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# Is there real value in investing in Smart Beta ETF funds?



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# Declaration:

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I declare that all the work in this dissertation is entirely my own unless the words have been placed in inverted commas and referenced with the original source. Furthermore, texts cited are referenced as such, and placed in the reference section. A full reference section is included within this thesis.

No part of this work has been previously submitted for assessments, in any form, either at Dublin Business School or any other institution.

Signed: Vignesh Sivaprakash

Date: 21<sup>st</sup> August 2015

# Table of Contents:

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<b>Table of Contents</b> .....	4
<b>Acknowledgement</b> .....	6
<b>Abstract</b> .....	7
<b>1 Introduction</b> .....	8
1.1 Passive Management .....	8
1.2 Active management .....	8
1.3 Research Questions .....	9
1.4 Sub-Questions .....	9
1.5 Explanation to the Research Question .....	9
1.6 Research Hypothesis .....	10
<b>2 Literature Review</b> .....	10
2.1 Literature Introduction .....	10
2.2 Theme I – CAPM (Capital Asset Pricing Model) .....	11
2.3 Theme II – Three Factor Model .....	12
2.4 Theme III – Smart Beta (SB) .....	13
2.4a Arguments .....	14
2.5 Theme IV – Factor Investing .....	16
2.6 Literature Conclusion .....	17
<b>3 Research Methodology</b> .....	17
3.1 Methodology Introduction .....	17
3.2 Research Design .....	18
3.2a Research Philosophy .....	18
3.2b Research Approach .....	18
3.3 Research Strategy & Research Choice .....	18
3.3a Research Choice .....	19
3.3b Research Strategy .....	19

3.4 Time Horizon .....	20
3.5 Data Collection .....	20
3.6 Sampling .....	21
3.7 Data Analysis .....	22
3.8 Research Ethics .....	22
3.9 Research Limitations .....	23
<b>4 Research Analysis &amp; Discussion .....</b>	<b>23</b>
4.1 Introduction .....	23
4.2 Research Map .....	24
4.3 Calculating Annualized Return - Compound Annual Growth Rate (CARG) .....	26
4.4 Calculating Annualized Standard Deviation (SD) ( $\sigma$ ) .....	28
4.5 Calculating Beta ( $\beta$ ) and Correlation ( $\rho$ ) .....	31
4.6 Calculating Sharpe Ratio (S) .....	35
4.7 Returns & Factors Based Regression Analysis .....	38
4.7a French & Fama Three Factor Model .....	38
4.7b Why this Returns based Regression Analysis? .....	39
4.7c Connection and Purpose .....	39
4.7d Collecting Data and Analysis .....	40
4.7e Interpreting Regression Analysis Summary Output .....	42
<b>5 Conclusion .....</b>	<b>50</b>
5.1 Introduction .....	50
5.2 Research Conclusions .....	50
5.3 Drawbacks .....	53
5.4 Further Research & Business Opportunities .....	53
5.5 Final Thought.....	54
<b>Bibliography .....</b>	<b>55</b>
<b>Appendix A: Reflections .....</b>	<b>59</b>
<b>Appendix B: Data Analysis CD-ROM and its contents .....</b>	<b>60</b>

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# Abstract

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Investors invest in asset markets to gain investment returns which obviously depend upon the level of risk they take. These investments create value only when the returns are recognised after management fees. One such kind of popular investment strategy, which claim to be less risky and provide excess returns (Alpha) by outperforming market indices with much lower management fees than Active Funds, and with only marginally higher fees than the Passive ETFs, are SB ETFs (Smart Beta Exchange Traded Funds).

At the same time these funds have created many controversies, for example, how could an ETF possibly outperform its own benchmark Index? Are they just another technique to gain more fees for similar products? This research will explore the real value of SB ETFs to investors and the justification for their management fees with the help of traditional performance and risk assessment methods.

# 1. Introduction:

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Fund Management is one of the highly competitive sectors in the field of Finance. In this field of fund management, it uses different strategies to manage their funds. They can be broadly categorized in to Passive management and active management, they can be the two different strategies followed by the fund managers.

## 1.1 Passive management:

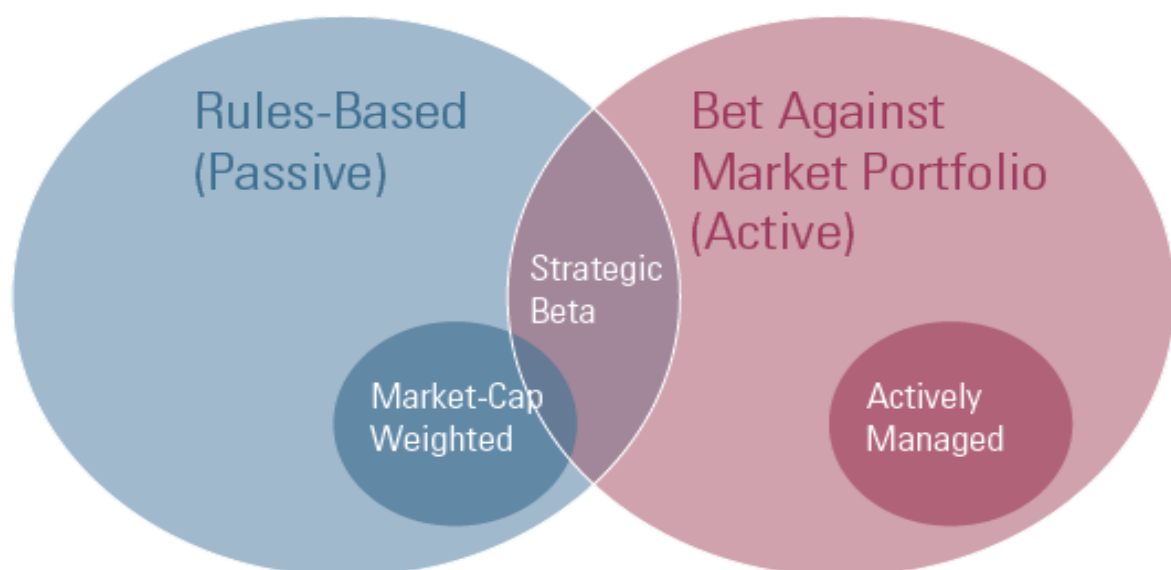
Passive management entails that the manager of an Index fund or an ETF is not required to make any investment decision as they just try to replicate the return of a selected market benchmark by obtaining all (or almost all) of the holding in the index and in the same weight (G. Rompotis, 2009). Passive managers do not make decisions about which securities to buy and sell; they merely follow the same methodology of constructing a portfolio as the Index uses. The manager's goal is to replicate the performance of an Index as closely as possible. Therefore passive managers do not try to beat the market, but only to match its performance.

## 1.2 Active Management:

The managers of actively managed funds believe that there are specific inefficiencies in the market that can be exploitable and they try to beat the market by picking stocks or other investments that are likely to outperform a referenced market Index (G. Rompotis, 2009). Active managers believe that because the market are inefficient, price react to information slowly enough to allow skilful investors to systematically outperform the market.

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**Exhibit 1 Part Passive, Part Active:** Strategic beta lives in the middle of the active-to-passive spectrum.



Picture Source: [news.morningstar.com](https://www.morningstar.com)

The above mentioned was the condition till the time **Smart Beta Exchange Traded Funds (SB ETFs)** were introduced to the market. The SB ETFs falls somewhere between the active and passive management category (Lexicon.ft.com, 2015) and the fund managers took the advantage of the factor exposures developed by French & Fama (explained in the literature) and others. It use different factors other than market capitalization (used generally) like size of firm, book to market values, market risk factor in addition to **CAPM (Capital Asset Pricing Model)**, profitability, price momentum, investment pattern and conservative and aggressive investments. In a very short span of its introduction in the market these funds gained a huge response from the investors, at the same time these funds are severely criticised by the people in the same fund managing industry saying that this new strategy is nothing but a big scam, just another ETF with fancy name to earn higher management fees. This made the researcher to think why this new strategic product in the industry is criticized badly? Do they really deliver outstanding performance? If not how they can be very popular? How could a fund be less risky and at the same time could fetch more returns? Or this is just a rumour or false information to defame the SB ETFs as they may hamper the other strategy based businesses and their income. These kinds of questions made the researcher to undertake this research to find out the real value of SB ETFs to their investors as there are only very few researches has actually made on this SB ETFs.

### 1.3 Research Question:

**Is there real value in investing in Smart Beta ETF funds?**

#### 1.4 Sub-questions:

- ✓ **Do Smart Beta ETF funds outperform their benchmark and market by generating Alpha?**
- ✓ **Are there greater risks in Smart beta funds?**
- ✓ **What plays the major factor in smart beta funds?**
- ✓ **Do Smart Beta ETF funds justify their fees?**

#### 1.5 Explanation to the research question:

There is always been contradiction when it comes to SB ETF investment funds. There are several SB ETF Funds available in the market claimed to outperform the market and are capable of generating **Alpha (Excess Return)** which is not possible by the passive ETF funds as they simply reflects the their benchmark index or the market indices. And the management fees charged by this SB ETFs are generally higher than the passively managed ETFs as they are said to generate more than expected return by outperforming the market.

There have been several doubts and questions raised in terms of its performance, yield, risks associated with them and whether they really outperforms their benchmark index and the underlying market index by generating Alpha and most importantly what plays the major factor (market, value, size, etc..) in the smart beta ETF funds in generating Alpha or it just reflects their benchmark or market like passive ETF funds as they are said to dependent mostly on the market factor and this should be crosschecked, in most of the cases the investors are not aware of these details and there are high chances that they are exposed to greater risk. According to Ferri, 2014, in some form or other

smart beta strategies can be linked to Fama-French research on factor investing. When a stock portfolio deviates from cap weighting, additional risks beyond market risk are introduced. The factor analysis would also give answer this statement of Ferri.

Several large and prominent investors incorporate smart beta strategies in to their portfolios. Growing popularity and increasing allocations into smart beta strategies may remain powerful tailwinds in the foreseeable future; however, as these strategies attract increasing amount of capital, they may start to reflect diminishing returns over time (Watson, 2013), and this research will answer all these sub questions undertaking series of assessments and will eventually answer the overarching question.

## **1.6 Research Hypothesis:**

The overall aim of this thesis is to test the hypothesis: SB ETF Funds are capable of generating Alpha by outperforming the market as they are using factors based investment strategy and the Alpha generated would justify their management fee and are supposed to be less risky investments.

# **2. Literature Review:**

---

**2.1 Literature Introduction:** In order to address the above research question, a critical review of the relevant literature is necessary. The review of the literature organised into four main themes:

- I. CAPM (Capital Asset Pricing Model)**
- II. Three Factor Model**
- III. Smart Beta**
- IV. Factor Investing**

Under this the literature section readers can expect to gain wide knowledge about the above mentioned strategies and models which is also the backbone to my research.

Starting from CAPM, a single index market model; totally based on the market capitalization developed mainly by Sharpe (Donaldson and Ingram, 2014). CAPM is widely used in passively managed ETFs even today, “ETF is a type of mutual fund with a benchmark index which aims to reflect the performance of such index to investors” (Kalfa Bas and Eren Sarioglu, 2015) ,“Exchange traded funds (ETFs) are Trust funds and basket of securities designed to track an index. ETFs add the flexibility, ease, and liquidity of stock trading to the benefits of traditional index fund investing” (Dimkpah and Ngassam, 2013). Next is the development of Three Factor Model, which was developed as a response to poor performance of the CAPM in explaining realized returns (Eraslan, 2013). This Three Factor Model is widely used in SB ETF strategies as Smart Beta strategies attempts to deliver a better risk and return trade-off than conventional market cap weighted indices (Lexicon.ft.com, 2015).

Following this is the SB; a very famous and controversial Index fund, and Factor Investing; key thing behind the creation base of SB investment funds. At the end of the literature section readers are expected to understand the connections between the themes of this literature and how some can

function with the help of others. Literatures in regards to the data assessment techniques have been explained in detail alongside with the research analysis & discussion part of this research to avoid congestion of too many concepts in literature review and also to better explanation of assessment methods while working out them.

## **2.2 Theme I – CAPM (Capital Asset Pricing Model):**

“The Capital Asset Pricing Model (CAPM) developed by Sharpe and others in 1964, was a revolutionary development in the study and understanding of the relationship between risk and return for common stocks” (Donaldson and Ingram, 2014) the author further explains that the CAPM inspired single index market model in explaining the cross section of expected stock returns and are a subject of great importance in our investment field. Factor models are also widely used in practice by investment management firm, in most of these models, the market index developed in the context of the CAPM is one factors representing market risk.

In the CAPM, the securities have only two main drivers: systematic risk and idiosyncratic risk. Systematic risk in the CAPM is the risk that arises from exposure to the market and is captured by Beta, the sensitivity of the security’s return to the market. Since systematic risk cannot be diversified away, investors are compensated with returns for bearing this risk. In other words, the expected return to any stock could be viewed as a function of its beta to the market (Jennifer et al., 2013).

According to Ang (2013) in CAPM, investors should hold the market portfolio with risk free T-bills. There is a special investor who holds a 100% of the market portfolio is the market itself. The investors more risk-averse than market will earn lower average returns than the market, they are perfectly fine with this because they are more risk-averse, so they sacrifice the higher returns for the safety of lower yielding T-bills. (These investors have optimal betas of less than one). If you are more risk seeking than the market, you will earn higher average return than the market portfolio. You don’t feel the pain of bad times as much as the average investor, enabling you to earn higher returns. (The investors more risk tolerant than the market hold portfolios with optimal betas greater than one).

Thus, whether you have large or small holdings of market factor risk depends on whether you are more risk-averse or more risk seeking than the market investor. In equilibrium, any person, who is more risk-averse than the market is balanced by a person less risk-averse than the market. The CAPM give us the directions on how to construct the optimal factor portfolio, which turns out to be the market capitalization weighted portfolio of all risky assets (of course! the market factor).

Bornholt, (2013), says that CAPM faces three main empirical challenges

- 1) The beta anomaly (portfolios of low beat stocks tend to have higher average returns than the CAPM predicts while portfolios of high beta stocks tend to have lower average returns than the CAPM predicts)
- 2) The value anomaly (firms with higher book to market equity (BE/ME) ratios tend to have higher average returns than do firms with low book to market ratios)
- 3) The momentum anomaly (stocks with relatively large recent six month to twelve month returns tend to have higher average return over the following twelve months than do stocks with relatively low recent six month to twelve month return)

This resulted in the development of Three Factor Model. But still passively managed ETF’s uses single weighting methods as they simply believe in the market.

