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Hybrid Investment Strategy

Active Portfolio Management – US Stock Market

Francisco de Carvalho Tavares Galvão Amado

Student Number: 1017

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Professor João Pedro Pereira

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Abstract

This thesis aims to develop an alternative active managed portfolio strategy based on companies' Fundamental and Technical Analysis and analyze its final results. There is a big distinction between the two approaches and the main objective is to understand if it is possible to take advantage of both.

With this in mind a **Hybrid Investment Strategy** for the US stock market, due to its dimension and liquidity, which was able to outperform the S&P 500 index, the benchmark, during both Bear and Bull Markets between 2000 and 2015.

Keywords: CAPM; Portfolio Theory; Active Investment Strategy; Fundamental Analysis; Technical Analysis.

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1. Introduction

Although there are several theories about capital allocation, none of them is accepted and applied consistently by all investors. The same happens when it comes to the models to analyze stocks, since there is no consensus as to which one is the best theory. The objective of this thesis is to develop a **Hybrid Investment Strategy** based on the idea that in the short term the market is not efficient, since there are errors in the valuation of companies, like Graham and Buffett claim. As decision steps to assess which assets to invest the model will use Fundamental Analysis indicators (focused on value and growth) and Technical Analysis (focused on market behavior and momentum) in order to take advantage from both strategies. The model will first run a test with all the Fundamental Analysis metrics chosen to screen and pick the best stocks. Afterwards the Technical Analysis meters will evaluate which stocks should be bought.

The market where the strategy will be implemented is the S&P 500, in the United States. It has the greatest liquidity and it is also the market that has more information and data available for analysis, therefore facilitating the implementation of this strategy. The period of study will be fifteen and a half years, from January 2000 until the first semester of 2015, in order to capture two cycles of Bear Markets and two of Bull Markets.

2. Literature Review

Modern Portfolio Theory and CAPM

Markowitz (1959) was the pioneer of the **Modern Portfolio Theory**. The main objective of his model was to explain how the “rational investor” can use the principle of diversification to optimize his investment portfolio. This had in consideration the relationship between risk and return of the assets held and supported the diversification of the portfolio in order to reduce the risk to a certain level of expected return. For that, Markowitz assumed that the expected return rates followed a normal distribution, hence that the expected return would be equivalent to the mean, so the level of risk would be the standard deviation of the asset. Therefore, it was possible to calculate the expected return and standard deviation (risk) of the portfolio, as well as calculating a portfolio of minimum variance for each expected rate of return. However, this model was difficult to apply since the calculations necessary to estimate the covariance within large asset portfolios are not easy to implement. And it is also known that the normality assumption does not hold, since the returns follow a logarithmic distribution.

Later the **Capital Asset Pricing Model** (CAPM) was introduced by Sharpe (1964), Litner (1965) and Mossin (1966), and established a link between return and risk. This simplified the model developed by Markowitz, however, it was based on several assumptions. It stated that the investors, in addition to allocate their capital in risky assets, could also allocate it on risk-free assets. Now the investors would have a portfolio that is located in the so called Capital Market Line, which at the point of tangency is the replica of the market (similar to a stock market index, such as S&P 500 or Euro Stoxx 300, for example). Thus the variance of the market portfolio would be equal to the weighted average of the covariance of each asset with the market portfolio.

In “equilibrium”, assets with higher covariance with the market portfolio, which contribute the most for its risk, would have a higher expected return. According to the model, the expected return of an asset is affected by the market risk (systematic risk) and the correlation that the asset has with the market.

Fama (1970) issued an article on *Journal of Finance* in 1970 named “**Efficient Capital Markets: A Review of Theory and Empirical Work**” where he proposed that markets are efficient. In his theory he stated that there are three forms of efficiency: strong-form (market is efficient if all information relevant to the value of a share is rapidly and correctly reflected in the market price); semi-strong (market is efficient if all relevant publicly available information is quickly reproduced in the market price); and weak efficiency (the information is just historical prices, impossible to profit from it). And these three types would influence the market price of stocks. Later, **Fama-French Three Factor Model** (1993) was created as an extension of the traditional asset pricing model CAPM. To describe the return of a stock or a portfolio of stocks, they added the size and value factors to the market risk factor (introduced on CAPM). Based on research, the authors of this model stated that there were two classes of assets that outperform others: value stocks outperform growth stocks and small cap stocks outperform large cap stocks. This way their model would not only capture the stocks exposure to the market but also the exposure to these two classes of assets.

