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Martingale Asset Management L.P. in 2008, 130/30 Funds and a Low Volatility Strategy

In early July of 2008, William (Bill) Jacques, one of the Founders, Executive Vice President, and Chief Investment Officer at Martingale Asset Management, a quantitative value-oriented investment manager in Boston, Massachusetts, was busy preparing for an upcoming meeting with the group that made new product decisions within the firm. The objective of the meeting was to review the investment results of a new strategy that Martingale had been running with its own money for six full months now, and to discuss next steps.

Next to his desk, hanging from the only non-glass wall in his office, was Bill's favorite artwork. It represented a large wooden map of the United States covered with vintage license plates from the 1960's and 1970's cut in the shape of each state. The combination of colors, shapes, numbers and letters induced a pleasant effect on the eye, while at the same time kept the brain busy reading and searching for information in those old license plates. To Bill, this artwork epitomized Martingale's approach to investment: Innovate by making connections between seemingly disparate ideas and blending them together to create something new and valuable.

The new strategy certainly reflected this motto. It was inspired by published research showing that portfolios of stocks built to have low historical volatility not only continued to have low volatility in subsequent periods; they also exhibited returns which were at least as good as the returns on broad based stock indices such as the S&P 500 or the Russell 1000. Martingale's insight had been to develop a minimum variance strategy within the framework of a 130/30 fund, of which Martingale had been an early adopter and promoter. Also known as short extension strategies, 130/30 funds were portfolios that relaxed the long-only constraint of traditional managers by allowing a limited amount of shorting. A 130/30 fund typically invested long $130 for each $100 of equity capital, and took short positions worth $30.

The performance of the strategy thus far had been strong, confirming the extensive back-testing results that Bill and his investment team at Martingale had been conducting for months prior to launching the strategy in late December 2007. (See **Exhibit 9**). Yet Bill felt the group needed to have another in-depth discussion of the strategy. While Bill believed that markets were not perfectly efficient all the time—Martingale thrived on discovering market anomalies and exploiting them for the benefit of its investors—, he felt that this apparent anomaly challenged one of the basic tenets of investing: That broad based portfolios of assets should exhibit a positive relation between risk and return.

Professor Luis M. Viceira and Research Associate Helen H. Tung prepared this case. HBS cases are developed solely as the basis for class discussion. Cases are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective management.

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Thus, Bill still wondered whether this was truly a market anomaly, or whether it was simply a fluke of the data, a spurious pattern that was unlikely to persist in the future. Bill had some ideas as to what might lead investors to not demand higher returns on more volatile stocks which he wanted to discuss with his group. He was particularly eager to discuss them with Arnold (Arnie) Wood, a Founder and President of Martingale who was a highly respected expert in behavioral finance. Arnie's input would be critical before he encouraged Martingale to offer a 130/30 low volatility product to outside investors.

The Firm and its Investment Process

Martingale, a quantitative value-oriented investment management firm located in Boston, Massachusetts, was founded in 1987 by Alan Strassman, Arnold (Arnie) Wood, William (Bill) Jacques, and Patricia O'Connor, who all shared a common vision about how to structure an asset manager and a core set of investment beliefs. The founding partners had previously worked together for over 10 years at Batterymarch Financial Management, an asset management firm which had been one of the first to pioneer index investing and value investing strategies packaged for institutional investors in the 1970's.

By 2008, Martingale managed approximately $5 billion in traditional equity, long/short, and short extension U.S. equity portfolios for 40 institutional clients, which included public and private pension funds, endowments, and state funds. See **Exhibit 1** and **Exhibit 2** for information on Martingale strategies.

Martingale has 21 employees, including 12 partners, who all work in the Boston office. The firm is wholly owned by its employees, with its four founding partners owning the majority of the partnership. The founders remain active in the daily operations of the firm. They also maintain close working relationships with a number of academics and encourage research in areas of interest to the firm.

Martingale's investment team believes that markets are relatively efficient in the long run, and avoids making bets that involve any kind of market timing. But they also believe that mispricing anomalies exist at the individual stock level caused by investors for whom emotions interfere with sound judgment. Martingale pursues research to identify these anomalies, and exploits them for the benefit of its clients. The development of investment strategies is supported and enhanced by Arnie's expertise in behavioral finance and knowledge of the academic and practitioner research in this area.

But a culture of forward thinking is only the starting point for the development of profitable investment strategies. Martingale's founders also believe in the discipline of quantitative methods for portfolio construction and in the value of execution to minimize implementation costs.

An example of Martingale's approach to investing was the LargeCap Value 200 strategy, launched in 1996. Martingale's insight was that investors probably were significantly underweighting the largest stocks in the market in the belief that they were fairly valued because of their extensive analyst coverage, and the tendency of active managers to focus attention on smaller sized stocks. The insight that large capitalization stocks might be misvalued proved to be correct on careful examination of the prices of these stocks relative to their fundamentals. This led to a quantitative value strategy that invested in the top 200 stocks in the Russell 1000 universe, which had returned 9.1% p.a. since inception on July of 1996 through June 30, 2008 versus 7.9% in the Russell Top 200 Value Index and 7.3% in the S&P 500.

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In selecting stocks, Martingale used a proprietary multi-factor security valuation model. First, they valued stocks based on ratios such as price/1-year forward earnings, and price/cash earnings. Second, they found undervalued stocks by looking at growth characteristics such as internally financed sustainable growth rates. Other factors in the valuation model included relative strength, management quality and analysts' earnings estimate revisions. Martingale never met with company management or listened to company conference calls to avoid the human tendency to develop biased judgment after meeting people. Martingale generated their investment research internally. They did not pay for external research through commissions and they did not participate in soft dollar trading.

Martingale used these criteria to rank stocks within an industry from undervalued to overvalued. Stocks at the top of the list were potential buys and the ones at the bottom were possible shorts. In the portfolio construction process, Martingale avoided bets on the direction of the stock market, it was always fully invested—Bill would say that "not being fully invested is not a safe position; it is an active market bet"—, and it sought to neutralize risks relative to the benchmark with respect to sector/industry, size/style, and beta. To keep trading costs low, Martingale maintained a diversified trade list and used principal trading done through a competitive auction process with guaranteed execution, along with conventional agency trading. In addition, Martingale continually evaluated alternative liquidity channels.

Short Extension Funds

Martingale was one of the first asset management firms to offer short extension funds in 2004. This style category had been growing rapidly since the introduction of the first fund in 2003. By March 31, 2008, short extension funds in the U.S. had about $66 billion in assets under management (AUM). Martingale managed about $1 billion and ranked 14th by AUM in the U.S. short extension universe.[1] (See **Exhibit 3** for the top 50 U.S. short extension managers.)

