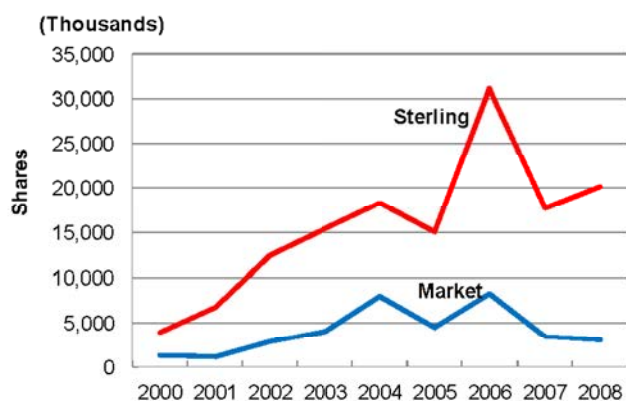


# **Exhibit 1**

## **Part 5 of 6**

**Figure 10**  
**Sterling BLMIS Call Option Volume Relative to Corresponding**  
**Market Volume 2000-2008<sup>173</sup>**



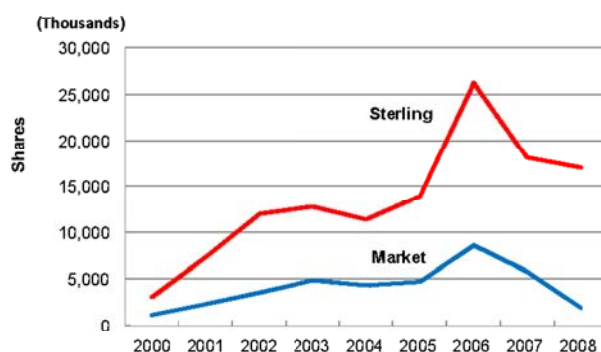
146. Similarly, as it relates to put options, Madoff traded 167 different put options on 390 days through 36,124 transactions. For the transactions on put options, 42.0 percent had a purported number of contracts above the daily market volume.<sup>174</sup> Similar to the call options, for the purported put contracts which Madoff traded above the daily market volume, the number of shares transacted by Madoff greatly exceeded the total share volume transacted in the market. The following figure illustrates these impossible put option share results.

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<sup>173</sup> Includes option trades made between 2000 and 2008, where the Sterling BLMIS transacted volume was greater than the market volume. Sources include Settled Cash table and CBOE (results may be understated as the settled cash table does not include data from May 2007 and September 2001).

<sup>174</sup> In determining how many transactions included contracts above the daily market volume, I aggregated volume across all Sterling-related accounts; therefore, the 42.0 percent reflects the percentage of unique transactions in Sterling-related accounts with volume above the daily market volume. The 36,124 total number of transactions reflects 486 unique transactions with a specific transaction date, strike price, and maturity—42.0 percent of which had reported volumes above the daily market volume.

**Figure 11**  
**Sterling BLMIS Put Option Volume Relative to Corresponding**  
**Market Volume 2000-2008<sup>175</sup>**



147. Sterling's BLMIS accounts not only purchased or sold options in quantities far above the daily volume, the account statements also reflect the fact that Sterling owned far more options than existed in the market place. In fact for the period 2000 through 2008, based on the customer statements, on average, Sterling owned more call options than those in existence on the exchange for 81 days out of each year. Similarly, on average, Sterling owned more put options than those in existence in the market place for 88 days out of each year.<sup>176</sup>
148. Additionally, these figures reflect Sterling's BLMIS accounts only. Madoff had billions of other dollars under management, meaning that the volumes necessary to implement the strategy were even more beyond market capacity. However, even when ignoring all of the other theoretical options traded for the billions Madoff had in AUM, Sterling's own BLMIS volume was far in excess of the total market volume by a significant percent of the time in any given year. The fact that call and put option volumes were greater than the market volume more than 50 percent of the time was an obvious red flag that Madoff was not executing the transactions he was reporting on customer statements. The only

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<sup>175</sup> Includes option trades made between 2000 and 2008. Sources include Settled Cash table and CBOE.

<sup>176</sup> Based on transaction data in the Settled Cash table as well as daily open interest data from the CBOE for the options purportedly owned by Sterling's BLMIS accounts.

explanation for these impossible transactions is (and was) fraud.

#### 4. Custodian and Administrator

149. Basic due diligence would also have revealed that in addition to being its own broker-dealer (*see* Section VIII.15) BLMIS operated as its own custodian and administrator – outside of industry norms. While some investment management firms may operate as their own service provider in some areas (e.g., prime broker), rarely do they operate as their own provider in all of these areas.
150. All investment vehicles, whether funds or separate accounts, have a custodian – the entity that holds the assets being invested.<sup>177</sup> Custodians hold the assets of the investors for safekeeping. If there is a third-party custodian, client assets are safe even if the investment vehicle becomes insolvent.<sup>178</sup> If the investment adviser represents himself as the custodian, it is rife with the possibility of fraud, in that the adviser could theoretically misreport or misappropriate the assets, which is in fact what occurred with BLMIS. Having third parties buy and sell securities (i.e., through the use of prime brokers) and hold securities (i.e., through the use of custodians) helps deter potential fraud. This organizational model using separate entities is industry practice for the investment management industry and applies to both hedge funds and managed accounts.
151. In addition to custodians, investment vehicles also employ the services of an administrator. Administrators offer services including: fund accounting, shareholder servicing, reviewing regulatory requirements, structuring alternative investment instruments, and stock exchange reporting.<sup>179</sup> Similar to prime broker and custodian activities, investment

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<sup>177</sup> Goldman Sachs, UBS, JPMorgan Chase, Morgan Stanley, and HSBC are the top five custodians today, in terms of number of funds serviced, in the world. Hedge Fund Network, August 2011. Less than 2.5 percent of currently active hedge funds report being their own custodian: 84 out of 3,407 funds. Barclay Hedge Database, August 2011. Additionally, of the hedge funds that did maintain custody of their clients' assets, almost half of the hedge fund families of which these funds were a part reported using other custodians for other funds in the family: 4 out of 9 hedge fund families reporting using other custodians. Hedge Fund Network, August 2011.

