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## **How to beat an Index-Fund: Reflections on Theory, Reality, and Strategy**

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## **Abstract**

Consistent annual returns on investment up to 20 per cent, cost effectiveness, clear-cut trading decisions as well as a very high degree of transparency make index-fund investments the chosen strategies for many participants in international stock markets.

The analysis in hand is designed to discuss advantages of and limits to index-fund trading and to present active management strategies which have a reasonable chance to perform profitwise not too far worse than index-funds at an overall drawdown risk under far better control.

In the course of the argumentation, it is basically referred to a model which consists of three core elements: Automation and computerization at first go in hand with secondly a restriction to one universal trading parameter proven stable and reliable in different markets such as index futures, bond futures, cash currencies, and stocks, of course, as well as thirdly dynamic asset allocation. This model is analyzed for tradability and applicability to different management strategies and various investment products including mutual funds.

Among the management strategies most important is the analysis of a sample investment in those 500 stocks indexed in the S&P 500 and a second sample portfolio of 50 stocks out of those 500 in comparison with the returns of the S&P 500 index itself. The analysis is conducted with regard to profits accumulated over time as well as drawdowns suffered according to retracements in the almost decade-long general uptrend in American stocks.

Findings of the contribution in hand suggest that index-fund investment is profitable and a reliable strategy for high returns in the long run. Nevertheless, the significant reduction in drawdown risk without wasting too many profits considering the model of active portfolio management under discussion leads to the conclusion that there are valid, profitable and powerful alternatives in active fund management for risk-averse investors.

## Introduction

Outperforming stock-market indexes averaging over the last decade at 15 per cent to 20 per cent per year appears to be a very difficult task. However, one might still consider the question of potentially outperforming stock-market indexes by actively managing funds relevant, if one deals with the problem in two ways: Outperforming stock-market indexes (and thereby index-funds, too) profitwise in uptrends for sure remains difficult, but more than this focus has to be set on strategies to beat indexes (and thereby index-funds) in the long run in mixed and in downward market conditions.

The latter is the key perspective which has determined our research at FAM over the years: How can overall profits compared with stock-market indexes and index-funds be kept alive and at the same time drawdown risks in a portfolio significantly be reduced? In the – more or less likely – event of further and strong continuation of the decade-long bull market in stocks, it is appropriate to aim at participating in the profit potential. But given the latest corrections were more than that and first indicators of a fundamental trend reversal, it remains a sophisticated philosophy to be partly out of the markets not to risk as much money as one otherwise would.

Meeting the challenge of beating index funds is not new to Robert Fischer. In one of his early works on trading stocks and options<sup>1</sup>, it is described in detail how a proper use of stock options can beat most stock investments with regard to return and safety. Based mainly on a simulation of total returns and risk with regard to option investments performed by Merton, Scholes and Gladstein<sup>2</sup>,

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<sup>1</sup> See Robert Fischer: *Stocks or Options? Programs for Profits*, 1980 (John Wiley), Pp. 254-257.

<sup>2</sup> See Robert C. Merton/Myron S. Scholes/Mathew L. Gladstein: *A Simulation of the Returns and Risk of Alternative Option Portfolio Investment Strategies*, 1976 (Unpublished Working Paper).

evidence is found that combined portfolios of ten per cent stock options added to 90 per cent treasury bills can improve results compared with the performance of the Dow Jones in rising markets, do not perform as well as the Dow Jones in stagnating markets and again improve returns and lower risk compared with the performance of the Dow Jones in downtrends.

It is obvious that the latter is a solid and yet simple approach to active portfolio management. Work is concentrated on just two days in every half-year when existing six-months calls are sold and new six-months calls are bought. With ongoing research for over a decade, FAM's portfolio management strategies have become slightly more complex, but better tested and more reliable, too. Some core elements and latest findings of profitwise chasing and drawdownwise beating index-funds shall briefly be outlined in the following sections.

