

Foreword by BARRY RITHOLTZ

THE BESTSELLING CLASSIC

TREND FOLLOWING

REVISED & EXTENDED FIFTH EDITION

How to Make a Fortune in **Bull, Bear, and**
Black Swan Markets

MICHAEL W. COVEL

Trend Following

Fifth Edition

How to Make a Fortune in Bull, Bear,
and Black Swan Markets

Michael W. Covel

Here is Mulvaney's philosophy in performance data format:

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
2016	5.94	10.75	-13.52	-2.84	-8.35	27.33	-1.01	-13.30	18.22				16.72
2015	6.93	-0.50	3.84	-7.98	4.13	-6.07	4.77	-9.23	6.15	-11.05	13.52	-2.10	-0.77
2014	-1.46	1.36	4.65	2.67	-4.47	2.37	2.25	9.33	17.69	-1.67	13.05	9.05	67.36
2013	10.46	7.39	9.29	9.73	0.13	-3.15	-4.03	-10.90	2.61	7.29	11.58	-1.24	43.12
2012	-3.75	0.78	5.21	-1.08	-0.90	-18.12	11.38	-6.26	-8.58	-15.07	-0.97	0.76	-33.72
2011	2.07	9.78	-4.62	6.07	-11.82	-7.41	11.15	1.59	-4.20	-14.14	12.05	-1.64	-5.26
2010	-3.84	-7.15	-5.15	2.02	-8.77	0.53	-12.03	14.59	16.46	22.29	-5.36	25.30	34.90
2009	1.60	-0.03	-3.36	-5.51	-1.30	-6.81	-0.53	10.85	1.32	-7.86	10.70	-3.19	-5.90
2008	21.65	28.86	-7.96	-8.58	5.35	8.51	-18.78	-6.73	11.58	45.49	6.97	5.30	108.87
2007	0.56	-5.18	-8.82	2.59	4.70	4.85	-16.89	-19.40	3.92	13.72	-8.59	8.47	-23.14
2006	11.09	-2.70	13.05	11.46	-4.27	-6.10	-5.20	1.95	1.00	-0.13	0.56	1.60	21.94
2005	-4.28	0.54	2.30	-9.28	-4.08	5.32	6.62	2.78	13.57	-5.64	15.27	8.35	32.34
2004	4.19	8.45	2.37	-11.50	-6.99	-0.73	-0.41	-6.21	7.76	0.76	9.63	-4.94	-0.10
2003	13.20	7.22	-12.83	1.45	7.64	-7.61	-6.33	0.07	6.66	15.32	-0.27	5.35	29.28
2002	—	—	-7.52	1.55	6.75	7.38	5.95	5.44	5.13	-7.73	-5.08	7.80	19.37
2001	-9.62	18.76	13.46	-15.25	-0.66	5.39	-1.26	—	—	—	—	—	6.69
2000	-5.02	2.52	-8.40	-0.27	6.97	1.55	-1.25	12.68	-4.36	1.96	9.05	8.90	24.51
1999					-0.29	-0.14	-2.22	2.13	-4.81	-4.80	7.01	4.84	1.09

By honest I don't mean that you only tell what's true. But you make clear the entire situation. You make clear all the information that is required for somebody else who is intelligent to make up their mind.

Richard Feynman

TABLE 2.1: Monthly Performance Data for Winton Futures Fund (%)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
2016	3.51%	1.76%	-2.92%	-1.49%	-1.64%	5.21%	0.73%	-1.72%	-0.30%	-2.64%	-1.23%	-1.06%	
2015	2.89%	-0.01%	2.04%	-3.24%	0.11%	-3.15%	3.90%	-4.27%	3.47%	-1.42%	3.44%	-1.58%	1.72%
2014	-2.04%	2.29%	-0.57%	1.81%	1.92%	0.18%	-2.09%	3.98%	-0.39%	3.55%	5.28%	0.64%	15.23%
2013	2.27%	-0.35%	2.06%	3.05%	-1.85%	-2.18%	-1.18%	-2.92%	3.09%	2.77%	2.70%	0.52%	7.98%
2012	0.66%	-0.80%	-0.66%	0.02%	0.06%	-3.39%	4.32%	-1.15%	-2.25%	-2.55%	1.18%	1.51%	-3.24%
2011	0.11%	1.62%	0.20%	3.06%	-2.22%	-2.55%	4.64%	1.55%	0.20%	-2.35%	0.94%	1.54%	6.68%
2010	-2.51%	2.29%	4.64%	1.58%	-0.85%	1.46%	-2.83%	4.92%	0.84%	2.62%	-2.23%	3.89%	14.27%
2009	0.92%	-0.32%	-1.78%	-3.08%	-2.08%	-1.31%	-1.55%	0.31%	2.73%	-1.54%	5.01%	-2.53%	-5.38%
2008	3.92%	8.21%	-0.92%	-0.97%	1.95%	5.22%	-4.66%	-3.09%	-0.38%	3.65%	4.48%	1.93%	20.25%
2007	4.03%	-6.39%	-4.13%	6.13%	5.04%	1.83%	-1.38%	-0.96%	6.83%	2.38%	2.45%	0.12%	16.13%
2006	3.93%	-2.74%	3.88%	5.68%	-3.21%	-1.34%	-0.62%	4.58%	-1.43%	1.43%	3.10%	2.03%	15.83%
2005	-5.16%	5.72%	4.70%	-4.03%	6.49%	2.85%	-2.15%	7.66%	-6.50%	-3.02%	7.05%	-4.59%	7.65%
2004	2.65%	11.93%	-0.50%	-8.27%	-0.16%	-3.12%	0.88%	2.64%	4.78%	3.37%	6.38%	-0.58%	20.31%
2003	5.30%	11.95%	-11.14%	2.07%	10.18%	-5.85%	-1.15%	0.69%	0.71%	5.46%	-2.68%	10.00%	25.52%
2002	-10.81%	-6.14%	11.44%	-4.66%	-3.80%	7.32%	4.79%	5.48%	7.42%	-7.76%	-1.09%	13.46%	12.86%
2001	4.58%	0.57%	7.48%	-5.23%	-3.32%	-2.95%	0.72%	0.02%	4.48%	12.45%	-7.56%	-4.02%	5.56%
2000	-3.66%	1.75%	-3.13%	1.53%	-0.50%	-1.28%	-4.33%	2.82%	-7.54%	2.50%	7.10%	16.04%	9.72%
1999	-1.51%	3.55%	-4.24%	10.09%	-8.58%	5.31%	-1.93%	-3.64%	-0.16%	-6.13%	13.12%	9.20%	13.24%
1998	1.50%	3.27%	8.02%	-1.48%	8.53%	3.23%	1.35%	11.06%	4.52%	-5.65%	1.18%	9.19%	53.26%
1997										-12.97%	9.96%	8.34%	3.68%

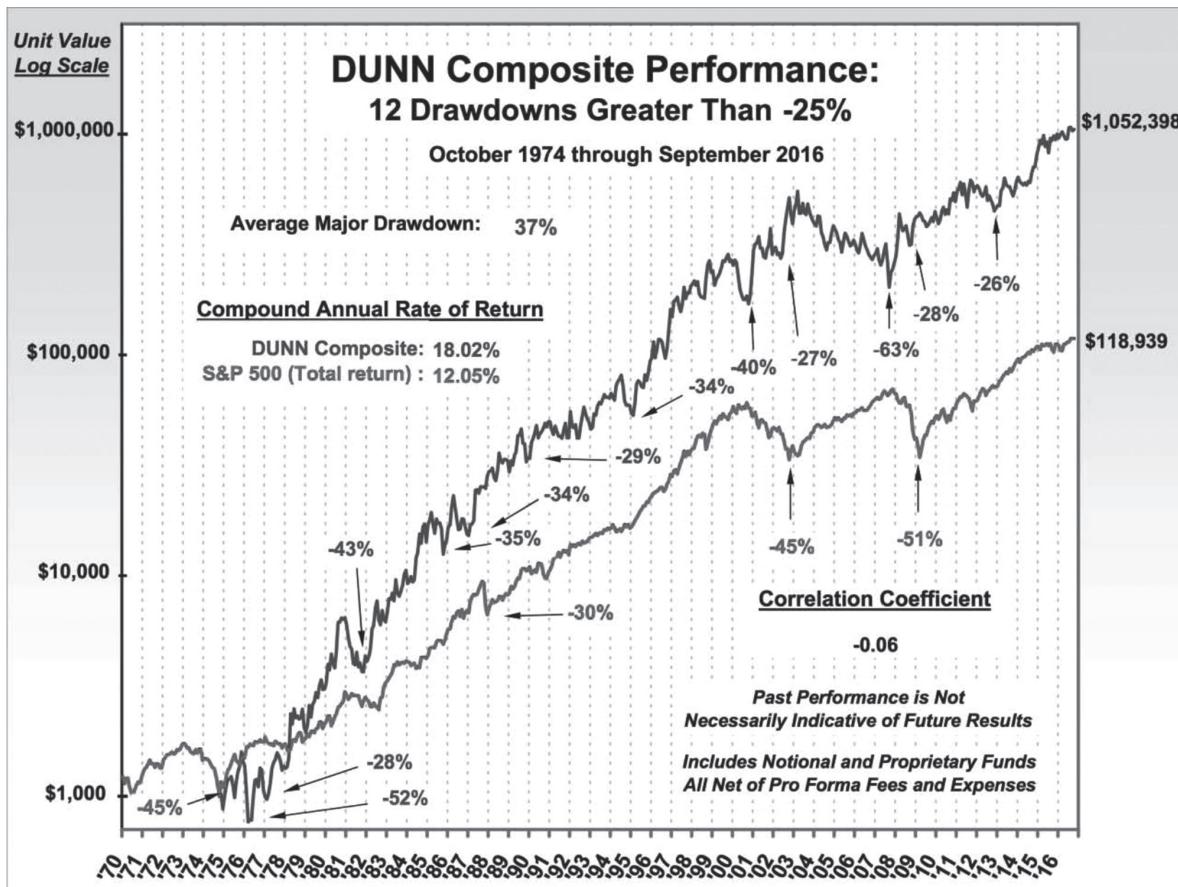


FIGURE 2.1: Dunn Capital Management: Composite Performance 1974–2016

TABLE 2.2: Monthly Performance Data for Dunn Capital Management WMA Program 1984–2016 (%)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD
2016	4.16	2.52	-4.04	-3.38	0.16	12.42	0.38	-3.54	1.46	-12.18	-3.72	2.17	-5.39
2015	8.52	-3.87	9.30	-10.78	4.65	-10.72	16.60	-2.41	4.97	-3.85	6.10	-4.24	10.92
2014	-4.35	-1.76	-1.91	2.23	-2.33	4.04	-1.12	9.83	7.04	0.22	13.43	7.22	35.65
2013	-0.23	16.79	3.22	10.59	-6.67	-1.66	-0.45	-4.81	-4.56	5.81	10.00	4.40	34.16
2012	-3.10	-4.96	-2.96	2.77	7.69	-13.23	4.53	-4.17	-4.37	-6.59	3.23	2.64	-18.62
2011	3.69	6.17	-12.06	11.78	-10.05	-12.59	19.93	10.40	-2.64	-9.00	5.26	1.25	6.36
2010	-6.61	3.97	9.83	4.22	-7.26	5.02	-4.39	16.96	-1.44	8.22	-8.73	10.95	30.75
2009	0.89	3.07	-3.05	-4.65	-1.08	-4.98	1.84	3.16	4.54	-4.14	11.00	-5.84	-0.58
2008	19.94	29.55	-10.13	-6.55	1.67	3.56	-10.18	-9.26	1.02	21.09	7.77	2.59	51.45
2007	6.21	-8.30	-3.36	8.22	11.77	7.39	-17.75	-22.63	16.90	3.00	7.78	6.55	7.60
2006	-3.63	-1.37	12.42	9.38	-7.78	-1.63	-5.69	-8.76	-5.22	5.93	4.33	7.86	3.08
2005	-4.09	-6.72	-4.04	-15.01	13.03	12.23	-1.89	-5.46	-3.51	-0.94	6.00	-3.88	-16.41
2004	-2.86	8.38	-2.90	-18.35	-6.84	-9.86	-5.16	9.29	1.58	7.93	5.32	-0.69	-16.68
2003	6.94	13.83	-22.44	1.57	9.45	-8.07	-4.75	16.70	-7.63	-4.23	-4.45	-4.47	-13.41
2002	3.03	-8.07	2.39	-5.71	5.41	24.24	14.82	10.50	9.10	-12.27	-12.70	21.34	54.06
2001	7.72	0.55	6.26	-8.96	-0.91	-8.31	0.09	6.47	1.13	20.74	-23.52	6.73	1.10
2000	6.85	-2.94	-17.34	-12.36	-7.59	-3.95	0.56	3.29	-9.70	9.12	28.04	29.39	13.08
1999	-13.18	3.91	4.22	4.09	7.63	9.61	0.52	5.77	3.60	-7.01	1.35	-5.44	13.34
1998	4.25	-5.30	3.99	-11.05	-4.76	-0.38	-1.37	27.51	16.18	3.79	-13.72	0.32	13.72
1997	17.83	-0.15	2.21	-6.47	-5.88	10.38	16.84	-10.21	6.45	-0.64	9.82	1.55	44.60
1996	15.78	-13.33	9.55	9.17	-1.18	0.60	-12.40	-5.20	12.55	20.28	26.94	-7.09	58.21
1995	0.49	13.71	24.41	3.80	-2.60	-3.59	0.63	18.46	-6.52	10.82	11.16	4.44	98.69
1994	-1.71	-5.34	14.90	6.97	5.21	3.29	-13.38	-17.67	-4.68	-1.02	0.74	-4.22	-19.33
1993	2.90	13.99	-3.28	12.37	3.76	0.58	7.41	8.42	-5.02	1.59	1.03	6.10	60.28
1992	-14.53	-0.90	4.04	-15.10	-0.36	13.04	11.43	9.18	-8.23	-5.42	-4.30	-8.15	-21.78
1991	-7.05	-4.51	10.30	-4.49	-4.99	-0.46	-2.54	9.93	9.23	-14.93	1.20	31.22	16.91
1990	23.45	5.35	6.11	6.80	-11.23	3.99	1.37	2.07	3.76	-0.40	5.44	-1.19	51.55
1989	21.10	-4.23	9.30	6.09	20.02	3.21	8.15	-13.02	-1.56	-16.65	7.34	-5.42	30.51
1988	0.73	4.34	-6.55	-2.47	3.88	-0.56	-1.83	-2.65	1.98	1.92	-0.72	-16.70	-18.72
1987	8.81	-1.75	7.18	31.63	-2.69	-4.61	5.97	-2.98	5.50	-5.59	17.76	1.96	72.15
1986	-1.50	24.55	11.93	-5.59	-5.98	-13.98	-4.20	12.45	0.64	-2.79	-6.18	-0.11	3.56
1985	6.23	10.03	-7.25	-13.09	21.66	-6.79	-8.36	-13.48	-30.68	6.69	13.61	10.02	-21.68
1984										-10.95	18.01		5.09

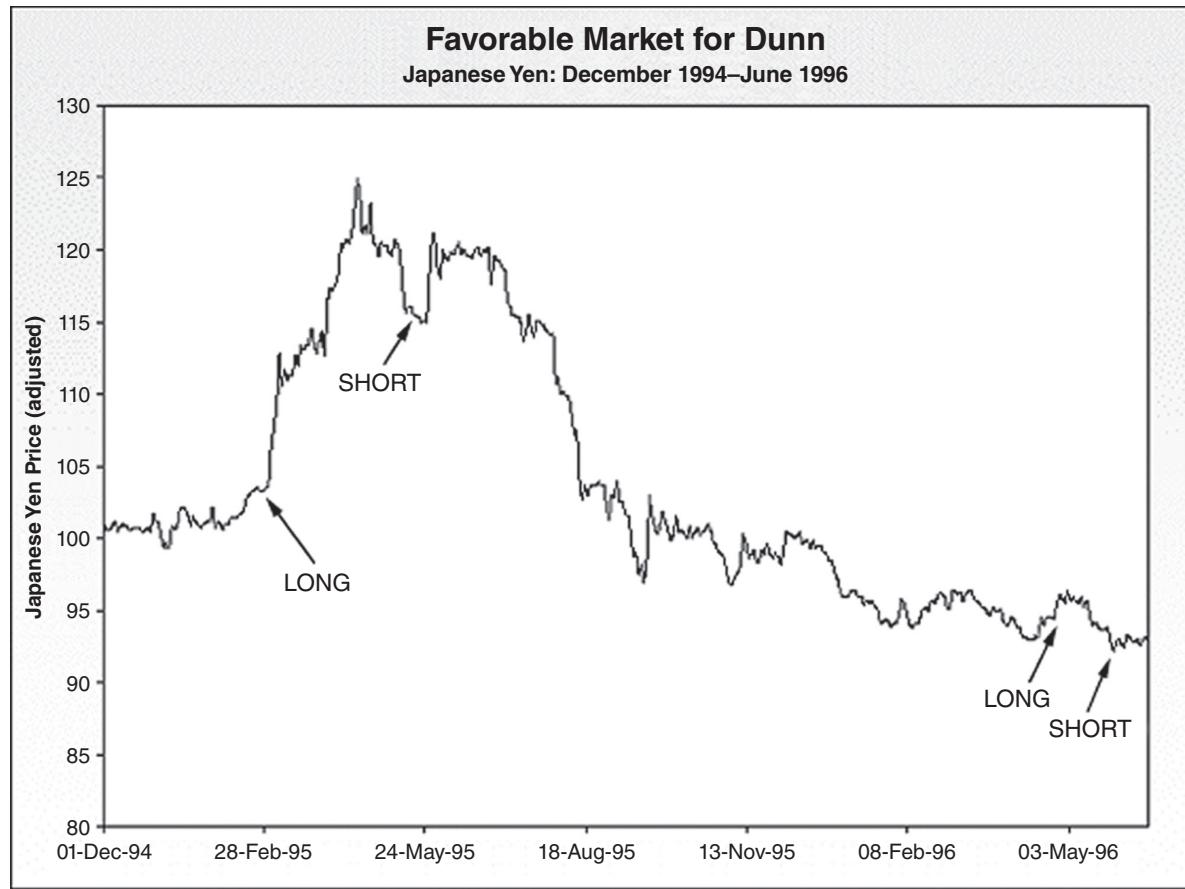


FIGURE 2.2: Dunn Capital's Japanese Yen Trade Source: Dunn Capital Management



FIGURE 2.3: Dunn Capital's British Pound Trade Source: Dunn Capital Management

I always know what's happening on the court. I see a situation occur, and I respond.

Larry Bird

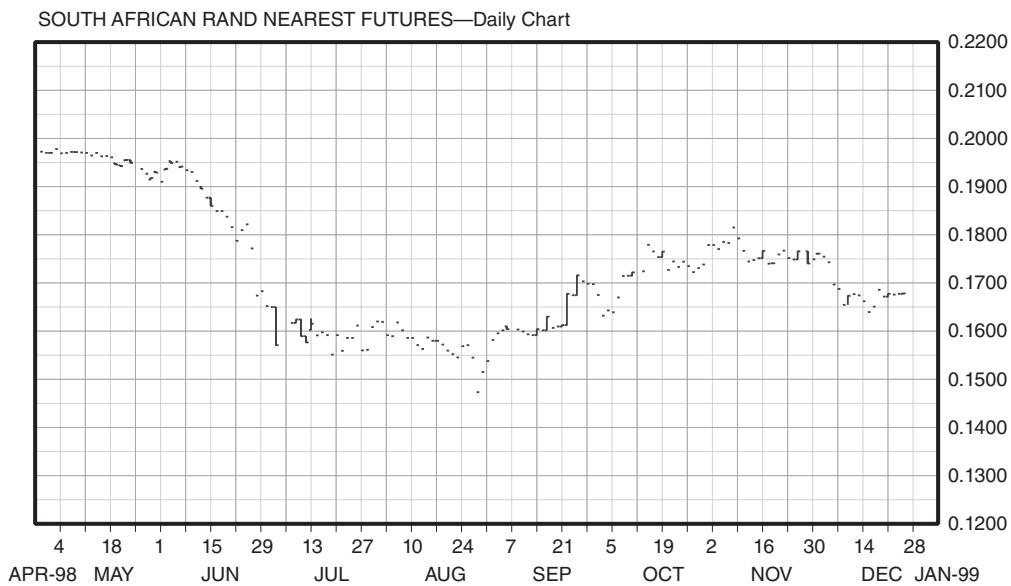


FIGURE 2.4: Henry South African Rand Trade Source: Barchart.com

JAPANESE YEN NEAREST FUTURES—Weekly Chart

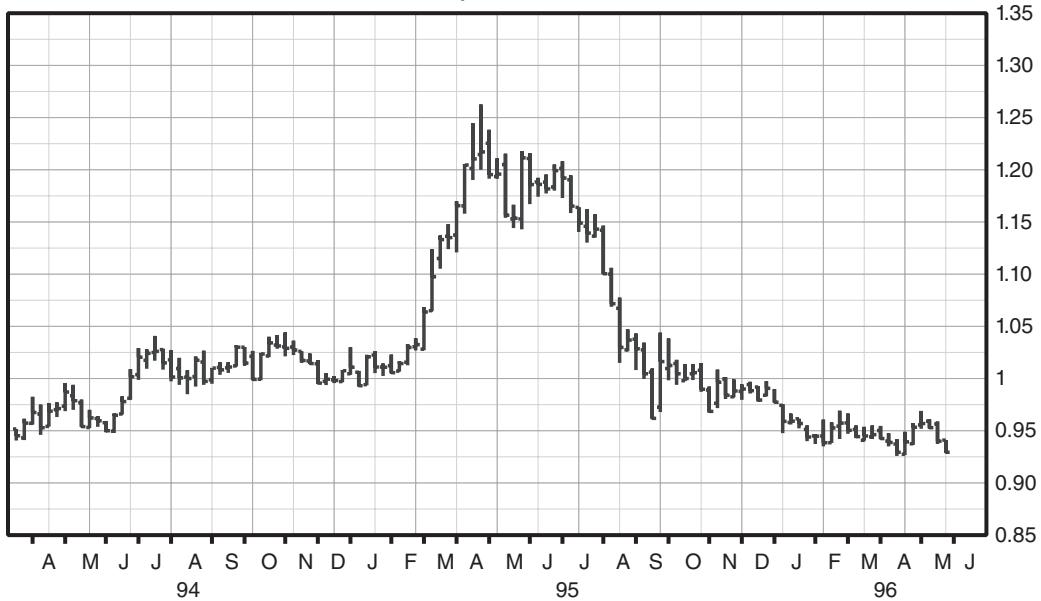


FIGURE 2.5: Henry Japanese Yen Trade Source: Barchart.com

Comparison of Campbell Program to the S&P 500 Index

January 1988-December 2016

\$1,000 Starting Value--Compounded

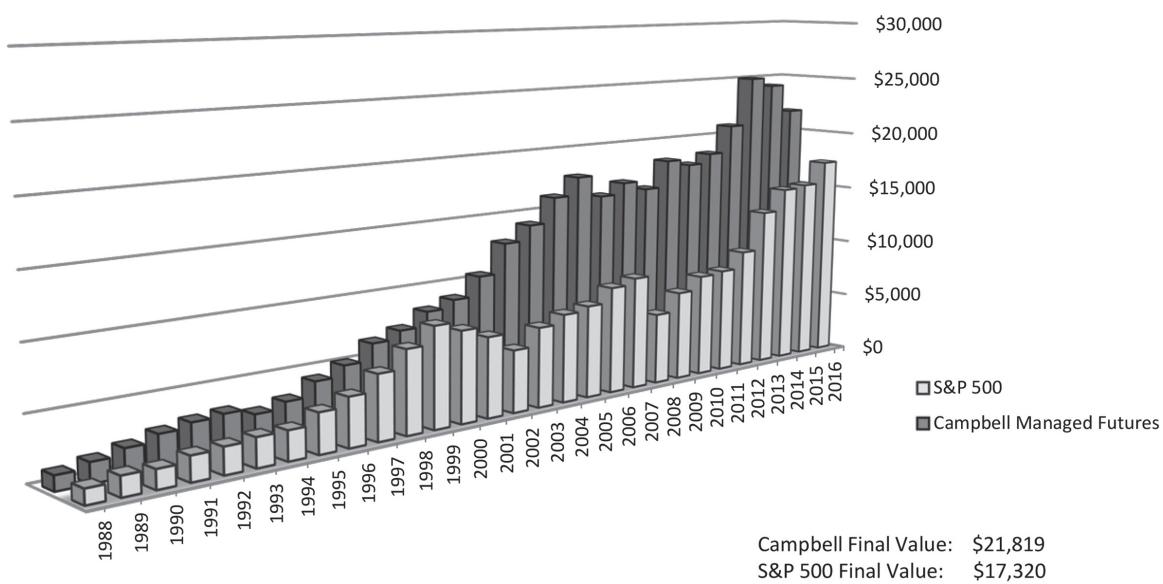


FIGURE 2.6: Hypothetical \$1,000 Growth Chart for Campbell & Company

TABLE 2.4: Correlation Analysis between Campbell Composite and S&P 500 Index, January 1988–December 2016

Both Positive	132 of 348 Months
Opposite	160 of 348 Months
Both Negative	56 of 348 Months

SOURCE: Campbell & Company

TABLE 2.5: Past Consistency Campbell Managed Futures, January 1988–December 2016 (estimates)

January 1988–December 2016 (estimates)	Number of Time Periods	Number of Profitable Periods	Number of Unprofitable Periods	Percentage Profitable
Total Months	348	199	149	57.18
Total Years	29	23	6	79.31
12-Month Rolling Windows	337	271	66	80.42
24-Month Rolling Windows	325	283	42	87.08
36-Month Rolling Windows	313	292	21	93.29
48-Month Rolling Windows	301	289	12	96.01
60-Month Rolling Windows	289	286	3	98.96

SOURCE: Campbell & Company

Our trend following methods do not pretend to determine the value of what we are trading, nor do they determine what that value ought to be, but they do produce absolute returns fairly consistently.

Campbell & Company⁷⁴

TABLE 3.1(a): Absolute Return: Annualized ROR (January 1993–June 2003)

Trading Managers	Annualized ROR	Compounded ROR
1. Eckhardt Trading Co. (Higher Leverage)	31.14%	1,622.80%
2. Dunn Capital Management, Inc. (World Monetary Asset)	27.55%	1,186.82%
3. Dolphin Capital Management Inc. (Global Diversified I)	23.47%	815.33%
4. Eckhardt Trading Co. (Standard)	22.46%	739.10%
5. KMJ Capital Management, Inc. (Currency)	21.95%	703.59%
6. Beach Capital Management Ltd. (Discretionary)	21.54%	675.29%
7. Mark J. Walsh & Company (Standard)	20.67%	618.88%
8. Saxon Investment Corp. (Diversified)	19.25%	534.83%
9. Man Inv. Products, Ltd. (AHL Composite Pro Forma)	7.66%	451.77%
10. John W. Henry & Company, Inc. (Global Diversified)	17.14%	426.40%
11. John W. Henry & Company, Inc. (Financial & Metals)	17.07%	423.08%
12. Dreiss Research Corporation (Diversified)	16.47%	395.71%
13. Abraham Trading (Diversified)	15.91%	371.08%
14. Dunn Capital Management, Inc. (Targets of Opportunity System)	14.43%	311.66%
15. Rabar Market Research (Diversified)	14.09%	299.15%
16. John W. Henry & Company, Inc. (International Foreign Exchange)	13.89%	291.82%
17. Hyman Beck & Company, Inc. (Global Portfolio)	12.98%	260.18%
18. Campbell & Company (Fin. Met. & Energy—Large)	12.73%	251.92%
19. Chesapeake Capital Corporation (Diversified)	12.70%	250.92%
20. Millburn Ridgefield Corporation (Diversified)	11.84%	223.88%
21. Campbell & Company (Global Diversified—Large)	11.64%	217.75%
22. Tamiso & Co., LLC (Original Currency Account)	11.42%	211.29%
23. JPD Enterprises, Inc. (Global Diversified)	11.14%	203.03%

TABLE 3.1(b): Trailing Performance and Sharpe Comparison through December 2016

Commodity Trading Advisors	Vol	Performance						Sharpe				
		60 Mo.	12 Mo.	24 Mo.	36 Mo.	48 Mo.	60 Mo.	12 Mo.	24 Mo.	36 Mo.	48 Mo.	60 Mo.
AQR Capital Mgt. (Managed Futures — Class I)	10%	-8%	-7%	2%	12%	15%	-0.80	-0.27	0.13	0.34	0.35	1.47
Aspect (Diversified)	13%	-9%	-2%	29%	24%	10%	-0.86	0.00	0.64	0.45	0.21	1.02
Campbell & Company (Managed Futures)	12%	-10%	-13%	5%	18%	23%	-0.87	-0.47	0.18	0.40	0.40	1.09
DUNN World Monetary and Agriculture (WMA) Program	23%	-5%	5%	42%	91%	55%	-0.18	0.21	0.62	0.81	0.50	1.34
DUNN WMA Institutional Program	11%	-1%	4%	23%	41%	31%	-0.08	0.24	0.65	0.82	0.56	1.32
Graham Diversified (Diversified k4D-10V)	10%	-8%	-7%	10%	22%	16%	-1.01	-0.39	0.36	0.53	0.36	1.13
ISAM (Systematic Program)	17%	-12%	1%	64%	47%	21%	-0.78	0.13	0.93	0.61	0.30	1.64
Lynx Asset Mgmt Bermuda	15%	-3%	-12%	12%	25%	16%	-0.15	-0.34	0.32	0.45	0.28	0.87
Man Investments (AHL Diversified)	12%	-8%	-10%	18%	15%	14%	-0.66	-0.32	0.49	0.33	0.27	0.99
Transtrend B.V. (Enhanced Risk — USD)	12%	8%	5%	23%	23%	22%	0.60	0.23	0.57	0.47	0.38	1.14
Winton Capital (Diversified)	9%	-3%	-2%	11%	22%	17%	-0.38	-0.09	0.42	0.55	0.39	1.15
Barclays CTA Index	5%	-1%	-2%	5%	4%	2%	-0.20	-0.24	0.37	0.22	0.10	1.15

Data Source: *BarclayHedge*

*The Offense/Defense Ratio ("ODR") calculation measures the Average Winning Months/Average Losing Months. Programs with a higher ODR indicates the program is successful at releasing the upside potential when the environment is good; conversely they are good at limiting losses when times are less favorable for the strategy.

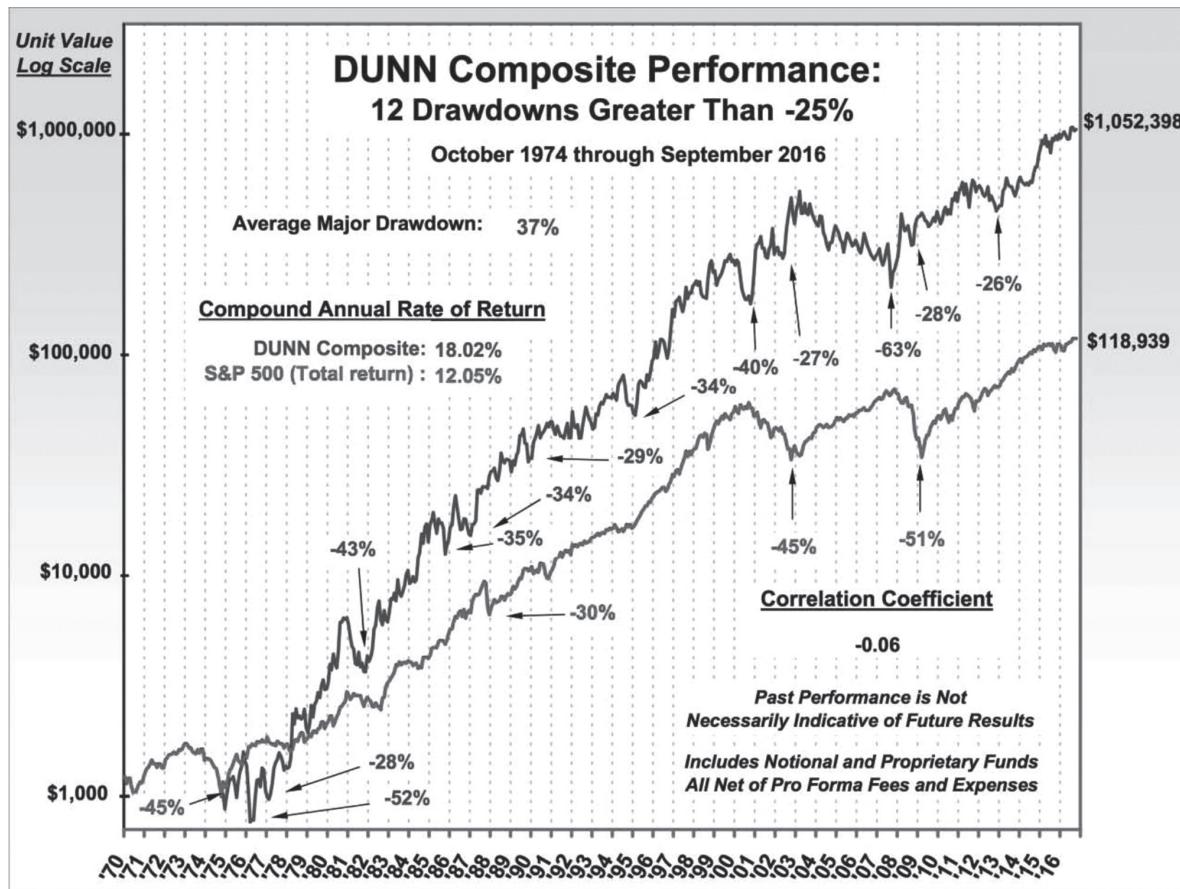


FIGURE 3.1: Drawdown Chart Source: Dunn Capital Management

Dunn Capital Management's documents include a summary of serious past losses. The summary explains that the firm has suffered through seven difficult periods of losses of 25 percent or more. Every potential investor receives a copy: "If the investor is not willing to live through this, they are not the right investor for the portfolio."¹⁹

Obviously you don't want to overhaul a program in response to one year just because something didn't work. That's when you're almost guaranteed that it would have worked the next year had you kept it in there.

Eclipse Capital

The 25 or 50 biggest trend followers are essentially going to make money in the same places. What differentiates them from one another are portfolio and risk management.²⁰

TABLE 3.2: Drawdown Recovery Chart

Size of Drawdown	Percent Gain to Recover	
5%	5.3%	
10%	11.1%	
15%	17.6%	
20%	25.0%	
25%	33.3%	
30%	42.9%	
40%	66.7%	
50%	100%	
60%	150%	
70%	233%	
80%	400%	
90%	900%	
100%	Ruin	

Unless you can watch your stock holding decline by 50% without becoming panic-stricken, you should not be in the stock market.

Warren Buffett

Note: Since 1980 Berkshire Hathaway has had drawdowns of -51%, -49%, -37%, and -37%. In addition, Charles Munger Partnership dropped -31.9% in 1973 and -31.5% in 1974.

TABLE 3.3(a): Correlation: Trend Followers

	AbrDiv	CamFin	CheDiv	DUNWor	EckSta	JohFin	ManAHL	MarSta	RabDiv
AbrDiv	1.00	0.56	0.81	0.33	0.57	0.55	0.56	0.75	0.75
CamFin	0.56	1.00	0.59	0.62	0.60	0.56	0.51	0.57	0.55
CheDiv	0.81	0.59	1.00	0.41	0.53	0.55	0.60	0.72	0.75
DUNWor	0.33	0.62	0.41	1.00	0.57	0.62	0.61	0.51	0.45
EckSta	0.57	0.60	0.53	0.57	1.00	0.57	0.58	0.74	0.71
JohFin	0.55	0.56	0.55	0.62	0.57	1.00	0.53	0.55	0.50
ManAHL	0.56	0.51	0.60	0.61	0.58	0.53	1.00	0.57	0.59
MarSta	0.75	0.57	0.72	0.51	0.74	0.55	0.57	1.00	0.68
RabDiv	0.75	0.55	0.75	0.45	0.71	0.50	0.59	0.68	1.00

AbrDiv: Abraham Trading; CamFin: Campbell & Company; CheDiv: Chesapeake Capital Corporation; DUNWor: DUNN Capital Management, Inc.; EckSta: Eckhardt Trading Co.; JohFin: John W. Henry & Company, Inc.; ManAHL: Man Inv. Products, Ltd.; MarSta: Mark J. Walsh & Company; RabDiv: Rabar Market Research.

