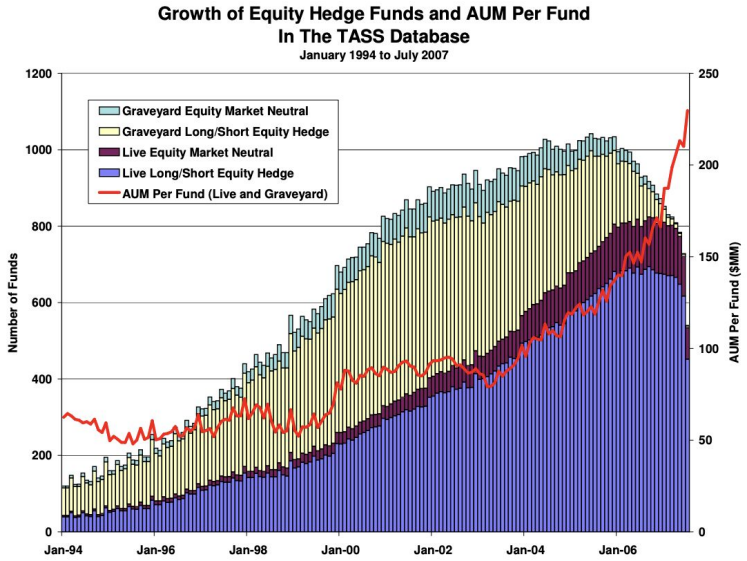

Figure 2: Number of funds in the Long/Short Equity Hedge and Equity Market Neutral categories of the TASS database, and average assets under management per fund, from January 1994 to July 2007.

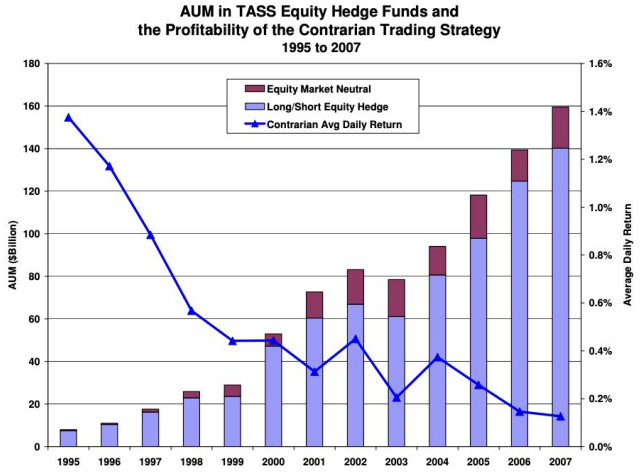

Figure 3: Beginning-of-year assets under management for funds in Long/Short Equity Hedge and Equity Market Neutral categories of the TASS database, from 1995 to 2007, and year-by-year average daily returns of Lo and MacKinlay's (1990) contrarian trading strategy applied to all U.S. common stocks (CRSP share codes 10 and 11) with share prices above $5 and less than $2,000, from January 3, 1995 to August 31, 2007.

Increasing leverage

Year	Average Daily Return	Return Multiplier	Required Leverage Ratio
1998	0.57%	1.00	2.00
1999	0.44%	1.28	2.57
2000	0.44%	1.28	2.56
2001	0.31%	1.81	3.63
2002	0.45%	1.26	2.52
2003	0.21%	2.77	5.53
2004	0.37%	1.52	3.04
2005	0.26%	2.20	4.40
2006	0.15%	3.88	7.76
2007	0.13%	4.48	8.96

Table 6: Year-by-year average daily returns of Lo and MacKinlay's (1990) contrarian trading strategy applied to all U.S. common stocks (CRSP share codes 10 and 11) with share prices above \$5 and less than \$2,000, from 1998 to 2007, and the return multipliers and leverage factors needed to yield the same average return as in 1998.