In three years time, total U.S. assets were projected to grow to $125 – $300 billion from U.S. institutional investors increasing or initiating investment mostly as a result of shifting funds from their long-only public equity allocations.[2] Analysts expected that traditional asset managers would move actively into this area and that these funds would capture a significant share of active funds in the near future, with retail oriented funds being offered as soon as 2009.

A short extension strategy seeks to enhance the return on a benchmark index by relaxing the long-only constraint in traditional active portfolios, while keeping the beta exposure with respect to the benchmark at one. This is achieved by shorting a small portion of the portfolio value and offsetting the short positions with an equal value of additional long positions so as to be net 100% long. A structure popular among short extension funds includes a long exposure of 130% of equity capital and a short exposure of 30%, for a net long exposure of 100% and a shorting ratio of 30%. This structure is so common that short extension funds are also known as "130/30 funds" regardless of their actual long/short exposure.[3]

The benefit of a short extension is that it has allowed fund managers to more fully express positive and negative views on expected individual stock returns than in a long-only fund. The long-only

[1] Pichardo, Raquel, "Frost Forms on 130/30 Growth," *Pension and Investment*, April 28, 2008.

[2] "130/30 Portfolios – Here Comes the Wave," Merrill Lynch, pg 12.

[3] Other names included enhanced alpha, alpha tilts, short enabled, limited shorting, information efficient. Funds sometimes used different amounts of leverage so that a 120 long and 20 short was called a "120/20."

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constraint restricts managers' use of their forecasting information and limits their effectiveness in transferring that information into a portfolio structure. A short extension structure allows managers to better exploit their views on stocks that are expected to underperform by shorting such stocks, and to use the proceeds from the short sale to fund more long positions of stocks expected to outperform.

To illustrate the limitations of a long-only mandate, consider the passive weights associated with a benchmark broad-based index, such as the Russell 1000 index. Typically, a small number of stocks account for a large percentage of the index value. **Exhibit 4** shows a descending rank order list of stocks according to their weights in the Russell 1000 index as of December 2007. The largest stock had a weight in the index of 3.5%, 911 stocks (91%) had weights less than 50 basis points, and 775 stocks (78%) had weights less than 10 basis points. For a long-only manager, the most bearish position on a stock means not owning the stock, that is, an underweight equal to the stock's benchmark weight, which for most of the stocks in the index is not meaningful. The smaller the benchmark weight, the lower the ceiling on the potential gains that can be derived from a long-only manager's negative view.

Optimal Shorting Ratio

Regulatory constraints aside, the optimal shorting ratio in a short extension fund depends on a number of factors, of which the ability of the manager to identify profitable risk-adjusted investment opportunities and the investor tolerance for tracking error are important ones. If the manager is skillful, then a higher shorting ratio—or equivalently, a lesser degree of portfolio constraints—might help the manager improve the information ratio of his strategy, as he would be able to translate more effectively his security ranking signals into active portfolio weights.[4] However, as portfolio constraints are relaxed, one might also expect the tracking error of the strategy to increase. Early research on the impact of portfolio constraints on the performance of active stock investment strategies suggested that a 20%-30% shorting ratio was enough to optimize the information ratio for typical tracking errors of 3%-4%.[5]

There are regulatory constraints in the U.S. that limit the maximum amount of shorting that traditional asset managers can adopt. In the U.S., mutual funds and other investment companies regulated under the Investment Company Act of 1940 are not allowed to relinquish custody of their long positions to a broker. This in turn limits their leverage to a maximum of 50%, which is the maximum amount of credit that the Federal Reserve Board allows brokerage firms and dealers to extend to customers for the purchases of securities on margin. This is known as Regulation T.

But other types of investment vehicles such as separate accounts are allowed to have stock loan accounts with prime brokers where a fund manager is counterparty to a stock lending transaction and is not subject to the leverage limits of Regulation T. In that case, the prime broker sets the leverage limit.[6]

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[4]The information ratio was defined as the portfolio's expected active return divided by the tracking error. The active return was the portfolio return minus the benchmark return. The tracking error was defined by the standard deviation of the active return. The information ratio was similar to the Sharpe ratio, but the Sharpe ratio compared the excess return to a risk-free rate while the information ratio compares the active return to a benchmark return.

[5]See Clarke, Roger, et al., "Toward More Information-Efficient Portfolios," The Journal of Portfolio Management, Fall 2004; and Litterman, Bob, "Active Alpha Investing," Open Letter to Investors, Goldman Sachs Asset Management, 2005.

[6] Jacobs, Bruce I. and Kenneth N. Levy, "20 Myths about Enhanced Active 120-20 Strategies," Financial Analysts Journal 63, no. 4, 2007.

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Tax Considerations

Short extension funds, when properly structured, do not generate taxes for an otherwise tax-exempt U.S. investor. In instances where tax-exempt investors borrow funds to buy stock, they incur "acquisition indebtedness" and are subject to taxes on Unrelated Business Taxable Income (UBTI). However, this tax can be avoided if the extra long position is bought with proceeds from the short sale and not with a margin loan.[7] Short extension funds entered prime brokerage relationships that allowed them to use the proceeds from short positions to finance their long positions, and thus did not involve indebtedness.

Of course, taxable investors would be subject to ordinary income and capital gains taxes on the dividend and capital gains distributions of the fund. Current U.S. regulations stipulate that returns from short sales are always subject to short-term capital gains taxes, regardless of how long the short position had been open.

Costs

In a short extension fund, there are shorting and borrowing costs associated with the extended portion of the portfolio. These fees are consolidated into what is generally known as a stock loan fee or a stock loan cost. Essentially, the broker allows the fund manager to have access to the proceeds of the short sales to invest in the extra long positions. The stock loan fee is negotiated, and in general, is in the range of 50-75 basis points on the value of the extra long positions.

The fund manger pays the securities' lenders the dividends on the short positions with the dividends from long positions which, given the strong long bias built into these funds, is typically more than sufficient. The fund manager typically maintains only a small amount of cash.

Trading costs in a short extension fund are higher than in a long-only portfolio due to higher stock turnover. Turnover in a short extension portfolio scales with leverage. In a 130/30 portfolio, turnover is roughly 60% higher than in a long-only portfolio because there is 60% more to invest (30% short and 30% extra long). Of course, portfolio optimizers take into account the trading costs in its cost benefit analysis in analyzing a trade.