TABLE 3.3(b): Further Correlation: Trend Followers

	AQR	Aspect	Campbell	DUNN WMA	Graham	ISAM	Lynx	Man	Transtrend	Winton	
AQR			77%	80%	78%	70%	76%	79%	63%	73%	67%
Aspect		77%		76%	75%	70%	85%	75%	71%	77%	80%
Campbell		80%	76%		72%	72%	75%	77%	70%	74%	67%
DUNN WMA		78%	75%	72%		69%	73%	75%	59%	72%	72%
Graham		70%	70%	72%	69%		72%	79%	64%	66%	80%
ISAM		76%	85%	75%	73%	72%		73%	77%	75%	67%
Lynx		79%	75%	77%	75%	79%	73%		64%	83%	79%
Man		63%	71%	70%	59%	64%	77%	64%		66%	66%
Transtrend		73%	77%	74%	72%	66%	75%	83%	66%		75%
Winton		67%	80%	67%	72%	80%	67%	79%	66%	75%	
Average		67%	69%	67%	68%	65%	68%	69%	60%	67%	66%
Barclays CTA Index		83%	78%	82%	70%	76%	82%	88%	67%	86%	73%
S&P 500		-21%	-1%	2%	-8%	15%	-19%	14%	6%	-1%	16%

Data Source: BarclayHedge

* Average excludes Barclay CTA Index and S&P 500

A Turtle correlation chart paints another picture. The relationship is there to judge. The data (Table 3.4) is the ultimate arbiter:

TABLE 3.4: Correlation among Turtles

	Chesapeake	Eckhardt	Hawksbill	JPD	Rabar
Chesapeake	1	0.53	0.62	0.75	0.75
Eckhardt	0.53	1	0.7	0.7	0.71
Hawksbill	0.62	0.7	1	0.73	0.76
JPD	0.75	0.7	0.73	1	0.87
Rabar	0.75	0.71	0.76	0.87	1

Correlation coefficients gauge how closely an advisor's performance resembles another advisor. Values exceeding 0.66 might be viewed as having significant positive performance correlation. Consequently, values exceeding -0.66 might be viewed as having significant negative performance correlation. Data is for Chesapeake Capital Corporation, Eckhardt Trading Co., Hawksbill Capital Management, JPD Enterprises Inc., and Rabar Market Research.

*If they can get you asking
the wrong questions, they
don't have to worry about
answers.*

Thomas Pynchon

If you have sound philosophy, and superior strategy, the day-to-day slows down. If you don't have such every distraction appears consequential.

Michael Covel

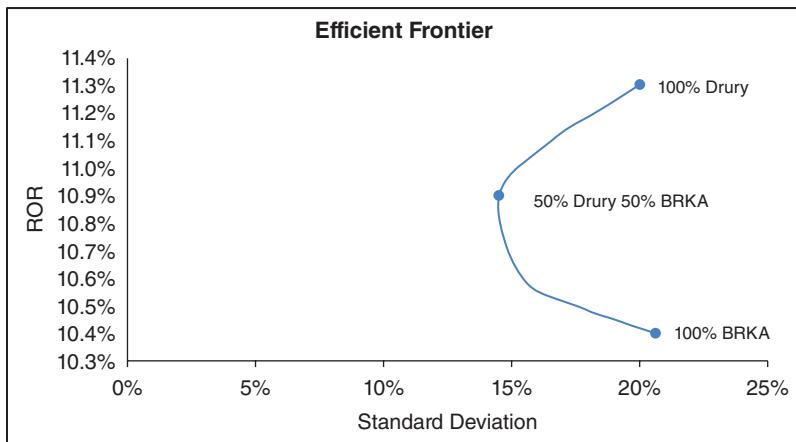
TABLE 3.5: May 1997 to February 2015: Drury and BRKA

	Drury	BRKA	50% Drury/50% BRKA
Rate of Return (ROR)	11.3%	10.4%	10.9%
Standard Deviation (Vol)	20.0%	20.6%	14.4%
Drawdown (DD)	32.5%	44.5%	23.9%
ROR/DD	0.35	0.23	0.50
ROR/Vol	0.57	0.50	0.83

Source: Drury Capital

Valeant is like ITT and Harold Geneen come back to life, only the guy is worse this time...Valeant, of course, was a sewer.

Charlie Munger
2015, 2016



There are no facts about the future, just opinions. Anyone who asserts with conviction what he thinks will happen in the macro future is overstating his foresight, whether out of ignorance, hubris or dishonesty.

Howard Marks

TABLE 3.6: May 1997 to February 2015 Drawdown December 2007–January 2013

	Drury	BRKA	50% Drury 50% BRKA
Drawdown	32.5%	44.5%	23.9%
Peak to trough (months)	32	14	10
Trough to peak (months)	23	47	8
Total (months)	55	61	18

SOURCE: Yahoo! Finance and Drury Capital



FIGURE 4.1: U.S. Dollar Short Trade



FIGURE 4.2: Long Gold Trade

Figure 4.3 shows the patience trend following had to endure in the face of extreme volatility:



FIGURE 4.3: Long Five-Year Notes Trade

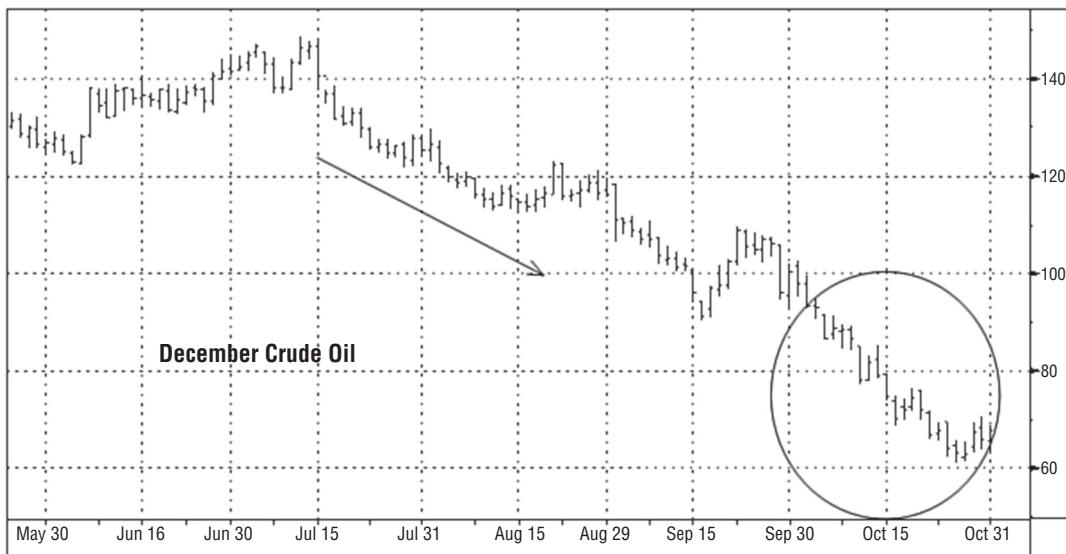


FIGURE 4.4: Crude Oil Short Trade



FIGURE 4.5: Nikkei 225 Short Trade

It may surprise many to know that in my method of trading, when I see by my records that an upward trend is in progress, I become a buyer as soon as a stock makes a new high on its movement, after having had a normal reaction. The same applies whenever I take the short side. Why? Because I am following the trend at the time.

Jesse Livermore (1940)



FIGURE 4.6: British Pound Short Trade

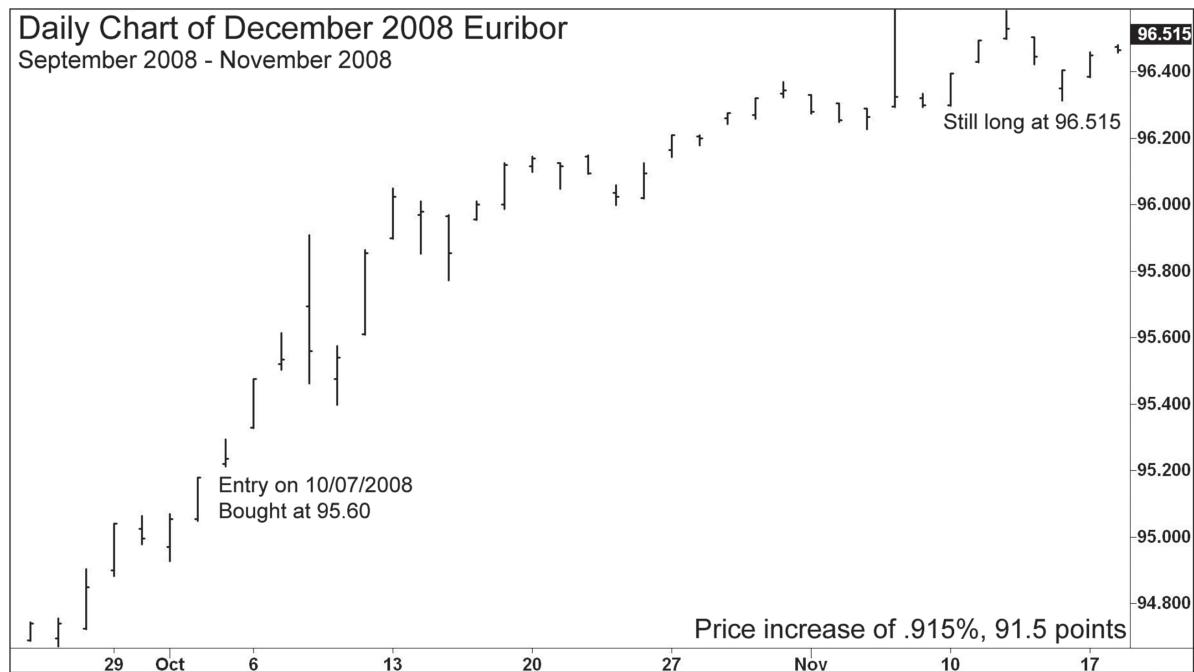
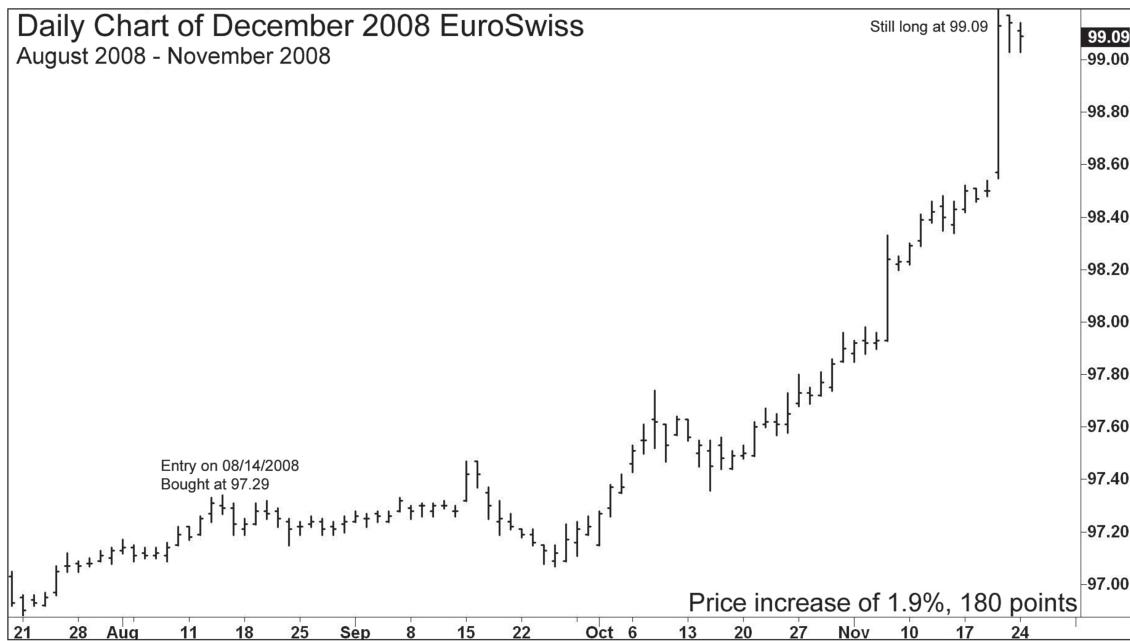
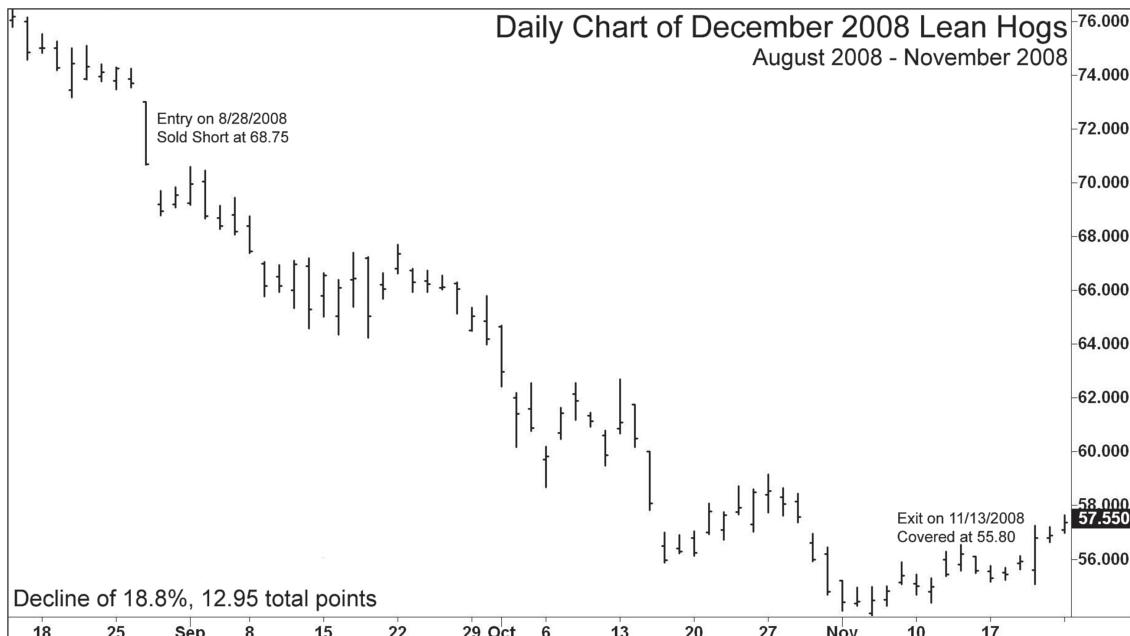


FIGURE 4.7: Long December 2008 Euribor Trade

**FIGURE 4.8:** Long December 2008 EuroSwiss Trade**FIGURE 4.9:** Short December 2008 Lean Hogs Trade

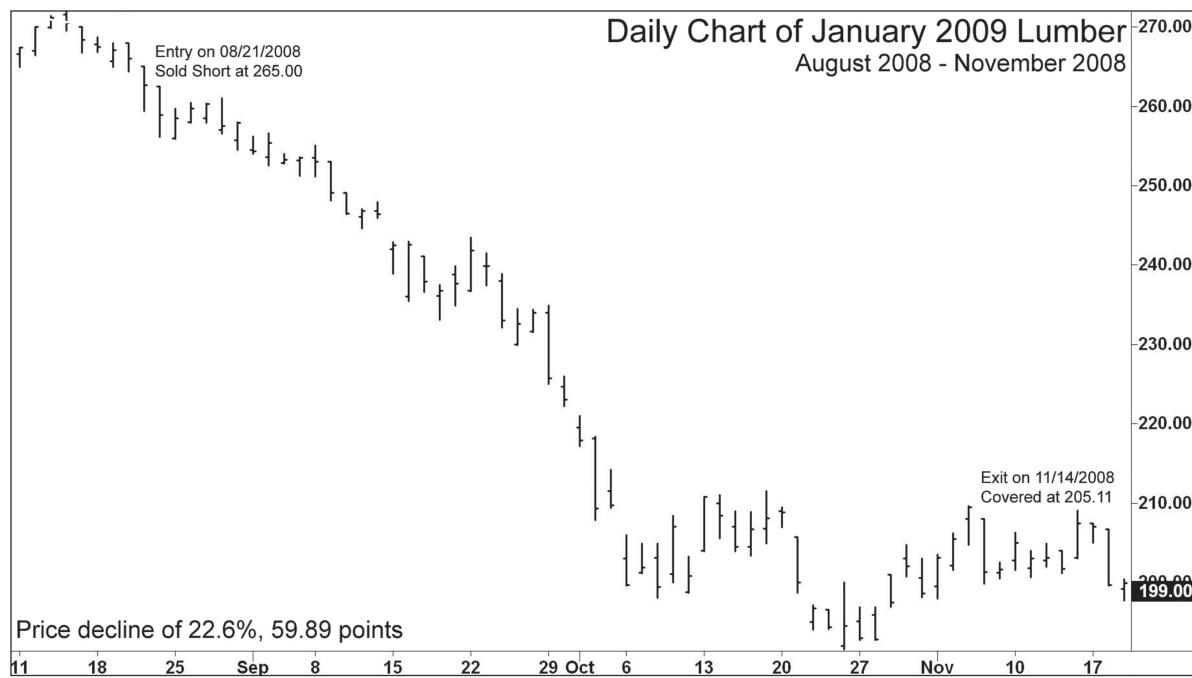


FIGURE 4.10: Short January 2009 Lumber Trade

Many professional speculators, including in particular exponents of the so-called Dow Theory widely publicized by popular financial journals, have adopted systems based in the main on the principle that it is advantageous to swim with the tide.

Alfred Cowles (1937)

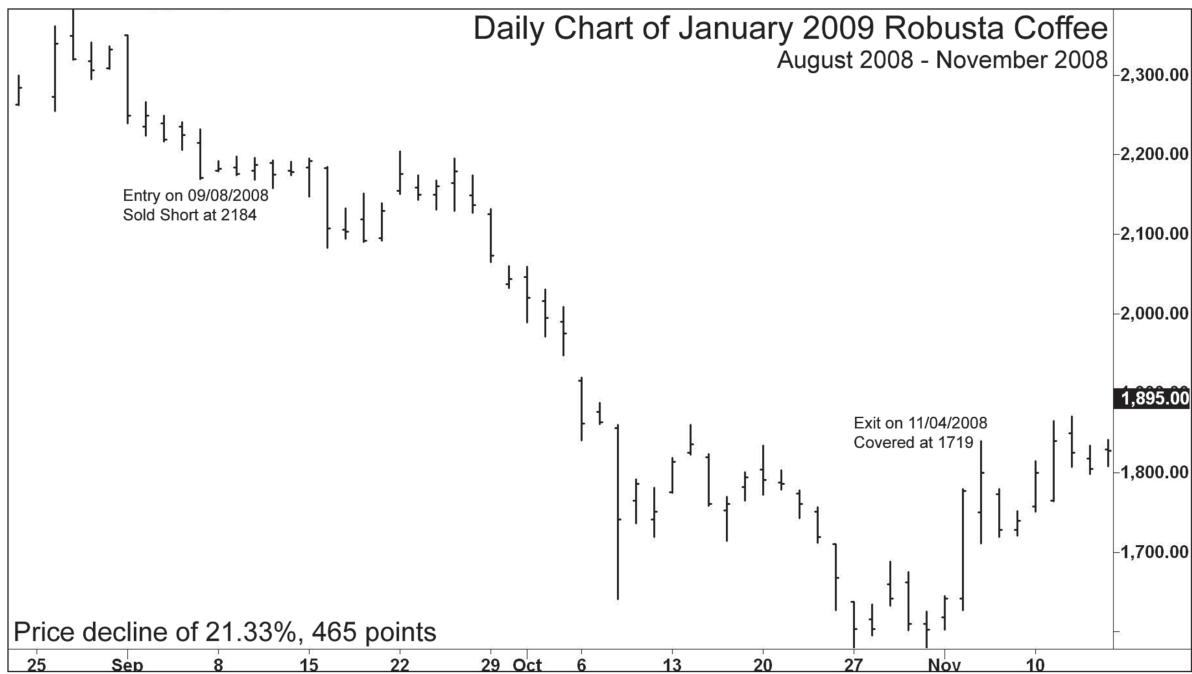


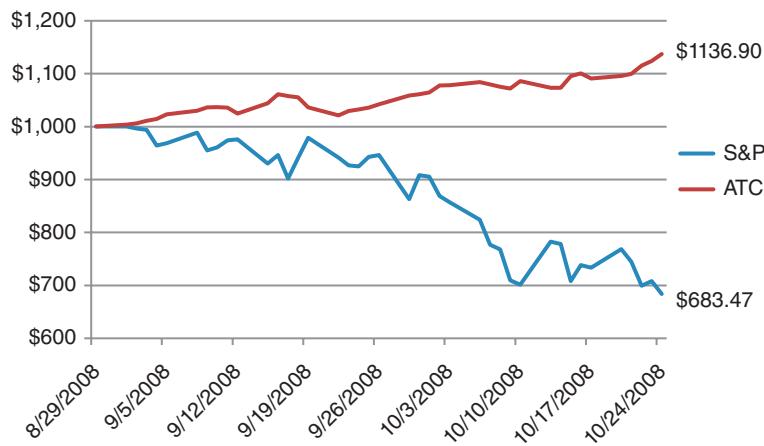
FIGURE 4.11: Short January 2009 Robusta Coffee Trade



FIGURE 4.12: Long December 2008 U.S. Dollar Trade

We think that forecasting should be thought of in the light of measuring the direction of today's trend and then turning to the Law of Inertia (momentum) for assurance that probabilities favor the continuation of that trend for an unknown period of time into the future. This is trend following, and it does not require us to don the garment of the mystic and look into the crystal balls of the future.

William Dunnigan (1954)



Abraham Trading vs. S&P 500

Sept. 1, 2008 to Oct. 24, 2008

Sept. 1, 2008 to Oct. 24, 2008		
	S&P 500	ATC
Average	-0.87%	0.33%
Std. Dev.	4.08%	0.87%
Correlation	-0.39	

Daily ROR Comparison

Date	S&P	ATC
9/1/2008	0.00%	0.32%
9/2/2008	-0.41%	0.26%
9/3/2008	-0.20%	0.50%
9/4/2008	-2.99%	0.33%
9/5/2008	0.44%	0.86%
9/8/2008	2.05%	0.67%
9/9/2008	-3.41%	0.62%
9/10/2008	0.61%	0.05%
9/11/2008	1.38%	-0.12%
9/12/2008	0.21%	-1.09%

Date	S&P	ATC
9/15/2008	-4.71%	1.95%
9/16/2008	1.75%	1.62%
9/17/2008	-4.71%	-0.33%
9/18/2008	4.33%	-0.25%
9/19/2008	4.03%	-1.78%
9/22/2008	-3.82%	-1.46%
9/23/2008	-1.56%	0.83%
9/24/2008	-0.20%	0.26%
9/25/2008	1.97%	0.35%
9/26/2008	0.34%	0.61%

Date	S&P	ATC
9/29/2008	-8.81%	1.56%
9/30/2008	5.27%	0.24%
10/1/2008	-0.32%	0.33%
10/2/2008	-4.03%	1.23%
10/3/2008	-1.35%	0.06%
10/6/2008	-3.85%	0.52%
10/7/2008	-5.74%	-0.41%
10/8/2008	-1.13%	-0.39%
10/9/2008	-7.62%	-0.33%
10/10/2008	-1.18%	1.34%

Date	S&P	ATC
10/13/2008	11.58%	-1.16%
10/14/2008	-0.53%	-0.03%
10/15/2008	-9.03%	2.06%
10/16/2008	4.25%	0.48%
10/17/2008	-0.62%	-0.88%
10/20/2008	4.77%	0.44%
10/21/2008	-3.08%	0.37%
10/22/2008	-6.10%	1.42%
10/23/2008	1.26%	0.78%
10/24/2008	-3.45%	1.17%

FIGURE 4.13: Abraham Trading Compared to the S&P

Conventional capital market theory is based on a linear view of the world, one in which investors have rational expectations; they adjust immediately to information about the markets and behave as if they know precisely how the structure of the economy works. Markets are highly efficient, but not perfectly so. Inefficiencies are inherent in the economy or in the structure of markets themselves . . . we believe inefficiencies in markets can be exploited through a combination of trend detection and risk management.

John W. Henry¹²

TABLE 4.1: 2002 Performance Histories for Trend Followers

Bill Dunn	+54.23%
Salem Abraham	+21.37%
John W. Henry	+45.06%
Jerry Parker	+11.10%
David Druz	+33.17%
William Eckhardt	+14.05%
Mulvaney Capital	+19.37%
S&P	-23.27
NASDAQ	-31.53%
Dow	-16.76

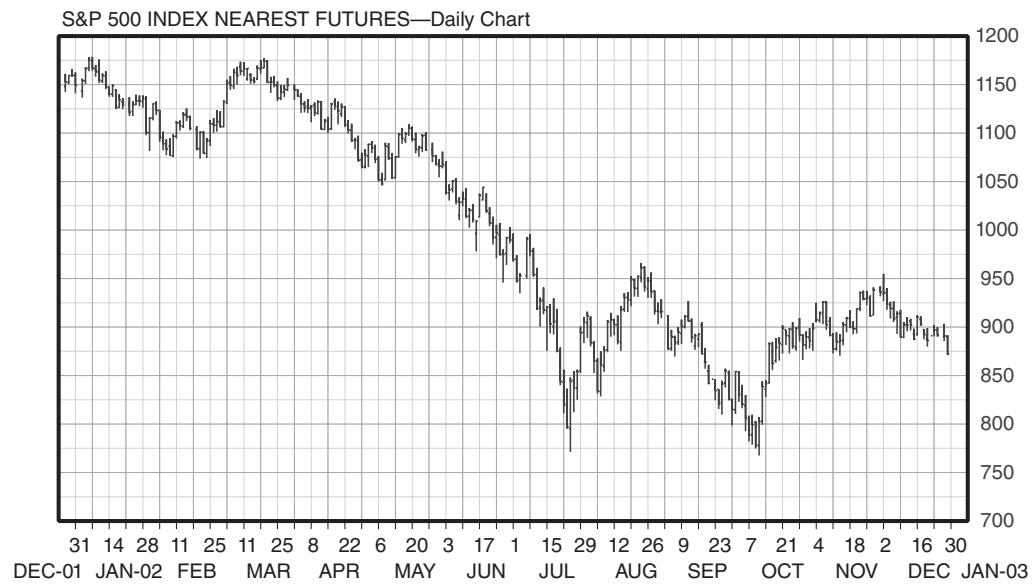


FIGURE 4.14: Trend Followers and the S&P Chart, January 2002–December 2002

Source: Barchart.com



FIGURE 4.15: Trend Followers and the Dollar Chart, January 2002–December 2002

Source: Barchart.com



FIGURE 4.16: Trend Followers and the Yen Chart, January 2002–December 2002
Source: Barchart.com

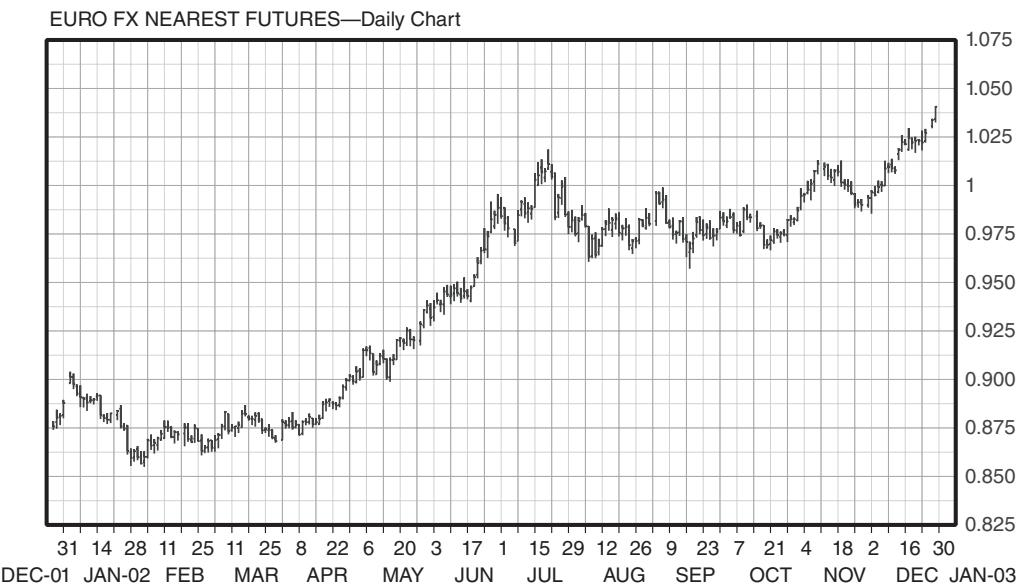


FIGURE 4.17: Trend Followers and the Euro Chart, January 2002–December 2002
Source: Barchart.com

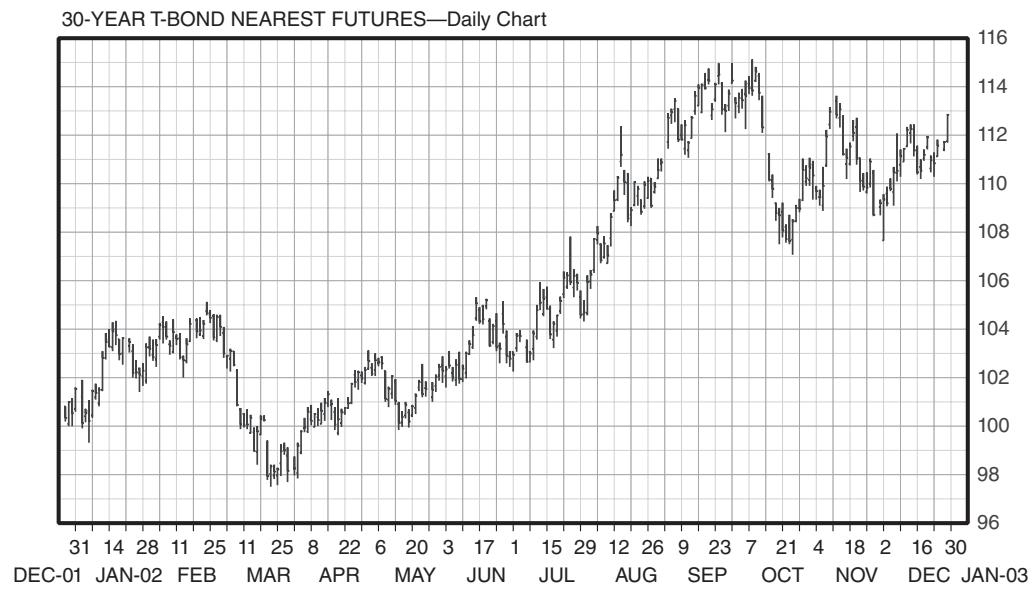


FIGURE 4.18: Trend Followers and the T-Bond Chart, January 2002–December 2002

Source: Barchart.com

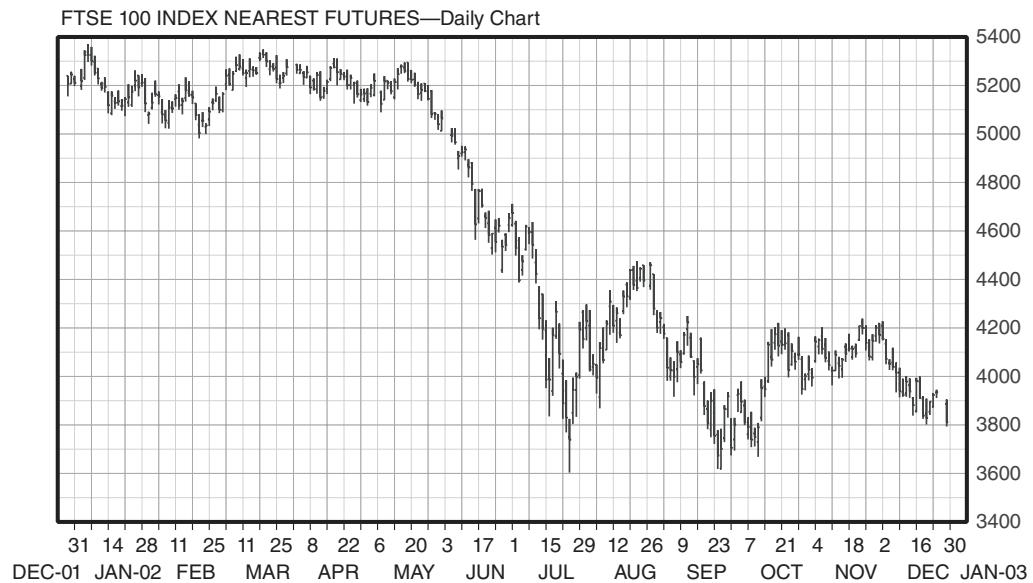


FIGURE 4.19: Trend Followers and the FTSE Chart, January 2002–December 2002

Source: Barchart.com

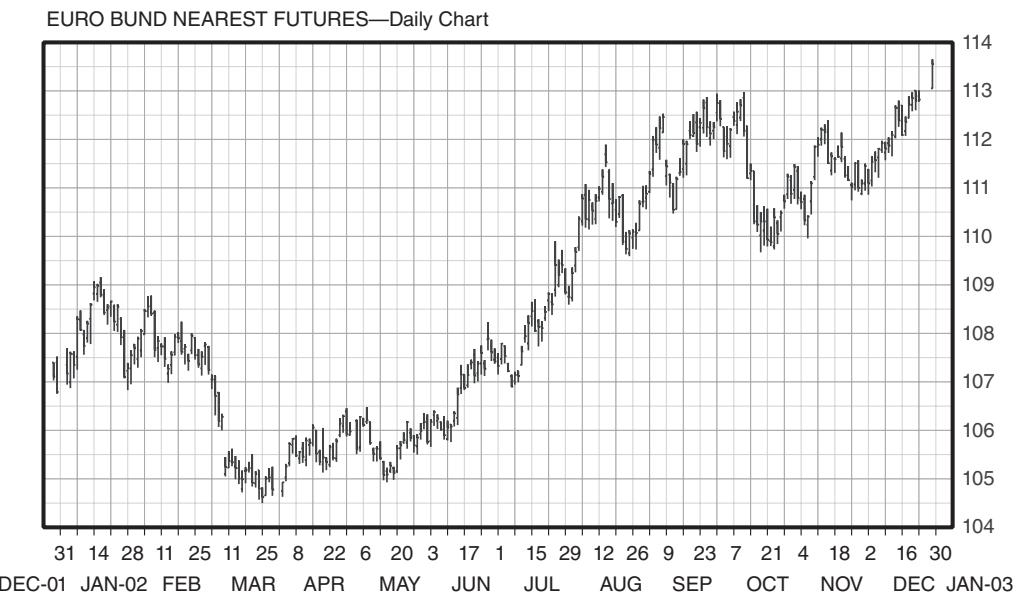
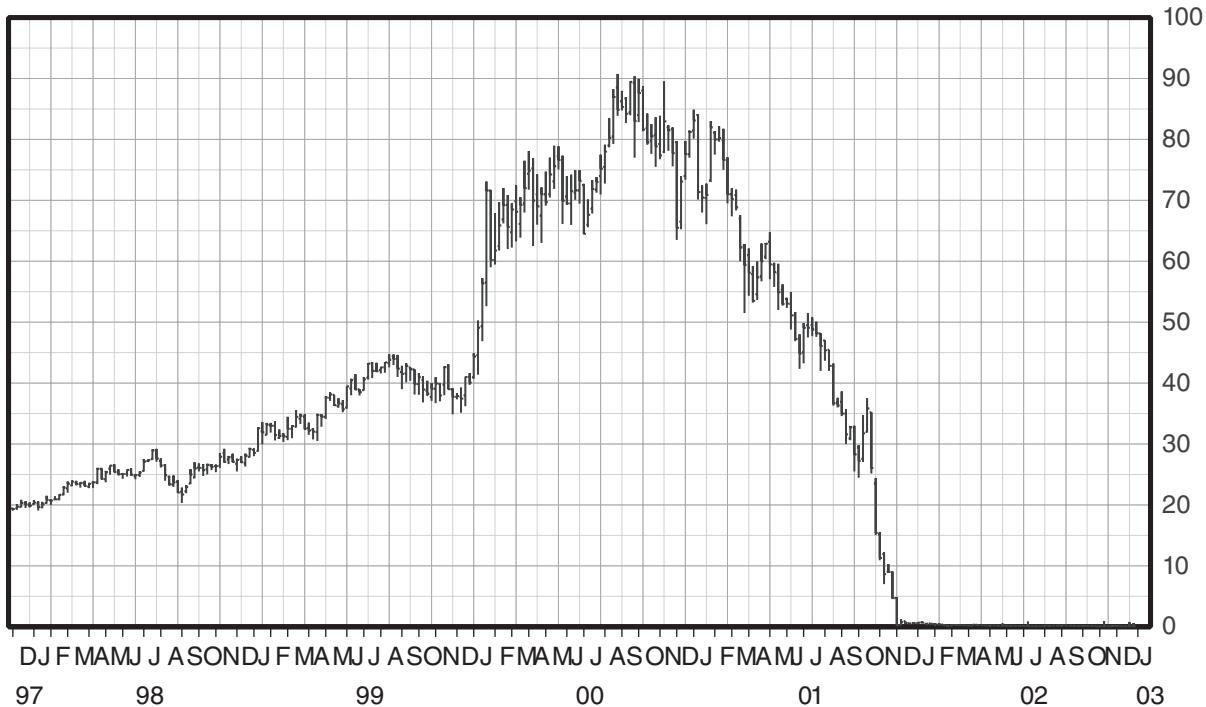


FIGURE 4.20: Trend Followers and the Euro-Bund, January 2002–December 2002
Source: Barchart.com



FIGURE 4.21: Trend Followers and the DAX, January 2002–December 2002
Source: Barchart.com

ENRON CORP—Weekly Chart

**FIGURE 4.22:** Enron Stock Chart Source: Barchart.com

They say patience is a virtue. For me patience is synonymous with discipline. You must have the discipline to know that markets change and poor periods are followed by good period. Longevity in this business—I have seen it again and again—is measured by discipline.