Two considerations form the backbone of the analysis: In what way do successful active management strategies for investments in stocks other than index-funds have to be designed? And by what margin can index-funds be outperformed profitwise and/or drawdownwise?

### **Theoretical premises for successful active investment**

Actively managed funds can achieve a very good performance if the portfolio manager anticipates market moves correctly. With a large variety of personalities of fund managers and of fund types around, investments are timed on the basis of management decisions. Assuming that decisions are based on definitive, objective rules, managed funds have an advantage to index-funds in bear market conditions. Actively managed funds run into trouble especially in very strong, erratic market moves. If recoveries are quick after setbacks in market uptrends, guiding a fund through and managing it in such difficult market conditions

successfully highly depends on experience, skill and nerves of the fund manager in charge.

Active fund management can typically be differentiated between fund managers relying on the analysis of fundamental data (by hand, or by genius, or by computer) and those fund managers who mainly rely on algorithms and computer models (modelling price and/or time). The massive losses most managed funds suffered in 1998 on investments in South America and Asia demonstrate that a lot of decisions based on fundamentals do not appear to work – due to the fact that there is often only limited fundamental data available. Considering the weaknesses of various management approaches, we at FAM call three elements essential for (our) consistent and successful long-term portfolio management: automation and computerization, a one-parameter model and, most important, dynamic asset allocation.

## **1. Automation and computerization**

Automation refers to investment strategies based on trend algorithms programmed into computers. Computer models are mainly applied to historical data, and test-results are extrapolated into the trading future.

Stock-market indexes can steadily be outperformed by trading stocks or mutual funds if a universal model is established that works world-wide on a large variety of stocks and mutual funds. A universal computer model is considered the tool to filter out the best performing stocks and mutual funds worldwide and qualify them for a balanced portfolio (of the investor's choice).

If the model is successfully applied, two basic and general advantages come to traders' and investors' minds: First of all, trading decisions become emotionless, steady, externally validated. Secondly, trading becomes reliable even in emerging markets in which fundamental information for active fund management is barely available.

It is, however, a philosophical question in how far mathematical models no matter how well tested on historical data are at all of relevance for future trading outcomes. Strategies of optimization and best fit to past market moves for sure lack convincing logical arguments for their application on trading reality in markets of the future.

So if managers do not want to be surprised by the appearance of some unexpected variables not considered with parameters in their models, it is appropriate to look for a model working with just one universal parameter. What is needed is a shift in research perspective away from best fit towards a strategy of equally satisfactory fit in as many different scenarios and on as many various investment products as possible.

## **2. One-parameter approach**

Most computerized trading models are tailored for special market segments. The more historical data for a market segment, interest rates for instance, is available the better a model can be developed that provides a fund manager with almost perfect historical performance profiles. As long as market prices in the segment move within the channel of historically pre-determined parameters, real-time results will be as good as the historical test-results.

Divergence between historical and actual performance, hence, occurs at all times when incidents and pattern changes show up unaccounted in the model's set of parameters.

In these cases unpredictable changes in price moves, recently in Asian markets for example, are blamed for losses generated by main actively managed funds. As far as trading credibility is concerned, the line of argumentation should be exactly opposite: The trading parameters of a computer model have to be designed in a way that even extreme market situations will not hurt the performance too badly.

Simplicity of the computerized approach combined with satisfactory test-results are mainly striven for regarding appropriateness of trading models for real-time trading. As trading concepts based on universal parameters are difficult to design and rarely available, it may in brief be discussed what FAM has come up with.

Ever since Robert Fischer became a broker in 1975, he was fascinated by elements of timing of investments expressed in the works of Elliott and Gann. His breakthrough as a researcher came as early as in 1983 when he presented main assumptions and major findings of his time and price analysis based on Elliott, Fibonacci and Gann in a seminar series held in Chicago, Dallas and Los Angeles<sup>3</sup>. A couple of publications followed in the United States<sup>4</sup>, but still Robert Fischer remained better known in his home country Germany – where he was chosen by the editors of Ebert's Terminmarkt for a title story in the magazine's June 1994 issue<sup>5</sup> – than in America.