<sup>178</sup> Mark Berman, *Hedge Funds and Prime Brokers* 42 (London: Risk Books 2009).

<sup>179</sup> Jason A. Scharfman, *Hedge Fund Operational Due Diligence* 16 (Hoboken: John Wiley & Sons, Inc. 2009).

vehicles typically do not act as their own administrator.<sup>180</sup>

##### 5. Lack of a Well-Known and Established Auditor

152. The purpose of the auditor is to review the financial statements of the audited firm and determine the legitimacy of the financials in agreement with generally accepted accounting, corporate, and government policies.<sup>181</sup> Sterling (The Mets) employs KPMG as its auditor and the Sterling Stamos fund employs Ernst & Young.<sup>182</sup>
153. Sterling testified that it knew who BLMIS's auditor was.<sup>183</sup> Basic due diligence (such as running a Dun & Bradstreet report, a site visit, or phone call) would have immediately shown that Friehling & Horowitz was a firm with one active accountant, that simply did not have the capability to provide adequate audit support to a firm the purported size of BLMIS. Madoff was a global investment adviser and BLMIS's purported size would have made it one of, if not the largest, hedge fund in the world during the 2000s (*See Appendix V*). The fact that BLMIS, with public estimates of AUM as much as \$7 billion by 2001, did not have a well-known, well-established, and well-equipped auditor was a serious warning sign that (like in Bayou) suspicious activity could be (and in fact was) occurring at BLMIS. In 2006, when BLMIS registered as an investment adviser it reported \$11.7 billion AUM and still did not use a well-known and established auditor.<sup>184</sup> Nor did BLMIS change auditors in 2007 or 2008 when AUM reported to rise to \$13 billion and

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<sup>180</sup> Less than one percent of hedge funds handle the responsibilities of an administrator for their own operations. Calculated using Barclay Global DataFeeder August 2011.

<sup>181</sup> Occupational Outlook Handbook (2010-11 ed.) (November 11, 2011), [www.bls.gov/oco/ocos001.htm#nature](http://www.bls.gov/oco/ocos001.htm#nature).

<sup>182</sup> "12/31/07 Audit Confirmation – Mets Limited Ptr" (March 5, 2008) (ELIP-BR00002602); Sterling Stamos "Letter to Investors" (October 5, 2005) (SSMSAC0000181-83). KPMG and Ernst & Young are two of the top four accounting firms (PwC, Ernst & Young, KPMG, and Deloitte & Touche are commonly referred to as the "Big 4"). These firms audit more than 50 percent of U.S. hedge funds, including providing auditing services to 18 out of 20 of the largest hedge funds. Barclays' Fund Graveyard Database as of August 2011.

<sup>183</sup> Cynthia Rongione (Bernstein) Dep. 218-219, November 15, 2011; *See also* Email from Cynthia Bernstein to David G. Friehling (August 28, 2008) (STESAK0004065).

<sup>184</sup> SEC Form ADV at 8 (August 25, 2006) (PUBLIC0003729-62 at 36).

\$17 billion respectively.<sup>185</sup>

154. The warning signs associated with using Friehling & Horowitz would have been even more pronounced at the time it was revealed that Bayou relied on a fabricated auditor in order to help perpetrate its fraud (*see* Section VIII.13). Discovering that BLMIS's auditor was a single person accounting firm with no ability or capacity to audit a company such as BLMIS, with billions of dollars under management, was a strong red flag that the situation was rife with opportunity for fraud. Auditors are, under typical industry customs and practices, expected to act as a significant check on the financial transactions of their clients—and without a capable auditor behind BLMIS there was a large opportunity for fraud to be committed.

### **C. Portfolio**

155. The analyses I performed below reflect industry practices for due diligence, and are consistent with the analyses I typically perform for high net worth and institutional clients as to both their consideration of new investments and ongoing monitoring of existing investments.

#### **1. Basket Return Relative to Benchmark**

156. One technique employed in quantitative due diligence is regression analysis. Regression analysis is a statistical technique for modeling the relationship between two or more variables. It is a common analysis in the context of quantitative due diligence, and was employed by Sterling's own hedge fund as part of their initial and ongoing due diligence procedures.<sup>186</sup>

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<sup>185</sup> SEC Form ADV, Bernard L Madoff Investment Securities (January 24, 2007) (PUBLIC0003763-96 at 3771); SEC Form ADV, Bernard L. Madoff Investment Securities (January 7, 2008) (PUBLIC0003834-64 at 3840).

<sup>186</sup> *See* Sterling Stamos Response to the Segal Advisors Investment Advisors Questionnaire (July 2007) (SSMSAA0001625-86 at 74) where Sterling Stamos includes "Regression Analysis of Hedge vs. Security Fund Returns." *See* Sterling Stamos Response to DeMarche Associates' Hedge Fund Manager Questionnaire (February 1, 2005) (SSMSAA0002134-58 at 54) where regression analysis is listed as part of ongoing monitoring. *See also* Sterling Stamos: Portfolio Team – Policies and Procedures (January 2005) (SSMSAA0015717-82 at 72).

