The Credit Suisse 130/30 Index:
A Summary and Performance Comparison

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EXECUTIVE SUMMARY

Long-only portfolio managers and investors have acknowledged that the long-only constraint is a potentially costly drag on performance, and loosening this constraint can add value. However, the magnitude of the performance drag is difficult to measure without a proper benchmark for a 130/30 portfolio. In this paper, we summarize the approach taken by Lo and Patel (2008) in which they provide a passive but dynamic benchmark consisting of a "plain-vanilla" 130/30 strategy using simple factors to rank stocks and standard methods for constructing portfolios based on these rankings. In this article, we provide both in-sample and out-of-sample performance of this 130/30 benchmark that illustrate its advantages and disadvantages under various market conditions, and compare it to other 130/30 indexes that have been proposed.

This is a redacted and edited version of Lo and Patel (2008), and includes a performance comparison to other 130/30 indexes during the out-of-sample period from October 2007 to December 2008. The views and opinions expressed in this article are those of the authors only, and do not necessarily represent the views and opinions of AlphaSimplex Group, Credit Suisse, MIT, any of their affiliates and employees, or any of the individuals acknowledged below. The authors make no representations or warranty, either expressed or implied, as to the accuracy or completeness of the information contained in this article, nor are they recommending that this article serve as the basis for any investment decision—this article is for information purposes only. This research was supported by AlphaSimplex Group, LLC and Credit Suisse. We thank Varun Dube, Michael Gorun, and Souheang Yao, for excellent research assistance, and Jerry Chafkin, Arnout Eikeboom, Kal Ghayur, Balaji Gopalakrishnan, Ronan Heaney, James Martielli, Steve Platt, Phil Vasan, and seminar participants at Credit Suisse and JP Morgan Asset Management for many stimulating discussions and comments.

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1. INTRODUCTION

One of the fastest growing areas in institutional investment management is the so-called "active extension" or "130/30" class of strategies in which the short-sales constraint of traditional long-only portfolios is relaxed. Fueled both by the historical success of long/short equity hedge funds and the increasing frustration of portfolio managers at the apparent impact of long-only constraints on performance, 130/30 products have grown to over $50 billion in assets.

Despite the increasing popularity of such strategies, there is still considerable confusion among managers and investors regarding the appropriate risks and expected returns of 130/30 products. For example, by construction, the typical 130/30 portfolio has a leverage ratio of 1.6-to-1, unlike a long-only portfolio that makes no use of leverage. Leverage is usually associated with higher-volatility returns, however, the typical 130/30 portfolio's volatility is comparable to that of its long-only counterpart, and its market beta approximately the same. Nevertheless, the added leverage of a 130/30 product suggests that the expected return should be higher than its long-only counterpart, but by how much? By definition, a 130/30 portfolio holds 130% of its capital in long positions and 30% in short positions, therefore, it may be viewed as a long-only portfolio plus a market-neutral portfolio with long and short exposures that are 30% of the long-only portfolio's market value. However, the active portion of a 130/30 strategy is typically very different from a market-neutral portfolio, hence this decomposition is, in fact, inappropriate.

These unique characteristics suggest that existing indexes such as the S&P 500 and the Russell 1000 are inappropriate benchmarks for leveraged dynamic portfolios such as 130/30 funds. A new benchmark is needed, one that incorporates the same leverage constraints and portfolio construction algorithms as 130/30 funds, but is otherwise transparent, investable, and passive. We provide such a benchmark in this paper.

In particular, using 10 well-known and commercially available valuation factors from Credit Suisse's Quantitative Equity Research Group from January 1996 to September 2007, we construct a generic 130/30 U.S. equity portfolio using the S&P 500 universe of stocks and a standard portfolio optimizer. The historical simulation of this simple 130/30 strategy—rebalanced on a monthly basis—yields a benchmark time-series of returns that can be viewed as a 130/30 index. By using only information available prior to each rebalancing date to formulate the portfolio weights, we create a truly investable index. And by providing both the data and the algorithm for computing the portfolio weights, we render the index passive and transparent.

In Section 2, we provide a literature review of long/short equity investing, and observe that only recently have the analytics of 130/30 strategies been formally developed. These analytics provide the motivation for a 130/30 index, which captures in a more direct fashion than collections of heterogeneous 130/30 managers the aggregate performance of active-extension strategies. However, we acknowledge that proposing a strategy as an index is rather unorthodox, and provide some historical perspective for this break from tradition in Section 3. In Section 4, we present the basic framework for constructing a generic 130/30 strategy. The empirical properties of this strategy are summarized in Section 5, and we conclude in Section 6.

2. LITERATURE REVIEW

Although 130/30 strategies are relatively new, the literature on long/short equity strategies is well-developed, and Grinold and Kahn (2000) and Ineichen (2002) provide a useful chronology of this literature.

The center stage of the long/short debate has focused on whether there are efficiency gains that result from relaxing the long-only constraint. For example, Brush (1997) shows that adding a long/short strategy to a long strategy expands the mean-variance efficient frontier, provided that long/short strategies have positive expected alphas. Grinold and Kahn (2000) show that the information ratios decline as we go from long/short to long-only, but short of deriving an analytical expression for the loss in efficiency resulting from the long-only constraint, they use a computer simulation to estimate the magnitude of the impact. Jacobs, Levy, and Starer (1998, 1999) further elaborate on the loss of efficiency that can occur as a result of the long-only constraint. And Martielli (2005) illustrates empirically how removing the long-only constraint improves the expected information ratio for U.S. large-cap equity funds, even after accounting for the additional costs associated with shorting stocks.

Clarke, de Silva, and Thorley (2002) develop a framework for measuring the impact of constraints on value added and performance analysis of constrained portfolios. They provide a generalized version of Grinold's (1989) fundamental law of active management which relates the managers' expected performance and the information coefficient of their forecasting processes, by recognizing that due to various implementation constraints, managers cannot fully exploit their ability to forecast returns. To capture the impact of these constraints they introduce a "transfer coefficient" into the fundamental law as a measure of how effectively the managers' information is transferred into portfolio weights. Clarke, de Silva, and Thorley (2002) use this framework to provide further support for long/short strategies by showing that the transfer coefficient falls more by imposition of the long-only constraint than by any other single restriction. Clarke, de Silva, and Sapra (2004) gauge the impact of various constraints empirically, and conclude that the long-only constraint is often the most significant in terms of information loss. They show that lifting this constraint is critical for improving the information transferred from stock-selection models to active portfolio weights. Sorensen, Hua, and Qian (2007) use numerical simulations of long/short portfolios to demonstrate the net benefits of shorting and to compute the optimal degree of shorting as a function of alpha, desired tracking error, turnover, leverage, and trading costs. Johnson, Kahn, and Petrich (2007) further emphasize the costs to efficiency of the long-only constraint and the importance of choosing gearing and risk in concert in the execution of long/short portfolios.

With the champions of long/short investing increasingly outnumbering its adversaries, the need for a formal model to analyze the factors that determine the size of the short extension in the long/short portfolios has become more pressing, and Clarke, de Silva, Sapra, and Thorley (2007) have filled this gap. Based on some simplifying assumptions about the security covariance matrix and the concentration profile of the benchmark, they derive an equation that shows how the expected short weight for a security depends on the relative size of the security's benchmark weight and its assigned active weight in the absence of constraints. They argue that the long/short ratio should be allowed to vary over time to accommodate changes in individual security risk, security correlation, and benchmark weight concentration, in order to maintain a constant level of active risk. Varying the long/short ratio, however, belongs to the domain of active 130/30 strategies, and is not appropriate for the purposes of the 130/30 index where the goal is to capture the risks and opportunities associated with the 130/30 investment format in a passive way.

Finally, Martielli (2005) and Jacobs and Levy (2006) provide an excellent practical perspective on the mechanics of the enhanced active equity portfolio construction and a number of operational considerations, and the advantages of enhanced active equity over equitized long/short strategies are summarized in Jacobs and Levy (2007).

3. CAN A STRATEGY BE AN INDEX?

Although Section 2 illustrates a substantial intellectual history that motivates this paper, we do depart from standard terminology in one important respect: We are proposing a strategy as a passive benchmark for 130/30 products, not a static or "buy-and-hold" basket of securities. This departure deserves further discussion and elaboration.

The original motivation behind fixing the set of securities and value-weighting them was to reduce the amount of trading needed to replicate the index in a cash portfolio. Apart from additions and deletions to the index, a value-weighted portfolio need never be rebalanced since the weights automatically adjust proportionally as market valuations fluctuate. These "buy-and-hold" portfolios are attractive not only because they keep trading costs to a minimum, but also because they are simpler to implement from an operational perspective. It is easy to forget the formidable challenges posed by the back-office, accounting, and trade reconciliation processes for even moderate-sized portfolios in the days before personal computers, FIX engines, and electronic trading platforms.

However, the definition of passive has changed in recent years with technological advances: An investment process is called "passive" if it does not require any discretionary human intervention. One of the benefits of technology is the ability to create passive portfolios capable of capturing more complex risk/return profiles, such as those of an aging population preparing for retirement. In this paper, we are proposing another passive index that involves a mechanical investment process, one that leads to a plain-vanilla 130/30 portfolio. However, the concept of a strategy as an index is far more general, and we believe that there is a broad array of such indexes that would provide useful information for investors. Indeed, the burgeoning literature and industry applications involving hedge-fund beta replication is just one manifestation of this trend toward transparency through mechanical portfolio construction rules (see, for example, Hasanhodzic and Lo, 2007), and we expect more dynamic strategies to become passive benchmarks as the investor base becomes more sophisticated and demanding.