### 2.3 Theme II – Three Factor Model:

“Three Factors Models such as those developed by Rosenberg (1974), Fama and French (1992), Haugen and Baker (1996), and Chen and Zhang (2010) are the proven improvements on the CAPM inspired single-index market model in explaining the cross section of expected stock returns and are a subject of great importance in our investment curriculum” (Donaldson and Ingram, 2014), the factor models are also widely used in practise by investment management firms. The underlying premise of these three factor models is that certain common factors may be identified which capture the types of risk that are rewarded over long investment horizons. In the most of these models, the market index developed in the context of the CAPM is one of the factors, representing market risk.

According to Donaldson and Ingram, 2014, the most widely studied and implemented model to follow in this stream of research to date is the Fama and French (1992, 1996) three factors model. Fama and French augmented the market model with two additional factors that they found had significant statistical power to explain what the single index beta alone could not and the inclusion of these two additional factors could increase the power of the model to explain the cross section of returns in diversified portfolios. The specific factors used are based on firm size (market capitalization – small and large) and the firm’s book to market value ratio (often referred to as value versus growth firms. They also found that, on average, and consistent with prior studies, small capitalization (cap) firms have returns that are greater than the large cap firms.

As mentioned earlier, the Fama and French three factor asset pricing model was developed as a response to poor performance of the CAPM in explaining realized returns. Fama and French (1993) argue that anomalies relating to the CAPM are captured by the three factor model (Eraslan, 2013). They base their model on the fact that average excess portfolio returns are sensible to three factors.

Namely:

- 1) Excess market portfolio return;
- 2) The difference between the excess return on a portfolio of small stocks and the excess return on a portfolio of big stocks (SMB, small minus Fama and French Three-Factor Model: Evidence from Istanbul Stock Exchange); and
- 3) The difference between the excess return on a portfolio of high book to market stocks and the excess return on a portfolio of low-book-to-market stocks (HML, high minus low).

**They formulate their model as:**

$$E(R_i) - R_f = b_i[E(R_m - R_f)] + s_i E(SMB) + h_i E(HML) \text{ (Eraslan, 2013)}$$

According to the author, **where:**

- 1)  $E(R_i)$ : Expected rate of portfolio return.
- 2)  $R_f$  : Risk-free rate of return.
- 3)  $E(R_m - R_f)$ : Expected rate of excess market portfolio return.
- 4)  $E(SMB)$ : Expected value of the difference between the excess return on a portfolio of small stocks and the excess return on a portfolio of big stocks.

- 5) E (HML): Expected value of the difference between the excess return on a portfolio of high-book-to-market stocks and the excess return on a portfolio of low-book-to-market stocks.

The model fits two additional risk factors to the CAPM in order to explain the return variations better and cure the anomalies of CAPM. “Fama and French in 1996 pointed out that the model captures many of the variations in the cross section of average stock returns and it absorbs most of the anomalies that have plagued the CAPM” (Eraslan, 2013). In the same study they argue the empirical success of their model suggests that it is an equilibrium pricing model, in consideration to the previous studies.

“The three factor model is now widely used by researches to test whether the size and value risk factors are present in worldwide stock markets. This model is also used to measure the performance of mutual funds and to estimate the cost equality” (Aguenaou, Abrache and El Kadiri, 2011). “Jegadeesh and Titman in 1993 augmented the French and Fama three factor model with a new risk factor which is “the momentum effect” (Aguenaou, Abrache and El Kadiri, 2011). The momentum effect means that stocks that did well relative to the market over the last three to twelve months will continue to perform well for the next few months and stocks did not perform well will continue to do poorly.

There was unavoidable debate when the time the Fama and French developed their factors model and there were contradictions as well, some of them said that the three factors model was basically flawed and some of them said it cannot potentially predict but can be used for testing and some time it worked too. Fama and French have also developed their models by adding one or two more factors based on their empirical research which is not covered in this section as this research’s concentration is on the three factors model.

## **2.4 Theme III – Smart Beta (SB)**

Smart Beta strategies attempt to deliver a better risk and return trade-off than conventional market cap weighted indices by using alternative weighting schemes based on measures such as volatility or dividends (Lexicon.ft.com, 2015), SB refers to an investment style or strategy where the manager follows an index designed to take advantage of perceived systematic bias or inefficiencies in the market. It therefore costs less than active management, since there is less day to day decision making for the manager, but since it will, at the very least, have higher trading costs than traditional passive management (which minimize those costs), it is a pricier option.

Even, researchaffiliates.com, (2015) says that SB strategies retain the benefits of traditional capitalization or market value weighted approaches, such as broad market exposure, diversification, liquidity, transparency and low cost access to the markets. In terms of construction SB strategies can be constructed with heuristic weighting methods, using simple and sensible rules. Or they can be built with optimization based weighting methods, which are complex and subject to errors in estimating returns and covariance.

According to Morningstar, SB is a broad and rapidly growing category of Benchmarks Index Funds. The common thread among them is that they seek to either improve their return profile or alter their risk profile relative to more traditional market benchmarks. In the case of equity products, which account for the majority of assets in this area, the result is typically one or more factor tilts relative to standard market Indices.

As of June 30<sup>th</sup> 2014, there were 673 SB ETFs, with collective assets under management of approximately \$396 billion worldwide. Since my concentration is on the US market, U.S. is home to the largest and most diverse stable of SB ETFs. It is host to 57% of the total number of SB ETFs, which together account for nearly 91% of the global assets. This should come as little surprise given the overall size and maturity of the domestic asset management and financial services industries. The first generation of SB ETFs came to US market in May 2000. The iShares Russell 1000 Growth (IWF) and iShares Russell 1000 Value (IWD) ETFs were the first SB ETFs. These funds represents first generation SB; introducing systematic style tilts to a market that was already well versed in a style based approach to equity investing. As of June 30<sup>th</sup> 2014, SB ETFs numbered 374 and had collective assets under management of \$359.7 billion (corporate.morningstar.com, 2014).

Smart beta strategies are better diversified and they systematically buy low and sell high by periodically rebalancing to non-price related target weights addition to exploiting mean reversion in prices, smart beta strategies profit from mean reversion in the value premium by effectively implementing a dollar cost averaging program (Hsu, 2014).

According to author Hsu (2014), Smart beta value indices offer more powerful approaches to capturing the value premium they use indices constructed in accordance with non-capitalization weighted methodology. In this approach, stocks are weighted by fundamentals associated with economic size, such as book value and total cash flows. These measures are not directly related to stock prices. Nonetheless, because they track capitalization over time, the fundamental weighted strategy generally contains industry exposures that are reasonably similar to the broad market index. The long-term returns earned by smart beta strategies are substantially higher than the traditional value indices value added returns. The fundamentals weighted approach to value investing results in approximately 200 bps (basis points) of historical outperformance.

Furthermore talking about the statistics and ratios the author says that over the 30 year period ending December 31, 2013, the stimulated return of the fundamentally weighted index was 13.14% per annum, more than 200 bps higher than the annualized returns of S&P 500 index (11.09%) and the Russell 1000 index (11.12%). In the same period, the S&P 500 value index underperformed the S&P 500 by 18 bps and the Russell 1000 value index exceeded the Russell 1000 index by 41 bps. The outperformance of the fundamentally weighted index is not attributable to added risk; its hypothetical 30 years return is modestly superior to the returns of the value style indices on a risk adjusted basis. The fundamental weighted index had a sharp ratio of 0.49, compared to 0.36 for the S&P 500 value index and 0.41 for the Russell value index.

From the above author concludes that through the rebalancing mechanism, smart beta approaches effectively sell high and buy low, profiting more effectively from mean reversion in stock prices. However, that the various approaches to index construction and maintenance within the smart beta universe represent different degrees of effectiveness in harvesting factor premia. While many of them do in fact outperform the cap weighted market index by reaping sources of excess return other than bulk beta, their efficiency, as measured by transaction costs, invisibility, and underlying economic exposure, can vary appreciably. The advantages of moving away from traditional strategies such as value style investing seem obvious. Nonetheless, investors do, indeed, need to be smart when it comes to analyzing smart betas.

#### **2.4a Arguments:**

“To smart beta, or not to smart beta; that is the question. Whether this nobler suffer the slings and arrows of rebuffing this popular investment trend whistle retaining independent thoughts, or to

embrace it for the sake of conformity and the hope of discovering an alpha? Aye, there's the rub, for when the soul knows what is prudent as the mind becomes greedy, we must give pause" (Ferri, 2014).

According to the author, low-fee, market-tracking index funds and exchange traded funds are made for soul. They replicate as close as feasible cap-weighted market benchmarks in an extremely low cost manner. The concept is simple: earn your fair share of a market's return and your performance likely will be well above the average actively managed portfolio over the long term. According to data compiled by the Investment Company Institute, money began flowing out of actively managed mutual funds and into traditional index funds about a decade ago and has accelerated over the years. Today, most large Index funds and ETFs track cap-weighted benchmark indices.

Further to the argument the author adds that, SB has become a catchall for any Index weighted strategy that doesn't follow a capitalization weighting methodology. Deviation from cap weighting gives exposure to additional risk. In an efficient market world, a higher risk portfolio is expected to have a higher return over time. Fama-French found that these additional risks (or betas) did provide risk premiums that have historically added to the return of a dumb beta portfolio.

"Adding extra portfolio risk adds to the prospect of higher return, but that's not a free lunch. It's a risk allocation decision" (Ferri, 2014).

In the Author's recent interview with David Blitzler, managing director and chair of the S&P Dow Jones Index Committee, referring to the S&P 500, he said, "There are a virtually infinite number of ways to reweight 500 stocks and some people are running around giving these special names, but it's still Fama-French". In continuation he said that he cannot tell if factors based strategies will reward investors in future, but he can tell there are two things that will occur. Clients will pay more that they would for cap-weighted strategies and there will be tracking errors against cap-weighted indexes for better or worse.

"Smart Beta" isn't about market risk; it's about other risks and the sensitivity of a portfolio to those other risk" (Ferri, 2015)

Explaining the above cotes author Ferri (2015): These types of risk includes, but not limited to, company size price momentum and value factors such as low price to book ratios. However, rather than represent these risk factors for what they are, the strategies are promoted as "smart", by product creators. In authors view, cloaking risk with fancy names creates the risk of chasing hot ideas. Rob Arnott of Research Affiliates is less troubled by the terminology and for good reason. His firm is a leader in SB Indexes and creator of Fundamental Index (RAFI), a strategy that weights securities using fundamental factors other than market capitalization. More than \$170 billion is tracking RAIF strategies worldwide. SB advocates point to back test strategies as proof of their superiority. Critics point to their proof as data mining.

"Nothing fails like success," John Bogle once said in a1997 speech addressing asset bloat that's common in outperforming investment strategies" (Ferri, 2015)

Clearly, huge performance premiums were earned in the early years. Money is pouring into SB strategies, and their marketing success may be their demise. The risk of asset bloat has a special name in this space. It's called "factor crowding," when too many dollars chase a limited supply of opportunities. Crowding reduces the spread between supposed undervalued securities and their counterparts until the spread becomes so thin that there's not enough to cover the management fee. At that point the strategy underperforms.

The author is not against the factor investing but against the bad marketing and warns that any excess earned must first overcome the extra cost; second greater mass marketing participation leads to factor crowding and lower expected premiums; and third, there are long periods when these strategies do not work. The smart thing is to do is to proceed with caution.

## **2.5 Theme IV – Factor Investing:**

In the investment field, the factor framework has migrated from academia to the real world of investment decision making. Investors are seeking higher returns at low costs, and factor investing seems to offer the returns that may believe are linked to them (Vitali and Engin, 2014). Recently, a number of alternative approaches to passive equity investing have gained popularity by claiming to offer risk adjusted performance superior to that of traditional market-capitalization-weighted indices. Alternative beta strategies, which provide efficient long only, access to value and size factors, represents improvements over existing value and small cap indices. Insofar as one can efficiently apply alternative beta portfolios as tool to improve an investor's portfolio Sharpe ratios and information ratios, these strategies are valuable (Tzee-man et al., 2011).

These factors have historically earned a premium, one view is that factor returns are compensation for bearing systematic risk, second view is that factor returns arise from systematic errors; either investors exhibits behavioural biases or investors are subject to different constraints (e.g., time horizons, ability to use leverage etc.) (Jennifer et al., 2013)

Authors Jennifer et al., (2013) further continues that all factors have experienced periods of underperformance and some factors have been highly cyclical. Their cyclicality may in fact be one of the reasons they have not been arbitrated away. Empirical studies show that these factors have exhibited excess return above the market.

For instance, the author refers the French and Fama (1992) study, found that the average small cap portfolio (averaged across all sorted book to market portfolios) earned monthly returns of 1.47% in contrast to the average large cap portfolio's returns of 0.90% from July 1962 to December 1990. Similarly, the average high book to market portfolio (across all sorted size portfolios) earned 1.63% monthly returns compared to 0.64% for the average low book to market portfolios.

Author Ang (2013) says the factors are dynamic (dynamic factors), because they involve time-varying positions in securities which chance over time. Dynamic factor premiums do not come for free. Dynamic factors often beat market over long periods of time, they can grossly underperform the market during certain periods like the 2008-09 financial crisis. Factor risk premiums exist in the long run because they compensate the investor for bearing losses during bad times. The factors are not appropriate for everyone because factor strategies are risky.

Furthermore the author Ang (2013) adds that an important concept of dynamic factors is that they remove market exposure. Optimally constructed value-growth nets out the market portfolio and is exposed to the returns of value stocks less the returns of growth stocks. Similarly by going long winners and short losers, momentum removes the market portfolio. In practice, factor portfolio need not to be constructed with an equal number of stocks or equal dollars in opposite long-short positions, these are called unbalances portfolios. There is no need to take short positions, but the fewer the short positions, the greater the market exposure.

Industry often used the terms smart beta, alternative beta, or exotic beta for dynamic factors. I stick with the term "factors" because, in asset pricing theory, beta has the strict meaning of measuring

exposure to a risk factor. (These risk factors actually have a beta of one with respect to themselves). Beta measures the magnitude of the exposure to a risk factor: we invest in factors, not betas (Ang, 2013).