157. A major feature of the SSC strategy from 1992 onward involved the so-called basket trades. Madoff claimed the basket trades consisted of purchasing a basket of 35 to 50 stocks correlated with the S&P 100 Index. Madoff further claimed that he would sell call options on the S&P 100, which provided Madoff a premium payment in exchange for the equity basket's potential increase in value above some threshold (i.e., the "upside" or the "strike price" of the call option), and would buy put options to protect against the equity basket's potential decline in value below some threshold (i.e. the "downside").
158. It is industry practice to monitor the performance of an investment adviser relative to benchmarks in order to determine how much of the fund's return is due to general market behavior as opposed to active management. The component of the return due to a manager's ability is commonly referred to as the "alpha" earned by the investment adviser.<sup>187</sup> Investors measure the alpha of the fund in order to assess the effectiveness of the fund manager.
159. Due diligence performed on the returns of Sterling's BLMIS accounts would show that the basket trades (the combination of stock, put and call positions) generated an absolute return of two percent with unbelievable consistency (*see* Appendix VIII).
160. Basic regression analysis of Sterling's BLMIS returns against the benchmark would have shown that Madoff made approximately two percent per basket trade regardless of corresponding returns in the market. Schedule 27 in Appendix VIII illustrates this result. The relatively low R-Squared, 0.17, of the regression is indicative of the fact that returns are being achieved independent of market conditions. Of greatest concern is that the calculated intercept, 0.0211 (indicating an alpha of 2 percent), has a t-stat of 10.56 which indicates virtual certainty, and a level of confidence unattainable in the investment

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<sup>187</sup> Mathematically, this is done by performing a linear regression of portfolio return on benchmark returns. The slope of the regression line is referred to as beta, while the intercept is referred to as alpha. For a fuller explanation, *see* William F. Sharpe, *Investments* 611-16 (New Jersey: Prentice Hall. 2<sup>nd</sup> ed. 1981).

management business.<sup>188</sup>

161. Results showing Madoff's absolute returns were consistently two percent per basket trade regardless of what the market did were a significant red flag that Madoff was not executing the strategy he purported to implement, or indeed any strategy. These results are, in my opinion, statistically impossible and were and are indicia of fraud.

**2. Lack of Material Volatility Inconsistent with Purported SSC Strategy**

162. Another common technique employed in due diligence is referred to as "reverse engineering." The goal of reverse engineering is to replicate, as best as possible, the investment strategy being pursued. This type of due diligence serves as a check on investment returns, as well as an analysis for determining reasonable expectations for performance, as well as volatility.
163. The volatility of Madoff's SSC strategy should, at a minimum, incorporate two prevalent market risks: (i) the volatility of a SSC strategy on the S&P 100 Index (i.e., purchase the S&P 100 Index and the put options on the S&P 100 Index, and sell the S&P 100 Index call options), and (ii) the volatility of the difference in performance of the top 40 stocks in the S&P 100 versus the actual S&P 100 index. Together these two data points reflect the SSC strategy as purportedly implemented by Madoff where the top 40 stocks are purchased (over a few times during the performance year), and call and put options on the S&P 100 index are sold and bought respectively.<sup>189</sup> I modeled the volatility of return for each strategy separately, the results of which are presented below, along with the volatility of Sterling's BLMIS returns.<sup>190</sup>

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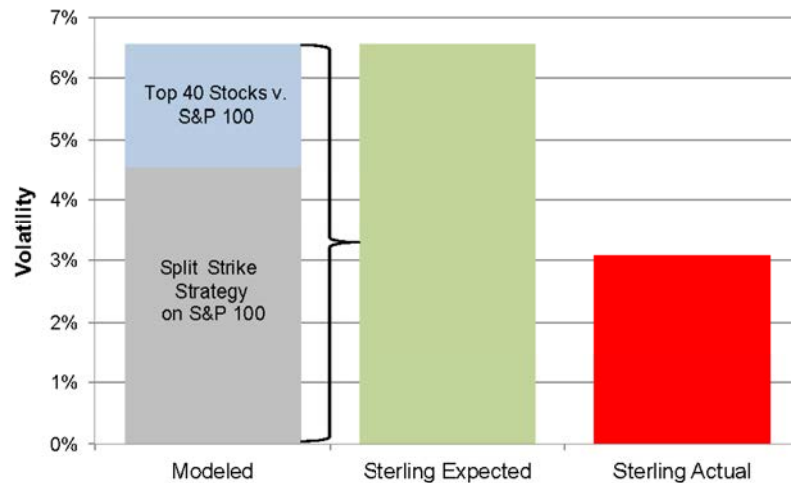
<sup>188</sup> The t-stat for a coefficient in a linear regression is the estimate of its value divided by the standard error of the estimate, and is used to create a confidence interval about the estimated coefficient. The larger the t-stat, the more likely the true coefficient differs from 0.0. *Quantitative Methods for Investment Methods* 326-27, Association for Investment Management and Research (Baltimore: United Book Press, Inc., 2001).

<sup>189</sup> For this analysis, the top 40 stocks of the index were chosen, which creates a basket that is highly correlated to the index. See Friedman Dep. 133, June 22, 2010.

<sup>190</sup> I assumed that the strike price of the put is 1.5% below the initial spot price of the index and that the strike price of the call is 2.0% above the initial spot price of the index. The procedure is repeated every month for 216 months, from December 1990 to November 2008. I used the historical option price data (closing price) from



**Figure 12**  
**Summary Performance Statistics for SSC Strategy Modeling (1990-2008)<sup>191</sup>**



164. As illustrated above, the expected volatility of the two primary market risks is significantly higher than the actual volatility produced by Sterling’s BLMIS returns. This asymmetric comparison of volatilities was a significant warning that the risk-adjusted returns produced by BLMIS for the Sterling accounts were suspicious. This due diligence also reveals that the volatility of Sterling’s BLMIS returns was inexplicably different than what should have been expected.