4. INDEX CONSTRUCTION

There are two basic components of any 130/30 strategy: forecasts of expected returns or "alphas" for each stock in the portfolio universe, and an estimate of the covariance matrix used to construct an efficient portfolio. In Section 4.1, we describe a set of 10 composite alpha factors developed by the Credit Suisse Quantitative Equity Research Group and distributed regularly to its clients, covering a broad range of valuation models ranging from investment style to technical indicators, and we use a simple equal-weighted average of these 10 factors as our generic expected-return forecast. The covariance matrix used to construct a mean-variance efficient portfolio is given by the Barra U.S. Equity Long-Term Risk Model, and in Appendix 7.1 (page 21) we describe the parameter settings we use to determine the portfolio weights of our 130/30 index.

4.1 Expected Excess-Return Forecasts

The alpha forecasts used in our construction of the 130/30 index are obtained from the Credit Suisse Quantitative Equity Research Group, and consist of 10 distinct composite factors. These can be categorized into five broad investment areas: value, growth, profitability, momentum, and technical. Each strategy was developed using fundamental data from financial statements, consensus earnings forecasts, and market pricing and volume data. These factors can be used as stand-alone investment strategies, e.g., investors can simply create portfolios of stocks with varying exposure to the alpha factors. The alpha factors can also be used as a bellwether for certain market trends and cycles. For example, if value factors are outperforming in the S&P 500, investors may take this as a signal that a shift to value is underway. While we do not explicitly take into account economic factors in our model, the shifts in the market environment will be reflected in the Credit Suisse alpha factors thanks to its bottom-up approach to factor construction. The 10 composite factors are available for approximately 3,500 U.S. companies spanning the combined universe of the S&P 1500, the top 3,000 companies by market cap, the top 100 ADRs, and the Credit Suisse Analyst Coverage. Approximately 5,000 international companies are covered as well.

We now describe each of the 10 alpha factors in turn, and list the financial indicators that go into their computation (the methodology for combining these indicators to obtain the composite factors is described below). We refer the reader to Figure 1 (page 8) for more detail.

1. **Traditional Value.** The traditional-value alpha portfolio buys cheap stocks and shorts the expensive ones. We construct the traditional-value factor using price ratios such as price-to-earnings, price-to-book, price-to-cash-flow, and price-to-sales. We refer to this approach as traditional value because these ratios have long served as the traditional measures of value.

2. **Relative Value.** For relative-value alpha, we measure value using such industry-relative price ratios as price-to-earnings, price-to-book, and price-to-sales. For example, the industry-relative price-to-earnings ratio of a company XYZ is constructed by taking XYZ's price-to-earnings ratio and standardizing it using the median and standard deviation (computed using the median) of that ratio across all companies in XYZ's industry group. In this approach, a stock is considered cheap if its ratio is less than the industry average. We also look at the same measure across time, by standardizing the industry-relative ratio of each company with its historical 5-year average and standard deviation. We consider a stock cheap if the current spread between its ratio and the industry average is less than the historical five-year average spread.

3. **Historical Growth.** The historical-growth alpha portfolio buys stocks with strong records of growth and shorts those with flat or negative growth rates. We measure growth based on earnings growth rates, revenue trends, and changes in cash flows.

4. **Expected Growth.** The expected-growth alpha portfolio buys stocks with high rates of expected earnings growth and shorts those with low or negative expected growth rates.

5. **Profit Trends.** The profit-trends alpha portfolio buys stocks showing strong bottom-line improvement and shorts stocks showing deteriorating profits or increasing losses. We measure profit trends by using the following ratios: overhead-to-sales, earnings-to-sales, and sales-to-assets. We also use trends in the following ratios: (receivables + inventories)/sales, cash-flow-to-sales, and overhead-to-sales.

6. **Accelerating Sales.** The accelerating-sales alpha portfolio buys stocks with strong records of sales growth and shorts those with flat or negative sales growth. We measure the rate of increase in sales growth, i.e., the acceleration of sales.

7. **Earnings Momentum.** We define earnings momentum in terms of earnings estimates, not historical earnings. The earnings-momentum alpha portfolio buys stocks with positive earnings surprises and upward estimate revisions and shorts those with negative earnings surprises and downward estimate revisions.

8. **Price Momentum.** The price-momentum alpha portfolio buys stocks with high returns over the past 6–12 months and shorts those with low or negative returns over the past 6–12 months.

9. **Price Reversal.** Price reversal is the pattern whereby short-term winners often suffer downside reversals and short-term losers tend to bounce back to the upside. These reversal patterns are evident for horizons ranging from one day to four weeks.

10. **Small Size.** The small-size alpha portfolio buys the smallest decile stocks in the index and shorts the largest decile in the index. We measure size using the following metrics: market capitalization, assets, sales, and stock price.

Stocks with high exposure to the 10 alpha factors are forecast to provide positive alpha; stocks with low exposure should generate negative alpha. Hence, we *invert* all the traditional-value and relative-value ratios, with the exception of the dividend yield, so that a high number means positive alpha. For the same reason, all of the price-reversal and small-size individual alpha measurements, as well as the following two profit-trends individual alpha measurements—Industry-Relative Trailing 12-Month (Receivables + Inventories) / Trailing 12-Month Sales and Trailing 12-Month Overhead / Trailing 12-Month Sales—are multiplied by -1.

As described above, each company in the S&P 1500 universe has 10 composite-alpha-factor time series associated with it, each of which consists of its constituent alpha measurements. For example, the traditional-value composite alpha factor is composed of the following five constituent factors: price/book value, dividend yield, price/trailing cash flow, price/trailing sales, and price/forward earnings. We now describe the algorithm used to combine these individual alpha measurements into composite-alpha-factor *z*-scores. After, say, the P/BV ratio is computed for a particular company on a particular date, the following two-step normalization procedure is used to compute its *z*-score (we start with a sample of all the companies in the S&P 1500):

1. First the P/BV's *z*-score is computed by normalizing that ratio using the ratio's cap-weighted mean across the S&P 500 companies and its standard deviation across the S&P 1500 companies (this standard deviation is computed using the cap-weighted mean, but the squared deviations from the mean are not cap-weighted).

2. The companies with *z*-scores computed in step 1 that are greater than 10 in absolute value are dropped from the sample, and the cap-weighted S&P 500 mean and the S&P 1500 standard deviation are re-computed based on this smaller sample, and then each company's (from the original sample) P/BV ratio is re-normalized.

We compute the *z*-score of dividend yield, price/trailing cash flow, price/trailing sales, and price/forward earnings in the same way. To compute the traditional-value composite-alpha-factor *z*-score, we first take an equal-weighted average of the *z*-scores of its five constituents where any constituent *z*-score that is greater than 10 or less than -10 is set to 10 or -10, respectively, and then normalize that equal-weighted average in two steps as described above.

CATEGORY	COMPOSITE ALPHA FACTOR	UNDERLYING ALPHA MEASUREMENT – Equity Factor Listing
VALUE	Traditional Value	Price / Forward Earnings Price / Trailing Sales Price / Trailing Cash Flow Dividend Yield Price / Book Value
	Relative Value	Industry Relative Price / Trailing Sales (Current Spread vs. 5-Year Average) Industry Relative Price / Trailing Earnings (Current Spread vs. 5-Year Average) Industry Relative Price / Trailing Cash Flow (Current Spread vs. 5-Year Average) Industry Relative Price / Trailing Sales Industry Relative Price / Forward Earnings Industry Relative Price / Trailing Cash Flow
GROWTH	Historical Growth	Consecutive Quarters of Positive Change in Trailing 12-Month Cash Flow Consecutive Quarters of Positive Change in Quarterly Earnings 12-Month Change in Quarterly Cash Flow 3-Year Average Annual Sales Growth 3-Year Average Annual Earnings Growth 12-Quarter Trendline in Trailing 12-Month Earnings Slope of Trendline through Last 4 Quarters of Trailing 12-Month Cash Flows
	Expected Growth	5-Year Expected Earnings Growth (I/B/E/S Consensus) Expected Earnings Growth: Fiscal Year 2 / Fiscal Year 1 (IBES)
PROFITABILITY	Profit Trends	Consecutive Quarters of Declines in (Receivables+Inventories) / Sales Consecutive Quarters of Positive Change in Trailing 12-Month Cash Flow / Sales Consecutive Quarters of Declines in Trailing 12-Month Overhead / Sales Industry Relative Trailing 12-Month (Receivables+Inventories) / Sales Industry Relative Trailing 12-Month Sales / Assets Trailing 12-Month Overhead / Sales Trailing 12-Month Earnings / Sales
	Accelerating Sales	3-Month Momentum in Quarterly Sales 6-Month Momentum in Trailing 12-Month Sales Change in Slope of 4-Quarter Trendline through Quarterly Sales
MOMENTUM	Earnings Momentum	4-Week Change in Leading 12-Month Consensus Estimate / Price 8-Week Change in Leading 12-Month Consensus Estimate / Price Last Earnings Surprise / Current Price Last Earnings Surprise / Standard Deviation of Quarterly Estimates (SUE)
	Price Momentum	Slope of 52-Week Trendline (20-Day Lag) Percent above 260-Day Low (20-Day Lag) 4-/52-Week Price Oscillator (20-Day Lag) 39-Week Return (20-Day Lag) 51-Week Volume Price Trend (20-Day Lag)
TECHNICAL	Price Reversal	5-Day Industry Relative Return 5-Day Money Flow / Volume 10-Day MACD – Signal Line 14-Day RSI (Relative Strength Indicator) 20-Day Stochastic 4-Week Industry Relative Return
	Small Size	Log of Market Capitalization Log of Market Capitalization Cubed Log of Stock Price Log of Total Assets Log of Trailing 12-Month Sales