However, there still remain some critics to the CAPM, Fama-French and Markowitz’s models, namely due to market efficiency (Efficient Market Hypothesis) and their assumptions that often do not correspond to reality. Until today, despite all the models created, it has not been found yet a perfect strategy to evaluate assets and invest in the stock market.

Fundamental Analysis vs. Market Behavior Analysis

Fundamental Analysis (FA) aims to assess the true value of a company. In order to do this, a detailed analysis of the financial situation of the business (via balance sheets, income statements, etc.) will have to be made along with research and forecasting of results, while paying attention to macroeconomic factors. Hence, in decision making process the fundamentals are the main point, since they are the only reliable tools to access the true value of a company at a given moment. Within the FA there are two main strategies: Value Investing and Growth Investing.

The Value Investing strategy is a theory defended by Benjamin Graham (father of Value Investing, author of "*Security Analysis*" (1934) and "*The Intelligent Investor*" (1949)) and Warren Buffett (pupil of Graham and considered to be one of the greatest investors of all times). The main objective is to find quality companies that are transacting at a price below its true value, firms that are underpriced. The investor that uses this technique seeks companies with solid fundamentals and good earnings and dividends, book value and cash flow. The value investor applies his money in securities that are undervalued by the market and have the potential to rise when the market corrects the error in the evaluation. Typically, this type of strategy is used by more conservative long term investors. The idea here is that the stockholder is buying part of a company and not just a simple title like Buffett said ("I hope that you do not think of yourself as merely owning a piece of paper whose price wiggles ... hope you instead visualize yourself as a part owner of the business" by Warren Buffett).

Growth Investing is completely different from Value Investing, since its main focus is the future potential of the company, not putting much emphasis on the share price at that moment. Unlike the value investor, the growth investor may buy into a company that is being traded at a higher

price than its intrinsic value, if at that time he expects a future growth that later will make the investment lucrative. Growth stocks are companies that grow substantially faster than the others, so investors often look for relatively new firms that have entered the market recently. The theory is that the growth of earnings and results will directly generate an increase in the share price. This type of investor prefers for rapidly expanding industries (such as new technologies, biochemical, etc.) and their gains are capital rather than dividends, since this type of company typically reinvest all the earnings and do not pay dividends.

The **Technical Analysis** (TA), on the other hand, is based on past market behavior, historical prices, volumes and the charts formed by them. This approach states that there are patterns of behavior that may lead to fall or rise of a stock price, following this idea the model predicts future movements for share prices. This strategy is used by various investors, mainly traders that buy and sell stocks every day, and normally applied in a short term investment approach. According to Murphy (1999) the TA is based on three pillars: the market discounts everything (everything that happens in the lifetime of a company is reflected in its market price and therefore in the historical price chart); history tends to repeat itself (investors follow behavior patterns that lead them to react in the same way to similar situations, causing them to repeat in the future movements identical to those that were made in the past); and prices move in trends (typically, there are well-defined longer or shorter cycles of uphill and downhill). The main instruments used by TA are: trend lines, supports, resistances, moving averages, RSI (Relative Strength Index) and some graphic configurations (patterns that tend to repeat themselves).

3. Methodology

Fundamental Analysis and Technical Analysis are the two main frameworks for investment decision in Financial Markets. While the first one is used and taught in Finance programs across several Universities, the second one is not so accepted in the academic world. However, traders in investment banks and other financial institutions rely much more on the Technical Analysis than on Fundamental. Even though their strategies depend on the time horizon of the investment, the Technical Analysis approach is more pursued. This was the main reason why it was decided to develop a Hybrid Strategy, to create a model based on what is taught in Universities and also what is used in financial institutions, in order to link both approaches.

Before going into more detail on Fundamental and Technical Analysis, it is important to state that the strategy was meant to be simple and easy to understand. Based on Buffett and Graham idea that the strategies that work the best are not the complex ones, instead the simple ones are much more reliable. A very complex model could work very well for a certain period of time but for a different period could have disastrous results.