John W. Henry¹⁸

NATURAL GAS NEAREST FUTURES—Weekly Chart

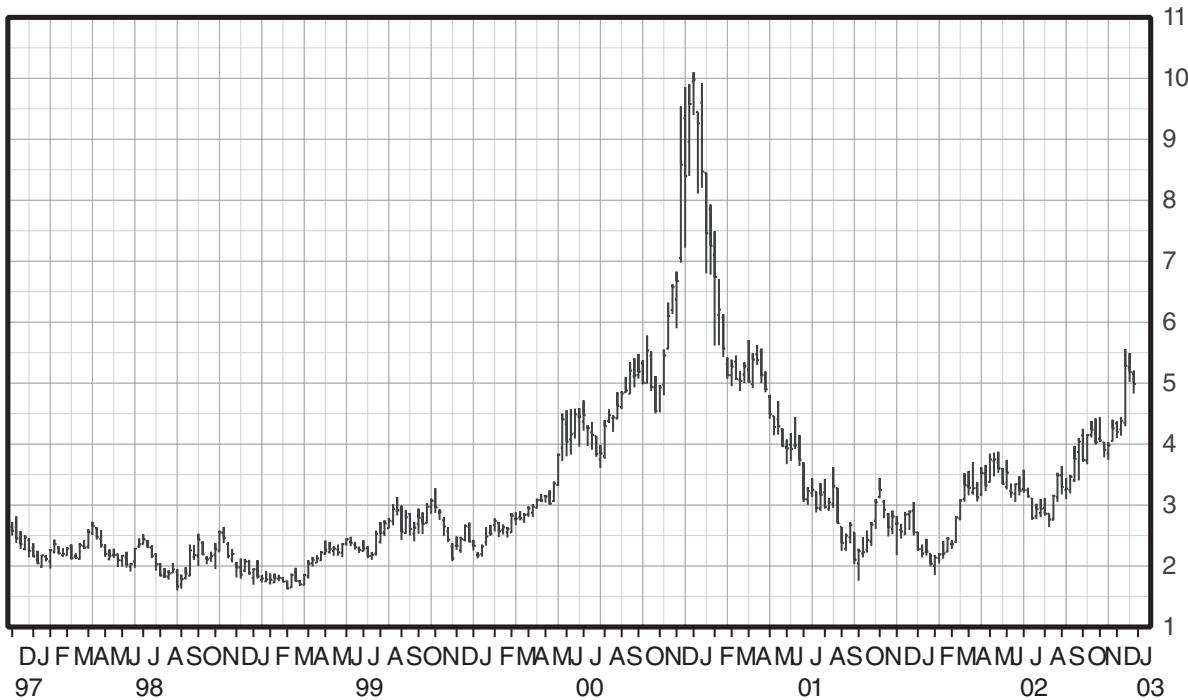
**FIGURE 4.23:** Natural Gas Stock Chart Source: Barchart.com

TABLE 4.2: Trend Followers' Performance**Dunn Capital Management WMA**

October 2000:	+9.12%
November 2000:	+28.04%
December 2000:	+29.39%
January 2001:	+7.72%

John W. Henry Financials and Metals

October 2000:	+9.39%
November 2000:	+13.33%
December 2000:	+23.02%
January 2001:	+3.34%

Graham Capital Management K4

October 2000:	+1.44%
November 2000:	+7.41%
December 2000:	+9.37%
January 2001:	+2.37%

Man Investments

October 2000:	+4.54%
November 2000:	+10.30%
December 2000:	+10.76%
January 2001:	+1.49%

Campbell & Company Financials and Metals

October 2000:	+3.19%
November 2000:	+5.98%
December 2000:	+2.38%
January 2001:	-1.09%

Among the hottest funds this year [2002] is Dunn Capital Management, which is up more than 50 percent. The firm from Stuart, Florida, profited on trades on Japan's Nikkei, Germany's DAX, and Britain's FTSE stock indexes, as well as on bond and Eurodollar interest-rate futures.¹⁹

The thing you have to worry about is the thing you haven't thought about.

Howard Marks

Chesapeake Capital

October 2000: -0.62%
November 2000: +7.42%
December 2000: +8.80%
January 2001: -0.43%

Abraham Trading

October 2000: +9.51%
November 2000: +8.58%
December 2000: -0.18%
January 2001: +2.28%

All the intensive research these firms performed did not protect them, or their investors, from massive losses. It is particularly noteworthy [that] Janus, whose commercials tout their superior research efforts and skills, [held] over 16 million shares. On April 30, 2001, the last time it reported individual fund holdings, 11 Janus funds collectively owned more than 5 percent of Enron. As of Sept. 30, Janus still owned more than 5 percent of Enron. Another touter of their superior stock-picking skills is the Fidelity family of funds. As of September 30, 2001, together they owned 154 million shares. So much for the value or research [of Janus and Fidelity].

Larry Swedroe²²

TABLE 4.3: Largest Shareholders in Enron (Percent Fund in Enron Shares)

Alliance Premier Growth (4.1%)
Fidelity Magellan (0.2%)
AIM Value (1%)
Putnam Investors (1.7%)
Morgan Stanley Dividend Growth (0.9%)
Janus Fund (2.9%)
Janus Twenty (2.8%)
Janus Mercury (3.6%)
Janus Growth and Income (2.7%)
Rydex Utility (8%)
Fidelity Select Natural Gas (5.7%)
Dessauer Global Equity (5.6%)
Merrill Lynch Focus Twenty (5.8%)
AIM Global Technology (5.3%)
Janus 2 (4.7%)
Janus Special Situations (4.6%)
Stein Roe Focus (4.2%)
Alliance Premier Growth (4.1%)
Merrill Lynch Growth (4.1%)

We don't see things as they are. We see things as we are.
Anaïs Nin

One of the former top executives of LTCM gave a lecture in which he defended the gamble that the fund had made. What he said was, “Look, when I drive home every night in the fall, I see all these leaves scattered around the base of the trees . . . There is a statistical distribution that governs the way they fall, and I can be pretty accurate in figuring out what that distribution is going to be. But one day, I came home and the leaves were in little piles. Does that falsify my theory that there are statistical rules governing how leaves fall? No. It was a man-made event.” In other words, the Russians, by defaulting on their bonds, did something that they were not supposed to do, a once-in-a-lifetime, rule-breaking event . . . this is just the point: In the markets, unlike in the physical universe, the rules of the game can be changed. Central banks can decide to default on government-backed securities.

Malcolm Gladwell⁴⁴

TABLE 4.4: Trend Following Profits August–September 1998

Dunn Capital Management WMA	
July 1998	-1.37%, 575,000,000
August 1998	+27.51%, 732,000,000
September 1998	+16.8%, 862,000,000
Dunn Capital Management TOPS	
July 1998	-1.08%, 133,000,000
August 1998	+9.48%, 150,000,000
September 1998	+12.90%, 172,000,000
John W. Henry Financials and Metals	
July 1998	-0.92%, 959,000,000
August 1998	+17.50, 1,095,000,000
September 1998	+15.26, 1,240,000,000
Campbell & Company Financials and Metals	
July 1998	-3.68, 917,000,000
August 1998	+9.23, 1,007,000,000
September 1998	+2.97, 1,043,000,000
Chesapeake Capital	
July 1998	+3.03, 1,111,000,000
August 1998	+7.27, 1,197,000,000
September 1998	-0.59, 1,179,000,000
Man Investments	
July 1998	+1.06, 1,636,000,000
August 1998	+14.51, 1,960,000,000
September 1998	+3.57, 2,081,000,000

Note: Percent returns for each month and total money under management in that fund.

10-YEAR T-NOTE NEAREST FUTURES—Daily Chart

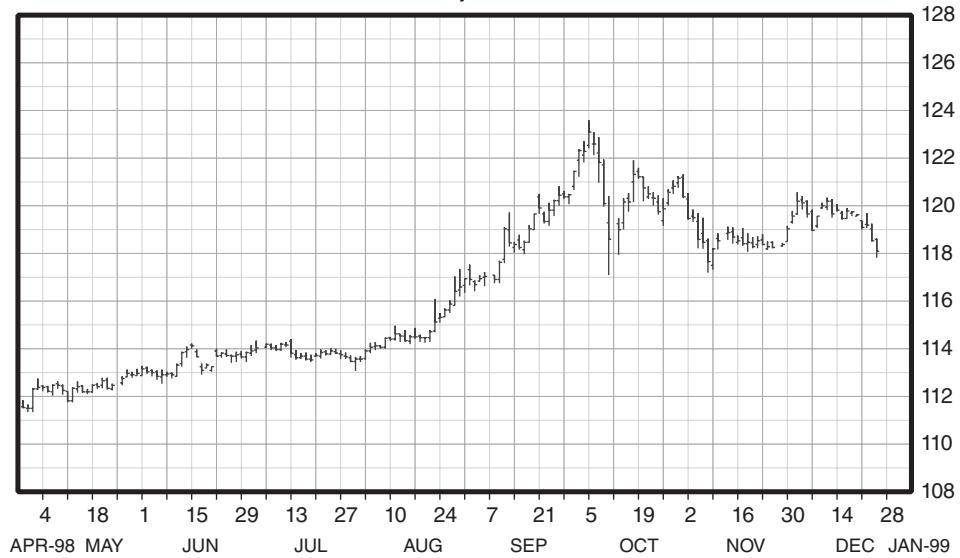


FIGURE 4.24: Trend Followers and 10-Year T-Note, May 1998–December 1998

Source: Barchart.com

30-YEAR T-BOND NEAREST FUTURES—Daily Chart

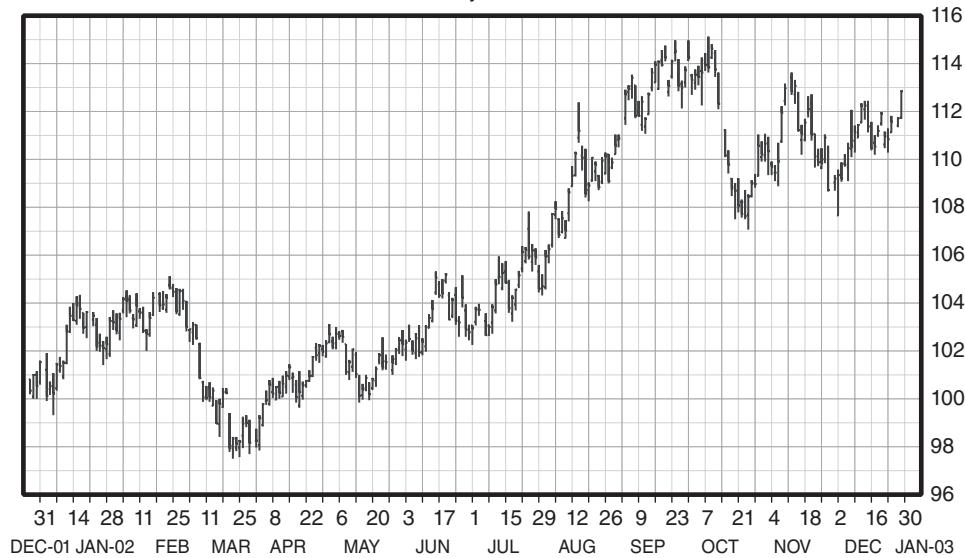


FIGURE 4.25: Trend Followers and U.S. T-Bond, May 1998–December 1998

Source: Barchart.com

EURO BUND NEAREST FUTURES—Daily Chart



FIGURE 4.26: Trend Followers and German Bund, May 1998–December 1998
Source: Barchart.com

S&P 500 INDEX NEAREST FUTURES—Daily Chart

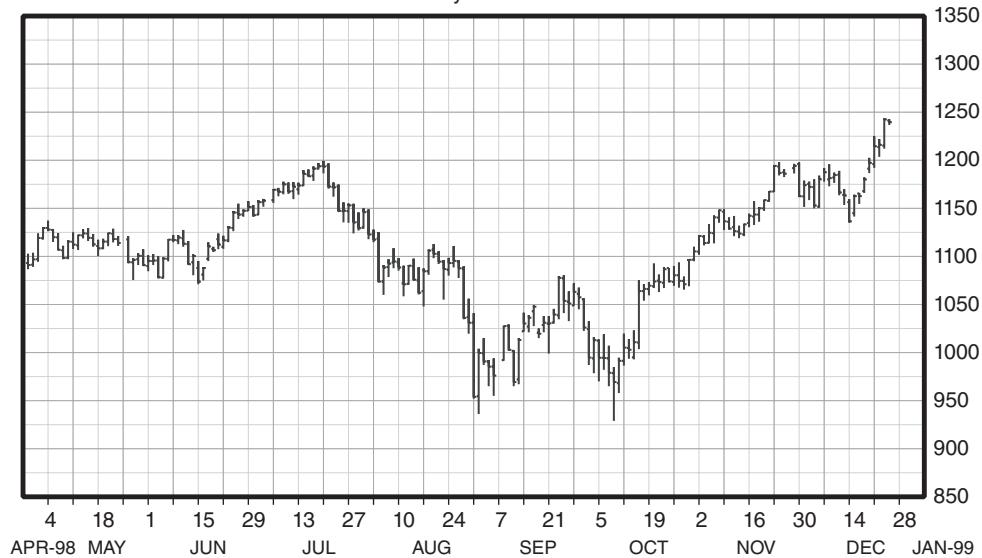


FIGURE 4.27: Trend Followers and S&P, May 1998–December 1998
Source: Barchart.com

SWISS FRANC NEAREST FUTURES—Daily Chart



FIGURE 4.28: Trend Followers and Swiss Franc, May 1998–December 1998

Source: Barchart.com

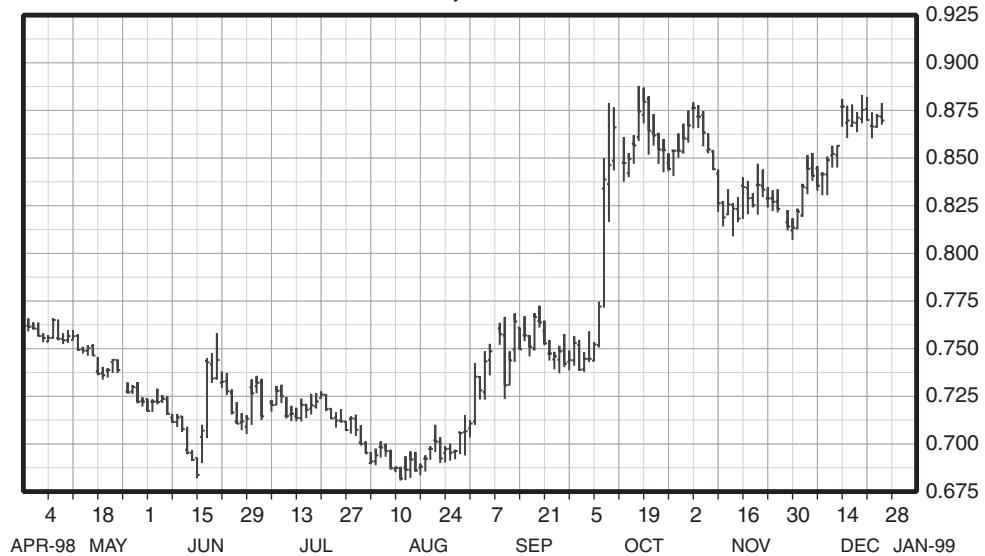
EURODOLLAR NEAREST FUTURES—Daily Chart



FIGURE 4.29: Trend Followers and Eurodollar, May 1998–December 1998

Source: Barchart.com

JAPANESE YEN NEAREST FUTURES—Daily Chart

**FIGURE 4.30:** Trend Followers and Yen, May 1998–December 1998

Source: Barchart.com

U.S. DOLLAR INDEX NEAREST FUTURES—Daily Chart

**FIGURE 4.31:** Trend Followers and Dollar Index, May 1998–December 1998

Source: Barchart.com

TABLE 4.5: Niederhoffer Performance⁵²

Date	VAMI	ROR	Quarter ROR	Yearly ROR	Amount Managed
Jan-97	11755	4.42%			
Feb-97	11633	-1.04%			
Mar-97	10905	-6.26%	-3.13%		\$130.0M
Apr-97	11639	6.73%			
May-97	11140	-4.28%			
Jun-97	10296	-7.58%	-5.58%		\$115.0M
Jul-97	11163	8.42%			
Aug-97	5561	-50.18%			
Sep-97	7100	27.67%	-31.04%		\$88.0M
Oct-97	1	-99.99%			
Nov-97	1	0.00%			
Dec-97	1	0.00%	-99.99%	-99.99%	0

I felt there were very definite economic trends that were established from knowledge and the ability to know what events meant. I was looking for a way to participate in [those] major trends when they occurred, even though they were unexpected.

Bill Dunn⁵³

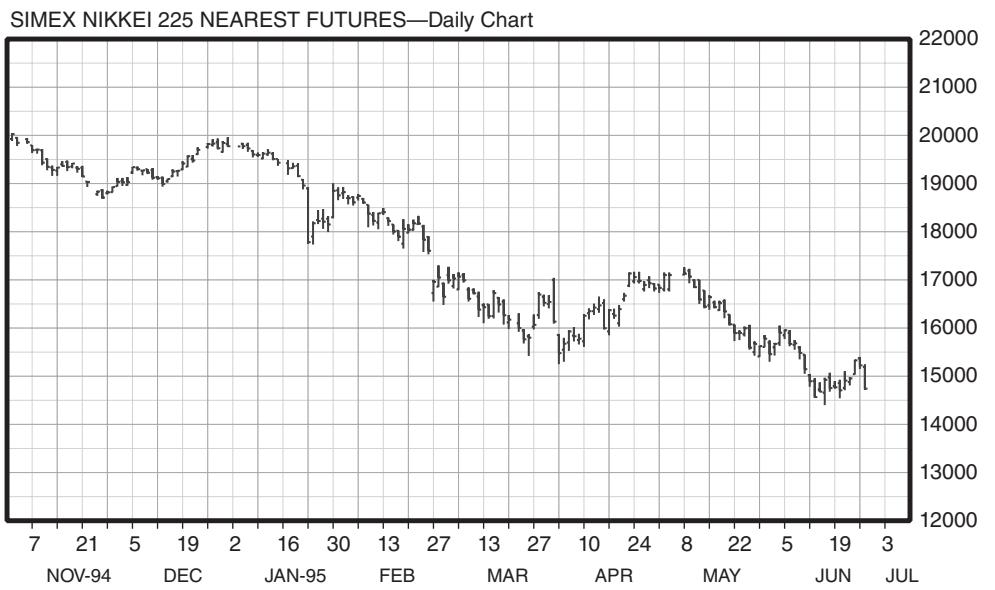


FIGURE 4.32: Nikkei 225 September 1994–June 1995

Source: Barchart.com

TABLE 4.6: John W. Henry Trading Programs

Name of Program	01-95	02-95	03-95
Financials and Metals	\$648	\$733	\$827
	-3.8	15.7	15.3
Global Diversified	\$107	\$120	\$128
	-6.9	13.5	8.5
Original	\$54	\$64	\$73
	2.1	17.9	16.6
Global Financial	\$7	\$9	\$14
	-4.1	25.6	44.4

Note: Total money under management in millions with monthly percent returns.

TABLE 4.7: 1995 Trend Following Performance

Name	01-95	02-95	03-95
Chesapeake	\$549	\$515	\$836
	-3.2	-4.4	8.6
Rabar	\$148	\$189	\$223
	-9.4	14.0	15.2
Campbell (Fin/Metals)	\$255	\$253	\$277
	-4.53	5.85	9.58
Mark J. Walsh	\$20	\$22	\$29
	-16.4	17.0	32.3
Abraham	\$78	\$93	\$97
	-7.9	1.2	6.6
Dunn (WMA)	\$178	\$202	\$250
	0.5	13.7	24.4
Dunn (TOPS)	\$63	\$69	\$81
	-7.6	9.9	22.7
Millburn Ridgefield	\$183	\$192	\$233
	-6.5	8.7	19.4

Note: Total money under management in millions with monthly percent returns.

In my opinion, luck is far and away the most important determinant in our lives. Various events of infinitesimal probability—where you are born, to whom you are born, who you marry, where you take your first job, which school you choose—have an enormous impact on our lives. People tend to deny that luck is an important determinant. We like explanations. For instance, during a basketball game, there are innumerable random events. If a guy hits three in a row, he's really hot. Most of the time, it's random. Of course, the announcer doesn't want to say, "Oh my! Another random event!" That's not exciting, so he'll give a reason. But it is just luck. Not all of our luck is good, but there is more good luck behind our performance than even I like to acknowledge.

Jim Simons⁶⁶



FIGURE 4.33: Crude Oil Futures, February 1993–February 1994 Source: Barchart.com

TABLE 4.8: Trend Follower Performance, June 1993–January 1994

	6-93	7-93	8-93	9-93	10-93	11-93	12-93	1-94
Abraham	-1.2	6.6	-5.3	1.2	-6.6	3.5	12.5	-1.45
Chesapeake	1.0	9.5	5.8	-2.7	-0.1	1.1	5.8	-3.33
JPD	-6.9	10.2	-2.1	-4.1	-2.0	2.7	8.6	-3.9
Rabar	-1.3	14.8	-3.9	-4.1	-6.0	5.6	10.1	-10.5
Saxon	-2.7	20.5	-14.3	-2.1	-1.1	6.6	17.1	-10.8

TABLE 4.9: 1993 Trend Following Returns

Name	% Return
Abraham Trading	+34.29%
Chesapeake Capital	+61.82%
Man Investments	+24.49%
Rabar Market Research	+49.55%
Dunn WMA	+60.25%
John W. Henry	+46.85%
Mark J. Walsh	+74.93%
Eckhardt Trading	+57.95%

“What’s one and one?”

*“I don’t know,” said Alice.
“I lost count.”*

Lewis Carroll⁷²

TABLE 4.10: October–November 1987 Stock Market Crash

Name	% Return
S&P 500	-28%
John W. Henry Original Investment Program	+58.2%
John W. Henry Financials and Metals Portfolio	+69.7%

The S&P lost 29.6 percent of its value during the 1987 crash and took until May 1989 to recover. EAFE Index, Jaguar, and Quantum performances were highly correlated to that of the broad market. Over the full period, Financial and Metals Portfolio earned nearly 260 percent on a composite basis.

John W. Henry⁷³

TABLE 4.11: Trend Following Performance 1987

Success demands singleness of purpose.
Vince Lombardi

Name	% Return
Chesapeake Capital	+38.78%
JPD	+96.80%
Rabar	+78.20%
John W. Henry (Financials and Metals)	+251.00%
Campbell & Company (Financials and Metals)	+64.38%
Millburn Ridgefield	+32.68%
Dunn Capital Management (WMA)	+72.15%
Mark J. Walsh	+143%
Man Investments	+42.54%

A speculative mania is a wonderful thing for our program. We do as much of that as possible. Unfortunately, in saying that, I sound a little bit anti-common man, man on the street. What's bad for the general public is very good for our program.

Toby Crabel

"When you have eliminated the impossible, whatever remains, however improbable, must be the truth."

Sir Arthur Conan Doyle⁷⁴

TIME PERIOD	EVENT	S&P 500 INDEX PERFORMANCE	BARCLAY CTA INDEX PERFORMANCE
1987 Q4	Black Monday	-22.53%	+13.77%
2002 Q3	WorldCom scandal	-17.28%	+6.77%
2001 Q3	9/11	-14.68%	+2.62%
2011 Q3	European debt crisis	-13.87%	+1.65%
1990 Q3	Iraq invades Kuwait	-13.75%	+5.82%
2002 Q2	Dot-com bubble	-13.40%	+8.20%
2001 Q1	Tech bear market	-11.86%	+3.75%
1998 Q3	Russian default/LTCM	-9.95%	+8.95%
2008 Q1	Credit crisis	-9.45%	+6.91%
2008 Q3	Credit crisis/bailout	-8.37%	-3.02%
2000 Q4	Dot-com bubble burst	-7.83%	+9.86%
2015 Q3	Fed policy uncertainty	-6.40%	-0.27%
1999 Q3	Y2K anxiety	-6.25%	-0.79%
1994 Q1	Fed rate hikes	-3.79%	-2.76%
2007 Q4	Credit crisis	-3.33%	+4.07%
2003 Q1	Second Gulf War	-3.15%	+0.72%
1990 Q1	Recession/oil spike	-2.99%	+5.43%

Big money is made in the stock market by being on the right side of the major moves. The idea is to get in harmony with the market. It's suicidal to fight trends. They have a higher probability of continuing than not.

Martin Zweig

Source: Sunrise Capital

Even before he trained with legend Richard Dennis, Jim DiMaria had learned an important trading principle in the less lucrative arena of baseball statistics: The players who score the most runs are home run hitters, not those with consistent batting records. “It’s the same with trading. Consistency is something to strive for, but it’s not always optimal. Trading is a waiting game. You sit and wait and make a lot of money all at once. The profits tend to come in bunches. The secret is to go sideways between the home runs, not lose too much between them.”¹²

“What kind of people are getting rich these days? People like John W. Henry.” That is, people on the nerdly end of the spectrum who have a comfort with both statistical analysis and decision-making in an uncertain environment.

Michael Lewis¹³

When John W. Henry purchased the Boston Red Sox, he understood that a combination of good management and hard science was the most efficient way to run a major league baseball team. As a trend follower, Henry had been exploiting market inefficiencies for decades.

Michael Lewis¹⁴

TABLE 5.1: Babe Ruth versus Dave Kingman

	Babe Ruth	Dave Kingman
At Bats	8,399	6,677
Hits	2,873	1,575
Runs	2,174	901
Home Runs	714	442
Batting Average	.342	.236
Slugging	.690	.478

When the mind is exhausted of images, it invents its own.

Gary Snyder

		Outcome	
		Good	Bad
Process Used to Make the Decision	Good	Deserved Success	Bad Break
	Bad	Dumb Luck	Poetic Justice

FIGURE 7.1: Process versus Outcome²⁵

Always do whatever's next.

George Carlin

Kurtosis is a measure of whether the data are peaked or flat relative to a normal distribution. That is, data sets with high kurtosis tend to have a distinct peak near the mean, decline rather rapidly, and have heavy tails. Data sets with low kurtosis tend to have a flat top near the mean rather than a sharp peak. A uniform distribution would be the extreme case.

National Institute of Standards and Technology²⁶

For such a long time we thought that most data must have a normal distribution and therefore that the mean is meaningful. Much of the world around us is not normal . . . [and] it is so difficult to see the simplest things as they really are. We become so used to our assumptions that we can no longer see them or evidence against them. Instead of challenging our assumptions, we spend our time studying the details, the colors of the threads that we tear from the tapestry of the world. That is why science is hard.²⁸

TABLE 8.1: Compounding Example

	30%	40%	50%
Year 1	\$26,897	\$29,642	\$32,641
Year 2	\$36,174	\$43,933	\$53,274
Year 3	\$48,650	\$65,115	\$86,949
Year 4	\$65,429	\$96,509	\$141,909
Year 5	\$87,995	\$143,039	\$231,609
Year 6	\$118,344	\$212,002	\$378,008
Year 7	\$159,160	\$314,214	\$616,944

Another psychological aspect that drives me to use timing techniques on my portfolio is understanding myself well enough to know that I could never sit in a buy and hold strategy for two years during 1973 and 1974, watch my portfolio go down 48 percent and do nothing, hoping it would come back someday.

Tom Basso

Whenever we see evidence that our rules are even remotely correct, our sense of security is boosted. When we are faced with evidence contrary to our rules, we quickly rationalize it away.³

With the title alone [Dow 36,000] causing hysterics, placing this on your coffee table will elicit your guests to share their best Dot-com horror story. How they invested their \$100,000 second mortgage in Cisco Systems at \$80 after reading about it, waiting for it to become \$500 (as predicted in this very book) only to see it dive to \$17. Just the thought of this book gives me the chuckles.

Amazon Review of Dow 36,000⁴



Al Capone (left) and Frank Mast

SIMEX NIKKEI 225 NEAREST FUTURES—Monthly Chart

**FIGURE 9.1:** Weekly Chart Nikkei 225, 1985–2003 Source:Barchart.com**TABLE 9.1:** 1968 Tech Stocks

Company	1968 High	1970 Low	% Drop	P/E at High
Fairchild Camera	102.00	18.00	-82	443
Teledyne	72.00	13.00	-82	42
Control Data	163.00	28.00	-83	54
Mohawk Data	111.00	18.00	-84	285
Electronic Data	162.00	24.00	-85	352
Optical Scanning	146.00	16.00	-89	200
Itek	172.00	17.00	-90	71
University Computing	186.00	13.00	-93	118

If you have a \$100,000 account and you're going to risk 5 percent, you'd have \$5,000 to lose. If your examination of the charts shows that the price movement you're willing to risk equals \$1,000 per contract, then you can trade five contracts. If you want to risk 10 percent, then do 10 contracts.

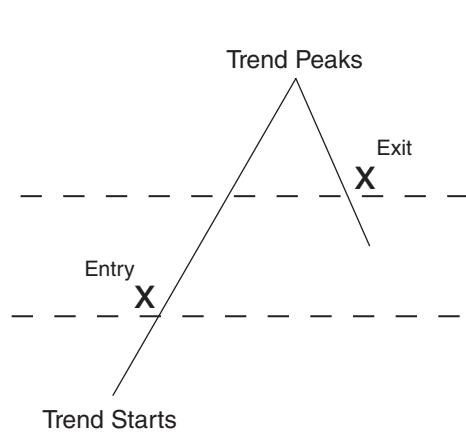
Craig Pauley¹²

TABLE 10.1: AHL Portfolio

Currencies	24.3%
Bonds	19.8%
Energies	19.2%
Stocks	15.1%
Interest rates	8.5%
Metals	8.2%
Agriculturals	4.9%

Large events happen more often than you would expect in systems that exhibit power law distributions.

Department of Physics
UC Santa Barbara



Novice traders trade 5 to 10 times too big. They are taking 5 to 10% risks on a trade they should be taking 1 to 2 percent risks.

Bruce Kovner

FIGURE 10.1: Trend Following Entry/Exit Example: The Middle Meat

Lynx Asset Management, which uses mathematical models to decide when and which securities to buy and sell, posted a 5.1 percent gain on [Brexit] Friday in one of its funds. Capital Fund Management, a \$7 billion firm in Paris, gained 4.2 percent that day in its Discus fund, while Systematica Investments, the \$10.2 billion fund run by Leda Braga, gained 1.35 percent in its main BlueTrend fund.

Bloomberg



The computer model tells us when to get in and when to get out. The computer understands what the price is telling us about the trend of the market. All of the systems are designed to risk modest amounts of capital and to stay with winners as long as possible.

Ken Tropin

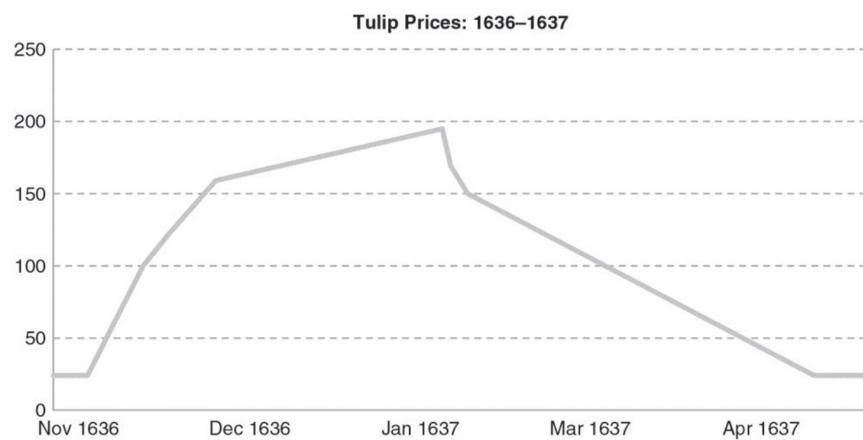


FIGURE 19.1: A standard price index for tulip bulb prices. Source: Thompson (2007).