Figure 1: Credit Suisse Alpha Factors in more detail. Source: Credit Suisse Quantitative Equity Research

The composite-alpha-factor *z*-scores for each of the other nine composite alpha factors are obtained in the same way given its corresponding constituent indicators. Then, for each company in the S&P 500 and for each date, we compute the equal-weighted average of its corresponding 10 composite-alpha-factor *z*-scores, and use it as the excess-return input into the portfolio optimizer (see Appendix 7.1, page 21). We wish to stress here that while an active 130/30 strategy may employ ingenious ways for dynamically weighting the factors, equal weighting is more appropriate for an index where we are not trying to make bets on any one factor with the goal of maintaining transparency and passivity.

5. EMPIRICAL RESULTS

Using the excess-return calculations outlined in Section 4 and the portfolio construction algorithm in Appendix 7.1 (page 21) with data from January 1996 to September 2007, we construct the returns of our 130/30 strategy assuming a one-way transaction cost of 0.25% and an annual short-sales cost of 0.75%, for an annual turnover of 100%. While the above-mentioned transaction and shorting cost constraints are applied within the optimization process to achieve the desired level of turnover, the Credit Suisse 130/30 returns are reported gross of costs throughout this paper. Given that our universe is the S&P 500, a one-way transaction cost of 0.25% is likely to be an overestimate for most 130/30 portfolios. However, transaction costs tend to be higher for portfolios constructed purely from fundamental or discretionary considerations, hence we use a more conservative value to cover these cases as well as the more typical quantitative 130/30 portfolios. Since the S&P 500 generally has an annual turnover of 2% to 10% (see Table 5, page 14), a turnover level of 100% preserves the passive nature of our 130/30 portfolio while allowing it to respond each month to changes in the underlying alpha factors. Section 5.1 summarizes the basic performance characteristics of the 130/30 index, and Section 5.2 contains trading statistics for the 130/30 portfolio.

5.1 Historical Risk and Return

Table 1 (page 10) summarizes the performance of the 130/30 index, and for comparison also includes the summary statistics of the S&P 500 index. For the in-sample period from January 1996 to September 2007, the arithmetically compounded average return of the 130/30 index is 15.19%, which compares favorably with the corresponding average return of 10.50% of the S&P 500 over that same period. The volatility of the 130/30 index is approximately 15% and is similar to the 14.68% standard deviation of the S&P 500. This volatility level implies a Sharpe ratio of 0.67 for the 130/30 index, assuming a 5% risk-free rate, which compares favorably with the S&P 500 index's Sharpe ratio of 0.37. Of course, some have argued that such a comparison is inappropriate because the 130/30 strategy is leveraged, and this argument is the very motivation for our index. By controlling the volatility and beta of our 130/30 strategy, we hope to create a benchmark that is as comparable to the S&P 500 as possible while allowing the unique characteristics of long/short equity investing to emerge.

Statistic	CS 130/30 INDEX (GROSS)				S&P 500 INDEX			
	Sample Period				Sample Period			
	1996-2007	2002-2007	2004-2007	2007	1996-2007	2002-2007	2004-2007	2007
Annualized Geometric Mean (%)	14.99	10.05	12.72	13.03	9.84	6.98	10.82	12.36
Annualized Arithmetic Mean (%)	15.19	10.25	12.30	12.66	10.50	7.49	10.58	12.09
Annualized SD (%)	15.14	11.34	7.42	8.85	14.68	12.00	7.35	9.38
Annualized Sharpe*	0.67	0.46	0.98	0.86	0.37	0.21	0.76	0.76
Skewness	-0.49	-0.62	-0.28	-0.45	-0.56	-0.61	-0.32	-0.26
Kurtosis	3.86	3.99	2.42	1.67	3.65	4.36	2.12	1.69
ρ_1	-3.36	0.13	-5.37	13.59	-0.9	5.2	-1.3	18.3
ρ_2	-7.70	1.01	-21.17	-64.57	-5.0	5.5	-16.6	-71.1
ρ_3	5.63	3.64	-17.49	-40.08	4.0	3.9	-24.8	-44.4
MaxDD (%)	-35.16	-22.75	-4.83	-4.83	-44.7	-28.3	-4.7	-4.7
DD Begin	20000831	20020328	20070531	20070531	20000831	20020328	20070531	20070531
DD End	20020930	20020930	20070731	20070731	20020930	20020930	20070731	20070731

*A risk-free rate of 5% is assumed.

Table 1: Summary statistics for the monthly returns of the Credit Suisse 130/30 Index (Gross), and the S&P 500 Index, from January 1996 to September 2007.

Figure 2 (below) plots the cumulative returns of the Credit Suisse 130/30 Index and other popular indexes such as the S&P 500, the Russell 2000, and the Credit Suisse/Tremont Hedge-Fund Index. These plots show that the 130/30 index behaves more like traditional equity indexes than the Credit Suisse/Tremont Hedge-Fund Index, but does exhibit some performance gains over the S&P 500 and Russell 2000.

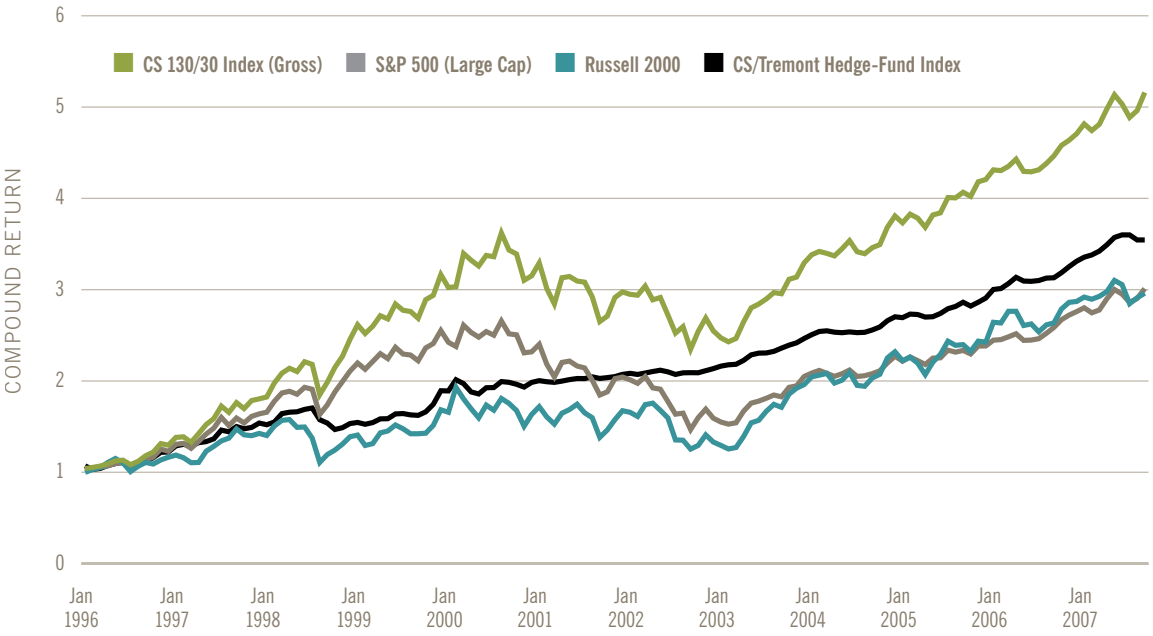

Figure 2: A comparison of the cumulative returns of the Credit Suisse 130/30 Investable Index and other indexes, from January 1996 to September 2007.

A year-by-year comparison of the 130/30 strategy with the S&P 500 presented in Table 2 (below) suggests that the increased flexibility of the 130/30 portfolio does seem to yield benefits over and above the S&P 500. However, there are periods such as 2006 where the 130/30 strategy underperforms the S&P 500, which is not surprising since in the bull market such as that of 2006 more skill may be needed to pick good shorting candidates than that captured by transparent factors. Performance of alpha factors in 2006 was not broadly consistent. For instance, performance of the historical growth factor was perverse in 9 out of 10 sectors and for the profit trends factor it was perverse in 7 out of 10 sectors. This headwind against fundamental factors caused slight underperformance in the 130/30 strategy. Table 2 contains the monthly and annual returns of the 130/30 and the S&P 500 indexes, and a direct comparison shows that the annualized tracking error of the 130/30 index is 2.62% and the average excess return associated with this 130/30 index is 4.69%, implying an information ratio (IR) of 1.79.[5] However, given the passive and transparent nature of the 130/30 strategy we have proposed, this impressive IR should not be interpreted as a sign of "alpha",[6] but rather as the benefits of increased flexibility provided by the 130/30 format. Apart from these performance differences, Table 1 (page 10) shows that the remaining statistical properties of 130/30 index returns are virtually indistinguishable from those of the S&P 500.