Leveraged daily returns

Date	Deciles by Market Capitalization										All
	Smallest	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Largest	
7/30/2007	-0.28%	0.08%	7.85%	-1.43%	0.29%	0.91%	1.04%	1.51%	2.05%	0.71%	1.77%
7/31/2007	0.77%	4.41%	1.12%	2.20%	-2.53%	0.09%	-3.19%	1.94%	-1.23%	0.22%	1.46%
8/1/2007	6.10%	1.78%	-5.55%	1.39%	3.79%	-3.52%	-2.83%	-2.52%	-8.06%	-0.90%	0.43%
8/2/2007	3.54%	-3.04%	-0.46%	-2.68%	-3.77%	-10.79%	8.63%	6.12%	-2.97%	-0.77%	-1.22%
8/3/2007	-3.79%	-2.49%	-3.12%	0.24%	3.52%	0.05%	-2.49%	-4.35%	-2.29%	-2.74%	-0.10%
8/6/2007	-3.33%	-7.06%	-1.57%	-4.12%	5.47%	-5.47%	-4.75%	-2.86%	1.06%	3.08%	2.01%
8/7/2007	**3.00%**	**1.03%**	**-6.55%**	**-11.65%**	**-6.01%**	**-2.79%**	**1.42%**	**-4.08%**	**-6.86%**	**-2.67%**	**-4.64%**
8/8/2007	**3.52%**	**-5.30%**	**-10.36%**	**-14.58%**	**-17.07%**	**-8.65%**	**-8.94%**	**-13.85%**	**-5.06%**	**-5.91%**	**-11.33%**
8/9/2007	**3.66%**	**-7.42%**	**-15.46%**	**-11.08%**	**-12.72%**	**-15.78%**	**-13.06%**	**-17.33%**	**-10.32%**	**-5.22%**	**-11.43%**
8/10/2007	**-1.32%**	**14.62%**	**24.32%**	**31.58%**	**35.08%**	**30.67%**	**30.07%**	**26.79%**	**18.73%**	**9.55%**	**23.67%**
8/13/2007	5.42%	-1.24%	-2.53%	-4.26%	-6.20%	-0.88%	-5.15%	-8.04%	-8.58%	-4.99%	-3.05%
8/14/2007	4.65%	3.64%	-1.02%	1.35%	2.23%	-1.12%	2.74%	-1.16%	0.66%	0.67%	0.33%
8/15/2007	3.52%	4.74%	-2.42%	-2.33%	-0.69%	-3.89%	-0.97%	-5.36%	-2.29%	-4.73%	-1.53%
8/16/2007	-5.03%	-2.16%	0.59%	-2.36%	-2.39%	-3.95%	-6.94%	-5.08%	1.08%	-7.31%	-3.24%
8/17/2007	14.30%	9.94%	0.41%	5.04%	5.32%	-2.07%	0.47%	-1.56%	1.24%	0.44%	1.53%
8/20/2007	15.02%	7.02%	1.42%	5.40%	2.03%	1.74%	4.88%	2.22%	1.57%	4.67%	4.58%
8/21/2007	4.98%	0.43%	0.02%	-1.80%	0.09%	-2.54%	-0.33%	-0.20%	0.74%	0.43%	0.24%
8/22/2007	-3.39%	-1.23%	-2.07%	-2.05%	-0.67%	-3.31%	-0.74%	-2.26%	1.57%	0.37%	-1.51%
8/23/2007	-0.14%	2.79%	2.79%	-0.64%	1.51%	4.15%	1.04%	-1.33%	1.28%	1.23%	1.31%
8/24/2007	2.47%	-1.13%	-0.26%	0.92%	3.70%	-0.23%	-0.29%	0.37%	-1.42%	2.43%	1.73%
8/27/2007	4.38%	2.80%	0.46%	0.78%	5.01%	-0.63%	1.58%	2.85%	2.84%	0.10%	2.99%
8/28/2007	1.64%	1.26%	0.34%	-2.45%	-2.56%	-1.99%	-1.33%	-1.77%	-1.88%	0.99%	-3.04%
8/29/2007	5.79%	0.31%	5.07%	8.32%	7.75%	-2.14%	5.67%	6.39%	3.63%	3.94%	7.06%
8/30/2007	4.27%	0.16%	2.46%	1.61%	3.55%	0.41%	-0.11%	-0.16%	0.47%	-0.19%	2.01%
8/31/2007	6.75%	3.86%	3.80%	-2.21%	0.21%	2.08%	-0.32%	-2.68%	0.02%	0.58%	1.46%

