NOTES

INTRODUCTION: THE ALPHA GAME

1. Joseph Nocera, "The Quantitative, Data-Based, Risk-Massaging Road to Riches," *New York Times Magazine*, June 5, 2005, p. 44.
2. Visiting Asness in July 2009, I found the superheroes piled up on a coffee table pending their return to their usual positions on a recently cleaned windowsill. Asness regarded the task of arranging them in the correct order as too delicate to delegate to an assistant and had not had time to restore them to their usual glory.
3. It should be noted that in 2007, when Blackstone went public, Schwarzman got a cash payment of more than $600 million and retained shares in the company estimated to be worth more than $7 billion. On the other hand, public offerings by hedge funds around the same time also created enormous paper wealth for the founders.
4. Michael Steinhardt, *No Bull: My Life In and Out of Markets* (New York: John Wiley & Sons, 2001), p. 179.
5. Elaine Crocker, who was in charge of identifying and seeding portfolio managers at Commodities Corporation in the 1980s and who became president of Moore Capital in 1994, comments, "Rarely do portfolio managers articulate why they are successful. Sometimes they try to do so but are wrong. I have worked with hundreds of portfolio managers and found that articulating why they are successful is quite difficult for them—although often they are not aware that it is." (Elaine Crocker, e-mail communication with the author, September 8, 2009.) Similarly, Roy Lennox, a longtime macro trader at Caxton, says, "Trading can be intuitive. We are looking at so many factors in the markets [that] a lot of our analysis operates on a subconscious level. All of a sudden you just know this is the right trade. If somebody really quizzed you, you probably couldn't clearly articulate your views and would just say, no no no, I *know* this is the right trade. It's because all these things have been taken in—the market action, the technicals, the things that you read in the newspapers or on Bloomberg and the conversations you have with other traders, analysts and policy makers. It just comes together." (Roy Lennox, interview with the author, June 24, 2009.)
6. Jonathan R. Laing. "Trader With a Hot Hand—That's Paul Tudor Jones II," *Barron's*, June 15, 1987.
7. Malcolm Gladwell, *Blink: The Power of Thinking Without Thinking* (New York: Penguin Books, 2005), p. 67. I am grateful to Chad Waryas for pointing out the parallel between trading and tennis.

8. Andrei Shleifer and Lawrence H. Summers, "The Noise Trader Approach to Finance," *Journal of Economic Perspectives* 4, no. 2 (Spring 1990). In the wake of the financial crisis of 2007–2009, it was said that financial economists had finally been forced to wake up to market inefficiencies. But their existence had already been widely accepted among economists for at least two decades.
9. There are many more examples. Richard Thaler, the leading light in behavioral finance, is involved in the investment-management firm Fuller & Thaler. At Long-Term Capital Management, Eric Rosenfeld, a former finance professor at Harvard Business School, was more important but less famous than Merton and Scholes, the Nobel laureates. Kenneth French is a director of Dimensional Fund Advisors. Asness set up AQR with John Liew, whom he had known at Chicago's PhD program.
10. Gwynne Dyer, "The Money Pit and the Pendulum," *The Globe and Mail*, January 17, 1998.
11. For a description of this trade-off, see Jeremy C. Stein, "Sophisticated Investors and Market Efficiency" (working paper downloaded from Stein's Web site at Harvard).
12. See Benn Steil, "Lessons of the Financial Crisis," Council Special Report No. 45 (Council on Foreign Relations, March 2009).
13. Near the end of 2008, the ratio of Citigroup's total assets to its tangible net worth was fifty-six to one. At the end of 2007 the total assets of the Swiss bank UBS exceeded its equity by fifty-three times.
14. It is true that hedge funds do not always mark their assets to market in a perfect way: There is evidence that they fudge them to make their returns appear less volatile. But hedge funds are nonetheless much closer to marking assets to market than are other financial institutions, notably banks.

CHAPTER ONE: BIG DADDY

1. Britt Erica Tunick, "Capital Gains: The Firms in Our Sixth Annual Ranking of the World's 100 Biggest Hedge Funds Manage an Altogether Staggering $1 Trillion," *Alpha*, May 2007.
2. Steve Fishman, "Get Richest Quickest: In the Precarious Hedge-Fund Bubble, It's Either Clean Up—Or Flame Out," *New York*, vol. 37, no. 41, November 22, 2004.
3. Peter Landau, "The Hedge Funds: Wall Street's New Way to Make Money," *New York* vol 1, no. 29 (October 21, 1968): pp. 20–24.
4. Adam Smith, *The Money Game* (New York: Vintage Books, 1976), p. 41.
5. John Brooks, *The Go-Go Years* (New York: Weybright and Talley, 1973), p. 128.
6. The account of Jones's early life comes principally from the author's interviews with Jones's children, Anthony Jones and Dale Burch, conducted sequentially on May 22, 2007. State Department files and entries about Jones in the Harvard yearbooks confirm the narrative.
7. According to State Department records, Jones worked as a clerk and export buyer from 1924 to 1926. He was hired as a statistician and analyst for an investment counselor and held this job from 1926 to 1928. State Department Historian's Office, e-mail communication with the author, June 5, 2007.
8. Charles Kindleberger, *The World in Depression* (Berkeley: University of California Press, 1986), p. 132.
9. According to State Department files, the marriage took place on January 17, 1932. The circumstances of Anna's previous marriage and associated custody battle are described in detail in a letter from Jones to the American consul general in Berlin, George S. Messersmith, dated March 22, 1932, held on file in the National Archives. This episode in Jones's life was discovered by Harold Hurwitz, a leading historian of Germany's anti-Nazi Left, who generously provided me with copies of documents and letters relating to Jones's life in the 1930s. (Harold Hurwitz, interview with the author, June 7, 2007.) I am also indebted to Peter Lowe, the nephew of one of the leaders of the Leninist Organization, who confirmed several details, and to Mark Hove at the Office of the Historian in the State Department. (Peter Lowe and Mark Hove, e-mail communications with the author, June 6 and 7, 2007.) The name of Jones's wife is confused by her multiple marriages and her use of pseudonyms: She also went by "Hannah Koehler" and by "Nelly."
10. The group was often known simply as the "Org" and later changed its name to Neu Beginnen.

11. Confidential State Department memorandum, February 20, 1933.
12. Mary was illustrating a medical book at the time she met Jones. "I was doing this illustrating when I met my husband, and he said, 'How can you draw those things when you can marry me?' So we were married." Mary Carter Jones, taped interview for Henry Street Oral History Project, 1993, box T2:23, Henry Street Settlement Records Series 8, Social Welfare History Archives, University of Minnesota, Minneapolis. My thanks to the Henry Street Settlement for permitting access.
13. According to Hurwitz, in the mid-1930s Jones was working for the Leninist Organization, now renamed Neu Beginnen, in New York. Moreover, Hurwitz speculates that Jones was involved in U.S. intelligence operations. According to records in the U.S. embassy in Paris, Jones maintained contact with the State Department in 1937 and as late as 1939 and received payments for a "rent allowance"; he may have been funded by the State Department to stay in touch with the German underground. Further, State Department files indicate that in April 1944 the department considered arranging a military deferment for Jones, suggesting a continuing connection between the government and Jones more than a decade after no official one existed. State Department files and Hurwitz interview.
14. The story of the Joneses' visit to Spain is told in their joint report: Alfred W. Jones and Mary Carter Jones, "War Relief in Spain: Report to the American Unitarian Association." (American Friends Service Committee and the American Unitarian Association, 1938).
15. Adam Smith, introduction to *The Money Managers*, ed. Gilbert Edmund Kaplan and Chris Welles (New York: Institutional Investor Systems, 1969), p. xiii.
16. In his contribution to the twenty-fifth yearbook for the Harvard class of 1923, Jones explains his interest in sociology as a reaction to his experiences in Germany: "I came home in the midst of the Depression to try to find out if anything like that could happen here." *25th Anniversary Yearbook of the Harvard Class of 1923* (Cambridge, MA), p. 450.
17. Alfred Winslow Jones, *Life, Liberty and Property: A Story of Conflict and a Measurement of Conflicting Rights* (Philadelphia: J.B. Lippincott Company, 1941), p. 23.
18. Alfred Winslow Jones, "The Free Market and the Future," *Fortune* 25, April 1942, pp. 98–99, 126, 128.
19. Smith, *The Money Game*, p. 11. I also owe to Smith the paradox that money is at once an abstraction and a medium for emotional expression. Smith entertainingly quotes Edward Crosby Johnson II, who in the 1950s established Fidelity as a dominant investment firm and made the same point in his own way: "The market is like a beautiful woman—endlessly fascinating, endlessly complex, always changing, always mystifying. I have been absorbed and immersed since 1924 and I know this is no science. It is an art. . . . It is personal intuition."
20. Alfred Cowles III and Herbert E. Jones, "Some A Posteriori Probabilities in Stock Market Action," *Econometrica* 5(3) (July 1937): 280–94.
21. In his contribution to the twenty-fifth-anniversary edition of his Harvard yearbook, Jones wrote extensively about his interests as of early 1948: There was a whole paragraph about his political views and a paean to gardening; finance wasn't mentioned.
22. "With a wife and two children, I needed something more lucrative, and turned to Wall Street." Alfred Winslow Jones contribution to the *Fiftieth Anniversary Report of the Harvard Class of 1923* (Cambridge, MA).
23. Data on Jones's returns up to 1961 come from the unpublished "Basic Report to the Partners," May 31, 1961, provided to me by Robert Burch IV, Jones's grandson. Data on returns from 1964 on come from the files of Clark Drasher, a fund manager for A. W. Jones. Data on the years 1962 and 1963 come from press accounts, notably Carol J. Loomis, "The Jones Nobody Keeps Up With," *Fortune*, April 1966, pp. 237–47.
24. Loomis, "The Jones Nobody Keeps Up With."
25. In his excellent biography of Warren Buffett, Roger Lowenstein reports that investors who entrusted their money to the future sage of Omaha in 1957 enjoyed a sixteenfold return over the next thirteen years. Jones was up just under fifteenfold in this period, but there were other thirteen-year periods in which he was up seventeenfold. See Roger Lowenstein, *Buffett: The Making of an American Capitalist* (New York: Broadway Books, 2001), p. 118.
26. This description comes from Richard Radcliffe, Clark Drasher, and Banks Adams, who worked for Jones as fund managers, and from Richard Gilder, who visited the office regularly in the late 1950s

and early 1960s as one of the fund's brokers. Richard Radcliffe, interviews with the author, April 6 and 16, 2007; Clark Drasher, interview with the author, April 10, 2007; Banks Adams, interview with the author, April 16, 2007; Richard Gilder, interview with the author, April 3, 2007.

27. How Jones came up with this idea is not clear. He may have known of the investment partnership operated by Ben Graham, the father of value investing and mentor to Warren Buffett. Graham's partnership in many respects resembled a hedge fund: It went both long and short, charged performance fees, and used leverage. Another potential source of inspiration, according to Richard Radcliffe, who joined A. W. Jones in 1954, is a legendary broker named Roy Neuberger. An unpublished profile of Neuberger by the writer "Adam Smith" reports that Neuberger arrived on Wall Street in the 1920s without having finished college and that he balanced long and short investments. When the 1929 crash came, Neuberger's portfolio emerged unscathed while most investors were ruined. Neuberger later met Jones through a neighbor near his country home. "He was starting a real hedge fund, and I became his broker," Neuberger told Smith. On Ben Graham's partnership, see Jim Grant, "My Hero, Benjamin Grossbaum," remarks delivered on November 15, 2007, at the Center for Jewish History (available at http://www.grantspub.com/articles/bengraham/). On Neuberger, see Adam Smith, "Roy Neuberger: Where the Money Is," unpublished article dated December 5, 2003. The article was circulated by Craig Drill of Drill Capital, whose advice to me has been tireless.
28. Kaplan and Welles, *The Money Managers*, pp. 112–13.
29. "A Basic Report to the Partners."
30. Ibid. For further evidence of how short selling was often seen as unworthy of respect, see Martin T. Sosnoff, "Hedge Fund Management: A New Respectability for Short Selling," *Financial Analysts Journal*, July–August 1966, p. 105.
31. Until 2007, shorting was only permitted on an uptick; one could not short a stock that was already moving downward. In addition, all profits from short sales, like profits from short-term investments on the long side, are taxed like ordinary income, which in Jones's era could mean at rates up to 90 percent. Meanwhile, long-term gains on stocks, which at the time meant gains on stocks that the firm had held for at least six months, were taxed at lower rates, usually 25 percent.
32. Richard Radcliffe recalls the velocity calculation as being a bit rough-and-ready. "We took the last five market highs and the last five lows and we looked up what the stocks had done in those highs and lows. . . . Sometimes there weren't five really good moves, so it was very crude. . . . I did it myself for my hedge fund after I left, but then I figured what the hell, it wasn't worth it." Radcliffe interview, April 16, 2007.
33. Jones's prescience in separating alpha from beta was first pointed out to me by Robert Burch IV. Robert Burch IV, interview with the author, April 18, 2007.
34. Dale Burch interview.
35. This is a slightly simplified version of a table given in Jones's 1961 "Basic Report."
36. For a flavor of how Jones's innovations are underappreciated, consider the following passage from *Capital Ideas Evolving*, by the late Peter L. Bernstein, the most widely read (and readable) historian of investment theory: "Markowitz's famous comment that 'you have to think about risk as well as return' sounds like a homey slogan today. Yet it was a total novelty in 1952 to give risk at least equal weight with the search for reward." Bernstein appeared unaware that Jones managed money based on this insight. Peter L. Bernstein, *Capital Ideas Evolving* (Hoboken, NJ: John Wiley & Sons, 2007), p. xiii.
37. Mark Rubenstein, *A History of the Theory of Investments* (Hoboken, NJ: John Wiley & Sons 2006), p. 122.
38. On Jones's propensity for secrecy, it is striking that he never told his children anything about his first marriage, which they only discovered by accident when Jones's son Anthony married an Austrian, causing the authorities to look up his family records. (Anthony Jones interview.) Moreover, Jones never mentioned his time in Berlin to Richard Radcliffe, who worked for him for a decade, even though the Berlin period must have remained vivid in Jones's memory. (Radcliffe interview, April 16, 2007.) Concerning Jones's business secrecy, a broker who later founded a hedge fund said, "We knew that Jones was making a fortune and that people who were associated with him were doing extremely well. But we didn't know how he was doing it." See Kaplan and Welles, *The Money*

Managers, pp. 115–16. It was not until 1966, seventeen years after the launch of the fund, that Jones's techniques were described in the financial media.

39. John Tavss, a tax lawyer who began his career working for Valentine, recalls that on another occasion Valentine's wife came to meet him at his office. He asked her to wait while he had a word with a colleague; then he disappeared down a corridor, got locked in conversation for an hour, and proceeded home, forgetting that his wife was waiting for him. John Tavss, interview with the author, April 18, 2007.
40. The top rate on regular income was 91 percent between 1951 and 1964; the top rate on capital gains was 25 percent during that time. In 1965, the top rate on regular income was lowered to 70 percent, where it stayed until 1968. Valentine of Seward & Kissel also figured out that a departing partner could be paid out with shares that carried with them unrealized investment gains, thereby ridding the hedge fund of tax liabilities; he continued to come up with ingenious tax designs for the successor generation of hedge funds, notably Tiger. John Tavss recalls, "He could take almost any problem and start spouting out potential solutions. He would come up with five ideas immediately." (John Tavss interview.) Craig Drill recalls: "Everyone in the hedge fund business who knew about this was very quiet about it for ten, or twenty, or thirty years." (Craig Drill, interview with the author, March 20, 2007.)
41. "If a partner dropped out or he had a slot, he'd just mention it at dinner and say, 'Are you happy?' That's what he said to Pauline Plimpton—widow of the founder of the law firm Debevoise & Plimpton—and she said, 'Yeah, I'm getting terrible results,' and she became a partner." (Dale Burch interview.)
42. The Securities Act of 1933 contains an exemption for "transactions by an issuer not involving any public offering." To avoid being deemed to be making a public offering, an investment partnership had to limit the number of partners. Likewise, the Investment Company Act of 1940, which imposes limits on the use of leverage, short selling, and high fees, contains an exemption for partnerships with fewer than one hundred partners that do not offer themselves publicly. Hedge funds were also anxious to avoid entanglement with the Investment Advisors Act, which prohibits "compensation to the investment advisor on the basis of a share of capital gains." To avoid registration under this act, hedge-fund managers argued that they were advising fewer than fifteen clients, an assertion that hinged on the claim that the "client" was the investment partnership rather than the more numerous partners. If the SEC had rejected that assertion and forced hedge funds to register, it would probably have crushed them. Richard Radcliffe, the first fund manager hired by A. W. Jones, recalls: "We always were afraid of getting regulated, and the way we would have been regulated would have been if we had too many partners there. . . . We got up close to a hundred, and we decided that we should have another fund. And we even separated out the investment strategies to make it look as if we were not just trying to get around the rules." (Radcliffe interview, April 16, 2007.) Clark Drasher, another A. W. Jones alumnus, offers a similar account. (Drasher interview.)
43. Brooks, *The Go-Go Years*, p. 144.
44. Alfred Cowles, "A Revision of Previous Conclusions Regarding Stock Price Behavior," *Econometrica* 28, no. 4 (October 1960).
45. By 1965, Jones's earlier faith in charts was coming under attack even from the chartists themselves. In his 1949 essay in *Fortune*, Jones had singled out a Russian immigrant named Nicholas Molodovsky as "the most scientific and experimental of technical students," reporting that with the exception of two episodes in which he had called the market wrong, "his predictions have been nearly perfect." But in 1965 Molodovsky, by then the editor of the influential *Financial Analysts Journal*, commissioned a paper from a rising academic star named Eugene Fama, which appeared under the title "Random Walks in Stock Market Prices." Fama compared chart following to astrology. By popularizing Fama's random-walk theory, Molodovsky was burning the ground under Jones's feet; the premise of Jones's fund was under attack from one of its progenitors. The blow must have felt especially heavy since Jones and Molodovsky were close; Molodovsky introduced Jones to Richard Radcliffe, whom Jones hired subsequently, and Radcliffe recalls Molodovsky as an intellectual influence on the Jones fund during his period there between 1954 and 1965. Radcliffe interviews.

46. By 1968, Donald Woodward, Jones's chief operating officer, was willing to say categorically that stock selection, not market timing, was the key to success. "Our judgment about the prevailing market trend has not been our strong point," he said. See "Heyday of the Hedge Funds," *Dun's Review*, January 1968, p. 76.
47. The description of the Jones stock-picking style is based on interviews with seven of the firm's employees: Richard Radcliffe, Carlisle Jones, Clark Drasher, Banks Adams, Alex Porter, Alan Dresher, and Walter Harrison. Radcliffe interview; Carlisle Jones, interview with the author, June 9, 2007; Drasher interview; Adams interview; Alex Porter, interview with the author, April 4, 2007; Alan Dresher, interview with the author, May 30, 2007; Walter Harrison, interview with the author, April 17, 2007. See also the entertaining but somewhat jaundiced description of Jones in Barton Biggs, *Hedgehogging* (Hoboken, NJ: John Wiley & Sons, 2006), pp. 81–85. Biggs, who ran a model portfolio for Jones, recalls, "Alfred Jones understood the performance game and the value of getting an edge from research before anyone else did." *Hedgehogging*, p. 83.
48. Jones's distaste for committee meetings extended to charitable obligations. Recalling her work on multiple civic committees during World War II, Mary Jones remarked: "My husband hated going on committees in wars—he just loathed it—he'd say, 'Make Mary do it,' or something like that." Mary Jones interview with Henry Street Oral History Project.
49. "At the time, nobody else ran a fund with these sorts of measurements. The brokers were eager to work for Jones because they could see how well their model portfolios were doing. And if they did well they got commissions. So we got good service. We got their best ideas. If the ideas went to the mutual funds, you did not know how they reached their decision." Radcliffe interview, April 16, 2007.
50. Biggs, *Hedgehogging*, p. 83.
51. Clark Drasher, who worked for A. W. Jones between 1963 and 1973, recalls: "The culture was not big on meetings. Everyone agreed that meetings were a waste of time. If you had a hot idea you didn't want the other guys to know because you wanted your segment to outperform the other guys' segments. Every May we would sit down and argue about who should get how much of the total general managers' fee." (Drasher interview.) Alex Porter, who started at A. W. Jones in 1967, recalls: "The practice was that they hired three or four people, and at the end of the year, one or two left and others came in. To a great extent it was performance driven." (Porter interview.)
52. Biggs, *Hedgehogging*, p. 84.
53. Kaplan and Welles, *The Money Managers*, p. 113.
54. The Russian-Yugoslav connection dominated a dinner mentioned in Kaplan and Welles, *The Money Managers*. On Jones's social contacts at the United Nations, Mary Jones recalls, "I knew most of the secretary generals and their staff. A lot of the ambassadors too." Mary Jones interview with Henry Street Oral History Project.
55. The first segment manager to defect from A. W. Jones was Carlisle Jones (no relation). He says of his former boss: "I don't think he knew the difference between a stock and a bond. . . . I was very jealous. He would nap for an hour. Then he would read the books or papers. The books probably didn't have to do with investment. . . . A lot of times I didn't feel as though I was properly compensated." Carlisle Jones interview.
56. The defector was Richard Radcliffe. (Radcliffe interview.) See also Biggs, *Hedgehogging*.
57. The estimate for 1968 comes from "Heyday of the Hedge Funds." The range for 1969 reflects estimates given at the Practicing Law Institute's forum on Investment Partnerships, held on March 7, 1969, and quoted in Joseph P. P. Hildebrandt, "Hedge Fund Operation and Regulation" (unpublished J.D. thesis, Harvard University) April 15, 1969. I am grateful to Craig Drill, an indefatigable collector of historical gems, for giving me a copy.
58. "Hedge Funds: Prickly," *Economist*, May 25, 1968, p. 91. Other estimates from the time put the number lower.
59. Jones considered the popular term for his style of investing a grammatical outrage. "My original expression, and the proper one, was 'hedged fund,'" he told friends in the late 1960s, when the expression in its corrupted form entered the language. "I still regard 'hedge fund,' which makes a noun serve for an adjective, with distaste." Brooks, *The Go-Go Years*, p. 142.

60. Loomis, "The Jones Nobody Keeps Up With."
61. Alex Porter recalls: "I read Carol Loomis's article in *Fortune*, and I called up Mr. Jones and didn't get him but got Don Woodward, who was the chief operating officer, and told him I wanted to come and work for him." Porter first ran a model portfolio, then went to work for Jones in 1967, remaining until the early 1970s. Porter interview.
62. This partner was Dean Milosis. The guess about Jones's personal income comes from "Heyday of the Hedge Funds." p. 76.
63. A comprehensive description of the regulatory questions asked about hedge funds in 1969 is given in Hildebrandt, "Hedge Fund Operation and Regulation." See also Carol Loomis, "Hard Times Come to Hedge Funds," *Fortune*, January 1970.
64. By contrast, the S&P 500 average gained 1 percent in the year to June 1, 1966, 7 percent the year after that, and 10 percent in the following one. The Jones funds were run on a financial year ending May 31; hence the comparison with S&P 500 returns ending June 1.
65. Clark Drasher recalls: "I don't think I really took this volatility thing seriously. Maybe I didn't give a hoot about it. I told Jones it was not a real measure of risk. I didn't like it because often something I wanted to do in bulk was restricted because of the volatility factor. A lot of mathematical baloney went on. All this attempt to be scientifically precise makes you feel good, but at the end of the day you made money if your selections were good or not. . . . Most of the time we were not balanced. We would get carried away in rising markets. You'd hate to be short much of anything in the 1960s. So when the bad times came in 1969 we got hit." (Drasher interview.) Similarly, Banks Adams recalls: "When the 1960s came and the markets were going straight up, those [volatility] numbers were just useless. Let's take Texas Instruments: It didn't fluctuate, it was going straight up. Telephones proved to be more volatile than Texas Instruments, which was doubling and tripling every year. A. W. Jones's thinking came out of the 1940s and 1950s." (Adams interview.)
66. Bernstein, *Capital Ideas Evolving*, p. 9. See also Edwin Burk Cox, *Trends in the Distribution of Stock Ownership* (Philadelphia: University of Pennsylvania Press, 1963), pp. xiii, 211.
67. Smith, *The Money Game*, p. 209.
68. The S&P 500 fell 23.4 percent over the same period. Jones's larger losses reflected the fact that he was more than 100 percent long.
69. Dale Burch interview.

CHAPTER TWO: THE BLOCK TRADER

1. This number comes from the Securities and Exchange Commission's "Institutional Investor Study Report," published in March 1971. See Wyndham Robertson, "Hedge Fund Miseries," *Fortune*, May 1971, p. 269.
2. The estimate of 150 hedge funds as of January 1970 comes from the painstaking census conducted by Carol Loomis. See Carol Loomis, "Hard Times Come to Hedge Funds," *Fortune*, January 1970. In 1969, the annual report of the Securities and Exchange Commission stated that the number of hedge funds was "approaching 200"; but as noted in the previous chapter, estimates ranged up to 500.
3. In the spring of 1971, the Securities and Exchange Commission released its long-awaited report on institutional investors. It reiterated the doubts about performance fees and called for hedge funds to register under federal law. But the fire had gone out of the campaign. In particular, the SEC had found no evidence to support the idea that hedge-fund trading was disruptive to markets. See Wayne E. Green, "SEC Finds No Link of Institutions to Price Swings: Doubts Needs for Curbs," *Wall Street Journal*, March 11, 1971, p. 6.
4. In an article published in January 1968, Donald Woodward put the size of the Jones funds at "well past" $100 million. According to notes kept by Clark Drasher, assets in 1969 came to $107 million and assets in 1973 came to $35 million. According to Jones's grandson, Robert L. Burch, internal records kept by the Jones partnership show that the capital had shrunk to $25 million by 1984. See "The Heyday of the Hedge Funds," *Dun's Review*, January 1968, p. 78; Clark Drasher, interview with the author, April 10, 2007. Robert L. Burch, e-mail communication with the author, May 18, 2007.