Year	CS 130/30 INDEX MONTHLY RETURNS (GROSS)													S&P 500 INDEX MONTHLY RETURNS											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual (Geom)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual (Geom)
1996	4.0	1.3	1.4	2.2	3.1	0.7	-4.3	3.3	5.5	3.3	7.7	-1.3	**29.7**	3.4	0.9	1.0	1.5	2.6	0.4	-4.4	2.1	5.6	2.8	7.6	-2.0	**23.0**
1997	6.6	0.4	-4.3	7.1	7.0	4.2	8.6	-4.0	6.5	-3.7	5.2	1.1	**39.1**	6.2	0.8	-4.1	6.0	6.1	4.5	8.0	-5.6	5.5	-3.3	4.6	1.7	**33.4**
1998	1.1	8.4	5.4	2.6	-1.7	5.1	-1.3	-15.2	7.4	8.2	5.6	8.2	**36.2**	1.1	7.2	5.1	1.0	-1.7	4.1	-1.1	-14.5	6.4	8.1	6.1	5.8	**28.6**
1999	6.5	-3.7	3.1	4.5	-1.3	6.1	-2.4	-0.5	-2.7	7.6	1.7	7.7	**28.8**	4.2	-3.1	4.0	3.9	-2.4	5.6	-3.1	-0.5	-2.7	6.3	2.0	5.9	**21.0**
2000	-4.5	0.3	12.0	-2.2	-1.9	3.6	-0.4	-5.2	-9.3	2.3	7.5	2.1	**-5.6**	-5.0	-1.9	9.8	-3.0	-2.1	2.5	-1.6	6.2	-5.3	-0.4	-7.9	0.5	**-9.1**
2001	4.5	-8.5	-5.6	10.1	0.4	-1.6	-0.4	-5.2	-9.3	2.3	7.5	2.1	**-5.6**	3.5	-9.1	-6.3	7.8	0.7	-2.4	-1.0	-6.3	-8.1	1.9	7.6	0.9	**-11.9**
2002	-0.9	-0.3	3.4	-5.0	0.9	-6.6	-7.3	2.8	-9.5	8.3	5.8	-5.2	**-14.3**	-1.5	-1.9	3.8	-6.1	-0.7	-7.1	-7.8	0.7	-10.9	8.8	5.9	-5.9	**-22.1**
2003	-3.0	-1.8	1.5	7.3	5.8	1.5	1.9	2.4	-0.4	5.3	0.8	4.9	**29.2**	-2.6	-1.5	1.0	8.2	5.3	1.3	1.8	2.0	-1.1	5.7	0.9	5.2	**28.7**
2004	2.7	1.1	-0.6	-0.8	2.3	2.6	-3.4	-0.6	1.9	1.0	5.4	3.3	**15.6**	1.8	1.4	-1.5	-1.6	1.4	1.9	-3.3	0.4	1.1	1.5	4.0	3.4	**10.9**
2005	-2.0	2.5	-1.1	-2.7	3.6	0.6	4.4	-0.1	1.5	-1.1	4.0	0.6	**10.5**	-2.4	2.1	-1.8	-1.9	3.2	0.1	3.7	-0.9	0.8	-1.7	3.8	0.0	**4.9**
2006	2.5	-0.2	1.1	1.8	-3.0	-0.1	0.5	1.6	1.9	2.6	1.2	1.5	**11.9**	2.6	0.3	1.2	1.3	-2.9	0.1	0.6	2.4	2.6	3.3	1.9	1.4	**15.8**
2007	2.3	-1.5	1.4	3.5	3.1	-2.0	-2.9	1.5	4.0	–	–	–	**9.6**	1.5	-2.0	1.1	4.4	3.5	-1.7	-3.1	1.5	3.7	–	–	–	**9.1**
Mean	**1.7**	**-0.2**	**1.5**	**2.4**	**1.5**	**1.2**	**-0.6**	**-0.5**	**0.1**	**2.9**	**3.3**	**2.2**		**1.1**	**-0.6**	**1.1**	**1.8**	**1.1**	**0.8**	**-0.9**	**-1.0**	**-0.2**	**3.0**	**3.3**	**1.5**	
SD	**3.6**	**3.9**	**4.5**	**4.5**	**3.2**	**3.5**	**4.2**	**5.7**	**5.7**	**4.1**	**4.6**	**3.8**		**3.3**	**3.8**	**4.3**	**4.4**	**3.1**	**3.4**	**4.1**	**5.4**	**5.6**	**3.9**	**4.3**	**3.5**	

Table 2: Monthly returns of the Credit Suisse 130/30 Index (Gross) and the S&P 500 Index, in percent, from January 1996 to September 2007. Please note that the annual returns for 2007 are year-to-date returns.

[5] Note that the annualized tracking error of 2.62% is computed directly from the monthly excess returns of the 130/30 strategy, whereas the tracking errors in Tables 4 and 9 (pages 13 and 20) are based on the monthly annualized tracking-error estimates produced by the MSCI Barra Aegis Portfolio Manager.

[6] Recall that the factors used in constructing the 130/30 portfolio are based on well-known accounting variables and have been available to Credit Suisse clients for several years.

Index	CS 130/30 INDEX (GROSS)	S&P 500 INDEX
Correlations (based on monthly returns to Sept. '07)		
Russell 1000	**99**	**100**
Russell 1000 Growth	**94**	**94**
Russell 1000 Value	**88**	**90**
Russell 2000	73	72
Russell 2000 Growth	73	71
Russell 2000 Value	68	67
Russell 3000	**98**	**99**
Russell 3000 Growth	**94**	**94**
Russell 3000 Value	**88**	**90**
S&P 500 (Large Cap)	**99**	**100**
S&P 500 Growth	**95**	**96**
S&P 500 Value	**92**	**94**
S&P 400 (Mid Cap)	**88**	**85**
S&P 400 Growth	**85**	**82**
S&P 400 Value	**79**	**78**
S&P 600 (Small Cap)	74	72
S&P 600 Growth	71	68
S&P 600 Value	73	72
Correlations to Other Market Indexes (based on monthly returns to Aug. '07)		
MSCI World Index	**93**	**95**
NASDAQ 100 Stock Index	**82**	**81**
BBA LIBOR USD 3-Month	-1	0
DJ Lehman Bond Comp GLBL	-5	-6
U.S. Treasury N/B (GT10)	17	18
U.S. Treasury N/B (GT2)	25	25
U.S. Treasury N/B (GT30)	11	11
Gold (Spot $/oz)	-2	-4
U.S. Dollar Spot Index	5	6
NYMEX Crude Future Implied Call Volatility	-18	-16
Correlations to CS/Tremont Indexes (based on monthly returns to Aug. '07)		
All Funds	52	50
Convertible Arbitrage	15	13
Dedicated Short Bias	**-78**	**-76**
Emerging Markets	54	55
Equity Market Neutral	44	42
Event Driven	55	55
Fixed Income Arbitrage	2	0
Global Macro	25	23
Long/Short Equity Hedge	62	59
Managed Futures	-10	-8
Multi-Strategy	16	15

Correlations ≥ 75% **Correlations ≤ -25%**

Table 3: Correlations of the Credit Suisse 130/30 Index (Gross) to various market and hedge-fund indexes, from January 1996 to September 2007.

In Table 3 (page 12), we report the correlations of the 130/30 index to various market indexes, key financial assets, and hedge-fund indexes. For comparison, we report the same correlations for the S&P 500. Not surprisingly, the 130/30 index is highly correlated with all of the equity indexes, and the correlation coefficients are nearly identical to those of the S&P 500. The right panels of Table 3 show the same patterns—the 130/30 index and the S&P 500 have almost identical correlations to stock, bond, currency, commodity, and hedge-fund indexes.