Increased transaction and management costs for short extension portfolios led to higher fees. Fees for short extension funds for U.S. equities range from 60 to 100 basis points (bps), which were higher than the 50-80 bps for an active U.S. large cap strategy or the 30-50 bps for an enhanced U.S. index strategy.[8]

Short extension funds at Martingale

Martingale was one of the first asset managers to offer short-extension funds in 2004. By early 2008, Martingale offered four funds based on the 130/30 model. (See **Exhibit 1**). Each fund tracked one benchmark index and was designed to be neutral to the benchmark in factors such as size, style, sector, beta, and volatility.

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[7] U.S. IRS Revenue Ruling 95-8 stated income a tax exempt organization received that was attributable to a short sale of publicly traded stock through a broker was not treated as UBTI under code section 514. See www.irs.gov.

[8] Cooper, Jay, "130/30s pull in $30 billion," *Pensions and Investments*, April 16, 2007.

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Martingale did not see a short extension strategy as a long-only portfolio and a separately constructed long-short portfolio. Rather, they implemented an integrated optimization algorithm that included all the long and short positions at once, along with the desired benchmark exposure. For example, in late December 2007, the 30% short extension in Martingale's 130/30 LargeCap Core fund was split between the two smallest quintile stocks in the Russell 1000, with about 26% going into the smallest quintile. The 130% long was distributed in the smallest to the largest quintile in percentages equal to 52%, 31% 14%, 15%, and 18% respectively.

Stock selection was based on Martingale's proprietary model that evaluated stock characteristics to find the most and least favored stocks. **Exhibit 5** shows a list of the top ten holdings, the top ten overweighted stocks and the top ten underweighted stocks held in Martingale's 130/30 LargeCap Core 500 fund in January 2008. Exhibit 5 also shows the industry composition of the benchmark, and the relative long and short positions of the fund in each industry.

The Risk Anomaly in the Equity Market

Historically, riskier asset classes such as equities have experienced higher returns than less risky asset classes such as bonds or cash. The historical experience has been consistent with the notion that greater risk is rewarded with higher expected return. But recent empirical studies suggested that the risk-return tradeoff might not be operating at the individual equity level. In particular, a study of the largest (by market capitalization) 1,000 U.S. stocks from 1968-2005 found that stock portfolios constructed to have minimum variance had about 75% of the risk of the market capitalization weighted portfolio, while achieving approximately the same or greater average return.[9]

Exhibit 6 shows portfolio return statistics for the market and several minimum variance (MV) portfolios constructed using different constraints and portfolio construction techniques. For example, the "Unconstrained MV Bayesian Shrinkage" portfolio had an annualized excess return over T-bills of 6.5% and an annualized standard deviation of 11.7% which resulted in a Sharpe ratio of 55%.[10] By contrast, the market had an average excess return of 5.6% and a standard deviation of 15.4% which resulted in a Sharpe ratio of 36%. This suggested that a 1.3x levered version of the MV portfolio could achieve a return of 8.5% p.a. with the same volatility as the market portfolio.

These results came at the cost of considerably higher turnover for these portfolios when compared to the turnover for the benchmark portfolio. For example, the monthly turnover rate for the "Unconstrained MV Bayesian Shrinkage" was 11.9% (143% annual), while it was 2.0% (24% annual) for the benchmark portfolio. But by changing the frequency of portfolio rebalancing from monthly to annual, the annual average turnover fell to 56% per annum, with only a 14 bps increase in monthly standard deviation and a minor change in monthly return of 12 bps. So a leveraged MV portfolio with less frequent rebalancing still outperformed the benchmark.

Minimum variance portfolios also exhibited tracking errors that resembled those typical in highly active equity strategies. Tracking errors ranged from 6% to 12%, and were particularly large in the 1999-2002 period, when market volatility was also high. (See **Exhibit 7**). Minimum variance portfolios also tended to have a small size and value bias, but not a momentum bias. But the study found that these biases could explain only about 60% of the superior performance of these portfolios. That is,

[9] Clarke, Roger, Harinda de Silva, and Steven Thorley, "Minimum-Variance Portfolios in the U.S. Equity Market," Journal of Portfolio Management, Fall 2006.

[10] The average T-bill return over this period was 5.9%.

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one could construct minimum variance portfolios that were neutral with respect to value and size and that exhibited lower volatility with about the same average return as the market portfolio.

Despite the larger turnover and tracking error of these strategies, institutional investors had shown much interest in them. To help investors better measure MV fund performance and to help grow MV strategies, a new benchmark was created in April 2008 for MV strategies. It was called MSCI World Minimum Volatility index.

Minimum Variance Short Extension Fund

A second study found that one could construct long-short portfolios based on stock volatility rankings that generated a subsequent positive return spread while preserving the risk ranking.[11] The study used monthly returns of all U.S. stocks from the period 1968-2005 and grouped the stocks into five volatility quintiles based on the standard deviation in monthly returns over the prior five years. Portfolio returns and portfolio volatility were calculated over the next month. The study found that the lowest quintile portfolio had a higher average return and lower volatility than the highest volatility quintile portfolio. This relationship prevailed in both periods of economic contraction and periods of economic expansions. (See **Exhibit 8** for portfolio statistics of the volatility-ranked quintile portfolios.) It also prevailed if one used beta with respect to the benchmark instead of volatility to rank stocks.

Thus, low volatility stocks and low beta stocks exhibited subsequent low volatility and low beta, and experienced higher average returns than high volatility stocks and high beta stocks. These results suggested that a long-short strategy which held long low volatility (or low beta) stocks and held short high volatility (or high beta) stocks might produce a positive risk-adjusted return.

It was precisely this insight that had led Martingale to develop a MV strategy within a 130/30 structure: A short extension fund based on the MV anomaly might augment portfolio returns while not significantly increasing or perhaps, even reducing the standard deviation of the fund.

Martingale had developed four versions of its own MV strategy: two long-only strategies, one with no stock alphas (pure minimum variance) and one using Martingale's stock alpha model (minimum variance plus alpha), and two 130/30 strategies, again, one with no stock alphas (130/30 minimum variance) and one with Martingale's stock alphas (130/30 minimum variance plus alpha). Martingale wanted to separate out the potential value added of each component of the strategy: Would a minimum variance weighted portfolio do well against the market capitalization weighted index? Would Martingale's stock alpha model add value against the pure minimum variance strategy? And finally, would a 130/30 strategy improve the low volatility strategy?

To understand the potential performance and value added of each strategy, Martingale had back-tested each of them extensively. Back-testing consisted in running the strategy using historical data to determine how the strategy would have performed in different market environments had it been implemented in the past. Martingale was well aware of the dangers of back-testing. They realized that with enough tweaking you could make back-testing show extremely favorable results – a variation on the old adage "if you torture the data long enough, it will confess to anything". To defend against this, Martingale's investment team established a set of rules for back-testing before examining any results.