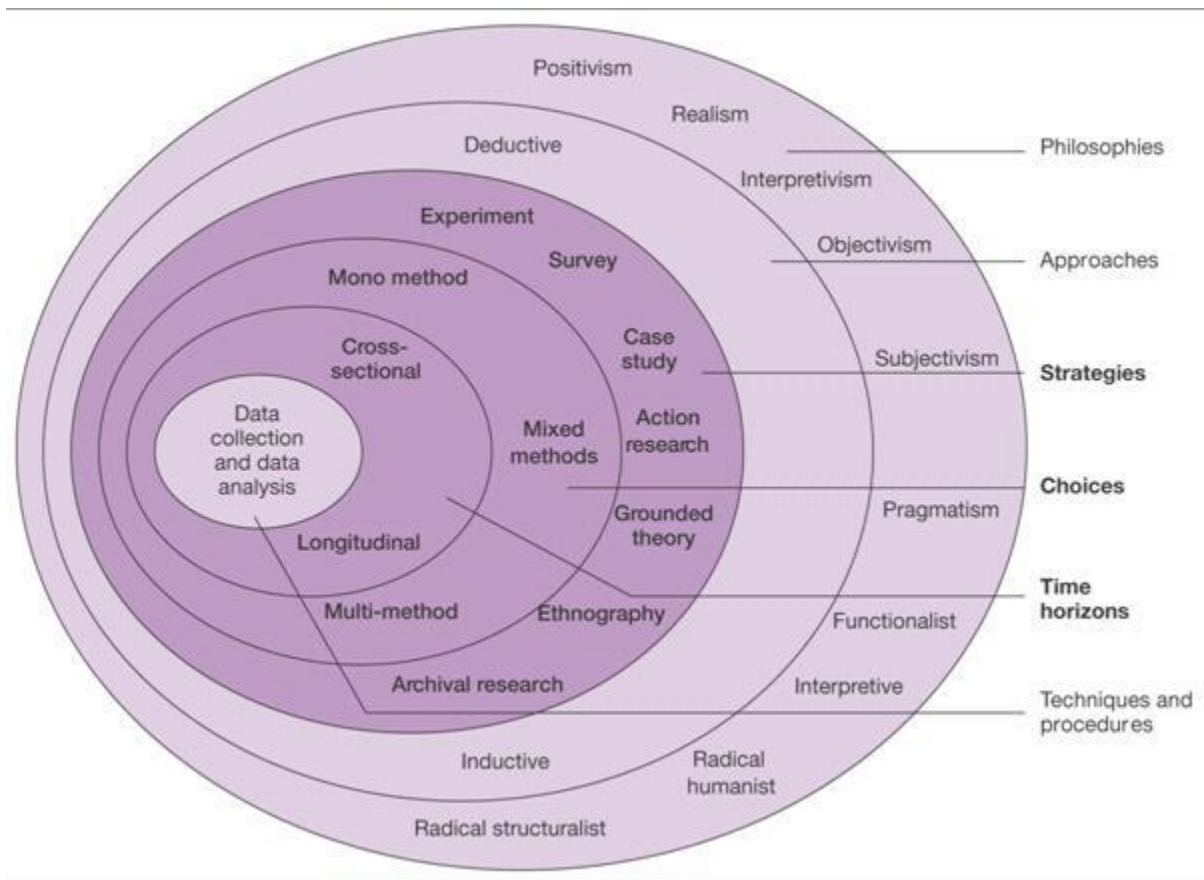
## 2.6 Literature Conclusion:

From the literature part we could see enough of evidence from the previous researches on CAPM, Multi Factor Model, Smart Beta and Factor Investing, and this evidence from empirical studies and researches carried out will highly contribute and support to precede my research on identification of real value of Smart Beta ETF funds.

# 3. Research Methodology:

## 3.1 Methodology Introduction:

Using the research onion see figure down below, this will map and develop the research methodology for this research. This will include selecting a suitable research approach, relevant strategies and philosophies as well as the techniques involved in the collection and analysis of the data.



Source: Saunders, Lewis and Thornhill (2007, p.102)

## **3.2 Research Design:**

### **3.2a Research Philosophy:**

The first layer of the onion deals with the philosophical approach to conducting the research.

According to authors Saunders, M., Lewis, P. and Thornhill, A. (2012 p.134) the researcher will prefer collecting data about an observable reality and search for regularities and casual relationships in their data to create law like generalizations like those produced by scientists. In this research the data collection is from very observable reality which is the capital market itself, this includes the data collection from the Indices and the SB ETF funds as well. Like the authors said this phenomena that the researcher can observe had lead to the production of credible data.

The authors further more say that to generate a research strategy to collect these data the researcher may use existing theory to develop hypotheses. These hypotheses will be tested and confirmed in whole or part, or refuted, leading to the further development of the theory which then may be tested by future research. In this research the researcher have not used any existing theory to develop my hypothesis as the authors further more adds however, this does not mean as a positivist have to start with existing theory because all sciences have developed from an engagement with the world in which data were collected and observed made prior to hypotheses being formulated and tested. Hence research philosophy would be positivism.

### **3.2b Research Approach:**

The next layer of the onion deals about the research approach which would be utilized in this research.

In this research the researcher have developed a hypothesis not necessarily based on an existing theory like explained by Saunders, Lewis and Thornhill (2007 p.117), “deductive approach is in which you develop a theory and hypothesis (or hypotheses) and design a research strategy to test the hypothesis”, My research is predominantly quantitative, and the data collected is all numbers which is explained in the data collection part of this research. Saunders, Lewis and Thornhill (2007 p.117) and Saunders, Lewis and Thornhill (2012 p.146) sates that “To test this hypothesis you utilize another characteristics, the collection of quantitative data (this is not to say that a deductive approach may not use qualitative data)”, and the researcher have used highly structured methodology to facilitate my research to ensure reliability, it involves the development of a theory that is subjected to a rigorous assessments like computing standard deviation, annualized return, beta, correlation, sharp ratio, regression test with the help of factors model to find Alpha. All the above mentioned assessments have been carried out on the very few selected data which is explained in the sampling part of this research.

In additional the researcher has made the concepts to be operationalised in a way that enables facts to be measured quantitatively. Hence my research approach would be deductive.

## **3.3 Research Strategy & Research Choice:**

The next two layers of the research onion talks about the research strategy and the research choices.

### **3.3a Research Choice:**

The researcher's research choice is mono method quantitative procedure. And reason for this selection can be stated from the following

This research design was structured with positivism as the research philosophy, and have used highly structured data collection techniques and have collected complicated set of data for the purpose of research and the researcher have chosen deduction as research approach as it best fits in with the criteria. Even Saunders, Lewis and Thornhill (2012 p.162, 163) says that the quantitative research is generally associated with positivism, especially when used with predetermined and highly structured data collection techniques. This quantitative research is usually associated with a deductive approach, where the focus is on using data to test theory or the hypothesis. And further when the authors explains about the characteristics of this quantitative research design says that the quantitative research examines relationships between variables, in this research those variables would be the price data of the SB ETF and the price data of the index which are measured numerically and analyzed using a range of statistical techniques. This methodology often uses probability sampling techniques which is exactly the researcher have used to ensure generalisability.

### **3.3b Research Strategy:**

In this research the researcher would be implementing multiple research strategies like Multiple case study and Archival research.

Authors Saunders, Lewis and Thornhill (2012 p.179) says that the case study strategy has considerable ability to generate answers to variety of questions including why? What? How? And may use quantitative methods to collect and analyze data. In this research it would be question of performance, fees, risk and influence of different factors in the given SB ETF Funds. In this research the researcher not only collected and analyzed data from a single case, but have collected data from multiple cases and multiple data related to that particular case and analyzed them. On this the authors Saunders, Lewis and Thornhill (2012 p.180) explains, a case study can also incorporate multiple cases, that is, more than one case and that multiple case study strategy may combine a small number of cases chosen to predict literal replication and a second small number chosen to predict theoretical replication. In this research it would be small number of findings from a single case combined with other case findings would answer multiple questions, example the annual return from all the cases would tell about its performance and the beta calculated from all the cases would tell about the SB ETF Funds volatility. The Author furthermore adds that "case study research is likely to prove to be intensive and demanding and multiple case studies are likely to produce more evidence". Therefore the researcher has chosen multiple case study approach because of its capacity to demonstrate one or more forms of replication.

The other research strategy the researcher have used in this research is the archival research strategy as most of my research relied on the 5 years historical price data of the SB ETF Funds and its respective index. "The term 'archival' has historical connotations; it can refer to recent as well as historical documents" (Saunders, Lewis and Thornhill, 2012 p.178). On using the historical data authors explains that these data are used in an archival research strategy they are analyzed because they are a product of day to day activities. They are, therefore, part of the reality being studied rather than having been collected originally as data for research purpose. In this research the archival research was useful to understand the changes over time of the prices.

### 3.4 Time Horizon:

The main strength of longitudinal research is its capacity to study change and development and this type of study may also provide you with a measure of control over some of the variables being studied (Saunders, Lewis and Thornhill, 2012 p.190). Even with time constraints the researcher have possibly introduces longitudinal element in my research by studying multiple cases over the time period of five years as from this the researcher would be able to gain valuable data, which would give me a powerful insights into developments over a period of wide ranging change.

### 3.5 Data collection:

Very crucial part of the primary research would be selecting the right SB ETF as there are many SB ETFs available in the market. The researcher's concentration is on the US market for this research and assessments. So, the researcher has selected top 20 largest domestic equity SB ETFs based on their market value as of 31<sup>st</sup> December 2014. This top 20 SB ETFs are from different sectors and providers (company issuing the SB ETFs) which also covers a verity of Indices like S&P 500, NASDAQ, Dow Jones, Russell etc.,

The table below shows the top 20 SB ETFs in the order mentioned 1 to 20; there 20 SB ETFs are selected for this research the table also shows the Ticker, Benchmark Index and Market value. The Benchmark column reports the respective index reported as "benchmark index" in the SB ETF summary prospectus or the Fact Sheet issued by the SB ETF providers and has also been cross checked with etfdb.com and Google Finance.

**Table 1: Top 20 Largest Domestic Equity Smart Beta Exchange Traded Funds**

<b>Name of the Smart Beta ETF</b>	<b>Ticker</b>	<b>Smart Beta Bench Mark</b>	<b>Market Value in \$ billion.</b>
Vanguard Dividend Appreciation ETF	<b>VIG</b>	NASDAQ US Dividend Achievers Select Index	<b>21.18</b>
iShares Select Dividend ETF (by BlackRock)	<b>DVY</b>	Dow Jones US Select Dividend IndexSM	<b>15.56</b>
SPDR S&P Dividend ETF (by STATE STREET)	<b>SDY</b>	S&P High Yield Dividend Aristocrat Index	<b>14.03</b>
Vanguard High Dividend Yield ETF	<b>VYM</b>	FTSE High Dividend Yield Index	<b>10.48</b>
Guggenheim S&P 500 Equal Weighted ETF	<b>RSP</b>	S&P 500 Equal Weighted Index	<b>10.14</b>
PowerShares S&P 500 Low Volatility Portfolio	<b>SPLV</b>	S&P Low Volatility Index	<b>5.27</b>
iShares Core high Dividend ETF	<b>HDV</b>	Morningstar Dividend Yield Focus Index	<b>5.2</b>
PowerShares FTSE RAFI US 1000 Portfolio	<b>PRF</b>	FTSE RAFI US 1000 Index	<b>4.36</b>
iShares MSCI USA Minimum Volatility ETF	<b>USMV</b>	MSCI USA Minimum Volatility (USD) Index	<b>3.58</b>
Schwab US Dividend ETF	<b>SCHD</b>	Dow Jones US Dividend 100 Index	<b>2.74</b>
PowerShares BuyBack Achievers Portfolio	<b>PKW</b>	S&P 500 Index	<b>2.73</b>
First Trust Health Care AlphaDEX Fund	<b>FXH</b>	StrataQuant Health Care Index	<b>2.57</b>
WisdomTree LargeCap Dividend Fund	<b>DLN</b>	WisdomTree LargeCap Dividend Index	<b>2.4</b>
First Trust Consumers Staples AlphaDEX Fund	<b>FXG</b>	StrataQuant Consumer Staples Index	<b>2.09</b>

First Trust Consumers Discretionary AlphaDEX Fund	<b>FXD</b>	StrataQuant Consumer Discretionary Index	<b>1.91</b>
Guggenheim S&P Pure Style ETFs	<b>RPG</b>	S&P 500 Pure Growth Index	<b>1.85</b>
PowerShares DWA Momentum Portfolio	<b>PDP</b>	Russell 3000 Growth Index	<b>1.61</b>
First Trust Large Cap Core AlphaDEX Fund	<b>FEX</b>	Defined Large Cap Core Index	<b>1.59</b>
PowerShares Dynamic Pharmaceuticals Portfolio	<b>PJP</b>	S&P Pharmaceuticals Select Index	<b>1.47</b>
SPDR S&P Homebuilders ETF (by STATE STREET)	<b>XHB</b>	S&P Homebuilders Select Industry Index	<b>1.42</b>

Soon after identifying the SB ETFs for this research, the next step was to get the fact sheets for all the 20 SB ETFs and their benchmark index. The fact sheets provides all the necessary information like inception date of the fund, ticker, expense ratio, benchmark index, number of holdings, top holdings, net assets etc., in case of SB ETF. Launch date, pictorial representation of historical performance, index characteristics, index components, ticker etc., in case of benchmark index. In general the fact sheet allows the researcher or the interested investors to understand and know more about the fund and its benchmark index.

The next step is to get the historical price data or the performance data for both SB ETFs and its benchmark index; these data are downloaded in the form of spread sheet or copied to a spread sheet if not downloadable from Yahoo Finance and Google Finance. The time period considered for the research was from 1<sup>st</sup> of June 2010 till 31<sup>st</sup> of May 2015. The reason behind considering only 5 years of performance data for this research is purely based on the time period the researcher had for this research to be done. The data longer 5 years would take more time to analyse and compute than the allocated time period for this research. Subsequently data are also collected from various credible websites like forbs, financial times, etf database, investopedia, marketwatch etc, and the data collected from journals and articles are used to give more insights about the SB ETF Funds, French and Fama factor analysis and also to prove the credibility of the various tests analysis the selected funds will undergo in this research.

### 3.6 Sampling:

According to Saunders, Lewis and Thornhill (2007 p.204), “sampling techniques provide a range of methods that enable you to reduce the amount of data you need to collect by considering only data from a subgroup rather than all possible cases or elements”. Sampling also saves time, an important consideration when you have tight deadlines.

The next step to this data collection is sampling, Non-probability sampling is used for this research and it is useful to filter as many possible funds from the 20 for conducting the actual research and tests. Considering 20 as a big number and will take more than allocated time for the research filtering process had been carried out. Even at the very beginning the collection of fact sheets and price data was tedious, as the data were not very easily available online and happened to refer numerous and reliable sources for the intended data. Final filtering is done on the basis of availability of proper and full fact sheets of both SB ETF and the Benchmark index from a reliable source, most importantly considering the availability of price data of 5 complete years for both SB ETF and the Benchmark index. Only 9 out of all 20 SB ETF funds satisfied the above requirements for proceeding with the research and assessments without any further trouble and the SB ETFs filtered are listed in the below table.