5.2 Trading Statistics

To develop a sense for the implementation issues surrounding the 130/30 index, Table 4 (below) reports the monthly and annual turnover and yearly averages of the annualized tracking errors (obtained from the

Year	CS 130/30 INDEX TOTAL TURNOVER													CS 130/30 INDEX LONG-SIDE TURNOVER											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual*
1996	130.0	10.4	8.0	7.3	11.4	6.8	4.9	12.1	6.2	6.8	10.8	5.4	**98.4**	115.0	7.1	6.0	5.4	7.8	4.4	4.0	9.0	4.5	5.0	7.7	3.5	**70.2**
1997	6.2	8.9	5.4	6.8	9.0	8.0	6.6	10.7	6.2	6.9	9.3	6.8	**90.8**	4.4	6.3	3.8	4.6	5.9	5.8	4.5	7.1	3.8	5.5	7.1	4.8	**63.6**
1998	6.1	10.1	8.0	7.4	10.5	7.4	4.7	11.4	7.8	7.7	11.4	5.0	**97.5**	4.5	7.2	5.5	5.0	8.1	4.9	3.1	8.3	5.6	5.4	7.7	3.3	**68.5**
1999	5.3	11.4	6.5	7.0	11.6	8.1	7.3	8.9	6.4	6.8	9.6	6.5	**95.5**	3.9	8.5	4.4	4.8	7.7	5.8	5.2	6.4	4.9	4.8	6.5	4.8	**67.6**
2000	7.2	9.1	5.6	6.1	8.7	7.8	8.0	8.9	6.8	6.9	12.1	7.5	**94.7**	4.6	6.5	4.2	4.4	6.5	5.6	6.3	6.3	5.1	4.9	8.3	5.1	**67.8**
2001	7.2	9.6	7.2	6.6	9.2	5.9	5.9	12.1	7.9	6.8	9.6	8.7	**96.8**	5.2	6.7	5.4	4.5	6.7	4.2	3.7	8.8	5.2	4.6	7.0	6.2	**68.2**
2002	6.6	10.4	7.8	6.7	8.6	7.4	7.2	9.6	6.8	6.8	9.1	9.3	**96.4**	5.1	7.3	5.5	4.5	5.4	4.8	5.4	7.2	4.7	4.4	6.5	6.1	**66.8**
2003	6.2	9.2	6.5	5.8	10.1	7.6	7.6	8.8	6.4	8.8	9.7	5.5	**92.1**	4.1	6.2	4.7	4.3	7.1	5.1	4.6	6.3	4.7	6.6	6.3	3.9	**63.8**
2004	6.9	9.1	6.3	6.5	7.6	8.7	6.4	6.4	5.7	5.3	8.2	6.3	**83.5**	4.6	6.8	4.8	4.7	5.3	5.7	4.4	4.0	3.7	3.8	6.1	4.3	**58.2**
2005	6.4	5.8	6.5	7.3	8.7	6.4	4.6	7.3	6.4	5.8	7.4	7.3	**79.8**	4.6	4.5	4.1	5.2	5.8	4.0	3.1	4.7	4.4	4.4	5.1	4.7	**54.5**
2006	6.1	6.1	6.0	6.1	7.2	6.9	6.4	7.7	5.6	7.3	6.2	7.0	**78.6**	4.5	4.6	4.0	4.4	5.5	4.6	4.4	5.6	4.2	5.3	5.1	4.7	**57.1**
2007	5.7	5.8	7.6	7.3	6.2	8.8	5.8	6.6	7.5	–	–	–	**81.7**	3.8	4.3	4.9	5.0	4.2	6.2	3.9	4.9	5.5	–	–	–	**57.0**
Mean	**16.7**	**8.8**	**6.8**	**6.7**	**9.1**	**7.5**	**6.3**	**9.2**	**6.7**	**6.9**	**9.4**	**6.8**		**13.7**	**6.3**	**4.8**	**4.7**	**6.3**	**5.1**	**4.4**	**6.6**	**4.7**	**5.0**	**6.7**	**4.7**	
SD	**35.7**	**1.9**	**0.9**	**0.5**	**1.6**	**0.9**	**1.1**	**2.0**	**0.8**	**0.9**	**1.7**	**1.3**		**31.9**	**1.3**	**0.7**	**0.4**	**1.2**	**0.7**	**0.9**	**1.6**	**0.6**	**0.7**	**1.0**	**0.9**	

Year	CS 130/30 INDEX ANNUALIZED TRACKING ERROR													CS 130/30 INDEX SHORT-SIDE TURNOVER											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual*
1996	2.0	2.0	2.0	2.0	2.0	1.8	1.8	2.1	1.9	1.9	2.0	1.9	**2.0**	15.0	3.3	2.0	1.8	3.7	2.4	0.9	3.1	1.7	1.8	3.2	1.9	**28.2**
1997	2.1	2.0	2.0	1.9	2.0	1.9	2.1	1.9	2.0	1.9	2.1	2.0	**2.0**	1.7	2.6	1.6	2.3	3.1	2.2	2.2	3.7	2.3	1.5	2.2	2.0	**27.2**
1998	2.1	2.1	1.9	2.0	2.1	2.0	2.1	2.3	2.4	2.5	2.5	2.4	**2.2**	1.5	2.9	2.5	2.4	2.5	2.5	1.6	3.1	2.3	2.3	3.7	1.7	**29.0**
1999	2.2	2.3	2.3	2.4	2.4	2.3	2.2	2.1	2.2	2.1	2.4	2.4	**2.3**	1.4	2.9	2.1	2.3	4.0	2.4	2.1	2.4	1.6	2.1	3.1	1.7	**27.9**
2000	2.9	2.8	3.1	3.0	2.9	2.7	2.8	2.7	2.7	2.9	2.9	2.9	**2.9**	2.6	2.6	1.4	1.7	2.2	2.2	1.7	2.6	1.8	2.0	3.8	2.4	**26.9**
2001	2.7	2.8	2.8	2.6	2.3	2.3	2.5	2.4	2.3	2.5	2.6	2.5	**2.5**	2.1	2.9	1.9	2.2	2.5	1.6	2.2	3.3	2.7	2.1	2.6	2.4	**28.6**
2002	2.5	2.6	2.6	2.5	2.6	2.5	2.6	2.9	2.6	2.7	2.7	2.6	**2.6**	1.5	3.1	2.3	2.3	3.2	2.6	1.9	2.5	2.1	2.4	2.6	3.2	**29.6**
2003	2.6	2.4	2.3	2.2	2.2	2.3	2.4	2.6	2.3	2.2	2.3	2.1	**2.3**	2.1	3.0	1.8	1.5	2.9	2.6	3.1	2.5	1.7	2.2	3.3	1.6	**28.3**
2004	2.1	2.1	2.1	2.2	2.3	2.1	2.1	2.2	2.1	2.0	2.1	2.1	**2.1**	2.3	2.3	1.5	1.8	2.3	3.0	2.1	2.4	2.0	1.5	2.2	2.0	**25.3**
2005	2.1	2.1	2.0	2.2	2.3	2.1	2.0	2.0	2.1	2.1	2.2	2.1	**2.1**	1.8	1.4	2.4	2.1	2.9	2.5	1.6	2.6	2.0	2.0	1.4	2.2	**25.3**
2006	2.0	2.1	2.0	2.0	2.0	21	2.0	2.0	2.1	2.0	1.8	1.7	**2.0**	1.7	1.5	1.9	1.7	1.7	2.3	1.9	2.0	1.4	1.9	1.1	2.4	**21.5**
2007	1.6	1.7	1.7	1.6	1.6	1.6	1.7	1.8	1.8	–	–	–	**1.7**	1.9	1.5	2.6	2.3	2.0	2.6	1.9	1.7	2.0	–	–	–	**24.7**
Mean	**2.2**	**2.3**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.2**	**2.3**	**2.3**	**2.3**		**3.0**	**2.5**	**2.0**	**2.0**	**2.7**	**2.4**	**1.9**	**2.6**	**2.0**	**1.9**	**2.7**	**2.1**	
SD	**0.4**	**0.4**	**0.4**	**0.4**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.3**		**3.8**	**0.7**	**0.4**	**0.3**	**0.7**	**0.3**	**0.5**	**0.6**	**0.4**	**0.3**	**0.8**	**0.5**	

*Annual turnover values for 1996 exclude the month of January.

Table 4: Monthly turnover and annualized tracking error for the Credit Suisse 130/30 Index, in percent, from January 1996 to September 2007.

MSCI Barra Aegis Portfolio Manager each month) of the 130/30 portfolio.[7] The turnover of the 130/30 index ranges from a high of 98.4% in 1996 to a low of 78.6% in 2006, and is typically 8% per month. For comparison, Table 5 (below) contains the turnover of several S&P indexes. In contrast to the 130/30 index which is intended to be a dynamic basket of securities, the S&P indexes are static, changing only occasionally as certain stocks are included or excluded due to changes in their characteristics. Therefore, as a buy-and-hold index, the turnover of the S&P 500 is typically much lower than that of the 130/30 index, but Table 5 shows that even for the S&P 500, there are years when this static portfolio exhibits higher turnover levels, e.g., 1998 when the turnover in the S&P 500 index was 9.5%. Moreover, for other static S&P indexes such as the Mid Cap 400, the turnover levels are even higher, hence the practical challenges of implementing the 130/30 index are not much greater than those posed by many other popular buy-and-hold indexes.

Year	S&P 500	S&P MIDCAP 400	S&P SMALLCAP 600
1993	2.6	10.3	–
1994	3.8	9.9	–
1995	5.0	15.6	13.7
1996	4.6	14.4	16.4
1997	4.9	17.9	21.8
1998	9.5	31.4	24.4
1999	6.2	28.9	24.4
2000	8.9	37.1	36.4
2001	4.4	17.0	15.6
2002	3.8	10.7	11.0
2003	1.5	8.6	11.0
2004	3.1	13.1	13.0
2005	5.7	14.5	13.8
2006	4.5	12.2	12.9

Table 5: Turnover of various S&P indexes, in percent. Source: Credit Suisse Equity Derivatives Group.