5. Michael Steinhardt, *No Bull: My Life In and Out of Markets* (New York: John Wiley & Sons, 2001), p. 81.
6. The lawyer was Paul Roth. He recalls: "They wanted to have their names in the firm and pulled straws to see the order. I was there that day in Howard Berkowitz's Manhattan apartment. I told them that 'Steinhardt, Fine, Berkowitz' sounded like a Jewish delicatessen. I was somewhat concerned—how do you go out with a name like that?" Paul Roth, interview with the author, October 3, 2007.
7. Jerrold Fine, interview with the author, August 29, 2007.
8. Steinhardt, Fine, Berkowitz & Company reported results for years to the end of September. To facilitate comparison, the S&P 500 numbers given here are also for the years to September.
9. See Robertson, "Hedge Fund Miseries," p. 270.
10. Howard Berkowitz interview, August 28, 2007. Jerry Fine interview, August 29, 2007. For the Spacek quote, see John Bogle's forward to Adam Smith, *Supermoney* (New York: John Wiley & Sons, 1972), p. xiii.
11. David Rocker, an analyst with Steinhardt, Fine, Berkowitz, recalls: "To make money on the short side you have to be a scrapper. The government is against you. The media was against you; it was un-American to be short. The company management was against you. Advances in stock prices tend to be long and gentle, whereas falls are sharp and short. And so most days when you go in the office, the short seller is taking it in the nose. There were not a lot of people at the time who were willing to take it in the nose." David Rocker, interview with the author, July 31, 2007.
12. Steinhardt, *No Bull*, p. 127. Elaborating on this point in an interview with the author, Steinhardt says, "We did seem like gunslingers and wise guys. I was concerned that they'd pass legislation to outlaw short selling because there was talk about that. But to the specific answer to your question [on how he responded to being resented], I felt very good that I had the wisdom, judgment, and courage to put myself in that position." Michael Steinhardt, interview with the author, October 4, 2007.
13. Steinhardt interview.
14. John LeFrere, interview with the author, August 28, 2007. The LeFrere story is not an isolated incident. When an analyst named Oscar Schafer joined the firm, Steinhardt called him the first day and asked what he was up to. Schafer replied that a friend of a friend fancied Commonwealth Oil, so he might take a look at it. Steinhardt immediately bought a huge block of the stock. Schafer was terrified. Oscar Schafer, interview with the author, August 29, 2007.
15. Michael Steinhardt recalls: "Tony was, as you've heard, very unusual because of his ability to express himself unequivocally. In such a way that he was vulnerable . . . It was that vulnerability that made you respect him when he was right and when he was wrong, and made you think he was a man of courage and conviction." Asked about the sources of Cilluffo's conviction, Steinhardt says: "It could be a mystery because we were dealing with a person who had lots of street smarts and who was intelligent, but wasn't intelligent in the way that the rest of us were in having taken economics 101 and 102 and finance and that good stuff; he didn't have that. His intelligence came from a different source and his judgments came from a different source. To talk about Kondratiev waves and put overwhelming emphasis on it, that was something only he could do. With conviction and a little bit of naïveté. I don't think he knew too much. But he knew what he had to know. Why he felt as he did was a mystery because he couldn't articulate it." Michael Steinhardt, interview with the author, September 10, 2007.
16. Tony Cilluffo, interview with the author, September 25, 2007. See also Steinhardt, *No Bull*, p. 122.
17. Steinhardt, *No Bull*, p. 128. Steinhardt adds: "I especially was influenced by him. I was prepared to give him his head." Steinhardt interview, October 4, 2007.
18. Steinhardt, *No Bull*, p. 186.
19. Steinhardt interview, October 4, 2007. See also Steinhardt, *No Bull*, p. 187. In an interview with Jack D. Schwager, Steinhardt approvingly cites a fellow investor who says, "All I bring to the party is twenty-eight years of mistakes." See Jack D. Schwager, *Market Wizards: Interviews with Top Traders* (New York: New York Institute of Finance, 1989), p. 211. It should also be noted that when Steinhardt tries to give examples of his feel for the markets, he can sound underwhelming. "Often

listening to an idea led me to an entirely different conclusion than the proponent of that same idea," he writes, as though the experience of realizing what you think by listening to someone who thinks otherwise were remotely unusual. Steinhardt, *No Bull*, p. 187.

20. Ibid., pp. 189–90.
21. One former Steinhardt colleague says: "There was no upside to Michael's aggression. In the end it drove me away. I would not treat a dog that way."
22. Howard Berkowitz says, "We were all research analysts, we were all very intense in our management process, we knew about the companies we visited, we understood what was going on. Markets were less efficient back then." (Berkowitz interview.) Jerry Fine insists, "We were, in my opinion, 100 percent research driven." (Fine interview.)
23. Other examples of hedge-fund success based primarily on stock picking include Julian Robertson's Tiger fund and its offshoots. See chapter five and the appendix.
24. One of the few money-supply watchers in the 1960s was Henry Kaufman of Salomon Brothers. He describes his profession in the 1960s as having "a handful" of members in the entire country. These tended to advise bond investors, not equity investors. Henry Kaufman, interview with the author, September 10, 2007. Another exception was James Harpel, a hedge-fund manager who ran Century Capital. Harpel recalls that his focus on the bearish implications of high interest rates was considered unusual in the early 1970s. James Harpel, interview with the author, October 2, 2007.
25. Cilluffo was watching the data on net free and borrowed reserves. Tony Cilluffo, interviews with the author, July 23 and September 25, 2007.
26. Interviews with six of Cilluffo's colleagues produced this picture of a man whose opinions were followed but whose reasoning could be mysterious. For example, Oscar Schafer recalls, "Tony, for a long time, had an amazing ability to say, 'Tuesday the market will go down.' And on Tuesday the market would go down." (Schafer interview.) David Rocker says of Cilluffo, "He did his own thing. Nobody else could figure it out." (Rocker interview.) Michael Steinhardt says of Cilluffo's monetary analysis, "I think it was an edge. The question was, was it blind luck or something different?" A bit later, he adds: "Maybe he could have been talking moonbeams or something else, but the fact is that he was right. When anyone questioned him deeply about these things, you immediately got the sense that his knowledge was superficial and that he was totally uneducated in these areas." (Steinhardt interview, October 4, 2007.)
27. William J. Casey (chairman of the Securities and Exchange Commission), "The Changing Environment for Pension Plans" (address to the American Pension Conference, October 7, 1971).
28. In 1960 the big savings institutions had accounted for just a quarter of the turnover on the New York Stock Exchange. By 1969 they accounted for more than half of it. The share rose steadily from then on. By the mid 1980s institutions were reckoned to account for 80 to 90 percent of stock-exchange turnover. See Charles J. Ella, "Modern Moneyman: A Hedge Fund Manager Mixes Research, Risks to 'Perform' in Market," *Wall Street Journal*, October 31, 1969, p. 1.
29. Block trading was to reach 30 percent of total turnover by 1980 and 50 percent by 1984. New York Stock Exchange data presented graphically in Randall Smith, "Street Hazard," *Wall Street Journal*, February 20, 1985, p. 1.
30. "It was rare for someone who was running the firm, like me, to be sitting on the desk, getting block indications and speaking to senior block traders, in contrast to most other firms, which had people who were nothing but clerks doing the same thing. So if you are a senior guy at a brokerage firm, who would you rather speak to? Me or some clerk? You would rather speak to me, open up to me, have me on your side. By being there, I got a better call than most others." Steinhardt interview, October 4, 2007. See similar remarks in Schwager, *Market Wizards*, p. 213.
31. Steinhardt interview, September 10, 2007.
32. Steinhardt, *No Bull*, p. 97.
33. Steinhardt recalls: "There were opportunities created by dealing with [Salomon's] Jay Perry. There were times he was eager to get his print on the tape. When you knew that, you offered him the wrong price. The wrong price on 300,000 shares is three eighths of a point. That's a lot of money in your pocket. That's what I did really well." Steinhardt interview, October 4, 2007.
34. Steinhardt interview, October 4, 2007.

35. Explaining their assumptions in a seminal article in 1961, Franco Modigliani and Merton Miller included the condition whose real-world absence Steinhardt exploited: "No buyer or seller (or issuer) of securities is large enough for his transactions to have an appreciable impact on the then ruling price." Merton H. Miller and Franco Modigliani, "Dividend Policy, Growth, and the Valuation of Shares," *Journal of Business* 34 (1961), p. 412. Meanwhile, Eugene Fama acknowledged that stock-market specialists, armed with privileged knowledge of unfulfilled buy and sell orders, could outperform the market. But he failed to see that this apparently minor qualification had become more significant with the rise of block trading. Now it was no longer just the specialists who knew what trades were coming down the pike; block traders like Steinhardt also had access to market-moving information. And the value of this information had gone up, because the big block trades were likely to move the price more than the small orders handled by the specialists. Eugene F. Fama, "Efficient Capital Markets: A Review of Theory and Empirical Work," *Journal of Finance* 25 (1970): 409–10.
36. For an elegant exposition of this point, see Richard Bookstaber, *A Demon of Our Own Design* (New York: John Wiley & Sons, 2007), pp. 183–84.
37. "I used to generate vast amounts of commissions relative to my capital because I did all sorts of things that generated huge commissions for my own purposes that I felt had some circular benefit: You generate commissions, you get good ideas, you have the ability to be more liquid than the next guy because the broker will buy your stuff when he needs to and not the next guy's stuff; and you get a better call on new issues and research." (Steinhardt interview, September 10, 2007.)
38. In another example of preferential treatment in 1986, a Goldman Sachs analyst recommended Southwest Airlines Co.'s stock to Steinhardt's traders the night before he gave the recommendation to the rest of Goldman's clients. George Anders, "Investors' Investor: Powerful Trader Relies on Information Net, Timing and a Hot Pace—Michael Steinhardt in Action; One Eye on His Screens, One Ear to Rumor Mills—Fees Alone Cost $22 Million." *Wall Street Journal*, March 3, 1986.
39. Steinhardt describes one instance in which he demanded to know the identity of the seller and even canceled his buy order after the fact. "Usually the seller doesn't know his ass from his elbow. Are there occasions when he does? You bet. We once bought a block of Equity Funding, a big dislocated block, and we sensed right away that something was wrong. And we went to Goldman and they had bought some stock too. And we asked and we found out who the seller was, and it was clear to us that the seller knew something. . . . It was an insider thing. Who am I to stop payment on that trade? I'm not supposed to know the seller, and even if I do, I'm not supposed to have proof that he knew anything. But I did." Steinhardt continues: "At one point, in the early eighties, we were Goldman Sachs's largest account. To be Goldman's biggest account, a mere hedge fund. Can you imagine the turnover we must have been doing? It required me having intimate relationships with the people at the trading desks at the major firms where I could trust them and they could trust me. Where they could give me information that was almost always to my benefit. And to their benefit as well. It was another source of income for us." Steinhardt interview, October 4, 2007.
40. John Lattanzio joined Steinhardt in 1979. John Lattanzio, interview with the author, October 4, 2007.
41. Cary Reich,"Will Weinstein, Former Head Trader, Oppenheimer & Co.," *Institutional Investor*, Vol. 21, no. 6, June 1987, pp. 38–42. Weinstein as much as admits in the interview that he colluded with the chief traders at Salomon Brothers and Goldman Sachs. Conversations with Steinhardt confirm that, as the biggest block trader on the buy side, he was part of the same circle.
42. "If he [the broker] had something coming, if he knew he had a huge seller, he would say to me, 'You know, it wouldn't be a bad thing for you to get short on blah blah blah.' Why would he want me to get short on blah blah? Because he had a huge seller and he knew, at some point, he was going to trade that stock down. And if he had me as a buyer covering my short, it would be good for him; it would be, almost certainly, good for me because I would be buying it lower." Steinhardt interview, October 4, 2007.
43. Ibid.
44. Ibid.

45. This calculation assumes that the odds of making a positive return in any given year are one in two. For a normal mutual fund, this assumption would be false: The stock market moves up in more years than it falls, so the odds of making a positive return are higher than that. But for a hedge fund that was both long and short, and that invested heavily in bonds, the assumption of one in two seems roughly fair.
46. "Steinhardt Fine Firm Agrees to Court Order in Seaboard Case," *Wall Street Journal*, April 23, 1976, p. 3.
47. To be sure, none of these reforms succeeded in eliminating the insider advantage. "It's impossible to disseminate information exactly homogeneously," Steinhardt says of the regulators' efforts. Steinhardt interview, September 10, 2007.
48. Anise C. Wallace, "Pullback at Block Trading Desks," *New York Times*, December 24, 1987, p. D1.
49. Dan Dorfman, "Sabbatical for a Superstar," *Esquire*, August 29, 1978, p. 12.

CHAPTER THREE: PAUL SAMUELSON'S SECRET

1. Justin Fox, *The Myth of the Rational Market: A History of Risk, Reward, and Delusion on Wall Street*, (New York: HarperCollins, 2009), p. 124.
2. Peter L. Bernstein, *Capital Ideas Evolving* (Hoboken, NJ: John Wiley & Sons, 2007), p. 113.
3. Samuelson explains, "Fama's theory of the random walk and mine are not the same. Mine is that there are no easy pickings. . . . If you read the numerous papers I have written on the efficient-market hypothesis, you will realize it is not a dogma. If you can get information early, before it is widespread, you can't help but get very rich." Paul Samuelson, interview with the author, February 5, 2008.
4. Bernstein, *Capital Ideas Evolving*, p. 143.
5. Explaining his investment with Buffett, Samuelson wrote, "Experience has persuaded me that there are a few Warren Buffetts out there with high rent-earning ability because they are good at figuring out which fundamentals are fundamental and which new data are worth paying high costs to get. Such super-stars don't come cheap: by the time you spot them their fee has been bid sky high!" See Paul A. Samuelson, foreword to Marshall E. Blume and Jeremy J. Siegel, "The Theory of Security Pricing and Market Structure," *Journal of Financial Markets, Institutions and Instruments* 1, no. 3 (1992): 1–2. For more on Samuelson's investment with Buffett, see Roger Lowenstein, *Buffett: The Making of an American Capitalist* (New York: Broadway Books, 2001), pp. 308–11.
6. The other outstanding example of an early quantitative firm is Princeton-Newport, created in 1969. For an entertaining account of Princeton-Newport, see William Poundstone, *Fortune's Formula: The Untold Story of the Scientific Betting System That Beat the Casinos and Wall Street* (New York: Hill and Wang, 2005).
7. My thanks to Jan Kunz, who worked for Commodities Corporation from its start and who provided me with a copy of the launch prospectus.
8. In 1964 Cootner published an influential book titled *The Random Character of Stock Market Prices*, which was a compilation of all the efficient-market papers published up until then.
9. The Apollo graduate was Morris Markovitz.
10. Many hedge funds that are marketed to investors that don't pay U.S. tax are legally structured as offshore corporations. Commodities Corporation was unusual in being an onshore corporation.
11. In a lecture delivered at Princeton University in May 1999, Weymar recalled, "I was particularly taken by the theme and role of the hero in the western canon. If one is contemplating heroism, it helps to be driven by existential angst, and mine was palpable during my 20's and 30's." F. Helmut Weymar, "Orange Juice, Cocoa, Speculation and Entrepreneurship" (Beckwith lecture at Princeton University, May 1999). I am grateful to Helmut Weymar for providing me with the text of the lecture. A former Commodities Corporation employee says bluntly: "Helmut wanted to be king of the world, basically. He got interested in art and then he stopped doing it because he thought, 'I'll never really make a splash in the art world.' So he did it because he needs and wants to be superior to others and be seen as superior to others."

12. F. Helmut Weymar, interview with the author, April 19, 2007.
13. Weymar interview; Weymar, "Orange Juice, Cocoa, Speculation and Entrepreneurship."
14. Weymar, "Orange Juice, Cocoa, Speculation and Entrepreneurship."
15. These descriptions of Weymar and Vannerson come from Jan Kunz, one of the start-up employees at Commodities Corporation (Jan Kunz, e-mail to the author, February 5, 2008), and from Irwin Rosenblum, the author of the autobiographical account *Up, Down, Up, Down, Up: My Career at Commodities Corporation* (Bloomington: Xlibris, 2003). I am grateful to Irwin Rosenblum and his book for this vignette and several other points in this chapter.
16. Weymar interview.
17. Commodities Corporation survived because Nabisco was keen to keep it in business in order to retain access to Weymar's cocoa forecasts and Vannerson's wheat forecasts. Nabisco was able to overrule the other shareholders, which wanted to close the firm, because it held a senior claim on the remaining assets. In case of liquidation, Nabisco would have reclaimed its $500,000, leaving the other investors with only $400,000 of their original $2 million. Having been virtually wiped out, the other shareholders decided that there was little to be lost by allowing Commodities Corporation to continue trading. Weymar interview.
18. Ibid.
19. This quip is attributed to Frank Vannerson. Morris Markovitz, interview with the author, November 1, 2007.
20. Weymar recalls: "Valuable as market analysis and data generation may be, money management discipline is even more important to successful speculation. . . . Most successful speculative derivatives traders generate more losing trades than profitable trades. They are successful only because their gains on positive trades are substantially larger than their tightly controlled losses on negative trades." Weymar, "Orange Juice, Cocoa, Speculation and Entrepreneurship."
21. For example, Paul Tudor Jones began his hedge fund, Tudor, with the help of seed capital from Commodities Corporation. An official at Tudor recalls: "When we incubated young traders, when they came close to kickouts he [Paul Jones] would bring them into the office and say, 'You've got to write an analysis on why this happened and how it's not going to happen again.' He took that away from Commodities Corporation."
22. Weymar interview; Irwin Rosenblum, interview with the author, April 19, 2007. Rosenblum was responsible for implementing the new risk controls and describes them in his autobiography. See also Tully, "Princeton's Rich Commodity Scholars."
23. Elaine Crocker, who rose to become a senior manager at Commodities Corporation and later president of Moore Capital, recalls, "The kickout forced you to liquidate your positions and get out of the market for thirty days. During this period you would plot the history of your trades in the period leading up to your losses and see whether you had violated your own trading philosophy. Most of the time, the answer would be yes. The whole system allowed traders to develop an approach to markets that would work for them, but at the same time held them accountable for sticking to it." Elaine Crocker, interview with the author, July 30, 2008.
24. In the mid-1980s MIT information theorist Robert Fano wrote a paper questioning the random walk in stock prices. Colleagues warned him that submitting the article for publication in a peer-reviewed journal would get him branded a crackpot. See Poundstone, *Fortune's Formula*, pp. 127–28. Similarly, Scott Irwin, who published one of the first articles to affirm the existence of trends, vividly recalls the difficulty of getting such views published. Scott Irwin, interview with the author, February 14, 2008.
25. As Weymar put it, "Happily blessed by an inquiring and open mind, Frank overcame the bias of his Princeton economics training." Weymar, "Orange Juice, Cocoa, Speculation and Entrepreneurship." Vannerson himself notes, "The academics were slow to come around. I think currencies did it, where trends were so obvious a child could see them." Frank Vannerson, e-mail communication with the author, February 11, 2008.
26. Vannerson believes he was the first to create an automated trend-following system: "I am pretty sure I was the first to put the whole thing together." A similar system was developed a little later by Ed Seykota, a legendary trader at the brokerage Hayden Stone whom Vannerson remembers as a "friendly rival." (Frank Vannerson, e-mail communication with the author, October 28, 2007.) But

the truth may be that Vannerson created the second automated system. Dennis Dunn of Dunn & Hargitt recalls creating such a system in the late 1960s. (Dennis Dunn, e-mail communication with the author, February 25, 2008.) It's worth noting that *Fortune's* excellent profile of Commodities Corporation, cited above, wrongly reported that TCS was invented after 1971.

27. Because of Weymar's mixed feelings, the company's launch prospectus mentioned the firm's research into price trends only in passing. Commodities Corporation aimed to market its superior knowledge of fundamentals, not its computerized trend following.
28. Recalling his status as the first non-PhD trader, Marcus says: "It created a certain amount of controversy. The whole idea was that this would be the best and brightest. I wouldn't have been hired if it wasn't for Amos pushing. Once I was hired, I wouldn't say that I faced considerable opposition. Some of their PhDs hadn't done as well as they had hoped." Michael Marcus, interview with the author, November 21, 2007.
29. Markovitz recalls, "Mike got a private jet. He wanted to have his wedding in Hawaii so [he] flew everyone out and put them up. He was a businessman, he would be cautious, he wouldn't waste it, but when it was for his own pleasure, his own enjoyment, life is short, you've got the money, spend it. It was pocket change to him, he might as well." Markovitz interview, February 5, 2008; Jack D. Schwager, *Market Wizards: Interviews with Top Traders* (New York: New York Institute of Finance, 1989), pp. 10 and 36.
30. Helmut Weymar, who commented on a draft of this chapter, objects that Marcus paid great attention to fundamentals, so that the shift away from Commodities Corporation's initial faith in fundamental analysis was less stark than I suggest here. (Helmut Weymar, personal communication with the author, August 1, 2008.) But there seems little doubt that in Weymar's initial trading the fundamentals dominated the chart following while in Marcus's trading the opposite was true. Marcus recalls: "The trend followers used to say that the fundamentals were embedded in the trend and that you could make more money if you waited until the fundamentals were being acted upon and causing a trend in one direction." (Marcus interview.) Note also Kovner's remark, later in this chapter, that the most profitable opportunities exist when there is no fundamental information. The contrast with the firm's founding prospectus, which emphasized econometric modeling and made no mention of trends, is fairly conclusive.
31. "You had advantages on the floor. Your advantage was that you knew a lot about the technical insides of one market. You could see who was buying, who was selling, how the orders were getting filled, where the stops were. The drawback was that you were pinned down to that market. If you were trading cotton, and soybeans were having a fabulous move, you would miss out. I later decided that you were better off giving up that technical advantage and having the opportunity to pick and choose among a number of markets." Marcus interview.
32. Ibid.
33. There were several libertarians at Commodities Corporation. Markovitz recalls: "There was a lot of the antiauthoritarian, libertarian sentiment. I think a lot of people in the business who weren't that way when they started became that way. I think it accelerates your awareness when you study the markets, analyze them, you see when the government interferes with the markets, ninety-nine times out of a hundred there is no benefit and it just creates problems." Markovitz interview, February 5, 2008.
34. Schwager, *Market Wizards*, pp. 19–20. On price controls and lumber, see also Barry Bosworth, "The Inflation Problem during Phase III,"*American Economic Review* 64, no. 2, Papers and Proceedings of the Eighty-sixth Annual Meeting of the American Economic Association (May 1974): pp. 93–99; and William Poole, "Wage-Price Controls: Where Do We Go from Here?" *Brookings Papers on Economic Activity* 1973, no. 1 (1973), p. 292.
35. Jeffry A. Frieden, *Global Capitalism: Its Fall and Rise in the Twentieth Century* (New York: W. W. Norton & Co., 2006), p. 364.
36. Xue-Zhong He and Frank H. Westerhoff, "Commodity Markets, Price Limiters, and Speculative Price Dynamics," *Journal of Economic Dynamics & Control,* 29(9) (September 2005): 1,578.
37. Meanwhile, investors sought safety in gold, driving the price above $300 an ounce in the summer of 1979 and above $800 in the winter—a far cry from the $35 mandated by the Bretton Woods system.

38. Marcus interview, November 21, 2007.
39. Marcus recalls, "I remember being in Bermuda and trying to curtail the growth of big government. That fitted in with my libertarianism." (Marcus interview.) Markovitz also recalls clashing with Weymar at the Bermuda conference. The following years brought even more forceful efforts to get Weymar to curtail overhead. (Markovitz interviews.)
40. For example, a company that contracted with school systems to provide lunches reckoned it had no need to insure itself against a spike in food prices until 1973, when it suddenly lost money as its input costs skyrocketed; from that time on, it insured itself by locking in its costs via the futures market. See Roger W. Gray, "Risk Management in Commodity and Financial Markets," *American Journal of Agricultural Economics* 58, no. 2 (May 1976): pp. 280–85. The article also notes that after 1973, commodities markets experienced "unprecedented high hedging levels relative to speculation."
41. Commodities Corporation arranged this loophole with a grain wholesaler. Markovitz interview, November 1, 2007; Marcus interview.
42. Commodities Corporation traders studied the "White Book," a summary of the trading ideas of Amos Hostetter, a revered elder statesman at the company. Burton Rothberg, a trader who recalls the influence of the White Book, also emphasizes Vannerson's influence. "Commodities Corporation really learned that trends always go further than you think. There was a lot of mathematical work on this by Frank Vannerson, and we found that over the short term trends tended to continue at every level. The theory was that unless you had a really good reason, you want to stay with the trend." Burton Rothberg, interview with the author, February 5, 2008.
43. Richard J. Sweeney, "Beating the Foreign Exchange Market," *Journal of Finance* 41(1) (March1986), pp. 163–82; Louis P. Lukac, B. Wade Brorsen, and Scott H. Irwin, "A Test of Futures Market Disequilibrium Using Twelve Different Technical Trading Systems," *Applied Economics* 20, no. 5 (May 1988): pp. 623–39. These publications were followed by B. Wade Brorsen and Louis P. Lukac, "A Comprehensive Test of Futures Market Disequilibrium," *Financial Review* 25 (4) (November 1990): 593–622. Belief in the existence of momentum effects became mainstream with the publication of Narasimhan Jegadeesh and Sheridan Titman, "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency," *Journal of Finance*, vol. 48, no. 1, March 1993, pp. 65–91.
44. Irwin interview.
45. Marcus interview.
46. Philip Weiss, "George Soros's Right-Wing Twin," *New York*, July 24, 2005.
47. Marcus recalls: "At the time I met Bruce, he was driving a taxi part-time and trading part-time. I was astounded by the depth and breadth of his knowledge. I would try to come up with something esoteric and arcane that would impress him, and he was right there and knew about it and could talk about it. Here was a guy working part-time and driving a taxi, but he was a colleague already." Marcus interview.
48. Rosenblum, *Up, Down, Up, Down, Up*, p. 98.
49. Markovitz interviews.
50. Rosenblum, *Up, Down, Up, Down, Up*, p. 98. Recalling Marcus's prediction that Kovner would become the president of Commodities Corporation, Paul Samuelson says, "My comment was, 'Bruce Kovner couldn't afford to be president of Commodities Corporation.'" (Samuelson interview.) Rosenblum also remembers Kovner as follows: "He was extremely ambitious and had all the requisite skills needed to fulfill those ambitions. He was brilliant, verbal, and confident and possessed of a great deal of personal charm. Helmut was totally taken by him and like most people in the company, would go out of his way to please Bruce. Bruce became very close to Michael [Marcus] who took him under his wing and taught him a great deal about trading." (Rosenblum, *Up, Down, Up, Down, Up*, p. 52.) Meanwhile, Kovner himself says of Samuelson, "He was always delightful. He was rather bemused by the fact that there are people who make money in these markets." (Bruce Kovner, interview with the author, October 14, 2009.)
51. Kovner emphasizes that he regarded Weymar's original efforts to estimate the "efficient" price for a commodity as less fruitful than Marcus's efforts to judge the market's direction. Trying to come up with a point estimate for the right price of cocoa or anything else was difficult and potentially

dangerous, since it could lead to obstinacy in trading. "As a trader of a leveraged fund you had to be centrally concerned with path rather than end points." Kovner interview.