**D. Performance**

165. An important step in the ongoing due diligence process is to assess the performance of the

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CBOE and the index price (adjusted for dividends and splits) from Bloomberg. I used the prevailing business day 3-month U.S. Treasury bill rates from Federal Reserve to proxy the risk free rates in pricing the options and computing interest and a 1.5% dividend yield on the S&P 100 when pricing the options.

<sup>191</sup> The historical data maintained by BLMIS, that I reviewed, did not include sufficient information to calculate monthly returns for Sterling’s BLMIS accounts prior to 1996. Therefore, monthly data prior to 1996 reflects fee-adjusted returns for Fairfield Sentry, a large, well-known Madoff feeder fund. It is industry practice when conducting due diligence exercises to supplement returns in this manner. Sources include StorQM Customer Statements (weighted average across Sterling accounts), Bloomberg market data, NeuePrivat Bank November 17, 2008. Sterling Stamos also used Fairfield Sentry as representative of Sterling’s BLMIS accounts their analyses. Chachra Dep. 154-155, 202, October 8, 2010.

strategy. Sterling began investing with Madoff in 1985 and remained invested through his collapse in December 2008.<sup>192</sup> By 2007, Sterling had more than \$750 million reported on its BLMIS statements.<sup>193</sup> Sterling's annual returns were never lower than 10 percent in any year, and only had 8 months of negative returns out of 216 total months in an 18 year period.<sup>194</sup>

166. The analyses that follow are consistent with the analyses Sterling's hedge fund, Sterling Stamos, performs on its many of own investments. These analyses are customary and typical in the industry, as well as appropriate, and necessary in order to help guard against fraud and other deceit or misappropriation by an investment adviser.

#### **1. Comparison to Peers and Benchmarks**

167. In the due diligence process, a proper assessment of investment adviser performance is not conducted in a vacuum. It is appropriate to continually evaluate the performance of an investment adviser in the context of other funds, benchmarks and general market movements. It is important to note that while the cumulative red flags described at Section VIII should have prompted due diligence, institutional clients and high net worth clients, in my experience, often conduct peer analysis on a regular basis. The peer analysis presented herein uses publicly-available information available from third-party providers, and incorporates the evaluation of widely-recognized, market events.<sup>195</sup>
168. The peer analysis presented herein focuses on two primary metrics used to evaluate investment adviser performance on a risk-adjusted basis, namely the Sharpe Ratio and the Sortino Ratio. The Sharpe Ratio measures the amount of return above a risk free rate per

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<sup>192</sup> BLMIS Customer Statement for Sterling Equities (October 31, 1985) (STESAH0007297).

<sup>193</sup> SQL Database: StorQM Customer Statements.

<sup>194</sup> SQL Database: StorQM Customer Statements.

<sup>195</sup> A peer group is a collection of other funds with comparable mandates. Typically, funds in a peer group will invest in identical assets, or sectors employing similar management technique. Edward J. Stavetski, *Managing Hedge Fund Managers* 71 (Hoboken, New Jersey: John Wiley & Sons 2009); G. Timothy Haight, Stephen O. Morell & Glenn E. Ross, *How to Select Investment Managers & Evaluate Performance* 248 (Hoboken: John Wiley & Sons, Inc. 2007).

unit of risk. It is calculated as the mean portfolio return less a risk free return ( $r_p - r_f$ ), divided by the standard deviation of the returns. A higher Sharpe Ratio indicates that the investment is generating more return for the same amount of risk. The Sortino Ratio is a form of the Sharpe Ratio where only downside risk is incorporated into the formula by calculating the standard deviation of returns that are only negative.<sup>196</sup> In this manner, the Sortino Ratio does not penalize performance for being volatile if the volatility always results in positive performance.

169. I chose the Sharpe Ratio and the Sortino Ratio based upon the long-standing popularity of these metrics in the investment management industry, as well as on their acceptance within the academic community.<sup>197</sup> The ratios are common statistics used to compare performance between two or more funds, and both of these risk-adjusted performance metrics were well-established due diligence tools during the relevant time period of Sterling's investments with Madoff. Sterling Stamos used these exact same sort of metrics themselves when evaluating investment performance.<sup>198</sup> Sterling Stamos communicated to Sterling about Madoff's and various Sterling Stamos funds' Sharpe Ratios, standard deviations, and percentage of positive months.<sup>199</sup>
170. Two other related metrics, the number of months with positive returns and the number of months with negative returns, are also included in the analysis as they are helpful in

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<sup>196</sup> In the formula for Sortino Ratio the positive returns are set to 0 for purposes of calculating the standard deviation.

<sup>197</sup> See the following: (i) [http://www.morningstar.com/InvGlossary/sharpe\\_ratio.aspx](http://www.morningstar.com/InvGlossary/sharpe_ratio.aspx); (ii) [http://www.morningstar.com/InvGlossary/sortino\\_ratio\\_definition\\_what\\_is.aspx](http://www.morningstar.com/InvGlossary/sortino_ratio_definition_what_is.aspx); (iii) [http://www.russell.com/us/glossary/analytics/sharpe\\_ratio.htm](http://www.russell.com/us/glossary/analytics/sharpe_ratio.htm); (iv) [http://www.russell.com/us/glossary/analytics/sortino\\_ratio.htm](http://www.russell.com/us/glossary/analytics/sortino_ratio.htm); and (v) 2011 CFA Curriculum, Level III, p. 172. The Sharpe Ratio was developed by William Sharpe and made public in his 1966 Journal of Business publication *Mutual Fund Performance*. William Sharpe, *Mutual Fund Performance*, The Journal of Business 119-128 (Vol. 39, No. 1, Part 2, January 1966). The Sortino Ratio was developed by Frank Sortino and Lee Price and made public in their 1994 Journal of Investing publication *Performance Measurement in a Downside Risk Framework*. Frank Sortino and Lee Price, *Performance Measurement in a Downside Risk Framework*, The Journal of Investing 59-64 (Vol. 3, No.3 Fall 1994).