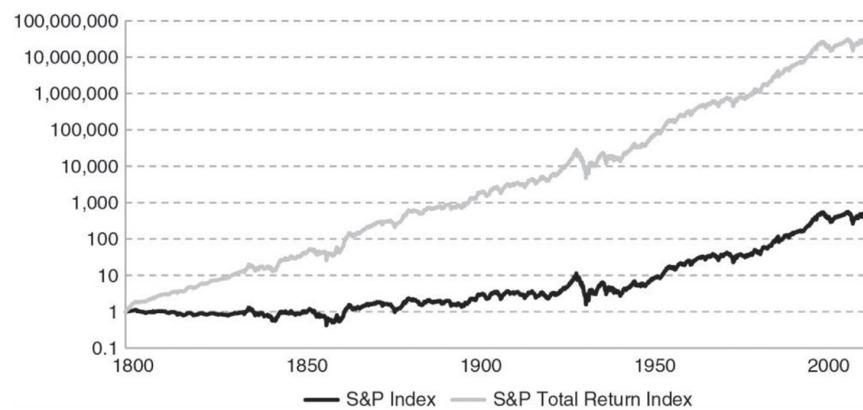


FIGURE 19.2: A historical plot of the S&P 500 Index and S&P 500 Total Return Index from 1800 to 2013 in log scale

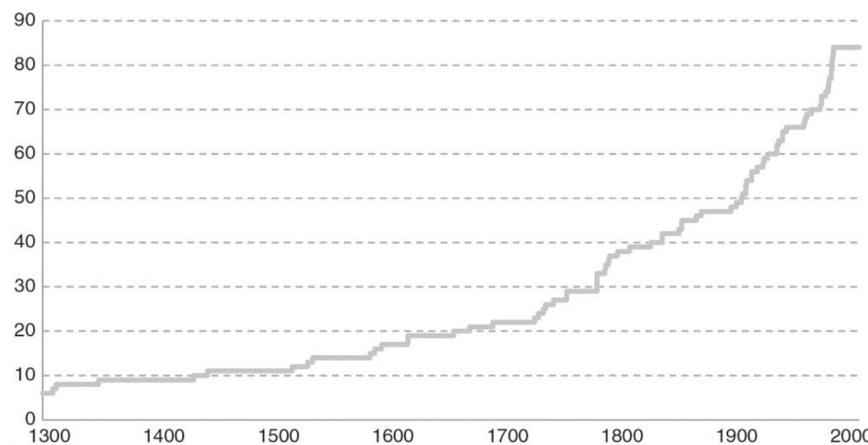


FIGURE 19.3: The number of included markets in the representative trend following program from 1300 to 2013

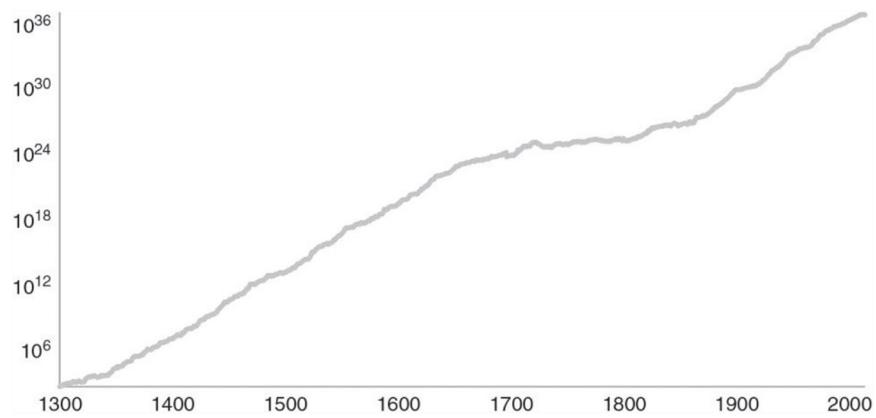


FIGURE 19.4: Cumulative (log) performance of the representative trend following portfolio from 1300 to 2013

TABLE 19.1: Performance Statistics for Buy-and-Hold and Trend Following Portfolios from 1223 to 2013

	Buy-and-Hold Portfolio	Trend Following Portfolio
Average Return (annual)	4.8%	13.0%
Standard Deviation (annual)	10.3%	11.2%
Sharpe Ratio	0.47	1.16

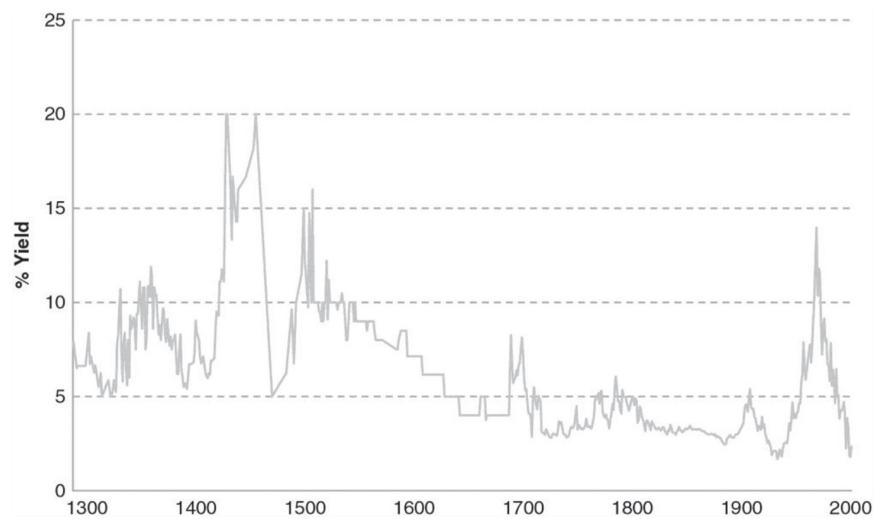


FIGURE 19.5: The GFD Long-Term Government Bond Yield Index from 1300 to 2013
Source: Global Financial Data.

TABLE 19.2: Performance of Trend Following over Different Interest Rate Regimes from 1300 to 2013

	High IR	Low IR	Rising IR	Falling IR
Average Return (annual)	15.5%	10.6%	11.9%	14.4%
Standard Deviation (annual)	9.9%	12.2%	11.2%	11.1%
Sharpe Ratio	1.56	0.86	1.06	1.30

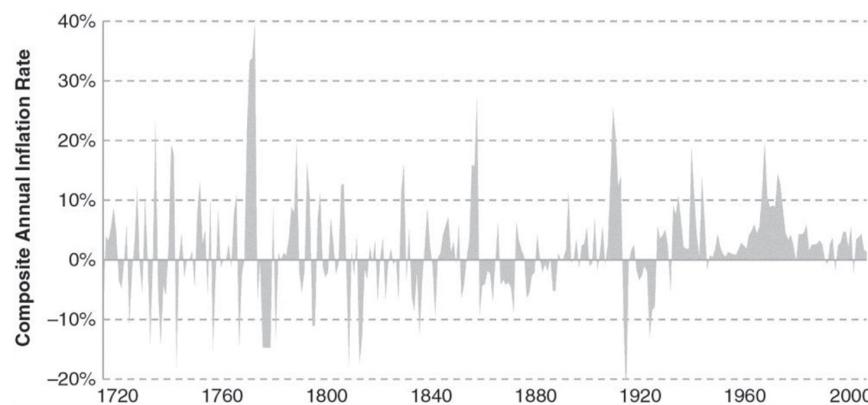


FIGURE 19.6: A composite annual inflation rate for the United States and the United Kingdom from 1720 to 2013. Source: Global Financial Data.

TABLE 19.3: Performance for Trend Following in Different Inflationary Environments during the Period from 1720 to 2013

	Inflation <5%	5% < Inflation < 10%	Inflation >10%
Average Return (annual)	10.4%	10.1%	14.9%
Standard Deviation (annual)	12.0%	9.90%	14.6%
Sharpe Ratio	0.87	1.02	1.02

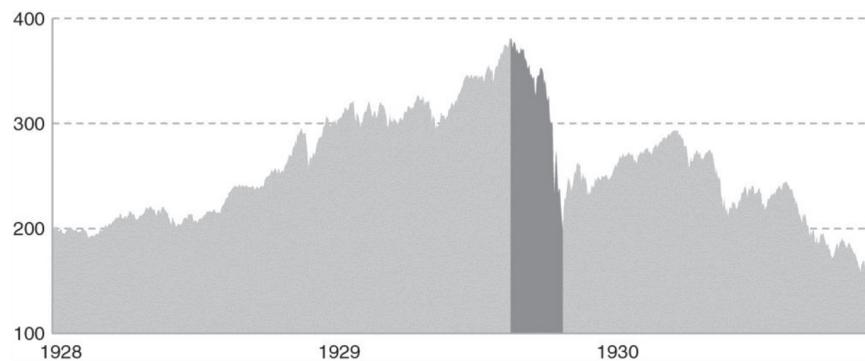


FIGURE 19.7: The Dow Jones Industrial index during the 1929 Wall Street Crash (Black Monday). *Source:* Global Financial Data.

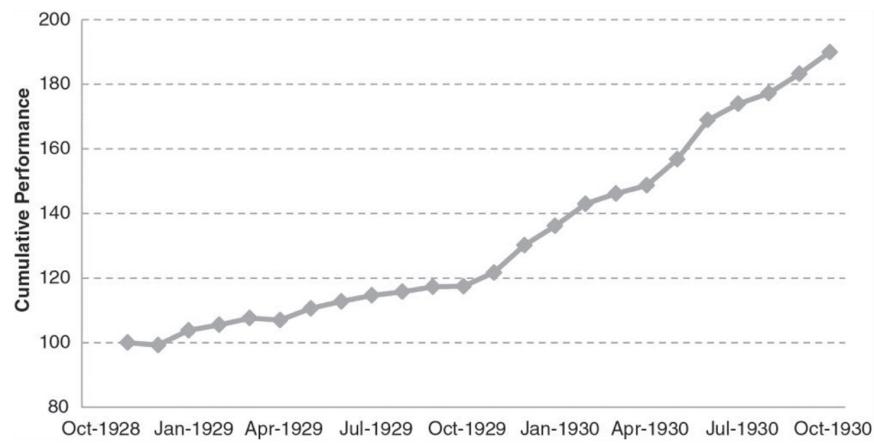


FIGURE 19.8: Cumulative performance for the representative trend following system pre and post the 1929 Wall Street Crash (Black Monday). The data period is October 1928 to October 1930.

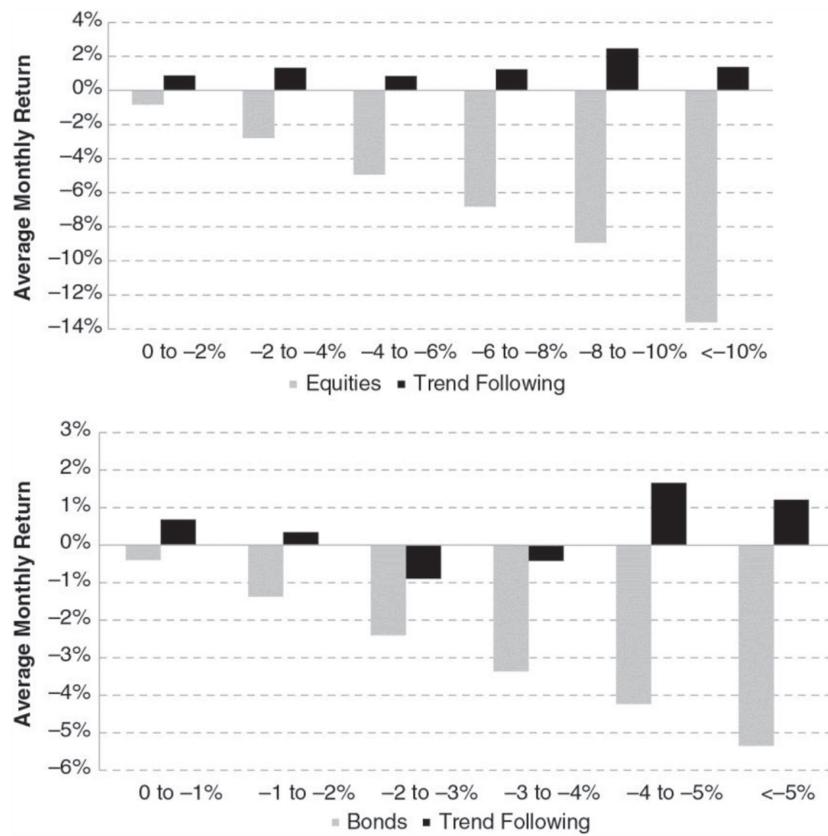


FIGURE 19.9: Average monthly returns for the representative trend following system during down periods in equity and bond portfolios

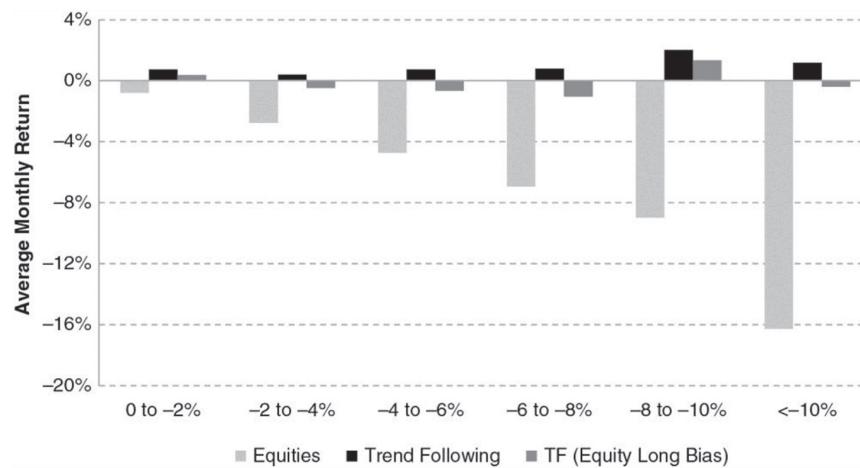


FIGURE 19.10: Average monthly returns for trend following when the equity index is down. Conditional performance is plotted for both with and without a long bias to the equity sector.

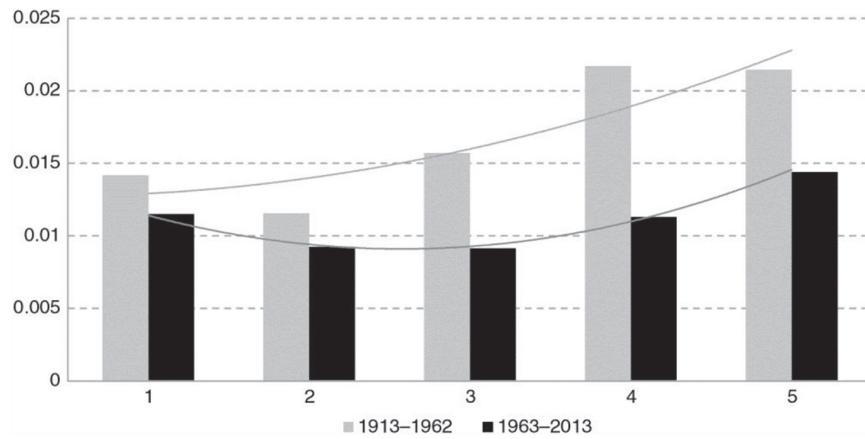


FIGURE 19.11: The “CTA Smile”: Quintile analysis of trend following for 1913–1962 and 1963–2013. Returns are sorted by quintiles of equity performance from 1 (worst) to 5 (best).

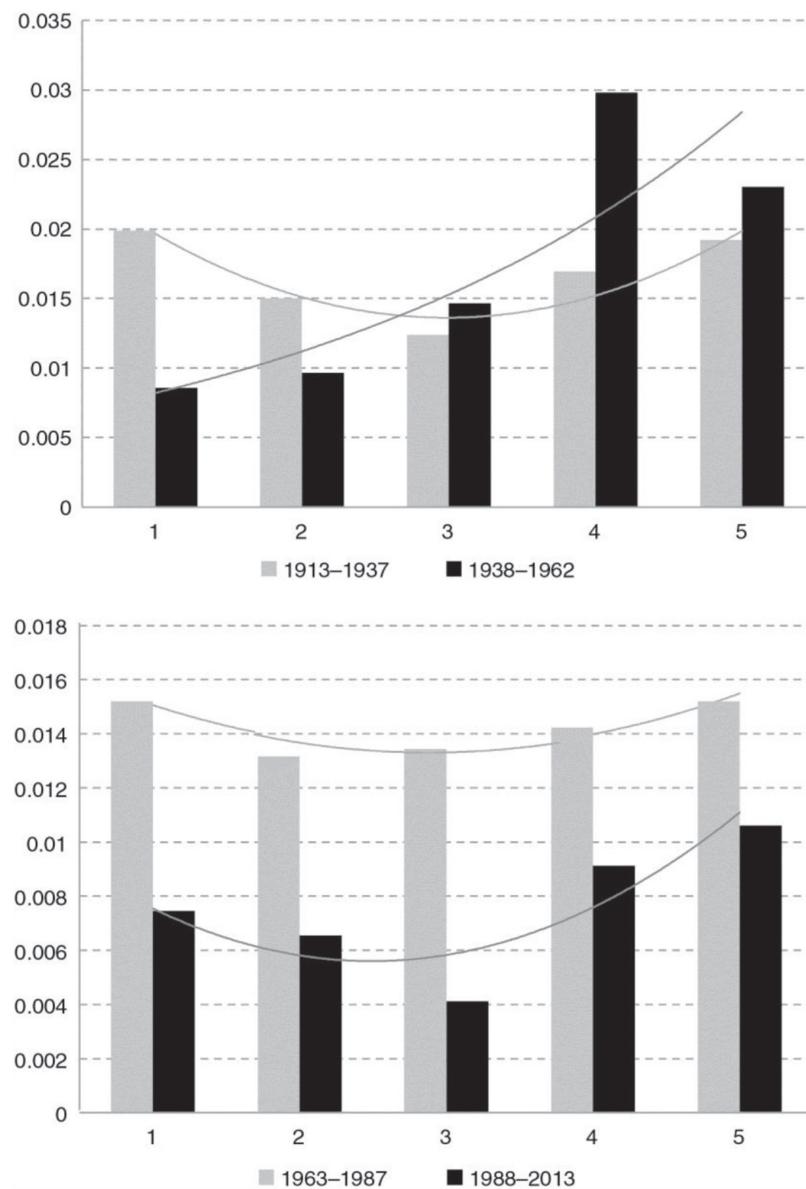


FIGURE 19.12: The “CTA Smile”: Quintile analysis of trend following for 1913–1937, 1938–1962, 1963–1987, and 1988–2013. Returns are sorted by quintiles of equity performance from 1 (worst) to 5 (best).

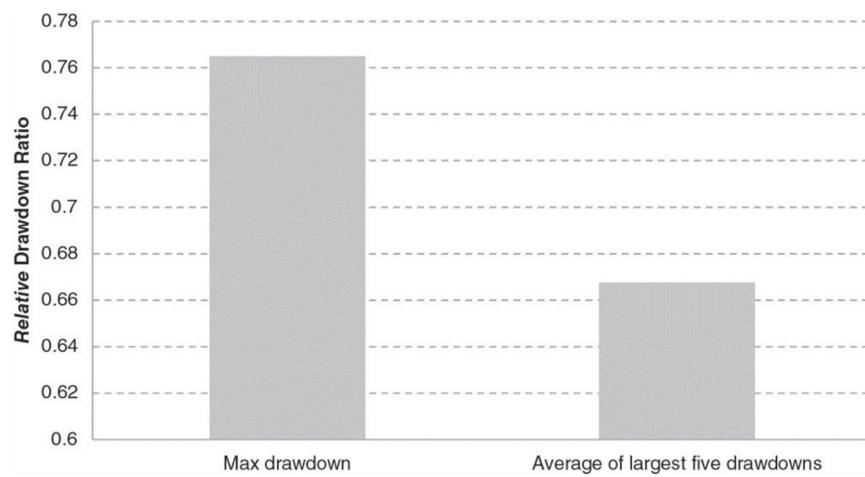


FIGURE 19.13: The maximum and average of the largest five relative drawdowns as a percentage for trend following relative to the buy-and-hold portfolio. The maximum drawdown of trend following is 75 percent of the magnitude of the maximum drawdown for the buy-and-hold portfolio.

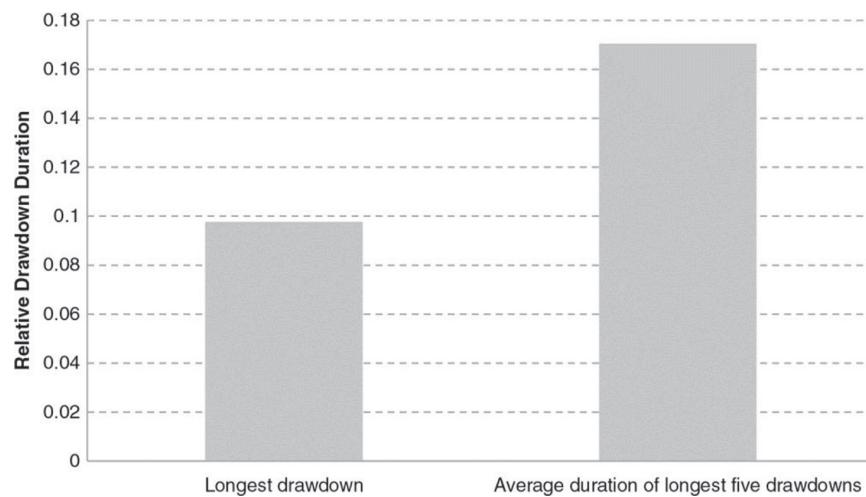


FIGURE 19.14: The relative size of the longest duration and average duration of the longest five drawdowns for trend following relative to the buy-and-hold portfolio. The longest drawdown duration is less than 10 percent of the length of the longest drawdown length for the buy-and-hold drawdown.

TABLE 19.4: Performance for the equity index, bond index, trend following, and combined portfolios. The sample period is 1695–2013 for the equity index and 1300–2013 for the bond index.

	Equity and Trend Following:			Bond and Trend Following:		
	1695–2013			1300–2013		
	Equity	TF	Equity+TF	Bond	TF	Bond+TF
Average Return (annual)	7.85%	10.74%	9.68%	6.57%	12.97%	7.74%
Standard Deviation (annual)	11.28%	12.91%	8.81%	7.31%	11.21%	5.44%
Sharpe Ratio	0.7	0.83	1.1	0.9	1.16	1.42

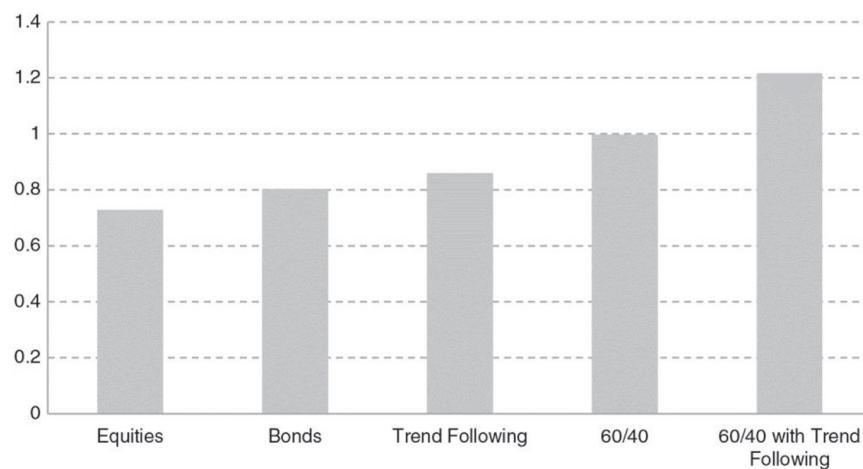


FIGURE 19.15: Sharpe ratios for individual asset classes including equity and combinations of the three asset classes from 1695 to 2013

Appendix: Included Markets and Relevant Assumptions

Sector	Market	Sector	Market
Commodities	Aluminum Brent Crude Oil Butter Cheese Coal Cocoa, NY Cocoa, London Coffee Copper Corn Cotton Crude Oil Feeder Cattle French Gold Coin Mintage in Livres Tournois French Silver Coin Mintage in Livres Tournois Gas Oil-Petroleum Gold Heating Oil	Commodities	Hops Iron Ore Lean Hogs Live Cattle Malt Manufactured Iron Natural Gas Nickel Oat Orange Juice Platinum Rice Rye Silver Soybeans Soyameal Soya oil Sugar #11 Sugar, White Tobacco
Commodities	Wheat Wheat, Hard Red Winter Wood Wool Zinc	Currencies	Canadian Dollars per British Pound CHF/USD Dutch Guilders per British Pound EUR/USD (DEM/USD) GBP/USD
Bonds	Bankers Acceptance Canada Canadian 10-Year Bond Euro-BUND Eurodollar France 10-Year Bond		Hamburg Mark for Paris Francs Hamburg Mark for Vienna Crowns JPY/USD Portugal Escudo per U.S. Dollar Swedish Krona per British Pound

Sector	Market	Sector	Market
	Gilts		Australian SPI200 Index
	Japanese Bond		CAC 40
	Long-Term Government Bond		DAX Index
	Netherlands 10-Year Bond		E-Mini Nasdaq 100 Index
	Short Sterling		E-Mini Russell 2000 Index
	U.K. Consolidated		E-Mini S&P 500 Index
	U.S. 10-year T-Note		FTSE 100 Index
	U.S. 2-year T-Note		Hang Seng
	U.S. 30-year T-Note		Italy All Index
	U.S. 5-year T-Note		Nikkei
	Venice Prestiti		Singapore MSCI Index
Currencies	AUD/USD		Taiwan MSCI Index
	CAD/USD		Tokyo Stock Exchange Index

$\langle \rangle$

$$s_n(t) = \frac{p(t-1) - \langle p \rangle_{n,t-1}}{\sigma_n(t-1)}, \quad (2.1)$$

$$Q_n^a(t) = \sum_{t' < t} \text{sgn}[s_n(t')] \frac{p(t'+1) - p(t')}{\sigma_n(t'-1)}. \quad (2.2)$$

\backslash

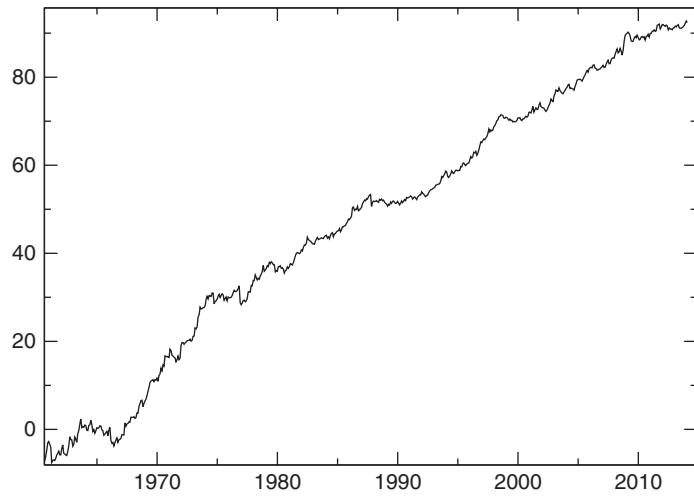


FIGURE 20.1: Fictitious P&L, as Described in Equation 2.2, of a Five-Month Trend-Following Strategy on a Diversified Pool of Futures
 t -statistic = 5.9 (corresponding to a Sharpe ratio = 0.8). Debiased t -statistic = 5.0.

TABLE 20.1: Sharpe Ratio and *t*-Statistic of the Trend (T) and *t*-Statistic of the Debiased Trend (T^*) for Different Time Horizons n (in Months), since 1960

Time-Scale n (Months)	SR (T)	<i>t</i> -Statistic (T)	<i>t</i> -Statistic (T^*)
2	0.8	5.9	5.5
3	0.83	6.1	5.5
5	0.78	5.7	5.0
7	0.8	5.9	5.0
10	0.76	5.6	5.1
15	0.65	4.8	4.5
20	0.57	4.2	3.3

TABLE 20.2: Sharpe Ratio and *t*-Statistic of the Trend (T) for $n = 5$, of the Debiased Trend (T^*) and of the Drift Component μ of the Different Sectors, and the Starting Date for Each Sector

Sector	SR (T)	<i>t</i> -Statistic (T)	<i>t</i> -Statistic (T^*)	SR (μ)	<i>t</i> -Statistic (μ)	Start Date
Currencies	0.57	3.6	3.4	0.05	0.32	May 1973
Commodities	0.8	5.9	5.0	0.33	2.45	Jan 1960
Bonds	0.49	2.8	1.6	0.58	3.3	May 1982
Indexes	0.41	2.3	2.1	0.4	2.3	Jan 1982

TABLE 20.3: Sharpe Ratio and *t*-Statistic of the Trend (T) for $n = 5$, of the Debiased Trend (T^*) and of the Drift Component μ for Each Decade

Period	SR (T)	<i>t</i> -Statistic (T)	<i>t</i> -Statistic (T^*)	SR (μ)	<i>t</i> -Statistic (μ)
1960–1970	0.66	2.1	1.8	0.17	0.5
1970–1980	1.15	3.64	2.5	0.78	2.5
1980–1990	1.05	3.3	2.85	-0.03	-0.1
1990–2000	1.12	3.5	3.03	0.79	2.5
>2000	0.75	2.8	1.9	0.68	2.15

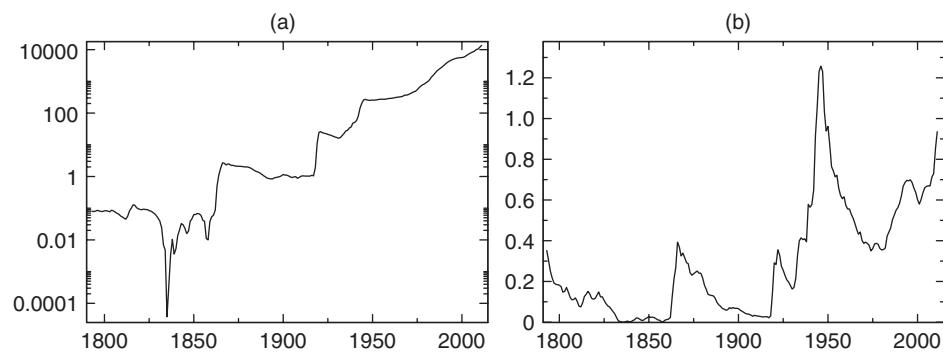


FIGURE 20.2: Global Debt of the U.S. Government (a) in Billions of U.S. Dollars and (b) as a Fraction of GDP

TABLE 20.4: Starting Date of the Central Bank's Monopoly on the Issuance of Notes

Country	Start
United States	1913
Australia	1911
Canada	1935
Germany	1914
Switzerland	1907
Japan	1904
United Kingdom	1844

The Bank of England does not have this monopoly in Scotland and Ireland, but regulates the commercial banks that share this privilege.

TABLE 20.5: Starting Date of the Spot Index Monthly Time Series for Each Country

Country	Start
United States	1791
Australia	1875
Canada	1914
Germany	1870
Switzerland	1914
Japan	1914
United Kingdom	1693

TABLE 20.6: Starting Date of the Spot Price for Each Commodity

Commodity	Start
Crude oil	1859
Natural gas	1986
Corn	1858
Wheat	1841
Sugar	1784
Live cattle	1858
Copper	1800

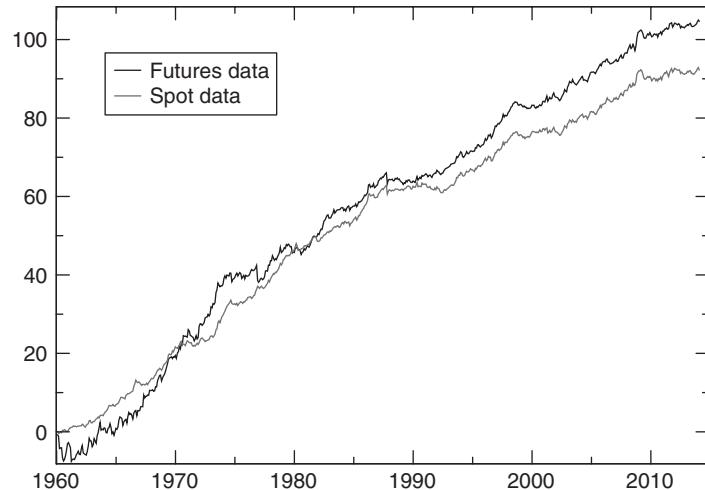


FIGURE 20.3: Trend on Spot and on Futures Prices

The overall agreement since the late 1960s (when the number of traded futures contracts becomes significant) is very good, although the average slope on spots is slightly smaller, as expected.

TABLE 20.7: Correlation between Spot and Futures Trend Following Strategies

Sector	Spot–Future Correlation
Commodities	0.65
Bonds	0.91
Indexes	0.92

Even though the “cost of carry” plays an important role for commodities, the trends are still highly correlated.

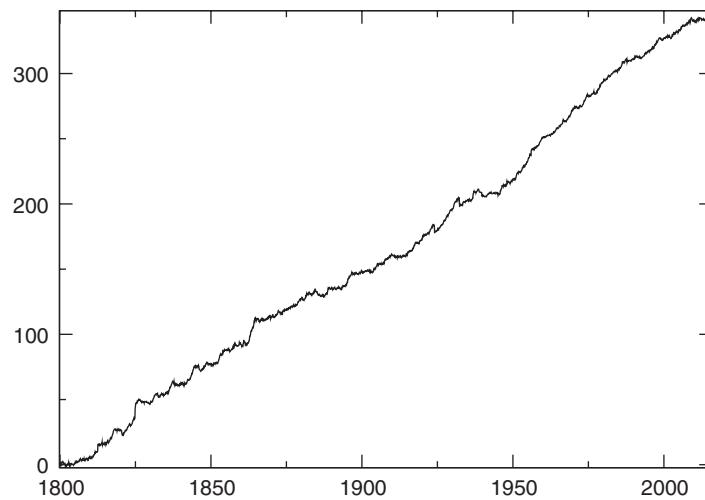


FIGURE 20.4: Aggregate Performance of the Trend on All Sectors
 t -statistic = 10.5. Debiased t -statistic = 9.8. Sharpe ratio = 0.72.

TABLE 20.8: Sharpe Ratio and *t*-Statistic of the Trend (T), of the Debiased Trend (T^*) and of the Drift Component μ of the Different Sectors, with the Starting Date for Each Sector

Sector	SR (T)	<i>t</i> -Statistic (T)	<i>t</i> -Statistic (T^*)	SR (μ)	<i>t</i> -Statistic (μ)	Start Date
Currencies	0.47	2.9	2.9	0.1	0.63	1973
Commodities	0.28	4.1	3.1	0.3	4.5	1800
Bonds	0.4	3.9	2.7	-0.1	-1	1918
Indexes	0.7	10.2	6.3	0.4	5.7	1800

TABLE 20.9: Sharpe Ratio and *t*-Statistic of the Trend and of the Drift μ over Periods of Fifty Years

Period	SR (T)	<i>t</i> -Statistic (T)	SR (μ)	<i>t</i> -Statistic (μ)
1800–1850	0.6	4.2	0.06	0.4
1850–1900	0.57	3.7	0.43	3.0
1900–1950	0.81	5.7	0.34	2.4
After 1950	0.99	7.9	0.41	2.9

$$\Delta(t) = a + bs^* \tanh\left(\frac{s_n(t)}{s^*}\right) + \xi(t), \quad (4.1)$$

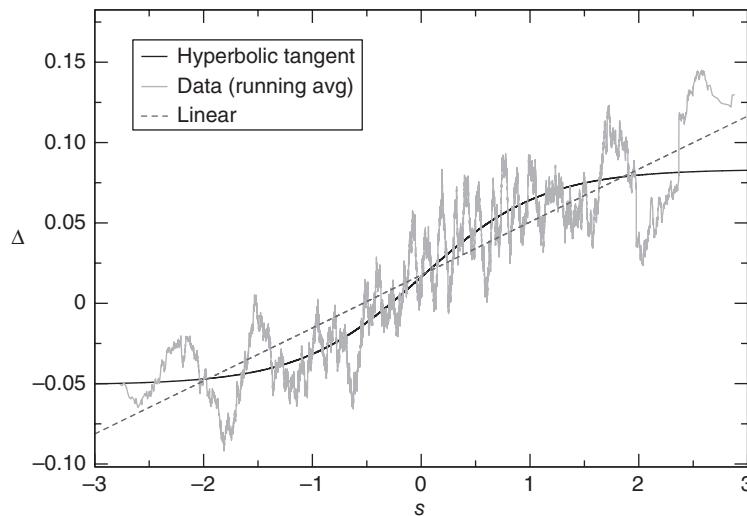


FIGURE 20.5: Fit of the Scatter Plot of $\Delta(t) = p(t+1) - p(t)$ as a Function of $s_n(t)$, for $n = 5$ Months, and for Futures Data Only

We do not show the 240,000 points on which the fits are performed, but rather show a running average over 5,000 consecutive points along the x-axis. We also show the results of a linear and hyperbolic tangent fit. Note the positive intercept $a \approx 0.02$, which indicates the overall positive long-only bias. The best fit to the data is provided by the hyperbolic tangent, which suggests a saturation of the signal for large values.

which recovers the linear regime when $|s_n| \ll s^*$ but saturates for $|s_n| > s^*$. This nonlinear fit is found to be better than the cubic fit as well as the linear fit, as it prefers a finite value $s^* \approx 0.89$ and now $b \approx 0.075$ (a linear fit is recovered in the limit $s^* \rightarrow \infty$). Interestingly, the values of a , b , and s^* hardly change when n increases from 2.5 months to 10 months.