52. Roy Lennox, who was hired by Kovner as a trading associate in 1980, recalls, "When I got the job with Bruce, I called up his assistant for some reading suggestions before I started. One of the books he had her send me was about reading charts. I thought, 'Oh my god, I was taught in business school that charts don't work, that markets are efficient.' But then Bruce told me that charts are just representations of market psychology and therefore extremely valuable, and indeed indispensable, for trading." Roy Lennox, interview with the author, June 24, 2009.
53. Schwager, *Market Wizards*, p. 32.
54. Kovner interview; Lennox interview.
55. Burton Rothberg recalls, "There was an infusion of outside money in the late seventies, early eighties. Helmut was opposed to managing outside money, but guys like Bruce wanted to take the money. There was a little a revolt." (Rothberg interview.) Markovitz recalls, "We had been arguing for at least a year, a couple of years, about trading outside money. Helmut was nervous that once he let traders out of his control, they might leave." (Markovitz interview, February 5, 2008.)
56. Elaine Crocker recalls, "We tried to hire Paul but he didn't want that. When he came down to Princeton to meet Helmut, Helmut told him, 'Remember, you will lose money at some point.' Afterwards Paul wrote a thank you letter, claiming that he had paid for dinner and been told he would lose money." Crocker interview.
57. Commodities Corporation continued for many years, eventually being absorbed into Goldman Sachs in 1997. But its heyday ended in the early 1980s. The firm lost money on trading in 1981, but Weymar allowed administrative expenses to grow unsustainably, from $15 million in 1981 to $23 million in 1982 to $27 million in 1983. See Rosenblum, *Up, Down, Up, Down, Up*, pp. 102 and 106–7.

CHAPTER FOUR: THE ALCHEMIST

1. The historian was Ralf Dahrendorf, director of the LSE between 1974 and 1984. This description of the climate at LSE and Soros's early life is taken from the excellent Michael T. Kaufman, *Soros: The Life and Times of a Messianic Billionaire* (New York: Knopf, 2002).
2. Soros reckoned he needed $500,000. Ibid., p. 83.
3. Soros also knew Steinhardt, Fine, and Berkowitz, who had set up their hedge fund two years earlier, in 1967. But A. W. Jones was the chief role model: "Double Eagle was modeled after AW Jones," Soros recalls. Soros's exposure to A. W. Jones was reinforced by the fact that his junior partner, Jim Rogers, had worked for Neuberger & Berman, A. W. Jones's main broker. George Soros, interview with the author, January 16, 2008; Jim Rogers, interview with the author, November 20, 2007. See also John Train, *The New Money Masters* (New York: Harper & Row, 1989), p. 17.
4. Soros comments, "The key to reflexivity is a misconception of reality, and this is where the fundamental misconception of economic theory comes in. The theory is that people act in their self-interest, but the fact is that they act in what they perceive to be their self-interest, and their best interest is not necessarily what they believe is in their best interest." Soros interview.
5. Soros's investment note, "The Case for Mortgage Trusts," is reprinted in *The Alchemy of Finance* and explains the reflexive logic of the investment trusts, as follows: Suppose a trust starts with 10 shares worth $10 each and earns $12 of income on total capital of $100. Seeing that high yield, five new investors pay $20 each for a share in the trust, so that the investment fund now has capital of $200. Assuming that the trust puts the new capital to work as efficiently as the first tranche, the trust will now have $24 in earnings to split among fifteen shareholders. Per share earnings will have gone up from $1.20 initially to $1.60 after the new capital injection. See George Soros, *The Alchemy of Finance* (Hoboken, NJ: John Wiley & Sons 1987), pp. 64–67. In another example of the application of reflexive thinking to markets, Soros observed that acquisitive conglomerates that knew how to talk up their stock price would soon be on a roll: The strong stock price would empower them to pay for acquisitions using their newly valuable equity; the acquisitions would mean higher earnings and an even stronger stock price; the cycle would repeat itself. (Ibid., p. 59.)

6. Rogers recalled that when he attended Oxford he was surrounded by Americans who wanted to become president. He wanted instead to invest all over the world—to be a "gnome of Zurich." (Rogers interview.) After leaving Soros in 1980, Rogers became known as a commodities guru and as the author of the book *Investment Biker.*
7. George Soros, interview with the author, June 10, 2008. See also Robert Slater, *Soros: The Unauthorized Biography, the Life, Times and Trading Secrets of the World's Greatest Investor* (New York: McGraw-Hill, 1996), p. 78.
8. Soros interview, January 16, 2008.
9. George Soros, *Soros on Soros: Staying Ahead of the Curve* (New York: John Wiley & Sons, 1995), p. 49. Soros adds, "If a story is interesting enough, one can probably make money buying it even if further investigation would reveal flaws. Then later, if you discern the flaw, you feel good, because you are ahead of the game. So I used to say, 'Jump in with both feet; take one out later.'" Soros interview, June 10, 2008.
10. Anise Wallace, "The World's Greatest Money Manager," *Institutional Investor*, June 1981, pp. 39–45.
11. Soros, *The Alchemy of Finance*, p. 42.
12. Ibid., p. 372.
13. Ibid., pp. 39, 42, and 372.
14. There is some dispute about the responsibility for the deterioration in the relationship between Soros and Rogers. In his unauthorized biography of Soros, cited above, Robert Slater suggests that Soros was a poor judge of character and incapable of recognizing the achievements of subordinates. There may be some truth to this, particularly since Soros's break with Rogers came at a time when Soros was undergoing a broader emotional reorientation, which involved divorce and visits to a psychotherapist. But Henry Arnhold, head of the firm for which Soros and Rogers launched the Double Eagle Fund, remembers Rogers as by far the more difficult member of the duo. (Henry Arnhold, interview with the author, February 27, 2008.) Having encountered both Rogers and Soros, the author is inclined to go with Arnhold's version.
15. The performance of the Quantum Fund in the years to 1985 is given in Soros, *The Alchemy of Finance*, p. 150.
16. Soros, *Soros on Soros*, pp. 56–57.
17. Not all economists believed that currencies tended toward equilibrium. The most influential paper to argue for exchange-rate overshooting was "Expectations and Exchange Rate Dynamics," by Rudiger Dornbusch of MIT, published in 1976 in the *Journal of Political Economy*. Dornbusch's argument did not hinge on the trend following by speculators that Soros emphasized; instead, he explained that currencies overshoot in response to monetary shocks because of the interplay between sticky prices for goods and fast-adjusting capital markets. However, Dornbusch's sticky-price assumption was a minority view within academic macroeconomics through the 1980s. On this point, see Kenneth Rogoff, "Dornbusch's Overshooting Model After Twenty-Five Years," IMF Working Paper No. 02/39. Presented at the Second Annual Research Conference, International Monetary Fund (Mundell-Fleming Lecture), November 30, 2001, revised January 22, 2002. Given that Dornbusch represented a minority view, Soros was not attacking a straw man. On the other hand, other hedge-fund managers were won over to Soros's view. As described in chapter seven, Stanley Druckenmiller found Soros's view of currencies valuable after the fall of the Berlin wall. See Jack D. Schwager, *The New Market Wizards: Conversations with America's Top Traders* (New York: HarperCollins, 1992), p. 203.
18. Soros also argued that economists tended to exaggerate the extent to which shifts in interest rates would help to drive currencies to equilibrium. If the United States ran a trade deficit, this implied a relatively low demand for investment capital and hence low interest rates; speculators would shift money out of dollars to currencies that yielded more, so weakening the dollar and helping to reduce the trade deficit. But in practice speculators cared less about the interest they could earn on dollars than about the dollar's trend. Thus, in November 1984, a fall in U.S. interest rates had been followed after a short pause by a jump in the dollar. The market's logic was that if the dollar did not drop in response to falling interest rates, the upward trend must be robust and it was time to buy the life out of the currency.

19. In this conclusion, Soros anticipated the views of the economics profession. Writing in 2002, Kenneth Rogoff, a Harvard professor then serving as the International Monetary Fund's chief economist, commented, "If there is a consensus result in the empirical literature, it has to be that nothing, but nothing, can systematically explain exchange rates between major currencies with flexible exchange rates." See Rogoff, "Dornbusch's Overshooting Model."
20. Soros noted the stock market's weakness as a reason to short the dollar and noted that other currencies were testing the upper limits of their trading ranges, suggesting that a breakout might be coming. Soros, *The Alchemy of Finance*, pp. 155–56.
21. Ibid., p. 149. Soros loosely observed a rule that enforced some risk control: He took more risk with his recent profits than with his capital. This might sound peculiar: Capital merely represents previous years' profits, so why protect it more cautiously than profits earned recently? But Soros's rule encouraged big risk taking in years when he had performed well, while forcing a cooler approach at times when he was weaker. If the performance of traders exhibits trends, the Soros rule had the effect of encouraging risk taking in periods when he was in sync with the markets. Likewise, the risk-control system at Commodities Corporation reined traders in once they lost a certain percentage of their capital.
22. "We had someone in for lunch in George's private dining room, upstairs on thirty-three, and something connected and he immediately just went over and picked up the phone and told the trader to put on a position. . . . He could completely reverse himself." (Gary Gladstein, interview with the author, March 18, 2008.) Gladstein joined Soros Fund Management in 1985 and was managing director from 1989 until 1999.
23. Soros confesses that he hung on to his dollar shorts by the skin of his teeth. Soros, *The Alchemy of Finance*, p. 163.
24. Some critics wonder whether Soros was tipped off about Plaza, perhaps by banking sources in Europe. But the fact that Soros bought yen massively after the announcement proves that he did not see the Plaza accord coming.
25. "This was like the biggest move they had ever seen in their entire life. So they were obviously all taking a profit, selling the yen. And this was a man who I worked for for twelve years, I never heard him raise his voice, never heard him swear. You'd only have to be in a room with me about an hour to see either of those events occur. And apparently he raised his voice, he was just furious that these guys were selling the yen and he just had them transfer all the yen over to his account rather than sell them." (Stanley Druckenmiller, interview with the author, March 13, 2008.) Druckenmiller got the story from Steve Okin, a trader who worked for Soros at the time and later worked for Druckenmiller. Druckenmiller also tells the story in Schwager, *The New Market Wizards*, p. 208.
26. Druckenmiller comments, "People want to feel good about themselves and feel they have a win. But this is when you really, really want to pile on. You can't have enough." Druckenmiller interview.
27. These yen and German mark accumulations are over the baseline established on September 6, 1985, the date of the previous diary entry. However, the buying seems to have occurred in the five days after Plaza. See Soros, *The Alchemy of Finance*, p. 164.
28. Soros suggests that his political antennae were an important part of his edge. "It's easier, in a way, to understand the mentality of the authorities than it is to understand the market, because the market is more anonymous. . . . So I would say, perhaps, that my application of boom-bust thinking has been in understanding how the authorities are acting more than the market itself." (Soros interview, January 16, 2008.) Moreover, Soros knew political leaders as well as economic officials. Richard Medley, who later worked for Soros, organized a conference featuring top policy makers from the Plaza-accord countries in Washington in November 1985. Medley recalls getting a call from Senator Bradley, who insisted that Soros be allowed to attend, even though the conference was oversubscribed. (Richard Medley, interview with the author, January 14, 2008.) Gary Gladstein emphasizes the usefulness of Soros's contacts with Quantum backers in Europe: "The board of Quantum was primarily European private bankers. They were very well connected, very well respected, and from time to time I know George would call them and ask them their thoughts." (Gladstein interview.)
29. The additional buying took place between September 27 and December 6. Soros, *The Alchemy of Finance*, pp. 164 and 177.

30. Ibid., p. 176. Indeed, Gary Gladstein, who joined Soros's firm in October to serve as chief administrative officer, was astonished by the leverage in his new firm's portfolio. Gladstein interview.
31. Soros, *The Alchemy of Finance*, p. 309.
32. Soros, *Soros on Soros*, p. 59. Soros pointed out that Quantum's return over the full fifteen months of the experiment, which included a "control period" in 1986, came to 114 percent.
33. Anatole Kaletsky, "Thursday Book Review: The Alchemy of Finance," *Financial Times*, July 16, 1987, p. 20.
34. Paul Tudor Jones recalls that the range of factors that Soros blended together was a revelation. "George Soros is one of the most profound thinkers in the markets. The book was a highly intricate piece of analytics. Looking at the interlocking relationships. He knitted things together; it was an education." (Paul Jones, interview with the author, April 23, 2009.) Jim Chanos, a celebrated short seller, is another money manager who believes *Alchemy* was a milestone. The book "really went into the whole feedback loop on perceptions and how they are important in the marketplace. For the first time he put in what traders knew to be true, but in a framework that you could think about; that you could debate and test." (Jim Chanos, interview with the author, February 6, 2008.) Equally, Scott Bessent, who later worked for Soros, recalls his reaction to the book: "I remember, I'm twenty-five and I read this and couldn't believe someone would invest this way. You would have some of these and these, short some of those. His risk management was in his head. No fund-of-funds person would have given him any money." (Scott Bessent, interview with the author, January 18, 2008.)
35. Paul Tudor Jones II, foreword to the first edition of *The Alchemy of Finance*, p. xvi.
36. Jim Chanos, who operated out of Soros's offices in the late 1980s, recalls, "It was the quietest place you've ever heard. The most raucous you heard was during lunch, when people yelled at the cook for making jerk chicken for the second time that week. . . . Steinhardt was much different. People screaming. Michael firing people. It was truly a different atmosphere." Jim Chanos interview.
37. John J. Curran, "Are Stocks Too High?" *Fortune*, September 28, 1987, p. 28.
38. James B. Stewart and Daniel Hertzberg, "Before the Fall," *Wall Street Journal*, December 11, 1987, p. 1.
39. Druckenmiller interview.
40. The Ways and Means Committee of the U.S. House of Representatives was considering legislation to eliminate the tax deductions for some interest expenses and to tax "greenmail"—payments made by companies to corporate raiders to buy back their stock at above-market prices to prevent the raider from taking over the company. See Mark Carlson, "A Brief History of the 1987 Stock Market Crash with a Discussion of the Federal Reserve Response" (Federal Reserve discussion paper, November 2006).
41. Soros, *Soros on Soros*, p. 60. In conversation with the author, Soros reaffirmed, "I came out and the market had fallen, and I said to myself that I should have been following the market. Had I done that I would have lightened up." Soros interview, January 16, 2008.
42. Druckenmiller interview.
43. Schwager, *The New Market Wizards*, p. 199.
44. Druckenmiller interview.
45. The Wall Streeter was Muriel Siebert of Siebert Financial. Quoted in Corey Hajim and Jia Lynn Yang, "Remembering Black Monday," *Fortune*, September 17, 2007, p.134.
46. Medley interview.
47. Druckenmiller interview.
48. This interchange is presented as told by Druckenmiller, who describes it as "a very clear recollection." Druckenmiller interview.
49. This is Druckenmiller's own expression. Druckenmiller interview.
50. This is the conversation as recounted by Druckenmiller.
51. Druckenmiller recalls, "To my horror, I picked up the *Barron's* Sunday morning and it turns out he was the guy who was selling his position." Druckenmiller interview.
52. One London lender, which held stocks belonging to Quantum as security against a loan, came close to triggering a crisis by refusing to release any of them even though it was sitting on more collateral than the loan covenant demanded. (Robert Miller, interview with the author, March 7, 2008.) It was Miller's job to manage Quantum's relationships with its bankers.

53. Soros interview, January 16, 2008.
54. "A Bad Two Weeks—A Wall Street Star Loses $840 Million," *Barron's*, November 2, 1987.
55. Gary Gladstein, interview with the author, March 18, 2008.
56. Michael Steinhardt, *No Bull: My Life In and Out of Markets* (New York: John Wiley & Sons, 2001), p. 176.
57. Ivan Fallon, "Quantum Loss," *Times* (London), November 15, 1987.
58. Howard Banks, "Cover Boy," ed. Gretchen Morgenson, *Forbes*, November 30, 1987, p. 12.
59. In 1981 Steinhardt announced his arrival in the bond market by borrowing nearly three times the value of his fund and betting that interest rates would soon come down; when the bet came good the following year, the result was a spectacular 78 percent return for Steinhardt and his partners.
60. Paul Tudor Jones, who came out of the commodity tradition, described *Alchemy* as "a revolutionary book. Remember, this was the period when trend following . . . [was] the vogue in investing. It was the time when technical analysis . . . reached its zenith. . . . [But] an intellectual framework for understanding the course of social, political, and economic events was noticeably forgotten." (Jones, foreword to Soros, *The Alchemy of Finance*, p. xv.) Meanwhile, Stanley Druckenmiller, who came out of the equity tradition, was struck by *Alchemy* for the opposite reasons: Soros broke with the nostrums of fundamental analysis and was ready to buy and sell on technical signals. (Druckenmiller interview.) Soros himself noted that "the Quantum Fund combines some of the features of a stock market fund with those of a commodity fund." (Soros, *The Alchemy of Finance*, p. 149.)
61. There was also a fusion between macro investing and micro investing. Hedge-fund investors who looked at the overall economy and those who looked at specific stocks borrowed each other's tricks, with varying success. For example, Mark Dalton, the president of Paul Tudor Jones's firm, recalls conversations between Tudor and Julian Robertson's Tiger in the late 1980s and early 1990s. "We had a series of conversations probably over three or four years. . . . I think it probably influenced both of us. . . . Clearly we recognized that the complementary analytical capabilities and information flow of long-short equity to macro could be very helpful." Mark Dalton, interview with the author, September 29, 2008.
62. Donald MacKenzie, *An Engine, Not a Camera: How Financial Models Shape Markets* (Cambridge, MA: The MIT Press, 2006), p. 206.
63. Ibid., p. 193.
64. Moreover, much of the market's trouble came from the breakdown of its back-office systems, which caused markets to seize up and exacerbated the panic. Portfolio insurance was far from being the sole culprit.
65. Soros, *The Alchemy of Finance*, p. 5.
66. MacKenzie, *An Engine, Not a Camera*, p. 114.
67. Ibid., p. 115.
68. In the mid-1970s, the stocks of small firms had been found to outperform those of big firms; and later researchers discovered that outperformance was concentrated in the first two weeks of January. Both findings appeared to damage the efficient-market theory, since returns were not supposed to reflect firm size or the vagaries of the calendar. But once the small-firm effect and the January effect became known, speculators pounced and they were arbitraged away. Just as the theorists predicted, a handful of well-informed investors had pushed prices to their efficient level. In 2002, G. William Schwert found that the small-firm effect had disappeared and that the January effect had halved since its identification. See G. William Schwert, "Anomalies and Market Efficiency" (working paper 9277, National Bureau of Economic Research, 2002).

CHAPTER FIVE: TOP CAT

1. This account of the Jensen-Buffett debate comes from Roger Lowenstein, *Buffett: The Making of an American Capitalist* (New York: Broadway Books, 2001), p. 316–18, and from the text of Buffett's speech, reprinted as "The Superinvestors of Graham-and-Doddsville," in *Hermes*, the Columbia Business School Magazine.
2. Buffett emphasized the point that the Grahamites had built their records independently. If they had just been copying one another, their similar returns would not have proved anything.

3. The account of Julian Robertson in this chapter and later in the book is based primarily on some twenty-five hours of conversation with twelve former or current employees, most of whom do not want to be identified. In addition, it is based on the voluminous and colorful letters that Robertson wrote to his investors between 1980 and 2000. I am grateful to Julian Robertson for allowing me to read the full set of these letters and for granting me an extensive interview.
4. George Soros (not the source of the Louis Bacon anecdotes) reflected on the loneliness and objectivity of the trader: "My philanthropy rescued me from the isolation to which my pursuit of profit consigned me. . . . In most social situations—in politics and in personal and business relations—it is possible to deceive oneself and others. In the financial markets, the actual results do not leave much room for illusions." George Soros, *The Alchemy of Finance* (Hoboken, NJ: John Wiley & Sons, 1987), p. 43.
5. Robert L. Burch, e-mail communication with the author, May 18, 2007.
6. Thorpe McKenzie, interview with the author, August 15, 2008; Thorpe McKenzie, e-mail communication with the author, October 8, 2009.
7. Robertson made gestures toward delegation, but these were hollow. Dwight Anderson, a former analyst, says publicly what his ex-colleagues confirm privately: "Everyone at Tiger was really just an analyst—Julian was the only portfolio manager." Quoted in Steven Drobny, *Inside the House of Money* (Hoboken, NJ: John Wiley & Sons, 2006), p. 253.
8. Thorpe McKenzie, Robertson's colleague at Kidder Peabody in the 1970s and his junior partner in setting up Tiger, recalls Robertson's invoking A. W. Jones. "Julian always said that if you did not know whether the market was going to go up or down, A. W. Jones had said that you could still get out and pick stocks to go long and short. That was one of the first things Julian ever said to me." McKenzie interview.
9. Julian H. Robertson, letter to the limited partners, March 8, 1983.
10. For example, Robertson bought puts on the S&P 500 in 1985. In a letter to his limited partners, he explained: "Most banks and investment advisory concerns would throw up their hands at the use of such 'speculative' options. In reality though, what could be more conservative?" Julian H. Robertson, letter to the limited partners, July 1, 1985. It's interesting to note that around the same time, Warren Buffett was ridiculing derivatives and proposing a 100 percent tax on profits from them.
11. Julian H. Robertson, letter to the limited partners, March 30, 2000.
12. Julian H. Robertson, letter to Robert A. Karr, February 17, 1995.
13. Daniel A. Strachman, *Julian Robertson: A Tiger in a Land of Bulls and Bears* (Hoboken, NJ: John Wiley & Sons, 2004), p. 62.
14. Between 1980 and 1997, Tiger beat the S&P 500 index in fourteen out of eighteen years. In this period his balance of short and long positions varied. But in late 1987, for example, Robertson's portfolio was less than 70 percent net long, meaning that it would capture only about two thirds of the rise of the market index. No matter: The S&P 500 rose 16.6 percent the following year, while Tiger rose 21.6 percent. Some time later, in April 1994, Robertson informed his investors that Tiger was 50 percent net long, adding that this was about average for Tiger over the previous several years. Julian H. Robertson, letter to the limited partners, April 8, 1994.
15. It can be argued that stock in small companies is relatively likely to be owned by founders or directors, who may sell in order to realize wealth—providing buyers such as Tiger with an easy bargain. On the other hand, insiders who sell stock sometimes have an informational advantage over buyers.
16. Maggie Mahar. *Bull!: A History of the Boom and Bust, 1982–2004* (New York: HarperBusiness, 2004), p. 56.
17. Julian Robertson, interview with the author, December 12, 2007.
18. Julian H. Robertson, letter to the limited partners, January 17, 1985.
19. Katherine Burton, *Hedge Hunters: Hedge Fund Masters on the Rewards, the Risks, and the Reckoning* (New York: Bloomberg Press, 2007), p. 4.
20. Julie Dalla-Costa, "Tigers . . . Together?" *Absolute Return*, July/August 2008, p. 29.
21. A former Tiger employee recalls, "The thing that was special about him was that he was extremely symmetrical. If he thought you hadn't done your homework, or that your analysis was flawed, he

would be very aggressive, very confrontational. Symmetrically, though, if he thought you had done exceptional work or were generating exceptional outcomes he would lavish you with praise, and publicly. You were his big tiger." Robertson's habit of calling ideas either the best ever or the worst ever is described by several former Tiger analysts.

22. A Tiger alum recalls, "Julian sat in the center of the L. It was just a blast. We were all close to one another, and Julian was right there. We all overheard each other's conversations. It was just a constant flow of information and ideas. And you had one of the greatest investors ever right there. It was just fun every day." Another Tiger recalls, "There was no notion of privacy. You expected to get in early, seven A.M., and leave at five P.M. During that time, you were on. No personal phone calls. You were talking about companies, ideas, industries, news. Julian was loud. You could hear every conversation."
23. One former Tiger employee recalls, "I came in with a short idea and he said, 'Well, you know, my friend so-and-so is the biggest bull on that stock.' We'd have a bull-bear debate. He'd get the guy on the phone. I'd say what I thought; he would say what he thought. Julian made the decision."
24. The White-House-to-shit-house recruit was Lou Ricciardelli.
25. "The first time I met Paul I don't think he had much money at all. We had a friend, a mutual accountant. I'm convinced the reason he invested with me was because we were both baseball nuts." Robertson interview.
26. Asked about getting ideas from the partners, Robertson says, "We really encouraged that. . . . We called on them a lot." (Robertson interview.) A former Tiger employee recalls that in 1986 Tiger created a new fund called Puma partly in order to be able to take money from chief executives and other well-connected businesspeople. "People like that we really wanted in the fund," this source says. Regulators had raised questions about hedge funds' access to information from well-placed investors during the flurry of inquiries in the late 1960s, but no rule was ever promulgated to obstruct this channel. Company executives and directors are free to recommend their stock to hedge funds or anyone else so long as they do not disclose inside information.
27. A Tiger alum recalls, "He could come into a meeting where you kind of thought, 'I'm glad the boss is coming so the management team gets to see the guy who runs the place, but it's not like we've talked about this sector lately. I wonder what he's going to know.' And it was uncanny what he would know."
28. Jim Chanos, interview with the author, May 29, 2007; Jim Chanos, e-mail communication with the author, August 6, 2008.
29. Julie Rohrer, "The Red-Hot World of Julian Robertson," *Institutional Investor*, May 1986, p. 134.
30. Robertson wrote to his investors in 1985 that the generic stocks were a sure win, despite what they had cost him in the past few months. "I feel so confident that mentally, I am almost accruing future profits from our past losses." Julian H. Robertson, letter to the limited partners, May 25, 1985.
31. John Griffin, speech to 100 Women in Hedge Funds on behalf of iMentor, November 14, 2007.
32. Strachman, *Julian Robertson*, p. 200.
33. A Tiger veteran sums up the sense of separation between Tiger and traditional fund managers. "It was us and them. They were the mutual funds, the dumb money, the indexed money, the money that didn't care. We looked at what we were doing as so different. It was paid for performance. It was going short and long. It was using leverage. And the returns were there. We went at it each year thinking we could make thirty or forty percent. We would go for it."
34. Julian H. Robertson, letter to the limited partners, February 4, 1991.
35. "John and I, we used to compete viciously on the tennis court all over the world." Robertson interview.
36. Julian H. Robertson, letter to the limited partners, February 4, 1991.
37. Gary Weiss, "The World's Best Money Manager—What You Can Learn from Julian Robertson," *BusinessWeek Assets*, November/December 1990.
38. Julian H. Robertson, letter to the limited partners, February 4, 1991.
39. This is the conversation as recalled by John Griffin and Julian Robertson.
40. Julian H. Robertson, letter to the limited partners, November 10, 1994.
41. Rohrer, "The Red-Hot World of Julian Robertson," p. 134. In another interview in1996 Robertson lamented that Soros could get an appointment with Hans Tietmeyer, the president of the Bundesbank,

at a moment's notice, whereas Robertson had to hustle for an audience. (Gary Weiss, "Fall of the Wizard," *BusinessWeek*, April 1, 1996.) A hedge-fund manager who knows Robertson comments, "To my mind Julian always had this inferiority complex that he wanted to be Soros. It was kind of like Morgan Stanley versus Goldman Sachs. He would run around being Macro Man so he could be like George."