<sup>198</sup> See, e.g., "Net Performance Overview" (undated) (SSMSSA00284955-4984).

<sup>199</sup> E-mail from Soraya Cohen to David Katz re: Updated Performance Spread Sheet (October 10, 2005) (STESAT0001316); Email from Ashok Chachra to Soraya Cohen re: Updated Performance Spread Sheet (October 10, 2005) (SSMSAA0231352).

evaluating the performance of investment advisers. Sterling Stamos also used these metrics in its comparison of performance across funds.<sup>200</sup>

171. Sterling's pattern of historical BLMIS returns was examined within the context of each different peer group, such as hedge funds, mutual funds, and world-class investment advisers. This range of investment alternatives casts a wide net for performance comparisons, and as further discussed below, I selected funds within these categories that exhibited similar characteristics to Madoff as related to strategy, asset classification, and/or skill of the investment adviser (e.g., when analyzing elite investment advisers).
172. As revealed below, across all four performance metrics, and across all peer groups, and across all time considered, Madoff always outperforms his peers to a degree of statistical implausibility, if not impossibility. In my opinion, it is implausible for an investment adviser to outperform, and often by a significant amount, every peer group, across virtually every performance metric, across lengthy periods of time.

**a) Hedge Funds**

173. My analysis of hedge fund returns involves data obtained from BarclayHedge, a comprehensive hedge fund database.<sup>201</sup> Using this database I created a peer group of hedge funds implementing comparable strategies to Madoff's SSC strategy.
174. BarclayHedge includes information on approximately 8,700 hedge funds, and categorizes these hedge funds into 35 different primary strategies based on the type of strategy

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<sup>200</sup> See, e.g., "Net Performance Overview," (undated) (SSMSAA00284955-84). The importance of positive returns is highlighted by Sterling's marketing materials for the Mets that advertises "Over last 25 years, Madoff returns have averaged 18% with a standard deviation of 4%" and "Above statistics predict positive annual returns 99.9% of the time." "Lenders' Meeting Presentation - Mets" (March 9, 2004) (STESBJ0005876-924 at 903).

<sup>201</sup> <http://www.barclayhedge.com>. My sample includes only "Hedge Funds," thereby excluding the following fund types: (i) Funds of Funds, (ii) CTA, and (iii) Benchmark Indices. Only hedge funds that report returns "Net of All Fees" have been included. I believe this to be consistent with reported returns of Fairfield Sentry, which was reported to be a feeder fund invested with Madoff, using the same SSC as purportedly implemented for Sterling. Michael Ocrant, *Madoff tops charts; skeptics ask how*, MAR/Hedge (Issue No. 89, May 2001) (STESAP0000204-08). For each time period examined, the sample includes only funds which published returns for every month in the period of interest. Chachra Dep. 154-155, October 8, 2010.

followed by the hedge fund.<sup>202</sup> Consistent with due diligence customs and practices, I reviewed the strategies/categories used by BarclayHedge, and identified those strategies that I considered most comparable to Madoff's purported SSC strategy. I identified three such strategies, and all of the hedge funds categorized by BarclayHedge in these strategies were included in my peer group ("Hedge Fund Peer Group"). The strategies/categories that I identified as most comparable to Madoff's SSC strategy were the following: (1) equity market neutral; (2) equity long/short; and (3) equity long-bias. These categories are most comparable because they invest in hedged domestic equity strategies. I further note that BarclayHedge includes American Masters Broad Market Fund LP, a hedge fund run by Tremont that was invested with Madoff, within the "equity market neutral" category. The following descriptions are provided by BarclayHedge for each strategy:

- **Equity Market Neutral:** This investment strategy is designed to exploit equity market inefficiencies and usually involves being simultaneously long and short matched equity portfolios of the same size within a country. Market neutral portfolios are designed to be either beta or currency neutral, or both. Well-designed portfolios typically control for industry, sector, market capitalization, and other exposures. Leverage is often applied to enhance returns.<sup>203</sup>
- **Equity Long/Short:** This directional strategy involves equity-oriented investing on both the long and short sides of the market. The objective is not to be market neutral. Managers have the ability to shift from value to growth, from small to medium to large capitalization stocks, and from a net long position to a net short position. Managers may use futures and options to hedge. The focus may be regional or sector specific.<sup>204</sup>
- **Equity Long-Bias:** Equity Long/Short managers are typically considered long-biased when the average net long exposure of their portfolio is greater than 30%.<sup>205</sup>

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<sup>202</sup> BarclayHedge assigns one primary strategy to each hedge fund.

<sup>203</sup> [http://www.barclayhedge.com/research/indices/ghs/Equity\\_Market\\_Neutral\\_Index.html](http://www.barclayhedge.com/research/indices/ghs/Equity_Market_Neutral_Index.html).

<sup>204</sup> [http://www.barclayhedge.com/research/indices/ghs/Equity\\_Long\\_Short\\_Index.html](http://www.barclayhedge.com/research/indices/ghs/Equity_Long_Short_Index.html).

<sup>205</sup> [http://www.barclayhedge.com/research/indices/ghs/Equity\\_Long\\_Bias\\_Index.html](http://www.barclayhedge.com/research/indices/ghs/Equity_Long_Bias_Index.html).