Table 7: Leveraged daily returns of Lo and MacKinlay's (1990) contrarian trading strategy applied to all U.S. common stocks (CRSP share codes 10 and 11) with share prices above \$5 and less than \$2,000, and market-capitalization deciles, from Monday July 30, 2007 to Friday August 31, 2007, with 8:1 leverage or a return multiplier of 4.

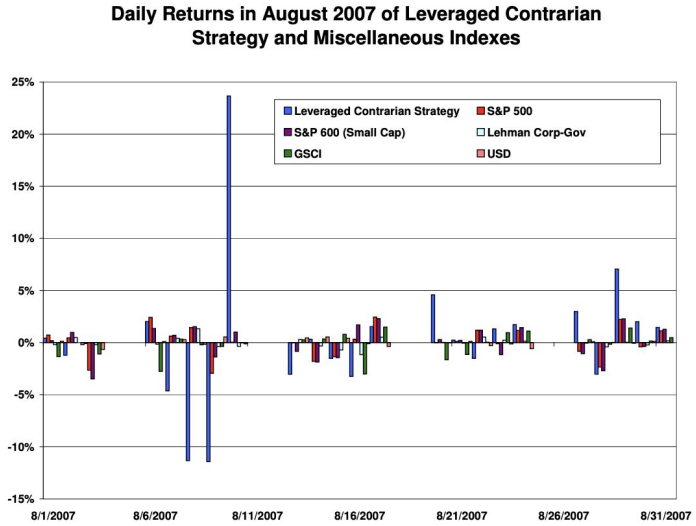

Figure 4: Leveraged daily returns of Lo and MacKinlay's (1990) contrarian trading strategy applied to all U.S. common stocks (CRSP share codes 10 and 11) with share prices above \$5 and less than \$2,000, and market-capitalization deciles, and miscellaneous indexes, for the month of August 2007, with 8:1 leverage or a return multiplier of 4.

The unwind hypothesis

The fact that the leveraged contrarian strategy lost −4.64% on Tuesday August 7th, and continued to lose another −11.33% on the 8th, suggests a sudden liquidation of one or more sizable market-neutral equity portfolios. Only a sudden liquidation would cause the strategy to lose close to −5% in the absence of any other significant market developments. And the logic behind the inference that market-neutral funds were being liquidated is the fact that both the S&P 500 and MSCI-ex-US indexes showed gains on August 7th and 8th, hence it is unlikely that sizable long-biased funds were unwound on these two days.

Consistent with statistical arbitrage, losses were most sever for intermediate-decile portfolios (deciles 3-5 and 8 in Table 7). Intermediate-decile portfolios are most attractive fro stat arb because large deciles do not exhibit sufficient profitability, and smaller deciles are to illiquid to trade in large volume.

Potential reasons for August 10 reversal

Belief that the natural mean-reverting tendencies of equities that yield positive expected returns for long/short equity strategies during “normal” times would return. However, only a partial reversal shout be expected because not everyone would reach the same conclusion.

The impact of August 7-9 drew investors that recognized the closing prices and had access to capital to buy (sell) securities at artificially deflated (inflated) prices → injection of new capital

Illiquidity

We calculate the correlation between a fund i's return and its lagged return from the previous month, indicating lower trading volumes and longer holding periods. Getmansky, Lo, and Makarov (2004) show that funds with large positive values for ρ_{1i} (autocorrelation = "self" correlation) tend to be less liquid. We see an increase in illiquidity in the Figure 5 for natural-gas futures contracts.