42. The difficulty of finding stocks in which Tiger could take financially meaningful positions frustrated some Tiger analysts and contributed to defections. See, for example, Dwight Anderson's complaint: "The entire universe of stocks that I could invest in had collapsed to about 20 names." (Quoted in Drobny, *Inside the House of Money*, pp. 251–52.) It is notable that most Tiger cubs have tried to control the growth of their funds, though the manageable ceiling for long/short equity funds has risen as markets have grown deeper and more liquid.
43. "Japan remains a fertile hunting ground for both longs and shorts, opportunities resulting from a lack of real analysis, and a market psychology that ignores fundamental valuations." Julian H. Robertson, letter to the limited partners, September 9, 1992.
44. Tim Schilt, internal memo to Tiger staff, August 21, 1995.
45. The day after the Plaza accord, Robertson's dollar-related bets netted $8.3 million, his best haul in a single day, though still less than the $30 million that Soros pocketed that Monday. Rohrer, "The Red-Hot World of Julian Robertson," p. 134.
46. Robertson himself wrote to his partners, "Druckenmiller's, Jones's, and Soros's grasp of macro economics is in another league from mine." (Julian H. Robertson, letter to the limited partners, April 5, 1991.) Speaking somewhat tactfully, the former Tiger commodity analyst Dwight Anderson has said: "In stocks, Julian had enough experience to have a great filter, but in commodities and macro, because he didn't have 40 years of experience, he relied more on his analysts to guide him." (Drobny, *Inside the House of Money*, p. 250.)
47. Arnold Snider, Tiger's drug-stock analyst, went out on his own in late 1993. The next three years were marked by a series of high-profile departures.
48. This episode is reconstructed from conversations with three eyewitnesses.

CHAPTER SIX: ROCK-AND-ROLL COWBOY

1. In 1984 a survey carried out by Sandra Manske of Tremont Partners identified only sixty-eight hedge funds, leading to the estimate that the number of funds extant at any one time in the 1973–87 period was under one hundred. The numbers quoted for 1990 and 1992 come from Hedge Fund Research.
2. A table published in *Forbes* identified ten hedge funds with assets of more than $1 billion—there were the Big Three, the Commodities Corporation trio, and four others: Odyssey Partners, managed by Leon Levy and Jack Nash; Omega Partners, managed by Leon Cooperman; Ardsley Partners, managed by Philip Hempleman; and John W. Henry, managed by the eponymous John Henry. See Dyan Machan and Riva Atlas, "George Soros, meet A. W. Jones," *Forbes*, January 17, 1994.
3. The story comes from John Porter, who worked at Louis Bacon's Moore Capital. See Steven Drobny, *Inside the House of Money: Top Hedge Fund Traders on Profiting in the Global Markets* (Hoboken, NJ: John Wiley & Sons, 2006), p. 145. Equally, in an interview in 1987 with *Barron's*, Jones said: "News is overrated in markets. . . . Futures markets react to new developments too quickly for news to matter, and one must remember the truism that price makes news and not vice versa." See Jonathan R. Laing, "Trader with a Hot Hand—That's Paul Tudor Jones II," *Barron's*, June 15, 1987.
4. A longtime colleague of Jones says, "What Paul will tell you is that he makes his money, for thirty years without a losing year, assessing human reaction. There's a body of information and he assesses human reaction with respect to this information. Fear and hope . . . that's the whole business." Another former Jones colleague says, "There's a skill set which I think he has in abundance, which is to have a feel for the market. By looking at prices and talking to people, he would know how prices would behave, how many people are in the same position. He would know, for example, if a lot of people own the same position, in which case if things reverse they could suddenly get very ugly very quickly."
5. A former pit trader describes the Jones technique as follows. "Say you notice that one of the traders is long two thousand contracts. He is an individual and he is speculating. If the market starts falling

hard, he is going to have to get out, because you understand his risk psychology. So if you have a big order, you wait for a quiet time in the pit, then you go into the middle of the pit and start screaming as loud as you can that you are ready to sell in huge quantity. It is like yelling fire in a movie theater. You start a panic. You get the market going down, everyone is starting to sell, and then when this crescendos, you buy back whatever you sold at the start and more, thereby completing your order."

6. Scott McMurray, "Quotron Man: Paul Tudor Jones II Swaggers and Profits Through Futures Pits," *Wall Street Journal*, May 10, 1988. See also Stephen Taub, David Carey, Amy Barrett, Richard J. Coletti, and Jackie Gold, "The Wall Street 100," *Financial World*, July 10, 1990, p. 56.
7. *Trader: The Documentary*, 1987, Glyn/Net Inc.
8. In one example of Jones's loose grip on the causes of his own success, analysis by Commodities Corporation, which had seeded Jones, determined that he tended to lose money on cotton, the market he believed he knew best. When the Commodities Corporation analysis was presented to Jones, he had difficulty accepting it.
9. A 1987 profile in *Barron's* reports: "And a year ago in April, Jones's research chief, 27-year-old Peter Borish, decided to start tracking daily the bull market of the twenties against the post-1982 bull market. He admits to fudging the exercise somewhat by juggling the starting periods. As a Monday-morning quarterback, he could see that starting the twenties countdown in February 1925 and the eighties market in October of 1982, he got a particularly snug fit. 'It wasn't totally unfair,' Borish observes, 'because the starting points had some historic parallels as both occurred four years after serious sentiment lows—the 1921 recession and the 1979 Carter financial crisis.'" Jonathan R. Laing, "Trader with a Hot Hand—That's Paul Tudor Jones II," *Barron's*, June 15, 1987.
10. In June 1987, *Barron's* reported that Borish expected the crash to come in February 1988. (See Laing, "Trader with a Hot Hand.") In the *Trader* documentary, filmed in 1986 and 1987, Borish had predicted that the crash would occur in March 1988. Jones's own predictions of the aftermath of the crash were even further off the mark. In the *Trader* documentary, he forecasts that it will take six to eight years after the crash for the economy to recover.
11. Jack D. Schwager, *Market Wizards: Interviews with Top Traders* (New York: New York Institute of Finance, 1989), p. 130.
12. In 1987 Jones told *Barron's*, "Prechter has become such a powerful market force because of his incredible track record that we decided to fade him. For the same reason, he'll probably be long at the all-time top." Laing, "Trader with a Hot Hand."
13. The quote comes from the *Trader* documentary. Jones also said, "I consider myself a premier market opportunist. That means I develop an idea on the market and pursue it from a very low risk standpoint until I have repeatedly been proven wrong, or until I change my viewpoint." See Schwager, *Market Wizards*, p. 129. Putting Jones's theorizing about Elliott waves further into perspective, Jones says, "The whole concept of the investment manager sitting up there and making all these incredible intellectual decisions about which way the market's going to go. I don't want that guy running my money because he doesn't have the competitive nature that's necessary to be a winner in this game."
14. Elaborating on how he would write a script for the market, Jones says, "I put myself in the mental position of being short the market, and I think how I would react emotionally to different events and see what it would take to get me to take my position off. And I write that down and that will be the high for the day. Because the high for the day will be the point at which the shorts capitulate. I close my eyes and imagine myself long. I say, 'Okay, where is the point I get nervous? Where would I say, "Oh my God, I have to get out?"' And that would be my projected low for the day. That preparation is important to try to determine great entry points to buy and to sell. You know every single high and low is going to be made in the context of these emotional extremes being hit. Execution is fifty percent of the game." Paul Tudor Jones, interview with the author, April 23, 2009.
15. A former Tiger recalls, "Paul Tudor Jones is a trader. In 1987 we were very aware of the risks in the market, both of us. When the crash came, Jones made a lot of money. He came in to breakfast at Tiger in the summer of 1987. Talked about momentum and technicals and trading. Julian had no

space in his mental map for that. We were saying, 'Japan and U.S. are overvalued.' Paul was saying, 'Technically, it looks like there is a fall coming.' He talked to us about us potentially managing a short-only book for him. We passed on it. But we shared the same sense of risk from very different origins."

16. Sushil Wadhwani, who worked for Jones in the 1990s, emphasizes his flexibility as a trader. "You'd talk to Paul in the morning his time and he'd be long something. The next day, that market would have gone down and you would fear he had lost money, but when you spoke to him again you would find that he had changed his mind and had gone from long to short. That's tremendous flexibility. It's very important in this game that one doesn't get hung up and anchored to a view." (Drobny, *Inside the House of Money*, p. 171.) Equally, Louis Bacon emphasizes the distinction between commodity traders and equity traders. In one investor letter, Bacon wrote: "Those traders with a futures background are more 'sensitive' to market action, whereas value-based equity traders are trained to react less to the market and focus much more on their assessment of a company's or situation's viability." (Riva Atlas, "Macro, Macro Man," *Institutional Investor*, vol. 34, no. 7, July 2000, pp. 44–56.)
17. Speaking of the crash of 1987, Jones says: "There was a tremendous embedded derivatives accident waiting to happen in the crash of '87 because there was something in the market at that time called portfolio insurance that essentially meant that when stocks started to go down it was going to create more selling because the people who had written these derivatives would be forced to sell on every down-tick. So it was a situation where you knew that if you ever got to a point where the market started to go down that the selling would actually cascade instead of dry up because of the measure of these derivative instruments that had been written." Paul Tudor Jones II, interview by Joel Ramin, January 13, 2000, available at http://chinese-school.netfirms.com/Paul-Tudor-Jones-interview.html.
18. Louis Bacon, interview with the author, July 21, 2009.
19. Jack D. Schwager, *Market Wizards: Interviews with Top Traders* (New York: CollinsBusiness, 1993), p. 134.
20. Louis Bacon, who was up about 40 percent in 1987, made most of his profits by going long the bond market the same way that Jones did. (Bacon interview.) Bruce Kovner recalls making more money on his bond position after the 1987 crash than he had from shorting the stock market. (Bruce Kovner, interview with the author, October 14, 2009.)
21. Discussing his Japan trade with *Barron's* in May 1990, Jones said, "Under- or overvaluation is only part of the battle. The key thing is to be able to time one's entry into a position at the precise moment when the market is about to move in your favor. Markets can stay undervalued, say, for months and years at a time. You don't want to waste your resources in that kind of position. In fact, if you put a gun to my head and ask me to choose between fundamental and technical analysis, I would take the technicals every time." See Jonathan R. Laing. "Past the Peak—Super Trader Paul Tudor Jones Bearish on Most Markets," *Barron's*, May 7, 1990.
22. Jones describes his view of Japan extensively in interviews with *Barron's* in February and May 1990. These provide something close to Soros's "real time experiment" during the Plaza Accord trade of 1985. See Laing, "Past the Peak—Super Trader Paul Tudor Jones Bearish on Most Markets." Also see "Barron's Roundtable 1990: Bargains and Bubbles—Part I—Baron, Lynch, Jones, and Rogers Pinpoint Plenty of Both," *Barron's*, February 5, 1990.
23. In an interview in 2000, Jones emphasized the importance of understanding how other players are positioned. "The secret to being successful from a trading perspective is to have an indefatigable and an undying and unquenchable thirst for information and knowledge. Because I think there are certain situations where you can absolutely understand what motivates every buyer and seller and have a pretty good picture of what's going to happen. And it just requires an enormous amount of grunt work and dedication to finding all possible bits of information." Paul Tudor Jones II, interview by Joel Ramin.
24. In January 1990, short-term interest rates in Japan stood at 7.25 percent and longer bonds yielded considerably more than that.
25. In the *Barron's* Roundtable interview in February 1990, Jones correctly predicted that the Nikkei would rebound after falling to around 36,500, since that had been the point from which the Nikkei

had broken out for the last stage of its bull rally the previous November. Jones also said that if the rebound proved weak, the market would fall again. This proved accurate.

26. In May 1990, with almost uncanny accuracy, Jones said to *Barron's*, "Japan has a long way to go yet on the downside. The slide won't resume, however, until late summer, I suspect. . . . I am lightly long Japan right now." Jones also predicted that the fall would have severe consequences for Japan's economy. The stocks in the Tokyo market were worth an enormous $4 trillion—160 percent of the annual output of Japan's economy. A 20 percent fall in the Nikkei would wipe out $800 billion of wealth, something equivalent to 35 percent of Japan's GDP. Jones predicted that the destruction of so much wealth would trigger "an enormous economic contraction." Sure enough, Japan's economy remained stagnant for much of the decade. See Laing. "Past the Peak—Super Trader Paul Tudor Jones Bearish on Most Markets."
27. Jones remembers the clocklike arrival of hedge-selling pressure by cotton farmers at year-end, no matter what was occurring fundamentally in the market. "The farmers clung emotionally to the hope that prices would some how improve if they could just wait," he recalls. "Of course, those hopes were usually dashed, but the phenomenon gave us something to exploit." Laing, "Trader with a Hot Hand."
28. Jones seems to have learned the value of visibility from Eli Tullis, the cotton trader under whom he served an apprenticeship in New Orleans. Jones recalls of Tullis, "Everyone always knew what his position was. He was very easy to tag. Eli's attitude was, 'The hell with it, I'm going to take them head on.'" Schwager, *Market Wizards*, p. 121.
29. *Trader: The Documentary.*
30. This description is taken from Laing, "Trader with a Hot Hand."
31. Schwager, *Market Wizards*, p. 129.
32. A 1988 *Wall Street Journal* profile captures Jones's trading style. "Charles Christensen, a futures analyst with Refco, says that's what happened on February 25 in the Chicago Board of Trade's Treasury bond futures pit, the most active futures market in the U.S. The futures were near their highs late in the day when Tudor Investment's trader suddenly appeared on the edge of the bond pit, both arms raised above his head, gesturing frantically to sell all at once 1,000 contracts—with a face value of about $95 million. Even big brokerage firms rarely offer to sell that many at a crack. 'The local traders looked at each other and said, "Who's buying?"' Mr. Christensen says. 'The answer was, "Nobody," so they all tried to sell ahead of him.' But many couldn't, they drove the price even lower, and Mr. Jones's trader apparently bought back the contracts cheaply. The estimated profit: $3 million. 'It's phenomenal: The man is such a good psychological trader,' Mr. Christensen gushed. 'He knows exactly when the market is acting exhausted so he can move in.'" McMurray, "Quotron Man."
33. James Elkins, interview with the author, April 23, 2008. Elkins was the president of Elkins/McSherry.

CHAPTER SEVEN: WHITE WEDNESDAY

1. Druckenmiller recalls, "When I went over there, I did expect to get fired in a year, but I didn't really care because I thought I would get some kind of postgraduate education." Stanley Druckenmiller, interview with the author, March 13, 2008.
2. Druckenmiller interview. Gary Gladstein recalls Druckenmiller's arrival: "George did think that he was going to be a superstar, but no one really knew that for sure. There were a number of people previously that George had been very enthusiastic about." Gary Gladstein, interview with the author, March 18, 2008.
3. Druckenmiller recalls, "I never learned enough about fundamental analysis, not having been to business school, not having a CFA. By necessity and also because my first boss, my mentor, used technical analysis, I had to rely quite heavily on charts." Druckenmiller interview.
4. Jack D. Schwager, *The New Market Wizards: Conversations with America's Top Traders* (New York: CollinsBusiness, 2005), p. 193.
5. Druckenmiller recalls, "I started there as an S&P trader; he didn't know that I traded bonds and currencies and all this other stuff before I got there. Even then he was running around insulting

everyone, telling everyone that his successor was coming in, which must not have been a good thing to hear for the others. I didn't really have a defined role the first three to six months. I almost quit it. . . . I still had my Pittsburgh firm, and I flew to Pittsburgh one day, and when I landed I found out that George had sold my bond position out. You have to understand, I had been in charge of a portfolio my entire career basically. I had the number one mutual fund out of twenty-two hundred mutual funds and basically had one lucky period after another. And no one had ever done anything like that to me. I basically blew a gasket over the phone when I found out. He was fine about it. He was apologetic. I was, by far, the rude one, but with reason." Druckenmiller interview.

6. This is the exchange as recalled by Soros. (George Soros, interview with the author, June 10, 2008.) Druckenmiller confirms his feelings at the time, adding the last line of the exchange reported here. "He wasn't the boss of the trading, and I wasn't the boss of the trading, and it was awful. I believe I was screwing up his trading and I believe he was screwing up mine. You just can't have two cooks in the kitchen." (Druckenmiller interview.)
7. The colleague was Robert Johnson, who moved from Bankers Trust to become a partner at Soros Fund Management in September 1992. Robert Johnson, interview with the author, July 29, 2008.
8. Performance data for Quantum here and elsewhere in the book, including in the chart given in the appendix, describe the return an investor would have received if he had reinvested distributions back into the fund. In practice, not all investors were permitted to do this because Quantum had more money than it could manage. I am grateful to Gary Gladstein, the former chief administrative officer and managing director of Soros Fund Management, for providing me with a complete set of performance data for Quantum, and to Michael Vachon, George Soros's spokesman, for the data on Soros Fund Management.
9. Soros describes Druckenmiller's authority from 1989: "He really ran the thing, and our relationship was good enough so we could discuss things and I could express views, but it didn't stop him from doing his thing." (George Soros, interview with the author, January 16, 2008.) And again: "If we had a difference of opinion, his opinion prevailed. I had the right to give him advice, so I was the coach, like a football player or tennis player." (Soros interview, June 10, 2008.) Equally, Druckenmiller recalls, "There were many times where he would question my positions and therefore want me to reduce them, but I rarely listened. He may have just been testing me." (Druckenmiller interview.)
10. Druckenmiller recalls, "I did not like the publicity we had at Soros. I tolerated it because I thought it was for a noble purpose. He needed it as a platform for his philanthropy. I didn't read it as he was doing it for his ego. He was trying to meet with heads of state, and he needed a platform, which it surely gave him. So the idea of me staying in the background and him doing the publicity was fine." Druckenmiller interview.
11. Druckenmiller recalls: "The way I figure out the economy is literally from the bottom up and from company anecdotal information, knowing that housing leads retail and retail leads capital spending. From listening to the guys on the ground. When you talk to companies and to guys who run companies, you get a whole additional perspective on the economy. . . . I learned a lot at Soros, but not what I thought I would learn. I did not learn what makes the yen go up or down, or what makes the stock market go up or down. Soros's great gift was how to use leverage, and how much money to have down based on the risk/reward and your sense of conviction. His view on the yen or the euro was better than random, but not much. And yet he was still one of the great money managers ever because he knew how to bet his convictions." Ibid.
12. Speaking about *Alchemy*, Druckenmiller says, "I found the first chapter basically unreadable. I found the currency chapter interesting and actually quite useful. . . . A budget deficit of huge proportions could actually be bullish for a currency because it drove up rates and sucked in capital. That, at the time, was very unique thinking which, to some extent, became conventional thinking in the next fifteen to twenty years." Ibid.
13. Druckenmiller recalls, "Everybody forgets that the deutsche mark went down hard after the first two or three days. Everyone thought it would be polluted by this horrible East German money. I saw it differently." Ibid.
14. "It was one of those situations that I could see as clear as day," Druckenmiller said later. His $2 billion bet was equivalent to almost 100 percent of the capital in Quantum. It was even bigger than

Soros's bet at the time of the Plaza accord in 1985—though, as a proportion of the assets in Quantum, it was smaller. Schwager, *The New Market Wizards*, p. 203.

15. Druckenmiller recalls, "If you had a floating currency, this is one of the situations where the deutsche mark would have just been screaming against the pound. The fact that they were linked, and all that pressure able to build and build, created an explosive situation. Now I think I only did, like, a billion and a half in August. It was a bit of a flyer; I put it on for six months. I didn't see the immediate catalysts, but I knew there were potential tremors growing there. And sometimes that's what you'll do; you'll put on a position, partly because you think it's going to work eventually, but also because it makes you watch it." Druckenmiller was so confident about the asymmetry of this bet that he did not regard $1.5 billion as a big position. "A billion and a half, I don't want to talk about it cavalierly, but it was like an intellectual position for me to put on. . . . If it had been something where we could have lost fifteen percent, it would have been very big. But I just couldn't see that happening." Stanley Druckenmiller, interview with the author, June 4, 2008.
16. Craig R. Whitney, "Bundesbank Chief is at Eye of Currency Storm," *New York Times*, October 8, 1992.
17. "I got the message," Soros said later. See George Soros, *Soros on Soros: Staying Ahead of the Curve* (New York: John Wiley & Sons, 1995), p. 81. The date and place of this encounter with Schlesinger is not given by Soros, who refers simply to a Schlesinger speech "at a prestigious gathering." However, it seems highly likely that the speech Soros attended was the Basel speech on September 8. Druckenmiller confirms that Soros called him with the tip on the lira's likely devaluation around this time, shortly before the weekend during which Italy devalued. (Druckenmiller interview, March 13, 2008.)
18. Soros's intuition was right. In his memoir, Norman Lamont, the British finance minister of the time, recounts a conversation between Eddie George, deputy governor of the Bank of England, and Hans Tietmeyer, his opposite number at the Bundesbank. Tietmeyer had noted pointedly that many Germans would welcome the end of plans to create a single currency. See Norman Lamont, *In Office* (London: Little, Brown, 1999), p. 227.
19. "I'm sure the lira idea came from him and not me. I'm also sure that the pound idea came from me and not him." Druckenmiller interview, March 13, 2008.
20. Johnson recalls, "I could just feel the energy of the two men just picking up . . . There's a funny kind of body language when you say something to people, and their eyes kind of start to go to each other. Like they're looking at each other like 'Whoa, yeah.' It was visceral." Johnson interview.
21. Scott Bessent recalls that Quantum wanted to limit its risk in the sterling trade to the investment gains it had made so far that year. Hence Quantum worked out what it would lose if sterling moved to the far side of the band permissible within the exchange-rate mechanism and capped the capital it risked accordingly. (Scott Bessent, interview with the author, January 18, 2008. See also Steven Drobny, *Inside the House of Money: Top Hedge Fund Traders on Profiting in the Global Market* (Hoboken, NJ: John Wiley & Sons, 2006), p. 275.) But Johnson and Druckenmiller have a different memory. Druckenmiller says, "I didn't think that [sterling moving to the other end of the band] was remotely possible. I felt very strongly that just couldn't happen because these economies were so ass-backwards. So yeah, theoretically it could have gone to the other side of the band. I didn't even consider it, to tell you the truth." (Druckenmiller interview, June 4, 2008.)
22. This exchange is recalled by Robert Johnson. Johnson interview; Robert Johnson, e-mail communication with the author, November 10, 2008.
23. "It was almost like you could feel a big inhale. You know, like you've seen when Michael Jordan goes to dunk. You can just see his eyes get big. It was fascinating. I walked out of there with absolutely no question that we were going to go after this thing. I knew other people in the banks and counterparties would imitate us." Johnson interview.
24. On an average day in 1986, for example, $58 billion worth of currencies were traded on the world's markets; but by 1992 the daily turnover had almost tripled to $167 billion. These data come from the U.S. Federal Reserve. They include spot trading, forward trading, and swaps and are adjusted for double reporting by participating dealers. Interestingly, before 1986 the foreign-exchange markets were so insignificant that the Fed did not collect data on them. See http://www.newyorkfed.org/markets/triennial/fx_survey.pdf.

25. The intervention came on August 21, 1992. At the end of Europe's trading day, the dollar's value had scarcely budged from its preintervention level, and four days later the dollar hit a record low against the deutsche mark. Contemporary news accounts show that the authorities' failure was not regarded as inevitable; the triumph of market muscle over government intervention was not fully understood until after sterling's debacle a month later. For example, a Reuters story on the August intervention quotes Klaus Weiland, a trader at Deutsche Girozentrale-Deutsche Kommunalbank, as saying: "Today's intervention restores some of the central banks' credibility." (Erik Kirschbaum, "Central Banks Battle to Support Flagging Dollar," Reuters, August 21, 1992.) Commentators in the *Economist* and the *Financial Times* noted that the central banks' failure raised doubts about the efficacy of intervention, but they presented these doubts as a novel factor in global finance. "Yesterday's action raises questions about the credibility of internationally co-ordinated exchange rate policy," the FT's Lex Column noted ("D-Day for the Dollar," Lex Column, *Financial Times*, August 22, 1992); the failed intervention "has reinforced the lesson that currency intervention works only if it is allowed to affect domestic monetary policy; it cannot do the job on its own," the *Economist* noted ("Forever Falling?" *Economist*, August 29, 1992, p. 65). Writing with the benefit of hindsight, Norman Lamont, the British finance minister, was more definitive in describing the August failure as a telling portent of a changed world. (Lamont, *In Office*, p. 222.)
26. Italy had devalued the lira previously, most recently in 1987. But those earlier devaluations had been smaller and had been initiated by the Italian government in order to boost exports. In 1985, for example, the Italian government was widely thought to have instructed ENI, the Italian energy giant, to initiate a deliberate run on the lira in order to force Italy's European partners to accept devaluation. In 1992, by contrast, the Italians fought devaluation tooth and nail, with the support of the Bundesbank.
27. By any previous standards, the Bundesbank's intervention was colossal. The largest ever intervention by the Federal Reserve, which had taken place in 1989, had involved the selling of just $1.25 billion.
28. The passage that follows draws extensively on Lamont, *In Office*, pp. 220–26.
29. Ibid., p. 231.
30. Soros recalled: "When Norman Lamont said just before the devaluation that he would borrow nearly fifteen billion dollars to defend sterling, we were amused because that was about how much we wanted to sell." Anatole Kaletsky, "How Mr. Soros Made a Billion by Betting Against the Pound," *Times* (London), October 26, 1992.
31. Will Hutton, "Inside the ERM Crisis: Black Wednesday Massacre," *Guardian*, December 1, 1992, p. 15.
32. "I did not in any way foresee the scale of what was to happen, let alone that the next day would see the end of our membership of the ERM. It simply did not cross my mind." Lamont, *In Office*, p. 245.
33. "Basically, it was the German central bank just trashing Britain. . . . It was so obvious what was going on." Druckenmiller interview, March 13, 2008.
34. Speaking of Soros's advice to go for the jugular, Druckenmiller says, "This gets back to the genius we were talking about. I can do all my fancy analysis. I can have the concepts, I can do the economics, and I can even have the timing, but one simple statement like that in terms of size . . . We probably got twice the profit I would have had without that snide comment he made about 'Well, if you love it so much . . . .'" (Druckenmiller interview, March 13, 2008.) Gerry Manolovici, an equity specialist at Soros Fund Management, recalls, "Schlesinger was asked after the lira devaluation whether now everything was stable. And Schlesinger said, 'No, other countries missed the opportunity to devalue.' At this Soros went nuts. He scoured the world for credit to put on short positions." (Gerry Manolovici, interview with the author, March 31, 2008.)
35. Soros recalls, "Basically, I said, 'This is the moment, they are capitulating, go for the jugular.' And he went, and even I went. I don't normally make phone calls, but I was also calling looking for counterparties." Soros interview, January 16, 2008.
36. Druckenmiller recalls, "We really went after this thing and kept going and going and going like the Energizer bunny. . . . So anybody with a brain is going to ask his dealer, 'What the hell is going on?' And I know people talk. It's Quantum." Druckenmiller interview, June 4, 2008.