Pattern recognition – integrated into the CTA environment of FAM – ended up in the isolation of a single one-parameter strategy for the detection of trend reversals applicable to trending products equally well in futures-, bond-, cash- and stock-markets.

Computerization of the pattern was the final step resulting in a simple, marketable and tradable approach. Important to notice is that FAM's parameter has proven universal even in a respect not very often tested by analysts: FAM developed a random price generator by which price moves in all kinds of trending products

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<sup>3</sup> See for details on the contents of the seminars Robert Fischer: The Golden Section Compass Seminar, 1984 (Fischer Financial Consultants).

<sup>4</sup> For his latest book see Robert Fischer: Fibonacci Applications and Strategies for Traders, 1993 (John Wiley).

<sup>5</sup> Read the entire story by Markus Nicksch: Porträt Robert Fischer. Besser? Oder einfach anders? In: Ebert's Terminmarkt Magazin, Nr. 195, June 1994, Pp. 44-48.

can randomly be modeled. We then applied our trend parameter to the random price data and came astonishingly close to the figures achieved on the underlying – real – historical data.

FAM's pattern and the parameter itself are proprietary, of course, but whoever in addition to reading our own publications is interested in the rationale behind the system might consider the following aspects.

Fibonacci ratios, Gann speed, fans and angles offer a wide range of possible approaches to patterns of market moves. John J. Murphy has in a comprehensive manner summed up Gann's thoughts as follows: »Gann's proportional relationship between time and price is the basis for his theory of geometric angles. ... Gann's geometric angles are trendlines drawn from prominent tops or bottoms at certain specific angles. Those angles are determined by the relationship between price and time. ... A bull market is in force as long as prices are above [a] rising line [drawn from a bottom]. A bear market is in force as long as prices remain below [a] declining line [drawn from a top]. When prices in an uptrend decline [to the trendline], time and price are in perfect balance and a state of equilibrium exists. The breaking of the trendline indicates a shift in that relationship and a possible change in the trend. Channel lines can also be drawn from prominent highs and lows that are parallel to the basic trendline.«<sup>6</sup> Gann in his work as a theorist<sup>7</sup> and a stock and commodity trader was a chartist. Putting conclusions drawn from chart analysis into computerized trading practice for us at FAM is a promising approach to successful management.

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<sup>6</sup> John J. Murphy: *Technical Analysis of the Futures Markets*, 1986 (The New York Institute of Finance), Pp. 536-547.

<sup>7</sup> For further details, the following books by William D. Gann can be recommended: *New Stock Trend Detector*, 1994 (Lambert Gann), as well as *How to Make Profits in Commodities*, 1942 (Lambert Gann).



### **3. Consistency and dynamic asset allocation**

Fund managers have the opportunity to allocate assets from stocks to bonds and cash. Asset allocation is the art of dividing an investment portfolio into different types of investments, therewith integrating investments in international stock-, bond- and cash-markets into a comprehensive worldwide strategy.

Analysts argue any time about the best combination of cash, bonds and stocks in a portfolio. But this is a static approach to the problem of portfolio structuring. It must not be the key question whether in any given market situation one in a portfolio is 20 per cent, 30 per cent or 40 per cent invested in cash, bonds or stocks. What is needed is a concept that serves as a tool to automatically adjust and re-structure the portfolio according to market conditions at any given time. In a strong uptrend investment should be a 100 per cent in stocks whereas strong downtrends require – ideal-typically speaking – 100 per cent of the invested money held in cash. Invested money in a portfolio has to be re-allocated dynamically depending on bull or bear market phases.