5.3 Out-of-Sample Results

In Lo and Patel (2008), the sample period ended in September 2007, hence now we have a 15-month out-of-sample period in which to observe the performance of the Credit Suisse 130/30 Index and compare its performance to other 130/30 indexes that were recently introduced.[8] The various indexes are described in Figure 3 (page 15), and the results are contained in Figures 4–5 (page 16 and 18) and

[7] The total, long-side, and short-side turnover in Tables 4 and 9 (page 13 and 20) are computed as one-way turnover against the total absolute value of the initial portfolio positions, whereas in the MSCI Barra Aegis Portfolio Manager, the long-side (short-side) turnover is computed against the value of the long (short) positions of the initial portfolio. Also, each time a portfolio is constructed, the MSCI Barra Aegis Portfolio Manager provides an annualized tracking-error forecast based on the Barra multiple-factor risk model.

[8] After the launch of the Credit Suisse 130/30 Index in April 2008, the live index returns are used. Please note that the portfolio constructed in any given month is implemented in production around the 18th day of that month.

FIRM NAME	ANNOUNCEMENT DATE	COMMENTS
CREDIT SUIISE	Oct. 2, 2007	**Universe:** About 500 Largest US companies **130/30:** Integrated 130/30 at each rebalance using an optimizer **Stock Ranking:** 10 factor composites using fundamental, price and volume data **Rebalance Period:** Monthly **Target Tracking Error:** 1.5 to 3% with respect to the universe, max +/- 40 bps active exposure to universe floated adjusted weights **ETF/ETN Available:** Yes, ETF is available by ProShares, Ticker "CSM" **Source:** http://www.credit-suisse.com/indices/13030
S&P	Nov. 19, 2007	**Universe:** S&P 500 Companies, stocks removed from S&P 500 removed from 130/30 index, and new additions to S&P 500 are eligible at next rebalance. **130/30:** *Long Basket:* The weight of the highest ranked 30 stocks is increased by 1% relative to the S&P500 and is the overweight or long basket. *Short Basket:* The weight of the lowest ranked 30 stocks is decreased by 1% relative to the S&P500 and is the underweight or short basket. Aggregate short position is always less than 30%. Long position is +30% at rebalance. **Stock Ranking:** S&P STARS ratings and two fundamental factors: 1) industry relative external financing, 2) industry relative valuation **Rebalance Period:** Quarterly **Target Tracking Error:** N/A **ETF/ETN Available:** No **Source:** S&P 500 130/30 Strategy Index, July 2008, www.indices.standardandpoors.com
DOW JONES	Mar. 11, 2008	**Universe:** Dow Jones 750 Large Cap Index Companies **130/30:** Leading Index: The 30 stocks with the highest RBP probability scores become components of the Dow Jones RBP Large-Cap Leading 30 Index. **Lagging Index:** The 30 stocks with the lowest RBP probability scores become components of the Dow Jones RBP Large-Cap Lagging 30 Index. **Stock Ranking:** RBP probability rankings **Rebalance Period:** Quarterly **Target Tracking Error:** N/A **ETF/ETN Available:** No **Source:** Dow Jones RBP US Large-Cap 130/30 Indexes, February 2008, www.djindexes.com
INDEX IQ	Apr. 30, 2008	**Universe:** Top 1000 stocks highest ranked companies in terms of 52-week average daily dollar trading volume and in terms of market capitalization **130/30:** Long exposure of up to 100 stocks and short exposure with about 60 stocks. Long weights are scaled to 130% and short weights are scaled to negative 30%. **Stock Ranking:** Using proprietary non-market-cap methodology **Rebalance Period:** Long exposure annual rebalance, short exposure quarterly rebalance **Target Tracking Error:** Maximum weight of single stock is capped at 5% at annual rebalance and monitored each quarter, single stock weight more than 10% at end of quarter is capped at 10% and excess weight allocated to other index components. Maximum short position allowed is 1% at quarterly rebalance. **ETF/ETN Available:** No **Source:** Methodology for IQ 130/30 Index, http://www.indexiq.com/
FIRST TRUST	May 21, 2008	**Universe:** Start with largest 2500 US traded stocks and stocks that are at least as large as the smallest stock in the largest 20% of NYSE listed stocks. These stocks are used for large cap index with additional requirement of minimum of 500,000 shares traded in each of the last six calendar months. **130/30:** Top 30% ranked stocks are long equal weighted and bottom 30% stocks are short equal weighted, and longs and shorts scaled to 130/30 at each quarterly rebalance. **Stock Ranking:** For long side: Growth factors are 3, 6, and 12 month price momentum and 1 year sales growth. Value factors are book value and cash flow multiples and return on assets. **For short side:** 3 and 6 month price momentum, book value and cash flow multiples and return on assets and short interest .10 or less are used. **Rebalance Period:** Quarterly **Target Tracking Error:** N/A **ETF/ETN Available:** Yes, ETN by JP Morgan, Ticker "JFT" **Source:** First Trust Enhanced 130/30 Large Cap Index – Index Methodology, www.ftportfolios.com

Figure 3: Description of other 130/30 indexes/strategies/ETNs.

Tables 6–9 (pages 17–20). Both the monthly returns and trading statistics are consistent with their in-sample counterparts. For example, Table 6 (page 17) shows that for the out-of-sample period the Credit Suisse 130/30 Index has outperformed the S&P 500 Index by about 4 percentage points annually,[9] but this is not surprising since the 130/30 index takes on additional risks, i.e., those associated with short-selling and leverage, which are not accounted for solely by market beta. The crucial point is that the value-added of the Credit Suisse 130/30 Index is not due to any proprietary investment acumen, but to other sources of risk premia that the 130/30 format can exploit more effectively than the long-only format. Tables 6–9 (pages 17– 20) and Figure 5 (page 18) also contain comparisons with other 130/30 indexes that were recently introduced. The biggest differences between the Credit Suisse 130/30 Index and the others are observed for the First Trust 130/30 Index and the IQ 130/30 Index, both of which exhibit annualized standard deviations much greater than the 20.53% of the Credit Suisse 130/30 Index during the out-of-sample period, and much greater than the S&P 500 Index's 19.35% volatility during this same period.

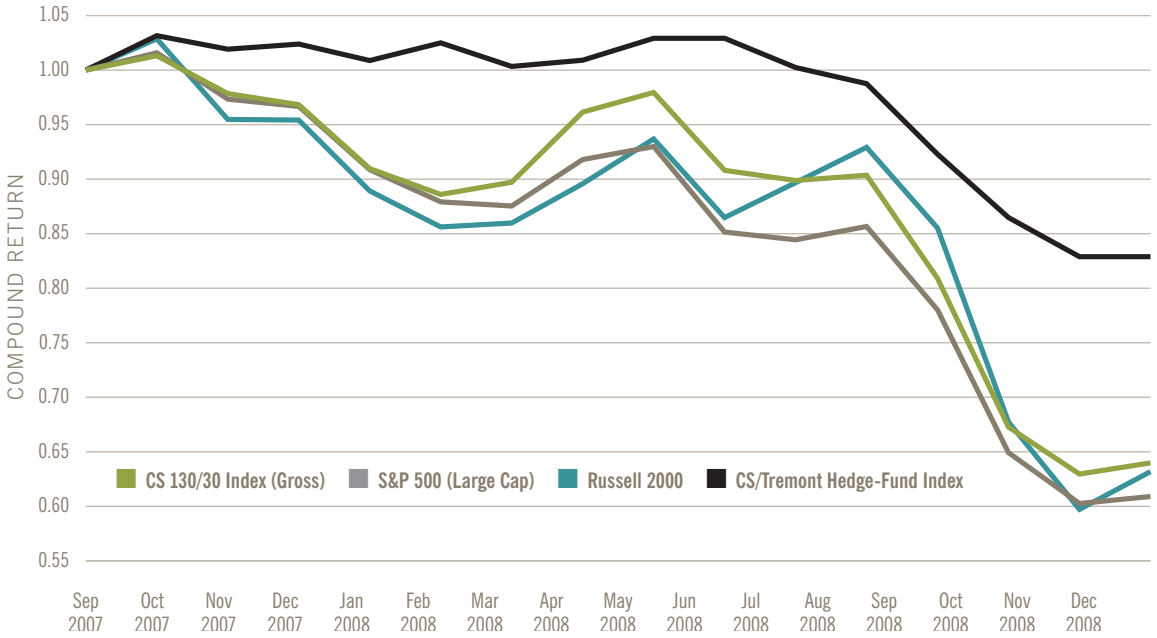

Figure 4: A comparison of the cumulative returns of the Credit Suisse 130/30 Index (Gross) and various other indexes, from October 2007 to December 2008.

[9] This value refers to the arithmetic mean. The corresponding geometric mean outperformance is around 3%.