**Table 2: 9 out of 20 SB ETFs satisfying the basic requirements for further research**

Name of the Smart Beta ETF	Ticker	Smart Beta Bench Mark	Market Value in \$bil.
iShares Select Dividend ETF (by BlackRock)	<b>DVY</b>	Dow Jones US Select Dividend Index <sup>SM</sup>	<b>15.56</b>
SPDR S&P Dividend ETF (by STATE STREET)	<b>SDY</b>	S&P High Yield Dividend Aristocrat Index	<b>14.03</b>
Guggenheim S&P 500 Equal Weighted ETF	<b>RSP</b>	S&P 500 Equal Weighted Index	<b>10.14</b>
PowerShares BuyBack Achievers Portfolio	<b>PKW</b>	S&P 500 Index	<b>2.73</b>
First Trust Health Care AlphaDEX Fund	<b>FXH</b>	StrataQuant Health Care Index	<b>2.57</b>
First Trust Consumers Staples AlphaDEX Fund	<b>FXG</b>	StrataQuant Consumer Staples Index	<b>2.09</b>
First Trust Consumers Discretionary AlphaDEX Fund	<b>FXD</b>	StrataQuant Consumer Discretionary Index	<b>1.91</b>
PowerShares Dynamic Pharmaceuticals Portfolio	<b>PJP</b>	S&P Pharmaceuticals Select Index	<b>1.47</b>
SPDR S&P Homebuilders ETF (by STATE STREET)	<b>XHB</b>	S&P Homebuilders Select Industry Index	<b>1.42</b>

With all my required data gathered for the research, the data will undergo series of assessments like mentioned in the strategy part and the results will eventually answer the overarching research question and the sub questions.

### 3.7 Data Analysis:

This research purely follows the quantitative procedure and the data collected would be predominantly numeric. In analyzing the collected data Microsoft Excel plays a major role as all the data collected, mostly the numbers like price data of the SB ETFs and their respective index are compared, contrasted and analysed in Microsoft Excel only. While working on Microsoft Excel, there was need of some additional data required for the analysis, for example risk free rate of 1 year US Treasury bond which had been taken from the web (Bloomberg.com). Formulae used for the computation purpose has been lent from the financial market theories, web or even the MS Excel facilitates those formulae inbuilt, for example calculating daily return or standard deviation on SB ETF Funds price, the formula can either be taken from the financial market theories, web or from the MS Excel itself. And for the final regression analysis test which is used to calculate the Alpha, a special data analysis add-on has to be installed with MS Excel, which is easily available online and free of cost provided by Microsoft itself. All the results have been converted to tables and charts for the convenient of better understanding.

### 3.8 Research Ethics:

“In the context of research, ethics refers to the appropriateness of your behaviour in relation to the rights of those who become the subject of your work, or are affected by it.” (Saunders, Lewis and Thornhill, 2007, p.178)

As previously explained, this research will use a longitudinal quantitative design. The data used to conduct the research is publicly available and free to use. Permission for the utilization of this data is therefore not required. Also, the computation methods used for the evaluation of data can be easily found in the financial market theories and web, even the formulae used are available in the Microsoft Excel itself. The research can therefore be repeated by any independent and potential researcher. An issue might be the choice of samples used in this research; the samples are chosen based on the completeness of the data available to carry out the research but not for the purpose of getting predetermined or desired results which is explained in the sampling section of this research.

### **3.9 Research Limitations:**

So far, this research has focused on the findings and their implications. It is now necessary to explain the limitations and constraints that restrict the validity and reliability of the research conducted. To keep the focus of this research within boundaries, several simplifications were made during the process of completing this research; it is important to be aware of these when interpreting the findings.

Time constraint was one of the major limitation in this research, like it is mentioned earlier several simplifications were made, only the data of previous 5 years has been considered for this research, more the number of observations more stronger your evidence will be, and also only limited number of tests and methods were used to analyse the collected data and are considered to sufficient to answer the research questions. And the methods used are not the only methods or the way to analyse the data.

Most importantly this research is not predicting or assuring any future performance of the SB ETF Funds. This research is only limited to the identification of historical performance of the SB ETF Funds and its capability to generate Alpha, as it is said to be perform well and charges higher fees than other similar products.

## **4. Research Analysis & Discussion:**

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### **4.1 Introduction:**

This part of research is predominantly quantitative; it starts with explaining the data and the sample used for this research analysis followed by a detailed map which shows that how this analysis will be carried out.

The data used for this research is the top 20 largest domestic equity SB ETFs based on their market value as of 31<sup>st</sup> December 2014 from the US market which covers a wide verity of Indices like S&P 500, NASDAQ, Dow Jones, Russell etc,. Based on the complete availability of the data like latest fact sheets<sup>1</sup> and complete 5 years price data of the SB ETFs and its respective indices, 9 samples have been chosen from the top 20 largest domestic equity SB ETFs. This data collection and the sampling have been explained in detail on the methodology part of this research. Shown below in the table are the samples on which this research analysis will be carried out.

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<sup>1</sup> Fact sheet is a paper giving useful information about a particular issue, in our case that would be the SB ETFs and their respective Indices.

**Table 3: Sample SB ETFs**

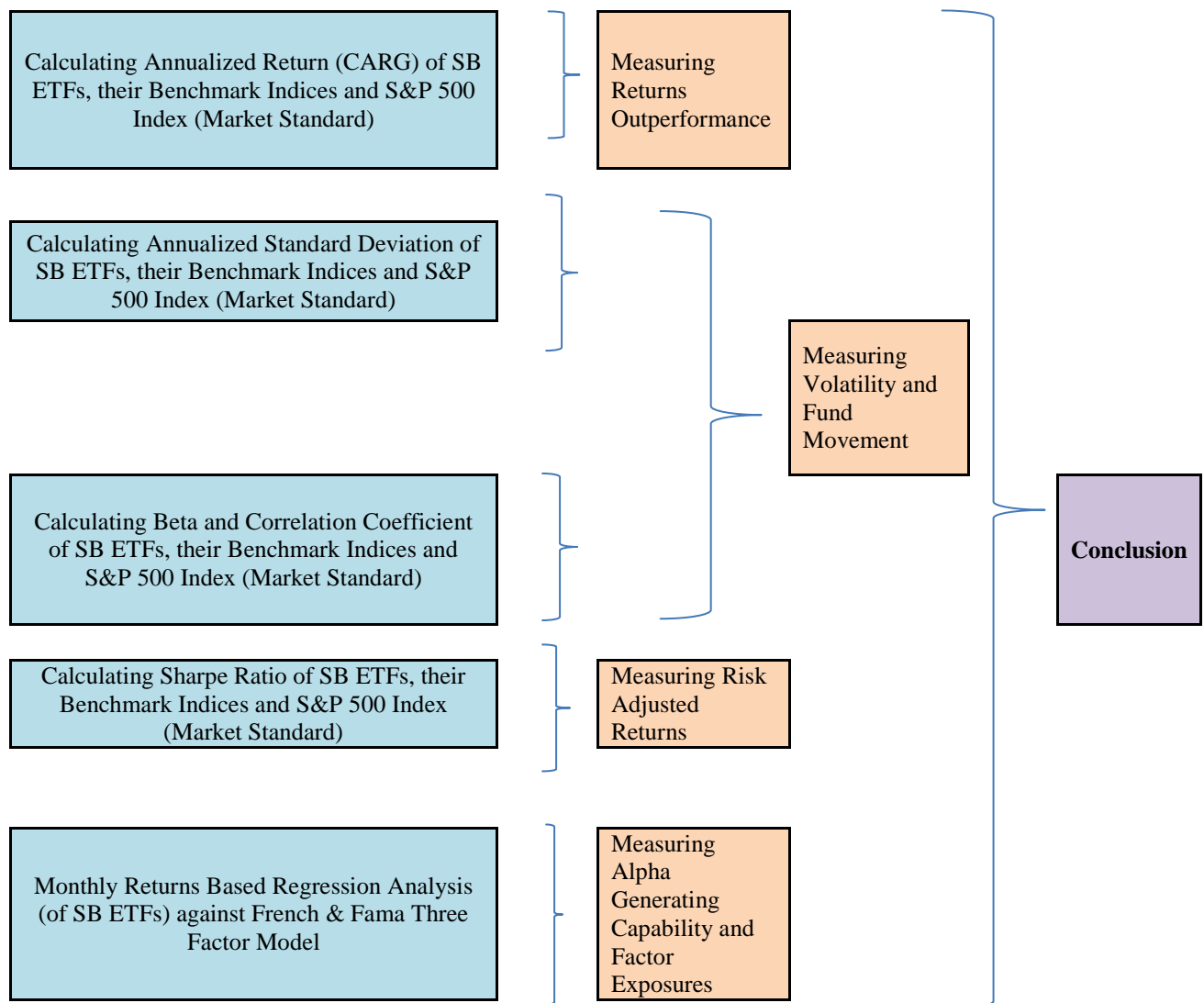
Name of the Smart Beta ETF	Ticker	Smart Beta Bench Mark	Market Value in \$billion.
iShares Select Dividend ETF (by BlackRock)	<b>DVY</b>	Dow Jones US Select Dividend Index <sup>SM</sup>	<b>15.56</b>
SPDR S&P Dividend ETF (by STATE STREET)	<b>SDY</b>	S&P High Yield Dividend Aristocrat Index	<b>14.03</b>
Guggenheim S&P 500 Equal Weighted ETF	<b>RSP</b>	S&P 500 Equal Weighted Index	<b>10.14</b>
PowerShares BuyBack Achievers Portfolio	<b>PKW</b>	S&P 500 Index	<b>2.73</b>
First Trust Health Care AlphaDEX Fund	<b>FXH</b>	StrataQuant Health Care Index	<b>2.57</b>
First Trust Consumers Staples AlphaDEX Fund	<b>FXG</b>	StrataQuant Consumer Staples Index	<b>2.09</b>
First Trust Consumers Discretionary AlphaDEX Fund	<b>FXD</b>	StrataQuant Consumer Discretionary Index	<b>1.91</b>
PowerShares Dynamic Pharmaceuticals Portfolio	<b>PJP</b>	S&P Pharmaceuticals Select Index	<b>1.47</b>
SPDR S&P Homebuilders ETF (by STATE STREET)	<b>XHB</b>	S&P Homebuilders Select Industry Index	<b>1.42</b>

#### **4.2 Research Analysis Map:**

The Research Analysis Map below shows the step by step procedures will be carried out with sample data to reach the conclusion, and the conclusion drawn from the analysis part would eventually answer the research questions and would also be able to prove the research hypothesis.

Starting from Calculating the Annual return of the SB ETF and their respective benchmark Indices and the same would be compared with the Annual return of the S&P 500 Index. And the second step would be measuring the volatility of the of the samples, when we talk about the measuring of volatility there are many ways this can be measured with the help of calculating Standard deviation, Beta and Correlation of the SB ETFs and their respective benchmarks indices. Simultaneously volatility of the S&P 500 Index will also be measured. Followed by the calculation of the Sharpe ratios to the SB ETFs, Benchmark Indices and the S&P 500 Index this helps to measure the risk adjusted return of the SB ETF funds and their respective benchmarks as well as the S&P 500 Index. And finally carrying out the return based regression analysis with the help of French & Fama 3 factor model; this would give the alpha generated by the particular fund and its exposure to the factors in the given period of time which is the actual excess return generated by that particular fund.

## Research Analysis Map



The reason behind the implementation of all the analysis for the S&P 500 Index as well, along with the SB ETFs and their respective indices is as follows. According to Us.spIndices.com (2015), the S&P 500 Index is widely regarded as the best single gauge of large cap US equities. There is over USD 7.8 trillion benchmarked to this index, with index assets comprising approximately USD 2.2 trillion of this totals. The index includes 500 leading companies and captures approximately 80% coverage of available market capitalization. This S&P 500 Index is considered to be best performing at times for the same reason that it consist of 500 leading companies and regarded as the faceoff benchmark for the overall performance of the US equity market. This is the reason behind analysing the S&P 500 along with the other SB ETF benchmark indices to identify whether the SB ETF Funds could practically outperform the S&P 500 Index. More importantly this S&P 500 Index is purely based on the market capitalization and the SB ETF funds outperforming this index will prove that the funds are not necessarily constructed based only on the market strategy, there can also be other factors apart from the market factor considered to construct these funds for their better performance.

Other terminology and methods mentioned in this research analysis map section will be explained in the following sections while working on the analysis part.

### 4.3 Calculating Annualized Return - Compound Annual Growth Rate (CARG):

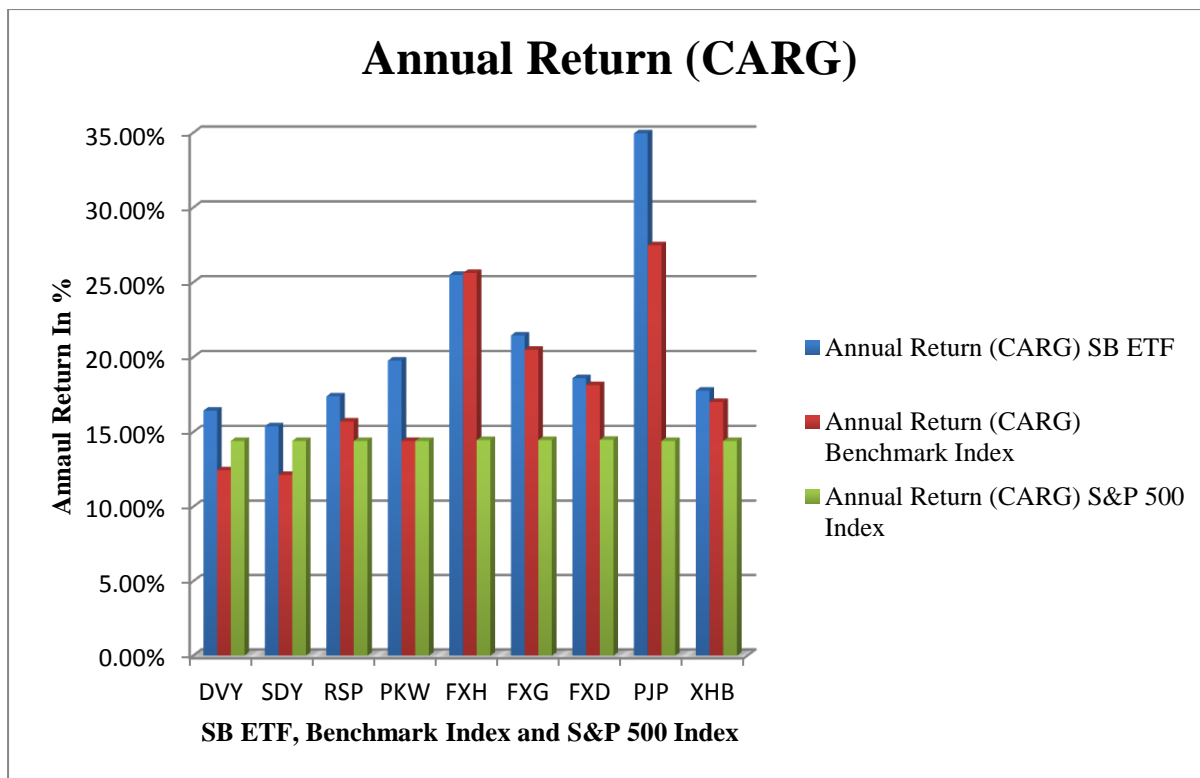
This is the first and foremost part of the research analysis as mentioned in the research analysis map. Let the researcher start this by explaining what is CARG and how it can be calculated.