[11] Clarke, Roger, Harinda de Silva, and Steven Thorley, "Exploring the Risk Anomaly in the Equity Market," Economics and Portfolio Strategy, December 15, 2006

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First, they used a "research" database that included all companies that existed at each point in time when portfolios were rebalanced. That is, they ran their strategies with all the companies that would have been available for investing at each point in time. Many commercially available databases typically dropped out stocks when they were delisted because their companies went bankrupt or were merged or acquired by others. Thus these databases had historical information only about the stocks that had been successful in the past and had survived until present times. Naturally, simulations based only on surviving stocks would have been better, but they would unrealistic and flawed. Martingale made sure to use databases that were free of this "survivorship bias."

Second, they used their actual stock alphas that existed at each point in time, rather than using recast alphas that might include a "look-ahead bias." After the fact you know which factors worked, so if you include these factors or weight them more heavily in your recast model, the resulting stock alphas will be unrealistically accurate.

Third, portfolio construction parameters, such as individual stock position limits and industry and sector constraints, were selected with an eye towards managing risk, rather than attempting to optimize these parameters for the highest level of return. For example, industry and sector target weights were established so that no one industry or sector would dominate and at least 20 industries would be represented. Portfolios were optimized versus cash, so risk is defined in terms of total volatility, not tracking error.

Exhibit 9 and **Exhibit 10** show summary measures of the back-tested portfolio performance of Martingale's set of MV strategies for the period October 1995-December 2007. **Exhibit 11** plots the time series of rolling 36-month average annualized returns on the pure minimum variance strategy and on the Russell 1000 Index over the same period. This exhibit showed that the MV strategy had underperformed the index during the "bubble period" of the late 1990's and early 2000's, and had outperformed the index in the subsequent period.

Based on these results, Martingale had decided to launch a MV fund and a MV 130/30 fund using its own internal funds in December 2007. In the six months between January 2008 and June 2008, the benchmark index (Russell 1000) had fallen by 11.2%. By contrast, the MV strategy had fallen 6.8%, and the 130/30 MV fund has only fallen by 1.5%. (See **Exhibit 12**.)

The Future of Martingale

Bill was pleased with the results of the new MV strategy, especially the one that combined the 130/30 structure with the MV portfolio. He was looking forward to his meeting with Arnie and the rest of the team to discuss whether they should share these results with Martingale's clients and prospective clients, and whether Martingale was ready to offer this product to outside investors. This decision would ultimately depend on whether they were all convinced that the strategy made sense and was not merely a spurious pattern in the data. Certainly, recent studies by academics in the U.S. and in The Netherlands showed that this was a worldwide phenomenon, not just a U.S. anomaly.[12]

Bill had thought about several possibilities that might explain the persistence of this anomaly. Most prominent among them was that perhaps this was a reflection of the costs of and the aversion of investors to short selling. One could view high volatility in the price of a stock as reflecting in part

[12] Ang, Andrew et al., "High Idiosyncratic Volatility and Low Returns: International and Further U.S. Evidence," 2008, Columbia Business School, New York; Blitz, David, and Pim van Vliet, "The Volatility Effect: Lower Risk without Lower Return," 2007, Erasmus Research Institute of Management, Erasmus University, Rotterdam.

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divergence of opinions about the future prospects for the stock. If investors with negative views on the stock did not engage in enough short selling, the price of the stock might be higher than it should be, and that would explain the lower returns of high volatility stocks over time. Another possibility could be that the volatility effect was driven by the inability of many institutional clients to tolerate high tracking error. Benchmark driven investing combined with style box allocation might be limiting the opportunities to exploit the volatility effect.

Looking again at his favorite art work, Bill wondered what Alan and Arnie would say about his thoughts and what they might suggest they do to further strengthen their conviction that this phenomenon was not driven by "data mining." Brainstorming with the entire investment team would surely lead to discussing other possibilities to grow the strategy. For example, Martingale had limited its investment universe exclusively to U.S. stocks. Should it expand this universe, perhaps by developing a global version of the MV strategy? Was Martingale suited for that?

Bill was aware that the ability of active managers like Martingale to thrive depended on their ability to innovate. Like sharks, they had to move forward continuously, or else. Through clever innovation, Martingale had certainly moved forward over the last 20 plus years. He had no doubt that Martingale would keep moving forward and serving its investors for the next twenty.

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Exhibit 1 List of Martingale Funds, June 30, 2008

Fund Category	Fund Name (Value)	Fund Name (Core)	Fund Name (Growth)	AUM ($ million)
Large Cap Equities				1,200
	LargeCap Value LargeCap Value 500 LargeCap Value 200	LargeCap Core LargeCap Core 500 LargeCap Core 200 AllCap Core	LargeCap Growth	
Mid Cap Equities				356
	MidCap Value	MidCap Core	MidCap Growth	
Small Cap Equities				1,700
	SmallCap Value* Small/MidCap Value*	SmallCap Core* Small/MidCap Core*	SmallCap Growth	
Short Extension				1,000
	LargeCap Value	LargeCap Core LargeCap Core 500	LargeCap Growth	
Equity Market Neutral		Equity Market Neutral		364
Total				4,620

Source: Martingale Asset Management.

* Closed.

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Exhibit 2 List of Martingale equities fund information, as of June 30, 2008