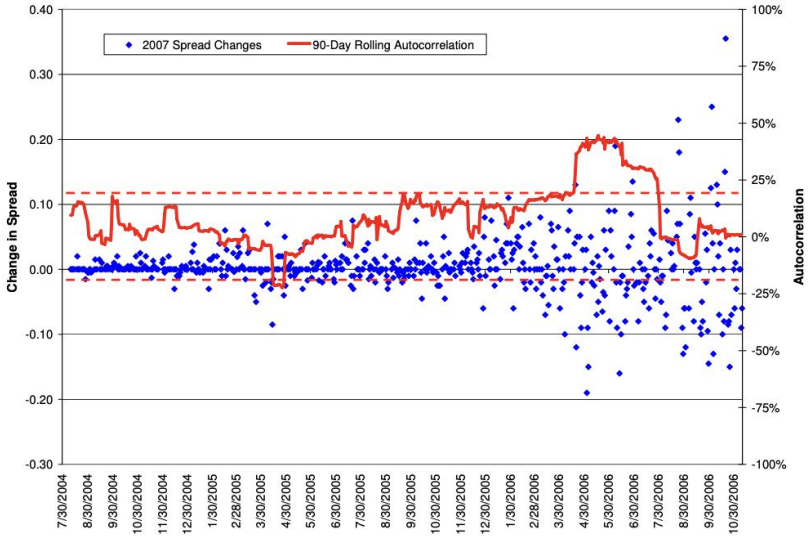

Figure 5: First-differences of March/April 2007 natural-gas futures spreads (dots), and 90-day rolling-window first-order autocorrelations $\hat{\rho}_1$ (solid line) of those first-differences, from August 9, 2004 to November 9, 2006. Dotted lines indicate the two-standard-deviation confidence band for the rolling-window autocorrelations under the null hypothesis of zero autocorrelation.

Abstract

During the week of August 6, 2007, a number of high-profile and highly successful quantitative long/short equity hedge funds experienced unprecedented losses. Based on empirical results from TASS hedge-fund data as well as the simulated performance of a specific long/short equity strategy, we hypothesize that the losses were initiated by the rapid unwinding of one or more sizable quantitative equity market-neutral portfolios. Given the speed and price impact with which this occurred, it was likely the result of a sudden liquidation by a multi-strategy fund or proprietary-trading desk, possibly due to margin calls or a risk reduction. These initial losses then put pressure on a broader set of long/short and long-only equity portfolios, causing further losses on August 9th by triggering stop-loss and de-leveraging policies. A significant rebound of these strategies occurred on August 10th, which is also consistent with the sudden liquidation hypothesis. This hypothesis suggests that the quantitative nature of the losing strategies was incidental, and the main driver of the losses in August 2007 was the firesale liquidation of similar portfolios that happened to be quantitatively constructed. The fact that the source of dislocation in long/short equity portfolios seems to lie elsewhere—apparently in a completely unrelated set of markets and instruments—suggests that systemic risk in the hedge-fund industry may have increased in recent years.

Conclusions

1. The events of August 2007 are not particularly relevant to the efficacy of quantitative investing.
2. The contrast between August 1998 and August 2007 has important ramifications for the connectedness of the global financial system.
3. The notion of "hedge-fund beta" described in Hasanhodzic and Lo (2007) is now a reality. The fact that the entire class of long/short equity strategies moved together so tightly during August 2007 implies the existence of certain common factors within that class.
4. The events of August 2007 have some useful implications for regulatory reform in the hedge-fund sector: registration of hedge funds under the Investment Advisers Act of 1940 is for investor protection and does not address systemic risk; hedge funds are becoming more like banks by imposing externalities, but they can draw liquidity at a moment's notice → introduction of a Capital Markets Safety Board?

PM Updates