Assumptions

All the data and indicators were exported from the Bloomberg Terminal, that was assessable at Millennium BCP and Nova School of Business and Economics. Therefore it was assumed that all the material is correct and consistent for all the quarters that were analyzed. All the data was exported from Bloomberg Terminal on 27th of November, 2015. Fundamental data is based on analyst estimates and values from financial statements, and Technical Analysis data is based historical values, such as closing prices and trading volumes.

The composition of the 500 companies listed on S&P Index has changed several times in the past 15 years. Sometimes it changes monthly other times quarterly. To facilitate the research it was decided to check which companies were in the index in the first trading day of each year and assumed that those were the stocks present on S&P for the next 12 months, meaning that each year the 500 companies are adjusted. In the end a total of a total of 1,037 firms were analyzed.¹

It was also possible to work with companies that stayed in the index for the last 15 years, however this approach would lead to Survivorship Bias, the error of not considering companies that got out of the S&P 500 index in the past. By ignoring the firms that got out of the index due to circumstances such as merger & acquisition, bankruptcy or other reason, the model would lose its consistency.

Regarding transaction costs, they were not incorporated in the model. It is hard to consider an accurate value for this type of costs for the past 15 years, so it was decided not to discount them in the strategy. However, it is important to have in mind that the average equity mutual fund or asset management firm charges to its clients an annual fee of 1% to 2%, value that was considered in the conclusion of this thesis.

3.1. Fundamental Analysis

For the Fundamental Analysis there are several ratios and indicators that investors use to evaluate stocks. It was decided to choose four of them in order to have a simple and coherent analysis, but at the same time capturing the essential information that characterizes a good company. Indicators of price, book value, growth and debt were chosen, namely:

¹ List of the 1,037 companies (Bloomberg Tickers) is in Appendix I

Price Earnings Ratio

The Price Earnings Ratio, or PER, is one of the most well-known ratios of Fundamental Analysis. It was initially shown by Graham and Dodd (1934) when they wrote “Security Analysis”, since that time many investors all over the world started to use this metric.

This indicator is simply the company share price divided by the earnings per share (EPS). When the earnings are negative, meaning that there was a loss, the ratio either does not exist or is negative. On average the Price Earnings Ratio is between 15 and 24, but it varies extensively according to the company industry and also according to the economic circumstances.

PER shows how much the investors are willing to pay per dollar of company earnings. From a Value Investment perspective it illustrates how cheap or expensive a stock is, the lower the better, *ceteris paribus*. Graham on “Security Analysis” states that a ratio of 16 is the maximum that an investor should pay.

Price to Book

The Price to Book is a ratio that compares the price of a stock in the market with its book value (or accounting value of shareholders’ equity). It is calculated dividing the stock price by the latest quarter book value per share. Normally the ratio is larger than 1, meaning that price per share is bigger than the book value per share. While the first one should reflect the firm’s future value and potential growth, the second shows past retained earnings and share issues.

According to Graham, the value investor should not choose firms with a ratio higher than 1.5. However, according to Morgan Stanley, more than 75% of S&P 500 firms have a Price to Book

ratio bigger than 1.5. Again, this indicator varies widely according to the firm industry and also to the economic conditions.

EPS Growth

The EPS (earnings per share) is an indicator of a firm's profitability. It represents the company profits allocated to each outstanding share of common stock. In our case the basic EPS was used excluding shares of convertible or warrants outstanding (only takes in consideration the number of shares that have been issued and held by the stockholders).

The EPS Growth is simply the growth rate of the last 4 quarters earnings per share. This indicator is one of the most important for Growth Investors since it tells if the company profits are increasing or not. It is important to notice that when a company has a loss (negative earnings) its EPS Growth cannot be calculated. In this paper it was used data from the Bloomberg platform that has been properly treated for these cases.

Net Debt to EBITDA

The Net Debt to EBITDA is a ratio that measures how many years it would take for a firm to pay back its obligations if net debt and EBITDA did not change. This was the indicator chosen to measure the leverage of each company. It is calculated by dividing the firm's liabilities, excluding cash or cash equivalents, by EBITDA (earnings before interest, taxes, depreciation and amortization).