Equity Characteristics	LargeCap Value 200		MidCap Core		SmallCap Value		130/30 LargeCap Core 500		Equity Market Neutral	
Inception	7/1/1996		7/1/1995		7/1/1996		10/1/2004		1/1/1991	
AUM (millions)	$43		$356		$801		$80		$364	
Fees	0.70% on the first $25 million 0.30% thereafter		0.70% on all assets		1.00% on all assets		0.75% on all assets		1.00% of invested capital plus 20% of profits	
Benchmark	Russell Top 200 Value Index		Russell Midcap Index		Russell 2000 Value Index		S&P 500 Index		U.S. T-bills	
	Fund	Bench-mark	Fund	Bench-mark	Fund	Bench-mark	Fund	Bench-mark	Long side of Fund	Short side of Fund
Return on equity (trailing)	13.1%	11.1	14.3%	10.7%	8.5%	5.7%	18.2%	13.2%	13.7%	7.9%
P/E, average (forward)	10.0x	10.7x	11.7x	14.6x	10.0x	13.1x	10.4x	12.7x	10.7x	18.4x
P/Cash flow, average	9.1x	12.0x	6.8x	8.6x	5.4x	8.3x	6.5x	11.0x	6.3x	19.1x
Earnings growth rate	11.1%	9.4%	14.4%	12.3%	11.6%	8.1%	16.7%	12.3%	15.6%	9.3%
Market cap, weighted average	$135B	$127B	$7.2B	$7.8B	$1.1B	$0.9B	$91B	$90B	$14.3B	$7.5B
Number of positions	74	122	140	800	223	1,326	273	500	168	176
Ten largest holdings, as % of portfolio	46%		15%		14%		24%		10.2%	9.8%
Turnover, average over last 3 years	100%		102%		110%		151%		159%	
Beta (vs. benchmark)	0.99		0.97		0.97		1.00		1.17	-1.18
Performance Results* *(percent)*										
Annualized return	Fund	Bench-mark	Fund	Bench-mark	Fund	Bench-mark	Fund	Bench-mark	Fund	Bench-mark
2008 YTD	-13.68	-15.25	-4.09	-7.57	-7.84	-9.84	-5.27	-11.91	8.25	0.99
1 Year	-16.58	-19.35	-10.85	-11.19	-24.11	-21.63	-6.75	-13.12	6.00	3.06
3 Years	4.41	2.98	8.48	6.84	-2.87	1.39	7.95	4.40	6.07	4.04
5 Years	8.40	7.19	15.15	13.07	8.79	10.02	N/A	7.58	4.57	3.04
Since inception	9.08	7.91	12.90	11.47	11.98	10.06	9.22	5.75	6.12	3.94
Annualized standard deviation, since inception	14.93	14.58	15.58	15.31	15.86	15.51	8.76	9.73	5.43	0.41

Source: Martingale Asset Management
**Fund results are gross of management fees but net of transaction fees.*

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Exhibit 3 Short extension managers rank (March 31, 2008)

Manager	Assets ($ billion)	Manager (continued)	Assets ($ billion)
State Street Global Advisors	$12,437	The Boston Co. Asset Mgmt.	$134
Barclays Global Investors	$9,300	Pyramis	$127
JPMorgan	$8,600	Brandywine	$109
Jacobs Levy	$4,857	GMO	$102
Analytic	$3,965	Fuller & Thaler	$87
Aronson, Johnson & Oritz	$3,500	Deutsche	$80
Goldman Sachs Asset Mgmt.	$3,000	RiverSource	$73
Acadian	$2,703	SSI	$70
AXA	$2,600	Stux	$65
UBS*	$2,490	Thomson Horstmann & Bryant	$60
Numeric	$2,237	INTECH*	$41
AQR	$1,650	Value Works	$38
Quantitative Mgmt. Assoc.	$1,504	Northern Trust	$32
Martingale	$1,049	Alpha Equity Mgmt.	$30
Invesco	$791	AG Asset Mgmt.	$26
D.E. Shaw	$631	Shennandoah Asset Mgmt.	$11
PanAgora	$617	MFS Investment Mgmt.	$10
McKinley Capital	$511	Nicholas-Applegate	$10
First Quandrant	$503	Lee Munder	$10
Mellon Capital*	$500	Turner	$8
Franklin Portfolio Assoc.	$474	Thompson, Siegel & Walmsley	$8
Los Angeles Capital Mgmt.	$372	American Century	$5
NYLIM	$361	Geode Capital	$3
Maverick	$175	Fred Alger	$3
Glenmede	$168	TWIN Capital Mgmt.	$2
Fifth Third	$163	Freeman	$1
		Total	$66,273

Source: Pension and Investments.

* Assets as of December 31, 2007.

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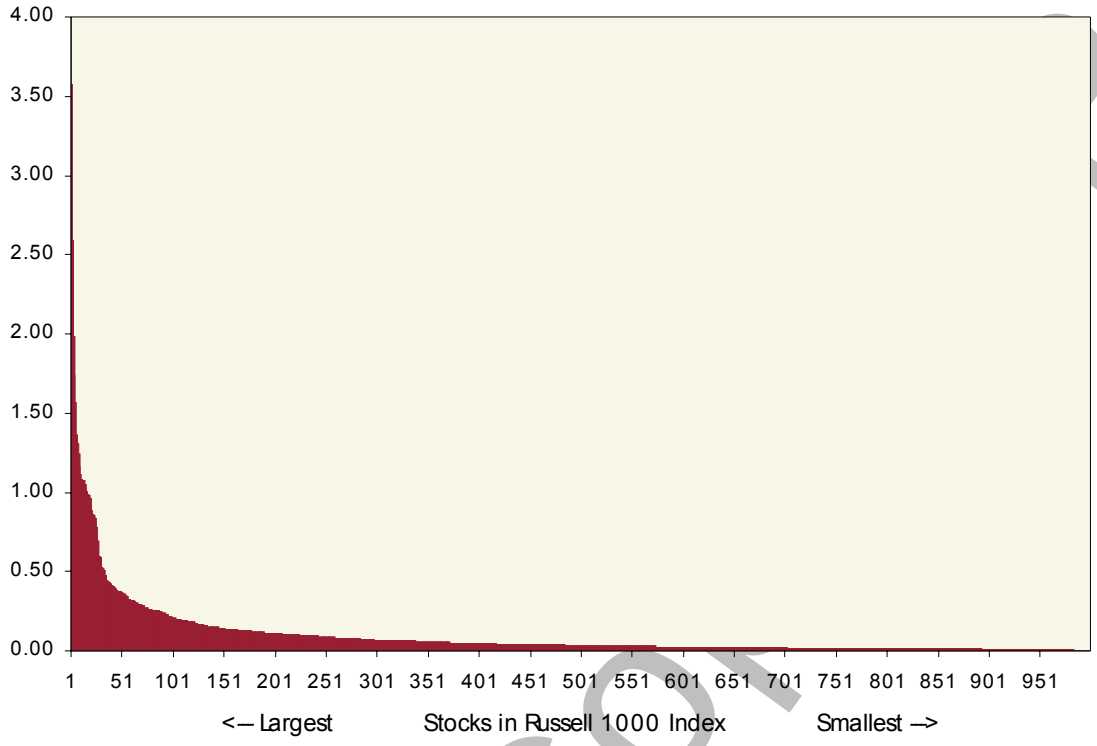
Exhibit 4 Russell 1000 stock weights (December 31, 2007)



Source: Martingale Asset Management.

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Exhibit 5a Top ten holdings held in the Martingale 130/30 LargeCap Core 500 fund (January 2008).