175. I assessed the Sharpe Ratio, Sortino Ratio, and number of months with negative and positive returns for the above-described Hedge Fund Peer Group on a ten-year rolling basis over the period January 1991 through November 2008. I used a ten-year period for purposes of my performance analyses because ten years is consistent with industry practice, and more importantly, it reduces the margin of error (as opposed to using a three-year or five-year time period for example). In terms of industry practice, historical performance analyses using 10 years of data is standard for the Association for Investment Management and Research (“AIMR”) Performance Presentation Standards (“AIMR-PPS”).<sup>206</sup> The AIMR-PPS standards were first introduced in 1987. In addition, in order to be compliant under the Global Investment Performance Standards (“GIPS”) published by the CFA Institute, and formally endorsed in 1999,<sup>207</sup> firms must initially report at least five years of historical performance, building up to a minimum of 10 years of historical performance.<sup>208</sup>
176. I first assembled the returns for all funds that reported monthly performance consistently from January 1991 through December 2000, which I refer to herein as the “2000 Rolling 10-Year Hedge Fund Peer Group.”<sup>209</sup> I assembled analogous Rolling 10-Year Hedge Fund Peer Groups for 2000 through 2008.<sup>210</sup> I evaluated each performance metric of interest over 10 years of returns data for each of the nine Rolling 10-Year Hedge Fund Peer Groups. For example, the Sharpe Ratios in each ten-year period presented herein were

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<sup>206</sup> *AIMR-Performance Presentation Standards*, Association for Investment Management and Research 4 (2001), [www.aimr.org](http://www.aimr.org).

<sup>207</sup> GIPS was endorsed in 1999 by AIMR, the predecessor to CFA Institute.

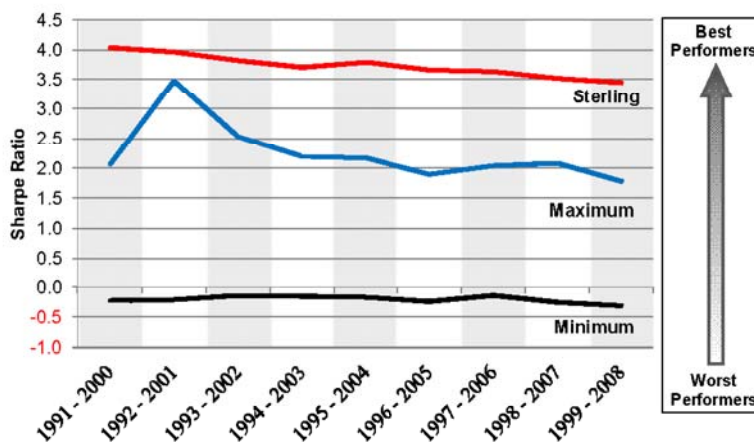
<sup>208</sup> CFA Institute, *Global Investment Performance Standards 2* (2010).

<sup>209</sup> This is the first ten-year period in the dataset with at least 30 funds. The peer group for this period includes 58 funds.

<sup>210</sup> Each ten-year period includes a different set of hedge funds (i.e., those hedge funds for which ten years of monthly data is available over the relevant time period).

calculated using returns data over 120 months.<sup>211</sup>

**Figure 13**  
**Sharpe Ratio for Hedge Fund Peer Group v. Sterling BLMIS<sup>212</sup>**  
**Rolling 10-Year Periods Ending 2000-2008**



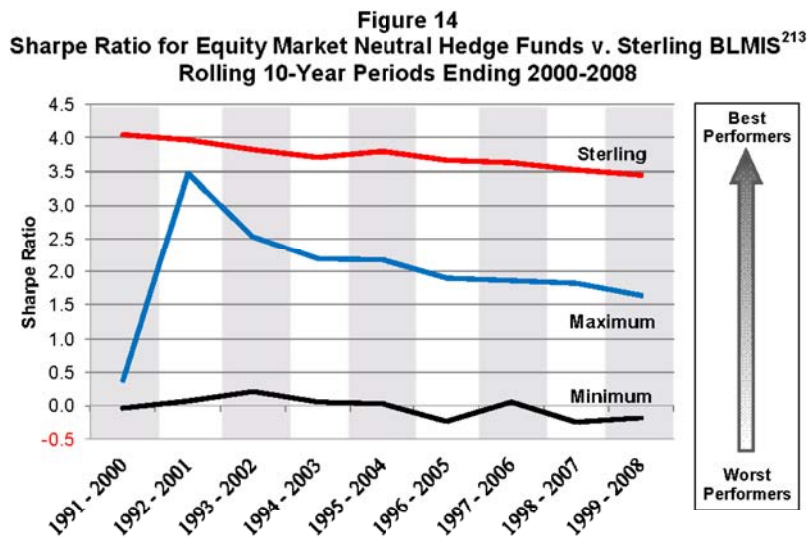
177. The Sharpe Ratio for Sterling was higher than the maximum Sharpe Ratio of any fund in the Rolling 10-Year Hedge Fund Peer Groups for every period for which data was provided (2000 through 2008).
178. The only year in which the Sharpe Ratio for the Hedge Fund Peer Groups was somewhat close to that of Sterling, was 2001. Interestingly, the fund that generated a Sharpe Ratio close to Sterling's for the 2001 Rolling 10-Year Period was the American Master's Broad Market fund, which was managed by Tremont and invested with Madoff. In other words, the only fund which produced a 10-Year Sharpe Ratio from 2000 through 2008 that was close to Sterling's was a Madoff-managed Tremont fund.
179. Charts of the 2000 and 2008 10-Year Periods highlight Sterling's position as a significant

<sup>211</sup> Given that Madoff's operations stopped in December 2008, the 2008 Rolling 10-Year Peer Group runs from January 2000 through November 2008. Accordingly, the metrics for this peer group are calculated over 119 months of returns data.