**CAGR (Compound Annual Growth Rate)** – Annual return calculated based on each year’s previous balances where each previous balance includes both the original principal and all interest accrued from prior years. CAGR can be calculated using the formula  $(\text{Ending value}/\text{Beginning value})^{1/n} - 1$  where n is the length of time of the investment in years. (TheFreeDictionary.com, 2015)

**Table 4: Annualized Return (CAGR)**

Name of the Smart Beta ETF	Ticker	Smart Beta Bench Mark	Annual Return (CARG) SB ETF	Annual Return (CARG) Benchmark Index	Annual Return (CARG) S&P 500 Index
iShares Select Dividend ETF (by BlackRock)	DVY	Dow Jones US Select Dividend IndexSM	16.43%	12.45%	14.40%
SPDR S&P Dividend ETF (by STATE STREET)	SDY	S&P High Yield Dividend Aristocrat Index	15.38%	12.14%	14.40%
Guggenheim S&P 500 Equal Weighted ETF	RSP	S&P 500 Equal Weighted Index	17.38%	15.70%	14.40%
PowerShares BuyBack Achievers Portfolio	PKW	S&P 500 Index	19.77%	14.40%	14.40%
First Trust Health Care AlphaDEX Fund	FXH	StrataQuant Health Care Index	25.51%	25.62%	14.47%
First Trust Consumers Staples AlphaDEX Fund	FXG	StrataQuant Consumer Staples Index	21.46%	20.49%	14.47%
First Trust Consumers Discretionary AlphaDEX Fund	FXD	StrataQuant Consumer Discretionary Index	18.60%	18.13%	14.48%
PowerShares Dynamic Pharmaceuticals Portfolio	PJP	S&P Pharmaceuticals Select Index	34.96%	27.47%	14.40%
SPDR S&P Homebuilders ETF (by STATE STREET)	XHB	S&P Homebuilders Select Industry Index	17.77%	17.01%	14.40%

This CAGR has been used in this part of calculating annual return is to get exact annual return of the SB ETFs, Benchmark Indices and the S&P 500 Index for the purpose of accuracy in the analysis. The table above shows the annual return (CARG) of the SB ETFs, Benchmark Indices and the S&P 500 Index along with the name of the SB ETFs with ticker and respective Benchmark Indices for the time period of 5 years starting from 1<sup>st</sup> of June 2010 to 31<sup>st</sup> of May 2015. The graphical representation of the CAGR table has been shown in the form of chart for better understanding.



What exactly is Annual Return (CAGR) chart tells us about? Like it is marketed that SB ETFs are better performers in terms of its return to its investors than the passive index funds as the passive index funds just replicates its benchmark and there are no way that it could outperform its benchmark index. The chart clearly explains about how the SB ETFs has outperformed its benchmark index as well as the S&P 500 Index. From 8 out of 9 samples except First Trust Health Care AlphaDEX Fund (FXH) with StrataQuant Health Care Index as its benchmark index, we have taken for the analysis has outperformed its respective benchmark index starting with minimum of 0.47% excess return than its benchmark index (StrataQuant Consumer Discretionary Index) in the case of First Trust Consumers Discretionary AlphaDEX Fund (FXD). And with maximum of 7.49% excess return than its benchmark index (S&P Pharmaceuticals Select Index) in the case of PowerShares Dynamic Pharmaceuticals Portfolio (PJP). Both the benchmarks of the above mentioned funds have also fetched excess return than the S&P 500 Index by 3.65% and 13.07% (wow! That's a huge number) respectively.

Now let us look in this way of average annual returns of all the samples, benchmarks and the S&P 500 Index. The average annual return from sample SB ETFs is 20.81% and the average annual return from the benchmark indices is 18.16% and the average annual return from the S&P 500 index is 14.43%. This explains us that the sample SB ETFs have beaten or outperformed or fetched an excess return of 2.65% with 20.81% as average annual return when compared to the average annual return of the benchmarks indices with 18.16%. If we see the difference in the average annual return between the benchmark indices and the S&P 500 Index is 3.73% and more surprisingly the difference in the average annual return between the sample SB ETFs and the S&P 500 Index is 6.38%, and that's 6% higher returns than the market standards. At this point all the researcher could say is that the SB ETFs have definitely outperformed its benchmark indices and S&P 500 Index in terms of returns.

#### 4.4 Calculating Annualized Standard Deviation (SD) ( $\sigma$ ):

The next step to this research analysis map is calculating Annualized standard Deviation. First let the researcher explain about the Standard Deviation itself.

**Standard Deviation (SD)** denoted by the symbol  $\sigma$  (sigma) is a measure of how much an investment's return can vary from its average return. It is a measure of volatility and in turn, risk. In other words Standard Deviation is applied to the annual rate of return of an investment to measure the investment's volatility. Standard Deviation is calculated as the square root of variance. (Investinganswers.com, 2015), (Investopedia, 2003)

The above mentioned definition of SD can be explained elaborately for better understanding and how it actually helps in this research. According to the authors while explaining about the SD, is a measure of risk that an investment will not meet the expected return in a given period. The smaller an investment's SD, the less volatile it is. The larger the SD, the more dispersed those returns are and thus the riskier the investment is. In other words, SD is also known as the historical volatility and is used by investors as a measure for the amount of expected volatility. Similar to mentioned earlier, a volatile stock will have a high SD while the low volatile stock will have low SD. A large dispersion tells us how much the return on the fund is deviating from the expected normal returns. Note, however, the SD is not the only measure to identify the volatility or the risk associated with the investment.

While talking about computing the actual SD there is few steps that should be carried out before. Starts from calculating the Mean, which is the simple average of the return for the entire population of data. The next step is to calculate the variance,

**Variance** is a measure of the spread between numbers in a data set. The variance measures how far each number in the set is from the mean. Variance measures the variability (volatility) from an average or mean, and volatility is a measure of risk. A variance value of zero indicates that all values within a set of numbers are identical; all variance that are non-zero will be positive numbers. A large variance indicates that numbers in the set are far from the mean and each other while a small variance indicates the opposite (Radcliffe, 2003).

As mentioned in the methodology part of this research that most of the data analysis part has been carried out in MS Excel to reduce the time consumption and for simplicity, therefore to calculate the variance formula is available in the MS Excel itself, all you have to do is, set the cell range to which variance has to be calculated (Variance is calculated on the returns of the fund, and the returns can be calculated using the simple and generally known formula (Today's close price – Yesterday's close price)/ Yesterday's close price) or by simply taking natural log (LN or ln) of Today's close price and Yesterday's close price)(close price = Adjusted close price) and simply apply the formula, and you got the variance for the entire population. As it is mentioned above, SD is the square root of the variance, as the researcher have already calculated the variance using the formula in the MS Excel now SD can be simply calculating by taking square root of it.

**NOTE:** the SD we have calculated is the daily SD as we have calculated variance for the returns of daily price data for the 5 years starting from 1<sup>st</sup> of June 2010 to 31<sup>st</sup> of May 2015, to calculate the Annualized SD, the researcher have multiplied the daily SD with the square root of 250 (average number of trading days in a year). This gives the Annualized SD and the reason behind using the

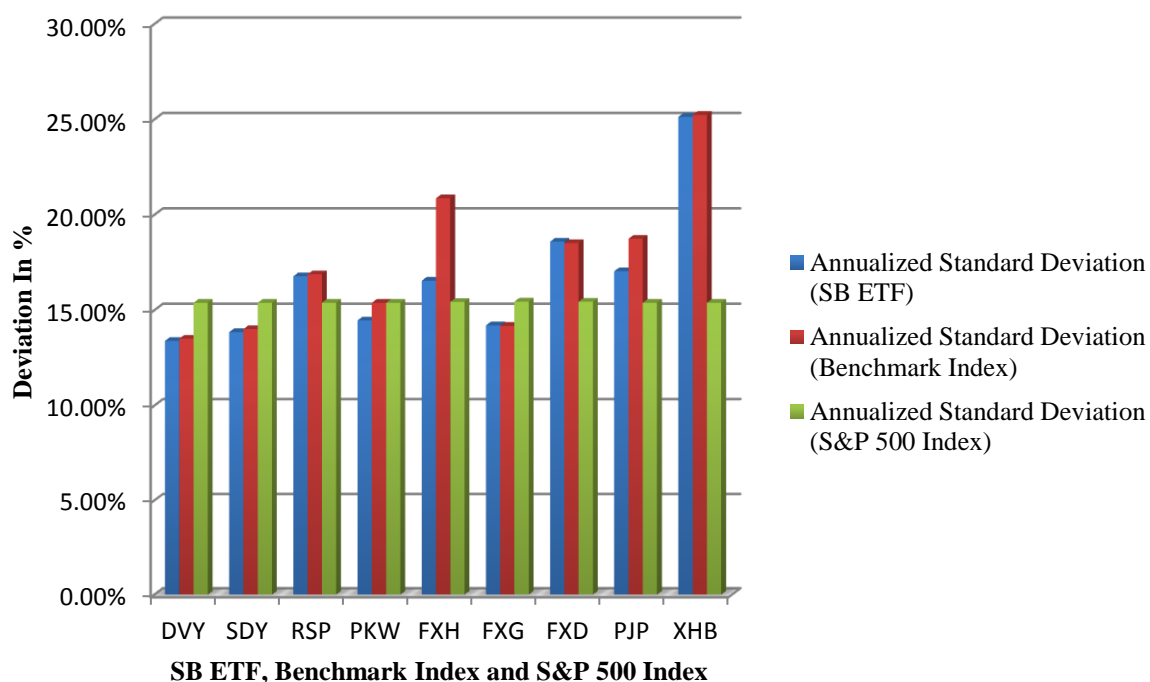
Annualized SD is to get the better clarity as the daily SDs are very small numbers and cannot explain things very clearly because of the huge population of data. And it makes sense when compared with the annual returns of the SB ETFs and their respective benchmark indices. The same applicable for calculating the Annualized Variance, multiplied the daily Variance with the square root of 250 (average number of trading days in a year) which gives you the Annualized Variance.

**Table 5: Shows the Mean, Annualized Variance and Annualizes SD of the SB ETFs, Benchmark Indices and the S&P 500 Index.**

Ticker	SB ETFs			Benchmark Indices			S&P 500 Index		
	Mean	Annualized variance	Annualized SD	Mean	Annualized variance	Annualized SD	Mean	Annualized variance	Annualized SD
DVY	0.0609%	0.11%	13.40%	0.0469%	0.12%	13.50%	0.0538%	0.15%	15.39%
SDY	0.0572%	0.12%	13.85%	0.0458%	0.12%	14.01%	0.0538%	0.15%	15.39%
RSP	0.0641%	0.18%	16.78%	0.0583%	0.18%	16.88%	0.0538%	0.15%	15.39%
PKW	0.0722%	0.13%	14.47%	0.0538%	0.15%	15.39%	0.0538%	0.15%	15.39%
FXH	0.0909%	0.17%	16.55%	0.0912%	0.28%	20.87%	0.0540%	0.15%	15.44%
FXG	0.0778%	0.13%	14.20%	0.0746%	0.13%	14.18%	0.0540%	0.15%	15.45%
FXD	0.0682%	0.22%	18.59%	0.0667%	0.22%	18.52%	0.0541%	0.15%	15.44%
PJP	0.1199%	0.18%	17.04%	0.0971%	0.22%	18.75%	0.0538%	0.15%	15.39%
XHB	0.0654%	0.40%	25.14%	0.0628%	0.40%	25.24%	0.0538%	0.15%	15.39%

First let us see what the Variance the researcher has calculated can say from the above table. As it is mentioned in the definition of Variance, is the measure of volatility or the spread between the two numbers in a data set, in this case the two numbers would be the daily price change of the SB ETFs and daily basis point (bp) change in the SB ETF's benchmark indices and S&P 500 Index. For the better understanding and convenience the researcher has mentioned the Annualized Variance in terms of percentage, usually it will in numbers, a Variance value of 0 indicates that the set of numbers in the data are identical, higher the number higher the difference in the spread of the numbers or higher volatility or fluctuations. At this instance let us take the first SB ETF iShares Select Dividend ETF (by BlackRock) (DVY) as a sample, and the variance of 0.11% which is 0.0011 in number is a very small value, which is almost close to zero but not exactly zero. This shows that there is no much of sharp fluctuations in the price data and even if you observe the 5 years price data (available in Appendix), the price of this particular SB ETF have been gradually increasing from June 2010 with no any noticeable high price difference. Even the Variance of the other SB ETFs and their benchmark Indices and even the S&P 500 Index could not explain much except the fact that there is no much volatility as the numbers are very close to zero.

## Annualized Standard Deviation



The Annualized SD tells us the different story indeed though it is derived from the variance. Initially we see the connections between the SB ETFs and their benchmark Indices in terms of Annualized SD. Out of all the samples, each SB ETF have different Annualized SD but they are very closely related or similar to their benchmark indices except one or two will little difference. This can be seen from the above chart and can be explained in detail with the help of the table below.

**Table 6: Annualizes SD of the SB ETFs, Benchmark Indices and the S&P 500 Index.**

Name of the Smart Beta ETF	Ticker	SB ETFs	Benchmark	SB ETF & Benchmark	S&P 500
		Annualized SD	Annualized SD	Difference	Annualized SD
iShares Select Dividend ETF (by BlackRock)	DVY	13.40%	13.50%	0.11%	15.39%
SPDR S&P Dividend ETF (by STATE STREET)	SDY	13.85%	14.01%	0.16%	15.39%
Guggenheim S&P 500 Equal Weighted ETF	RSP	16.78%	16.88%	0.10%	15.39%
PowerShares BuyBack Achievers Portfolio	PKW	14.47%	15.39%	0.92%	15.39%
First Trust Health Care AlphaDEX Fund	FXH	16.55%	20.87%	4.32%	15.44%
First Trust Consumers Staples AlphaDEX Fund	FXG	14.20%	14.18%	-0.03%	15.45%
First Trust Consumers Discretionary AlphaDEX	FXD	18.59%	18.52%	-0.08%	15.44%
PowerShares Dynamic Pharmaceuticals Portfolio	PJP	17.04%	18.75%	1.70%	15.39%
SPDR S&P Homebuilders ETF (by STATE STREET)	XHB	25.14%	25.24%	0.10%	15.39%

It can be seen that there is not much of difference between the Annualized SD of the SB ETFs and their benchmark Indices except one or two. With notable difference of 4.32% and 1.70% in the case of First Trust Health Care AlphaDEX Fund (FXH) and PowerShares Dynamic Pharmaceuticals Portfolio (PJP) respectively. And this percentage of difference shows that their benchmark Index is 4.32% and 1.70% more volatile than the actual SB ETFs which is following them. Other samples are almost similar with a little or no difference between them and the difference ranges between 0.03% and 0.92%. This also shows that the SB ETFs closely follows their benchmark indices and the deviations in the benchmark have effect on the SB ETFs.