Stock rank	Stock symbol	Company name	Fraction of portfolio (%)	Cumulative total (%)
1	XOM	EXXON MOBIL CORP COM	5.31%	5.31%
2	T	AT&T INC COM	3.21%	8.52%
3	MSFT	MICROSOFT CORP COM	3.19%	11.71%
4	COP	CONOCOPHILLIPS COM	2.36%	14.08%
5	IBM	INTL BUSINESS MACH COM	2.33%	16.41%
6	CVX	CHEVRON CORP NEW COM	2.22%	18.63%
7	HPQ	HEWLETT PACKARD CO COM	2.21%	20.84%
8	GE	GENERAL ELECTRIC CO COM	2.09%	22.93%
9	ORCL	ORACLE CORP COM	2.02%	24.95%
10	WMT	WAL MART STORES INC COM	1.76%	26.72%

Source: Martingale Asset Management.

Exhibit 5b Top ten overweight stocks held in the Martingale 130/30 LargeCap Core 500 fund (January 2008).

Stock rank	Stock symbol	Company name	Fraction of portfolio (%)	Overweight relative to S&P (%)
1	ORCL	ORACLE CORP COM	2.02%	1.32%
2	NLY	ANNALY CAP MGMT INC COM	1.31%	1.31%
3	XOM	EXXON MOBIL CORP COM	5.31%	1.28%
4	HUM	HUMANA INC COM	1.38%	1.28%
5	COP	CONOCOPHILLIPS COM	2.36%	1.25%
6	T	AT&T INC COM	3.21%	1.25%
7	AES	AES CORP COM	1.35%	1.23%
8	TRV	TRAVELERS COMPANIES INC	1.49%	1.22%
9	AET	AETNA INC NEW COM	1.44%	1.21%
10	KCI	KINETIC CONCEPTS INC COM NEW	1.21%	1.21%

Source: Martingale Asset Management.

Exhibit 5c Top ten underweight stocks held in the Martingale 130/30 LargeCap Core 500 fund (January 2008).

Stock rank	Stock symbol	Company name	Fraction of portfolio (%)	Underweight relative to S&P (%)
1	PCL	PLUM CREEK TIMBER CO INC COM	-1.21%	-1.27%
2	ERTS	ELECTRONIC ARTS INC COM	-1.09%	-1.23%
3	SE	SPECTRA ENERGY CORP COM	-1.04%	-1.17%
4	SGMS	SCIENTIFIC GAMES CORP CL A	-1.11%	-1.11%
5	PNW	PINNACLE WEST CAP CORP COM	-1.03%	-1.06%
6	PG	PROCTER & GAMBLE CO COM	0.72%	-1.05%
7	INTC	INTEL CORP COM	0.23%	-0.94%
8	WFMI	WHOLE FOODS MKT INC COM	-0.89%	-0.93%
9	PAYX	PAYCHEX INC COM	-0.83%	-0.92%
10	LPX	LOUISIANA PAC CORP COM	-0.89%	-0.89%

Source: Martingale Asset Management.

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Exhibit 5d Sector Analysis of Martingale 130/30 LargeCap Core 500 fund (January 2008).

Sector	Benchmark	Long	Short	Net Long	Active (net long – benchmark)
Technology	18.01%	25.30%	-5.23%	20.07%	2.06%
Consumer (cyclical)	6.21%	9.96%	-1.84%	8.13%	1.92%
Commercial Services	2.43%	5.79%	-1.70%	4.10%	1.67%
Telecommunications	3.54%	6.52%	-1.67%	4.85%	1.31%
Industrials	3.37%	4.61%	-0.43%	4.18%	0.82%
Energy	12.47%	14.13%	-1.79%	12.33%	-0.14%
Consumer Services	4.74%	5.63%	-1.88%	3.75%	-0.99%
Health Care	12.47%	14.38%	-2.91%	11.46%	-1.01%
Utility	3.43%	3.77%	-1.48%	2.28%	-1.15%
Financial	18.06%	23.29%	-6.51%	16.78%	-1.28%

Source: Martingale Asset Management.

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Exhibit 6 Excess returns for the market and minimum variance portfolios (January 1968 to December 2005)

Portfolio	Monthly mean returns (bps)	Monthly standard deviation (bps)	Annualized mean returns (%)	Annualized standard deviation (%)	Sharpe ratio
Market	46	445	5.6	15.4	0.36
Min-var, Bayesian shrinkage*					
Unconstrained	54	337	6.5	11.7	0.55
Factor constrained	46	364	5.6	12.6	0.44
Sensitivity constrained**	47	344	5.6	11.9	0.47
Min-var, Principal components*					
Unconstrained	56	333	6.7	11.6	0.58
Factor constrained	45	363	5.5	12.6	0.43
Sensitivity constrained	49	339	5.9	11.8	0.50
Long/short, Bayesian***					
Unconstrained	45	303	5.5	10.5	0.52
Factor constrained	40	321	4.8	11.1	0.43
Sensitivity constrained	45	300	5.4	10.4	0.52

Source: Clarke, Roger, et al., "Minimum-Variance Portfolios in the U.S. Equity Market," *Journal* of *Portfolio Management*, Fall 2006.

* Bayesian shrinkage and principal components were more recent methods of structuring the security covariance matrixes that, unlike other methods, did not rely on pre-specified factor models. The goal was to have more robust empirical results. See referenced paper for more details.

** It was believed that a more accurate method to measure a security's factor exposure was to use historical sensitivity to factor returns instead of the stock characteristic. Sensitivity constrained portfolio was constrained using estimated factor sensitivities.