<sup>212</sup> 2000 is the first year in which there is sufficient data available for a 10 year period. 2008 data is through November 2008. Sources include StorQM Customer Statements, Settled Cash table, BarclayHedge Database, Neue Privat Bank November 17, 2008, Federal Reserve FRB H.15 Release.

outlier in the distribution of hedge fund peers, regardless of what time period is analyzed (see also Appendix VI). The Sharpe Ratio for Sterling was a red flag in 2000 as much as it was in 2008 (and all the years in between).

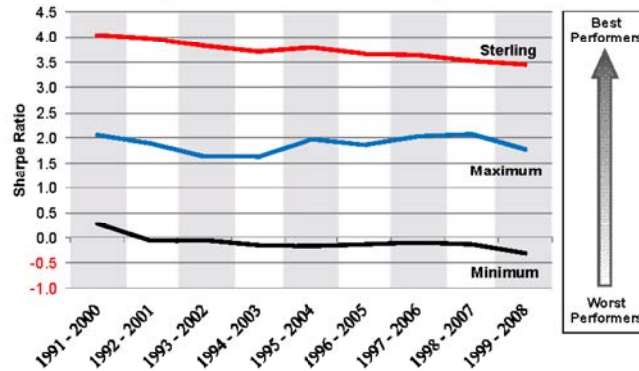
180. While the figure above includes all hedge funds in the Hedge Fund Peer Group, the same conclusions, by definition, are drawn from the three strategy/categories that comprise the Hedge Fund Peer Group. That is, if the maximum Sharpe ratio across all hedge funds in all strategies is less than the Sharpe ratio for Sterling's BLMIS accounts, then the maximum Sharpe ratio in any one strategy/category will be less than the Sharpe ratio for Sterling's BLMIS accounts. The figures below illustrate this:



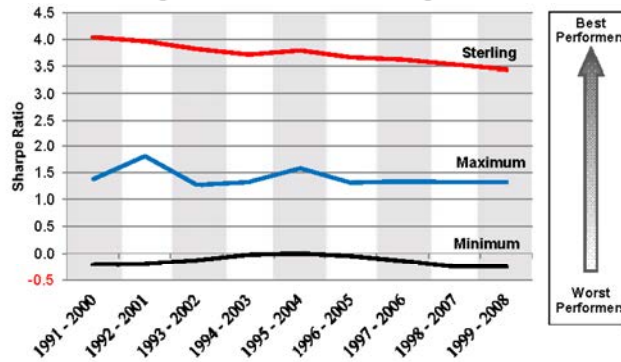
<sup>213</sup> 2000 is the first year in which there is sufficient data available for a 10 year period. 2008 data is through November 2008. Sources include StorQM Customer Statements, Settled Cash table, BarclayHedge Database, Neue Privat Bank November 17, 2008, Federal Reserve FRB H.15 Release.



**Figure 15**  
**Sharpe Ratio for Equity Long/Short Hedge Funds v. Sterling BLMIS<sup>214</sup>**  
**Rolling 10-Year Periods Ending 2000-2008**



**Figure 16**  
**Sharpe Ratio for Equity Long-Bias Hedge Funds v. Sterling BLMIS<sup>215</sup>**  
**Rolling 10-Year Periods Ending 2000-2008**

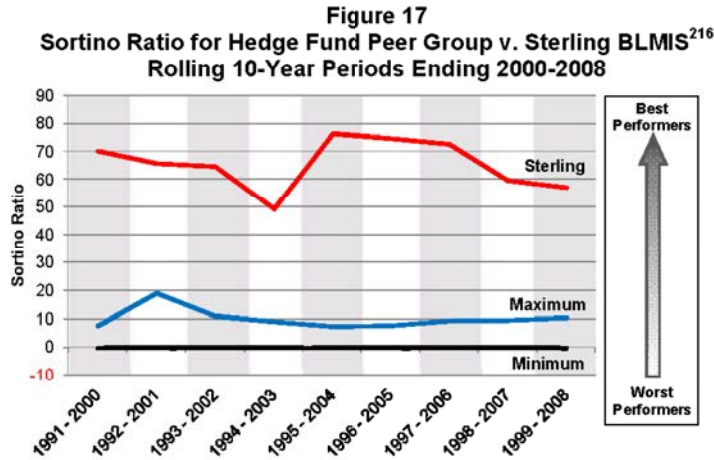


181. The Sortino Ratios for Sterling were also significantly higher than the maximum for the Rolling 10-Year Hedge Fund Peer Groups for every period for which data was provided as illustrated below. The Sortino Ratios for Sterling’s BLMIS accounts are so much higher

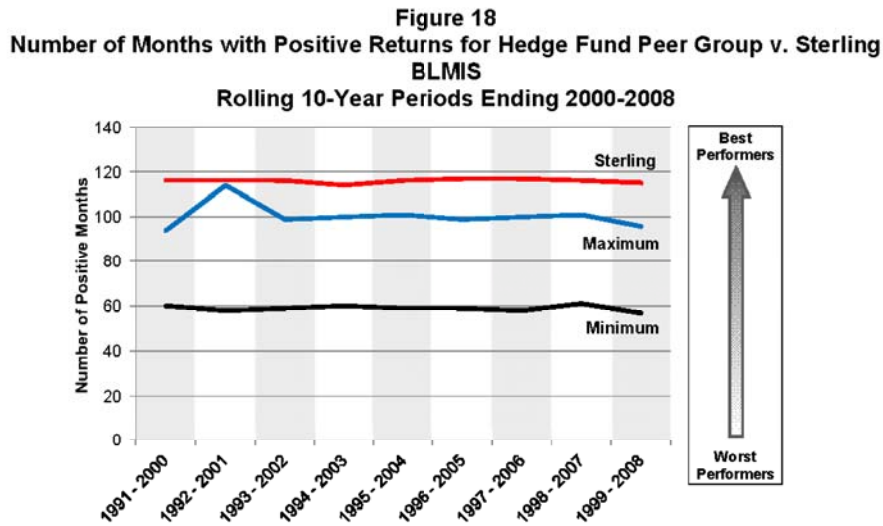
<sup>214</sup> 2000 is the first year in which there is sufficient data available for a 10 year period. 2008 data is through November 2008. Sources include StorQM Customer Statements, Settled Cash table, BarclayHedge Database, Neue Privat Bank November 17, 2008, Federal Reserve FRB H.15 Release.

