

Column overall title: A Mathematician on Wall Street

Column 25

### **My Encounters With Madoff's Scheme and Other Swindles**

by Edward O. Thorp

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On the afternoon of Thursday, December 11, 2008, I got the news I had been expecting for more than seventeen years. Calling from New York, my son Jeff said Bernie Madoff has confessed to defrauding investors of \$50 billion in the greatest Ponzi scheme in history. "It's what you predicted in ... 1991!" he said.

It began on a balmy Monday morning in New York in the spring of 1991, when I arrived at the office of a well-known international company. The investment committee, reviewing their hedge fund investments, decided at this time to add due diligence by hiring me as a consultant. I spent a few days listening to summaries of track records, analyses of the business structures of the hedge funds, the backgrounds of their managers, and making on-site visits. One of the fund managers was so paranoid when I interviewed him at his office that he wouldn't tell me what kind of personal computers they used. When I went to the restroom he escorted me for fear that I might acquire some valuable crumb of information.

With one exception, I approved the investments. The story from Bernard Madoff Investments didn't add up. My client had been getting steady monthly profits ranging from 1% to more than 2% for more than two years. Moreover, they knew other Madoff investors who had been winning every month for more than ten years.

Madoff claimed to use a "split strike price" strategy which worked like this: buy a stock, sell a call option at a higher price and use the proceeds to pay for a put option at a lower price. Table 1 details how this works.

**Table 21.1**

<u>Day 1</u>	<u>Owed</u>	<u>Owned</u>
Buy 100 XYZ at 42	\$4,200	100 shares XYZ
Buy one put option at \$3 per share to sell 100 shares of XYZ at \$40 on day 60	\$300	1 put, strike \$40
Sell one call option at \$3 per share to buy 100 shares of XYZ at \$45 on day 60	1 call, strike \$45	\$300
<u>Day 60</u>		
<i>Scenario 1.</i> Stock is \$45 or higher.		Result
Put expires worthless. Buyer of call pays \$45 and receives 100 shares of XYZ		\$300 profit
<i>Scenario 2.</i> Stock is \$40 or lower.		
Call expires worthless. Madoff uses the put to sell the stock at \$40 a share		\$200 loss
<i>Scenario 3.</i> Stock closes between \$40 and \$45.		
Sell stock for a gain or loss		Profit or loss equals \$100 times the difference between the current stock price and the original purchase price of \$42.
<i>Scenario 4.</i> Call holder exercises early.		
This is usually a mistake on the part of the call owner. If it occurs the profit is more than in Scenario 1 and the elapsed time is shorter, further boosting the rate of return. In the Madoff world of fictitious trades this doesn't happen.		\$300 profit plus gain from selling put.

I explained that, according to financial theory, the long run impact on portfolio returns from many properly priced options with zero net proceeds, as the example in Table 21.1, should also be zero. So we expect, over time, that the client's portfolio return should be roughly the same as the return on equities. The returns Madoff reported were much too large to be believed. Moreover, in months when stocks are down, we expect Scenario 2 of the table to dominate, producing a loss. But Madoff wasn't reporting any losses. After checking the client's account statements for such months I found that losing months for the strategy were magically converted to winners by short sales of S&P Index futures. In the same way, months that would have produced very large wins were "smoothed out."

Suspecting fraud, I asked my client to arrange for me to visit the Madoff "investing" operation on the seventeenth floor of the famous Lipstick Building on Third Avenue. Bernie was in Europe that week, and as we now know, likely raising more money. His brother Peter Madoff, head of compliance and of computer operations, said that I would not be allowed through the front door.

I asked my client who it was that did the accounting and annual audits for the Madoff fund. I was told it was handled by a one man shop run by a man who had been a friend and neighbor of Bernie's since the 1960s. Not reassured, I asked when the client received confirmations of trades. The answer was that they came by mail in batches every week or two, well after the dates of the alleged trades. At my suggestion, the client then hired my firm to conduct a detailed analysis of their individual transactions to prove or disprove my suspicion that they were fake. After analyzing

about 160 individual options trades, we found that for half of them no trades occurred on the exchange where Madoff said that they supposedly took place. For many of the remaining options transactions, we found that the volume of trades reported for the client's two accounts alone exceeded the total volume reported by the exchange. To check some of the remaining trades, those which did not contradict the prices and volumes reported by the exchanges, I asked an institutional broker friend at Bear Stearns to find out in confidence for me who all the buyers and sellers were. We could not connect any of them to Madoff's firm.