This financial ratio, widely used by rating agencies and financial institutions, is one of the best to access the ability of a firm to pay its debt. Values higher than 4 or 5 can indicate too much leverage, however it depends on the type of industry.

3.2. Technical Analysis

A Quantitative Approach

Ramiro Loureiro, Market Analyst at Millennium BCP, developed an investment strategy in 2011 based on market behavior analysis. The paper intended “to approach equity market investments through statistical and mathematical models, i.e. – a quantitative approach”. The main goal was to generate an actively managed portfolio based on automatic stock selection from the US stock market that could beat the two main benchmarks, the S&P 500 and the Nasdaq 100.

This strategy was tested from January 2000 until March 2011, and it was mainly based on Technical Analysis principals shown on Murphy’s “Technical Analysis of the Financial Markets” book. The main conclusions were remarkable, the active investment strategy was able to outperform the benchmark by a large margin and retrieve a sound return (Compounding Annual Growth Rate) of 9.9% a year. Both in Bull and Bear Markets the portfolio was capable to persistently generate decent results, which were never worse than the S&P 500 and Nasdaq 100 performances.

In July of 2011 the bank, Millennium BCP, decided to create the Millennium BCP Technical US Index based on Ramiro Loureiro’s paper. This Index was sold to the bank’s clients as a certificate and was design to track the performance of Ramiro Loureiro’s strategy by investing in real time on the publicly traded companies in the US stock market that were chosen by the model.

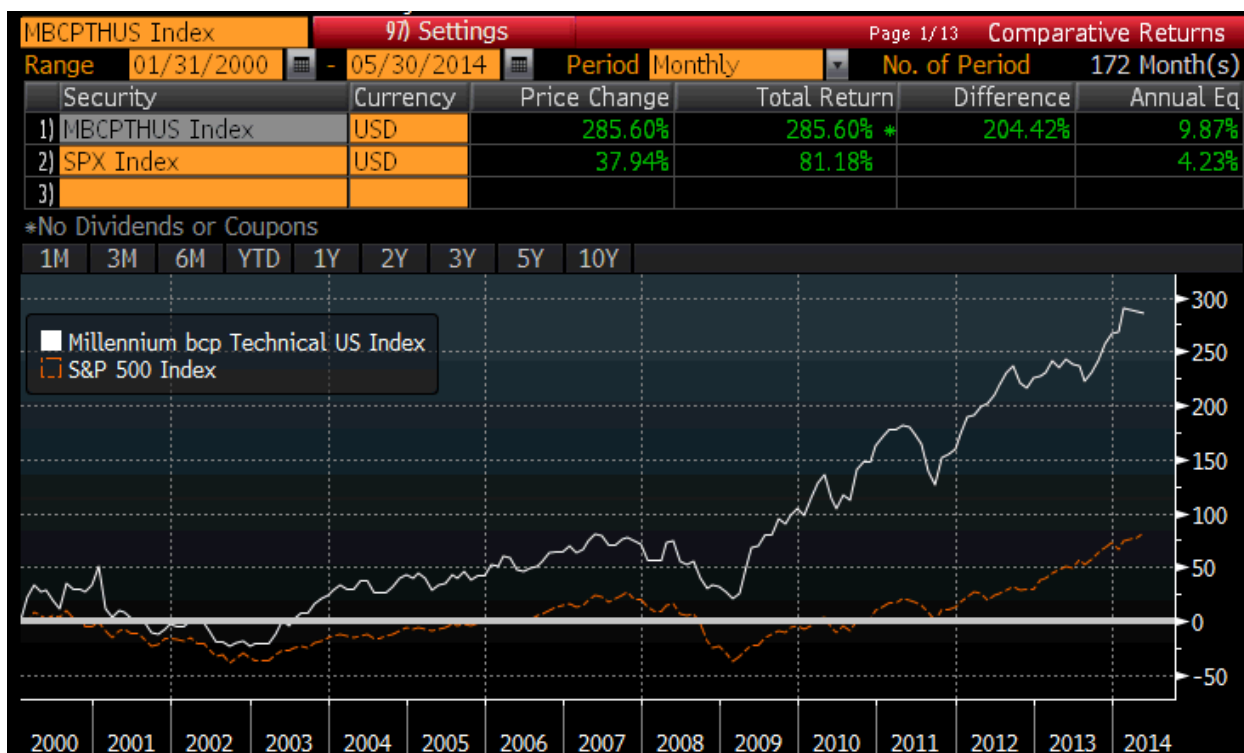


Figure 1. Evolution of the Millennium BCP Technical US Index compared with the benchmark (S&P 500) from 2000 until first semester of 2014 (real time from May 2011 until the end). Source: Bloomberg Terminal