In addition, states of imperfect information must not be neglected when aiming at actively managing funds. Investors can solve most of the problems of shortage of information as long as they are trading in the United States where plenty and diversified information is at their fingertips or mouse-clicks. However, problems occur when portfolio investments are intended for emerging markets. Data is incomplete or out of date, and markets move in such a volatile manner that a lot of managers run short of analysis fundamentals – and it is not only the small or the medium size type of investor, even institutional investors are hit from time to time by the outcomes of uncertainty.

Asset allocation remains a difficult undertaking. Consistency in this context means that asset allocation is conducted according to clear and previously to investments prescribed rules. Again it is a useful approach to integrate asset allocation into the broader strategy of automated and computerized investment decisions.

Thus far the theoretical framework. As always, the most demanding task is to put theory into practice. We at FAM were confronted with the ever young discrepancy between promising results on paper and real setbacks to equity, too, when we started trading investors' money following our automated and computerized one-parameter model. Fortunately, it did not take us much too long to make our model tradable and to bring our real-time trading results in line with our expectations drawn from theoretical reflections.

### **Making a one-parameter model tradable**

A robust model for trading stocks or mutual funds has to consist of two equally important parts: one for the timing of buy and sell action in the markets and one for the selection of stocks or mutual funds to a portfolio.

We started the real-time approval of the model with the timing part, applying our timing model to a sample portfolio of four index futures, three bond futures and five cash currencies from major markets in the world. After the timing according to the one-parameter model had proven stable and reliable for more than two years with net returns of almost 20 per cent in 1996 and just short of 30 per cent in 1997, FAM went brave and set up a small model portfolio of 40 mutual funds (MF-40) to be traded real-time and a somewhat bigger model portfolio of 100 international stocks (INT-100) to be paper-traded over a test period of one year.

Two universes<sup>8</sup> were formed of roughly 3,000 stocks representing the benchmark indexes for 30 major economies worldwide<sup>9</sup> as

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<sup>8</sup> As FAM's database serves weekly data provided by Datastream International Inc., New York.

<sup>9</sup> Relying exclusively on stocks from benchmark indexes avoids volume problems and guarantees marketability and tradability to FAM's approach.

well as of approximately 1,000 mutual funds (most of them American, but not less than one third international, too).

FAM then developed a momentum indicator to analyze data and to perform the preliminary task of selecting mutual funds and stocks to the portfolios – thus strategywise taking into account recent important and fundamental developments in international markets and therefore in FAM’s trading environment. »What moves stocks [and most other investments] today are the Internet, instant television analysis and the explosion of electronic means of moving money. One of the biggest changes is that the concept of momentum has replaced elaborate investment models as a riser of stocks. ... Professionals who try to foresee a trend by examining price to earnings ratios and other once useful barometers, can get burned.«<sup>10</sup>

Out of the two universes, 40 mutual funds and a 100 stocks with high averages in price velocity and additionally a great ease of movement were selected – by the computer according to the momentum indicator and country quotas on stocks<sup>11</sup> – and then exposed to the timing model.

More important than the plain figures on net profit according to the timing model which were not bad at almost 15 per cent for the mutual funds MF–40 and over 20 per cent for the stocks INT–100 half-way through November 1998 (so in line with the results in the portfolio of cash currencies, bond futures and index futures at over 20 per cent again by the end of October 1998) was the fact that both model portfolios proved reliable in the case of dynamic asset allocation according to market conditions.

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<sup>10</sup> E. S. Browning: Abreast Of The Market. In: Wall Street Journal, Mar. 15, 1999.

<sup>11</sup> INT–100 consists of stocks from the G–7 plus six countries: United States 25, Canada 10, Brazil 3, Germany 10, United Kingdom 5, France 5, Spain 5, Italy 5, Switzerland 5, Netherlands 5, Japan 15, China 4, Australia 3.

Taking a look at Table 1<sup>12</sup>, it becomes quite clear that the number of funds and the number of stocks in MF-40 and INT-100 held long and kept flat (with invested money in cash or in short-term treasury bills) changes with the cycles of uptrends and downtrends in the markets.