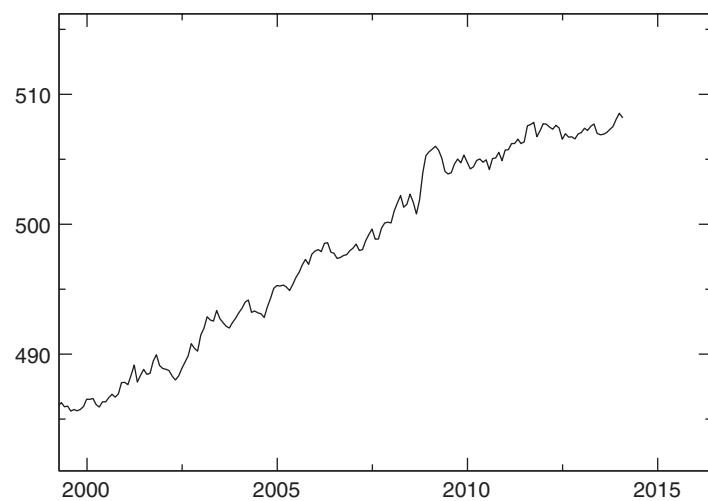


FIGURE 20.6: Recent Performance of the Trend

Since 2011, the strategy is virtually flat.

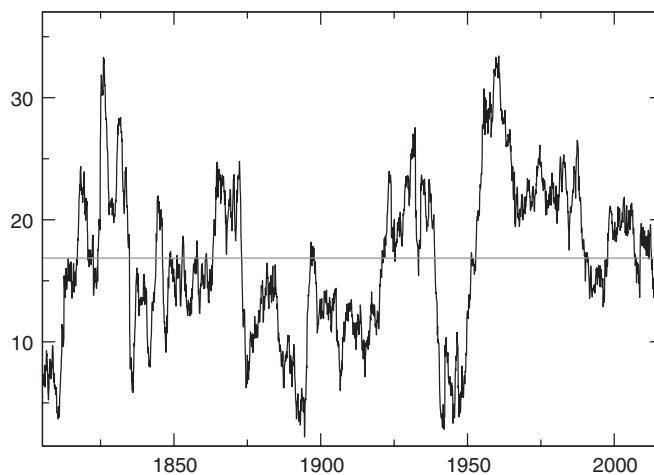


FIGURE 20.7: Ten-Year Cumulated Performance of the Trend
(Arbitrary Units)

The horizontal line is the historical average.

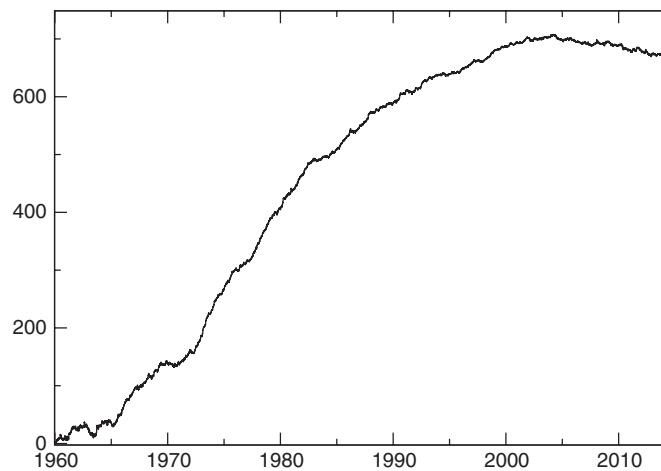


FIGURE 20.8: Performance of a Three-Day Trend on Futures
Contracts since 1970

The effect seems to have completely disappeared since 2003 (or has maybe even inverted).

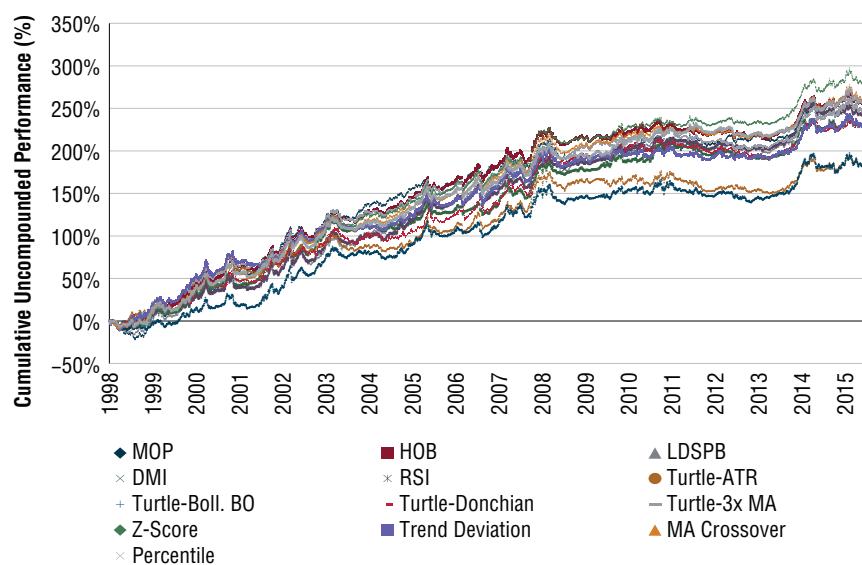


FIGURE 21.1: Simulated Performance of Trend Following Models: January 1999 to June 2016

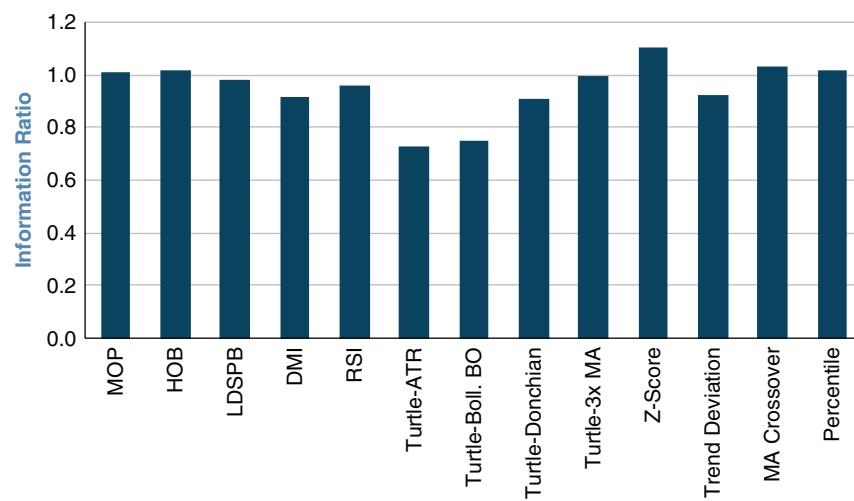


FIGURE 21.2: Simulated Risk-Adjusted Performance of Trend Following Models:
January 1999

	MOP	HOB	LDSPB	DMI	RSI	Turtle-ATR	Turtle-Boll. BO	Turtle-Donchian	Turtle-3x MA	Z-Score	Trend Deviation	MA Crossover	Percentile
MOP	100%	86%	90%	67%	75%	67%	71%	67%	81%	86%	80%	83%	85%
HOB		100%	95%	88%	94%	90%	89%	90%	94%	95%	93%	97%	95%
LDSPB			100%	81%	88%	81%	83%	82%	90%	92%	87%	94%	91%
DMI				100%	94%	90%	92%	90%	86%	88%	87%	89%	88%
RSI					100%	92%	92%	93%	92%	92%	91%	94%	94%
Turtle-ATR						100%	91%	92%	89%	88%	89%	91%	89%
Turtle-Boll. BO							100%	88%	88%	89%	88%	90%	88%
Turtle-Donchian								100%	85%	91%	83%	92%	90%
Turtle-3x MA									100%	90%	96%	94%	93%
Z-Score										100%	89%	97%	96%
Trend Deviation											100%	93%	92%
MA Crossover												100%	95%
Percentile													100%

FIGURE 21.3: Simulated Correlations between Trend Following Models: Jan 1999 to Jun 2016

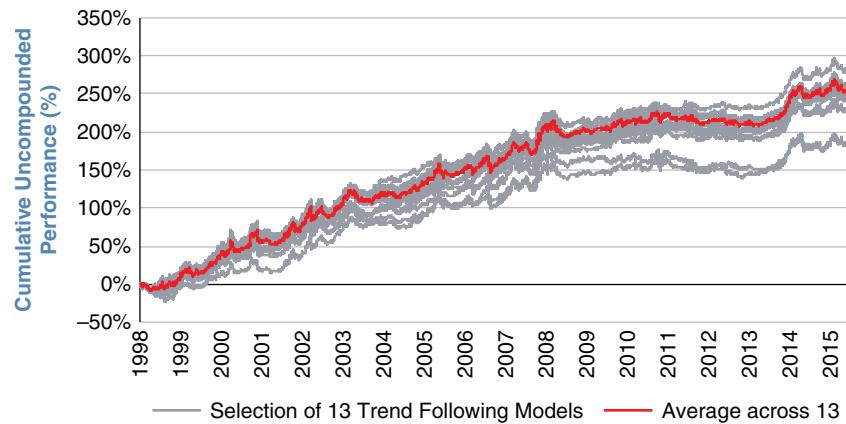


FIGURE 21.4: Simulated Performance of Trend Following Models and Average across all 13: Jan 1999 to Jun 2016

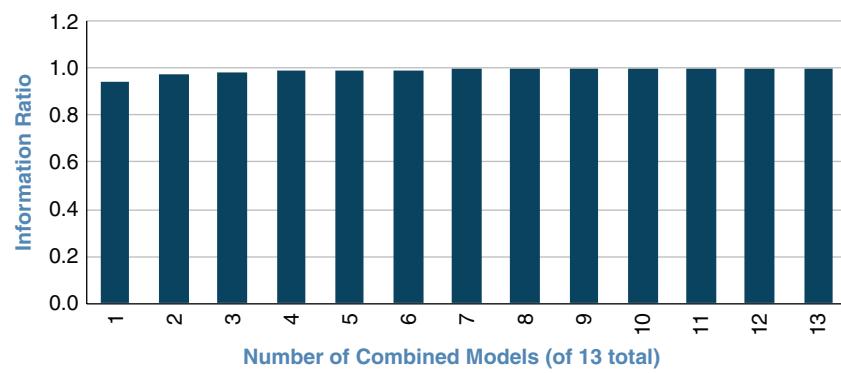


FIGURE 21.5: Simulated Average Information Ratios from Combining Different Trend Following Models: January 1999 to June 2016

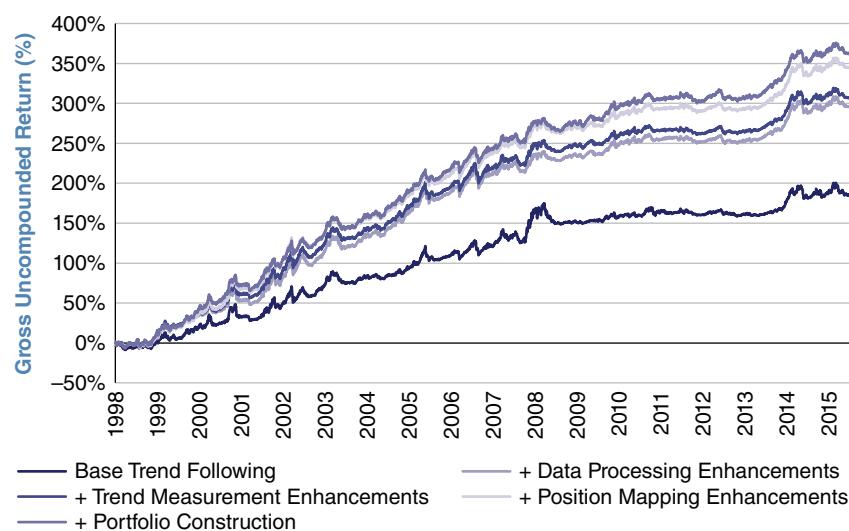


FIGURE 21.6: Aspect's Trend Following Model Simulated Performance Improvements: January 1999 to June 2016

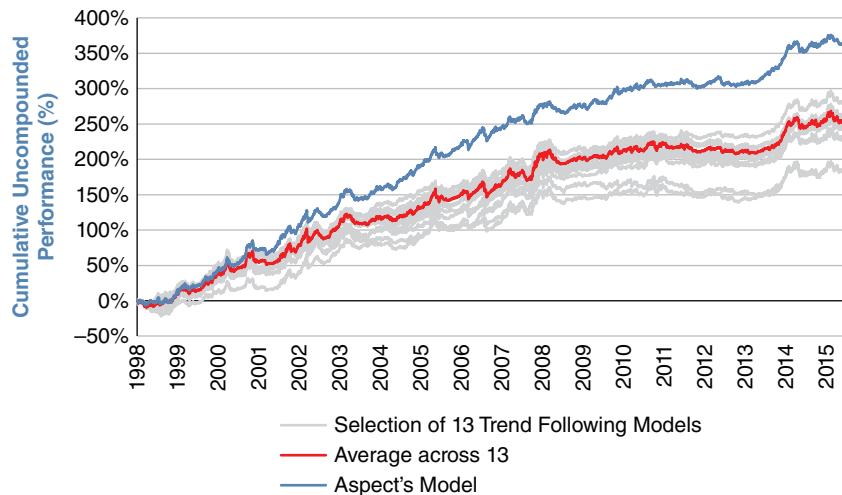


FIGURE 21.7: Simulated Performance of Trend Following Models versus Aspect's Trend Following Model: January 1999 to June 2016

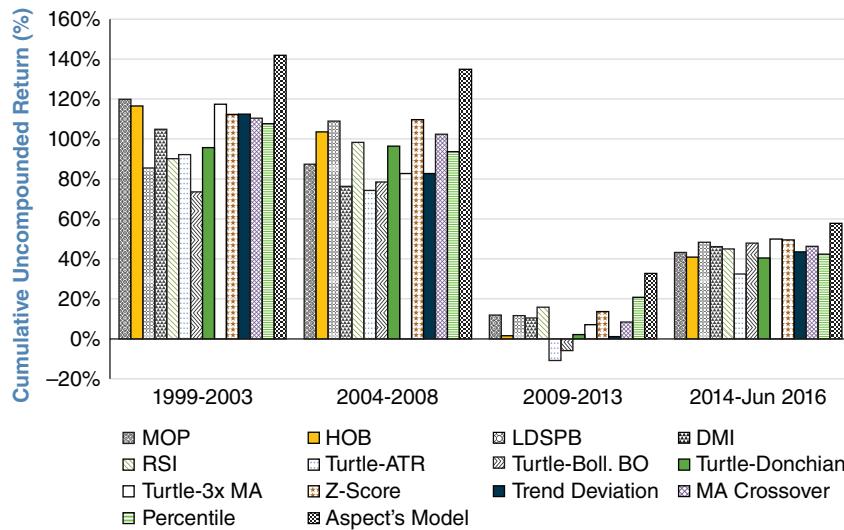


FIGURE 21.8: Simulated Performance of Trend Following Models versus Aspect's Trend Following Model: January 1999 to June 2016

Finally we demonstrate that Aspect's model cannot be improved by adding any of the 13 models considered earlier. Figure 21.9 shows the effect on the risk-adjusted return when Aspect's trend following model is blended with any of the other 13 models.

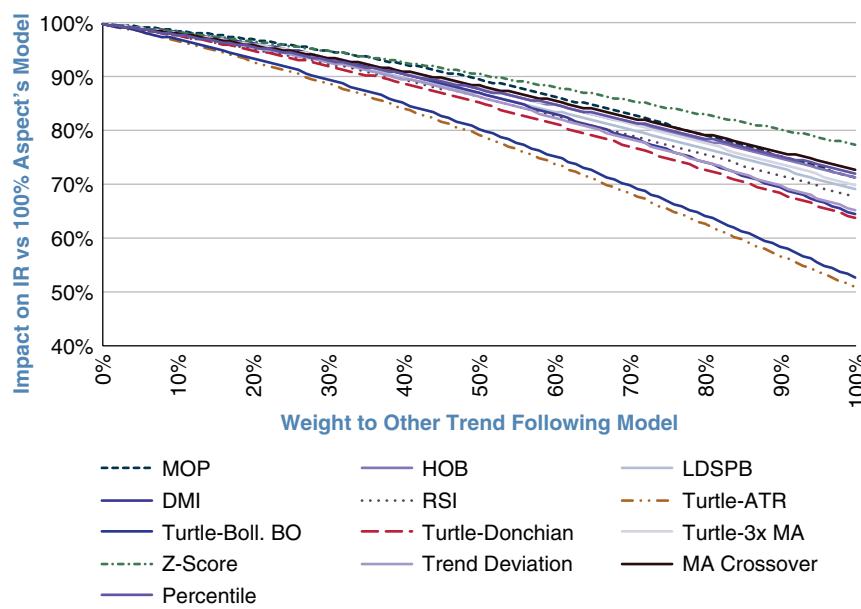


FIGURE 21.9: Simulated Impact on Aspect's Model Information Ratio from Adding Other Trend Following Models: Jan 1999 to Jun 2016

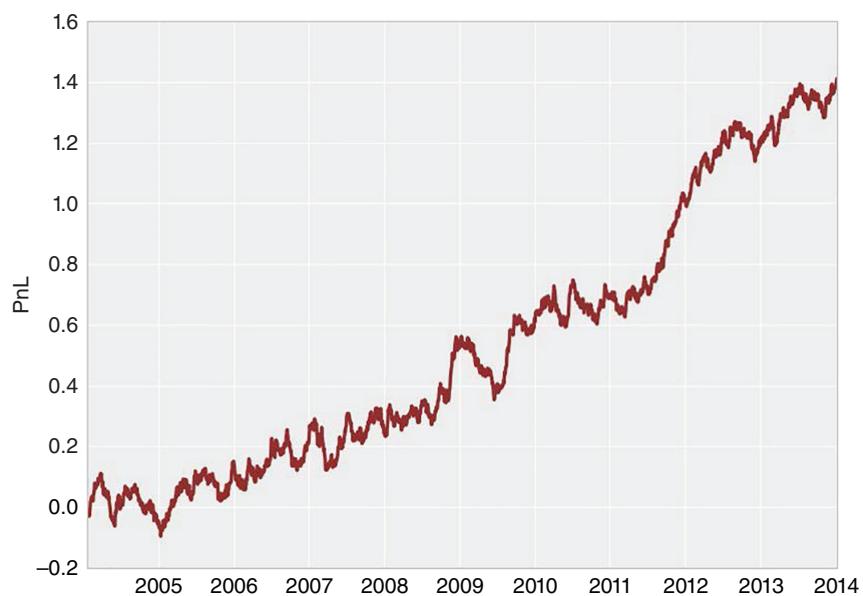


FIGURE 22.1: A Candidate Trading Strategy

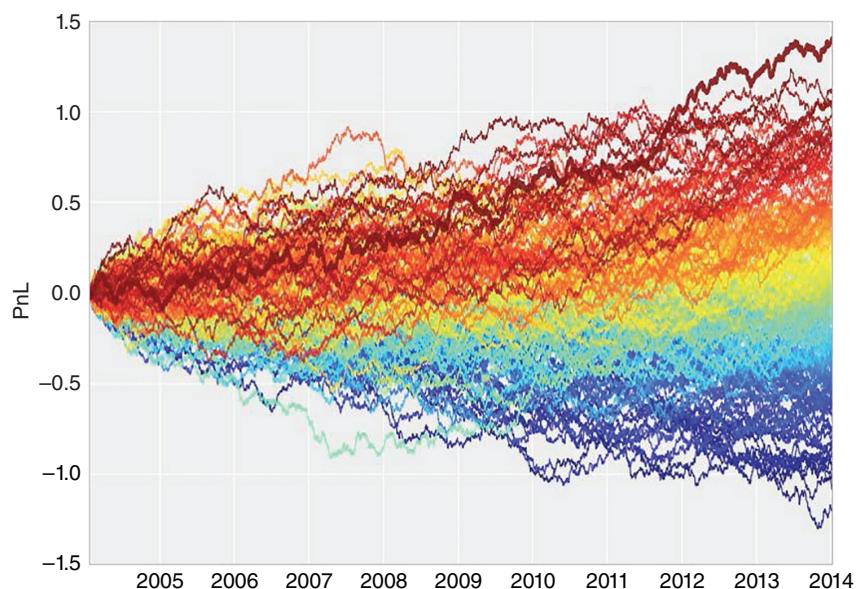


FIGURE 22.2: Two Hundred Randomly Generated Trading Strategies

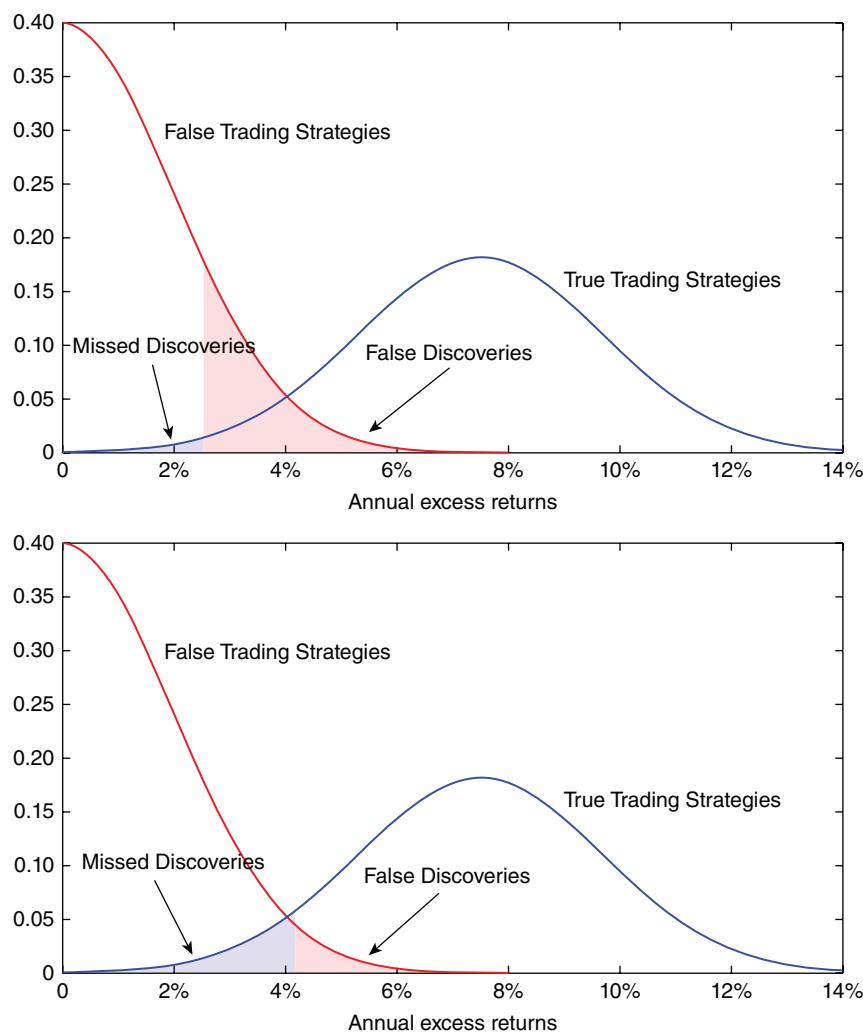


FIGURE 22.3: Panel A: False Trading Strategies, True Trading Strategies.
Panel B: False Trading Strategies, True Trading Strategies.

50 Day Channel Breakout (CB50):

C = close of today

HC(50) = highest close in the last 50 days (including today)

LC(50) = lowest close in the last 50 days (including today)

Long Signal: If C = HC50 then go Long tomorrow market on open

Short Signal: If C = LC50 then go Short tomorrow market on open

10x100 Simple Moving Average Crossover (MA10x100):

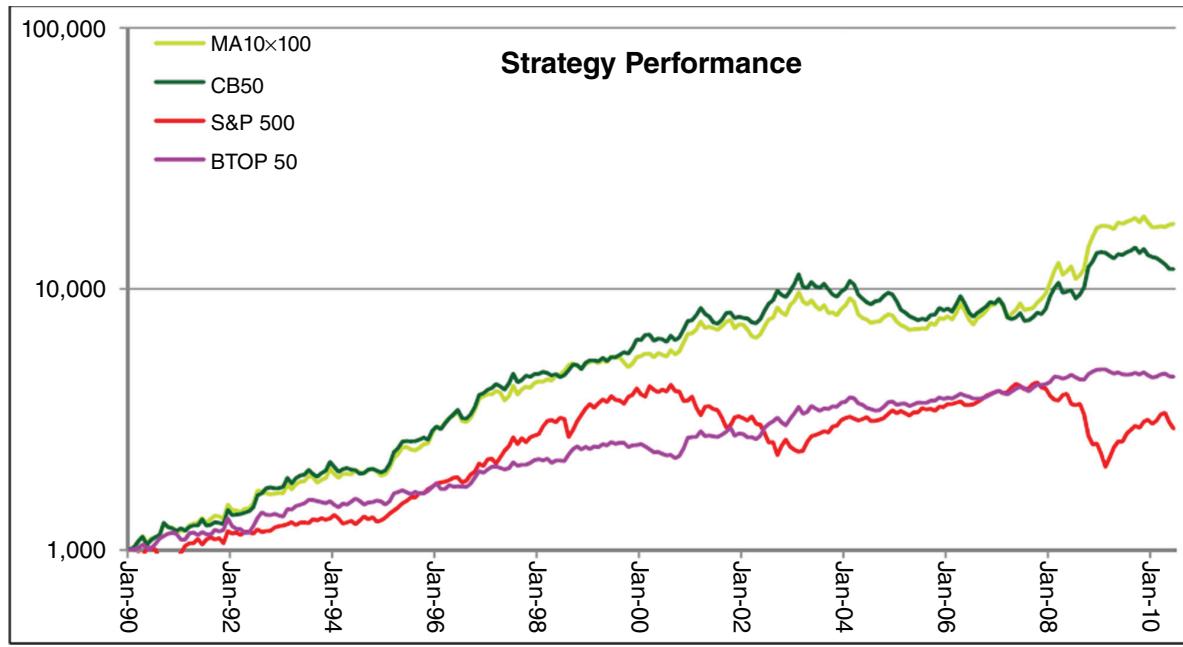
MA10 = average of the last 10 closes (including today)

MA100 = average of the last 100 closes (including today)

Long Signal: If MA10 > MA100 then go Long tomorrow market on open

Short Signal: If MA10 < MA100 then go Short tomorrow market on open

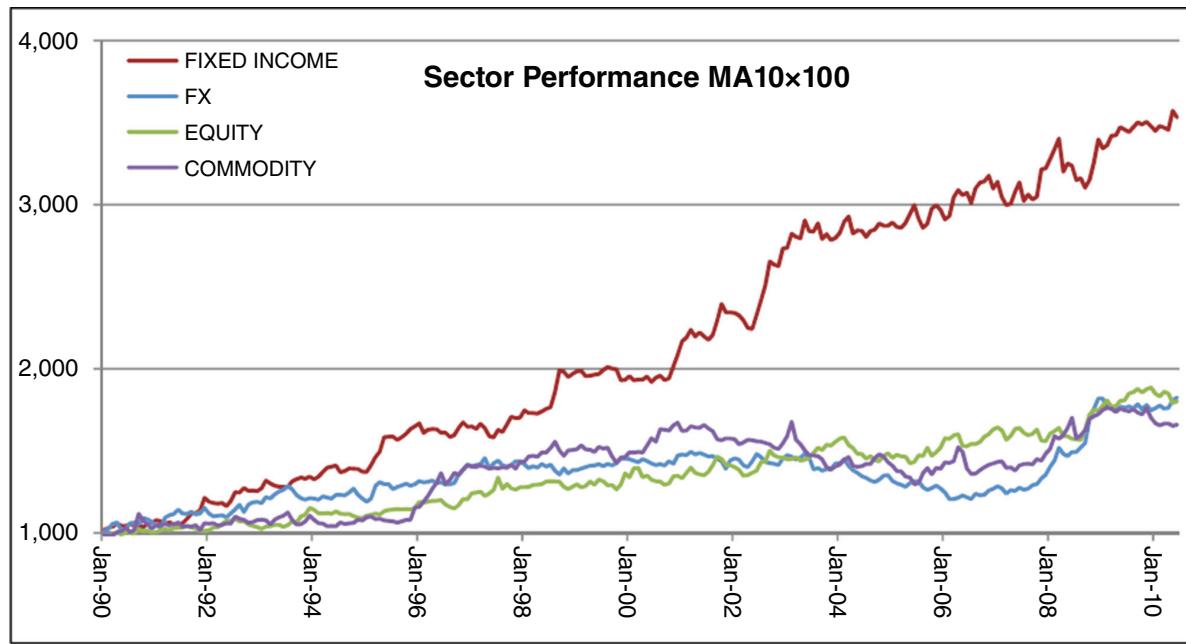
Foreign Exchange	Fixed Income	Equity Index	Commodity
EUR/USD	U.S. Bond (30Y)	S&P 500	Light Crude Oil
GBP/USD	U.S. Note (10Y)	Nasdaq 100	Heating Oil
EUR/GBP	German Bund (10Y)	Euro Stoxx 50	Natural Gas
EUR/JPY	Japanese Govt Bond	Dax	Gold
USD/JPY	Eurodollar (3M)	Nikkei 225	Silver
GBP/JPY	Euribor (3M)	Hang Seng	Corn

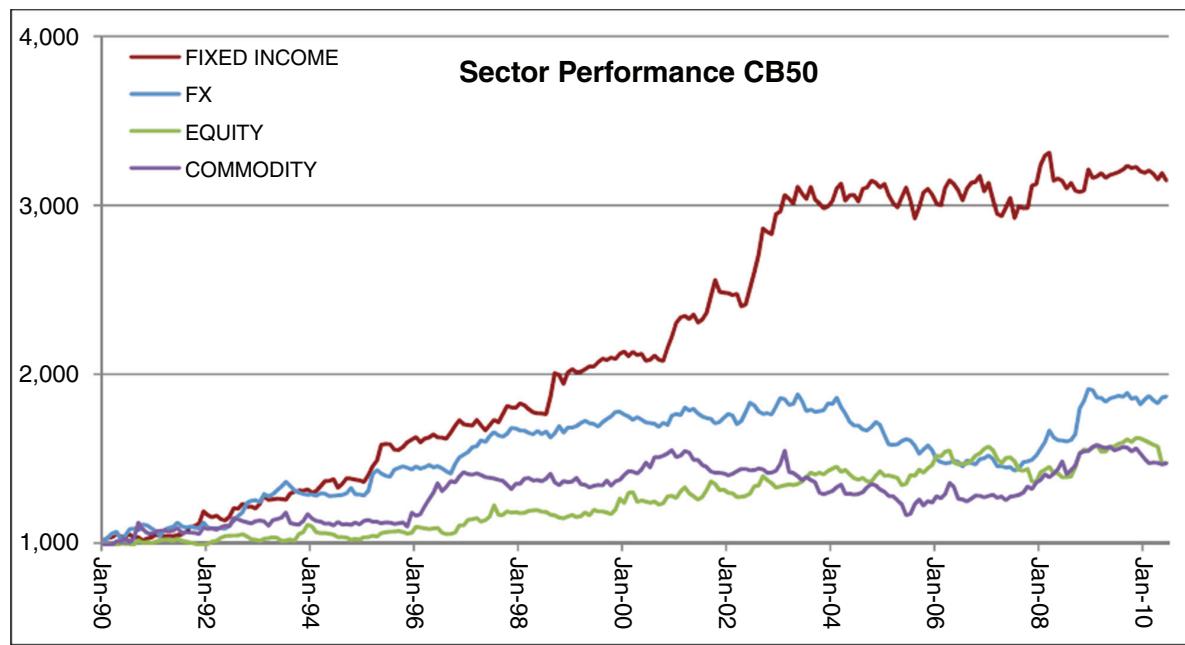


The above logarithmic scale chart shows cumulative NAV curves for the two trend following strategies, the SP500 and the BTOP50.

	MA10x100	MA10x100 (with fees)	CB50	CB50 (with fees)	SP500	BTOP50
Annual Compounded Return	15.1%	11.2%	12.8%	9.5%	5.4%	7.7%
Worst Peak-to-Trough Drawdown	-28.2%	-24.3%	-33.7%	-29.9%	-52.6%	-13.3%
Annual Standard Deviation	15.8%	12.6%	15.3%	12.2%	15.0%	9.5%
Annual Return/Max P/T Drawdown	0.53	0.46	0.38	0.32	0.10	0.58
Sharpe Ratio (Avg RFR = 4.26%)	0.68	0.55	0.56	0.43	0.07	0.37

	MA10x100	MA10x100 (with fees)	CB50	CB50 (with fees)	SP500	BTOP50
Skew	0.25	0.25	0.29	0.29	-0.65	0.43
Correlation to SP500	-14.3%	-14.3%	-12.4%	-12.4%	NA	-11.9%
Alpha to SP500	11.0%	7.1%	8.7%	5.3%	NA	3.6%
Correlation to BTOP50	70.2%	70.2%	68.2%	68.2%	-11.9%	NA
Alpha to BTOP50	6.7%	3.7%	4.8%	2.2%	1.8%	NA
Beta to BTOP50	1.16	0.93	1.09	0.88	-0.19	NA
Avg # of Trades Per Year Per Market	4.0	4.0	3.0	3.0	NA	NA
Avg # of Days Per Trade	60	60	81	81	NA	NA



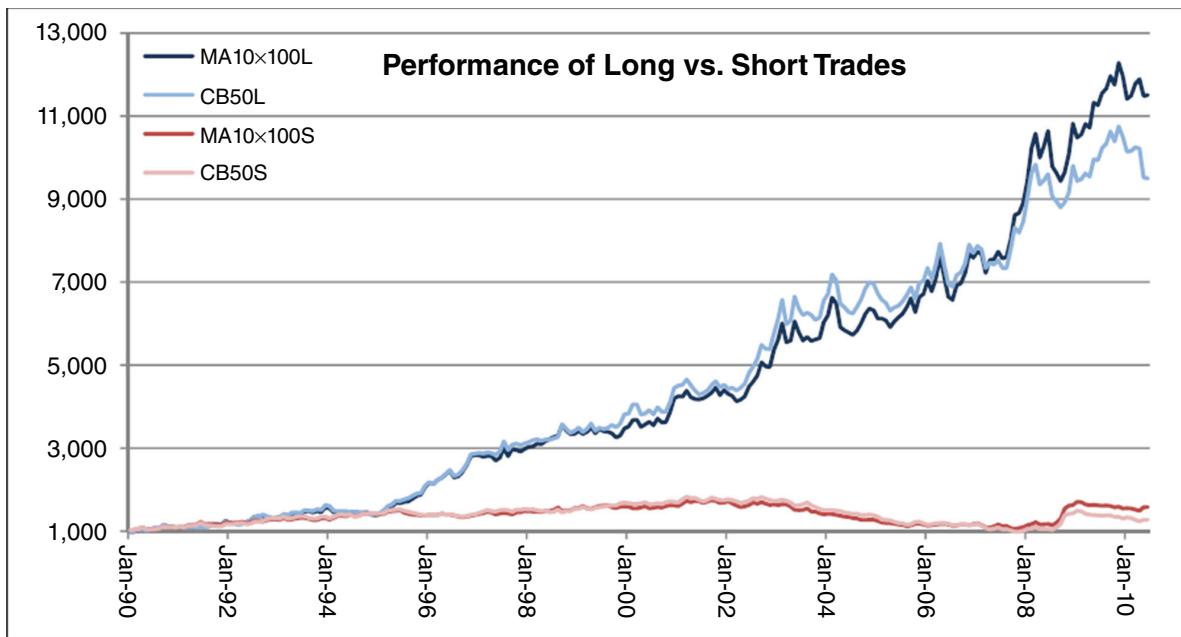


	MA10x100 FX	CB50 FX	MA10x100 Fixed Income	CB50 Fixed Income	MA10x100 Equity	CB50 Equity	MA10x100 Commodity	CB50 Commodity
Annual Compounded Return	3.0%	3.1%	6.3%	5.7%	2.9%	1.9%	2.5%	1.9%
Worst Peak-to-Trough Drawdown	-19.2%	-24.0%	-8.8%	-7.9%	-9.9%	-13.2%	-22.7%	-24.8%
Annual Standard Deviation	6.5%	6.2%	6.6%	6.6%	6.0%	6.1%	7.4%	7.0%
Annual Return/Max P/T Drawdown	0.15	0.13	0.72	0.73	0.29	0.15	0.11	0.08
Sharpe Ratio (Avg RFR = 4.26%)	0.29	0.33	0.80	0.71	0.31	0.14	0.20	0.12

(Continued)

	MA10x100 FX	MA10x100 CB50 FX	CB50 Fixed Income	MA10x100 Equity	CB50 Equity	MA10x100 Commodity	CB50 Commodity
Skew	0.65	0.73	0.41	0.51	0.18	0.14	0.15
Correlation to SP500	-11.2%	-8.1%	-11.2%	-6.5%	-2.0%	-1.9%	-9.1%
Alpha to SP500	2.0%	2.1%	5.3%	4.7%	1.9%	0.9%	1.5%
Correlation to BTOP50	53.3%	50.1%	53.2%	51.4%	33.9%	32.2%	27.9%
Alpha to BTOP50	0.6%	0.9%	4.0%	3.4%	1.1%	0.1%	0.7%
Beta to BTOP50	0.36	0.33	0.37	0.36	0.21	0.21	0.22
Avg # of Trades Per Year Per Market	4.7	3.2	3.7	3.0	4.0	3.0	4.2
Avg # of Days Per Trade	55	79	65	81	61	78	59
							77

Individual Sector portfolios are assumed to be funded at 25%. If they were each fully funded, their annual compounded returns would each be higher by 3.19%.