The Index was calculated and maintained by Standard & Poor's based on a methodology developed by Millennium investment banking (from Millennium BCP Group) in consultation with Standard & Poor's.²

The Hybrid Strategy Approach

There are several Technical Analysis indicators, some of them can be measured with a simple calculation while others have to be done using graphics and specific tools on computer programs showing chart formations that investors and traders usually to look at. Since they believe that investors and the market follow behavior patterns that lead them to react in the same way to similar situations, the charting analysis is very important.

² Bank's official Methodology Guide of Millennium BCP Technical US Index is in Appendix II

This analysis only focused on the indicators that could be calculated mathematically, so the graphic formations part was excluded. The indicators used were:

Momentum

Momentum measures the velocity of price changes. The momentum of a stock is calculated by continually taking price differences for a certain time interval.

$$\text{Momentum} = V - V_x$$

Being V the closing price and V_x the closing price x days ago. Normally momentum is calculated within a 10 day period. When prices are rising and momentum is positive, it means the uptrend of a stock price is accelerating. When momentum reduces and gets close to zero it means that the new gains being achieved by the latest closes are the same as the gains 10 days ago earlier, uptrend in reducing its speed. Therefore, prices could be rising and momentum is negative, meaning that the last price gain is less than that of 10 days ago. This indicator measures the acceleration or deceleration in the current advance or decline in the price trend and tends to be a leading indicator.

MACD

The MACD (Moving Average Convergence & Divergence) is an indicator developed by Appel (1985), it is an oscillator technique that combines two exponential moving averages of closing prices. An oscillator is a Technical Analysis indicator that is bound within a range, normally expressing oversold or overbought periods. The MACD takes a dual moving average (MA) crossover approach, one of the MA is the MACD Line (the difference between two exponentially smoothed MA's of closing prices) and the other is the Signal Line (a 9 period exponentially

smooth average of MACD Line). Usually when the first one increases and crosses the second one (MACD Line > Signal Line) it signals a reversion on the share price, these situations are good buying opportunities.

RSI

The RSI (Relative Strength Index) is also an oscillator indicator developed by Wilder (1978) and one of the most used in Technical Analysis. It ranges between 0 and 100:

$$RSI = 100 - \frac{100}{(1+RS)}, \quad \text{Relative Strength (RS)} = \frac{\text{Average of x days' up closes}}{\text{Average of x days' down closes}}$$

Normally data from 14 trading session are used. RSI values lower than 30 indicate that the market is oversold (probably the stock is undervalued), while values higher than 70 indicate overbought moments (probably the stock is overvalued).

Supports

Supports are minimum values of the historical price of a stock, normally, are the troughs that are seen in price charts. According to Murphy (1999), a Support is a level or area on the graphic where buying interest is sufficiently strong to overcome selling pressure. As consequence, after a stock reaches a Support level its price will go up again in the next trading sessions. In an uptrend, the values of Support levels tend to increase since the price of the stock is going up, on the other hand, in downtrend the values of Support levels tend to decrease. Two types of supports were calculated, one considering the lowest value of the last 4 weeks trading sessions, a very short-term, and a second one considering the lowest value of the last 10 week trading sessions, capturing more trading sessions.

4. The Hybrid Strategy

The main objective of this strategy is to select companies with good fundamentals, that might present some undervaluation, according to their industry, and also that are showing good market behavior and appeal to investors.

The approach has two stages: first the stocks are analyzed according to their fundamental indicators and secondly according to their technical metrics.

To analyze each company's fundamentals a ranking was done each trimester to evaluate which were the best firms to invest during that time. To do this rank, the firm's indicator at moment X was compared with the company's and also the industry's moving average of that same indicator. This allowed to perceive which companies in each moment were trading with the most appealing fundamentals. The process was done for all the indicators, and in the end an overall ranking (equally weighted) was created to understand which were the best companies in each quarter according to an aggregation of all four meters.