My client had a dilemma. If they closed their accounts with Madoff, and I were right, they would save their principal, their reputation, and avoid a possible legal mess.<sup>1</sup> If I were wrong, they would needlessly sacrifice their best investment.<sup>2</sup> On the other hand, if they stayed with Madoff and I were wrong, they expected to prosper. If I were right, their jobs could be at risk. They withdrew.

In my attempt, via "networking," to find out how much other money was invested with Madoff I repeatedly heard that all his investors were told not to disclose their relationship, even to each other, on threat of being dropped. I was able to "locate" about half a billion and inferred that the scheme had to be much larger. I was given one investor's track record, showing steady monthly gains in the 20% annualized range back to 1979, and was told the record was similar back into the late 1960s. It appeared as though the scheme had already been operating for more than twenty years!

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<sup>1</sup> For the classic story of a legal mess, see Jarndyce versus Jarndyce in *Bleak House* by Charles Dickens.

<sup>2</sup> If Madoff is really gaining 20% a year and their best alternatives would give, say, 16% a year, then they're only out 4% a year.

Having shown that Madoff was posting fake trades to my client's accounts, and that he was apparently doing so to several other investors with whom I spoke, I had the "smoking gun" that proved fraud. I warned people in my "network," forecasting an ever-expanding Ponzi scheme that would one day end disastrously. The longer it went undetected the worse it would be when it ended.

At this time Madoff was a major figure in the securities industry, serving as chairman of NASDAQ, running one of the largest "third market" (off the exchanges) stock trading firms in the country, consulted by government, and routinely checked out by the S.E.C.

Would the establishment have believed charges of wrongdoing? The story of Harry Markopoulos gives the answer. Challenged by his boss in 1999 to explain why Madoff, with a supposedly similar strategy, could produce much better and steadier returns, Markopoulos concluded on the basis of quantitative financial reasoning, as I had done, that it was impossible and must be a fraud. Though he didn't establish that the individual trades were faked, even without that "smoking gun" his arguments were overwhelmingly persuasive. For the ten next years Markopoulos attempted to get the S.E.C. to investigate. The S.E.C. repeatedly brushed him aside, cleared Madoff after superficial investigations, and in one instance quashed a request from the Boston office, prompted by the Markopoulos information, to investigate Madoff Investments as a possible Ponzi scheme.

In a remarkable 477 page document, "Investigation of Failure of the SEC to Uncover Bernard Madoff's Ponzi Scheme – Public Version," August 31, 2009, Report No. OIG-509, the SEC investigates and documents its own repeated failures, beginning in

1992 and continuing until Madoff confessed in 2008, to follow up on obvious clues, pointed complaints, and clear violations of securities laws.

In 2001, at a hedge fund investing conference sponsored by *Barron's*, the headline story<sup>3</sup> was about the investment manager who wasn't there, the manager with the best record of all, Bernie Madoff. Better yet, he didn't charge the typical hedge fund fees of 1% of assets per year plus 20% of any new net gains. How could this be? Supposedly he made his money from small fees on the huge trading volume that was flowing through his brokerage firm from the orders he placed on behalf of his investment clients.

Even with the well publicized doubts expressed in the *Barrons* story, and the suspicions of fraud now voiced by many, the regulators slept on. So did Madoff's thousands of investors and the many fiduciaries they were paying to protect them. How did the fraud end? Bernie Madoff (pronounced "made off," as in "with your money") turned himself in on December 11, 2008, with the improbable story that he was the sole conspirator in the scheme. This man who was virtually ignorant about computer systems claimed to have single-handedly directed the whole secure 17<sup>th</sup> floor computerized operation, along with some twenty or so employees generating – supposedly unknowingly – a daily torrent of billions of dollars of fake trades for thousands of accounts.