The SD also tells about the risk and return, the important aspect is that they are indicator of your investment's volatility and measures how much an investment's return can vary from its average return. It also varies from one SB ETF to other, here from the samples the Annualized SD varies between 13.40% and 25.14% from iShares Select Dividend ETF (by BlackRock) (DVY) with 13.40% to SPDR S&P Homebuilders ETF (by STATE STREET) (XHB) with 25.14%, can be seen from the table above. All these numbers are almost similar to their benchmark Indices as they are constructed in such way to closely follow or replicate the benchmarks. What eventually this SD says is that there are 13 to 25% chances that the samples fund return can vary from its average return, so as its benchmark Indices. This percentage of deviation may increase or decrease if we use more samples. Note: it is not necessary that all the samples may vary between 13 to 25% as each individual fund has their own SDs and this generalization of 13 to 25% has been made only for the illustration purpose of SDs variations in the samples.

Now what the market standard S&P 500 Index's SD says about the SDs of the SB ETF and their benchmark Indices? S&P 500 Index have the Annualized SD of 15.4% in average from the above table. Which is there are 15% chances that the S&P 500 Index's return vary from the average return of the same. Some of the SB ETFs have better SDs when compared to the S&P 500 Index namely iShares Select Dividend ETF (by BlackRock) (DVY), SPDR S&P Dividend ETF (by STATE STREET) (SDY), Guggenheim S&P 500 Equal Weighted ETF (RSP), PowerShares BuyBack Achievers Portfolio (PWK), and First Trust Consumers Staples AlphaDEX Fund (FXG), here in this situation why these SB ETF's SDs are said to be better? Because these funds have lesser percentage of deviations for example, if the fund performance goes down the returns may vanish by less than 15% where the S&P 500 Index's returns will vanish by 15% when the market turns down. When the market performs well the S&P 500 Index will have better returns, but risk associated with the losses during the bad times to be considered that's why the researcher said the above mentioned SB ETFs SD is better than the S&P 500 Index. The same will be applicable to rest of the SB ETFs which has higher SDs than the S&P 500 Index. Finally the SD is not about which investment is better, it is about the volatility and the risk associated with the particular investment.

#### 4.5 Calculating Beta ( $\beta$ ) and Correlation ( $\rho$ ):

Following the Variance and SD, Beta and Correlation is another method which is very useful to measure the volatility and movement of the particular investment. First will start with Beta (denoted by Greek letter  $\beta$  - Beta) followed by Correlation (denoted by Greek letter  $\rho$  - Rho).

**Beta ( $\beta$ )** - A measure of the volatility, or systematic risk, of a security or a portfolio in comparison to the market as a whole. Beta is used in Capital Asset Pricing Model (CAPM), a model that calculates the expected return of an asset based on its beta and expected market returns. Beta is calculated using the regression analysis, and you can think of beta as the tendency of a security's returns to respond to swings in the market (Russell, 2014).

How can Beta be measured? Beta is an expression of how volatile an investment is compared to the overall market. A beta of 1 indicates that the investment will move with the market. A beta of less than one means that the investment will be less volatile than the market. For example, if a stocks beta is 1.4, then it is assumed to be 40% more volatile than the market.

**Correlation ( $\rho$ )** - is also known as the Correlation Coefficient, which ranges between -1 and +1. Perfect positive Correlation (a correlation coefficient of +1) implies that as one security moves, either up or down, the other security will move in lockstep, in the same direction. Alternatively, perfect negative Correlation means that is one security moves in either direction the security that is perfectly negatively correlated will move in the opposite direction. If the Correlation is 0, the movement of the securities are said to have no correlation; they are completely random (Russell, 2014).

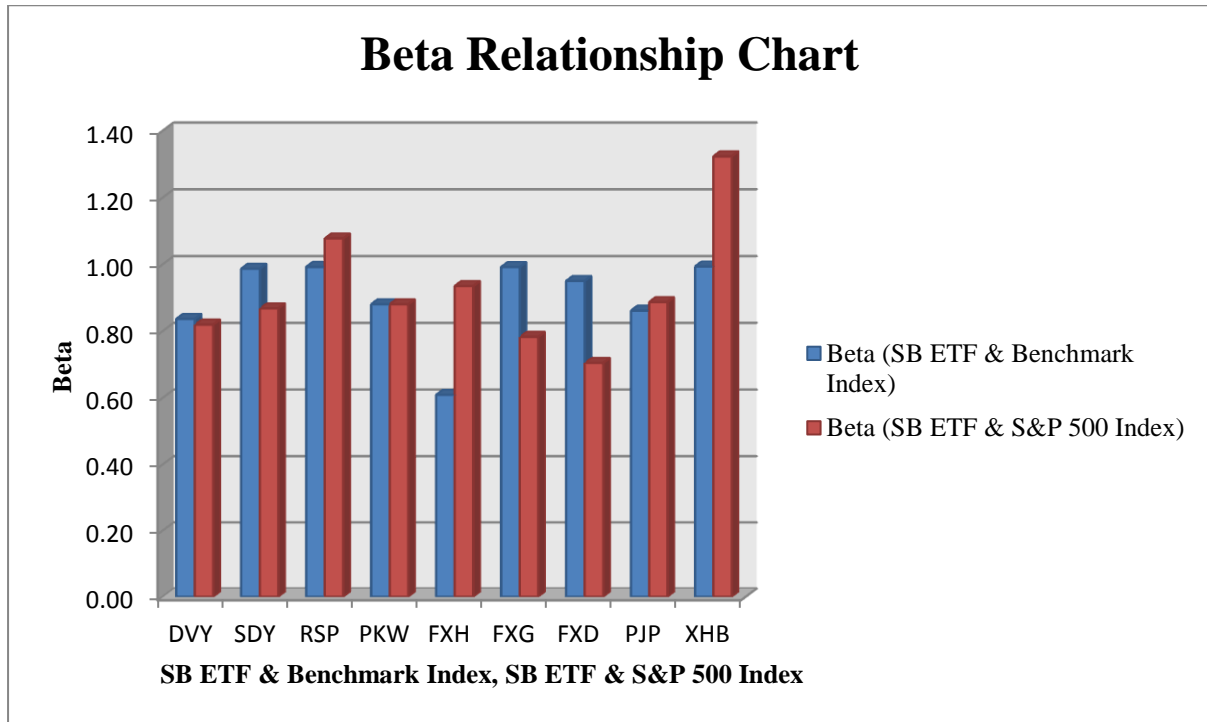
In other words, Correlation simply describes how two things are similar or dissimilar to each other. Specifically how two investments move in relationship to each other, how tightly they are linked or opposed? Higher Correlation theoretically means higher risk to the bottom line. The higher the Correlation of your investment the higher the gain or loss you get, in other words you have a great opportunity for gains or financial loss.

**Table 7: Shows the Beta and Correlation between SB ETFs & Benchmark Indices and SB ETFs & S&P 500 Index (market standard):**

Name of the Smart Beta ETF	Ticker	Smart Beta Bench Mark	SB ETF & Benchmark Index		SB ETF & S&P 500 Index	
			Beta ( $\beta$ )	Correlation ( $\rho$ )	Beta ( $\beta$ )	Correlation ( $\rho$ )
iShares Select Dividend ETF (by BlackRock)	<b>DVY</b>	Dow Jones US Select Dividend IndexSM	<b>0.84</b>	<b>0.84</b>	<b>0.82</b>	<b>0.94</b>
SPDR S&P Dividend ETF (by STATE STREET)	<b>SDY</b>	S&P High Yield Dividend Aristocrat Index	<b>0.99</b>	<b>1.00</b>	<b>0.87</b>	<b>0.96</b>
Guggenheim S&P 500 Equal Weighted ETF	<b>RSP</b>	S&P 500 Equal Weighted Index	<b>0.99</b>	<b>1.00</b>	<b>1.08</b>	<b>0.99</b>
PowerShares BuyBack Achievers Portfolio	<b>PKW</b>	S&P 500 Index	<b>0.88</b>	<b>0.94</b>	<b>0.88</b>	<b>0.94</b>
First Trust Health Care AlphaDEX Fund	<b>FXH</b>	StrataQuant Health Care Index	<b>0.61</b>	<b>0.78</b>	<b>0.94</b>	<b>0.87</b>
First Trust Consumers Staples AlphaDEX Fund	<b>FXG</b>	StrataQuant Consumer Staples Index	<b>0.99</b>	<b>0.99</b>	<b>0.78</b>	<b>0.85</b>
First Trust Consumers Discretionary AlphaDEX	<b>FXD</b>	StrataQuant Consumer Discretionary Index	<b>0.95</b>	<b>0.99</b>	<b>0.71</b>	<b>0.79</b>
PowerShares Dynamic Pharmaceuticals Portfolio	<b>PJP</b>	S&P Pharmaceuticals Select Index	<b>0.86</b>	<b>0.95</b>	<b>0.89</b>	<b>0.80</b>
SPDR S&P Homebuilders ETF (by STATE STREET)	<b>XHB</b>	S&P Homebuilders Select Industry Index	<b>0.99</b>	<b>1.00</b>	<b>1.32</b>	<b>0.81</b>

Before the researcher start on the Beta and Correlation he has already calculated for 9 samples and their benchmark Indices along with S&P 500 Index, he explains how he have actually calculated the results from the numbers (price data). As mentioned previously that, most of the data analysis part has been carried out in the MS Excel, to save time and to reduce complexity. Once we have calculated the daily returns ((today's close price – yesterday's close price) / yesterday's close price)(close price = Adjusted close price) of the 5 years price data of the SB ETF and Benchmark Index and S&P 500 Index. The Beta can be calculated using the slope formula in the MS Excel, just select the cell range to which the Beta has to be drawn and just apply the slope formula, the same applicable to the

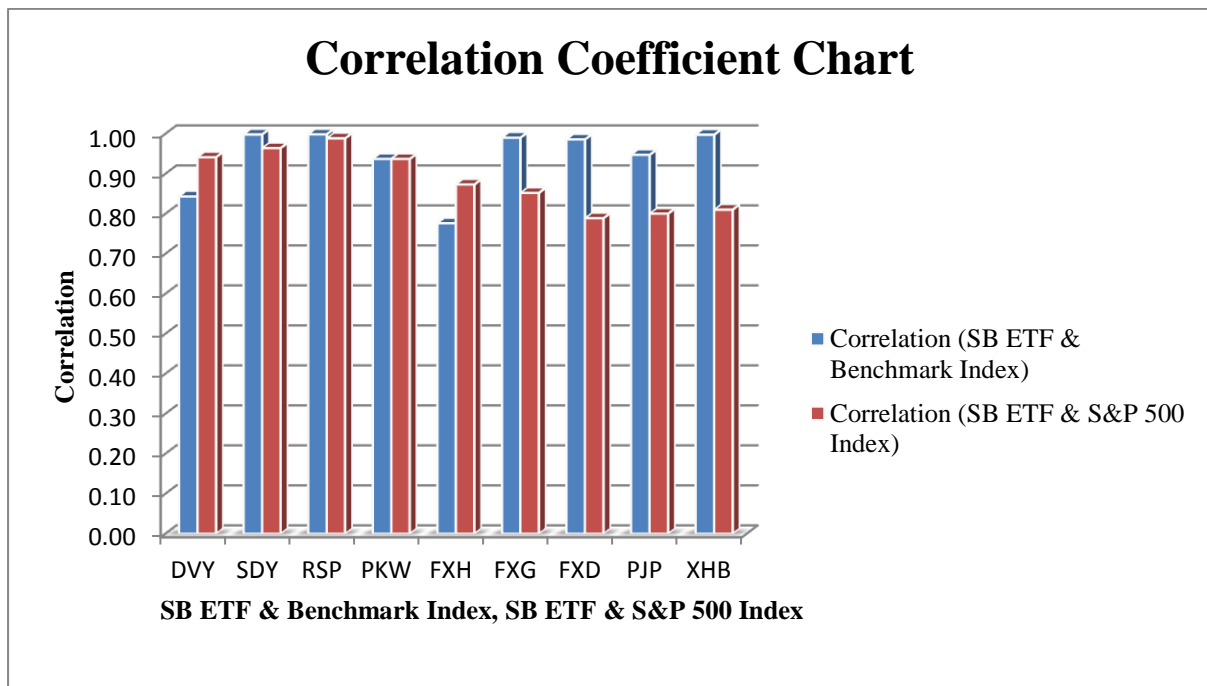
Correlation, in this case the Correlation has its own formula in MS Excel, just select the cell range and apply the formula. Note: while calculating Slope (Beta) or Correlation, remember it is a comparison of returns of two data sets, so the range selection should be made from both the price data of SB ETF as well as the Benchmark Index or SB ETF and S&P 500 Index. The result would give you the Beta and Correlation like shown in the above table.



The Chart above shows the beta of SB ETF and their bench mark Index in the blue line & beta of SB ETF and S&P 500 Index (market standard) in the brown line. First talking about the beta measurements of the SB ETFs and their benchmark Indices, surprisingly all the samples have beta value less than 1. From the definition above, the beta value less than 1 show that the SB ETFs are less volatile than their benchmark Indices as this beta values have been calculated between the SB ETFs and their benchmark Indices. On an average the sample SB ETFs are 10% less volatile than their benchmark Indices as all the beta value are less than 1 but not less than 0.84 except one, First Trust Health Care AlphaDEX Fund (FXH) has a beta value of 0.61 which is that SB ETF is 39% less volatile than its bench mark StrataQuant Health Care Index. This can also be explained as, when the benchmark Indices claim or fall by 10% there are chances that the SB ETFs may appreciate or depreciate by 9% in their value. But in the case of First Trust Health Care AlphaDEX Fund (FXH) it would be 6% as its beta value is 0.61 or the fund is 39% less volatile than its benchmark StrataQuant Health Care Index.