By doing so, the model is not imposing any restrictions on companies indicators, such as a PER lower than 15 or a Price to Book lower than 1.5. This technique is very useful since the indicators should be analyzed according to companies' industry and also the economic cycle. Ultimately, it does not reject any company since it is a ranking of all the 500 firms present in each quarter on the S&P 500 index.

The second stage is the technical analysis evaluation of the firms. This part, instead of considering all the 500 companies from S&P index in each quarter, just analyzed the top 150 firms from the fundamental analysis rank. Again, in this phase a ranking of stocks was done by indicator, similar to the procedure specified above. However, in this stage a restriction was

introduced, being that the Momentum indicator has to be higher than zero and the difference between MACD and MACD Signal also as to be positive. In the end an equally weighted ranking of 150 stocks was done with the four metrics, producing the final decision rank which had in consideration fundamental and market behavior indicators. Due to the restrictions imposed, there were quarters where the ranking had less than 150 stocks.

Number of stocks to hold

Evans and Archer (1968) wrote the first paper concerning how diversified a portfolio of stocks should be to significantly reduce risk. They discovered that the risk of a portfolio, captured by the time series standard deviation of returns, stops decreasing by holding 15 or more shares of stock. Later, Elton and Gruber (1977) showed that the total risk, measured by the expected portfolio variance and also variance in variance, is less likely to decrease when holding more than 50 different stocks. Therefore, it was decided that 50 would be the maximum number of stocks to hold in the portfolio in each quarter.³

The model in the last day of each quarter states which are the top 50 firms to invest in the following trimester, i.e. on the 31st December does the evaluation and on the 1st of January buys the stocks. Therefore, in each trimester there are 50 new chosen firms to invest in, unless the same company is chosen in consecutive quarters, in this case the company is sold in the end of the quarter and bought again in the beginning of the following one. Since the Technical Analysis is normally used to invest with a short time horizon, it was decided to rebalance the portfolio every quarter. This means that all the shares that are bought in the beginning of the trimester are sold at the end of it.

³ The list of companies (Bloomberg Tickers) chosen in each quarter is in Appendix I

Financial Events: Dividends and others

This strategy does not include ordinary dividends paid by companies. Despite dividend payments increase the model's results, since it is an extra gain it was not considered, this was decided because the benchmark, S&P 500 index, does not integrate dividends in its value.

When the numbers were exported from the Bloomberg Terminal, an option was chosen to adjust the data to these events like stock splits, reverse splits, spin-offs, extraordinary dividends, capital increase, etc., all these circumstances are already discounted on the model. Regarding operations like mergers and acquisitions, bankruptcies and companies leaving the index, it was already mentioned above that every year the index rebalanced.

5. Performance & Evolution

The model that was developed had a total return of 1,056.24% from the 1st of January, 2000 until 31st of June, 2015 (fifteen and a half years), equivalent to a Compound Annual Growth Rate (CAGR) of 17.11%. During the same period the benchmark, the S&P 500 index, had a total gain of 40.42%, corresponding to a CAGR of 2.21%. The Hybrid Strategy revealed a good performance against the benchmark.