*** Long/short portfolio did not have short sell constraint, so that security weights could be negative.

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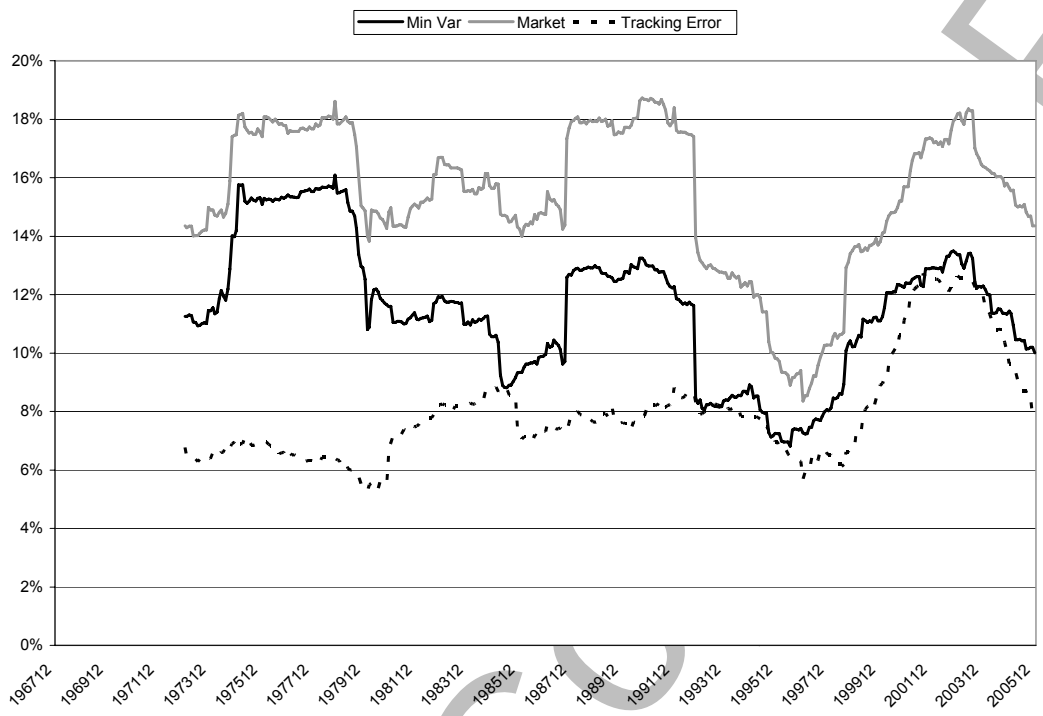
Exhibit 7 Portfolio risk* of the market and minimum variance portfolios and the tracking error of the minimum variance portfolio relative to market (January 1968 to December 2005)



Source: Clarke, Roger, et al., "Minimum-Variance Portfolios in the U.S. Equity Market," *Journal* of *Portfolio Management*, Fall 2006.

*Rolling standard deviation of returns of the trailing 5 years

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Exhibit 8a Portfolio returns for volatility quintile portfolios (January 1968 to December 2005)

Quintile	Monthly mean returns (bps)	Monthly standard deviation (bps)	Annualized mean returns	Annualized standard deviation	Return per unit of risk
1 – Low volatility	98	370	11.8%	12.8%	0.92
2	100	460	12.0%	15.9%	0.75
3	106	569	12.7%	19.7%	0.65
4	100	706	12.0%	24.5%	0.49
5 – High volatility	76	882	9.1%	30.6%	0.30
Average	96	597	11.5%	20.7%	0.56

Source: Clarke, Roger, et al., "Exploring the Risk Anomaly in the Equity Market," *Economics and Portfolio Strategy*, December 15, 2006, and author's calculations.

Exhibit 8b NBER contraction phase portfolio returns for volatility quintile portfolios during the business cycle from January 1968 to December 2005

Quintile	Monthly mean returns (bps)	Monthly standard deviation (bps)	Annualized mean returns	Annualized standard deviation	Return per unit of risk
1 – Low volatility	50	516	6.0%	17.9%	0.34
2	2	618	0.2%	21.4%	0.01
3	-20	790	-2.4%	27.4%	-0.09
4	-9	923	-1.1%	32.0%	-0.03
5 – High volatility	-36	1166	-4.3%	40.4%	-0.11
Average	-3	803	-0.3%	27.8%	-0.01

Source: Clarke, Roger, et al., "Exploring the Risk Anomaly in the Equity Market," *Economics and Portfolio Strategy*, December 15, 2006, and author's calculations.

Exhibit 8c NBER expansion phase portfolio returns for volatility quintile portfolios during the business cycle from January 1968 to December 2005

Quintile	Monthly mean returns (bps)	Monthly standard deviation (bps)	Annualized mean returns	Annualized standard deviation	Return per unit of risk
1 – Low volatility	107	335	12.8%	11.6%	1.11
2	118	422	14.2%	14.6%	0.97
3	129	515	15.5%	17.8%	0.87
4	120	657	14.4%	22.8%	0.63
5 – High volatility	97	818	11.6%	28.3%	0.41
Average	114	549	13.7%	19.0%	0.72

Source: Clarke, Roger, et al., "Exploring the Risk Anomaly in the Equity Market," *Economics and Portfolio Strategy*, December 15, 2006, and author's calculations.

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Exhibit 9 Back-tested portfolio performance of Martingale's minimum variance strategies (October 1995 to December 2007)

Portfolio	Annualized mean returns (%)	Annualized standard deviation (%)	Beta	Tracking error	Turnover monthly (%)
Market (Russell 1000 Index)	9.7	14.5	1.00	0.0	<1
Min-variance*	11.5	10.1	0.67	7.7	4
Min-variance and alpha**	12.5	10.4	0.68	7.6	6
130/30 Min-variance***	12.0	9.4	0.50	10.4	4
130/30 Min-variance and alpha****	14.7	10.0	0.55	10.1	10

Source: Martingale Asset Management.

* Simulated long-only minimum variance portfolio
** Simulated long-only minimum variance portfolio plus Martingale stock alpha
*** Simulated 130/30 minimum variance portfolio
**** Simulated 130/30 minimum variance portfolio plus Martingale stock alpha

Exhibit 10 Back-tested portfolio performance of Martingale's minimum variance strategies (October 1995 to December 2007)

Geometric Monthly Returns	# of Months	Market (Russell 1000 Index)	Minimum Variance	Minimum Variance + Stock Alpha	130/30 Minimum Variance	130/30 Minimum Variance + Stock Alpha
Mean return-all months	147	0.78%	0.91%	0.98%	0.95%	1.15%
Percent of market return		100%	118%	127%	122%	148%
Mean return-down market months	53	-3.56%	-1.86%	-1.89%	-1.16%	-1.21%
Percent of down market return		100%	52%	53%	33%	34%
Mean return-up market months	94	3.31%	2.51%	2.64%	2.16%	2.50%
Percent of down market return		100%	76%	80%	65%	76%

Source: Martingale Asset Management.