Table 1: Dynamic asset allocation on stocks and mutual funds

	MF-40		INT-100	
	Long	Flat	Long	Flat
Jan. 1998	25	15	72	28
Feb. 1998	33	7	80	20
Mar. 1998	35	5	75	25
Apr. 1998	32	8	73	27
May. 1998	9	31	69	31
Jun. 1998	33	7	59	41
Jul. 1998	14	26	60	40
Aug. 1998	2	38	40	60
Sep. 1998	6	34	21	79
Oct. 1998	16	24	44	56
Nov. 1998	32	8	57	43

Past results are not necessarily indicative of future trading performance.

The test period for real-time and for paper-trading combined is nearly over, and the system has passed the test of tradability. Additionally important to notice is that the momentum indicator used for mutual fund or stock selection tackles the individual fund or stock. Therefore special sub-universes might be established according to an investor's preferences (either internationally, by region or by country, or even by industry-group) and funds or stocks then be selected from these sub-universes.

As we have all elements of a trading system for actively managing a portfolio in hand, we can apply the double-step approach of portfolio selection and timing according to generalized and computerized rules to the problem of outperforming a stock-market index – at first profit-wise, and then drawdownwise.

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<sup>12</sup> Results for 1998 in sample calculations in this study are as of November 13.

### **Sample: Competing with the S&P 500 profitwise**

Benchmark of a sample analysis is the Standard & Poor's 500 index of 500 major American stocks. Over the 1990s, the S&P 500 averaged at an annual rate of 24 per cent.

Let us assume the following: We build a portfolio for demonstration purposes which consists of all 500 stocks considered in the S&P 500. Instead of trading them bundled in an index-fund, we apply FAM's timing model for an active fund management to all 500 stocks in the portfolio and trace buy long and sell flat signals (no short signals yet at this point) over the nine-year period 1990 to 1998. Stocks are traded at USD 100,000 each without further use of weights for stocks.

And a second assumption: Remembering that the timing model is only responsible for decisions when to trade a stock and that in addition a model for portfolio selection is required to decide whether a stock at all becomes part of a portfolio, we apply FAM's stock selection model to the 500 stocks in the S&P 500 and create for the purpose of demonstration a second portfolio consisting of 50 stocks out of the 500 in the S&P universe, traded at USD 100,000 each again.

Results and performance for portfolio 500 – demonstrating timing – and portfolio 50 – demonstrating stock selection in combination with timing – can profitwise be compared with the overall performance for the S&P 500 assuming that the S&P 500 was imaged and its performance costlessly duplicated in an index-fund strategy. Outcomes of this model calculation are summed up in Table 2<sup>13</sup>.

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<sup>13</sup> No commission and slippage is included with profiles in the study. On average all model portfolios considered are at only 50 per cent invested. Interest generated in short-term TSY bills on free cash is not added as portfolio performance, either. It is assumed that this interest income as well as dividends on stocks invested in do more than compensate for unaccounted commission and slippage.

Table 2: Profit analysis on S&P 500 index versus managed portfolios of 500 S&P stocks and 50 S&P stocks long/flat

	Yearly Net Profit									Total Return
	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SP	-8.9%	30.6%	3.9%	7.8%	-2.0%	33.9%	21.3%	30.3%	15.5%	219.6%
500	2.0%	30.3%	14.5%	11.2%	1.5%	24.4%	14.4%	22.9%	10.1%	131.3%
50	20.6%	92.4%	43.4%	43.6%	26.4%	75.2%	47.1%	36.2%	22.5%	417.4%

Past results are not necessarily indicative of future trading performance.

Two facts are evident from the model calculation: It remains difficult to outperform an index-fund by active management, but it works if a solid stock selection model is integrated with the timing model.