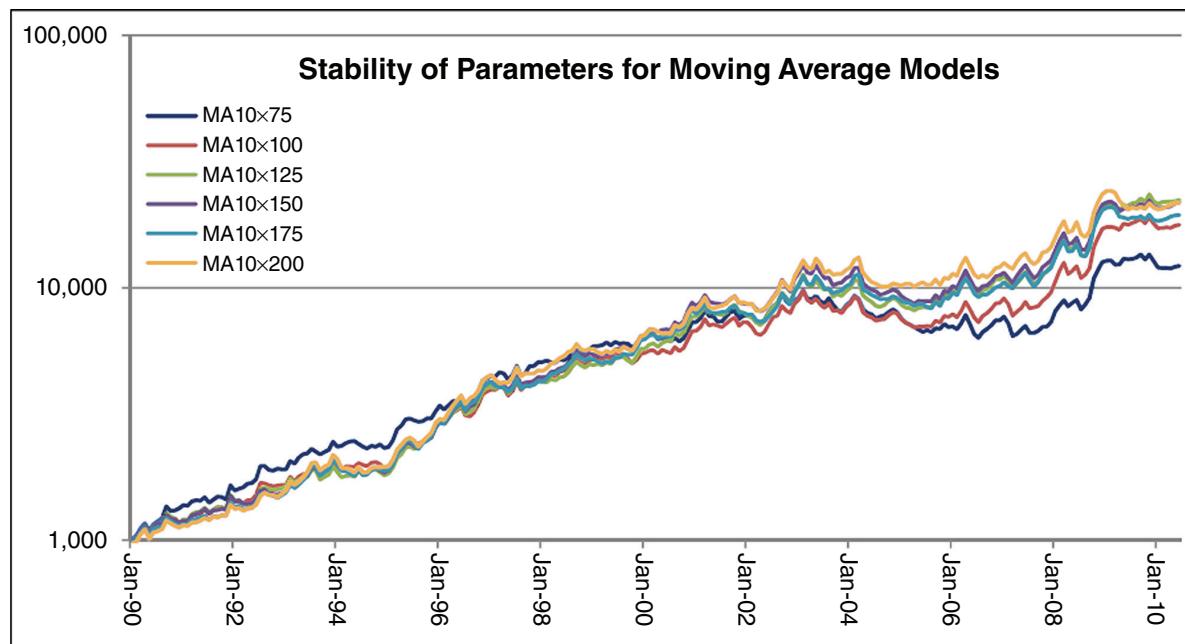


	MA10x100	MA10x100 Long	MA10x100 Short	CB50	CB50 Long	CB50 Short
Annual Compounded Return	15.1%	12.7%	2.3%	12.8%	11.6%	1.2%
Worst Peak-to-Trough Drawdown	-28.2%	-13.7%	-39.9%	-33.7%	-13.6%	-46.1%
Annual Standard Deviation	15.8%	12.2%	8.9%	15.3%	12.0%	8.7%
Annual Return/Max P/T Drawdown	0.53	0.92	0.06	0.38	0.85	0.03
Sharpe Ratio (Avg RFR = 4.26%)	0.68	0.87	0.02	0.56	0.79	-0.11

(Continued)

	MA10x100	MA10x100 Long	MA10x100 Short	CB50	CB50 Long	CB50 Short
Skew	0.25	0.00	1.66	0.29	0.09	1.56
Correlation to SP500	-14.3%	12.7%	-42.9%	-12.4%	14.1%	-41.3%
Alpha to SP500	11.0%	10.4%	0.4%	8.7%	9.4%	-0.7%
Correlation to BTOP50	70.2%	65.7%	34.7%	68.2%	64.0%	31.5%
Alpha to BTOP50	6.7%	7.6%	-1.0%	4.8%	6.7%	-1.9%
Beta to BTOP50	1.16	0.84	0.32	1.09	0.81	0.29
Avg # of Trades Per Year Per Market	4.0	2.0	2.0	3.0	1.5	1.5
Avg # of Days Per Trade	60	67	54	81	74	88

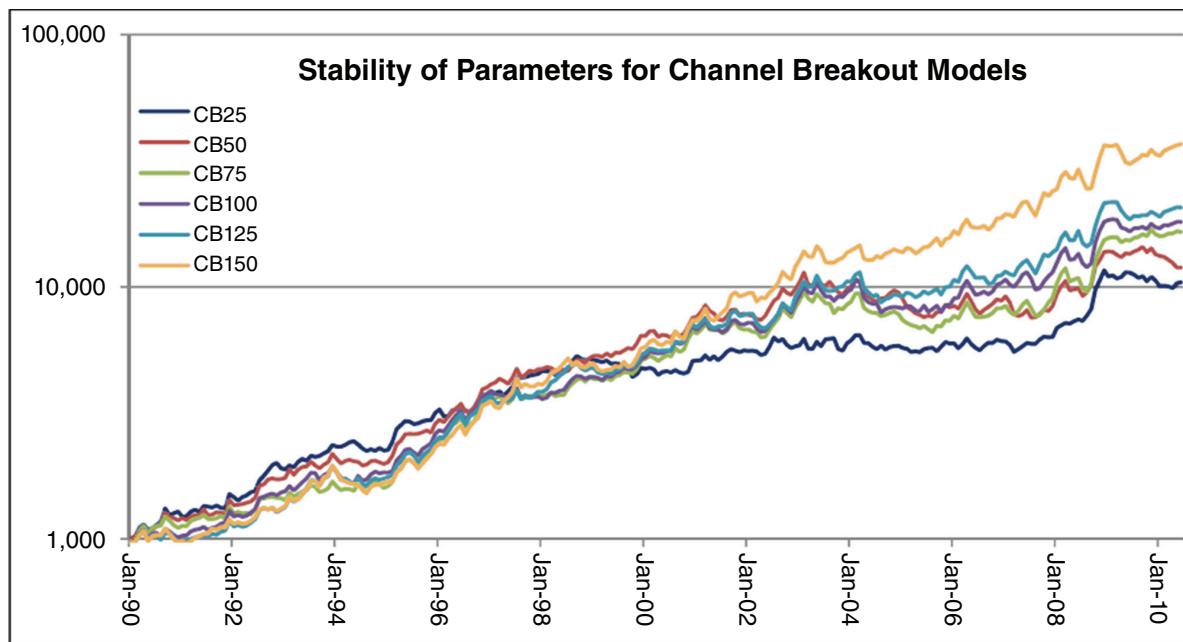
Individual Long and Short portfolios are assumed to be funded at 50%; if they were fully funded their annual compounded returns would each be higher by 2.13%.



	MA10x75	MA10x100	MA10x125	MA10x150	MA10x175	MA10x200
Annual Compounded Return	13.0%	15.1%	16.3%	16.2%	15.6%	16.2%
Worst Peak-to-Trough Drawdown	-35.4%	-28.2%	-27.8%	-30.1%	-26.8%	-23.4%
Annual Standard Deviation	15.1%	15.8%	16.1%	15.9%	15.7%	16.1%
Annual Return/Max P/T Drawdown	0.37	0.53	0.59	0.54	0.58	0.69
Sharpe Ratio (Avg RFR = 4.26%)	0.58	0.68	0.75	0.75	0.72	0.74

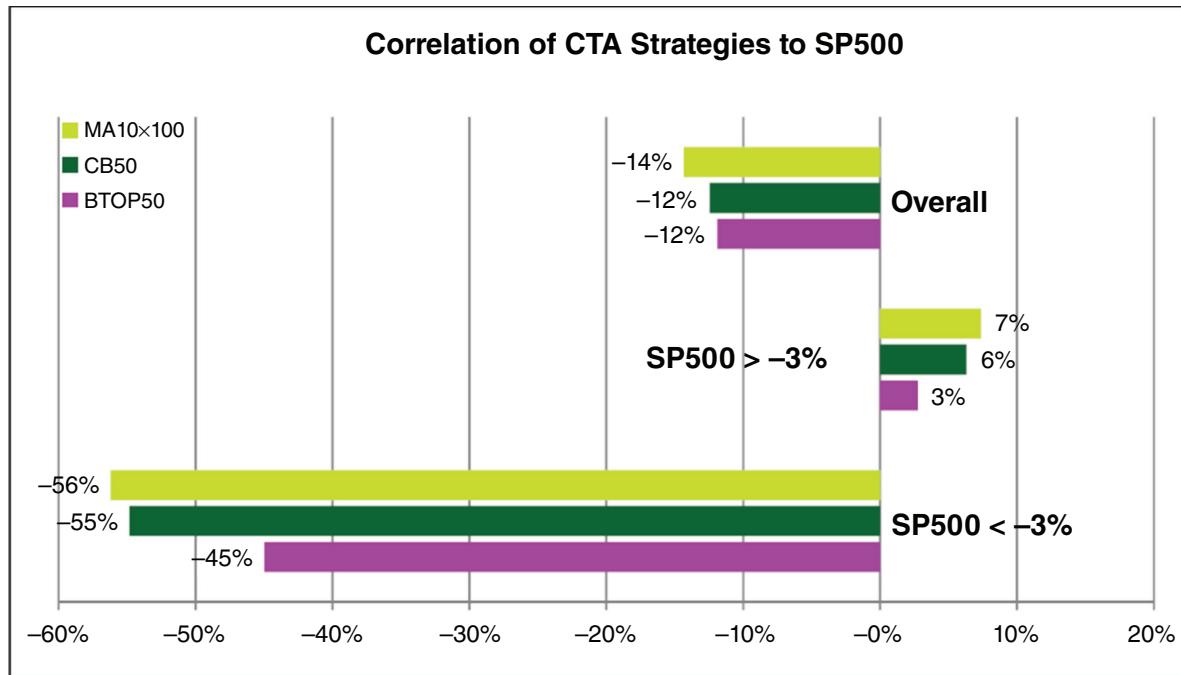
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	MA10x75	MA10x100	MA10x125	MA10x150	MA10x175	MA10x200
Skew	0.27	0.25	0.25	0.10	0.19	0.07
Correlation to SP500	-14.8%	-14.3%	-14.6%	-13.3%	-13.4%	-12.9%
Alpha to SP500	8.9%	11.0%	12.2%	12.1%	11.5%	12.1%
Correlation to BTOP50	68.8%	70.2%	68.8%	68.3%	65.2%	63.2%
Alpha to BTOP50	4.9%	6.7%	8.0%	8.0%	7.6%	8.2%
Beta to BTOP50	1.09	1.16	1.17	1.14	1.08	1.07
Avg # of Trades Per Year Per Market	4.7	4.0	3.5	3.1	2.8	2.5
Avg # of Days Per Trade	51	60	68	78	86	95

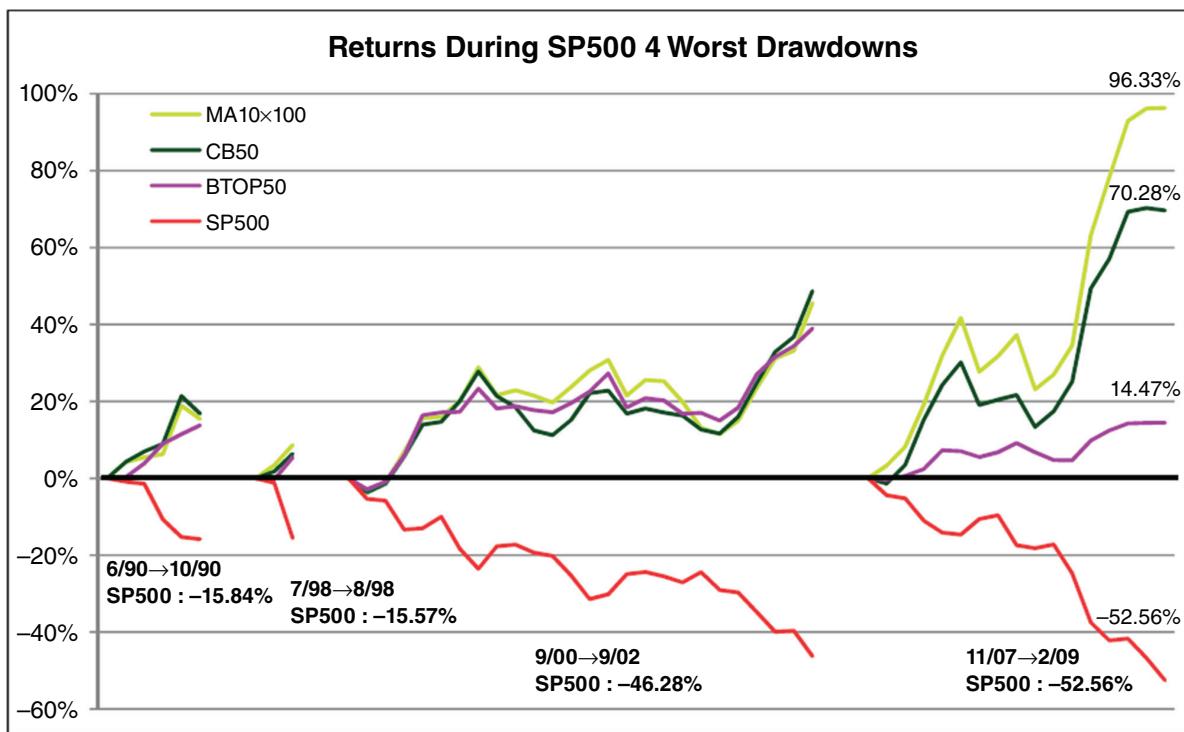
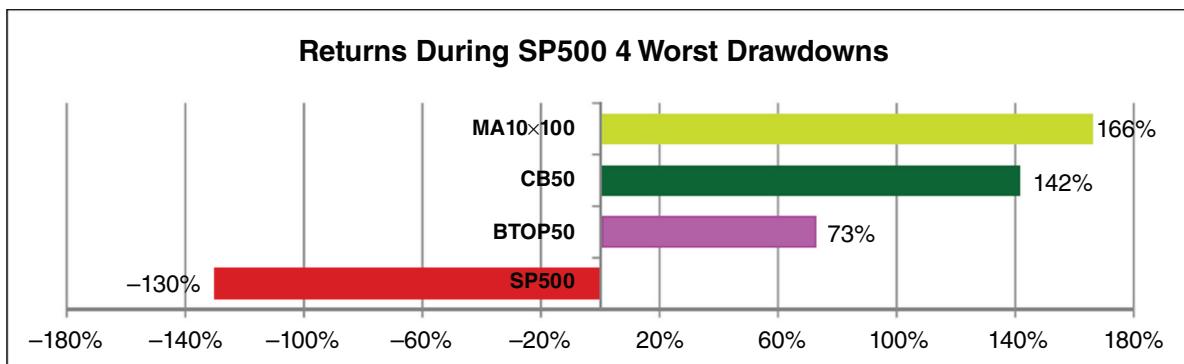


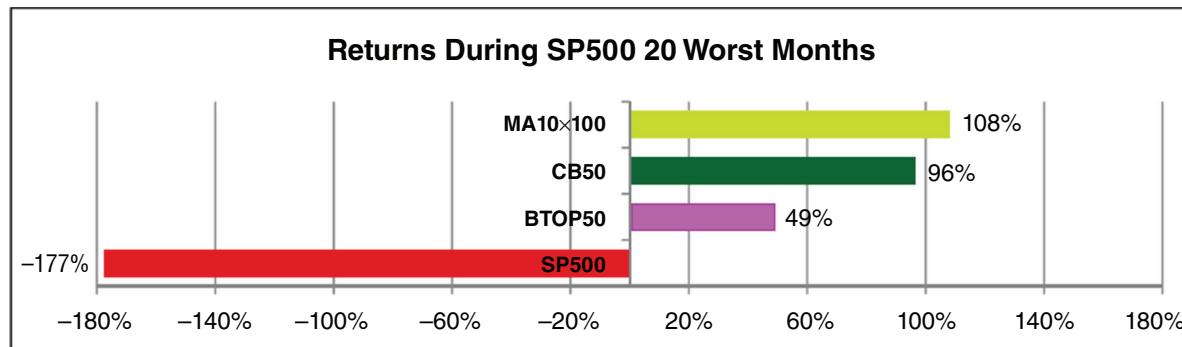
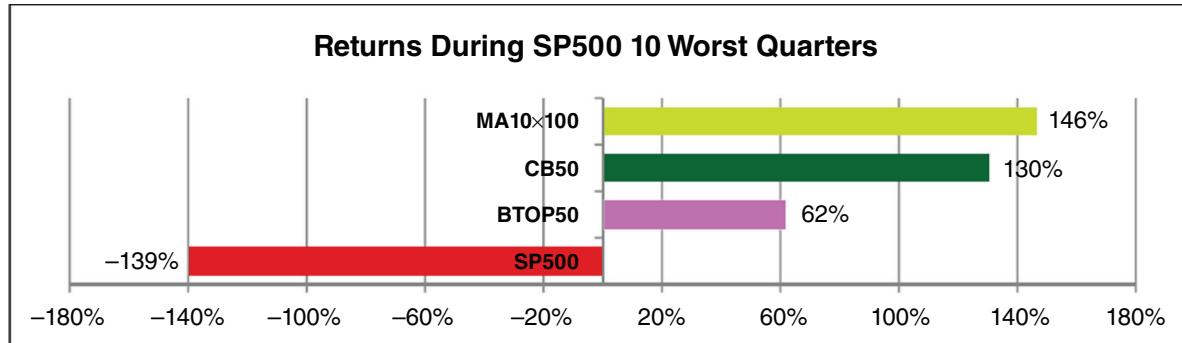
	CB25	CB50	CB75	CB100	CB125	CB150
Annual Compounded Return	12.1%	12.8%	14.7%	15.2%	15.9%	19.2%
Worst Peak-to-Trough Drawdown	-17.4%	-33.7%	-31.3%	-25.1%	-24.1%	-22.6%
Annual Standard Deviation	13.8%	15.3%	15.9%	15.8%	16.1%	16.8%

	CB25	CB50	CB75	CB100	CB125	CB150
Annual Return/Max P/T Drawdown	0.70	0.38	0.47	0.60	0.66	0.85
Sharpe Ratio (Avg RFR = 4.26%)	0.57	0.56	0.65	0.69	0.72	0.89
Skew	0.71	0.29	0.46	0.11	0.02	0.05
Correlation to SP500	-14.7%	-12.4%	-15.7%	-13.5%	-9.6%	-4.0%
Alpha to SP500	8.0%	8.7%	10.6%	11.1%	11.8%	15.0%
Correlation to BTOP50	63.2%	68.2%	66.9%	62.2%	58.1%	53.0%
Alpha to BTOP50	4.7%	4.8%	6.5%	7.3%	8.2%	11.7%
Beta to BTOP50	0.91	1.09	1.12	1.04	0.99	0.94
Avg # of Trades Per Year Per Market	6.0	3.0	1.9	1.4	1.1	0.8
Avg # of Days Per Trade	40	81	126	171	222	292



Next we consider the absolute returns of the CTA strategies during the worst four drawdowns of the SP500. In four periods when the SP500 lost a total of over -130% , the CTA strategies made $+142\%$ and $+166\%$





Luck	Payoff
10%	lose 2
20%	lose 1
30%	break even
20%	win 1
10%	win 2
10%	win 3

FIGURE 24.1: A Luck-Payoff matrix, showing six outcomes For now, however, we return to our basic coin example, since it has enough dimensions to illustrate many concepts of risk management. We consider more complicated examples later.

	Fixed Bet \$10	Fixed-Fraction Bet 1%
Start	1000	1000
Heads	1020	1020
Tails	1010	1009.80
Heads	1030	1030
Tails	1020	1019.70
Heads	1040	1040.09
Tails	1030	1029.69
Heads	1050	1050.28
Tails	1040	1039.78
Heads	1060	1060.58
Tails	1050	1049.97

FIGURE 24.2: Simulation of fixed-bet and fixed-fraction betting systems

Notice that both systems make \$20.00 (twice the bet) on the first toss, which comes up heads. On the second toss, the fixed bet system loses \$10.00 while the fixed-fraction system loses 1% of \$1,020.00 or \$10.20, leaving \$1,009.80. Note that the results from both these systems are approximately identical. Over time, however, the fixed-fraction system grows exponentially and surpasses the fixed-bet system, which grows linearly. Also note that the results depend on the numbers of heads and tails and do not at all depend on the order of heads and tails. The reader may prove this result by spreadsheet simulation.

is like trying to take nickels from in front of a steam roller. Eventually, one losing streak flattens the account.

% Bet	Start	Heads	Tails								
0	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00	1000.00
5	1000.00	1100.00	1045.00	1149.50	1092.03	1201.23	1141.17	1255.28	1192.52	1311.77	1246.18
10	1000.00	1200.00	1080.00	1296.00	1166.40	1399.68	1259.71	1511.65	1360.49	1632.59	1469.33
15	1000.00	1300.00	1105.00	1436.50	1221.03	1587.33	1349.23	1754.00	1490.90	1938.17	1647.45
20	1000.00	1400.00	1120.00	1568.00	1254.40	1756.16	1404.93	1966.90	1573.52	2202.93	1762.34
25	1000.00	1500.00	1125.00	1687.50	1265.63	1898.44	1423.83	2135.74	1601.81	2402.71	1802.03
30	1000.00	1600.00	1120.00	1792.00	1254.40	2007.04	1404.93	2247.88	1573.52	2517.63	1762.34
35	1000.00	1700.00	1105.00	1878.50	1221.03	2075.74	1349.23	2293.70	1490.90	2534.53	1647.45
40	1000.00	1800.00	1080.00	1944.00	1166.40	2099.52	1259.71	2267.48	1360.49	2448.88	1469.33
45	1000.00	1900.00	1045.00	1985.50	1092.03	2074.85	1141.17	2168.22	1192.52	2265.79	1246.18
50	1000.00	2000.00	1000.00	2000.00	1000.00	2000.00	1000.00	2000.00	1000.00	2000.00	1000.00
55	1000.00	2100.00	945.00	1984.50	893.03	1875.35	843.91	1772.21	797.49	1674.74	753.63
60	1000.00	2200.00	880.00	1936.00	774.40	1703.68	681.47	1499.24	599.70	1319.33	527.73
65	1000.00	2300.00	805.00	1851.50	648.03	1490.46	521.66	1199.82	419.94	965.85	338.05
70	1000.00	2400.00	720.00	1728.00	518.40	1244.16	373.25	895.80	268.74	644.97	193.49
75	1000.00	2500.00	625.00	1562.50	390.63	976.56	244.14	610.35	152.59	381.47	95.37

FIGURE 24.3: Simulation of equity from a fixed-fraction betting system

At a 0% bet there is no change in the equity. At 5% bet size, we bet 5% of \$1,000.00 or \$50.00 and make twice that on the first toss (heads) so we have an expected value of \$1,100. Then our second bet is 5% of \$1,100.00 or \$55.00, which we lose, so we then have \$1,045.00. Note that we do the best at a 25% bet size. Note also that the winning parameter (25%) becomes evident after just one head-tail cycle. This allows us to simplify the problem of searching for the optimal parameter to the examination of just one head-tail cycle.

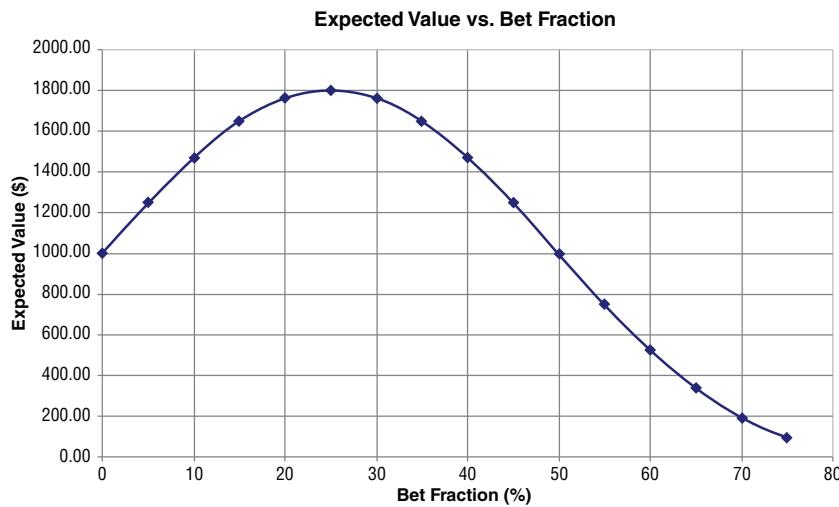


FIGURE 24.4: Expected value (ending equity) from 10 tosses, versus bet fraction, for a constant-bet fraction system, for a 2:1 payoff game, from the first and last columns of Figure 24.3

Notice that the expected value of the system rises from \$1,000.00 with increasing bet fraction to a maximum value of about \$1,800 at a 25% bet fraction. Thereafter, with increasing bet fraction, the profitability declines. This curve expresses two fundamental principles of risk management: (1) The Timid Trader Rule: If you don't bet very much, you don't make very much; and (2) The Bold Trader Rule: If you bet too much, you go broke. In portfolios that maintain multiple positions and multiple bets, we refer to the total risk as the portfolio heat.

Note: The chart illustrates the Expected Value / Bet Fraction relationship for a 2:1 payoff game. For a graph of this relationship at varying payoffs, see Figure 24.8.

Note how for small values of b , R increases with $b(P - 1)$ and how for large values of b , R decreases with b^2P . These are the mathematical formulations of the Timid and Bold Trader Rules.

We can plot R versus b to get a graph that looks similar to the one we get by simulation, above, and just pick out the maximum point by inspection. We can also notice that at the maximum, the slope is zero, so we can also solve for the maximum by taking the slope and setting it equal to zero.

$$\text{Slope} = dR / db = (P - 1) - 2bP = 0, \text{ therefore:}$$

$$b = (P - 1) / 2P, \text{ and, for } P = 2:1,$$

$$b = (2 - 1) / (2 \times 2) = .25$$

So the optimal bet, as before, is 25% of equity.

The Kelly Formula
$K = W - (1 - W) / R$
<p>K = Fraction of Capital for Next Trade W = Historical Win Ratio (Wins/Total Trials) R = Winning Payoff Rate</p> <p>For example, say a coin pays 2:1 with 50-50 chance of heads or tails. Then</p> <p>$K = .5 - (1 - .5) / 2 = .5 - .25 = .25$. Kelly indicates the optimal fixed-fraction bet is 25%.</p>

FIGURE 24.5: The Kelly Formula

Note that the values of W and R are long-term average values, so as time goes by, K might change a little.

Some Graphic Relationships Between Luck, Payoff, and Optimal Bet Fraction

Optimal Bet vs Y = Luck and X = Payoff

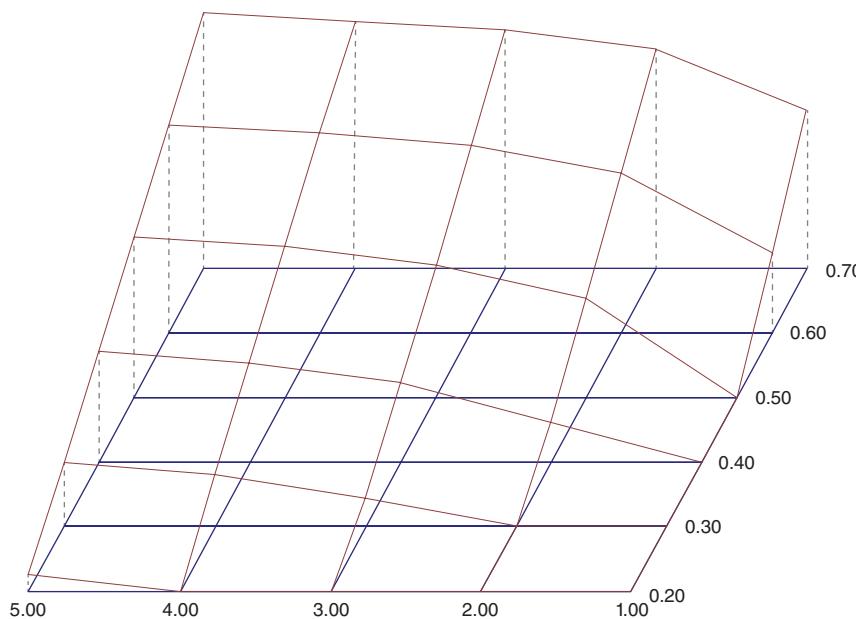
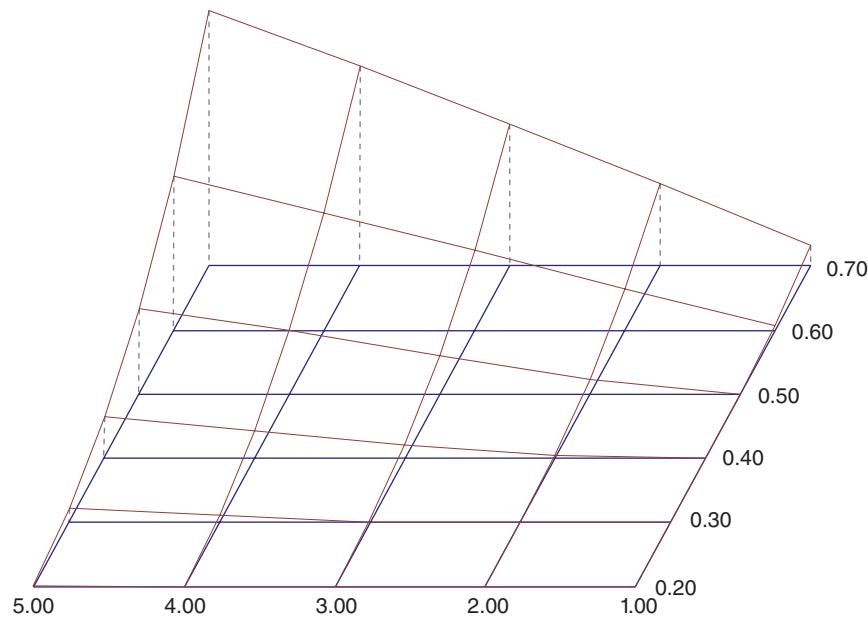


FIGURE 24.6: Optimal bet fraction increases linearly with luck, asymptotically to payoff.

The Optimal Bet Fraction Increases with Luck and Payoff

This graph shows the optimal bet fraction for various values of luck (Y) and payoff (X). Optimal bet fraction increases with increasing payoff. For very high payoffs, optimal bet size equals luck. For example, for a 5:1 payoff on a 50-50 coin, the optimal bet approaches about 50% of your stake.

Optimal Expected Value vs Y = Luck and X = Payoff**FIGURE 24.7:** The optimal expected value increases with payoff and luck.

The Expected Value of the Process, at the Optimal Bet Fraction

This graph shows optimal expected value for various values of luck and payoff, given betting at the optimal bet fraction. The higher the payoff (X: 1:1 to 5:1) and the higher the luck (Y: .20 to .70), the higher the expected value. For example, the highest expected value is for a 70% winning coin that pays 5:1. The lowest expected value is for a coin that pays 1:1 (even bet).

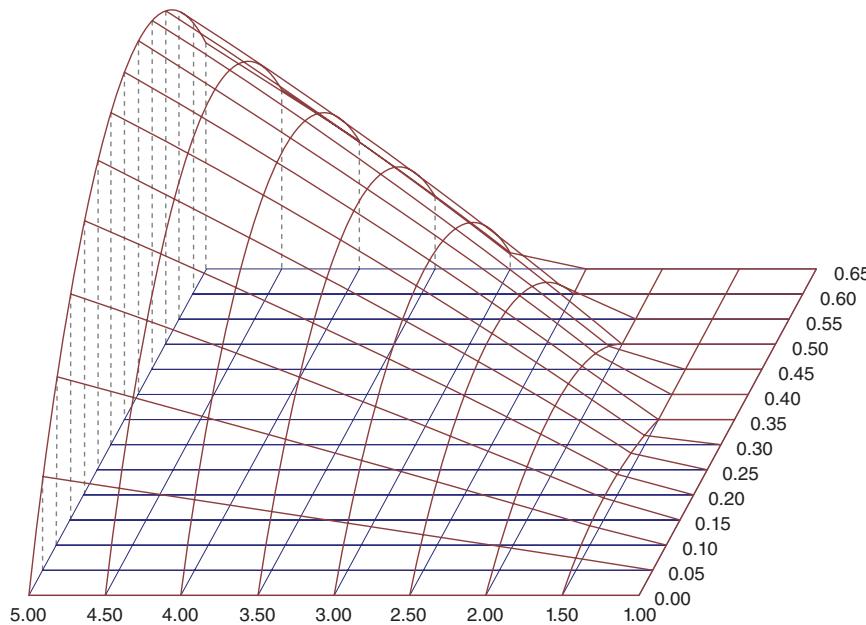
Expected Value of One Flip at 50% Luck vs Y = Bet Size and X = Payoff

FIGURE 24.8: For high payoff, optimal bet fraction approaches luck.

Finding the Optimal Bet Fraction from the Bet Size and Payoff

This graph shows the expected value of a 50% lucky (balanced) coin for various levels of bet fraction and payoff. The expected value has an optimal bet fraction point for each level of payoff. In this case, the optimal bet fraction for a 1.5:1 payoff is about 15%; at a 2:1 payoff the optimal bet fraction is about 25%; at a 5:1 payoff, the optimal bet fraction is about 45%.

Note: Figure 24.4 is the cross section of Figure 24.8, at the 2:1 payoff level.

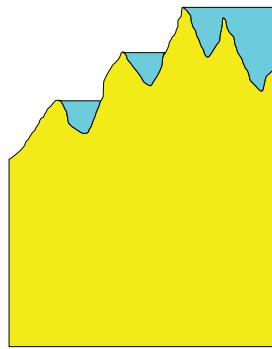


FIGURE 24.9: The Lake Ratio = Blue / Yellow

Getting a feel for volatility by inspection.