37. Soros recalls, "I remember we called everyone who was willing to put on an additional position to sell sterling. . . . It wasn't possible to find counterparties who were willing because they had limits to how much they could do." Soros interview, January 16, 2008.
38. Louis Bacon recalls, "I don't think I'd ever talked to George before. Having George talk was like having a demigod coming down from on high to talk to you." Louis Bacon, interview with the author, July 21, 2009.
39. Bessent interview.
40. Scott Bessent recalls, "We could push the bank against the wall. They would have to buy an unlimited amount of sterling from us." Bessent interview.
41. David M. Smick, *The World Is Curved* (New York: Portfolio, 2008), pp. 183–84.
42. Lamont, *In Office*, p. 249.
43. The minister was Kenneth Clarke. See Philip Johnston, "Ministers Caught in a Maelstrom as the Pound Plunged Through the Floor," *Daily Telegraph*, September 13, 2002.
44. Soros interview, January 16, 2008; Scott Bessent, e-mail communication with the author, November 8, 2008.
45. The $27 billion includes $4.1 billion worth of sterling purchases by other central banks. Under the rules of the exchange-rate mechanism, these would have to have been repaid by the Bank of England. See Lamont, *In Office*, p. 259.
46. The magnitude of sterling's fall depends on the period chosen. At its trough, reached in March 1993, sterling was 16 percent down, implying a cost to British taxpayers of over $4 billion. But the immediate fall was 14 percent, and sterling fluctuated around that level through December.
47. There are various estimates of the total sterling selling by Soros Fund Management. Druckenmiller recalls that he sold about $7.5 billion on behalf of Quantum, a figure that would have excluded selling by Soros in his side account. (Druckenmiller interview, March 13, 2008.) Soros, in an interview one month after the trade, put the total sterling sales at almost $10 billion. Meanwhile, two former Soros employees give substantially higher estimates. Kaletsky, "How Mr. Soros Made a Billion."
48. According to news reports, these banks were Citicorp, J.P. Morgan, Chemical Banking, Bankers Trust, Chase Manhattan, First Chicago, and Bank America. (See Thomas Jaffe and Dyan Machan, "How the Market Overwhelmed the Central Banks," *Forbes*, November 9, 1992, pp. 40–42.) It is notable that hedge funds made larger profits on the sterling trade than banks, even though banks managed far more capital. Further, hedge funds were the leaders in the currency trades, with banks that executed their trades then copying them on their own books. The IMF's Capital Markets report, commissioned after the collapse of the European exchange-rate mechanism, noted that the determination of hedge funds "to position themselves favorably for possible exchange rate realignments in the ERM apparently served as a signal for other institutional fund managers to re-examine their own positions. . . . Thus, although hedge funds have less than $10 billion in capital, their potential influence on forex markets [was] larger." (International Monetary Fund, "International Capital Markets," 1993, p. 11.) Given the size of Soros's profits relative to those of the banks, the IMF was understating the point by a wide margin.
49. As of late October, Soros's profits on his sterling position stood at $950 million. But at that time Soros was correctly expecting that sterling would ultimately fall further, so the eventual profit was probably larger. If Soros Fund Management exited its estimated $10 billion position with a profit averaging 14 percent, a reasonable estimate of the truth, it would ultimately have made $1.4 billion. Kaletsky, "How Mr. Soros Made a Billion."
50. Stephen Taub, Nanette Byrnes, and David Carey, "The $650 Million Man," *Financial World* 162, no. 14 (July 6, 1993): pp. 38–61.
51. The Swedish trade was conceived by Robert Johnson. On the secrecy of the Swedish trade, Druckenmiller recalls, "By then at least we learned to keep our mouth shut." Druckenmiller interview, June 4, 2008; Johnson interview.
52. David Israelson, "France Tries to Halt Speculation on Franc," *Toronto Star*, September 23, 1992.
53. Larry Elliott, Mark Milner, Ruth Kelly, and David Gow, "After Black Wednesday: The Currency Puzzle Remains Unsolved," *Guardian*, September 17, 1993, p. 17.

54. Robert Johnson recalls, "One of the reasons I left Banker's Trust and joined Soros is I didn't know if Banker's Trust had the courage to go after something so threatening to government structures when they have to have a banking license. I knew George did." Johnson interview.
55. Soros recalls, "I warned him [Trichet] that he's liable to be attacked, and I said, 'I'd like to be helpful and therefore I will not take a position.'" (Soros interview, June 10, 2008.) Elsewhere Soros has said, "When the French franc came under attack, I really believed I could have toppled it if I joined the fray. This led me to behave rather foolishly. I chose to abstain from speculating against the franc in order to be able to express what I thought were constructive suggestions. This had doubly unfortunate results: I lost what was a profit opportunity, *and* I annoyed the French authorities even more with my comments than I would have done by speculating against the franc. It taught me a lesson: Speculators ought to keep quiet and speculate." (Soros, *Soros on Soros*, pp. 85–86.) This passage gives a sense of Soros's split personality but should be treated with a grain of salt. For one thing, Quantum made money by not betting against the franc. For another, Soros failed to keep quiet and speculate during the emerging-market crisis, as described in chapter nine.
56. "I fight for many causes in my life, but I don't particularly feel like defending currency speculation." Soros, *Soros on Soros*, p. 83.
57. Kaletsky, "How Mr. Soros Made a Billion."

CHAPTER EIGHT: HURRICANE GREENSPAN

1. I am grateful to Michael Steinhardt and Tricia Fitzgerald for providing full historical performance data, which are also presented in Appendix II.
2. Shadowbanks later made loans to companies and home buyers, whereas Steinhardt's early version focused on the government bond market.
3. Steinhardt recalls that his main broker, Goldman Sachs, was providing leverage "overjoyedly." Michael Steinhardt, interview with the author, December 15, 2008.
4. Steinhardt recalls that his leverage on U.S. government bonds was exceptionally high. His leverage on European bonds was more like twenty to one, and the leverage for his funds as a whole might have been less than ten to one. Steinhardt interview. See also Steinhardt, *No Bull*, p. 224.
5. The Goldman partner was Leon Cooperman, formerly the boss of the asset management division of Goldman. The Salomon partner was Stanley Shopkorn, the head of equity trading. In 1993 John Meriwether left Salomon Brothers and raised $1.2 billion for a fund called Long-Term Capital Management.
6. The estimate of three thousand hedge funds comes from the International Advisory Group in Nashville. Even this excluded offshore funds. See Gary Weiss, "Fall Guys?" *BusinessWeek*, April 25, 1994.
7. Dyan Machan and Riva Atlas, "George Soros, Meet A. W. Jones," *Forbes*, January 17, 1994, pp. 42–44.
8. Laurie P. Cohen and Michael Siconolfi, "The Cruelest Month: Before May's Squeeze, One in April Wounded Investors in Treasurys," *Wall Street Journal*, October 7, 1991.
9. Laurence Zuckerman, "$76 Million to Settle Treasury Note Charges," *New York Times*, December 17, 1994.
10. Michael Siconolfi. "Salomon, Two Funds Set to Settle Claims," *Wall Street Journal*, March 31, 1994.
11. Bob Woodward, *Maestro* (New York: Simon & Schuster, 2000), p. 116.
12. Further illustrating his concern about a potential Wall Street backlash, Greenspan had used the occasion of his January 31 testimony before Congress to deliver a warning to equity investors: "Short-term interest rates are abnormally low in real terms," he declared, signaling that a rate hike was coming. (See Hearing of the Joint Economic Committee, "1994 Economic Outlook," 103rd Congress, Second Session, January 31, 1994.) In his autobiography, Greenspan recalls that his message was unusually explicit in that testimony: "It was like banging a pot." (Alan Greenspan, *The Age of Turbulence: Adventures in a New World* (New York: Penguin Press, 2007), p. 154.) Vincent Reinhart, a senior Fed economist at the time, recalls that Greenspan's effective anticipation

of equity-market reactions was matched by the surprise he experienced at the hands of the bond market. (Vincent Reinhart, interview with the author, September 11, 2008.)

13. Federal Open Market Committee transcript, February 3–4, 1994.
14. By February 8, the ten-year bond yield was 5.98 percent, twenty-four basis points up from the yield at the start of the month.
15. During 1993, Quantum made big profits on the yen-dollar rate and was acutely sensitive to the links between the exchange rate and trade talks. By January 1994, Druckenmiller's bet against the yen was worth an astonishing $25 billion, demonstrating not only his confidence in the trade but also the rapid growth of Quantum since the sterling coup less than two years earlier. Although this trade blew up in February, Druckenmiller was fortunate to have sold his large portfolio of European bonds in January 1994. Combined with a successful trade in copper, this allowed him to get through the turbulent year of 1994 without losses. Stanley Druckenmiller, interview with the author, June 4, 2008. See also David Wessel, Laura Jereski, and Randall Smith, "Stormy Spring," *Wall Street Journal*, May 20, 1994.
16. Between February 11 and February 15, the ten-year Treasury yield moved from 5.88 percent to 6.20 percent.
17. Data for Japan come from Bloomberg Generics, a time series of active debt issues. No such series exists for Italy and Spain; data for these countries come from analysis of expired bond issuance by Paul Swartz of the Center for Geoeconomic Studies at the Council on Foreign Relations.
18. "Where It Hurts: Bets on Foreign Debt Go Bad and Punish Big Players in U.S.—Bankers Trust and Others Feel Pain From Europe and 'Emerging Markets'—Steinhardt Takes a Big Hit," *Wall Street Journal*, March 3, 1994.
19. Randall Smith, Tom Herman, and Earl C. Gottschalk Jr., "Mean Street," *Wall Street Journal*, April 7, 1994.
20. Steinhardt, *No Bull*, p. 224. Various news accounts put Steinhardt's European risk at $7 million per basis point or lower, but I have taken Steinhardt's estimate in his autobiography as the most authoritative.
21. Steinhardt recalls, "We were losing money and I couldn't quite catch my breath; things were happening and we had positions and it was as if I just didn't quite have the ability to understand where we were and why we were where we were. It was as if we were playing yesterday's or last year's game." Steinhardt interview.
22. "I remember Michael being very upset. I just want to sell them. I just want out. It's over, just sell them. And the guy not being able to execute it and sell them." John Lattanzio, interview with the author, December 15, 2008.
23. "Where It Hurts."
24. Steinhardt, *No Bull*, pp. 225 and 227. Steinhardt elaborates: "My great problem, as humbly acknowledged, was I didn't know what I was talking about. I didn't know the names of the securities, the names of the French ten-years, whatever they call them. . . . I didn't know who made the markets and all this other stuff. . . . I didn't know that there could be substantial differences between the French bonds and the Germans and the gilts and the Americans. . . . I mean, I didn't know. And that's when I got killed. . . . Was I ever dumb and cocky." Steinhardt interview.
25. Askin told one magazine that "most managers are not as comfortable as we are with prepayment risk, nor the structural risk inherent in this market. We understand it, we can measure it, and we can hedge it." Final Report of Harrison J. Goldin, Trustee, to the Honorable Stuart M. Bernstein, United States Bankruptcy Judge, Southern District of New York. In re Granite Partners, L.P., Granite Corporation, and Quartz Hedge Fund. Case Nos. 94 B 41683 (SMB) through 94 B 41685 (SMB) inclusive. New York, NY, April 18, 1996, 27.
26. See Saul Hansel, "Markets in Turmoil: Investors Undone: How $600 Million Evaporated," *New York Times*, April 5, 1994. The success of Askin's marketing was not surprising given his reputation at Drexel, where he was considered one of the foremost experts on prepayment risk.
27. The bankruptcy trustee would later find that Askin lacked the analytical models necessary to determine whether his portfolio was market neutral. See Final Report of Harrison J. Goldin, 27–28.

28. The bankruptcy trustee found no evidence of the proprietary prepayment model on Askin's computer, and no employee of his firm was able to verify its existence. See Final Report of Harrison J. Goldin, 28.
29. Final Report of Harrison J. Goldin, 84–85.
30. Even when Askin tried to accept some of these low prices, it proved impossible to do so. The instruments were held by other brokers as collateral, and the brokers had hedged the risk in the instruments with offsetting trades. Because the offsets were too complex to unwind, the brokers refused to release the collateral. See Final Report of Harrison J. Goldin, 95.
31. Woodward, *Maestro*, p. 126.
32. *The Late Edition*, CNN, April 3, 1994 (transcript retrieved from Nexis).
33. Al Ehrbar, "The Great Bond Market Massacre," *Fortune*, October 17, 1994.
34. "We had a far greater impact than anticipated," Greenspan said bluntly. Federal Open Market Committee conference call, February 28, 1994.
35. Blinder's protest against yellow suspenders is recalled by Vincent Reinhart, a former Fed economist. Reinhart interview.
36. See President's Working Group on Financial Markets, "An Assessment of Developments with Potential Implications for Market Price Dynamics and Systemic Risk," September 27, 1994.
37. Lynn Stevens Hume, "Gonzalez Derivatives Legislation, Hedge Fund Hearing Due in April," *Bond Buyer*, March 28, 1994.
38. The paper was by Don R. Hays of Wheat First Securities. It was circulated on April 5, 1994.
39. Brett D. Fromson, "Hearings on 'Hedge Funds' Planned," *Washington Post*, March 25, 1994, p. G7.
40. Robert Johnson, interview with the author, July 29, 2008.
41. "Hedge Funds." Hearing of the House Banking, Finance, and Urban Affairs Committee. April 13, 1994. 103rd Congress, Second Session.
42. Steinhardt recalls: "I was really miserable. And I was miserable, I would say, in the second quarter and into the third quarter. I couldn't get out of it, even when I was pretty much out of the bonds, I couldn't ever quite mount a successful offensive. Every time I started something, it just didn't work." Steinhardt interview.
43. A Steinhardt employee recalls of the last year: "He would intellectually hedge himself. If you had a view on something and put a trade on, he would come in and say, 'I was just talking to'—pick your famous guy—'and he thinks it's the dumbest idea he's ever heard ever, and he has no idea why you're doing this.' Then he'd say, 'But I don't know anything about this, so do whatever you want . . .' And he'd leave. So now you're screwed because if it goes badly he can say, 'I told you this was a bad idea.' If it worked, he could say, 'Why wasn't it bigger? I told you that you could do whatever you want. . ." He would do this consistently."
44. Contemporary press accounts put the earnings for 1995 at $500 million. See Stephanie Strom, "Top Manager to Close Shop on Hedge Funds," *New York Times*, October 12, 1995, p. D1. However, Steinhardt's records show that returns were 26.8 percent (before fees) on assets of $2.7 billion, suggesting profits of just over $700 million.
45. Some commentators have suggested that Steinhardt's dollar losses in 1994 were so large as to outweigh the gains over the rest of his career, since the earlier gains, though impressive in percentage terms, were on a relatively small asset base. This claim is not borne out by an examination of Steinhardt's internal records.
46. Stephen Taub, "The Hedge Rows of Wall Street," *Financial World*, September 13, 1994, p. 38.
47. Riva Atlas and Dyan Machan. "To be or not to be: Nothing personal, mind you, but Alan Greenspan pushed Michael Steinhardt—and a lot of other hedge fund operators into a corner. Many of them will not survive. Will Steinhardt?" *Forbes*, September 26, 1994.
48. In a June 1995 letter to investors, Kovner announced that he would be returning $1.3 billion of Caxton's $1.8 billion in assets under management after closing one of his two foreign funds, the $800 million GAM fund, and his $450 million U.S. fund. According to press accounts of the announcement, Kovner stated, "The lower liquidity in currency, fixed-income, and commodity markets hurt our performance." (See Peter Truell, "A Big Hedge Fund Returns $1.3 Billion to Its

Investors," *New York Times*, June 9, 1995.) Louis Bacon's Moore Capital also suffered withdrawals around this time; his poor performance was compounded by an acrimonious split with a senior lieutenant. The same went for Quantum: "We find that our size is hindering us," Soros wrote to his clients. (Peter Truell, "Some Big Funds, Like Soros's, Have Difficulty Despite Trend," *New York Times*, July 27, 1995.) Those who returned capital to investors almost certainly did boost their performance over the ensuing years, since later research was to find an inverse correlation between size and investment returns. For example, in 2009 the software firm PerTrac Financial Solutions reported that between 1996 and 2008 hedge funds managing less than $100 million made 13 percent a year, compared with 10 percent for those running more than $500 million. (Stephen Taub, "The Hedge Rows of Wall Street," p. 38.) Likewise, data from Rock Creek Capital, reported in chapter sixteen, reinforce the view that size is an impediment.

49. The survey was conducted by Republic New York Securities and based on a modest sample of 130 hedge funds.
50. The five-year performance data come from International Advisory Group, a Nashville-based consulting firm. A few years later, a paper from the Yale School of Management found that offshore hedge funds returned a bit less than the S&P 500 index: 13.3 percent from 1989 through 1995, compared with the benchmark return of 16.5 percent. But hedge funds appeared much less risky: The annual standard deviation of their returns was 9.1 percent, versus 16.3 percent for the S&P 500. Meanwhile, swings in the S&P 500 stock index explained only 36 percent of swings at hedge funds. See Stephen J. Brown, William N. Goetzmann, and Robert G. Ibbotson, "Off-Shore Hedge Funds: Survival and Performance 1989–1995" (Yale School of Management working paper no. F-52B, January 2, 1998.) Another paper, based on different data and looking at an overlapping period (1989 to 1998), confirmed that hedge-fund volatility was low. The annualized standard deviations of monthly returns for equally weighted and value weighted portfolios of all hedge funds were, respectively, 5.75 percent and 8.94 percent, much less than the standard deviation of the S&P 500, which was 13.2 percent. See Franklin R. Edwards, "Hedge Funds and the Collapse of Long-Term Capital Management," *Journal of Economic Perspectives* 13, no. 2 (Spring 1999), p. 196. See also the positive finding for hedge-fund alpha reported in the conclusion.

CHAPTER NINE: SOROS VERSUS SOROS

1. See Andrew Meier, "Cursed Cornucopia," *Time*, December 29, 1997; Paul Klebnikov, "A Company Built on Bones," *Forbes*, November 6, 1995; Michael R. Gordon, "Siberia Tests Russia's Ability to Profit from Privatization," *New York Times*, December 9, 1997; Robert G. Kaiser, "Norilsk, Stalin's Siberian Hell, Thrives in Spite of Hideous Legacy," *Washington Post*, August 29, 2001.
2. Paul Tudor Jones recalls, "I cross myself every time I think about that helicopter ride." Paul Jones, interview with the author, April 23, 2009.
3. Thorpe McKenzie, interview with the author, August 15, 2008.
4. Dwight Anderson, interviews with the author, August 26, 2008, and October 2, 2008.
5. Arturo Porzecanski, an economist at Kidder Peabody in 1993, remembers trying to persuade his bank's clients of the merits of buying Peru's debt. Only hedge funds were prepared to set aside Peru's record of default and act on Porzecanski's argument. Arturo Porzecanski, interview with the author, June 24, 2008.
6. Between the late 1990s and the mid-2000s, the benefits of these cross-border capital flows were underestimated by economists, whose empirical tests found little relationship between the openness of a country's capital market and its growth rate. But in an article published in 2007, Peter Henry of Stanford punched a hole in this pessimistic consensus. By searching the data for a relationship between capital-account openness and the growth rate, economists had been setting the wrong test, Henry argued. The act of letting in foreign capital should be expected to create a one-off lowering of the cost of borrowing, and hence a few years in which dozens of new ventures could be financed; but once an economy had milked this advantage, it was likely to return to its original growth rate. Opening up to foreign capital, in other words, should be expected to create a permanent increase in the level of family incomes, since even if the economy returned to its original growth rate it would be growing from a higher base; but it should not be expected to lead to permanent acceleration in

growth. Sure enough, when Henry looked for temporary growth effects, he found that they were powerful: In the three years after the stock market in a typical emerging economy opened up to foreign capital, the average annual growth of real wages in the manufacturing sector increased by a factor of seven. Henry checked his results against a control group of economies that had not opened up their stock markets. These experienced no such wage acceleration. See the introduction to Peter Blair Henry, "Capital Account Liberalization: Theory, Evidence and Speculation," *Journal of Economic Literature* 45 (December 2007), pp. 887–935. For the sevenfold increase in manufacturing wages, see Peter Blair Henry and Diego Sasson, "Capital Account Liberalization, Real Wages and Productivity" (working paper, March 2008). Also relevant is Ross Levine, Norman Loayza, and Thorsten Beck, "Financial Intermediation and Growth: Causality and Causes," *Journal of Monetary Economics* 46, no. 1 (2000). This paper finds that a doubling in the size of private credit in an average developing country is associated with a 2 percentage point rise in annual economic growth, meaning that after thirty-five years the economy would be twice as large as it would have been without ample opportunities to borrow.

7. I am grateful to Gary Gladstein, the former chief administrative officer and managing director of Soros Fund Management, for these data.
8. Arminio Fraga, interview with the author, June 6, 2008.
9. Ibid.
10. Ibid.
11. The paper was by Graciela Kaminsky of the Federal Reserve and Carmen Reinhart of the International Monetary Fund. It was later published in the *American Economic Review.*
12. Fraga interview.
13. A participant at the meeting recalls, "It was really kind of a bombshell statement to make. Talk about being pathetically ignorant when you say that to the three guys from Soros."
14. Rodney Jones, interview with the author, June 18, 2008. Sources differ as to whether the Soros team established the initial position in late January or early February, but Jones, who kept real-time notes of the crisis and was focused exclusively on the region, is confident that the sales occurred in the last ten days of January.
15. According to data subsequently released by the Bank of Thailand, the full measure of reserves, which includes forward-market operations, registered a fall of $4.4 billion in February. No forward data are reported for the change in January, but the $2 billion sale by Soros Fund Management appears to have driven a substantial proportion of the decline in Thai reserves in this period.
16. Druckenmiller recalls, "When I shorted it, it cost nothing. Like the British pound the first time, like half a percent." Stan Druckenmiller, interview with the author, June 4, 2008.
17. On February 12, Rodney Jones, the Hong Kong–based Soros economist, wrote a memo to Druckenmiller and Soros, laying out Thailand's acute vulnerability. The Thai central bank held only $36 billion in reserves. Moreover, the private sector owed $85 billion to foreigners who would want their money out in a panic. This implied that a determined attack on the baht by Druckenmiller would have quickly forced devaluation.
18. It is also the case that Soros was not paying sufficient attention to Thailand to repeat the trick of 1992, when he had urged Druckenmiller to "go for the jugular." Robert Johnson, the economist who had advised Soros and Druckenmiller on the sterling trade, ran into Soros at Davos at the end of January 1997. Soros appeared unsure whether the Thai trade was worth bothering with. Robert Johnson, interview with the author, July 29, 2008.
19. Rodney Jones interview, June 18, 2008.
20. "By selling the Thai baht short in January 1997, the Quantum Funds managed by my investment company sent a signal that it may be overvalued. Had the authorities responded, the adjustment would have occurred sooner and it would have been less painful. As it is, the authorities resisted and when the break came it was catastrophic." George Soros, *The Crisis of Global Capitalism* (New York: PublicAffairs, 1998), pp. 142–43.
21. The extent of contact between Druckenmiller and Paul Jones is confirmed by people who worked at both funds. The size of Tiger's position is recalled by Dan Morehead, who executed Tiger's macro trades during this period. On the other hand, Rob Citrone, who was Tiger's macro analyst, thinks

the position was considerably larger—as big as $5 billion. Because of the way that Tiger worked, however, a trader is more likely to have known the real position than an analyst. Rob Citrone interview, September 30, 2009. Morehead interview, September 2, 2008.