Profitwise the S&P 500 is outperformed by active management using portfolio 500 in four out of nine years, especially in those years when the S&P 500 did not perform too well. For the last three consecutive years of continuous and strong rise in the American stock market there was no way of beating the index-fund strategy on all 500 constituents of the S&P 500 – even though 16 per cent on average were not poor, either. In weak years around the zero line, index-funds can be beaten on a small scale on the entire assembly of all 500 stocks indexed in the S&P 500. Actively managing a portfolio, however, means to be partly flat on some stocks in the portfolio in strong uptrends, thereby missing a portion of an index-fund’s profit potential.

So far, so bad? Not necessarily, because adding portfolio selection to the mere timing ends up in a performance almost doubling the average yearly gains of the S&P 500. As stock selection is the art of filtering best performers and heavyweights from the poor performers and light-weights in the index, a pretty good chance shows up to catch index-funds following the S&P 500 significantly even on the rise.

Throughout this contribution, the notion of beating index-funds in two directions has been a central element of the analysis. Profitwise it is not generally to decide to what extent index-funds

can be beaten by active portfolio management strategies. But we can proceed to an overall drawdown analysis to get a clearer picture of the matter.

### Sample: Competing with the S&P 500 drawdownwise

The same sample is considered as above: portfolio 500 to image the S&P 500 as a whole and portfolio 50 in a combined approach of stock selection and timing. Table 3 can be checked for results of the model calculation. All stocks are still bought long and sold flat.

Table 3: Risk analysis on S&P 500 index versus managed portfolios of 500 S&P stocks and 50 S&P stocks long/flat

	Maximum Intra-Year Drawdown									Overall Risk
	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SP	-18.3%	-5.1%	-5.1%	-2.8%	-7.2%	-1.4%	-6.3%	-8.8%	-17.9%	-18.3%
500	-7.9%	-3.5%	-3.7%	-3.0%	-5.2%	-1.2%	-4.3%	-4.5%	-8.2%	-8.2%
50	-14.1%	-4.3%	-4.8%	-3.5%	-5.9%	-2.4%	-4.9%	-7.3%	-13.1%	-14.1%

Past results are not necessarily indicative of future trading performance.

Comparing the maximum intra-year drawdowns and the overall risks in the two portfolios with those of the index-fund, it becomes obvious why active fund management makes sense if there is confidence in the underlying model and in the capabilities of the fund management to execute it and to bring real-time performance as close as possible to system results and expectation values.

Timing of all 500 stocks in the S&P 500 ended up in realizing only two thirds of the profit potential of an index-fund, but the overall risk in the portfolio calculated as overall maximum retracement in equity from peak to peak is cut to more than half. On the other hand, when adding stock selection to the timing model, the drawdown risk is not reduced as significantly. Looking

for trending and volatile stocks to filter best performers and heavyweights with the selection model means that some higher drawdowns have to be accepted than when trading all 500 stocks in the S&P 500. The overall risk in the portfolio can only be reduced by 23 per cent. But as a reminder: Profits in the portfolio 50 are almost doubled in this respect.

Taking a look at drawdowns, a variation in strategy can be added to the approach. Instead of only buying stocks long and selling them flat in portfolio 500 and portfolio 50, a buy long and sell short strategy can be conducted as a strategy for hedge funds. Results for this modification are presented in Table 4.

Table 4: Risk analysis on S&P 500 index versus managed portfolios of 500 S&P stocks and 50 S&P stocks long/short

	Maximum Intra-Year Drawdown									Overall Risk
	1990	1991	1992	1993	1994	1995	1996	1997	1998	
SP	-18.3%	-5.1%	-5.1%	-2.8%	-7.2%	-1.4%	-6.3%	-8.8%	-17.9%	-18.3%
500	-6.4%	-3.1%	-3.0%	-2.7%	-4.1%	-1.1%	-3.7%	-3.9%	-5.9%	-5.9%
50	-11.2%	-2.9%	-3.8%	-3.8%	-4.9%	-2.6%	-3.9%	-6.2%	-9.8%	-11.2%

Past results are not necessarily indicative of future trading performance.