Reference for Sharpe Ratio: <http://www.stanford.edu/~wfsharpe/art/sr/sr.htm>

Stock	Price/Share	Shares	Value
A	\$50	1000	\$50,000
B	\$100	500	\$50,000
C	\$200	250	\$50,000

Value-Basis Position Sizing

Dividing \$50,000 by \$50/share gives 1000 shares

Stock	Price/Share	Risk/Share	Shares	Risk	Value
A	\$50	\$5	1000	\$5,000	\$50,000
B	\$100	\$10	500	\$5,000	\$50,000
C	\$200	\$5	1000	\$5,000	\$200,000

Risk-Basis Position Sizing

Dividing \$5,000 by \$5 risk/share gives 1000 shares

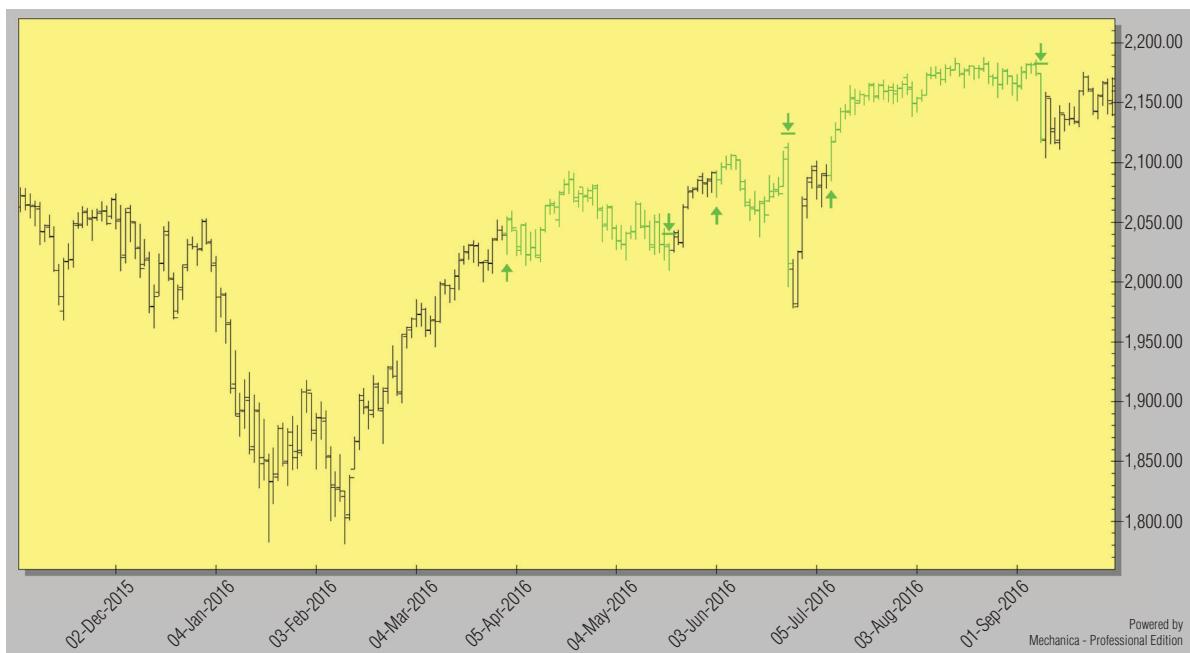


FIGURE 25.1: Trend Following System, E-Mini S&P 500 (Back-Adjusted)

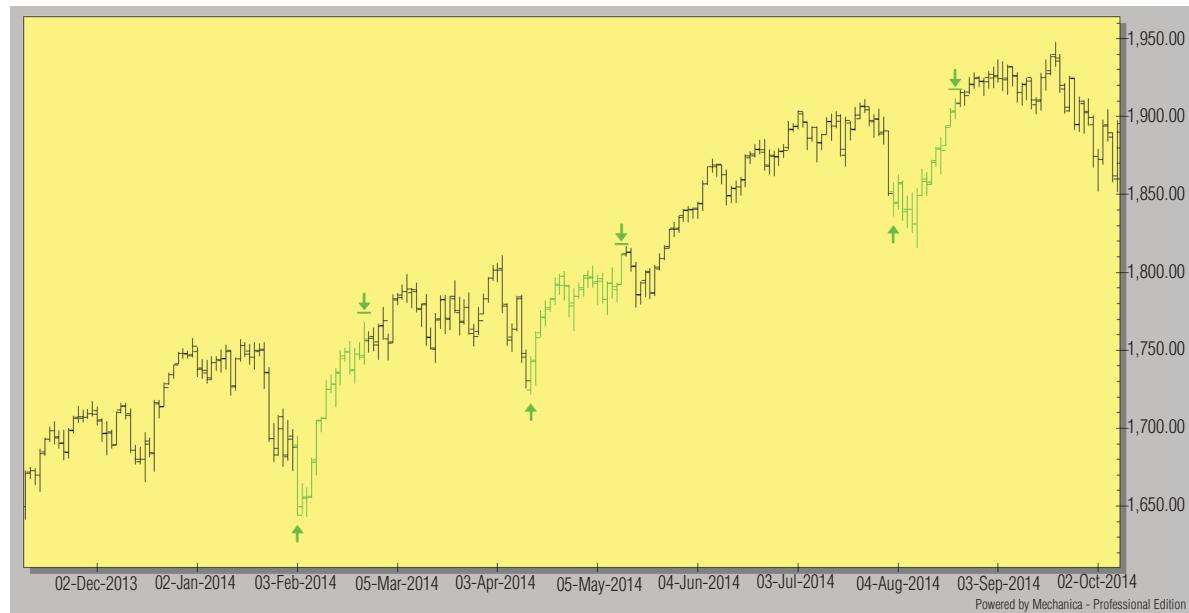


FIGURE 25.2: E-Mini S&P 500 (Back-Adjusted)

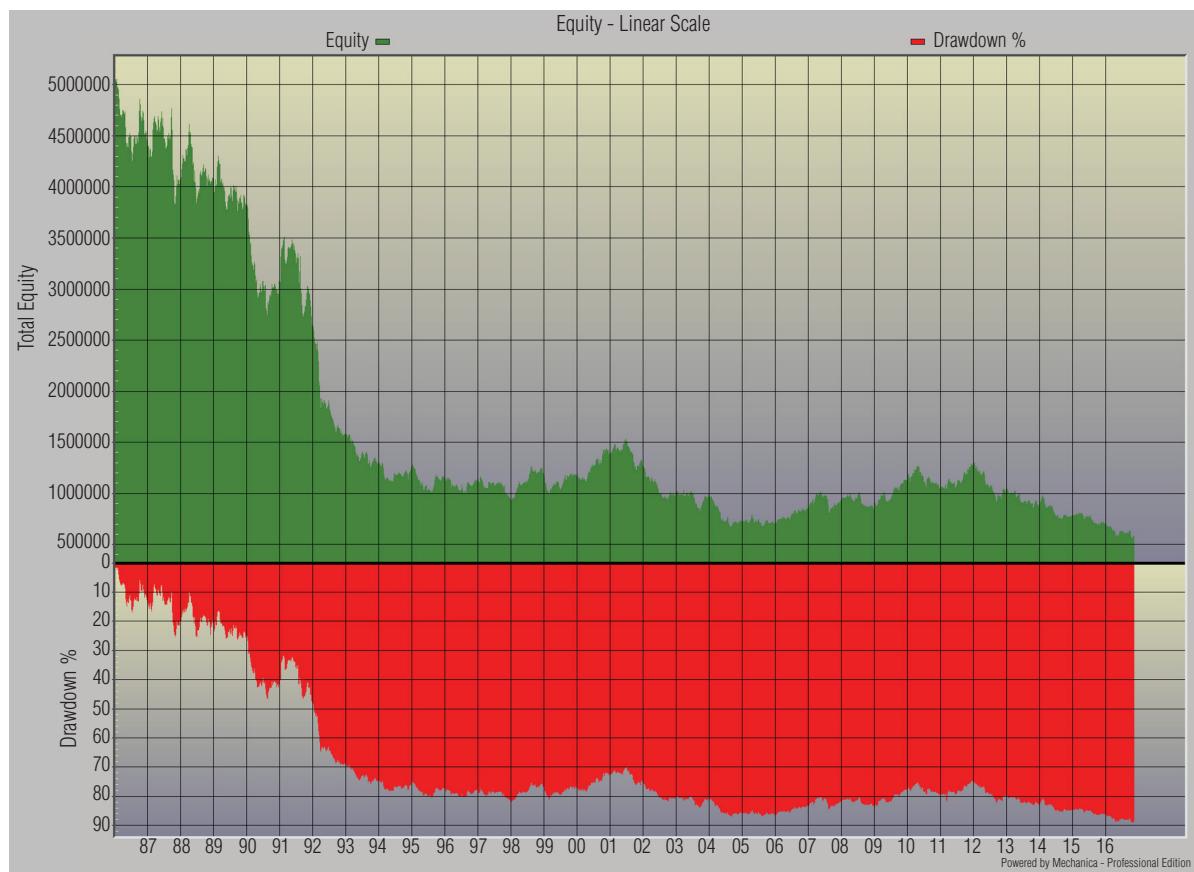


FIGURE 25.3: GRAB System; Parameter Values 40, 80

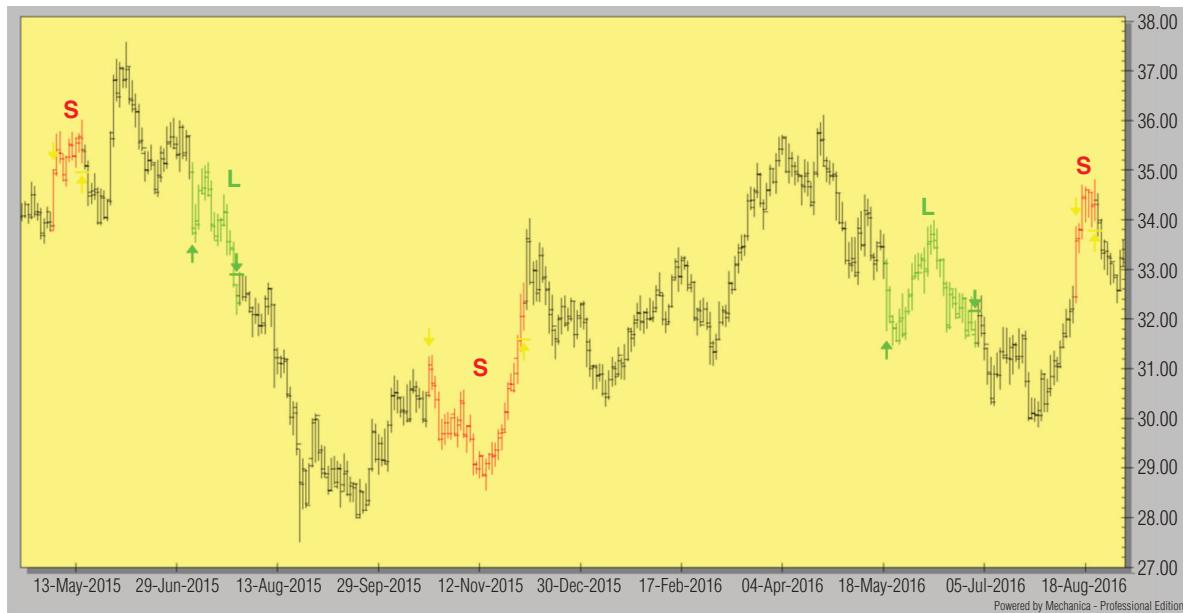


FIGURE 25.4: GRAB System; Parameter Values 40, 80 Soybean Oil (Back-Adjusted)
"L": Long Trades, "S": Short Trades

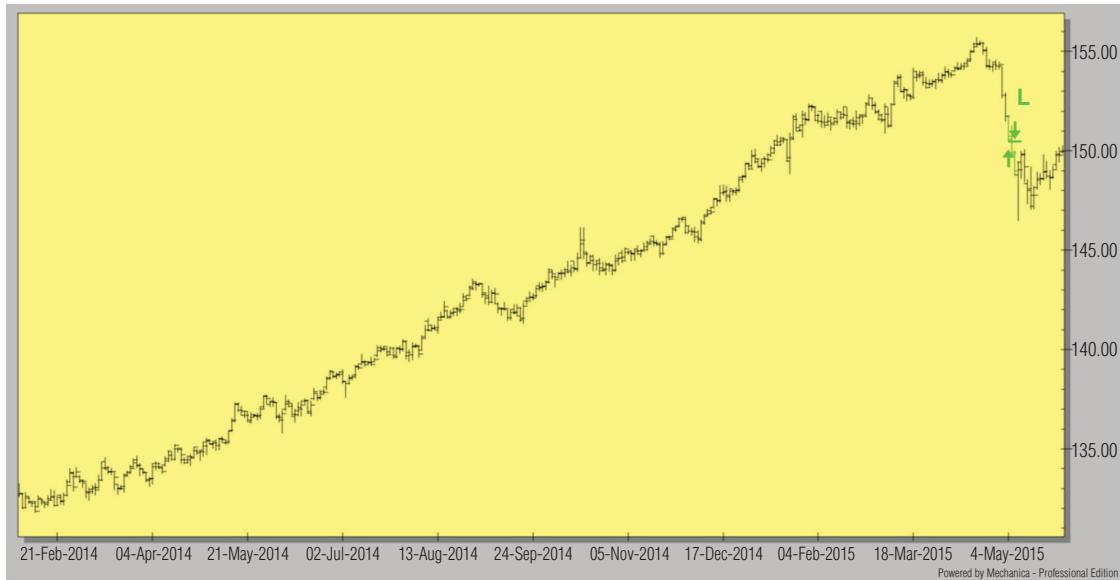


FIGURE 25.5: GRAB System; Parameter Values 40, 80 Euro German Bund
(Back-Adjusted)

"L": Long Trades, "S": Short Trades

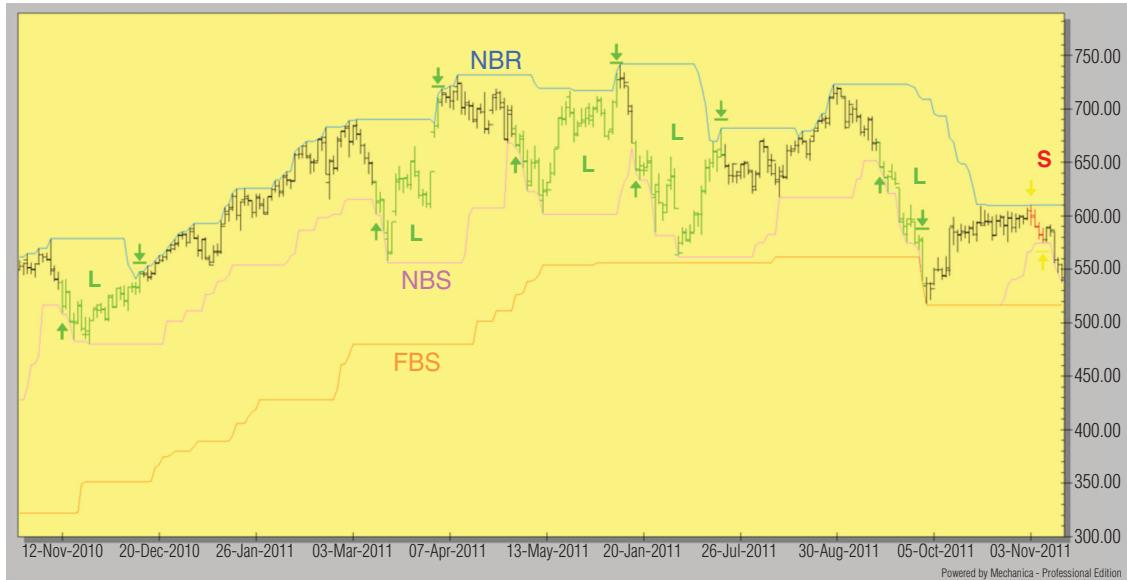


FIGURE 25.6: Near-Box Look-Back: 20 Days. Far-Box Look-Back: 100 Days, Corn
(Back-Adjusted)

"L": Long Trades, "S": Short Trades, "NBR": Near Box Resistance, "NBS": Near Box Support, "FBS": Far Box Support



FIGURE 25.7: Parameters Far Apart: Near-Box Look-Back: 20 Days. Far-Box Look-Back: 200 Days, New York Coffee (Back-Adjusted)

"L": Long Trades, "S": Short Trades, "NBR": Near Box Resistance, "NBS": Near Box Support, "FBS": Far Box Support



FIGURE 25.8: Parameters Close Together: Near-Box Look-Back: 110 Days. Far-Box Look-Back: 140 Days Natural Gas (Back-Adjusted)

"L": Long Trades, "S": Short Trades, "NBR": Near Box Resistance, "NBS": Near Box Support, "FBS": Far Box Support

GRAB Trading System Code

Indicator Setup

```
'GRAB System.
'Two-box system. Far box defines major trend; system
trades only in same direction as major trend,
'meanwhile fading the signals of near box.
'Last trade in each trend exits at break of far box - at
the same time as the trend reverses.
'All trades, except the last in the trend, use a limit
order, as they are fading the near box.
'The last trade exits on a stop, as the trend changes.
'Assign entry and exit break out parameters using
integers "X" and "Y".
```

```
'Set X = Far box lookback
X = 80
'Set Y = Near box lookback
Y = 40
'Create the far and near box support/resist levels.
FAR_BOX_RESISTANCE = MAX[H,X,0]
FAR_BOX_SUPPORT = MIN[L,X,0]
NEAR_BOX_RESISTANCE = MAX[H,Y,0]
NEAR_BOX_SUPPORT = MIN[L,Y,0]
'Initialize long term trend value to 0 so that it does
not set until indicators up to speed.
'See if high TODAY breaks yesterday's look back high, or
if low breaks yesterday's look back low.
IF FAR_BOX_RESISTANCE = 0 THEN
    TREND = 0
ELSE IF HIGH >= FAR_BOX_RESISTANCE[1] THEN
    TREND = 1
ELSE IF LOW <= FAR_BOX_SUPPORT[1] THEN
    TREND = -1
ELSE
    TREND = TREND[1]
```

Position Entry

```
'If the trend is up buy on a break of near box support.
IF TREND[1] = 1 THEN BUYLIMIT = NEAR_BOX_SUPPORT[1]
'If the trend is down sell on a break of near box
resistance.
IF TREND[1] = -1 THEN SELLIMIT = NEAR_BOX_RESISTANCE[1]
```

Position Exit

```
IF LONG = 0 THEN JUMPTO[1]
'If long either, sell (at a limit) on a break up from
the near box or, sell (on a stop) on a break down 'from
the far box - a change in trend from up to down.
SELLIMIT = NEAR_BOX_RESISTANCE[1]
SELLSTOP = FAR_BOX_SUPPORT[1]
JUMPTO[2]
[1]
' Vice-versa if short.
BUYLIMIT = NEAR_BOX_SUPPORT[1]
BUYSTOP = FAR_BOX_RESISTANCE[1]
[2]
```

Managed Futures—represented by the Barclay Systematic Traders Index. This index is an equal-weighted composite of managed programs whose approach is at least 95% systematic.

Closing 2015, there are 454 systematic programs included in the index.

TABLE 26.1: Monthly Statistics for Stocks, Bonds, Hedge Funds, and Managed Futures for the Period June 2011–December 2015

	Stocks	Bonds	Hedge Funds	Managed Futures
Mean (%)	0.50	0.42	0.45	0.33
Standard Deviation (%)	4.32	1.01	1.72	2.25
Skewness	-0.63	-0.33	-0.84	0.22
Excess Kurtosis	1.17	1.37	2.06	0.43
Correlations				
Stocks	1.00			
Bonds	-0.11	1.00		
Hedge Funds	0.80	-0.03	1.00	
Managed Futures	-0.17	0.24	0.07	1.00

TABLE 26.2: Monthly Return Statistics for 50/50 Portfolios of Stocks, Bonds, and Hedge Funds or Managed Futures for the Period January 2001–December 2015

HEDGE FUNDS					MANAGED FUTURES				
HF (%)	Mean (%)	StDev (%)	Hedge Funds	Kurtosis	HF (%)	Mean (%)	StDev (%)	Hedge Funds	Kurtosis
0	0.46	2.17	Skew	2.27	0	0.46	2.17	Skew	2.27
5	0.46	2.13	-0.80	2.28	5	0.45	2.05	-0.74	2.05
10	0.46	2.09	-0.81	2.3	10	0.45	1.94	-0.69	1.79
15	0.46	2.05	-0.82	2.31	15	0.44	1.83	-0.63	1.49
20	0.46	2.02	-0.84	2.32	20	0.43	1.74	-0.55	1.16

(Continued)

HEDGE FUNDS					MANAGED FUTURES				
HF (%)	Mean (%)	StDev (%)	Hedge Funds	Kurtosis	HF (%)	Mean (%)	StDev (%)	Hedge Funds	Kurtosis
25	0.46	1.98	-0.85	2.33	25	0.43	1.66	-0.45	0.82
30	0.46	1.95	-0.86	2.34	30	0.42	1.59	-0.35	0.49
35	0.46	1.92	-0.87	2.35	35	0.41	1.53	-0.24	0.19
40	0.46	1.89	-0.88	2.35	40	0.41	1.49	-0.13	-0.03
45	0.46	1.87	-0.89	2.35	45	0.40	1.47	-0.04	-0.18
50	0.46	1.84	-0.90	2.35	50	0.39	1.47	0.04	-0.23

Note. HF% = hedge fund allocation percentage; StDev(%) = standard deviation.

TABLE 26.3: Monthly Return Statistics for Portfolios of Hedge Funds and Managed Futures for the Period January 2001–December 2015

MF(%)	Mean(%)	StDev(%)	Skew	Kurtosis
0	0.45	1.72	-0.84	2.06
5	0.45	1.64	-0.73	1.73
10	0.44	1.58	-0.61	1.37
15	0.43	1.52	-0.48	1.00
20	0.43	1.48	-0.34	0.65
25	0.42	1.44	-0.21	0.33
30	0.42	1.42	-0.09	0.09
35	0.41	1.41	0.02	-0.08
40	0.40	1.42	0.10	-0.18
45	0.40	1.44	0.16	-0.20
50	0.39	1.47	0.19	-0.17

Note. MF% = managed fund allocation percentage; StDev(%) = standard deviation.

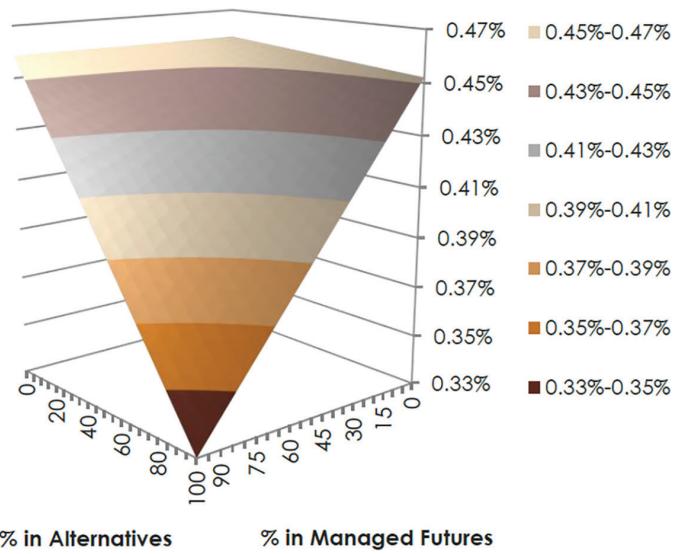


FIGURE 26.1: Mean return of varying allocation between traditional and alternative portfolios, while changing the alternative portfolio's Managed Futures/Hedge Fund composition, for the period January 2001–December 2015

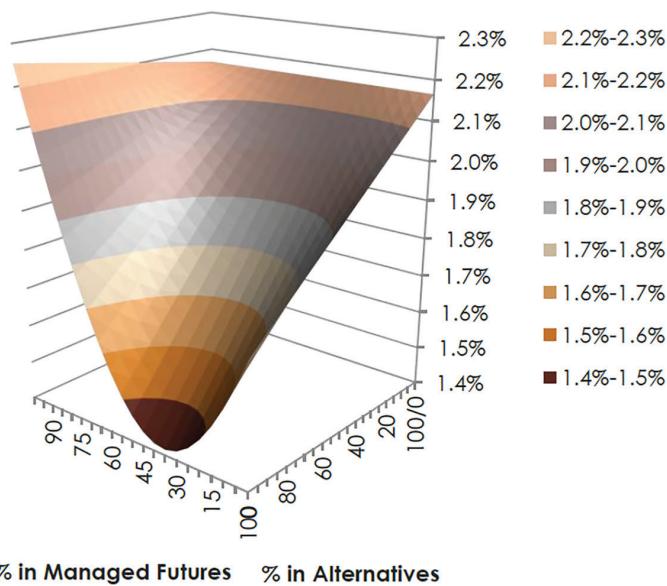


FIGURE 26.2: Standard deviation of varying allocation between traditional and alternative portfolios, while changing the alternative portfolio's Managed Futures/Hedge Fund composition for the period January 2001–December 2015

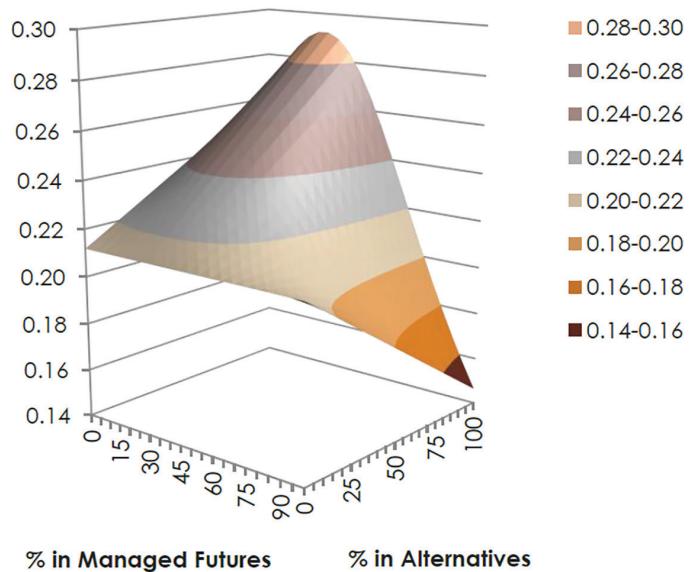


FIGURE 26.3: Risk-adjusted return of 50/50 portfolios of stocks, bonds, hedge funds, and managed futures for the period of January 2001–December 2015

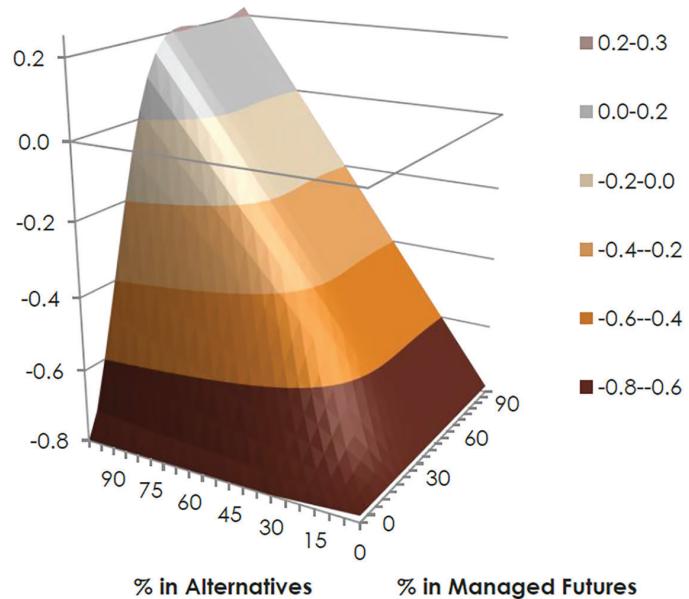


FIGURE 26.4: Skewness of 50/50 portfolios of stocks, bonds, hedge funds, and managed futures for the period June 2001–December 2015

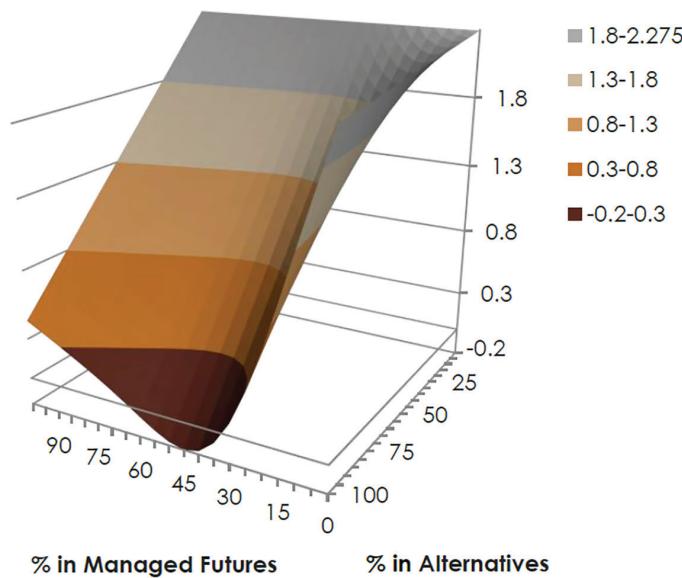


FIGURE 26.5: Kurtosis of 50/50 portfolios of stocks, bonds, hedge funds, and managed futures for the period June 2001–December 2015

TABLE 26.4: Performance Statistics for Portfolios Ranging from 100% Traditional Portfolio to 100% Alternatives Portfolio in 10% increments for the Period January 2001–December 2015

Stocks(%)	Bonds(%)	HF(%)	MF(%)	Mean(%)	StDev(%)	Skew	Kurt	Return/Risk
50	50	0	0	0.46	2.66	-0.47	1.29	0.17
45	45	5	5	0.45	2.59	-0.46	1.28	0.17
40	40	10	10	0.45	2.53	-0.44	1.28	0.18
35	35	15	15	0.44	2.46	-0.42	1.28	0.18
30	30	20	20	0.43	2.39	-0.41	1.27	0.18
25	25	25	25	0.42	2.32	-0.39	1.27	0.18
20	20	30	30	0.42	2.26	-0.37	1.26	0.19
15	15	35	35	0.41	2.19	-0.36	1.26	0.19
10	10	40	40	0.40	2.12	-0.34	1.25	0.19
5	5	45	45	0.40	2.05	-0.32	1.25	0.19
0	0	50	50	0.39	1.99	-0.31	1.25	0.20

Note. Return/Risk calculated using annualized mean and standard deviation. HF(%) = hedge fund allocation percentage, MF(%) = managed futures allocation percentage, StDev(%) = standard deviation, Kurt = kurtosis.

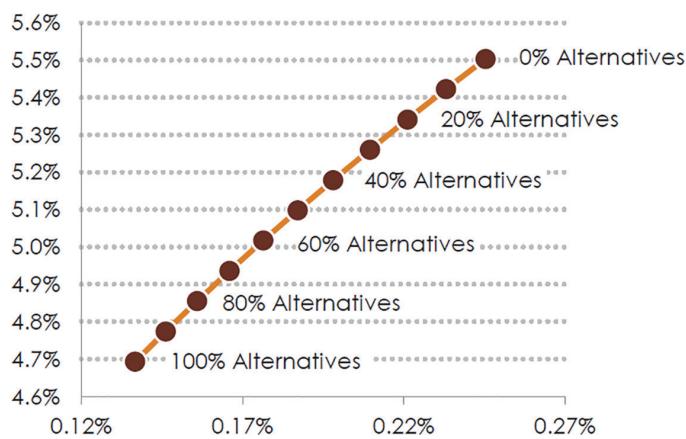


FIGURE 26.6: Efficient frontier for portfolios ranging from 100% Traditional portfolio to 100% Alternatives portfolio in 10% increments for the period June 2001–December 2015

TABLE A-1: Monthly Statistics for Stocks, Bonds, Hedge Funds, and Managed Futures for the Period January 1990–December 2015

	Stocks	Bonds	Hedge Funds	Managed Futures
Mean (%)	0.83	0.52	0.83	0.54
Standard Deviation (%)	4.2	1.05	1.94	2.86
Skewness	-0.58	-0.22	-0.62	0.75
Excess Kurtosis	1.19	0.74	2.54	2.11
Correlations				
Stocks	1.00			
Bonds	0.11	1.00		
Hedge Funds	0.74	0.09	1.00	
Managed Futures	-0.11	0.21	0.02	1.00

TABLE A-2: Monthly Return Statistics for 50/50 Portfolios of Stocks, Bonds, and Hedge Funds or Managed Futures for the Period January 1990–December 2015

HF(%)	Mean(%)	StDev(%)	Skew	Kurt	MF(%)	Mean(%)	StDev(%)	Skew	Kurt
0	0.67	2.32	4	1.46	0	0.67	2.32	-0.54	1.46
5	0.68	2.18	-0.57	1.50	5	0.67	2.11	-0.46	1.33
10	0.69	2.15	-0.60	1.55	10	0.66	2.01	-0.37	1.24
15	0.70	2.11	-0.64	1.60	15	0.65	1.92	-0.25	1.22
20	0.70	2.08	-0.67	1.65	20	0.65	1.84	-0.10	1.30
25	0.71	2.04	-0.71	1.70	25	0.64	1.78	0.06	1.50
30	0.72	2.02	-0.74	1.75	30	0.63	1.74	0.23	1.83
35	0.73	1.99	-0.76	1.81	35	0.63	1.72	0.40	2.25

HF(%)	Mean(%)	StDev(%)	Skew	Kurt	MF(%)	Mean(%)	StDev(%)	Skew	Kurt
40	0.74	1.97	-0.79	1.87	40	0.62	1.71	0.56	2.71
45	0.74	1.95	-0.81	1.93	45	0.61	1.73	0.70	3.12
50	0.75	1.93	-0.82	1.99	50	0.61	1.77	0.79	3.42

Note: StDev(%) = standard deviation, Kurt = kurtosis.

TABLE A-3: Monthly Return Statistics for Portfolios of Hedge Funds and Managed Futures for the Period January 1990–December 2015

MF(%)	Mean(%)	StDev(%)	Skew	Kurt
0	0.83	1.94	-0.62	2.54
5	0.81	1.85	-0.51	2.14
10	0.80	1.78	-0.38	1.72
15	0.78	1.71	-0.22	1.32
20	0.77	1.67	-0.05	0.99
25	0.76	1.63	0.14	0.79
30	0.74	1.62	0.32	0.73
35	0.73	1.63	0.48	0.82
40	0.71	1.65	0.61	1.02
45	0.70	1.69	0.71	1.28
50	0.68	1.74	0.78	1.54

Note: StDev(%) = standard deviation, Kurt = kurtosis.