Now let me discuss, what the market, S&P 500 Index has impact on this SB ETFs. Not any less to my surprise all the SB ETFs beta value is less than 1 with S&P 500 Index except two of them, namely Guggenheim S&P 500 Equal Weighted ETF (RSP) with beta value 1.08 and SPDR S&P Homebuilders ETF (by STATE STREET) (XHB) withy beat value 1.32. More surprisingly, there is no much of a difference between the beta values of SB ETFs with their benchmark Indices & SB

ETFs with S&P 500 Index, which could be seen clearly from the table and the chart from above. Above all what this beta value of SB ETFs and S&P 500 shows? There will be an impact on these funds when there is a fluctuation in the market. Some changes in the market will have huge impacts up to 8% and 32% more volatility than the market in some funds like Guggenheim S&P 500 Equal Weighted ETF (RSP) and SPDR S&P Homebuilders ETF (by STATE STREET) (XHB) as they have high beta values. Even the rest of the funds from the samples will have some impact according to the beta values, but would be 8% lesser volatile than the market on average.



Following the beta relationship, now let's analyse the Correlation Coefficient of SB ETFs with their benchmark Indices and S&P 500 Index. The chart above clearly shows the Correlation Coefficient of SB ETFs with their benchmark Indices & SB ETFs with S&P 500 Index.

Let's have a quick recollection about what Correlation Coefficient can say about the fund movements from the above definition. Correlation simply describes how two things are similar or dissimilar to each other, which ranges between -1 and +1. Perfect positive Correlation of +1 implies that one security (In this case, SB ETFs with their benchmark Indices and S&P 500 Index) moves, either up or down, the other security will move in lockstep, in the same direction. Alternatively, perfect negative Correlation means that the one security moves in either direction the security that is perfectly negatively correlated will move in the opposite direction. If the Correlation is 0, the movement of the securities are said to have no correlation; they are completely random.

First, let's analyse the case of SB ETFs and their benchmark Indices. The table and the chart above clearly shows that all the SB ETFs from the sample are positively Correlated with their benchmark Indices. It is not that surprising as the SB ETFs are constructed in such a way that they are meant to follow or replicate their benchmarks Indices. Out of 9 samples, 3 samples, SPDR S&P Dividend ETF (by STATE STREET) (SDY), Guggenheim S&P 500 Equal Weighted ETF (RSP) and SPDR S&P Homebuilders ETF (by STATE STREET) (XHB) have perfect positive correlation of +1 with their

benchmark indices. 4 other samples, PowerShares BuyBack Achievers Portfolio (PKW), First Trust Consumers Staples AlphaDEX Fund (FXG), First Trust Consumers Discretionary AlphaDEX Fund (FXD) and PowerShares Dynamic Pharmaceuticals Portfolio (PJP) have correlation coefficient of +0.94, +0.99, +0.99 and +0.95 respectively. They can be considered as almost +1, that is perfect positive correlation with their benchmark Indices. This shows that this perfectly positive correlated SB ETFs move exactly in the same direction with their benchmark Index, either up or down, there won't be any other change in the movement of the funds; it will be exactly the same as their respective benchmark Indices.

In other words, funds movement is totally dependent on the movement of their benchmark Index. This can be advantage during the good time in the market at the same time this could be disaster when the market turns down during the bad times. Now we have 2 funds left at the samples, iShares Select Dividend ETF (by BlackRock) (DVY) and First Trust Health Care AlphaDEX Fund (FXH) with correlation coefficient of +0.84 and +0.78, surprisingly these two funds have lesser beta value of 0.84 and 0.61 respectively. This shows that these two funds are less volatile than the benchmark and also do not move exactly with the benchmark Index but in the same direction as benchmark Index because the value is not negatively correlated.

Secondly, the correlation coefficient between the SB ETFs and the S&P 500 Index, all of the SB ETF samples have positive correlation coefficient with the S&P 500 Index, which they all move in the same direction with the market either the market goes up or down. One more interesting finding from this observation is that the samples SB ETFs have good correlation coefficient with its benchmark Index as well as the S&P 500 Index. The following 4 funds, iShares Select Dividend ETF (by BlackRock) (DVY), SPDR S&P Dividend ETF (by STATE STREET) (SDY), Guggenheim S&P 500 Equal Weighted ETF (RSP), and PowerShares BuyBack Achievers Portfolio (PKW) have correlation of +0.94, +0.96, +0.99, +0.94 respectively, with the S&P 500 Index, which can be assumed as +1, a perfect positive correlation (which has already been explained above). And rest of the SB ETFs, First Trust Health Care AlphaDEX Fund (FXH), First Trust Consumers Staples AlphaDEX Fund (FXG), First Trust Consumers Discretionary AlphaDEX Fund (FXD), PowerShares Dynamic Pharmaceuticals Portfolio (PJP), and SPDR S&P Homebuilders ETF (by STATE STREET) (XHB) have correlation of +0.87, +0.85, +0.79, +0.80, +0.81 respectively, they all are positively correlated but not necessarily move exactly with the market but moves in the same direction as the market with lots of similarities.

#### 4.6 Calculating Sharpe Ratio (S):

The next step after calculating Beta and Correlation Coefficient in the research analysis map is calculation of Sharpe Ratio. The Sharpe Ratio is generally known as the measure of risk adjusted return.

The **Sharpe Ratio** is the measure of calculating risk adjusted return. This ratio is the average return earned in excess of the risk free rate per unit of volatility or total risk, subtracting the risk free rate from the mean return, the performance associated with risk taking activities can be isolated (Hayes, 2003).

The ratio describes how much excess return you are receiving for the extra volatility that you endure for holding a riskier asset. You always need to be properly compensated for the additional risk you take for not holding a risk free asset.

This Sharpe Ratio can be calculated using the formula as shown below

$$S(x) = \frac{(r_x - R_f)}{SD(x)} \dots \text{(Staff, 2007)}$$

Where,

X is Investment

S(x) is Sharpe Ratio of the Investment

$r_x$  is Average rate of return of x

$R_f$  is Rate of return of a risk free security (i.e., T-bill)

SD(x) is Standard Deviation of  $r_x$

The author explains about the numbers to be considered for this calculation, he says that the returns measured can be of any frequency (i.e., daily, weekly, monthly or annually) as long as they are normally distributed. In this case the researcher has already calculated the annual returns of the SB ETFs of the samples and would be considering the same annual return for this calculation. Further to his explanations, the author says that, traditionally the risk free rate of return is the shortest dated Government T-bill. As all the samples belongs to the US equity market and the research is also primarily on the US equity mark and would be considering 3 months or 90 days US Treasury Bill's Coupon rate as my risk free rate to be applied in this formula for calculating Sharpe Ratio. 3 months or 90 days US Treasury Bill's Coupon rate is '0' (Bloomberg.com, 2015). The Annualized SD which has been already calculated for the other apart of this research will be implied in this formula for calculating Sharpe ratio.

Eventually what is this Sharpe Ratio says about the investment? According to Investinganswers.com (2015) the higher the Sharpe ratio is, the more return the investor is getting per unit of risk. The lower the Sharpe ratio is, the more risk the investor is shouldering to earn additional return. Thus, the Sharpe ratio ultimately shows which investment is shouldering excessive risk among the group of investments you possess. A Sharpe ratio of greater than or equal to 1 is considered as good risk adjusted return, a Sharpe ratio of greater than or equal to 2 is considered as very good risk adjusted return, a Sharpe ratio of greater than or equal to 3 is considered as excellent risk adjusted return. What if a Sharpe ratio less than 1? A Sharpe ratio lower than 1, indicates that return on investment is less than the risk taken (Becker, 2012).

All the data like annual rate of return, risk free rate and Annualized SD, which is already been computed with the help of MS Excel, and the same has been utilized to compute the Sharpe ratios of SB ETFs, their benchmark Indices and the S&P 500 Index. The outcomes have been shown in the table below.

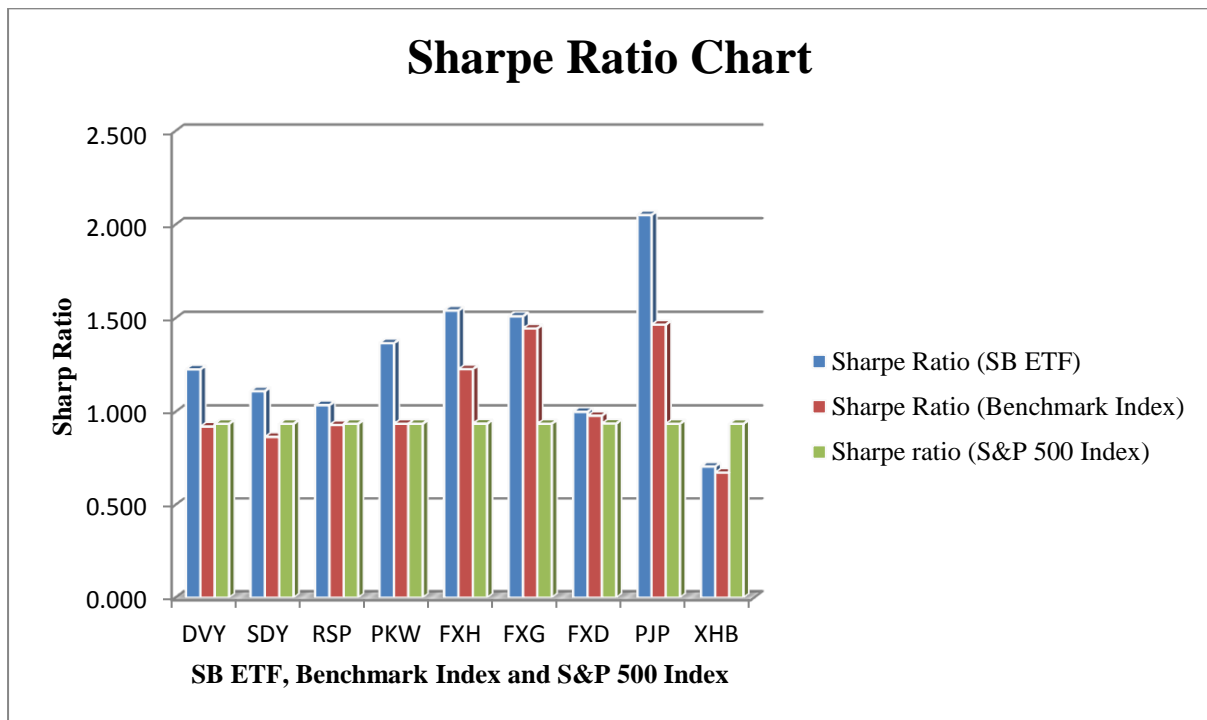
**Table 8: Shows the Sharpe Ratios of SB ETFs, their Benchmark Indices and S&P 500 Index:**

Name of the Smart Beta ETF	Ticker	Smart Beta Bench Mark	Sharpe Ratio (SB ETF)	Sharpe Ratio (Benchmark Index)	Sharpe ratio (S&P 500 Index)
iShares Select Dividend ETF (by BlackRock)	<b>DVY</b>	Dow Jones US Select Dividend IndexSM	<b>1.23</b>	<b>0.92</b>	<b>0.94</b>
SPDR S&P Dividend ETF (by STATE STREET)	<b>SDY</b>	S&P High Yield Dividend Aristocrat Index	<b>1.11</b>	<b>0.87</b>	<b>0.94</b>
Guggenheim S&P 500 Equal Weighted ETF	<b>RSP</b>	S&P 500 Equal Weighted Index	<b>1.04</b>	<b>0.93</b>	<b>0.94</b>
PowerShares BuyBack Achievers Portfolio	<b>PKW</b>	S&P 500 Index	<b>1.37</b>	<b>0.94</b>	<b>0.94</b>
First Trust Health Care AlphaDEX Fund	<b>FXH</b>	StrataQuant Health Care Index	<b>1.54</b>	<b>1.23</b>	<b>0.94</b>
First Trust Consumers Staples AlphaDEX Fund	<b>FXG</b>	StrataQuant Consumer Staples Index	<b>1.51</b>	<b>1.45</b>	<b>0.94</b>
First Trust Consumers Discretionary AlphaDEX	<b>FXD</b>	StrataQuant Consumer Discretionary Index	<b>1.00</b>	<b>0.98</b>	<b>0.94</b>
PowerShares Dynamic Pharmaceuticals Portfolio	<b>PJP</b>	S&P Pharmaceuticals Select Index	<b>2.05</b>	<b>1.47</b>	<b>0.94</b>
SPDR S&P Homebuilders ETF (by STATE STREET)	<b>XHB</b>	S&P Homebuilders Select Industry Index	<b>0.71</b>	<b>0.67</b>	<b>0.94</b>

The results above shows that all the SB ETFs from the sample has good risk adjusted returns because they all have Sharpe ratios greater than 1, except SPDR S&P Homebuilders ETF (by STATE STREET) (XHB) with Sharpe ratio of 0.71 which shows that the SB ETF return on investment is less than the risk taken, but still fetched a excess return of 0.76% than its benchmark Index and 3.36% than S&P 500 Index. Some of them have performed really well, for example PowerShares Dynamic Pharmaceuticals Portfolio (PJP) with Sharpe ratio of 2.05 which shows the fund has very good risk adjusted return of all the samples. In other words, the funds return on investment is way over than the risk taken. This particular fund has fetched an excess return of 7.49% than its benchmark Index and 20.59% than the S&P 500 Index (market standard), and that's really a good number. With this the researcher says that this SPDR S&P Homebuilders ETF (by STATE STREET) (PJP) is top performing out of all samples taken for analysis.

For the better understanding and comparison the researcher have also calculated the Sharpe ratios for the S&P 500 Index (market standard) and the benchmark indices followed by the sample SB ETFs which can be seen from the table above. Some of the benchmark indices have Sharpe ratios as good as the SB ETFs following them. Like StrataQuant Health Care Index, StrataQuant Consumer Staples Index, S&P Pharmaceuticals Select Index with Sharpe ratios greater than 1, which shows that even the benchmark Indices provides better risk adjusted returns and so as the SB ETFs following them. Rest of the SB ETFs in the samples have Sharpe ratios less than 1, but at the same time some of them are close and some are closer to 1. Like Dow Jones US Select Dividend IndexSM, S&P High Yield Dividend Aristocrat Index, S&P 500 Equal Weighted Index, StrataQuant Consumer Discretionary Index have Sharpe ratios 0.92, 0.87, 0.93, 0.98 respectively. This shows that they have less return on investments than the risk taken but not necessarily very less returns as they are close to 1. In the case of S&P Homebuilders Select Industry Index it can be said that they truly have less returns than the risk taken because of this Sharpe ratio 0.67 even the fund (SPDR S&P Homebuilders ETF (by STATE STREET) (XHB)) following the Index have less Sharpe ratio of 0.71. Other than this fund, it can be

confidently said that all the other SB ETFs in the sample have better risk adjusted return though some of their benchmark index don't. This can also be seen clearly from the chart shown below.