It is important to notice that the long and short approach works even in uptrends.

Comparing the historical performance of the two strategies over the last nine years of more or less continuous bull market conditions, the overall profit is only slightly increased (from an average of 15 per cent to 16 per cent annually for portfolio 500 and from a yearly average of 46 per cent to 48 per cent for portfolio 50) when adding short signals to the strategy. This result means that short signals on the one hand have overall only marginally been profitable. On the other hand, short signals have not only brought no loss to the portfolio, but drawdownwise have reduced the total risk in the portfolio significantly (by yet another 28 per cent for portfolio 500 and an additional 21 per cent in



portfolio 50 in comparison with buying long and selling flat). As there have only been very few strong trend reversals over the years on the downside, false short signals are many. But still all those false signals add up to zero. The number of trades is doubled, but the equity curve is smoothed – and the overall risk in the portfolio is further reduced against the buy long and sell flat strategy. It is uncertain for how long the general uptrend with major stock exchanges in Europe and in the United States will last – that is why a hedge strategy is a very interesting alternative for investors compared with holding stocks for some time, then selling them flat and not speculating on strong swings to the downside.

## **Prospects**

Prospects for index-fund trading depend to a great extent on the international economic environment. As long as the prospects are good for continued worldwide growth, stock markets will rise and index-funds will gain profits by following the benchmarks.

Prognoses on the prospects for the world economy shall be left to the World Bank Group, the International Monetary Fund, and the OECD. The likelihood for a stable and turbulence-free development of the international economic framework is difficult to estimate. In the event that volatility in the markets remains high and in addition reversals in market trends to the downside occur in countries other than Japan and a couple of emerging economies, actively managed portfolio strategies pop up as valid and reliable trading alternatives. Timing of an investment in this respect is not only a question active fund managers have to deal with. Initial timing for entering stock markets is a problem of major importance also to be solved by investors in index-funds.

And yet a final point has to be made comparing prospects for different types of active fund management: Fund management

relying on fundamental data analysis is so much dependant on validity and reliability as well as availability of market data that investments in regions other than the United States and its G-7 partners very quickly become risky business. However, unavailability of reliable data is not a valid excuse for fund managers facing investors having suffered drawdowns larger than originally expected from false forecasts and predictions of market moves. Hence, global investment in an automated and computerized environment can serve as an alternative means to consistently outperform international benchmarks at low risk.

Closing this contribution, some key-figures related to FAM's above mentioned model stock portfolio INT-100 in comparison with global benchmarks such as the Salomon Brothers' benchmark bond index, Morgan Stanley's EAFE index and Morgan Stanley's world index shall be presented (see Table 5).

Table 5: Profit and drawdown analysis on FAM INT-100 long/flat versus SB bond index (B), MS EAFE index (E) and MS world index (W)

	Yearly Net Profit									Overall Risk
	1990	1991	1992	1993	1994	1995	1996	1997	1998	
(B)	12.0%	13.0%	15.0%	17.0%	-6.7%	27.0%	-1.6%	15.4%	16.5%	-17.3%
(E)	-18.7%	16.0%	-7.1%	20.5%	3.3%	18.7%	11.7%	16.2%	11.1%	-30.6%
(W)	-24.0%	10.0%	-14.0%	31.0%	6.0%	9.4%	4.0%	2.1%	13.7%	-24.0%
100	14.4%	40.4%	27.5%	58.3%	21.6%	78.9%	79.0%	39.8%	22.6%	-9.3%

Past results are not necessarily indicative of future trading performance.

The profile is a convincing proof of remarkable and sustainable profit accumulation in a global context at an overall risk below 10 per cent. With the study in hand, a set of ideas is presented on strategies how to successfully establish a trading system which keeps track with profits in international markets and at the same time reduces risk in retracements. Index-funds are still and will be hard to beat, but emotionless computerized management strategies deserve future consideration.