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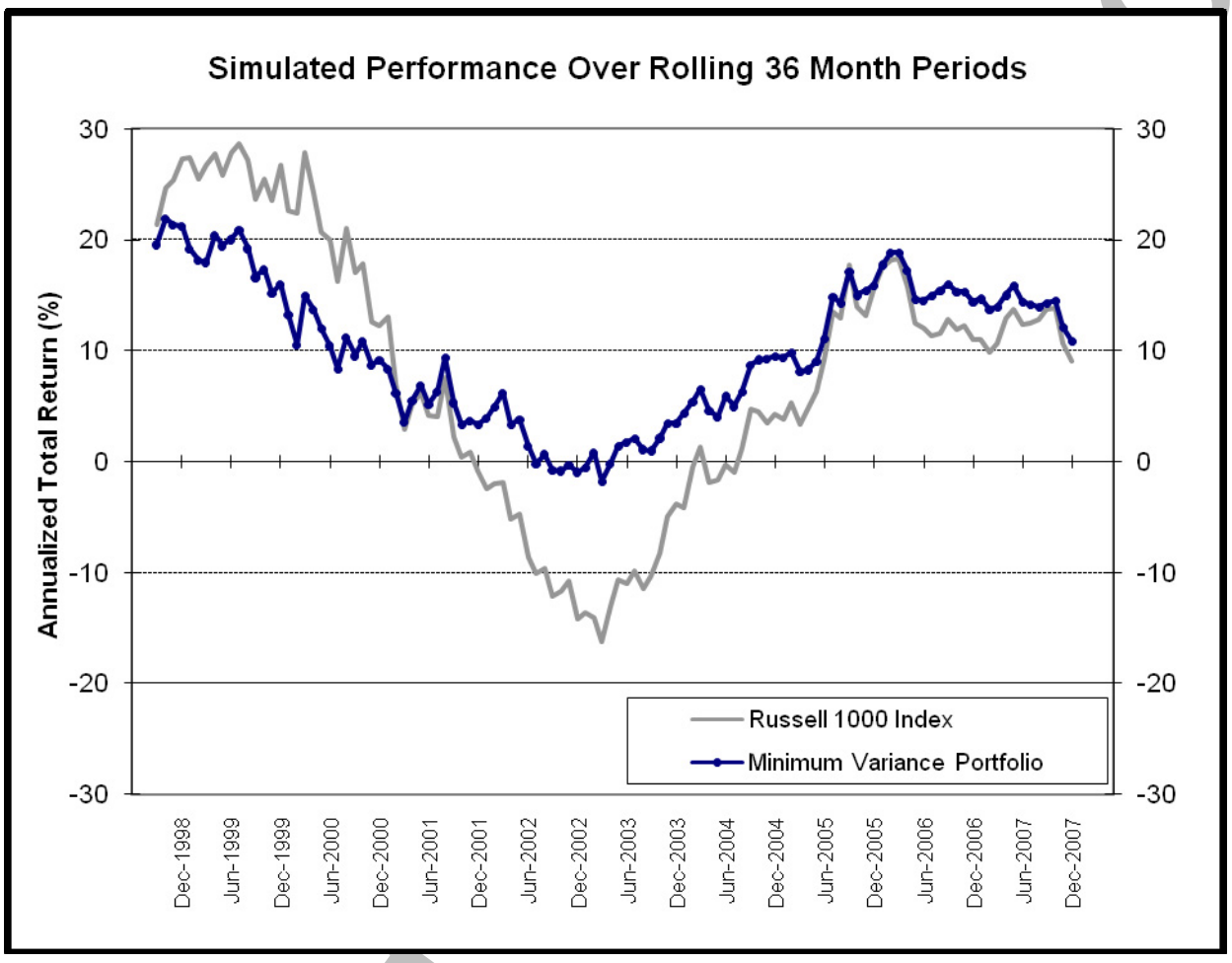
Exhibit 11 Annualized returns of the minimum variance portfolio and Russell 1000 Index (October 1995 to December 2007)



Source: Martingale Asset Management.

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Exhibit 12 Return of minimum variance portfolios (June 30, 2008)

	Minimum Variance and Alpha	130/30 Minimum Variance and Alpha
Inception	1/2008	1/2008
Benchmark	Russell 1000	Russell 1000
Benchmark return		
Since inception	-11.2%	-11.2%
Fund Gross Return		
Since inception	-6.8%	-1.5%

Source: Martingale Asset Management.

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Disclosures

1. Low Volatility strategies employ a systematic process to build a portfolio of undervalued companies selected from approximately 1,000 mid- to large sized U.S. companies. A 130/30 Low Volatility strategy holds short positions of 30% of the portfolio's capital to potentially add value. The Russell 1000 Index is an appropriate benchmark index for the strategies; its returns are provided to represent the investment environment existing during the time periods shown. For comparison purposes, the index is fully invested, which includes the reinvestment of income. Index returns do not include any transaction costs, management fees or other costs.

2. The results presented herein represent simulated, back-tested results. These results do not represent the results of actual trading, but were achieved by means of retroactive application of a valuation model designed with the benefit of hindsight. As a result, it is possible that actual results based on actual trading, without the benefit of hindsight, may materially differ from the simulated, back-tracked results presented here. Alphas used during the simulation were generated from the valuation model in use at each point in time. Further, as with any active equity strategy, there is always the potential for declines in the value of accounts managed pursuant to this strategy. It is possible that market conditions and other economic factors unintentionally impacted the design of this valuation model, thereby producing results that would be difficult or impossible to match without the benefit of hindsight. All investment models are subject to risk, and there can be no assurance that an investment strategy will achieve its stated objective. Market and economic conditions have not affected our performance significantly relative to its respective benchmark.

3. Simulated performance returns were calculated using the total (pure gross) return to a theoretical portfolio including capital gains and dividend income, and are based on end of month holdings. Calculations do not reflect any estimated implementation costs or a deduction of investment advisory fees, transaction costs, prime brokerage fees (when applicable) or any other expenses that may be incurred in the management of the account. Actual results will be reduced by advisory fees and other expenses.

4. Actual results presented herein are from a live portfolio funded with Martingale's own capital and is a non-fee-paying account. Its performance calculations are time-weighted rates of return based on trade date valuations and accrual-based accounting for income. Returns are net of both transaction costs and non-reclaimable withholding taxes. Dividends, interest and other earnings are reinvested. Portfolios are revalued for all cash flows. All valuations and returns are expressed in U.S. dollars. The dispersion of annual returns is measured by the asset weighted standard deviation of portfolio returns represented within the composite for the full year. The performance presented herein represents past performance and is not an indicator of future results. Further, as with any active equity strategy, there is always the potential for declines in the value of accounts employing this strategy.

5. Martingale's investment advisory fees are described in Part II of Form ADV. Net of fee results are calculated by applying the highest fee charged to any account employing these strategies for the performance period. The standard fee schedule for a traditional long-only Low Volatility strategy is 0.70% on the first $25 million and 0.30% on any balance thereafter. The standard fee schedule for a 130/30 Low Volatility strategy is 0.75% on all assets. Actual advisory fees can vary among clients employing this strategy. Actual advisory fees can vary among clients employing this strategy. For use in one-on-one presentations only.

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