<sup>215</sup> 2000 is the first year in which there is sufficient data available for a 10 year period. 2008 data is through November 2008. Sources include StorQM Customer Statements, Settled Cash table, BarclayHedge Database, Neue Privat Bank November 17, 2008, Federal Reserve FRB H.15 Release.

than their peers primarily because Sterling’s BLMIS returns were rarely negative.

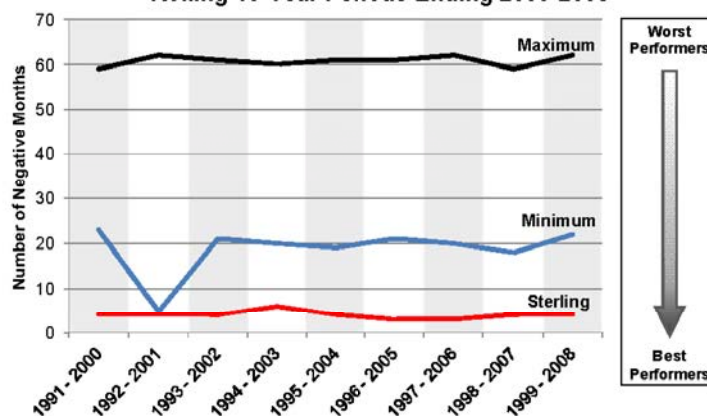


182. The figures below illustrate that Sterling’s BLMIS returns were also outliers in terms of months with consistently positive returns and lack of months with negative months.



<sup>216</sup> 2000 is the first year in which there is sufficient data available for a 10 year period. 2008 data is through November 2008. Sources include StorQM Customer Statements, Settled Cash table, BarclayHedge Database, Neue Privat Bank November 17, 2008, Federal Reserve FRB H.15 Release.

**Figure 19**  
**Number of Months with Negative Returns for Hedge Fund Peer Group v. Sterling**  
**BLMIS**  
**Rolling 10-Year Periods Ending 2000-2008**



183. It is clear from my evaluation of the above-presented metrics that Madoff-managed funds were significant outliers in the hedge fund world from 1991 through 2008. This was indicia of fraud and further evidence that Madoff was lying about his purported strategy.

#### **b) Mutual Funds**

184. Consistent with due diligence customs and practices I also considered a peer analysis using mutual funds that implemented investment strategies comparable to Madoff's purported SSC strategy. As part of quantitative due diligence it is common practice to review both hedge funds and mutual funds for investment strategies comparable to the target investment strategy. My analysis of mutual fund returns involves data obtained from Morningstar, a comprehensive mutual fund database.

185. Morningstar includes information on over 131,000 mutual funds,<sup>217</sup> and categorizes these mutual funds into 7 global asset strategies, with multiple subcategories for a total of 101

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<sup>217</sup> <http://corporate.morningstar.com/US/documents/Brochures/DirectProductBrochure.pdf> (accessed on November 20, 2011).

possible strategies/categories.<sup>218</sup> Consistent with due diligence customs and practices I reviewed the categories used by Morningstar and identified those categories that included strategies that I considered most comparable to Madoff's purported SSC strategy. I identified one such category (the Hedge Fund sub-category within the Alternative global asset category), and all of the funds categorized by Morningstar as Hedge Fund were included in my peer group ("Mutual Fund Peer Group"). I note that Morningstar includes Gateway, a mutual fund implementing an SSC strategy, within the Hedge Fund category. Morningstar defines the Hedge Fund category as follows:

- Hedge Fund: Hedge fund portfolios engage in alternative strategies. Hedge fund portfolios can focus on specific areas of the market and/or specific trading strategies.<sup>219</sup>

186. Consistent with my evaluation of hedge funds, I assessed the Sharpe Ratio, Sortino Ratio, and number of months with positive and negative returns for the above-described set of mutual funds on a 10-year rolling basis. I evaluated mutual fund performance over the period January 1996 through November 2008. I first assembled the returns for all funds that reported monthly performance consistently from January 1996 through December 2005, which I refer to herein as the "2005 Rolling 10-Year Mutual Fund Peer Group."<sup>220</sup> I assembled analogous Rolling 10-Year Mutual Fund Peer Groups for 2006 through 2008. I evaluated each metric of interest over 10 years of returns data for each of the four Rolling 10-Year Mutual Fund Peer Groups. Again, the Sharpe and Sortino Ratios presented herein were calculated using returns data over 120 months.<sup>221</sup> The following figures illustrate the results of the Sharpe and Sortino Ratios (*see also* Appendix VII).

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<sup>218</sup> The number of subcategories per global asset category ranges from 1 to 48. *The Morningstar Global Category Classifications*, Morningstar Methodology Paper (March 31, 2010).

<sup>219</sup> *The Morningstar Global Category Classifications*, Morningstar Methodology Paper (March 31, 2010).

<sup>220</sup> This is the first ten-year period in the dataset with at least 30 funds. The peer group for this period includes 31 funds.

<sup>221</sup> Consistent with my hedge fund analysis, the metrics for my 2008 Rolling 10-Year Mutual Fund Peer Group are calculated over 119 months of returns data.