On August 11, 2009, exactly nine months after Madoff turned himself in, Frank DiPascali, Jr., the man who supervised his operations from day-to-day, was charged by the SEC in the U.S. District Court, Southern District of New York. At this point the SEC knew that Bernard Madoff Investment Securities "(BMIS) managed investor accounts as

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<sup>3</sup> Arvedlund, Erin E., "Don't Ask, Don't Tell," *Barron's Magazine*, May 7, 2001.

far back as the 1960s...". However, the SEC complaint says the split strike price strategy dated from 1992, whereas it was in place years earlier. Madoff claimed his family, brother Peter, sons Mark and Andrew, all principals in the firm, and the detail oriented hands-on wife Ruth, were totally innocent and unaware of any complicity in the ongoing massive forty-year fraud. In addition to single-handedly running his swindle, Super Bernie was vacationing at his various residences, travelling abroad to raise ever more money, shuffling massive funds internationally among banks, paying large fees to "fiduciaries" who brought him investments, while the complex scheme somehow ran like clockwork in his absence. When pleading guilty, he told the judge that he began stealing money in the early 1990s.<sup>4</sup> As we've seen, it was already big then and had started at least twenty years earlier.

Madoff gave the size of the scam at \$50 billion, with later estimates of sixty-five billion,<sup>5</sup> for the amount of fake equity investors believed they had in their accounts at the end. More meaningful is how much money was put in, how much paid out, and to whom. Several "handlers," who each collected hundreds of millions or billions from investors, claimed to have thoroughly verified the legitimacy of Madoff's strategy, skimmed off hundreds of millions in fees, and moved up the ranks of the politically and socially connected super rich. One individual reportedly<sup>6</sup> withdrew over five **billion**

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<sup>4</sup> "Bernard Madoff Gets 150 Years in Jail for Epic Fraud (Update 7)," Bloomberg.com, June 29, 2009.

<sup>5</sup> News Release, "Bernard L. Madoff Charged in Eleven-Count Criminal Information," U.S. Attorney for the Southern District of New York, March 10, 2009.

<sup>6</sup> One Jeffrey M. Picower, according to the *New York Times*, Sunday, July 4, 2009, page B2.

dollars more than he put in! The fact that Madoff was letting others collect the hundreds of millions, and eventually billions, in management fees, all the while settling for much less in trading commissions, should have been enough to alert investors, advisors, and regulators.

The government released a searchable list of more than 13,000 past and present Madoff account holders, ranging from hundreds of not very rich Florida retirees, to celebrities, billionaires, and non-profits like charities and universities. If these legions of investors were easily gulled, often for decades, what does this and other swindles tell you about the efficient market hypothesis?

By the time you read this, several books detailing the fraud will have been published, most likely with far more detail than I can give here. But even from my synopsis, you can see that Madoff's investors generally failed to do their own independent thinking and analysis, trusting that others had verified the legitimacy of his strategy and his operation. If you are going to seek superior investments you had better do the work.

When I shifted my focus from beating gambling games to analyzing the stock market, I naively thought that I was leaving a world where cheating at cards was then problematic and entering an arena where regulation and the rule of law gave investors a fair playing field. Instead, I learned that bigger stakes attracted bigger thieves. Madoff's Ponzi scheme was only the largest of the many that were exposed in 2008 and 2009, with others ranging from eight billion (a "bank") through hundreds of millions (including several hedge funds), to multimillion dollar real estate, mortgage and annuity scams. I speculate that the size of swindles likely follows a simple mathematical "power

law," like the distribution of high incomes and top wealth discussed in previous columns, with their number increasing as their economic size decreases.

### **More Frauds**

Madoff's scheme was the biggest I encountered but it was not the only one. In the late 1970s, while jogging near my home in Newport Beach, California, I was astonished to see a new securities firm which had sprung up almost overnight. Passing the big signage of "XYZ Corporation," I entered the hubbub of booming phone banks and scores of salesmen/traders. Adopted at once by my own personal guide, I was "introduced" to their quick buck world where I would make a fortune from the put and call options on gold, silver and other metals which they stood ready to sell me.

Back in my office, I compared their prices to the "correct" model prices we used at Princeton-Newport Partners to wholesale large amounts of such options to Mocatta Metals. With inflation approaching double digits and a spike in commodity prices, precious metals and options to buy or sell them were a booming business.

To my astonishment, I found that XYZ Corp. was offering to sell me options at less than half my expected payoff! After I collected financial statements from my friendly salesman and examined them, I discovered that when XYZ Corp. sold an option it counted the proceeds as income, but it did not set aside any reserve to pay off the options if and when they were cashed in by the buyer. Since the correct reserves on each option they sold should have been more than twice what they were being paid, proper accounting would show their net worth becoming more negative every time they sold another option.

It was clear that they had to sell more and more options, using the ever-increasing cash flow to pay off any early “investors” who might cash in. Classic Ponzi and it would end badly. What to do?