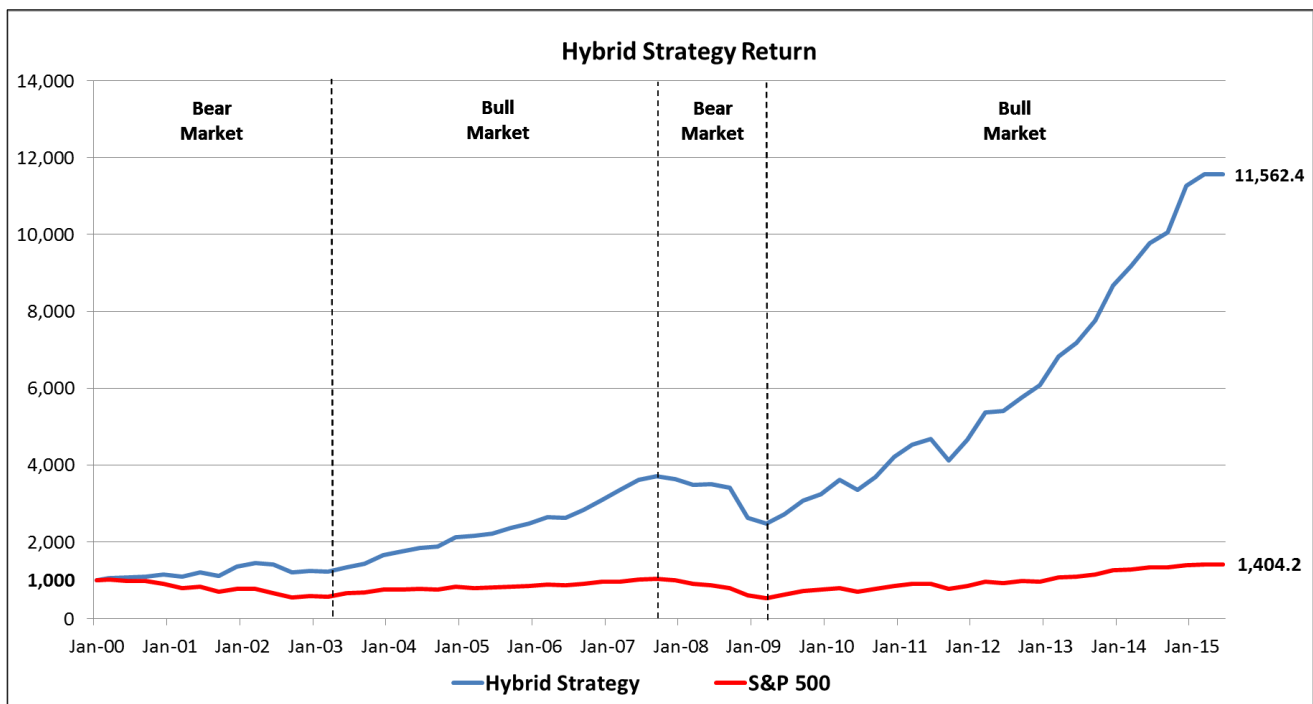


Figure 2. Hybrid Strategy performance, the results obtained are based in quarterly observations

As it can be seen from the figure above and the table below, the strategy developed was able to outperform the benchmark throughout the fifteen and a half years and also during all the market cycles.⁴

	Hybrid Strategy	S&P 500
Bear Markets:		
Jan/00 - Mar/03	23.1%	-42.3%
Oct/07 - Mar/09	-33.2%	-47.7%
Bull Markets:		
Mar/03 - Oct/07	207.7%	80.0%
Mar/09 - present	367.9%	158.6%

Table 1. Hybrid Strategy and S&P 500 performance during Bull and Bear Market cycles

Even during the Bear Market of 2000-2003, known for the ‘Dotcom Bubble’, the strategy managed to have a positive return. The most remarkable period is in the latest Bull Market,

⁴ Figure with logarithmic return of the Hybrid Strategy and the S&P 500 is in Appendix I

which postponed the Global Financial crises of 2007-2008, and is still going on today, where the Hybrid Strategy had a total return of 367.9%.

	Hybrid Strategy	S&P 500
Max. return	22.1%	15.2%
Max. Loss	-22.7%	-22.6%
% Quarters Outperform	88.7%	–
% Positive Quarters	77.4%	61.3%
Annualized Volatility	15.17%	16.68%
Total Return	1,056.2%	40.4%
CAGR	17.11%	2.21%
Info Sharpe	1.13	0.13
Tracking Error	0.034	–
Information Ratio	4.324	–

Table 2. Hybrid Strategy performance and risk evaluation against the benchmark

In terms of risk, it can be perceived that the Hybrid Strategy is less risky than the benchmark. The annualized volatility (risk) is smaller than the S&P 500 (1.51 percentage points less), which makes the performance even more impressive since the annual returns is almost 8 times higher than the benchmark, generating an Info Sharpe (ratio between annual return and annualized volatility) of 1.13 against 0.13 from S&P 500. This goes against the efficient market theory and the risk-return tradeoff, the principle that return rises with an increase in risk. It is also impressive to note that the model outperformed the benchmark more than 88% of the quarters and had almost 16 percentage points more quarters with positive return.