Statistic	CS 130/30 INDEX (GROSS)		S&P 500 INDEX		S&P 500 130/30 STRATEGY INDEX	
	Sample Period		Sample Period		Sample Period	
	2007-2008	2008	2007-2008	2008	2007-2008	2008
Annualized Geometric Mean (%)	-30.04	-33.93	-32.75	-37.00	-32.54	-37.76
Annualized Arithmetic Mean (%)	-33.11	-38.24	-37.15	-43.15	-36.59	-44.06
Annualized SD (%)	20.53	22.63	19.35	21.02	20.56	22.10
Annualized Sharpe*	-1.86	-1.91	-2.18	-2.29	-2.02	-2.22
Skewness	-0.74	-0.53	-0.90	-0.69	-1.06	-0.87
Kurtosis	3.40	2.80	3.40	2.85	3.95	3.34
ρ_1	34.97	38.05	24.85	29.47	23.53	26.92
ρ_2	-26.19	-29.77	-34.03	-40.68	-32.27	-39.90
ρ_3	-12.12	-10.74	-11.38	-9.74	-8.25	-6.21
MaxDD (%)	-37.86	-35.72	-40.68	-37.66	-41.99	-39.23
DD Begin	20071031	20080530	20071031	20071231	20071031	20071231
DD End	20081128	20081128	20081128	20081128	20081128	20081128

Statistic	S&P 500 130/30 STRATEGY TOTAL RETURN		FIRST TRUST 130/30 INDEX		IQ 130/30 INDEX	
	Sample Period		Sample Period		Sample Period	
	2007-2008	2008	2007-2008	2008	2007-2008	2008
Annualized Geometric Mean (%)	-30.14	-34.00	-44.22	-54.19	-42.00	-49.88
Annualized Arithmetic Mean (%)	-33.38	-38.54	-51.36	-69.73	-48.81	-62.18
Annualized SD (%)	19.78	21.64	32.89	33.70	29.36	31.27
Annualized Sharpe*	-1.94	-2.01	-1.71	-2.22	-1.83	-2.15
Skewness	-0.96	-0.77	-0.83	-0.69	-0.86	-0.62
Kurtosis	3.59	2.97	2.83	2.51	3.04	2.57
ρ_1	23.66	27.00	31.20	39.59	28.59	34.23
ρ_2	-40.50	-46.00	14.86	0.74	9.35	-0.14
ρ_3	-12.47	-11.30	-8.49	-7.34	-8.25	-3.91
MaxDD (%)	-39.33	-36.17	-55.50	-55.31	-51.41	-49.99
DD Begin	20071031	20071231	20071031	20071231	20071031	20071231
DD End	20081128	20081128	20081128	20081128	20081128	20081128

*A risk-free rate of 5% is assumed.

Table 6: Summary statistics for the monthly returns of the Credit Suisse 130/30 Index (Gross), the S&P 500 Index, and various other 130/30 indexes, from October 2007 to December 2008. Please note that the annualized mean returns are arithmetic averages of monthly returns multiplied by 12, not compounded geometric averages.

Year	CS 130/30 INDEX (GROSS)													S&P 500 INDEX											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual (Geom)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual (Geom)
2007	–	–	–	–	–	–	–	–	–	1.3	-3.4	-1.0	**-3.2**	–	–	–	–	–	–	–	–	–	1.6	-4.2	-0.7	**-3.3**
2008	-6.1	-2.6	1.3	7.2	1.9	-7.3	-1.0	0.5	10.5	-16.9	-6.4	1.6	**-33.9**	-6.0	-3.2	-0.4	4.9	1.3	-8.4	-0.8	1.4	-8.9	-16.8	-7.2	1.1	**-37.0**
Mean	**-6.1**	**-2.6**	**1.3**	**7.2**	**1.9**	**-7.3**	**-1.0**	**0.5**	**-10.5**	**-7.8**	**-4.9**	**0.3**		**-6.0**	**-3.2**	**-0.4**	**4.9**	**1.3**	**-8.4**	**-0.8**	**1.4**	**-8.9**	**-7.6**	**-5.7**	**0.2**	
SD	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**12.8**	**2.1**	**1.9**		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**13.0**	**2.1**	**1.2**	

Year	DOW JONES RBP U.S. LARGE-CAP 130/30 INDEX													S&P 500 130/30 STRATEGY TOTAL RETURN											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual (Geom)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual (Geom)
2007	–	–	–	–	–	–	–	–	–	1.7	-4.2	-1.2	**-3.7**	–	–	–	–	–	–	–	–	–	1.6	-4.2	-0.7	**-3.3**
2008	-5.5	-3.6	-0.2	4.4	1.3	-7.9	-1.2	1.7	-9.4	-17.2	-6.6	3.1	**-35.0**	-5.3	-3.3	0.0	4.5	1.5	-7.7	-1.1	1.9	-9.2	-17.1	-6.2	3.4	**-34.0**
Mean	**-5.5**	**-3.6**	**-0.2**	**4.4**	**1.3**	**-7.9**	**-1.2**	**1.7**	**-9.4**	**-7.8**	**-5.4**	**1.0**		**-5.3**	**-3.3**	**0.0**	**4.5**	**1.5**	**-7.7**	**-1.1**	**1.9**	**-9.2**	**-7.6**	**-5.1**	**1.2**	
SD	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.**	**0.0**	**13.4**	**1.7**	**3.0**		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**13.3**	**1.6**	**3.1**	

Year	FIRST TRUST 130/30 INDEX													IQ 130/30 INDEX											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual (Geom)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual (Geom)
2007	–	–	–	–	–	–	–	–	–	5.7	-5.5	5.4	**5.2**	–	–	–	–	–	–	–	–	–	3.9	-4.2	1.4	**1.0**
2008	-7.5	0.0	-4.6	6.6	4.7	-1.6	-12.8	-3.1	-21.0	-24.8	-8.3	2.5	**-54.2**	-9.8	1.7	-4.0	7.5	4.3	-3.0	-9.6	-0.6	-18.3	-23.1	-7.5	0.2	**-49.9**
Mean	**-7.5**	**0.0**	**-4.6**	**6.6**	**4.7**	**-1.6**	**-12.8**	**-3.1**	**-21.0**	**-9.6**	**-6.9**	**3.9**		**-9.8**	**1.7**	**-4.0**	**7.5**	**4.3**	**-3.0**	**-9.6**	**-0.6**	**-18.3**	**-9.6**	**-5.9**	**0.8**	
SD	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**21.5**	**2.0**	**2.0**		**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**19.1**	**2.3**	**0.9**	

Table 7: Monthly returns of the Credit Suisse 130/30 Index (Gross), the S&P 500 Index, and various other 130/30 indexes, in percent, from October 2007 to December 2008. Please note that the geometrically compounded returns for 2007 include the months of October, November, and December only, and have not been annualized.

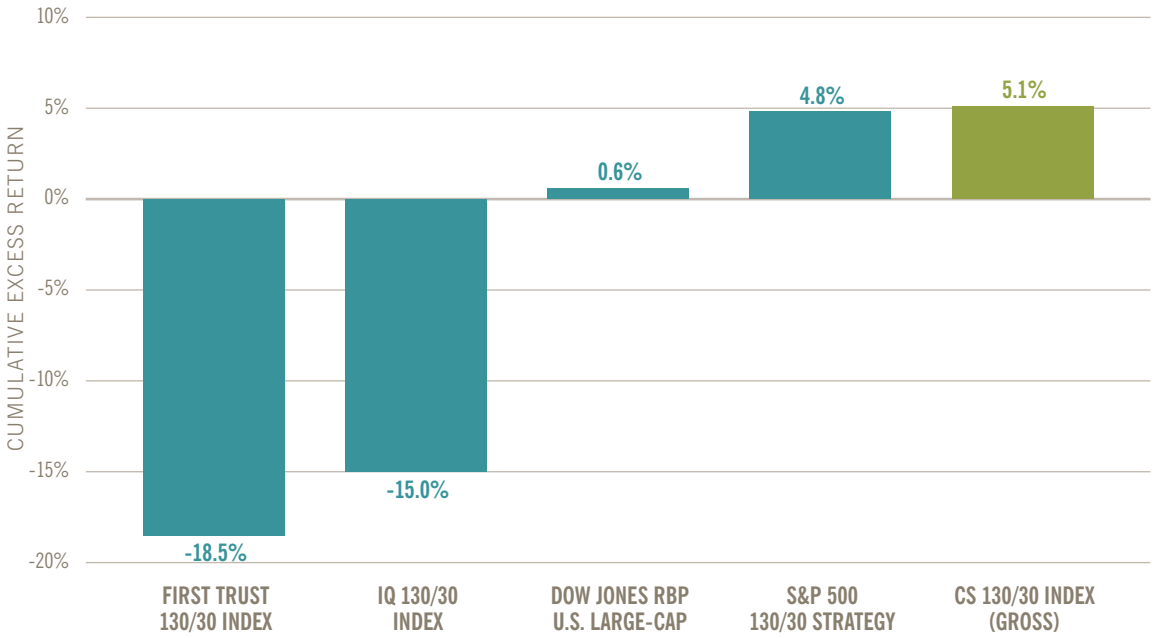

Figure 5: A comparison of the out-of-sample cumulative monthly excess returns versus the S&P 500 Index for the Credit Suisse 130/30 Index (Gross) and various other indexes, from October 2007 to December 2008.