I decided on a little educational experiment for myself. After considering the scanty information available on sales, options outstanding, early redemption rates and so forth, I estimated they would survive for at least eight more months. It turned out to be ten. Buying \$4,000 worth of six-month options, I doubled my money in four months and cashed out. A few months later the offices were shuttered, the operators gone, and another fraud investigation had begun.

### **Captain Money and the Golden Girl**

In the early 80s, a decade before coming across Madoff, I learned of a remarkable investment manager in nearby San Diego. A genius foreign exchange trader was racking up returns of one percent, two percent, three percent and even four percent a month. He didn't lose. I asked mathematician George Shows, an associate in my Newport Beach office of Princeton-Newport Partners, to make an onsite visit to the offices of J. David Dominelli in La Jolla. George came back with the amazing track record and “advertising” literature but could find no evidence of any actual trading activity. Our request for audited financial statements, proof of assets, and proof of trades, were smoothly deflected. I suspected “Ponzi” and we didn't invest. The whole scheme collapsed in 1984, wiping out over \$200 million (worth twice as much in 2009), defrauding over one thousand investors, including much of the social, political and

financial elite of the San Diego area. Donald C. Bauder tells the incredible story in his book.<sup>7</sup>

### **Character is Destiny**

Not much later, in 1984, I came across an innovative company with a new high tech computerized product for the financial community. They were seeking more capital to finish research and development and to market their product. The story was persuasive to me, and the business plan made sense, and my computer expert associate, Steve Mizusawa, gave a thumbs-up to the research and development plan. I and several friends invested alongside the principals, paying them the typical hedge fund annual performance fee of 20% of any new net profits. When we received the first year's financial statements we found that, although much money had been spent on research and development, the principals declared a profit, of which they paid themselves 20% before allocation to the investors. But there was no profit. There was a loss. What happened? The principals declared that the money spent on research and development produced value, a value greater than the amount spent, and they treated this as though it were money earned! After another year, we investors managed to extricate ourselves without loss.

Mismanaged, the company then dissipated their clear technological edge, the competition passed them with a similar product that became ubiquitous, and its founder is a multi-billionaire. A few years later, two of the principals founded a hedge fund, and knowing their characters, I warned against investing in it. In 2008 they were charged

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<sup>7</sup> Bauder, Donald C., *Captain Money and the Golden Girl*, Harcourt Brace Jovanovich, New York, 1985.

with misappropriating several hundred million dollars of their investors' capital in yet another Ponzi scheme.

### **What's in a Name?**

In the mid 90s, I made an onsite visit to check out a start-up hedge fund manager who presented an impressive track record and a pillar-of-the-establishment name, Benjamin Franklin Bush III. What I found was a fiftyish single father who shared a one bedroom rental bungalow with his grammar school aged child. On a desk, looking like an after-thought, was an idle personal computer from which Ben Bush allegedly traded.

It was obvious. We didn't invest. But, unknown to me, a friend of mine, a well-known local financial advisor and hedge fund manager, did his own due diligence, invested, and then faced the pain when the *Los Angeles Times*<sup>8</sup> reported that Bush pleaded guilty to taking client funds for his personal and business use.

The flood of almost daily frauds, swindles and hoaxes reported in the financial press has continued during my entire investment career and I expect that when you read this months, years or decades later, you'll find your own profusion of examples.

Hoaxes, frauds, manias and other large scale financial irrationalities have been with us from the beginnings of the markets in the seventeenth century, long before the Internet. Two readable and entertaining accounts are the famous *Extraordinary Popular Delusions and the Madness of Crowds*, by Charles MacKay, and its more current sequel, *Ponzi Schemes, Invaders from Mars and Other Extraordinary Popular Delusions*, by Joseph Bulgatz. Yet accounts like these are not processed by the EMH true believer.

### **Epilog**

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<sup>8</sup> *Los Angeles Times*, April 8, 1998.

After writing this and discussing the Madoff Scheme with my wife, I mentioned two items that didn't make sense. Bernie Madoff, in his elocution to the judge, said, contrary to fact, that he thought his scheme began about 1991. The SEC's complaint against Frank DiPascali said, presumably using information from Mr. DiPascali, that the fraud was computerized and the split strike price strategy had begun in 1992, also contrary to client reports I had reviewed earlier. Then my wife asked a key question, "What would they have to gain" from such claims? An answer occurred to me that not only neatly answered her question, with a unified explanation of both puzzle pieces, but gave me an insight into what may yet be revealed.