The Tracking Error, developed by Grinold (1999), measures how the portfolio replicates the benchmark. In other words, it shows how its variations diverge or converge from the benchmark. An investor that wants to perfectly replicate the benchmark performance wants a Tracking Error as much as possible close to zero.

The Information Ratio is an indicator that relates the portfolio risk with its excess return against the benchmark and the Tracking Error. It measures the ability to generate excess return relative to the benchmark, but also attempts to exhibit the consistency of the investment strategy. According to J.P. Morgan Asset Management (Investment Insights - Spotlight on: Risk Assessment), a ratio higher than one is “excellent”.

5.1. Sensitivity Analysis

The sensitivity analysis was created to evaluate the different performance of the model in three situations: in 3-months rebalance (standard model), 6-months rebalance and 12-months rebalance. The strategy remains the same in all three, the only difference is in rebalance and, therefore, the holding period of stocks. In addition it was also compared the same three situations but for a model only considering Fundamental Analysis (top 50 companies to invest in each moment without Technical Analysis restrictions).

Number of months	Hybrid Strategy			Fundamental Strategy		
	3-m	6-m	12-m	3-m	6-m	12-m
CAGR	17.11%	10.99%	16.12%	18.19%	13.41%	10.13%
Annualized Volatility	15.17%	16.09%	18.95%	22.99%	17.02%	22.21%
Info Sharpe	1.13	0.68	0.85	0.79	0.79	0.46
Tracking Error	0.034	0.054	0.097	0.055	0.056	0.085
Information Ratio	4.324	1.609	1.429	2.889	1.987	0.925

Table 3. Risk and return evaluation of Hybrid Strategy versus Fundamental Strategy

In terms of Info Sharpe, relation between return and risk, the Hybrid Strategy outperforms the Fundamental Strategy in quarterly and annual rebalance. In terms of Information Ratio, the Fundamental Strategy is better only on 6-months rebalance. However, the best strategy is

undoubtedly the Hybrid with quarterly rebalanced, it has a solid return for unit of risk, revealed on Info Sharpe, and presents a consistent and efficient investment strategy, proved by the Information Ratio. This sensitivity analysis shows when Technical Analysis is added to the model the results improve, especially in short term investment strategy.

6. Model Limitations

The main limitation of the model is concerning Fundamental Analysis back testing. As it is known, fundamental indicators are based on companies' financial statement and also consensus estimates (values that investment bank analysts' provide to the market that indicate how they expect the company earnings, sales, debt, etc. will be in a predefined period, based on previous values and future expectations). To investors these estimates are very importance, since they are interpreted as target values for firm's results in a given moment. For instance, when a company does not achieve what was forecasted or, instead, exceeds the forecasts, the impact on its share price is totally different in each situation.

When quarterly, semester or yearly data is released by firms, the fundamental values can be known and it is possible to compare the real values with the analysts' estimates. So when back testing fundamentals it is important to have in mind that the values were already released by firms, therefore, the fundamental indicators are adjusted (the so called estimates revisions, changes on analysts' past estimates to meet companies' released values). On the other hand when using fundamental in real time (not back test) they are based on analysts' estimates. This is the reason why there is a drawback when fundamental data is used to perform back tests.

7. Conclusion

The development of equity investment strategies that are able to outperform the market is an issue that has been discussed for a long time by investors and asset managers. However, normally, a higher expected return is associated with a higher risk. Since Markowitz introduced this relationship a variety of models were proposed, but none could surpass the CAPM created in 1959.

In this framework, it was proposed a new active investment strategy in the US stock market that outperformed the benchmark during the period analyzed. A Hybrid approach that links Fundamental Analysis with Technical Analysis and takes advantage of both. At a time when several papers are written sustaining that on average, after incorporation of fees, active portfolio management does not outperform passive portfolio management, it would be interesting to consider this new Hybrid approach. Even when fees are taken in consideration, assuming a discount of 1% or 2% on the model's CAGR, the Hybrid strategy continues to outperform the market and produce sound results.

For an asset manager that wants to use this Hybrid Strategy, it would be interesting to analyze if the model also works in the European stock market and compare it with the performance in the US. It would also be relevant to test the significance of each indicator, in order to understand which ones contribute the most for the strategy's results.

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