22. Rodney Jones, who tracked the reserves closely, put the leakage on May 14 at $6.5 billion. On the other hand, Paul Blustein, another careful observer, puts it at $10 billion. According to Thai central bank data, total loss of reserves in all of May came to $18.3 billion. See Paul Blustein, *The Chastening: Inside the Crisis that Rocked the Global Financial System and Humbled the IMF* (New York: PublicAffairs, 2001), p. 71.
23. Rodney Jones recalls, "Soros did not go even bigger because of fear of crazy reaction. One did not know how that would play out. This was why the baht short could not be sized as aggressively as the sterling short in 1992. You were dealing with a developing country, and it was much harder to understand the reaction function." (Rodney Jones, interview with the author, July 21, 2008.) In addition, David Kowitz recalls that he was worried in February about possible government countermeasures. "They were shooting bullets at us, making the thing strengthen, so we looked like we were losing a lot of money. It was a bit stressful, and I probably would've folded, but Stan Druckenmiller, he doubled down. It was a famous call." (David Kowitz, interview with the author, August 26, 2008.)
24. Morehead calculated this amount for a memo he wrote to his Tiger colleagues on June 3, 2007. Dan Morehead, interview with the author, September 2, 2008.
25. Barry Porter, "BOT Out to Make Soros Pay for Attack; BOT and Soros Do Battle," *South China Morning Post*, June 24, 1997, p. 1.
26. Rodney Jones's calculations were not far off. Data released later by the Bank of Thailand show that reserves fell by $18.3 billion in May, slightly less than the $21 billion that Jones estimated. As a share of total reserves, the fall in May was even larger than Jones thought, since total reserves at the end of the month, net of forward sales, came to only $5.3 billion.
27. Morehead interview. Morehead was Robertson's currency trader. His account fits with the memory of another currency trader at a different hedge fund who was deeply involved in Thailand. On the other hand, Rob Citrone, Tiger's macro analyst, says he does not recall the episode; but Robertson did not always inform analysts of his actions. In any event, Tiger documents record that the fund was up an impressive 13.1 percent in July 1997, the month of the Thai devaluation. In a letter to investors at the end of the quarter, Robertson reported that the 29.3 percent gain in July to September mainly reflected two factors: profits in equities and in Asian currency trading. Julian H. Robertson, letter to the limited partners, October 7, 1997.
28. According to data on central-bank reserves kept by Rodney Jones, the $1 billion of selling by Tiger would have accounted for two thirds of the decline in the reserves on the last day before the peg broke, implying that Tiger played a role akin to Quantum's in sterling's 1992 devaluation. Rodney Jones, interview with the author, February 9, 2009.
29. The Soros team sold $500 million of its baht position in June 1997, some $2.5 billion in August and September, and another $500 million toward the end of the year. The positions had been created around January 20–24 ($2 billion) and around May 14–15 ($1.5 billion). Using average exchange rates for the six-month forward market, Paul Swartz of the Council on Foreign Relations calculates that Soros's total earnings from the baht trade would have come to about $750 million. The estimate of Tiger's profit comes from Dan Morehead, though again, Rob Citrone has a different memory: He believes the profits exceeded $1 billion. Morehead interview; Rob Citrone, interview with the author, September 30, 2009.
30. David Kowitz recalls, "I don't think he liked to be the bad guy. He wants to be remembered as a great statesman. Being blamed for the destruction of pathetic third-world countries wasn't helpful for that." Kowitz interview.
31. Speaking in Hong Kong on September 21, Soros revealed that Quantum was long the rupiah, explaining that markets had overshot in the case of the Indonesian currency and that the Indonesian government's consistent approach to reform gave him confidence. See Thomas Wagner, "Rubin Sees Promise in Southeast Asia, But Markets Fall Again," *Associated Press*, September 22, 1997; AFX News, "Soros Says Mahathir 'Menace' to His Own Country," September 22, 1997.
32. Kowitz interview.

33. Reflecting on the rupiah trade, Arminio Fraga recalls: "We often heard 'These big speculators can go into these small markets and manipulate them for their profit,' but we never saw it that way. For us it was always extremely dangerous. If you had made the wrong fundamental call and you went into something and you were caught wrong, usually you paid dearly to get out." Arminio Fraga, interview with the author, June 6, 2008.
34. Because Druckenmiller and Fraga had earned between $200 million and $300 million on smaller Asian currency trades during 1997, their Asian calls made money even though Thailand and Indonesia roughly canceled each other out. Among the smaller Asian trades, the most important was a short position on the Malaysian ringgit. Druckenmiller recalls that the short position was worth $1.5 billion but that he took profits early, when the ringgit started to fall, limiting the profit from the trade but also rendering false the inflated Malaysian rhetoric about the Soros funds' hostility. Druckenmiller interview.
35. Rodney Jones, memo to Stanley Druckenmiller, Arminio Fraga, and David Kowitz, November 17, 1997.
36. Blustein, *The Chastening*, p. 4.
37. Rodney Jones recalls, "Arminio [Fraga] called Stan Fisher [the number two at the IMF] after I had been there in Korea in November. Stan said the IMF staff had been there and they don't think this is a problem." Rodney Jones interview, July 21, 2008. On the other hand, Edwin Truman of the Federal Reserve recalls being in Seoul with Stan Fisher shortly after Jones's visit. By this time, Fisher knew that South Korea was in trouble, making it less likely that his influence accounts for the Quantum team's reluctance to short South Korea. Edwin Truman, correspondence with the author, December 22, 2009.
38. Robert Johnson recalls, "George's purpose for years was production, and it moved to distribution. He was intuitively a speculator, but his heart was all tied up in his philanthropy." Likewise, Rodney Jones recalls, "Mahathir had done psychological damage. Soros no longer wanted to be the bad speculator." Robert Johnson, interview with the author, July 29, 2008. Rodney Jones, interview with the author, July 21, 2008.
39. Robert Johnson recalls, "George was accused of being the Trojan horse. People said his philanthropy in eastern Europe was really a Trojan horse for pecuniary gain. He was very sensitive about that. If the president invited him to Korea and then he bounced Korea, it would create a scar that might be permanent. He never went to Malaysia until well after the argument with Mahathir. Once he showed up somewhere in an official capacity, he started blanking out that part of the grid for those who were taking positions." Robert Johnson, interview with the author, July 29, 2008.
40. Kevin Sullivan, "Soros Buoys Korean Stocks; Market Climbs After Financier Calls Crisis Fixable," *Washington Post*, January 6, 1998, p. D1.
41. Between January 5 and January 15, the KOSPI index rose from 396 to 506.
42. Sullivan, "Soros Buoys Korean Stocks."
43. Michael T. Kaufman, *Soros: The Life and Times of a Messianic Billionaire*. New York: (Knopf, 2002), p. 230.
44. Commenting on the financial logic of Soros's Svyazinvest stake, Gary Gladstein, managing director of Soros Fund Management at the time, says, "That was a terrible investment. We didn't do much due diligence on it. George decided he wanted to take a position, because George operates from his gut and he felt good about it at the time." Gary Gladstein, interview with the author, March 18, 2008.
45. Looking back on the secret loan to Russia, Soros calls it "a somewhat questionable maneuver." George Soros, interview with the author, June 10, 2008.
46. George Soros, *Soros on Soros: Staying Ahead of the Curve* (New York: John Wiley & Sons, 1995), p. 143.
47. Soros recalls, "I got involved because I was, in effect, betting the government was making the transition from robber capitalism to legitimate capitalism. . . . I was combining two considerations—a political one, which was to help to transform the economy into legitimate capitalism, and a financial one, which was to make a profit. Obviously, they didn't combine well." (George Soros, interview with *New York Review of Books*, January 14, 1999.) Equally, Robert Johnson comments, "He felt

that if he was a beacon of investment in Russia, others would follow and the capital inflows would transform the society and integrate them into the G7. There's a philanthropic side of George that started to interfere with the speculative one." (Johnson interview.)

48. On July 7, 1998, Julian Robertson wrote to his investors, "With yields at 102 percent, we are being well paid to take the risks of owning sovereign Russian debt."
49. Anderson interviews.
50. Soros's actions starting August 7 are described in his diary and reprinted in Soros, *The Crisis of Global Capitalism*, pp. 156–67.
51. Soros recalls, "I called Larry Summers and said, 'If they devalue and you give them a bridge loan, they could really put their house in order.' And Larry said, 'You are the only one advocating us getting in; everybody else tells us to pull the plug and get out.' That's when I wrote an article in the *FT* advocating my plan publicly. And then I was blamed for provoking the collapse." George Soros, interview with the author, June 10, 2008.
52. Gladstein marvels, "George went around saying that Russia was going to collapse. Meanwhile, we have this huge position in Russia that we can't sell. We had Russian equities, bonds; we had Russian exposures all over." Gladstein interview.
53. The main victim of Soros's Russia escapade was Stan Druckenmiller, who recalls: "Even though it was his trade, it became my position. You know, he always put his philanthropy and his statesmanship ahead of his money management. So 1998 was the first year when Soros Fund Management had a huge separation with Duquesne [Druckenmiller's old hedge fund, which he still managed]. Duquesne was in the fifties and Quantum was only up twelve. That's how devastating it was." Druckenmiller interview.
54. Soros, *The Crisis of Global Capitalism*, p. 168.

CHAPTER TEN: THE ENEMY IS US

1. By way of comparison, Morgan Stanley, a far larger institution, had earned just $1.0 billion in 1996. Eric Rosenfeld, presentation at Harvard Business School, April 22, 2009. Rosenfeld was a senior founding partner at LTCM.
2. James Rickards, interview with the author, February 12, 2009; James Rickards, e-mail communication with the author, March 30, 2009. Rickards was LTCM's chief counsel.
3. Donald MacKenzie, *An Engine, Not a Camera: How Financial Models Shape Markets* (Cambridge, MA: The MIT Press, 2006) pp. 215–16.
4. Other Wall Street houses hired quants around this time. For example, Fischer Black, the third inventor of the options-pricing formula, moved to Goldman Sachs in 1984. But Black and most other quants were kept off the trading floor. The difference at Salomon was that Meriwether brought Rosenfeld and the others into the heart of the action.
5. Roger Lowenstein writes of Coats, "Tall, likable, handsome, bound to get along with clients. Sure, he had been a goof-off in college, but he had played forward on the basketball team, and he had trading in his heart." (Roger Lowenstein, *When Genius Failed: The Rise and Fall of Long-Term Capital Management*, New York: Random House, 2000, p. 11.) For the juxtaposition of Coats and the Arbitrage Group, I am indebted to Michael Lewis, "How the Eggheads Cracked," *New York Times*, January 24, 1999.
6. Lowenstein, *When Genius Failed*, pp. 20, 21n.
7. The phrase was coined by an LTCM employee. See Kevin Muehring, "John Meriwether by the numbers," *Institutional Investor*, November 1, 1996.
8. Like many hedge funds, Long-Term did not like to acknowledge that it was a hedge fund. "We had moved on from thinking of ourselves as a mere 'hedge fund' and had started to think of ourselves as a new kind of 'financial technology company.'" (Rickards e-mail.) Lowenstein also reports that Merton saw Long-Term Capital not as a "hedge fund," a term that he and the other partners sneered at, but as a state-of-the-art financial intermediary that provided capital to markets just as banks did. (Lowenstein, *When Genius Failed*, p. 30.)

9. What follows on Italy is drawn partly from "Portfolio Outline," an internal LTCM document that describes many of the firm's positions at the time of liquidation, and partly from discussion with Eric Rosenfeld and an e-mail exchange with James Rickards, the former LTCM general counsel, and other sources.
10. The foreign investor could get around the Italian tax obstacle by borrowing money from a local bank and using it to buy government bonds; the bank would hold on to the bonds as collateral. For the purposes of Italian tax law, the bank was deemed to be the owner of the bonds, so the tax problem was solved and the foreigner was left to collect high interest payments from the Italian government. Admittedly, the foreigner's receipts from these bonds were set with a fixed interest rate, whereas its payments on its offsetting lira loan floated: If the floating rate rose, the trade would become a loser. But this mismatch was solved by converting the floating payment into a fixed one via the international swaps market. The final messiness was the risk that the Italian government might default, but there were opportunities to hedge that in the fledgling market for credit default swaps.
11. Lowenstein, *When Genius Failed*, p. 77.
12. The Italian government issued floating-rate bonds with a seven-year maturity, called Certificati di Credito del Tesoro (CCTs). These CCTs were off-limits to retail investors, who instead bought short-term Italian treasury bills called Buoni Ordinari del Tesoro (BOT). LTCM bought CCTs and shorted BOTs, betting on their convergence. See LTCM, "Portfolio Outline."
13. Ibid.
14. Andre Perold, "Long-Term Capital Management, L.P. (A)" (Harvard Business School case study 9-200-007, November 5, 1999).
15. Lowenstein, *When Genius Failed*, p. 90.
16. Ibid., p. 84.
17. What follows on risk management is drawn partly from Eric Rosenfeld's draft article for the *Encyclopedia of Quantitative Finance*, ed. Rama Cont (Hoboken, NJ: John Wiley & Sons, 2010).
18. To work out the worst loss on ninety-nine out of a hundred days, LTCM would take the standard deviation of a position, meaning the amount of variation from the mean that occurred in 68 percent of cases, and multiply by 2.58 to get the variation from the mean that occurred in 99 percent of cases. Thus, a position with a standard deviation of six basis points would not fall by more than about fifteen basis points in 99 percent of cases, or on ninety-nine days out of a hundred.
19. Rosenfeld, Harvard Business School presentation. See also Perold, "Long-Term Capital Management."
20. For example, at the time of the Bank of China party, LTCM's leverage was about nineteen to one—extraordinarily high relative to most other hedge funds. But, according to the firm's calculations, LTCM's value at risk was $720 million, and its $6.7 billion in capital was more than enough to absorb that. See Perold, "Long-Term Capital Management."
21. Many hedge funds borrowed cheaply by financing positions in the repo market with overnight money. Long-Term was willing to pay more in order to lock the money up for six to twelve months. It also arranged a three-year loan and a standby credit. Rosenfeld presentation; Perold, "Long-Term Capital Management."
22. Having done its best to lock up capital in these ways, LTCM calculated the residual liquidity risk, gaming out scenarios in which its brokers changed the terms of their lending. For example, rather than lending LTCM 100 percent of the money it needed to buy Italian government bonds, the brokers might demand that Long-Term put up "margin," or capital, equivalent to 5 percent of the value of its positions. To withstand that sort of shock, LTCM made sure to hold emergency reserves of capital. Thus, in September 1997 the firm was using less than $1.7 billion in working capital to meet margin requirements imposed by its brokers, while its total working capital came to $7.6 billion.
23. Rosenfeld observed, "Everyone else started catching up to us. We'd go to put on a trade, but when we started to nibble, the opportunity would vanish." Lewis, "How the Eggheads Cracked."
24. It is not in fact clear that LTCM's Royal Dutch/Shell trade really was a case of overreach. It is true that arbitrage in stocks was different from arbitrage in fixed income. Whereas convergence in bond prices must happen by the time the bonds mature, there is no such forcing event in stocks: The gap

between Royal Dutch Petroleum and Shell Transport had existed for years and might exist forever. It is also true that LTCM staked a huge $2.3 billion on its position, a size that even aggressive trading desks viewed as outlandish. For example, the Goldman Sachs proprietary trading desk bet one tenth as much as LTCM on the Royal Dutch/Shell convergence. But LTCM felt able to make such a large bet because it could finance it more cheaply than its rivals. This allowed it to hold the trade with a view to capturing the "carry" resulting from the gap in dividend yield, rather than holding it in the hope that the two stocks would converge. Its rationale for putting on the trade was different from that of other trading desks, which is why it did it on a larger scale. Even with the benefit of hindsight, and even while acknowledging errors in LTCM's risk management, Eric Rosenfeld views the Royal Dutch/Shell trade as sound. (Eric Rosenfeld, interview with the author, April 16, 2009.) For a critical view of LTCM's position, see Lowenstein, *When Genius Failed*, p. 100.

25. Lowenstein, *When Genius Failed*, p. 126.
26. Rosenfeld interview. Relatedly, Rosenfeld explains that Long-Term's partners debated the question of whether they should reduce the size of their trades in light of the fact that profit opportunities were smaller than in 1994–96. They concluded that this was not their job: Investors expected them to incur risk of a specified and constant size, not to exercise discretion in taking risk on and off. If investors had wanted to reduce risk, they could have withdrawn funds from LTCM.
27. Rosenfeld, Harvard Business School presentation.
28. Rosenfeld interview.
29. LTCM made money on swap spreads in 1997 by going long Treasuries and betting on the spread broadening. In 1998 it was short Treasuries and betting on the spread narrowing. See Perold, "Long-Term Capital Management."
30. Rosenfeld, Harvard Business School presentation.
31. Rosenfeld interview. Similarly, Rickards recalls, "I was on vacation in North Carolina with my family and it was a Friday. Then I got a call from Jim McEntee, and he said, 'Jim, there's a partners' meeting on Sunday. I think you ought to be here.' So we got in the car and drove home. This was a group that liked to play golf. There was nothing normal about a Sunday meeting. And then we just worked for seven weeks almost nonstop after that." Rickards interview.
32. Gary Gladstein, managing director of Soros Fund Management, recalls, "Meriwether came in offering us a very attractive deal with reduced fees and certain percentage of the firm." (Gary Gladstein, interview with the author, March 18, 2008.) Druckenmiller recalls, "We were out of our own pond, and we really didn't know what we were doing, so we didn't do it." (Stanley Druckenmiller, interview with the author, June 4, 2008.)
33. Lowenstein, *When Genius Failed*, p. 153.
34. Rickards recalls, "What you realize [when you suddenly need to raise capital] is that everybody will see you. They might not have any intention of investing with you, but to them it's information. You're the desperate ones, so you're like, 'What do you want to know?' We had had high-quality operational security for four years, and all of the sudden we're pouring our hearts out." Rickards interview.
35. Gary Gladstein, managing director of Soros Fund Management, recalls of this period, "The major bank we dealt with was Kleinwort Benson. Kleinwort had been acquired by Dresdner. The CEO of Dresdner made this comment in Europe that he didn't have any exposure to hedge funds. Then he finds out that he has major exposure to hedge funds because Kleinwort Benson is doing most of the financing for us. So immediately he said that Kleinwort had to close down the account." Gladstein interview.
36. Rosenfeld interview.
37. The imitators were legion. One upstart named Convergence Asset Management launched in January 1998 and raised $700 million in a single month from investors who had been shut out of LTCM, and by the summer of that year, LTCM-style funds were said to account for a quarter of all swaps trading in London. The hedge-fund manager (and future TV celebrity) James Cramer recalled, "I can't believe how many times I was told to do a trade because the boys at Long-Term deemed it a winner." MacKenzie, *An Engine, Not a Camera*, p. 228.
38. The quote comes from Richard Leahy, a Long-Term partner. See Lewis, "How the Eggheads Cracked."

39. Rosenfeld, Harvard Business School presentation.
40. Lowenstein, *When Genius Failed*, pp. 156–57.
41. Rickards recalls, "The whole world knew. So now you could start to trade against us, whereas before if you were on the other side of a trade from LTCM, you might not like it. Now, it's like, 'Okay, these guys are going to die. Figure out what they have and trade against it.'" Rickards interview.
42. MacKenzie, *An Engine, Not a Camera*, p. 234.
43. Meriwether observed: "I like the way Victor [Haghani] put it: The hurricane is not more or less likely to hit because more hurricane insurance has been written. In the financial markets this is not true. The more people write financial insurance, the more likely it is that a disaster will happen, because the people who know you have sold the insurance can make it happen. So you have to monitor what other people are doing." See Lewis, "How the Eggheads Cracked."
44. "When we engaged Goldman, a couple of things happened. I'm the lawyer, so I said, 'I need you guys to sign a nondisclosure agreement.' They're like, 'No way. You're desperate; we'll help you, but we're not signing anything.' Typical Goldman. So I say okay. I didn't have a lot of leverage. So they came in and they literally, in front of our eyes, downloaded our positions and took them back to their headquarters." Rickards interview, February 12, 2009.
45. The quotations from the Goldman trader in London and from Corzine are taken from Lowenstein, *When Genius Failed*, pp. 174–75.
46. Peter Fisher, interview with the author, March 6, 2009.
47. Fisher recalls thinking, "It's not going to be like Drexel Burnham. We're not going to be at the command center trying to decide what we're going to do with the collateral, and we can kind of work it out because we've actually got the assets. This is a hedge fund and there are no assets here. So in the event of default, all that risk is now transferred to these seventeen brokers, who are going to be duty-bound to liquidate. Their lawyers are going to tell their trading desks, 'We gotta close this out as fast as you can because we have a duty—we can't just sit on these positions.'" Fisher interview. See also Lowenstein, *When Genius Failed*, pp. 188–89.
48. The stock prices of banks such as Merrill Lynch and J.P. Morgan had fallen by almost half over the summer.
49. In later congressional testimony, both William McDonough, the head of the New York Fed, and Greenspan emphasized that the Fed's willingness to broker a rescue of LTCM was heightened by the already febrile state of the markets. In light of the later collapse of the hedge fund Amaranth, this is important. Amaranth looked in 2006 like proof that hedge funds could blow up without destabilizing the financial system. But the world could absorb shocks in 2006 in a way that it could not in 1998—or, for that matter, in 2008. This is why it is impossible to say categorically whether hedge funds, or even some subset of hedge funds, do or do not pose systemic risk. The answer depends on market conditions, as argued in the conclusion.
50. Fisher recalls, "All the talking heads are saying that it's because the video of Bill Clinton's Monica Lewinsky deposition is going to be aired at nine o'clock New York time. I remember very clearly as the week progressed that Dave Komansky [Merrill Lynch's boss] and I just thought that was the funniest thing ever." Fisher interview.
51. Rosenfeld, Harvard Business School presentation.
52. By Wednesday Bill McDonough had returned from London and was chairing the meetings, but Fisher was participating as a backbencher. Fisher interview.
53. Rickards interview.
54. Alan Greenspan, "Private-sector refinancing of the large hedge fund, Long-Term Capital Management." Statement before the Committee on Banking and Financial Services, U.S. House of Representatives, 105th Congress, Session 2, October 1, 1998.
55. "In August 2007, the risk-management structure cracked. All the sophisticated mathematics and computer wizardry essentially rested on one central premise: that the enlightened self-interest of owners and managers of financial institutions would lead them to maintain a sufficient buffer against insolvency by actively managing their firms' capital and risk positions. For generations, that premise appeared incontestable [sic] but, in the summer of 2007, it failed." Alan Greenspan, "We Need a Better Cushion Against Risk," *Financial Times*, March 27, 2009, p. 9.

56. Alan Greenspan, "Private-sector refinancing of the large hedge fund, Long-Term Capital Management." Statement before the Committee on Banking and Financial Services, U.S. House of Representatives, 105th Congress, Session 2, October 1, 1998.
57. Reflecting on the evolution of his thinking, Peter Fisher comments, "I was reluctant to say then, 'Therefore we should regulate leverage.' I guess I got myself halfway there. I was saying, 'The problem was leverage, but how do we regulate that?' Ten years on the problem is leverage and we just got to regulate it; we got to find a way. So that's the policy change for me in ten years." (Fisher interview.) Equally, Vincent Reinhart, a senior Fed economist at the time of the LTCM failure, reflects, "Extraordinarily, 1998 was followed not by a reining in of leverage but by an acceleration. The opposite of the logical lesson was drawn." (Vincent Reinhart, interview with the author, September 11, 2008.)

CHAPTER ELEVEN: THE DOT-COM DOUBLE

1. See Tom Wolfe, *The Right Stuff* (New York: Picador, 1979), p. 9.
2. Julian H. Robertson, letter to the limited partners, October 2, 1998. Emphasis in the original.
3. The account of the yen loss is based mainly on an interview with Dan Morehead, Tiger's currency trader. (Dan Morehead, interview with the author, September 2, 2008.) Robertson himself wrote that "the dollar/yen trading market, which is typically quoted in $100 million increments with a 5 basis point bid/offer spread, collapsed in the early part of October to a $50 million increment and 50 basis point spread. Given this thinness, volatility reached unprecedented levels with the price moving 17 percent in one 48-hour period." (Julian H. Robertson, letter to the limited partners, November 4, 1998.)
4. Tiger's "Quarterly Review," circulated to investors in July 1999, reports that total leverage for Tiger Management stood at just over 500 percent as of January 1, 1999. This ratio factored in the use of futures and took account of both equity and macro positions.
5. Robertson letter, November 4, 1998.
6. Discussing the vast size of Tiger's yen short, a former Tiger analyst explains, "You had to be willing to fight with Julian to make things bigger or smaller. Because when Julian fell in love with an idea, at times he would just keep taking it up. There were no risk limits, size limits, position limits, whatever else. So you had to have the personal fortitude to go through a very unpleasant process, to have him be pissed at you, to fight him not to be bigger. And as the population of Tiger changed at that time period, fewer people were willing to fight him, confront him. . . . Julian would be like, 'I like this idea. Let's be bigger.' And the analyst was like, 'Yes, yes, yes.' So they just let Julian get bigger and bigger without letting him know that he was becoming the market."
7. Michael Derchin, Tiger's airline analyst, says Robertson "saw Soros make a lot of money on the macro side, and I think he got attracted to it. And so he made some very big macro bets that blew up on him." Michael Derchin, interview with the author, March 18, 2008.
8. For an excellent scholarly treatment of this dilemma, see Markus K. Brunnermeier and Stefan Nagel, "Hedge Funds and the Technology Bubble," *Journal of Finance* 59, no. 5 (October 2004).
9. John Cassidy, *Dot.con: The Greatest Story Ever Sold* (New York: HarperCollins, 2002), pp. 3–8.
10. Julian H. Robertson, letter to the limited partners, August 7, 1998.
11. Tiger's share of US Airways fluctuated around the 20 percent level. In June 1998 it was just about exactly 20 percent, judging from SEC filings. On March 5, 1999, Bloomberg reported that Tiger owned about 19 percent of US Airways. At the end of 1999, Tiger owned about 22 percent of the airline, according to Tiger's SEC 13F filing for the last quarter of 1999.
12. Derchin interview. Derchin was Tiger's airlines analyst.
13. Julian H. Robertson, letter to the limited partners, April 7, 1999.
14. "Most important in impacting our negative performance has been that Tiger has bought and sold some thirty-one billion dollars worth of securities over the last ten months. These sales of longs and purchases of shorts have been done primarily to reduce leverage in line with our smaller size. The cost of liquidating these positions has been high. . . . Tiger's success has been as a long-term investor. Quarterly withdrawals are incompatible with long-term investment." Julian H. Robertson, letter to the limited partners, August 6, 1999.