Index	CS 130/30 INDEX (GROSS)	S&P 500 INDEX	S&P 500 130/30 STRATEGY INDEX	S&P 500 130/30 STRATEGY TOTAL RETURN	FIRST TRUST 130/30 INDEX	IQ 130/30 INDEX
Correlations (based on out-of-sample monthly returns from October 2007 to December 2008)						
Russell 1000	**99**	**100**	**99**	**99**	**83**	**83**
Russell 1000 Growth	**98**	**98**	**98**	**98**	**88**	**88**
Russell 1000 Value	**96**	**98**	**98**	**98**	73	73
Russell 2000	**92**	**96**	**96**	**96**	72	72
Russell 2000 Growth	**94**	**96**	**96**	**96**	**81**	**81**
Russell 2000 Value	**87**	**92**	**92**	**92**	60	60
Russell 3000	**99**	**100**	**99**	**99**	**82**	**82**
Russell 3000 Growth	**98**	**98**	**98**	**98**	**87**	**87**
Russell 3000 Value	**96**	**98**	**98**	**98**	72	72
S&P 500 (Large Cap)	**99**	**100**	**99**	**99**	**81**	**81**
S&P 500 Growth	**98**	**97**	**96**	**95**	**67**	**67**
S&P 500 Value	**93**	**97**	**96**	**95**	67	67
S&P 400 (Mid Cap)	**97**	**98**	**98**	**98**	**87**	**87**
S&P 400 Growth	**96**	**96**	**96**	**96**	**91**	**91**
S&P 400 Value	**97**	**98**	**99**	**99**	**80**	**80**
S&P 600 (Small Cap)	**91**	**95**	**95**	**95**	72	72
S&P 600 Growth	**94**	**96**	**97**	**96**	**79**	**79**
S&P 600 Value	**87**	**92**	**93**	**93**	64	64
Correlations to Other Market Indexes						
MSCI World Index	**97**	**97**	**97**	**97**	**88**	**92**
NASDAQ 100 Stock Index	**94**	**94**	**93**	**92**	**78**	**83**
BBA LIBOR USD 3-Month	0	4	-3	-3	-14	-4
DJ Lehman Bond Comp GLBL	-13	-11	2	3	-6	-20
U.S. Treasury N/B (GT10)	11	12	3	2	6	11
U.S. Treasury N/B (GT2)	63	60	54	54	52	57
U.S. Treasury N/B (GT30)	9	10	0	0	4	9
Gold (Spot $/oz)	12	14	18	18	34	25
U.S. Dollar Spot Index	**-49**	**-45**	**-51**	**-51**	**-56**	**-49**
NYMEX Crude Future Implied Call Volatility	63	61	58	57	**80**	**80**
Correlations to CS/Tremont Indexes						
All Funds	72	71	72	72	**93**	**91**
Convertible Arbitrage	74	72	**75**	**75**	**88**	**87**
Dedicated Short Bias	**-51**	**-58**	**-55**	**-55**	**-33**	**-40**
Emerging Markets	**76**	75	**76**	**76**	**91**	**89**
Equity Market Neutral	21	24	21	20	18	17
Event Driven	75	74	75	75	**94**	**93**
Fixed Income Arbitrage	**76**	**77**	**78**	**78**	**81**	**82**
Global Macro	33	30	34	34	68	60
Long/Short Equity Hedge	77	73	74	74	**94**	**94**
Managed Futures	**-46**	**-50**	**-48**	**-48**	0	-10
Multi-Strategy	**77**	**75**	**77**	**77**	**93**	**91**
Distressed	**79**	**79**	**79**	**79**	**91**	**91**
Event Driven Multi Strategy	70	68	69	69	**91**	**91**
Risk Arbitrage	71	65	67	67	76	76

Correlations ≥ 75% **Correlations ≤ -25%**

Table 8: Correlations of the Credit Suisse 130/30 Index (Gross), the S&P 500 Index, and various other 130/30 indexes to various market and hedge-fund indexes, from October 2007 to December 2008.

Year	CS 130/30 INDEX TOTAL TURNOVER												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2007	–	–	–	–	–	–	–	–	–	4.7	6.7	6.5	**71.7**
2008	5.9	9.0	6.7	9.0	7.6	7.2	6.4	10.1	9.4	7.9	12.0	7.4	**98.7**
Mean	**5.9**	**9.0**	**6.7**	**9.0**	**7.6**	**7.2**	**6.4**	**10.1**	**9.4**	**6.3**	**9.4**	**7.0**	
SD	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**2.3**	**3.7**	**0.6**	

Year	CS 130/30 INDEX LONG-SIDE TURNOVER												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2007	–	–	–	–	–	–	–	–	–	3.5	4.5	4.1	**48.4**
2008	3.9	6.3	5.0	6.8	5.1	5.2	4.6	7.5	6.2	5.8	7.8	5.3	**69.5**
Mean	**3.9**	**6.3**	**5.0**	**6.8**	**5.1**	**5.2**	**4.6**	**7.5**	**6.2**	**4.7**	**6.2**	**4.7**	
SD	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**1.7**	**2.4**	**0.8**	

Year	CS 130/30 INDEX ANNUALIZED TRACKING ERROR												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2007	–	–	–	–	–	–	–	–	–	1.8	2.1	2.0	**2.0**
2008	2.0	2.2	2.1	2.1	2.2	2.2	2.3	2.6	2.3	2.7	2.8	3.0	**2.4**
Mean	**2.0**	**2.2**	**2.1**	**2.1**	**2.2**	**2.2**	**2.3**	**2.6**	**2.3**	**2.3**	**2.5**	**2.5**	
SD	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.7**	**0.5**	**0.7**	

Year	CS 130/30 INDEX SHORT-SIDE TURNOVER												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2007	–	–	–	–	–	–	–	–	–	1.2	2.3	2.4	**23.3**
2008	2.1	2.7	1.7	2.2	2.6	2.0	1.8	2.6	3.3	2.0	4.2	2.1	**29.2**
Mean	**2.1**	**2.7**	**1.7**	**2.2**	**2.6**	**2.0**	**1.8**	**2.6**	**3.3**	**1.6**	**3.2**	**2.3**	
SD	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.6**	**1.3**	**0.2**	

Table 9: Monthly turnover and annualized tracking error for the Credit Suisse 130/30 Index (Gross), in percent, from October 2007 to December 2008.

6. CONCLUSION

In this paper, we have argued that for a portfolio to be considered a true "index", it must be transparent, investable, and passive. Transparency requires that the rules for constructing the index be systematic, clear, and easily implementable. Investability requires that the components of the portfolio consist of liquid exchange-traded instruments. And passivity requires that the implementation of the index is purely mechanical, requiring little or no manual intervention and discretion. With these criteria in mind, we have proposed a simple dynamic portfolio as an index for the many 130/30 products that are now being offered.

Proposing a dynamic strategy as an index is a significant departure from tradition. However, the growing complexity of financial products coupled with corresponding advances in trading technology and portfolio construction tools provide compelling motivation for this next generation of benchmarks. Although the interpretation and implementation of such dynamic portfolios will require more effort than the standard buy-and-hold indexes, this is the price of innovation as institutional investors become more engaged in alternative investments. And as trading technology becomes more sophisticated, we anticipate the creation of many more benchmarks from dynamic trading strategies, and we hope that the 130/30 index will pave the way for that future.

7. APPENDIX

7.1 Portfolio Construction Algorithm

We use the MSCI Barra Aegis Portfolio Manager with the Barra U.S. Equity Long-Term Risk Model to construct the 130/30 portfolio on a monthly basis from January 1996 to December 2008. For each month, we use the S&P 500 as the benchmark and the universe in the portfolio construction. We start with $100,000,000 in cash, and then rebalance on a monthly basis (i.e., for each month after January 1996, we input the previous month's portfolio as the initial portfolio in the optimization process). The precise specifications used are summarized below.

Constraints: We constrain the portfolio beta to equal one.

Expected Returns: For each company in the S&P 500 and for each date, we use the equal-weighted average of its corresponding ten composite-alpha-factor *z*-scores as the excess-return input into the optimizer when constructing the investable portfolio. We set the risk-free rate, the benchmark risk premium, and the expected benchmark surprise all to zero.

Optimization Type: We use long/short portfolio optimization, where we set the long and the short position leverage to 130% and 30%, respectively.

Trading: We do not put any constraints on the holding and trading threshold levels, and we set the active weight to 40 basis points. This yields a tracking error, defined as the annualized standard deviation of the difference between the portfolio and the benchmark daily return series, between 1.5% and 3% for each month.

Risk: We use the Barra default setting, which includes the following specifications: mean return of zero, probability level of 5%, risk aversion value of 0.0075, and AS-CF risk aversion ratio of 1.

Transaction Costs: We set the one-way transaction costs to 0.25% and construct the portfolio with the annualized turnover of 100%. The turnover of approximately 100% per year is achieved by coupling the one-way transaction costs of 0.25% with a transaction-cost multiplier of 0.75 in the MSCI Barra Aegis Portfolio Manager.

Tax Costs: We do not assume any model for the tax costs.

Under these parameters, the portfolio optimization process generates the optimal number of shares to be held for each stock in our 130/30 portfolio for each month. Now, for each stock *i* in our portfolio, we have the following monthly information: the number of shares S_{it-1} at the end of the previous month, the price per share P_{it-1} at the end of the previous month, and total return for the month R_{it}. We use this information to form the net-of-cost monthly 130/30 portfolio total return R_{pt} as:

$$R_{pt} \equiv \sum_{i=1}^{n} \frac{P_{it\text{-}1}\, S_{it\text{-}1}}{\sum_{j=1}^{n} P_{jt\text{-}1}\, S_{jt\text{-}1}} R_{it}$$

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