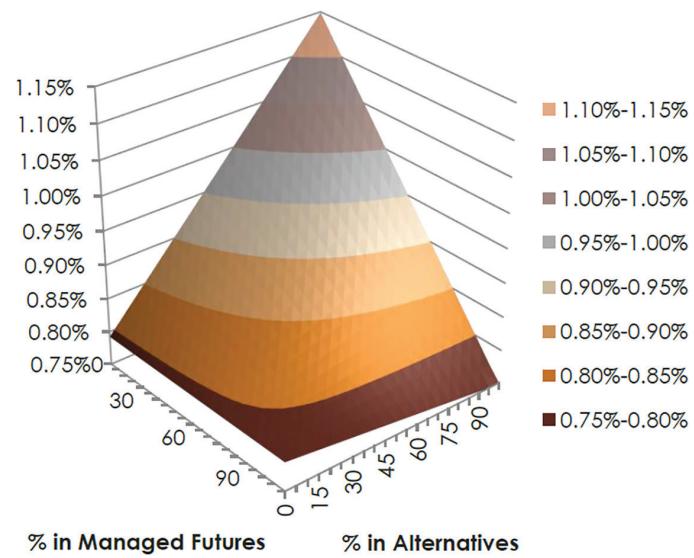


FIGURE A-1: Mean return of 50/50 portfolios of stocks, bonds, hedge funds, and managed futures for the period January 1990–December 2015

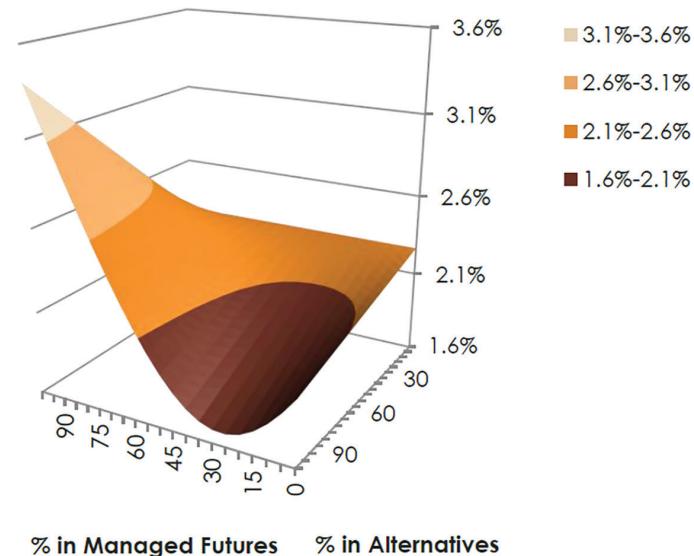


FIGURE A-2: Standard deviation of 50/50 portfolios of stocks, bonds, hedge funds, and managed futures for the period January 1990–December 2015

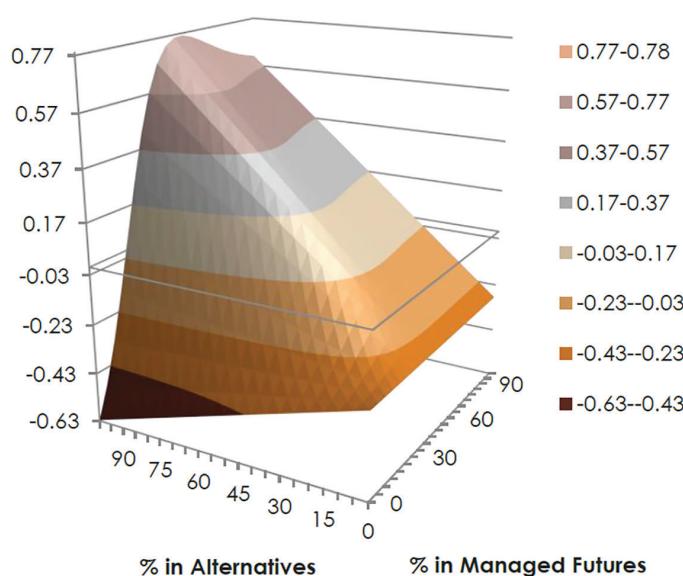


FIGURE A-3: Skewness of 50/50 portfolios of stocks, bonds, hedge funds, and managed futures for the period January 1990–December 2015

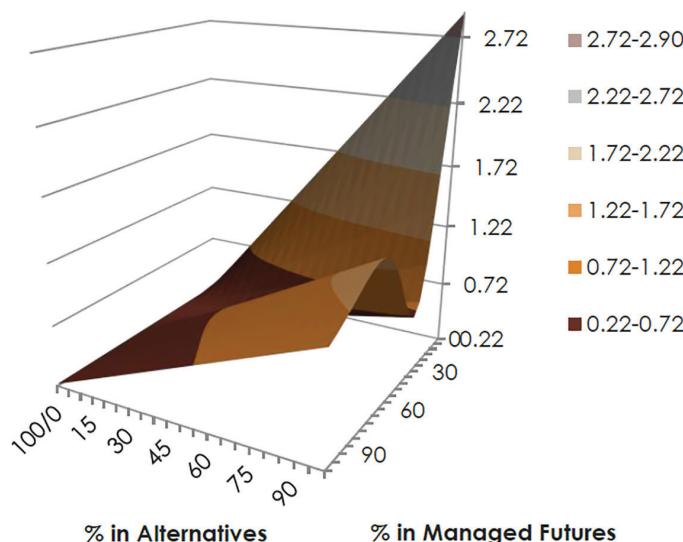


FIGURE A-4: Kurtosis of 50/50 portfolios of stocks, bonds, hedge funds, and managed futures for the period January 1990–December 2015

Appendix B

In this appendix, we present the results of our analysis via data tables and graphics in the same format as the main body of the study, but for the exact same period that Kat studied in his paper (June 1994–May 2001). It is important to keep in mind that we used different data than Kat:

1. To represent “bonds,” Kat used a 10-year Government Bond Index, while we used the Barclays U.S. Aggregate Bond Index (formerly the Lehman Aggregate Bond Index).
2. For “hedge funds,” Kat used his own methodology to build hedge fund portfolios with data from Tremont TASS, while we used the HFRI Fund Weighted Composite Index.
3. While we and Kat both used the S&P 500 Total Return Index to represent “stocks,” Kat capped its mean return at 1% per month, while we used its exact return stream.
4. For “managed futures,” Kat used the Stark 300 Index and we used the Barclay Systematic Traders Index.

After factoring in all of these differences, we were pleasantly surprised at how closely our results resembled Kat’s work from over 10 years ago.

TABLE B-1: Monthly Statistics for Stocks, Bonds, Hedge Funds, and Managed Futures for Kat’s Study Period of June 1994–May 2001

	Stocks	Bonds	Hedge Funds	Managed Futures
Mean (%)	1.46	0.63	1.16	0.65
Standard Deviation (%)	4.39	1.03	2.36	2.89
Skewness	-0.81	0.12	-0.67	0.34
Excess Kurtosis	1.05	0.38	2.95	0.31
Correlations				
Stocks	1.00			
Bonds	0.22	1.00		
Hedge Funds	0.70	0.01	1.00	
Managed Futures	-0.05	0.32	-0.02	1.00

TABLE B-2: Monthly Return Statistics for 50/50 Portfolios of Stocks, Bonds, and Hedge Funds or Managed Futures for Kat's Study Period of June 1994–May 2001

HF(%)	Mean(%)	StDev(%)	Skew	Kurt	MF(%)	Mean(%)	StDev(%)	Skew	Kurt
0	1.04	2.36	-0.59	0.04	0	1.04	2.36	-0.59	0.04
5	1.05	2.32	-0.64	0.17	5	1.02	2.25	-0.53	-0.14
10	1.06	2.30	-0.70	0.32	10	1.01	2.20	-0.46	-0.29
15	1.06	2.25	-0.75	0.48	15	0.99	2.06	-0.38	-0.40
20	1.07	2.23	-0.81	0.52	20	0.97	1.99	-0.30	-0.45
25	1.07	2.20	-0.85	0.85	25	0.95	1.93	-0.22	-0.43
30	1.08	2.18	-0.90	1.05	30	0.93	1.88	-0.13	-0.34
35	1.09	2.17	-0.94	1.26	35	0.91	1.86	-0.06	-0.21
40	1.09	2.15	-0.97	1.47	40	0.89	1.85	0.02	-0.05
45	1.10	2.15	-0.99	1.68	45	0.87	1.86	0.07	0.10
50	1.10	2.14	-1.01	1.88	50	0.85	1.89	0.12	0.21

Note: HF(%) = hedge fund allocation percentage, MF(%) = managed futures allocation percentage, StDev(%) = standard deviation, Kurt = kurtosis.

TABLE B-3: Monthly Return Statistics for Portfolios of Hedge Funds and Managed Futures for Kat's Study Period of June 1994–May 2001

MF(%)	Mean(%)	StDev(%)	Skew	Kurt
0	1.16	2.36	-0.67	2.95
5	1.14	2.24	-0.56	2.41
10	1.11	2.13	-0.44	1.82
15	1.09	2.04	-0.31	1.20
20	1.06	1.96	-0.18	0.60
25	1.04	1.89	-0.05	0.07
30	1.01	1.85	0.07	-0.34
35	0.99	1.82	0.18	-0.60
40	0.96	1.81	0.25	-0.70
45	0.93	1.82	0.29	-0.67
50	0.91	1.84	0.31	-0.55

Note: MF(%) = managed futures allocation percentage, StDev(%) = standard deviation, Kurt = kurtosis.

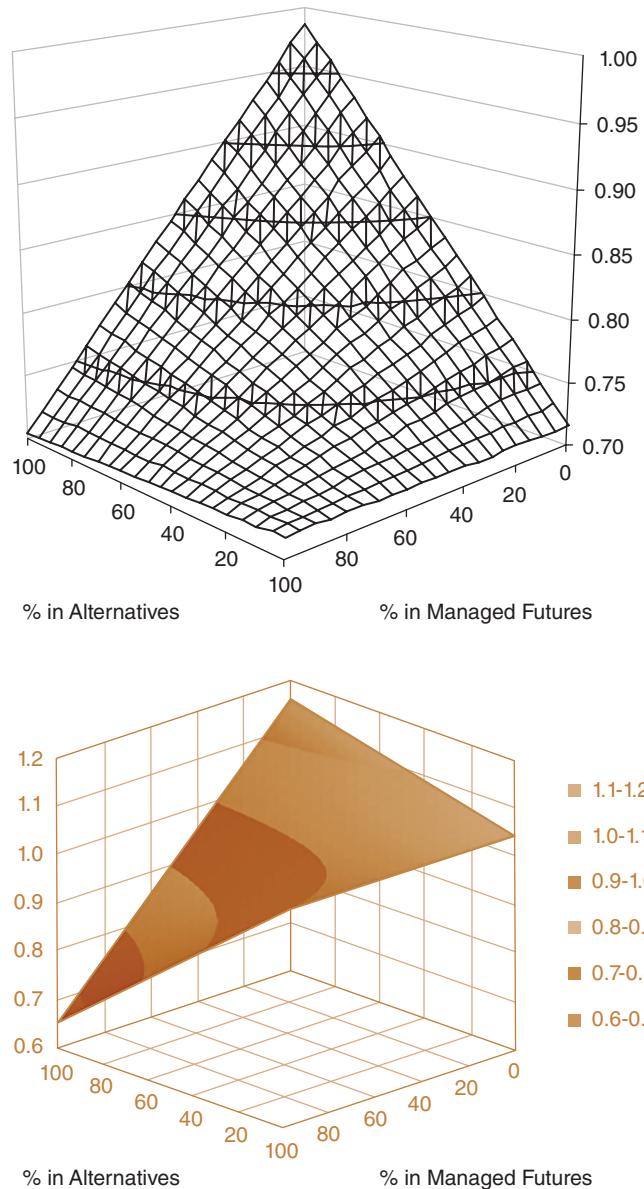


FIGURE B-1: Mean return of 50/50 portfolios of stocks, bonds, hedge funds, and managed futures for Kat's study period of June 1994–May 2001 (top, Kat's original graphic;¹¹ ours is on bottom). Note: Our image looks different than Kat's, primarily because he constrained the equity returns for the period and we did not.

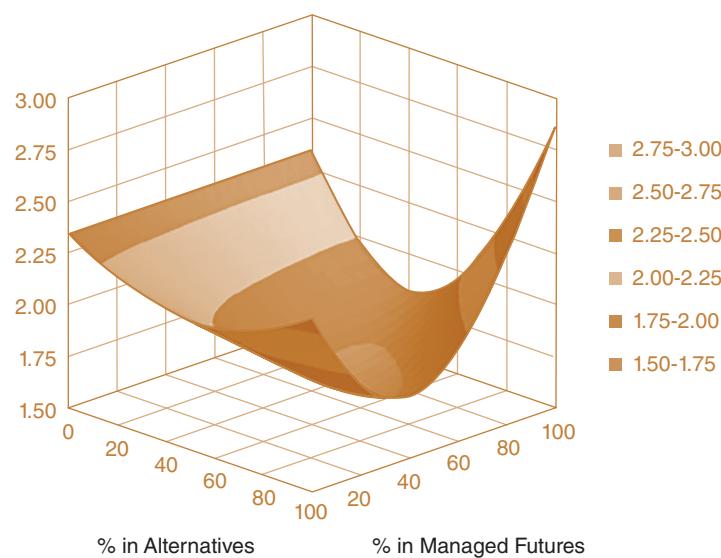
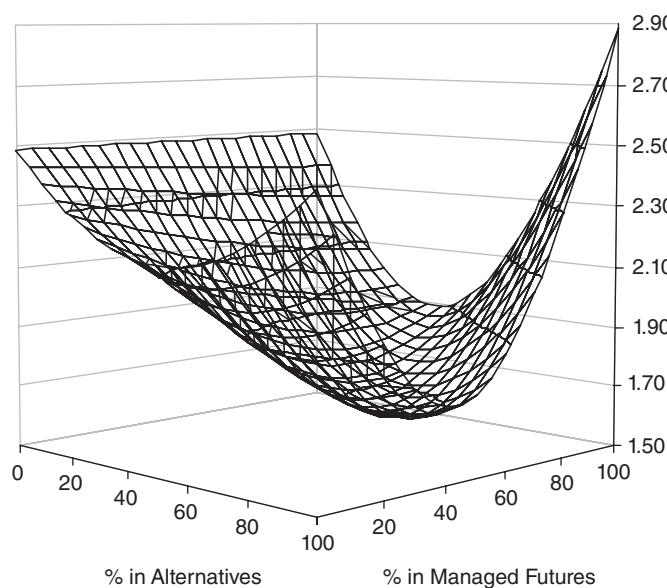


FIGURE B-2: Standard deviation of 50/50 portfolios of stocks, bonds, hedge funds, and managed futures for Kat's study period of June 1994–May 2001 (top, Kat's original graphic;¹¹ ours is on bottom)

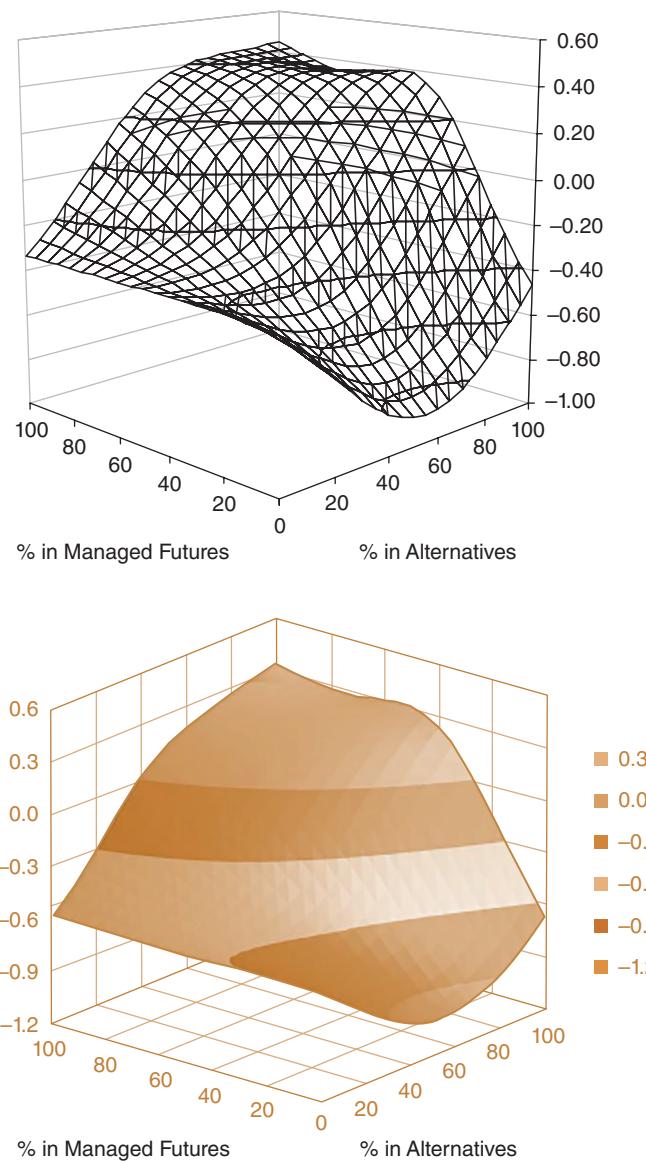


FIGURE B-3: Skewness of 50/50 portfolios of stocks, bonds, hedge funds, and managed futures for Kat's study period of June 1994–May 2001 (top, Kat's original graphic,¹¹ ours is on bottom)

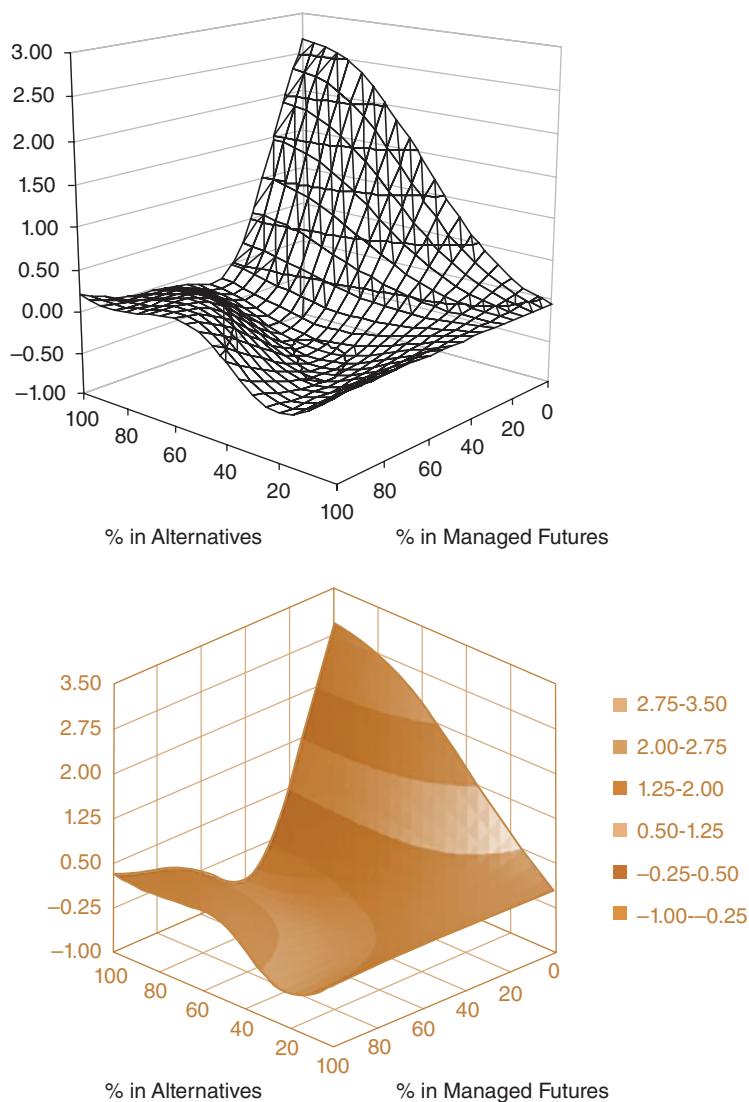


FIGURE B-4: Kurtosis of 50/50 portfolios of stocks, bonds, hedge funds, and managed futures for Kat's study period of June 1994–May 2001 (top, Kat's original graphic below;¹¹ ours is on bottom)

TABLE 27.1: Data Sources and Summary Statistics

Market	Begins	Data Sources	Avg Excess Return/yr	Volatility/yr	Avg Ex-Ante
Commodities					
Corn	Jun-60	Bloomberg	-2.2%	22.0%	-4.7%
Oil	Apr-87	Bloomberg	9.7%	34.8%	4.1%
Gold	Jan-76	Bloomberg	2.2%	19.6%	-5.1%
Copper	Dec-89	Bloomberg	8.7%	26.5%	3.6%
Nat Gas	Mar-91	Bloomberg	-7.1%	49.7%	-6.9%
Equities					
Nikkei	May-93	Bloomberg	2.4%	24.4%	0.5%
S&P 500	Jan-60	Bloomberg, Haver	5.5%	16.9%	-2.0%
EuroStoxx	Jun-99	Bloomberg	3.1%	25.0%	1.0%
S&P ASX	Apr-01	Bloomberg	5.6%	16.4%	-0.7%
FTSE 100	May-93	Bloomberg	5.9%	18.6%	-1.0%
Currencies					
AUD	Dec-77	Bloomberg, R.B.A.	2.5%	11.2%	2.7%
GBP	Dec-72	Bloomberg, IMF, DMS*	1.6%	9.7%	2.1%
EUR	Dec-72	Bloomberg, IMF, DMS*	1.2%	10.3%	-0.9%
JPY	Dec-72	Bloomberg, IMF, DMS*	0.1%	10.6%	-2.6%
CHF	Dec-72	Bloomberg, IMF, DMS*	1.3%	11.8%	-2.6%
Bond Futures					
UK Gilt	Nov-83	Bloomberg	2.8%	7.4%	1.1%
JGB	Aug-75	Bloomberg, B.O.J.	2.9%	4.6%	1.3%
Bund	Jul-92	Bloomberg	4.6%	5.5%	1.6%
US 10Y Note	Aug-72	Bloomberg, GSW**	2.9%	7.1%	1.4%
Australia 10Y	Jun-02	Bloomberg	2.4%	7.6%	0.5%

*Dimson, Marsh, and Staunton database. **Gurkaynak, Sack, and Wright database.

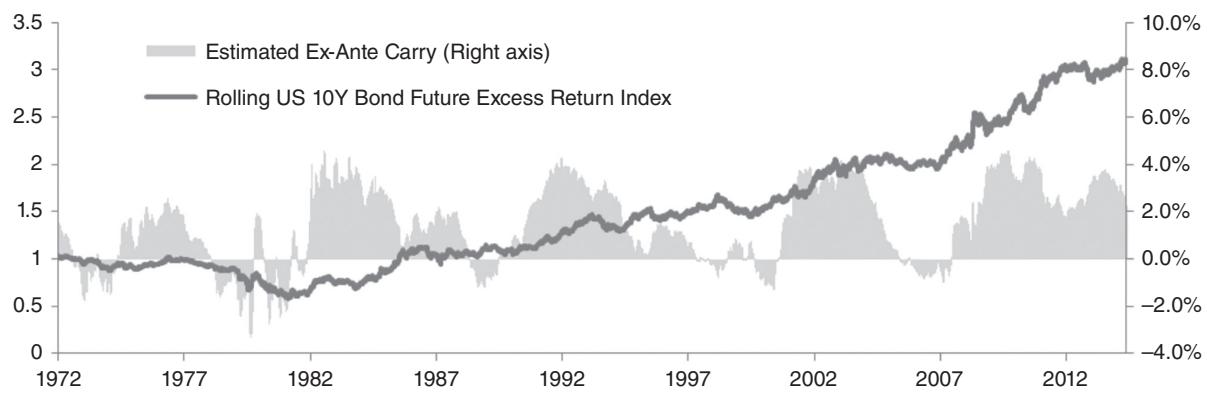


FIGURE 27.1: Excess Return Index and Estimated Carry for Rolling U.S. 10-Year Note Futures Source: Bloomberg, PIMCO.

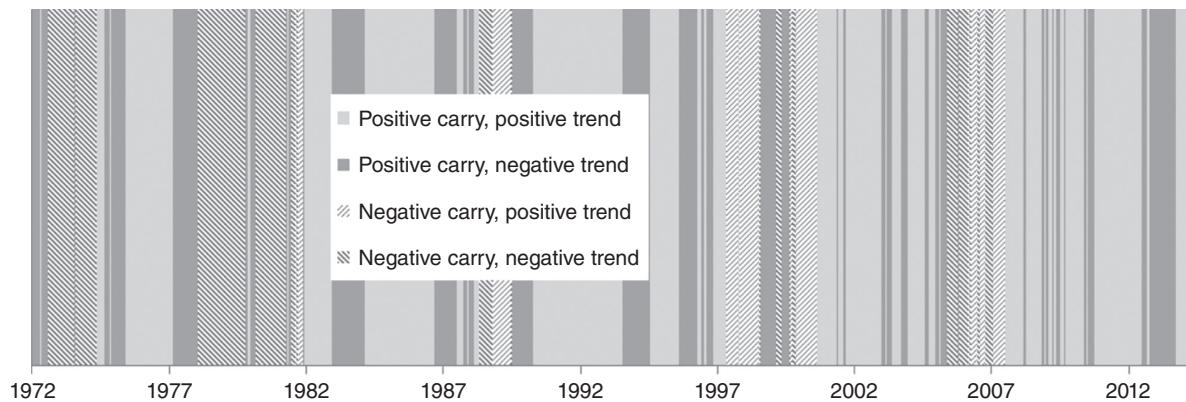


FIGURE 27.2: Decomposing History of U.S. 10-Year Note Futures by Carry and Trend Source: Bloomberg, PIMCO.

TABLE 27.2: Average Returns and Risk-Adjusted Returns by Category, U.S. 10-Year Note Futures, 1972–2014

Market	Begins	Full Sample Avg Return	Annualized Returns by Category				Annualized Return/Volatility by Category			
			Carry>0		Carry<0		Carry>0		Carry>0	
			Trend>0	Trend<0	Trend>0	Trend<0	Trend>0	Trend<0	Trend>0	Trend<0
US 10Y Note	Aug-72	2.9%	5.2%	1.6%	3.0%	-4.2%	0.8	0.2	0.5	-0.5

TABLE 27.3: Proportion of History in Each Carry and Trend Category by Market

Market	Begins	Frequency by Category			
		Carry>0	Trend>0	Carry<0	Trend<0
Commodities					
Corn	Jun-60	17.5%	8.6%	19.5%	54.4%
Oil	Apr-87	47.7%	11.4%	11.1%	29.7%
Gold	Jan-76	0.0%	0.0%	48.4%	51.6%
Copper	Dec-89	37.6%	11.7%	17.3%	33.4%
Nat Gas	Mar-91	26.0%	10.2%	7.5%	56.4%
Sector Average		25.8%	8.4%	20.8%	45.1%
Equities					
Nikkei	May-93	41.4%	35.2%	10.8%	12.5%
S&P 500	Jan-60	17.9%	7.2%	48.1%	26.8%

(Continued)

		Frequency by Category			
		Carry>0		Carry<0	
Market	Begins	Trend>0	Trend<0	Trend>0	Trend<0
EuroStoxx	Jun-99	44.9%	18.8%	18.0%	18.3%
S&P ASX	Apr-01	21.5%	12.6%	44.2%	21.7%
FTSE 100	May-93	21.9%	7.7%	44.6%	25.9%
Sector Average		29.5%	16.3%	33.1%	21.0%
Currencies					
AUD	Dec-77	51.9%	31.7%	6.0%	10.5%
GBP	Dec-72	54.0%	35.8%	3.2%	7.1%
EUR	Dec-72	19.8%	10.7%	33.3%	36.1%
JPY	Dec-72	8.1%	3.4%	43.3%	45.2%
CHF	Dec-72	6.1%	4.1%	44.9%	44.9%
Sector Average		28.0%	17.1%	26.1%	28.8%
Bond Futures					
UK Gilt	Nov-83	38.1%	15.5%	25.8%	20.6%
JGB	Aug-75	68.0%	16.1%	6.7%	9.1%
Bund	Jul-92	65.5%	22.4%	9.5%	2.6%
US 10Y Note	Aug-72	52.9%	23.6%	10.0%	13.5%
Australia 10Y	Jun-02	34.9%	27.4%	17.5%	20.2%
Sector Average		51.9%	21.0%	13.9%	13.2%

TABLE 27.4: Full Table of Results by Market, Maximum Available Sample Periods 1960–2014

Market	Begins	Full Sample Avg Return	Annualized Returns by Quadrant				Annualized Return/Volatility by Quadrant			
			Carry>0		Carry<0		Carry<0		Carry>0	
			Trend>0	Trend<0	Trend>0	Trend<0	Trend>0	Trend<0	Trend>0	Trend<0
Commodities										
Corn	Jun-60	-2.2%	21.2%	-8.9%	-5.7%	-7.4%	0.8	-0.4	-0.2	-0.4
Oil	Apr-87	9.7%	27.6%	29.6%	-15.4%	-17.1%	0.8	0.9	-0.5	-0.4

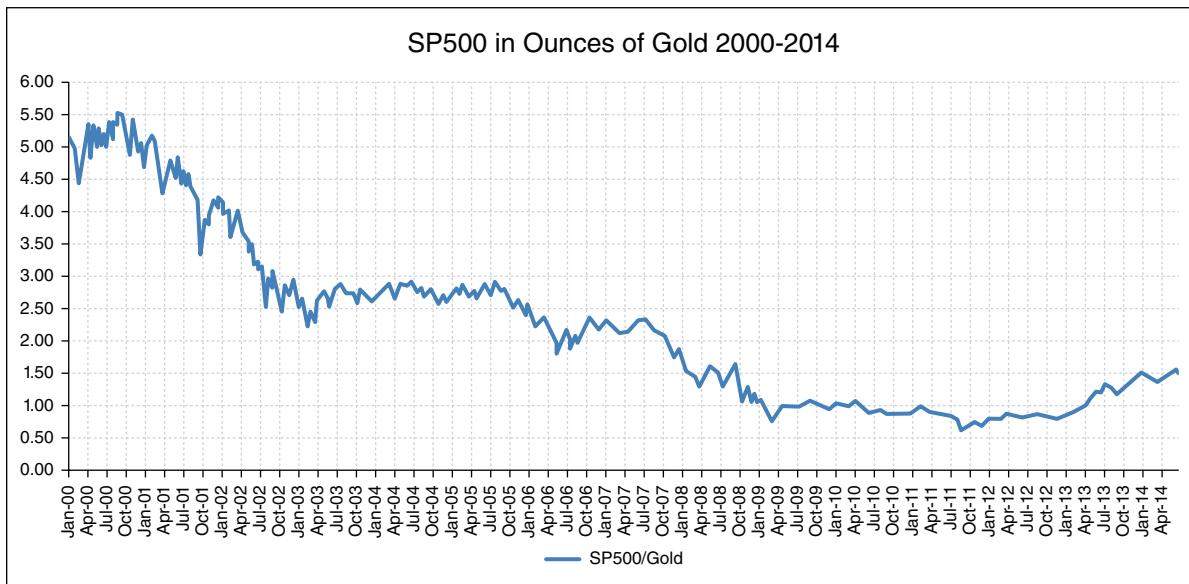
Market	Begins	Full Sample Avg Return	Annualized Returns by Quadrant				Annualized Return/Volatility by Quadrant			
			Carry>0		Carry<0		Carry<0		Carry>0	
			Trend>0	Trend<0	Trend>0	Trend<0	Trend>0	Trend<0	Trend>0	Trend<0
Gold	Jan-76	2.2%	—	—	7.1%	-2.4%	—	—	0.3	-0.1
Copper	Dec-89	8.7%	20.6%	8.1%	1.9%	-0.9%	0.8	0.3	0.1	0.0
Nat Gas	Mar-91	-7.1%	10.5%	-46.8%	32.4%	-13.3%	0.2	-1.1	0.9	-0.3
Sector Average		2.3%	20.0%	-4.5%	4.1%	-8.2%	0.6	-0.1	0.1	-0.3
Equities										
Nikkei	May-93	2.4%	9.1%	1.9%	-15.6%	-2.5%	0.5	0.1	-1.0	-0.1
S&P 500	Jan-60	5.5%	13.4%	21.4%	6.0%	-4.9%	1.1	0.8	0.5	-0.2
EuroStoxx	Jun-99	3.1%	6.7%	27.4%	7.3%	-35.2%	0.4	0.8	0.4	-1.1
S&P ASX	Apr-01	5.6%	14.9%	10.4%	5.7%	-6.7%	1.2	0.4	0.5	-0.3
FTSE 100	May-93	5.9%	8.4%	29.2%	5.8%	-3.2%	0.6	1.0	0.4	-0.1
Sector Average		4.5%	10.5%	18.1%	1.9%	-10.5%	0.8	0.6	0.1	-0.4
Currencies										
AUD	Dec-77	2.5%	5.2%	2.1%	-6.5%	-4.6%	0.5	0.2	-0.9	-0.4
GBP	Dec-72	1.6%	4.7%	-2.1%	-1.5%	-2.0%	0.5	-0.2	-0.2	-0.2
EUR	Dec-72	1.2%	5.8%	3.2%	6.2%	-6.6%	0.6	0.3	0.6	-0.6
JPY	Dec-72	0.1%	5.1%	11.7%	4.7%	-6.1%	0.6	2.3	0.4	-0.6
CHF	Dec-72	1.3%	0.8%	7.4%	4.9%	-2.9%	0.1	0.6	0.4	-0.3
Sector Average		1.3%	4.3%	4.5%	1.6%	-4.4%	0.4	0.6	0.1	-0.4
Bond Futures										
UK Gilt	Nov-83	2.8%	2.8%	4.9%	2.2%	2.0%	0.4	0.6	0.3	0.3
JGB	Aug-75	2.9%	3.7%	5.3%	-2.1%	-3.4%	0.9	0.9	-0.4	-0.6
Bund	Jul-92	4.6%	4.7%	2.6%	6.6%	11.8%	0.9	0.5	1.2	2.1
US 10Y Note	Aug-72	2.9%	5.2%	1.6%	3.0%	-4.2%	0.8	0.2	0.5	-0.5
Australia 10Y	Jun-02	2.4%	7.3%	1.6%	-6.8%	3.1%	0.9	0.2	-0.8	0.5
Sector Average		3.1%	4.7%	3.2%	0.6%	1.8%	0.8	0.5	0.2	0.4

TABLE 27.5: Full Table of Results by Market, Maximum Available Sample Period from 1960–1982

Market	Begins	Full Sample Avg Return	Annualized Returns by Category				Sharpe Ratios by Category			
			Carry>0		Carry>0		Carry>0		Carry>0	
			Trend>0	Trend<0	Trend>0	Trend<0	Trend>0	Trend<0	Trend>0	Trend<0
Commodities										
Corn	Jun-60	−0.9%	42.6%	−0.9%	−7.6%	−11.4%	1.6	0.0	−0.4	−0.8
Gold	Jan-76	6.0%			30.8%	−20.6%			1.0	−0.8
Sector Average		2.6%	42.6%	−0.9%	11.6%	−16.0%	1.6	0.0	0.3	−0.8
Equities										
S&P 500	Jan-60	1.8%	16.0%	12.9%	5.2%	−11.6%	1.9	0.7	0.5	−0.8
Sector Average		1.8%	16.0%	12.9%	5.2%	−11.6%	1.9	0.7	0.5	−0.8
Currencies										
AUD	Dec-77	−0.3%	1.2%	−5.2%	−0.5%	1.9%	0.3	−1.3	−0.1	0.6
GBP	Dec-72	−0.5%	7.9%	−6.9%	−15.5%	−39.1%	1.1	−0.7	−1.8	−3.3

(Continued)

Market	Begins	Full Sample Avg Return	Annualized Returns by Category				Sharpe Ratios by Category			
			Carry>0		Carry>0		Carry>0		Carry<0	
			Trend>0	Trend<0	Trend>0	Trend<0	Trend>0	Trend<0	Trend>0	Trend<0
EUR	Dec-72	1.4%	13.9%	3.0%	5.4%	-6.4%	3.3	0.6	0.5	-0.6
JPY	Dec-72	0.4%	1.9%	4.8%	9.8%	-10.6%	0.5	1.4	0.9	-1.0
CHF	Dec-72	2.0%			5.8%	-1.8%			0.4	-0.2
Sector Average		0.6%	6.2%	-1.1%	1.0%	-11.2%	1.3	0.0	0.0	-0.9
Bond Futures										
JGB	Aug-75	0.1%	6.0%	-1.9%	-2.9%	-2.2%	2.7	-0.6	-0.9	-0.5
US 10Y	Aug-72	-1.9%	4.7%	-3.8%	-5.6%	-6.6%	0.7	-0.6	-0.8	-0.7
Note										
Sector Average		-2.4%	5.4%	-2.9%	-4.2%	-4.4%	1.7	-0.6	-0.8	-0.6



S&P 500 in Ounces of Gold 2000–2014