15. Richard A. Oppel Jr., "A Tiger Fights to Reclaim His Old Roar," *New York Times*, December 19, 1999.
16. Other prominent hedge-fund managers observing Tiger's plight explicitly drew the lesson that secrecy was essential to stability. For example, Louis Bacon of Moore Capital delivered a speech in London in April 2000 drawing this lesson. See Alexander Ineichen, "The Myth of Hedge Funds," *Journal of Global Financial Markets* 2, no. 4 (Winter 2001), pp. 34–46.
17. Stanley Druckenmiller, interview with the author, June 4, 2008.
18. Druckenmiller recalls, "I had never had a big drawdown from the day I arrived at Quantum until then. Even in '94, when everyone got smoked, I was up 4 percent. I had never known any period of tension. . . . Anyway, in 1999 I find myself down 18 percent in the month of May, and oh, by the way, the market is sharply up. You're talking about a very proud guy who has never had a down year, essentially, and I'm getting killed. Obviously this is in the newspaper." Stanley Druckenmiller, interview with the author, March 13, 2008.
19. Robertson's refusal to buy into the bubble was not quite absolute. In March 1999 he created a $200 million subportfolio to invest in technology, and by late 1999 Robertson claimed that the subportfolio was up 62 percent. But a $200 million subfund was too small to affect Tiger's prospects. According to Tiger's reports to investors, total exposure to the technology and communications sector (longs minus shorts) equaled 7 percent of Tiger's capital as of September 30, 1999. By contrast, exposure to the transportation sector came to 9 percent of capital. See also Oppel, "A Tiger Fights."
20. Jane Martinson, "Cyber Stars Corraled at the Ranch," *Guardian*, July 10, 1999, p. 27. Warren Buffett's Berkshire Hathaway fell 23 percent in 1999 against a 20 percent return for the S&P 500 (including dividends), marking Berkshire's first annual decline since 1990.
21. Gary Gladstein, the veteran managing director of Soros Fund Management, recalls Druckenmiller's visit to Sun Valley as a turning point. Equally, Carson Levit recalls, "Stan went out and got religion in Sun Valley on the new economy thing." Carson Levit, interview with the author, June 17, 2008.
22. Druckenmiller interview, March 13, 2008.
23. Levit interview. Robertson confirms that Tiger's sale of South Korea Telecom helped to drive the price down in the summer. See Julian H. Robertson, letter to limited partners, September 10, 1999.
24. David Einhorn. *Fooling Some of the People All of the Time: A Long Short Story* (Hoboken, NJ: John Wiley & Sons, 2008), pp. 33–34.
25. Cassidy, *Dot.con*, pp. 95–96.
26. Michael Lewis, *The New New Thing: A Silicon Valley Story* (New York: W. W. Norton, 1999), p. 165.
27. Einhorn, *Fooling Some of the People All of the Time: A Long Short Story*, p. 37. It should be noted that Einhorn's other short positions generated a large profit in 1999, a rare case of a hedge fund successfully bucking the bubble.
28. The Fed's monetary looseness featured in Druckenmiller's thinking. Druckenmiller interview.
29. An academic study of hedge funds in this period confirmed that their portfolios were heavy with tech stocks, especially in the third quarter of 1999. Technology stocks went from 16 percent of their equity portfolios to 29 percent in just three months, even though the tech sector accounted for just 17 percent of all U.S. stocks at the end of September. See Brunnermeier and Nagel, "Hedge Funds and the Technology Bubble."
30. John Griffin, interview with the author, November 29, 2007.
31. Oppel, "A Tiger Fights."
32. Julian H. Robertson, letter to the limited partners, December 8, 1999.
33. Julian H. Robertson, letter to the limited partners, January 7, 2000.
34. Julian H. Robertson, letter to the limited partners, March 30, 2000.
35. Druckenmiller interview. The role of Celera Genomics as a trigger is suggested in a detailed reconstruction of Quantum's last weeks, which quotes Druckenmiller as saying to a trader, "This is insane. I've never owned a stock that goes from $40 to $250 in a few months." See Gregory Zuckerman, "Hedged Out: How the Soros Funds Lost Game of Chicken Against Tech Stocks," *Wall Street Journal*, May 22, 2000.

36. Druckenmiller interview.
37. Ibid.
38. Zuckerman, "How the Soros Funds Lost."
39. Druckenmiller interview.
40. Thinking back on Druckenmiller's mood, Soros says, "He was torn because he felt loyal; he was engaged. And on the other hand, he felt it was too much. He couldn't bring himself to actually follow through and leave, so because of the inattention he created a situation where he blew up and then he could leave. An expensive way . . . " George Soros, interview with the author, June 10, 2008.
41. Steven Drobny, *Inside the House of Money: Top Hedge Fund Traders on Profiting in the Global Markets,* (Hoboken, NJ: John Wiley & Sons, 2006), p. 28.

CHAPTER TWELVE: THE YALE MEN

1. Sean Driscoll, interview with the author, October 27, 2009. Driscoll is the manager of Glorious Food, the caterer.
2. Roger Lowenstein, *When Genius Failed: The Rise and Fall of Long-Term Capital Management* (New York: Random House, 2000), pp. 103–104. See also Chrystia Freeland, "I Love Competition . . . I Love Winning," *Financial Times,* October 10, 2009.
3. Marcia Vickers, "The Money Game," *Fortune,* October 3, 2005.
4. Day after day during one five-year period, Steyer wore the same vibrant plaid tie to the office, desisting only when an assistant seized it, stains and all, and mounted it in a display box as though it were a deal trophy. See Loch Adamson, "Steyer Power," *Alpha,* January 2005.
5. Robert Rubin says flatly of Steyer, "He doesn't care what he can buy." Steyer and his wife used some of their wealth to support a community bank, One California, which they founded in 2004. Robert Rubin, interview with the author, June 10, 2008. See also Francine Brevetti, "New Bank Welcomes Clients That Others Shun," *Inside Bay Area,* October 4, 2007.
6. The partner was Katie Hall, who had known Steyer at Morgan Stanley and at Stanford.
7. Steyer recalls, "I got no full night of sleep for six months after the crash. I would go to sleep and wake up and then lie there. After the crash, my wife and I would come in at like three and just walk around. No market was open. We'd just hang around the halls, waiting for the market to open. . . . I have a nice wife. I think she thought I might open the window." (Tom Steyer, interview with the author, July 25, 2008.) Steyer's colleague Katie Hall recalls, "Tom is a very, very, very, very focused guy, and if he can't sleep he goes into the office." (Katie Hall, interview with the author, August 28, 2008.) Likewise, Meridee Moore recalls, "Sometimes you'd be right there with Tom trying to talk to him and he would pick up the phone. I used to go into a conference room and call him on the phone sometimes because it would be easier to get his attention. He would always take the phone call. I think that's an arbitrage thing. What if the phone call is from somebody saying the deal's about to break?" (Meridee Moore, interview with the author, July 24, 2008.)
8. Meridee Moore emphasizes the similarity in approach between merger arbitrage and distressed-debt investments. In bankruptcy, distressed debt is often converted into equity, and the payoff from that conversion is akin to the payoff from the deal premium in a merger: In both cases there is an expected return in a fixed time frame. Moore interview.
9. Meridee Moore recalls distressed debt investing in the early 1990s: "There were really three buyers, and all the regulators were putting pressure on the banks to sell their debt. So we have this wonderful supply-demand imbalance." Moore interview.
10. Steyer recalls that the conventional wisdom after Drexel's bankruptcy was that "everything Drexel's ever done was fraudulent, nothing they own is worth anything, these companies are all a joke. Everybody knew that, but it just didn't happen to be true. So if you could bid—which is what we were doing too—against that underlying absolutely accepted lie, then you can make a phenomenal amount of money." Steyer interview.
11. Swensen explains why event-driven funds have a systematic edge in David Swensen, *Pioneering Portfolio Management: An Unconventional Approach to Institutional Investment* (New York: Free Press, 2009), p. 183.

12. Swensen, *Pioneering Portfolio Management*, p. 252. Reflecting on what motivated Steyer, Meridee Moore says, "You get to research different things every day. You get to work on whatever you want. You're predicting outcomes. And if you're right, there's nothing more rewarding. It's the ultimate challenge. That's what keeps people going; it's not the money." Moore interview.
13. Steyer also wanted Farallon employees to have their liquid savings in the firm because otherwise they would expend precious energy on managing their personal portfolios elsewhere, and Steyer could not abide such a distraction. Steyer interview.
14. When Swensen started negotiating seriously with Steyer, he demanded a further refinement on the standard performance fee—Yale preferred to pay a slightly higher than usual rate, but the fee would kick in only after Farallon's returns exceeded the risk-free yield on Treasuries. Steyer could see the purity of this model. But he warned Swensen, correctly, as it turned out, that Farallon would end up earning more from Yale under the Swensen formula. Steyer interview.
15. Steyer interview.
16. The Yale Endowment Web site reports that its first allocation to "absolute return" was in July 1990. Data for 1995 allocations come from Josh Lerner, "Yale University Investments Office: August 2006" (Harvard Business School case study 9-807-073, May 8, 2007).
17. Lerner, "Yale University Investments Office."
18. In 2000, event-driven funds accounted for $71 billion in assets, or 14 percent of the industry total, according to Hedge Fund Research. In 2005, they accounted for $213 billion, or 19 percent. In 2007 they accounted for 436 billion, or 23 percent.
19. For example, Mark Wehrly, Farallon's general counsel, reports that Farallon borrows about $25 for every $100 in equity. Mark Wehrly, interview with the author, July 25, 2008.
20. Robert Howard and Andre F. Perold, "Farallon Capital Management: Risk Arbitrage" (Harvard Business School case study 9-299-020, November 17, 1999). According to this HBS study, the Sharpe ratios for two Farallon funds between 1990 and 1997 were 1.38 and 1.75. The S&P 500 had a Sharpe ratio of 0.50.
21. Enrique Boilini, who led Farallon's investment in Alpargatas, recalls that Gabic, a similar textile company, did not attract the interest of a foreign hedge fund, with the result that its factories were liquidated and all its workers lost their jobs. In turning Alpargatas around, Farallon worked with Texas Pacific Group, another U.S. investor. Enrique Boilini, interview with the author, August 8, 2008.
22. Mark Landler, "Year of Living Dangerously for a Tycoon in Indonesia," *New York Times*, May 16, 1999.
23. Dorinda Elliott, "The Fall of Uncle Liem," *Newsweek*, June 15, 1998.
24. Shoeb Kagda, "Stanchart, M'sian Plantations Among Shortlisted to Buy BCA," *Business Times* (Singapore), November 29, 2001.
25. Andrew Spokes, interview with the author, July 25, 2008.
26. Meridee Moore recalls of Spokes, "He sat in our office in San Francisco for eight months. The women here were just falling all over themselves. He was the most desirable bachelor in town." Moore interview.
27. CalPERS announced it would stay out of Indonesia in February 2002. Craig Karmin and Sarah McBride, "Calpers Pulls Out of 4 Countries, Dealing Blow to Southeast Asia," *Wall Street Journal*, February 22, 2002.
28. Spokes interview.
29. In a further pleasing detail, the government bonds paid a floating rate, so that BCA's owners would be hedged against changes in interest rates on bank deposits. Spokes interview.
30. Data are from Bank Indonesia's Web site, for years ending March 31, 2002, 2003, and 2004.
31. As Indonesia sought to reduce its debt burden with the Western donors of the Paris Club in April 2002, many, including U.S. executive director of the IMF Randal Quarles, cited the BCA deal as evidence that Indonesia was worthy of fresh IMF support. Andrew Spokes recalls: "We were really our own catalyst. It was event driven, and we were our own event, because that transaction pretty much turned around that entire market." Spokes interview.
32. Deborah Frazier, "Underground Water Plan Has a Friend in an Old Foe," *Rocky Mountain News*, October 4, 1996.

33. Gary Boyce, interview with the author, July 23, 2008.
34. Steyer interview.
35. Mark Wehrly recalls, "We were successful in basically polarizing every single constituency against us. So we got the politics wrong. I think we got the science right, but the world wasn't ready for it, and we were doing a horrible job persuading them that this was a good idea. So we retrenched." Wehrly interview.
36. "[Yale president Richard Levin] was misled, and I think that the school was misled by Farallon." Joe Light, "Ranch Deal Prompts Donation, Reevaluation," *Yale Herald*, February 1, 2002.
37. Andrea Johnson, who acted the role of the transparency fairy, recalls, "Obviously it was goofy, but you do these things for the photo op." Andrea Johnson, interview with the author, June 30, 2008.
38. Steve Bruce, Farallon's public-relations adviser, emphasizes the efforts to protect the salamanders. "They hired an environmental engineering firm to come in and do a study on salamanders: where they hatch their eggs, where they move them, how do they get to the beach, what sort of pesticides do you have to use, how do you keep the course in place without screwing up their breeding facilities. So by the time the critics brought it up, this was a red herring disguised as a salamander." Steve Bruce, interview with the author, June 25, 2008.
39. "Farallon Founder Hits Back at Critics," *Financial News* (Daily), March 28, 2004.
40. "I just remember David Swensen being really angry. It was very clear to me that he found our campaign extremely upsetting. It was personal to him, because he had received so many accolades even then, and it has only gotten more since then for his incredible management of the investment of the endowment. And I think more than that, there is a sense of pride in that endowment office that they are managing a nonprofit institution's money and that they have standards. I got the sense that he didn't feel like he invests in just whatever." Johnson interview.
41. Swensen's altercation with the students is recalled by Andrea Johnson and is captured in a news photograph and story. See Tom Sullivan, "Yale Defends Record Privacy," *Yale Daily News*, April 5, 2004; Johnson interview.
42. Meridee Moore recalls, "You have to get out there and figure out what the potato farmers are going to do. We weren't on the ground that much. That turned out to be much more important than we expected." (Moore interview.) Mark Wehrly, the Farallon general counsel, says, "Once in a while you end up with the wrong partner, and we did there, and it cost us." (Wehrly interview.)
43. Swensen himself argued that illiquid markets offered bargains. "Success matters, not liquidity. If private, illiquid investments succeed, liquidity follows as investors clamor for shares of the hot initial public offering. In public markets, as once-illiquid stocks produce strong results, liquidity increases as Wall Street recognizes progress. In contrast, if public, liquid investments fail, illiquidity follows as investor interest wanes. Portfolio managers should fear failure, not illiquidity." Swensen, *Pioneering Portfolio Management*, p. 89.

CHAPTER THIRTEEN: THE CODE BREAKERS

1. This figure is net of fees, which were considerable. Rather than charging clients a management fee of 1 percent or 2 percent and keeping 20 percent of the investment gains, Medallion charged a management fee of 5 percent. Sandor Straus, a mathematician who was a partner at Renaissance Technologies and its antecedents between 1980 and 1996, recalls that the 5 percent fee was chosen in 1988 because that was what was needed to cover technology expenses. In addition, the Medallion Fund charges a performance fee that has increased over the years from 20 percent to 44 percent. Sandor Straus, interview with the author, July 25, 2008.
2. Elwyn Berlekamp, interview with the author, July 24, 2008.
3. Sandor Straus regards Henry Laufer as the most important contributor to Medallion's success, notably because of the work he did starting in 1989. Laufer did his breakthrough work on short-term patterns between 1983 and 1985, according to Straus. Laufer then went back to academia for a while before reengaging with Medallion in 1989. Some public accounts erroneously state that Laufer's involvement began in the 1990s. Straus interview.
4. Robert Frey, a Renaissance alumnus, describes the firm's pattern recognition as neither mean reverting nor trend following. Rather, in response to a shock, the market moves around in multiple ways: "If I

think of an electrical circuit or any sort of physical system, if I put an input in, the initial output may be negatively correlated to the input, and then it may become positively correlated. It depends on how the thing resonates through the system." Robert Frey, interview with the author, July 28, 2008.

5. Straus interview.
6. Mark Silber, interview with the author, July 30, 2008. Silber is the chief financial officer of Renaissance Technologies.
7. Eric Wepsic, interview with the author, January 28, 2009. Wepsic is a member of D. E. Shaw's six-person Executive Committee.
8. Richard Bookstaber, *A Demon of Our Own Design: Markets, Hedge Funds, and the Perils of Financial Innovation* (Hoboken, NJ: John Wiley & Sons, 2007), p. 187.
9. Ibid., p. 189.
10. Trey Beck notes, "At Morgan Stanley, they had a whole bank of IBM mainframes. When we started we had one Sun workstation. We did not need NASA technology because we did not expect other people to be making the same trades." Trey Beck, interview with the author, August 31, 2009. Beck is a managing director at D. E. Shaw.
11. Michael Peltz, "Computational Finance with David Shaw," *Institutional Investor* 28, no. 3 (March 1994): pp. 92–94.
12. The economists' idealized models created different versions of this vulnerability in different parts of the world. Trey Beck of D. E. Shaw cites an example from emerging markets: Two apparently equivalent bonds issued by the same government might trade at different levels, tempting an arbitrage-minded economist to bet on convergence. But the difference might reflect a factor omitted from the economist's model: Perhaps the more expensive bond was substantially owned by a well-connected oligarch, with the result that its default risk was far lower because the government would not wish to alienate him. Beck interview.
13. Wepsic interview.
14. Trey Beck, interview with the author, September 2, 2009.
15. Wadhwani recalls, "Like a lot of ex-academic economists, I was very driven by value. And I guess the key thing I learned from observing great traders was actually that value is a great medium-term factor, but tactical trading is about many, many, many more things other than value. On average, be in the direction of value, but you want to pay attention to all these other things too." Sushil Wadhwani, interview with the author, July 28, 2009. See also Steven Drobny, *Inside the House of Money: Top Hedge Fund Traders on Profiting in the Global Markets*, (Hoboken, NJ: John Wiley & Sons, 2006), p. 174.
16. Wadhwani recalls, "Often it was the case that you were already using the input variables these guys were talking about, but you were perhaps using these input variables in a more naive way in your statistical model than the way they were actually using it." Wadhwani interview.
17. Mahmood Pradhan, who worked with Wadhwani at Tudor, elaborates: "There are times when particular variables explain certain asset prices, and there are times when other things determine the price. So you need to understand when your model is working and when it isn't. For example, sometimes current account deficits have a strong bearing on exchange rates. But other times people are quite willing to tolerate very large current account deficits because of some new preoccupation that is not in your model. Sovereign wealth funds may have emerged. Or the Asians have more capital. Or something else is going on that you may not be capturing." Mahmood Pradhan, interview with the author, April 29, 2008.
18. Mark Dalton, interview with the author, September 29, 2008. Dalton is the president of Tudor.
19. Eric Wepsic of D. E. Shaw confirms, "Our staff started on average a little younger, a little more right out of school, a lot of people who had just got their PhDs, or people like me who didn't even have a PhD." (Wepsic interview.) One of the few exceptions to the Renaissance rule of not hiring from Wall Street was Robert Frey, a mathematician who had been at Morgan Stanley.
20. Wadhwani interview.
21. See, for example, Peter F. Brown, Stephen A. Della Pietra, Vincent J. Della Pietra, and Robert L. Mercer, "The Mathematics of Statistical Machine Translation: Parameter Estimation," *Computational Linguistics* 19, no. 2 (1993). As noted below, the Della Pietra brothers followed Brown and Mercer from IBM to Renaissance Technologies.

22. As far back as 1949, code breakers had wondered about the application of their technique to translation. But they lacked computing power; statistical translation depended on feeding a vast number of pairs of sentences into a computer, so that the computer had enough data from which to extract meaningful patterns. But by around 1990, statistical translation was possible on a well-equipped workstation.
23. Mercer had spent a couple of summers at IDA working with Nick Patterson, a British mathematician who went on to join Simons. Simons's connection to Baum also helped him persuade Brown and Mercer to join up. Peter Brown recalls: "When Bob and I were contacted by Jim Simons we hadn't heard of him. But when we heard he had worked with Lenny Baum we started to take the offer seriously." Peter Brown, interview with the author, July 28, 2008.
24. An account of the reaction to the Brown-Mercer work is given in Andy Way "A Critique of Statistical Machine Translation." In W. Daelemans and V. Hoste (eds.), *Journal of Translation and Interpreting Studies: Special Issue on Evaluation of Translation Technology*, Linguistica Antverpiensia, 2009, pp. 17–41.
25. See, for example, Pius Ten Hacken, "Has There Been a Revolution in Machine Translation?" *Machine Translation* 16, no. 1 (March 2001): pp. 1–19. This source erroneously attributes the quote on firing linguists to Peter Brown.
26. The initial versions of the IBM program included no linguistic rules at all. Later versions did use some, but they played a far smaller role than in traditional translation programs.
27. Wepsic interview.
28. John Magee, a leading technician of the 1950s, made a point of reading the newspapers two weeks late in order to be sure that knowledge of the economy would not cloud his judgment.
29. Mercer says, "We will contemplate any proposed signal. But if somebody comes with a theory that does not make intuitive sense, we would examine it especially carefully." (Robert Mercer, interview with the author, July 28, 2008.) The same willingness to trade on statistical evidence was shared by earlier contributors to Medallion's success. For example, Elwyn Berlekamp recalls, "Mostly we looked at statistics at Medallion. We found that attempts to look at fundamentals did not get us very far." Elwyn Berlekamp, interview with the author, July 24, 2008. It is also interesting that Brown and Mercer's coauthors who followed them to Renaissance, Stephen and Vincent Della Pietra, explicitly presented their experience with statistical machine translation as relevant to finding order in other types of data, including financial data. See Adam L. Berger, Stephen A. Della Pietra, and Vincent J. Della Pietra, "A Maximum Entropy Approach to Natural Language Processing," *Computational Linguistics* 22, no. 1 (March 1996): pp. 39–71.
30. To manage the potential linguistic chaos resulting from this permissiveness, neologisms had to be submitted to a review. Mercer interview.
31. The Russian employees were Pavel Volfbeyn and Alexander Belopolsky. The firm that they defected to was Millennium. They argued through their lawyer that their new system was not based on proprietary secrets from Renaissance. See Thomas Maier, "Long Island's Richest Man from Math to Money," *Newsday*, July 5, 2006, p. A04.
32. Silber interview.
33. Robert Frey explains, "Those researchers were sort of like hothouse flowers. They sit there. If they need data, the data are provided. They have no clue of the hoops you have to jump through to make sure that the data are available and clean and ready. There are tens of terabytes of data available at the touch of a button. Someone going out, who left the greenhouse, so to speak, and went out into the cold, cruel world, I think would quickly find out that even if you could produce these simulations and do all of this stuff, which isn't trivial, you wouldn't have access to the historical data. You wouldn't really know how to call up somebody and execute a trade. If you said to me, Robert you don't have a noncompete agreement and we want you to recreate Renaissance, it would probably be four or five years before you could get to a point where you could actually trade." (Frey interview.) It should be said, however, that Medallion defectors who join a rival hedge fund that has research and trading infrastructure already in place could damage Medallion in well under five years.
34. The $6 billion number is for 2007 and is given in Richard Teitelbaum, "Simons at Renaissance Cracks Code, Doubling Assets," Bloomberg.com, November 27, 2007.

CHAPTER FOURTEEN: PREMONITIONS OF A CRISIS

1. Hal Lux, "Boy Wonder," *Institutional Investor*, January 2001.
2. The expense ratio for Citadel investors averaged just under 9 percent in the three years 2005 to 2007. Expenses covered costs such as brokerage, legal fees, tax and audit fees, and the building out of Citadel's computer infrastructure, which partially supported trading businesses whose profits flowed entirely to Citadel, not to outside investors. Meanwhile, other hedge funds found they could raise fees too. In November 2002, Bruce Kovner's Caxton announced that it would be hiking its fees to 3 percent of the principal plus 30 percent of the performance. Caxton said it needed to raise fees because of the competitive atmosphere in luring trading talent. See "Caxton to Hike Fees, Merge Funds," *Private Asset Management*, November 24, 2002.
3. Marcia Vickers, "Ken the Conqueror," *Fortune*, April 16, 2007, p. 80.
4. Gregory Zuckerman, "Shake-Out Roils Hedge Fund World," *Wall Street Journal*, June 17, 2008.
5. An Amaranth veteran recalls, "Typically at Amaranth when traders made money, they were allowed to keep that money in their portfolio, rather than saying, 'Oh, great, you just made a billion dollars for the firm, now we're going to take that and give it to the guys in converts.' That would not have been the way to motivate people."
6. A senior Amaranth executive recalls, "In 2003, 2004, 2005, multistrategy arbitrage returns were getting smaller. The business was getting saturated; the trades were getting crowded."
7. An Amaranth veteran recalls of Hunter: "He was incredibly intelligent. Just incredibly intelligent. Brilliant in terms of his analysis of, 'Okay, we think this is going to happen, and here's how we can use the various instruments out there to take advantage of that.' And just finding very interesting little market movements, submarket movements, and things going on and how to profit from those. And also how to construct what people like to describe as asymmetrical risk profiles. And people had a tremendous amount of respect for him because he could sort of make those arguments, and then when he implemented them, they were actually incredibly profitable."
8. One newspaper account reported, "Mr. Maounis says the firm knew of Mr. Hunter's history at Deutsche Bank but did extensive checks and found 'nothing that made us uncomfortable.'" See Ann Davis, "Private Money: The New Financial Order—Blue Flameout: How Giant Bets on Natural Gas Sank Brash Hedge-Fund Trader," *Wall Street Journal*, September 19, 2006.
9. According to one insider, Hunter's compensation for 2005 consisted of $75 million in cash and $50 million in deferred compensation.
10. An Amaranth veteran recalls Maounis saying of Hunter, "Don't you think he is a genius?" Another Amaranth veteran says of Maounis, "What I believe is, he must have said, 'Brian's book is like a zero-premium convertible book.' So even though notionally it looked large, it's really not that risky. So with hindsight everyone's saying, 'What in the fuck, are you crazy? Look at the size of this thing!' But the risk guys must have convinced Nick that even though notionally it was very, very large, from a risk perspective it was very, very small. Because that was Nick's upbringing. That was how a convertible bond portfolio could be."
11. A senior Amaranth executive recalls, "Nick was always very jealous of, envious, as we all are, of Jim Simons's ability to manufacture money with the Medallion fund. We spent a lot of money building stat-arb systems, hiring stat-arb people. Didn't even get in the same universe as that, but he kept trying and trying, looking for the holy grail. Nick had the true belief that there were certain people who were truly special at what they did. And he thought that Brian Hunter was truly special."
12. These details on Amaranth's positions, and many others that follow, are drawn from a lengthy report by the U.S. Senate Permanent Subcommittee on Investigations, which reports to the Committee on Homeland Security and Government Affairs. See U.S. Senate Permanent Subcommittee on Investigations, "Excessive Speculation in the Natural Gas Market," June 25, 2007. The report is not flawless. It draws the conclusion that Amaranth's failure makes the case for additional hedge-fund regulation, whereas the failure is better seen as an example of the market disciplining a rogue trader.

Further, the report makes much of the total exposure accumulated by Amaranth in various futures contracts, not explaining that the net exposure matters more and that natural-gas futures are traded over the counter, making it impossible to know how much of the total market Amaranth accounted for. Nevertheless, the Senate investigators did collect a vast amount of valuable data and testimony on Amaranth's natural-gas trading. In the judgment of the Senate report, "Amaranth's large-scale trading was a major driver behind the rise of the January/November price spread from $1.40 in mid-February to $2.20 in late April, an increase of more than 50 percent." The Senate report states, "On every trading day in May, Amaranth accounted for at least 55 percent of the open interest in the November 2006 contract . . . Put simply, Amaranth was too big for the market it had created." Even allowing for the caveat that NYMEX is not the whole of the gas-futures market, Amaranth's share of NYMEX trading is striking.

13. At the time, Blackstone kept its withdrawal secret. A Blackstone official explains that publicity might have caused other investors to flee Amaranth, creating a run on the fund that might have provoked a freeze on withdrawals, trapping Blackstone's money.
14. Amaranth's willingness to pay Morgan Stanley a large fee to get out of certain gas positions confirms the verdict that it had grown too big for the market. If it had been able to trade out of its positions easily, it would have done so. The Morgan Stanley evidence matters because Amaranth representatives have sometimes suggested that the fund was brought down not by its excessive size, but rather by conspiracies against the fund, ranging from predatory trading on the NYMEX in late August to J.P. Morgan's opposition to the Goldman Sachs deal in September.
15. Amaranth's broad exposures were well known because the fund provided investors with monthly reports detailing returns and outlining how these had been generated. Hedge-fund transparency is generally considered a good thing, but there is a risk to it.
16. U.S. Senate Permanent Subcommittee on Investigations, "Excessive Speculation in the Natural Gas Market."
17. A former trader at Amaranth comments, "They counseled Brian to get out. He needed to be ordered." Another Amaranth official says, a bit uncertainly, "I don't want to believe that Brian Hunter didn't try to reduce his positions. Because we were told that he was trying, but there just wasn't enough liquidity." Yet a third Amaranth veteran describes extensive debates within the firm as to how quickly to cut the natural-gas exposure; these concluded in the view that it was unwise to pay a high price in order to exit precipitously. It is not clear that Amaranth could have saved itself by opting to exit quickly at all costs. If Hunter had cut his positions aggressively any time after April, he might well have taken losses so large as to put Amaranth out of business.
18. Looking back on this period, one trader describes Hunter as "a menace." Equally, the Senate report quotes numerous traders to this effect. For instance, one says, "Everyone in the market knew Amaranth killed MotherRock." Amaranth denies it.
19. The Amaranth veteran comments, "Remember, I said the guy fell in love. Maybe that's what we're talking about. Maybe it's just another manifestation of the love. . . . I told you he thought this guy could do no wrong. And when he made that statement [to the *Wall Street Journal*] I'm sure he believed it."
20. An Amaranth official recalls that some of Hunter's summer/winter positions were designed to hedge others, but that by September supposedly offsetting positions were going wrong simultaneously, suggesting that Amaranth was being targeted by rival traders.
21. This dialogue comes from interviews with Winkler and Griffin and from a complaint filed by Amaranth against J.P. Morgan in the New York State Supreme Court on November 13, 2007.
22. Many big banks run multiple computer systems, which would have made it hard to sync Amaranth data into all the relevant divisions.
23. J. Tomilson Hill, vice chairman of the Blackstone Group, comments, "If Citadel had been big enough in 1998 to buy LTCM, the odds would have been much better that a deal would have gotten done." J. Tomilson Hill, interview with the author, September 9, 2009.
24. This account is based on interviews with Ken Griffin and other Citadel staff members, as well as with Karl Wachter and Charles Winkler of Amaranth.
25. One popular regulatory response to the growth of leveraged trading is to push over-the-counter derivatives such as swaps onto exchanges. Although this response is generally reasonable, it should

be noted that most of Hunter's gas exposure was on an exchange, and further that the exchange authorities were ineffectual in limiting his excessive trading. By contrast, the discipline of the market proved brutally effective.

CHAPTER FIFTEEN: RIDING THE STORM

1. John Gittelsohn, "High Roller of Home Loans," *Orange County Register*, May 20, 2007.
2. Mark Pittman, "Bass Shorted 'God I Hope You're Wrong' Wall Street," *Bloomberg*, December 19, 2007.
3. Michael Litt, interview with the author, July 2, 2009. The BIS report was "The Recent Behavior of Financial Market Volatility" (BIS paper 29, August 2006). For an account of FrontPoint's portfolio manager, Steve Eisman, see Michael Lewis, "The End," *Portfolio*, December 2008. It should be noted that the BIS was actually among the few official institutions to warn of the risk of a financial crisis, even though this warning was not apparent to Litt.
4. From inception in December 2006 to mid-October 2007, Bass's dedicated mortgage fund was up 463 percent. FrontPoint ran multistrategy funds, so the mortgage bets were diluted. Nevertheless, in 2007 FrontPoint's low-volatility multistrategy fund was up 23 percent and its midvolatility version was up 44 percent.
5. The following account of Paulson's subprime trade is reconstructed from conversations with John Paulson and Paolo Pellegrini and from a report produced by Paulson and Company. John Paulson, interview with the author, July 15, 2009; Paolo Pellegrini, interview with the author, July 2, 2009; Paulson and Company, "Paulson Credit Opportunities, 2007 Year End Report."
6. Pellegrini interview.
7. Paulson and Pellegrini soon realized their error. Their research showed that the percentage of mortgage loans extended on the basis of limited documentation had risen from 27 percent in 2001 to 41 percent in 2005, but it also showed that refinancing was covering up the problem of poor loan quality. Between 1998 and 2006, at least half of subprime mortgages were refinanced within five years.
8. This is the conversation as remembered by John Paulson. Paulson interview.
9. Paulson's plan was to buy insurance on $12 of subprime mortgages for every $1 he had in his fund, so a $600 million fund involved buying insurance on $7.2 billion of mortgages. The cost of this insurance was about 1 percent of the value of the mortgages, so 12 percent of the value of the fund. But Paulson earned 5 percent from the interest on the free cash in the fund, so that the net cost of putting on the bet was 7 percent of the fund's assets.
10. Gregory Zuckerman, *The Greatest Trade Ever: The Behind-the-Scenes Story of How John Paulson Defied Wall Street and Made Financial History* (New York: Broadway Books, 2009), p. 197.
11. Zuckerman, *The Greatest Trade Ever*, p. 208.
12. In 2008, according to Hedge Fund Research, asset-backed hedge funds were down 3 percent, a respectable showing given the carnage that surrounded them. Although the rest of the hedge-fund industry suffered a hard year in 2008, it was not because it fell for subprime mortgages.
13. In perhaps the clearest example of this folly, UBS vacuumed up $50 billion worth of AAA mortgage bonds, confident that AAA paper would always pay back; in 2007 alone, this decision accounted for $12.5 billion of losses.
14. Paul Muolo and Matthew Padilla, *Chain of Blame: How Wall Street Caused the Mortgage and Credit Crisis* (Hoboken, NJ: John Wiley & Sons, 2008), p. 190. Other accounts confirm O'Neal's determination to raise Merrill's ranking in mortgage securitization. See Bradley Keoun and Jody Shenn, "Merrill Loaded for Bear in Mortgage Market That Humiliated HSBC," *Bloomberg*, February 12, 2007.
15. William D. Cohan, *House of Cards: A Tale of Hubris and Wretched Excess on Wall Street* (New York: Doubleday, 2009), p. 281.
16. "Investors who sought to take advantage of the inimitable risk management reputation of Bear Stearns found themselves in a highly complex hedge fund investment program that relied on overworked junior personnel to manage a conflict reporting process required by federal law." Administrative complaint against Bear Stearns Asset Management filed by the Commonwealth of Massachusetts, quoted in Cohan, *House of Cards*, p. 302.

17. Hedge fund subsidiaries of other banks also fared poorly. UBS's Dillon Read Capital Management and Royal Bank of Scotland's Greenwich Capital were both wound down in 2007 following losses on subprime securities. Much as happened at Bear Stearns, UBS injected capital into its failed funds, took their losses onto its balance sheet, and then found itself in need of a government bailout. Of UBS's $19 billion in losses in 2007, Dillon Read accounted for $3 billion. Meanwhile, the Royal Bank of Scotland had to take RBS Greenwich's losses onto its balance sheet, contributing to the bank's later collapse into the arms of the UK government.
18. These figures come from Paulson and Company, "Paulson Credit Opportunities, 2007 Year End Report." The cumulative figure is reached by compounding the 20 percent return in 2006 with the 590 percent return in 2007.
19. This story and the ensuing account of the Sowood transaction is reconstructed from interviews with Ken Griffin, Gerald Beeson, and Adam Cooper of Citadel. Ken Griffin, interview with the author, July 9, 2009; Gerald Beeson, interview with the author, June 30, 2009; Adam Cooper, interview with the author, June 30, 2009.
20. Kyle Bass of Hayman Capital wrote in an investor letter dated July 31, 2007: "What is truly remarkable about this particular situation is the fact that Jeff Larson, the former manager of the $30 billion Harvard Endowment, is the principal Manager at this firm. Sowood was renowned as being a 'best-in-class' fund." Kyle Bass, letter to Hayman Capital investors, July 30, 2007. See also Jenny Strasburg and Katherine Burton, "Sowood Funds Lose More Than 50% as Debt Markets Fall (Update 4)," *Bloomberg*, July 31, 2007.
21. Gregory Zuckerman and Craig Karmin, "Sowood's Short, Hot Summer," *Wall Street Journal*, October 27, 2007.
22. Some press accounts note that Larson and Griffin spoke on Friday, July 27. But Griffin, Cooper, and Beeson separately recall that the key phone conversation was on Sunday.
23. Jeff Larson, letter to Sowood investors, July 30, 2007.
24. Cohan, *House of Cards*, p. 381.
25. Jim Cramer, "Street Signs," CNBC, August 3, 2007.
26. A quant firm could believe both in stock momentum and in momentum reversal. Both effects could exist, but on different time horizons.
27. For instance, Black Mesa, a small quantitative hedge fund based in New Mexico, reported in an investor letter that a pattern of liquidation started on July 25, 2007, and lasted through Friday. "The losses were found not to be attributable to common market risks," Black Mesa reported. "The losses were in our proprietary factors or, in other words, attributable to risks to which we deliberately expose ourselves."
28. Many in the quant industry suspect that the storm of deleveraging was started by Bruce Kovner's Caxton Associates. This is not quite right. It is true that Kovner assembled his portfolio managers on the evening of Sunday, August 5, and instructed them to cut risk. But the meeting did not include Aaron Sosnick, who managed the capital that Caxton committed to statistical arbitrage. Rather, Sosnick had cut his leverage substantially in the previous several days, so was not selling aggressively on Monday, August 6, the start of the quant quake. Bruce Kovner, interview with the author, October 14, 2009.
29. Quant equity hedge funds in the summer of 2007 seem to have been leveraged between six to one and eight to one. They sometimes described this as leverage of "three to four," meaning three to four times on the short side and the same amount on the long side, giving a total leverage of six to eight.
30. Clifford Asness, "The August of Our Discontent: Questions and Answers about the Crash and Subsequent Rebound of Quantitative Stock Selection Strategies," working paper, September 21, 2007.
31. Cliff Asness explains, "By and large much of quantitative investing is about common sense and discipline, rather than about esoteric math and computer algorithms. . . . The computers help us process the data and maintain a diversified and disciplined approach. . . . It's about good investing done broadly and without the often dangerous influence of tick-by-tick human emotion. Our strategies are not 'black boxes.' " (Clifford Asness, "The August of Our Discontent: Questions and Answers about the Crash and Subsequent Rebound of Quantitative Stock Selection Strategies,"

working paper, September 21, 2007.) In an e-mail to investors, Jim Simons wrote, "While we believe we have an excellent set of predictive signals, some of these are undoubtedly shared by a number of long/short hedge funds." (Jim Simons, e-mail to Renaissance Technologies investors, August 9, 2007.)

32. Satya Pradhuman, director of research at Cirrus Research, identified 148 companies with market capitalizations between $2 billion and $10 billion and 473 companies with market capitalizations between $250 million and $2 billion in which large quant funds had ownership stakes exceeding 5 percent. See Justin Lahart, "How the 'Quant' Playbook Failed," *Wall Street Journal*, August 24, 2007.
33. Scott Patterson, "A Hedge-Fund King Is Forced to Regroup," *Wall Street Journal*, May 26, 2009.
34. Asness, "The August of Our Discontent."
35. Cliff Asness comments, "Most of our lives are about automated quant trading. But when you have a conflagration of this size, having good intelligence, having good contacts on the Street, those things really matter." (Cliff Asness, interview with the author, July 9, 2009.) Similarly, Sushil Wadhwani, who was running his systematic funds in London, recalls, "I remember Friday morning. . . . It was a question of either someone came in with a bailout or they delevered." (Sushil Wadhwani, interview with the author, July 28, 2009.)
36. Here was yet another example of a hedge fund managed under the umbrella of an investment bank going wrong. The fact that the parent bank bailed out the hedge fund, as had happened at Bear Stearns, showed why the fund managers may have been less vigilant than their counterparts at independent funds with no deep-pocketed parents. J.P. Morgan analyst Stephen Wharton brought up this issue on Goldman's conference call, organized to announce the recapitalization. "I mean do you feel there is some moral hazard being introduced here in terms of how investment banks are reacting to problematic hedge funds managed by their asset management arms?" Naturally, Goldman rejected the comparison, pointing out that it was providing $2 billion of the $3 billion recapitalization, with the rest coming from outside investors. Goldman Sachs conference call, final transcript, *Thomson StreetEvents*, August 13, 2007.
37. See Amir E. Khandani and Andrew W. Lo, "What Happened to the Quants in August 2007?" working paper, November 4, 2007; Richard Bookstaber, *A Demon of Our Own Design* (Hoboken, NJ: JohnWiley & Sons, 2007). See also Richard Bookstaber, "What's Going On with Quant Hedge Funds?" (available at http://rick.bookstaber.com/2007/08/whats-going-on-with-quant-hedge-funds.html).
38. "I have said before that 'there is a new risk factor in our world,'" Cliff Asness wrote in the wake of the quant quake. "But it would have been more accurate if I had said 'there is a new risk factor in our world and it is us.'" See Asness, "The August of Our Discontent."
39. Cliff Asness and Adam Berger, "We're Not Dead Yet," *Alpha*, November 2008.
40. "It's hard to prove that if there are a lot of people in a space, returns get worse. You can look at the performance and conclude that, like Lo does. Increased assets in a space, performance goes down—it sounds reasonable. But if you try to actually demonstrate is by building a portfolio and saying, 'This is a portfolio I would like to get but can't because the market is slipping away from me,' you can't quite do that. At Thales we find we can trade the same model with a slight variation: one that sets trades on a two- to three-day time scale and one that trades on a five-day time scale. They don't even interfere with one another even though these are two models that are almost the same. The likelihood that our particular model is being interfered with by Shaw or Caxton or Citadel seems low." Marek Fludzinski, interview with the author, June 25, 2009.
41. Asness, "The August of Our Discontent."
42. Mike Mendelson, interview with the author, July 9, 2009.

CHAPTER SIXTEEN: "HOW COULD THEY DO THIS?"

1. In 2008, Kynikos was up more than 60 percent. Relative to the market's performance, however, the 2007 return of over 30 percent was even better. Kynikos takes a performance fee based on its returns relative to the market benchmark.
2. This remark and much of the telephone exchange between Chanos and Schwartz was reported by Gary Weiss and confirmed by the author in an interview with Chanos. See Gary Weiss, "The Man

Who Made Too Much," *Portfolio*, February 2009. Weiss also reports that Schwartz disputes the timing and detail of the call, saying it took place one day earlier, on Wednesday. However, Chanos remembers receiving the call on the way to see Bernstein, and Bernstein confirms that the dinner was on Thursday and that Chanos told him then about the phone call. James Chanos, interview with the author, September 23, 2009; Carl Bernstein, interview with the author, September 28, 2009.

3. Bryan Burrough, "Bringing Down Bear Stearns," *Vanity Fair*, August 2008; Andrew Ross Sorkin, *Too Big to Fail: The Inside Story of How Wall Street and Washington Fought to Save the Financial System—and Themselves* (New York: Viking, 2009), p. 15.
4. In an interview on September 21, 2009, an SEC spokesman confirmed that, eighteen months after Bear's failure, nobody had been prosecuted for conspiring to drive Bear Stearns down.
5. There is no evidence of a conspiracy to bring down Bear but plenty of evidence that Bear made mistakes that, coupled with high leverage and a reliance on short-term funding, sealed its own fate. The loss of confidence in Bear seems to have been brought on by the knowledge that it held huge mortgage positions and that other institutions holding similar positions were reporting major losses. On February 14, UBS had written down the value of its mortgage book, including "Alt-A" loans to wealthy borrowers. This had dire implications for Bear Stearns, which held a $6 billion portfolio of Alt-A mortgages and had used these as collateral to fund itself. On March 10, Moody's downgraded mortgage bonds that Bear had underwritten and hinted that further rating downgrades would be forthcoming. Given all this, the notion that Bear collapsed because of a short-selling conspiracy seems too simple. Moreover, when Bear was bought by J.P. Morgan, Morgan's analysis of Bear's mortgage book suggested that the bank's latent losses exceeded recognized ones by a wide margin, which is one reason why Morgan almost refused to buy Bear and eventually did so for a fraction of the $54 per share at which Bear had closed on Friday, March 14. Again, the point is that the shorts had good reason to be short. For the chest-bumping image, I am indebted to a hilarious post by Bess Levin on the Dealbreaker blog, July 1, 2008.
6. Hugo Lindgren, "The Confidence Man," *New York*, June 15, 2008.
7. Interviews with two ex-Lehman Brothers officials. See also Sorkin, *Too Big to Fail*, pp. 79 and 100.
8. In an e-mail analysis, value investor Whitney Tilson credited Einhorn with having made Lehman face facts: "The losses are the losses—Einhorn certainly isn't causing them. But thanks in large part to his questions, the company is selling assets, deleveraging and raising capital, all of which makes it more likely that the firm lives to fight another day rather than imploding and shaking the world financial system to its core." On his *New York Times* DealBook blog, Andrew Ross Sorkin put it more bluntly: "Few people had more reasonable claim to vindication on Monday than David Einhorn." See Hugo Lindgren, "The Confidence Man," *New York*, June 15, 2008.
9. Chrystia Freeland, "The Profit of Doom," *Financial Times*, January 31, 2009 (weekend supplement).
10. This threat is recalled by Werner Seifert, the Deutsche Börse chief executive, who tells his side of the story in his book, *Invasion of the Locusts: Intrigues, Power Struggles, and Market Manipulation* (Ullstein Taschenbuchvlg, 2007).
11. Michael J. de la Merced, "A Hedge Fund Struggle for CSX Is Left in Limbo," *New York Times*, June 26, 2008.
12. Gillian Tett, *Fool's Gold: How the Bold Dream of a Small Tribe at J.P. Morgan Was Corrupted by Wall Street Greed and Unleashed a Catastrophe* (New York: Free Press), 2009, pp. 160–62.
13. Paul Tudor Jones, internal Tudor e-mail, June 28, 2008.
14. "I just thought even though one was a weekly and one was a daily, the chart patterns were so similar and the backdrops were so similar—two huge credit bubbles with enormous overcommitment to a variety of asset markets, real estate and stock market bubbles happening simultaneously." Paul Tudor Jones, interview with the author, April 15, 2009.
15. Ibid.
16. After the fact, policy makers argued that they let Lehman fail because they lacked the legal authority to do otherwise. But policy makers had successfully stretched the legal bounds of their authority in

other cases, and they acted aggressively again in the following days with respect to AIG, and then with respect to Goldman Sachs and Morgan Stanley, which were hurriedly granted full access to the Fed's emergency loans. Moreover, the policy makers' claim that the Fed could not lend to Lehman because it lacked adequate collateral is weakened by the fact that in the three days after Lehman's bankruptcy, the Fed did actually lend Lehman's broker-dealer unit $160 billion to tide it over until its sale to the British bank Barclays. It seems overwhelmingly likely that the government would have found a legal way to save Lehman Brothers if it had guessed in advance the consequences of its failure.

17. Paul Tudor Jones, interview with the author, April 15, 2009.
18. Jones interview. Jones adds, "From a trading perspective, fear is a much stronger emotion than greed, which is why things go down twice as fast as they go up. And that's also just the law of nature. How long does it take for a tree to grow, and how quickly can you burn it down? It's much easier to destroy things than to build them up. So from a trading perspective, the short side is always a beautiful place to be because quite often when you get paid, you get paid in vertical no-pain type of moves."
19. Eric Rosenfeld, interview with the author, April 16, 2009. Echoing Rosenfeld, Louis Bacon recalls, "I grew my hedge fund within Lehman initially, and they were one of our closest counterparties, physically as well, since their headquarters was thirty paces from ours. Watching Lehman go under produced a foreboding nausea that was for me the financial equivalent of the horror of watching the World Trade Center go under, which I could also see clearly burning from my office. (I had worked for two years on the 102nd floor of Tower 2 for Shearson/Lehman, by the way.) It was not just the cold-sweat fear for the initial victims and your own safety, it was the instantaneous recognition that an entire American protective edifice had collapsed and that a longer-term downfall was inevitable." Louis Bacon, interview with the author, July 21, 2009.
20. Jones says of the $100 million trapped in Lehman, "We actually tried to get out on the Wednesday before. They were supposed to wire it out on Friday. They did not, so we were one day late on that." Jones interview.
21. The precise magnitude of Tudor's losses is unknown, but traders at other firms estimate that emerging-market loans fell by at least two thirds, and given that the portfolio was leveraged, Tudor's $2 billion presumably fell by more than that. Meanwhile, Paul Jones explains, "What I missed was the tail risk associated with something that for the prior eight years our manager had risk managed through in an excellent fashion. And also something that all of a sudden took on characteristics that heretofore it had never taken on, which was one hundred percent correlation with the U.S. stock market." Jones interview.
22. Jones interview. Jones adds, "What I was thinking was here's a guy who prides himself on being able to be liquid in relatively short order, and yet I had forty percent of our fund exposed to a strategy where liquidity had conveniently, totally disappeared."
23. Jones interview. Jones adds, "I guess it gets back to this old saying that my grandfather, who was a Depression baby, told me. He said, 'You're only as wealthy as what you can write a check for tomorrow morning.' I never understood it when he told that to me. I was really, really young—I was in my teens when he told that to me. I understood it for the first time last October when I saw the whole world crashing and when I saw within our BVI fund a variety of illiquid investments that we could not exit. I thought, 'Oh my God. I know exactly where that statement came from and what it means now.' And I will never ever violate that again."
24. Jones interview. The end-year losses would have been substantially larger without offsetting gains from macro trading.
25. James B. Stewart, "Eight Days: The Battle to Save the American Financial System," *New Yorker*, September 21, 2009, p. 74.
26. In 2006 Citadel reported in its bond-offering documents that its leverage was thirteen to one. By mid 2008, the ratio had fallen to eleven to one, according to Citadel officials.
27. Daniel Dufresne, Citadel's treasurer, affirms, "One reason why markets targeted us was we were the only hedge fund that had a credit-derivatives market active in our name because we had issued debt in 2006." Daniel Dufresne, interview with the author, June 30, 2009.

28. Ken Griffin, interview with the author, July 9, 2009.
29. Stewart, "Eight Days," p. 78.
30. Sorkin, *Too Big to Fail*, p. 438.
31. Steve Galbraith, "A September to Remember (Even if we would like to Forget)," Maverick Capital Management, letter to investors, October 9, 2008.
32. The convertible portfolio was losing money even before the short-selling ban. Lehman's failure triggered the fire sale of an estimated $2 billion of convertible bonds, which hit Citadel's holdings. But the short ban was an additional blow.
33. By way of illustration, Ken Griffin recalls, "We took all our energy derivatives and said, 'Guys, we don't want to face you. We want to face the clearinghouse instead, so let's transfer all the OTC positions we have to cleared positions. Let's reduce our bilateral exposure.'" Griffin interview.
34. This is the exchange as recalled by James Forese. James Forese, interview with the author, June 25, 2009. See also Marcia Vickers and Roddy Boyd, "Citadel Under Siege," *Fortune*, December 9, 2008.
35. This passage is based on interviews with Ken Griffin, Gerald Beeson, Adam Cooper, Dan Dufresne, and Katie Spring of Citadel.
36. Loch Adamson, "Rethinking Chris Hohn," *Alpha*, October 2008.
37. "Hedge Funds and the Financial Market." Hearing of House Oversight and Government Reform Committee, Panel II, 110th Congress, Session 2, November 13, 2008.

CONCLUSION: SCARIER THAN WHAT?

1. The account of the Douglas Aircraft episode is based primarily on research in the SEC archive by Chad Waryas of the Council on Foreign Relations. See "In the Matter of Investors' Management Co. Inc." Administrative Proceedings, file no. 3-1680. Securities Exchange Act Release no. 8947, Investment Advisers Act Release no. 268, July 30, 1970.
2. Brimberg appears as "Scarsdale Fats" in Adam Smith, *The Money Game* (New York: Vintage Books, 1976), pp. 190–91. Banks Adams, interview with the author, April 16, 2007.
3. "The State of Public Finances Cross-Country," IMF Staff Position Note, November 3, 2009. See in particular Tables 3 and 4. The numbers given for debt as a percentage of GDP come from the same publication.
4. Anna Fifield, "Obama in tough talk to 'fat cat' bankers," *The Financial Times*, December 15, 2009, p. 2.
5. Piergiorgio Alessandri and Andrew Haldane, "Banking on the State," paper based on a presentation to the Federal Reserve Bank of Chicago, November 2009.
6. See Dean P. Foster and H. Peyton Young, "Hedge Fund Wizards," The Berkeley Electronic Press, January 2008.
7. See for example Russ Wermers, "Mutual Fund Performance: An Empirical Decomposition into Stock-Picking Talent, Style, Transactions Costs, and Expenses," *Journal of Finance* 55, no.4, August 2000.
8. Roger G. Ibbotson, Peng Chen, and Kevin Zhu, "The A, B, Cs of Hedge Funds: Alphas, Betas, and Costs" (Yale working paper, 2010). An earlier version of this paper showing similar findings appeared in 2006.
9. The three studies finding these returns for private equity are: Steven N. Kaplan and Antoinette Schoar, "Private Equity Performance: Returns, Persistence, and Capital Flows," *Journal of Finance* 60, no. 4 (August 2005); Jones, Charles, and Matthew Rhodes-Kropf, "The Price of Diversifiable Risk in Venture Capital and Private Equity" (working paper, Columbia University, 2003); Alexander Ljungqvist and Matthew Richardson, "The Cash Flow, Return, and Risk Characteristics of Private Equity" (NYU Stern Working Paper Series, 2003). On the returns of buyout funds, Jones and Rhodes-Kropf estimate annual alpha of 0.72 percent per year, while Kaplan and Schoar are more negative. Ljungqvist and Richardson find stronger alpha for buyout funds, possibly because they focus on funds that were raised in the 1980s, when returns were higher.

10. Paul Tudor Jones II interview with Stephen Taub, "Alpha Hall of Fame," *Alpha,* June 2008, p. 66.

APPENDIX I: DO THE TIGER FUNDS GENERATE ALPHA?

1. This S&P 500 return excludes dividends. Including them would bring the return up to about 15 percent per year, not a material difference.
2. For this phrase and for many of the calculations in this appendix, I am indebted to my Council on Foreign Relations colleague Paul Swartz.
3. The Tiger Cub index fell 14.8 percent in the last four months of 2008. This was a lot less awful than the market index, which was down 29.6 percent.