As mentioned earlier, the researcher has also calculated the Sharpe ratio for the S&P 500 Index (market standard) which you can see from the table and the chart above. This has been done to see whether the SB ETFs have better risk adjusted return than the market or not? We have already seen that 8 out of 9 from the samples that they have better return on investment than the risk taken. What market can provide instead? The S&P 500 has the Sharpe ratio of 0.94. This shows that they provide less return on investments than the risk taken but not necessarily very lesser return as they are close to 1. Overall this proves that the SB ETFs from the sample have Sharpe ratios well above 1 and some have 2 and they can provide better risk adjusted return than the market itself (or) The SB ETFs take same amount of risk as the market but give far better returns than the market (or) SB ETFs are less riskier investment for the type of return it provides to the investors.

#### 4.7 Returns & Factors Based Regression Analysis:

This Regression Analysis is the final and crucial step in my Research Analysis Map. The results are based on multiple linear regressions against monthly factor returns.

Before proceeding with this analysis, the researcher explains about the connection between the SB ETFs and the Three Factor Model and why this analysis is carried out and what this analysis is all about and how this analysis supports this research.

##### 4.7a French & Fama Three Factor Model:

Though already mentioned enough about this French & Fama three factor model in the literature part of this research, the researcher explains a little more about the same as this could help us to understand the clearer story behind this regression analysis.

“A factor model that expands on Capital Asset Pricing Model (CAPM) by adding size and value factors in addition to the market risk factor in CAPM” (Investopedia, 2003)

According to the author, this model considers the fact that value and small cap stocks outperform markets on regular basis. By including these two additional factors, the model adjusts for the outperformance tendency, which is thought to make it a better tool for evaluating performance. French & Fama attempted to better measure market returns and, through research, found that value stocks outperform growth stocks. Similarly, small cap stocks tend to outperform large cap stocks. As an evaluation tool, the performance of portfolios with a large number of small cap or value stocks would be lower than the CAPM results, as the three factor model adjusts downwards for small cap and value outperformance.

There is a lot of debate about whether the outperformance tendency is due to market efficiency or market inefficiency. On the efficiency side of the debate, the outperformance is generally explained by the excess risk that value and small cap stocks faces as a result of their higher cost of capital and greater business risk. On the inefficiency side, the outperformance is explained by market participants mispricing the value of these companies, which provides the excess return in the long run as the value adjusts.

In other words, the French & Fama model claims that all market returns can roughly be explained with by three factors: 1) exposure to the broad market (Mkt – RF), 2) exposure to the value stocks (HML), and 3) exposure to the small stocks (SMB) (Wesley R. Gray, 2011).

#### **4.7b Why this Returns based Regression Analysis?**

According to the authors Jason, Vitali and Brett (2010) the last few decades have seen the introduction of numerous evaluation methodologies that characterize portfolio performance and identify talented active managers. The simplest of these methodologies is return based regression analysis, such as the one predicted on the French & fama (1992, 1993) three factor model. With only return information, regression analysis can identify style tilts and estimated risk adjusted alphas for managers or the investors. But also regression analysis requires few inputs; it also provides insight into sources of performance.

#### **4.7c Connection and Purpose:**

SB ETFs are also known as strategically constructed funds to give maximum yield, return or dividend according to the purpose of construction. How they could do this? Because it is said that they are constructed not only based on the market factor, they also based on the value, size and other factors and takes advantage of the tilts. According to Tzee-man et al., (2011) each alternative beta strategy offers different performance advantages over the others, but none of them dominate in all categories. An alternative beta portfolio represents a mapping to the market, value and size factors – that is, the three French & Fama factors span the investment opportunity set for the alternative betas. Therefore they can generally be linearly combined with one another (and/or cash) to mimic each other.

We have 9 SB ETFs in the sample; from the annual return section we have found that they have generated higher returns than its benchmark indices and the S&P 500 Index (market standard). From this return based regression analysis the researcher is going to find out whether they provide any excess return (Alpha) in relation to the size and value factor apart from market factor. This return based regression analysis will be carried out on the monthly return basis of the SB ETFs and the factor model. From this analysis the researcher could find out the capability of SB ETFs, in generation of Alpha in relation to the French & Fama three factors and if at all they could successfully generate

the Alpha, from where the Alpha came from (i.e., from which factor? as they are said to be constructed strategically to take advantages of different factors to generate Alpha).

#### 4.7d Collecting Data and Analysis:

Like the authors Jason, Vitali and Brett (2010) said above, that regression analysis requires few inputs. What those inputs are? The returns based regression analysis requires monthly risk adjusted returns of the SB ETFs, monthly risk adjusted returns of Market, Size risk and Value risk factors for the time period we would like to run the regression analysis, in this case that would be the period of 5 years starting from 1<sup>st</sup> of June 2010 till 31<sup>st</sup> of May 2015. We already have the monthly price data of SB ETFs which can be simply downloaded from the websites like Google finance and Yahoo Finance which have explained in the data collection part of this research and have also explained how to calculate returns in calculating variance and Beta part of this research, the only difference would be, they are daily price data and will be calculating daily returns and this would be monthly price data and will be calculating monthly returns. Following that subtract the monthly returns from the risk free rate would give you the monthly risk adjusted return of the SB ETFs.

Where we would get the monthly risk adjusted returns of Market, Size risk and Value risk factors? Ken.French is doing some great public service, they calculated all the factor values and posted in their website<sup>2</sup> (find in the footnote) starting from 1926 to till date as a downloadable file so any interested person could download and use it, the file also provides the monthly risk free rate for every particular time period (daily, weekly, monthly and early) which can be used for monthly risk adjusted return calculations of SB ETFs. And the factors data from the Ken.French website will look something like shown below.

#### Example Data: French & Fama Three Factor Model

Date	Mkt-RF	SMB	HML	RF
201505	1.36	0.92	-1.89	0
201504	0.59	-2.98	2.1	0
201503	-1.12	3.11	-0.74	0
201502	6.13	0.52	-2.14	0
201501	-3.11	-0.66	-3.11	0
201412	-0.06	2.6	1.52	0
201411	2.55	-2.14	-3.42	0
201410	2.52	4.17	-1.89	0
201409	-1.97	-3.8	-1.61	0
201408	4.23	0.49	-0.75	0
201407	-2.04	-4.28	0.01	0
201406	2.61	2.99	-0.66	0
201405	2.06	-1.87	-0.38	0

Where,

**Mkt – RF:** Return on value weighted CRSP Index (all US Index) minus Risk Free rate

<sup>2</sup> [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

**SMB:** Long/Short portfolio between small and big stocks which is meant to capture exposure to small Size risk

**HML:** High minus Low and this is a Long/Short portfolio that meant to capture Value risk (Value = Book to Market. So, it is high book to market stocks minus low book to market stocks after controlling for size)

**RF:** Risk Free Rate

Compiling all the data mentioned above next is to proceed with the regression analysis. This regression analysis requires a special data analysis add-on in the MS Excel, which is available online and free to access. With the help of the data analysis add-on we can easily do this multifactor returns based regression analysis. It will ask for only two input, which is in Y axis (variable data) and in X axis (constant data). Feeding risk adjusted return data of SB ETFs in the Y axis and risk adjusted return of Market, Size risk and Value risk factors in the X axis will give an output as shown below.

**Regression Analysis  
SUMMARY OUTPUT:  
PowerShares Dynamic  
Pharmaceuticals Portfolio  
(PJP)**

<i>Regression Statistics</i>	
Multiple R	0.7902038
<b>R Square</b>	<b>0.6244221</b>
Adjusted R Square	0.6043018
Standard Error	0.0245615
Observations	60

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<b>Significance F</b>
Regression	3	0.056166284	0.018722	31.03452	<b>5.9643E-12</b>
Residual	56	0.033782943	0.000603		
Total	59	0.089949227			

	<b>Coefficients</b>	<i>Standard Error</i>	<i>t Stat</i>	<b>P-value</b>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Alpha (Monthly)	<b>1.4%</b>	0.00353233	3.918204	<b>0.000245</b>	0.006764281	0.0209165	0.0067643	0.0209165
Beta wrt Mkt-RF	<b>0.0076431</b>	0.001018147	7.506848	<b>5.03E-10</b>	0.005603483	0.0096827	0.0056035	0.0096827
Beta wrt SMB	<b>0.0014981</b>	0.001771611	0.845632	<b>0.401357</b>	0.002050832	0.0050471	-0.002051	0.0050471
Beta wrt HML	<b>-0.0062577</b>	0.001850244	-3.38211	<b>0.001318</b>	0.009964211	0.0025512	-0.009964	-0.002551

#### 4.7e Interpreting Regression Analysis Summary Output:

The regression analysis summary output can be interpreted with the help of just four values like highlighted in the above example. What are those highlighted values and what they eventually say is explained in the following sections.

**R Square**, usually represented as  $R^2$ , is a technique that evaluates the statistical relationship between two series of events. It is commonly used to describe the portion of a security's movement in the market relative to the movement of a related index (Investinganswers.com, 2015).

According to Morningstar.com (2015), R square measures the relationship between a portfolio and its benchmark. It can be thought of as a percentage from 1 to 100. R Square is not a measure of performance of a portfolio; a great portfolio can have a very low R Square value. It is simply a measure of the correlation of the portfolio's returns to the benchmark's returns.

##### General range for R Square:

- 70-100% = good correlation between the portfolio's returns and the benchmark's returns
- 40-70% = average correlation between the portfolio's returns and the benchmark's returns
- 1-40% = low correlation between the portfolio's returns and the benchmark's returns

An R square of 100 indicates that all movements of a portfolio can be explained by movements in the benchmark. Conversely, a low R square indicates that very few of the portfolio's movements can be explained by movements in its benchmark Index. R Square can be used to ascertain the significance of a particular beta or alpha. Generally, a high R Square will indicate a more useful beta figure. If the R Square is lower, then the beta is less relevant to the fund's performance.

Note: In this case this R Square value will give Correlation between the risk adjusted return of SB ETF (in Y axis) and the French & Fama Three Factor Model (in X axis)

**Significance F** or an F statistics is a value you get when you run an ANOVA test or a regression analysis to find out the mean between two populations are significantly different. It's similar to a T statistic from a T-Test; A T-Test will tell you if a single variable is statically significant and an F-Test will tell you if a group of variables are jointly significant (Statistics How To, 2015).

Simply put, if you have significant results, it means that your results likely did not happen by chance. If you do not have statistically significant results, you just through your data out as it don't show or prove anything. Generally the Significance F value of 0.00 shows that there is greater than 99.9% certainty that the difference did not occur by chance. Lower the Significance F value higher the certainty of no occurrence by chance.

The **P Value** is the probability of seeing a result as extreme as the one you are getting in a collection of random data in which the variable had no effect (Dss.princeton.edu, 2015).

A P Value of 5% or less is the generally accepted point at which to reject the null hypothesis. With a P Value of 5% (or 0.05) there is only 5% chance that results you are seeing would have come up in a random distribution, so you can say with a 95% probability of being correct that the variable is having some effect, assuming your model is specified correctly.

The 95% confidence interval for your coefficients shows by many regression packages gives you the same information. You can be 95% confident that the real, underlying value of the coefficient that you are estimating falls somewhere in that 95% confidence interval, so if the interval does not contain 0, your P Value will be 0.05 or less.

**Coefficients** - In simple or multiple linear regression, the size of the coefficient for each independent variable gives you the size of the effect that variable is having on your dependent variable, and the sign of the coefficient (positive or negative) gives you the direction of the effect. In regression with a single independent variable, the coefficient tells you how much the dependent variable is expected to increase (if the coefficient is positive) or decrease (if the coefficient is negative) when that independent variable is increases by one. In regression with multiple independent variables, the coefficient tells you how much the dependent variable is expected to increase when that independent variable increases by one, holding all the other independent variables constant (Dss.princeton.edu, 2015).

Conducting this returns based regression analysis with the French & Fama Three Factor Model and the SB ETFs will give the summary output like shown above for every SB ETF in the sample of 9. Taking out important numbers (like explained above) for the interpretation and made a table for better presentation as shown below.

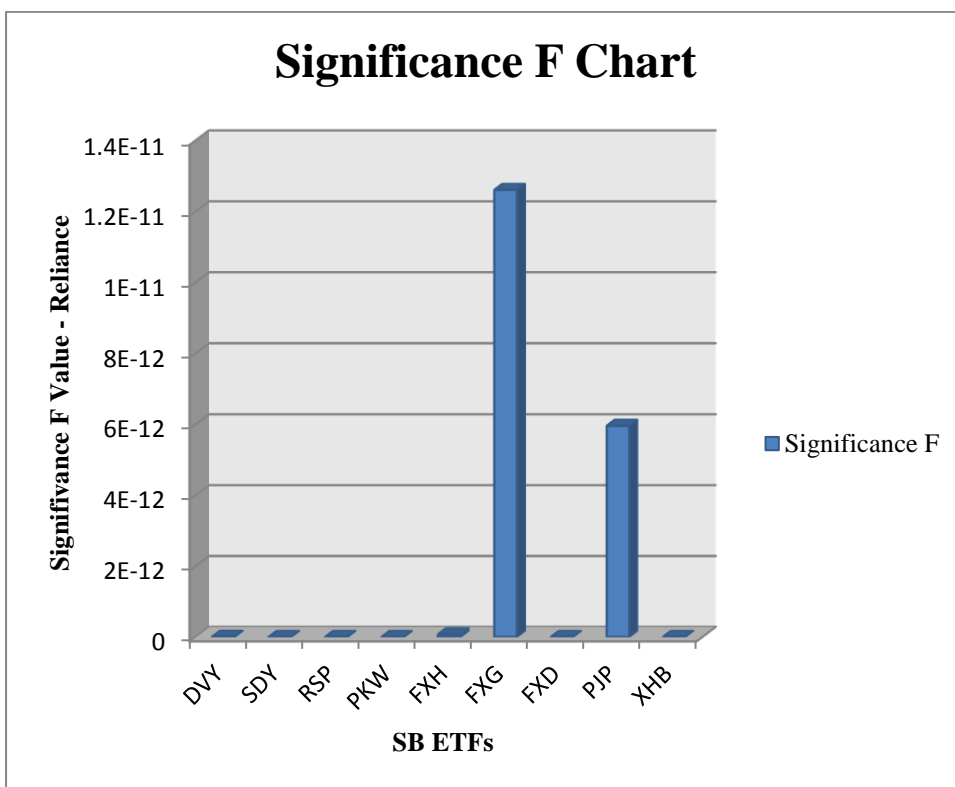
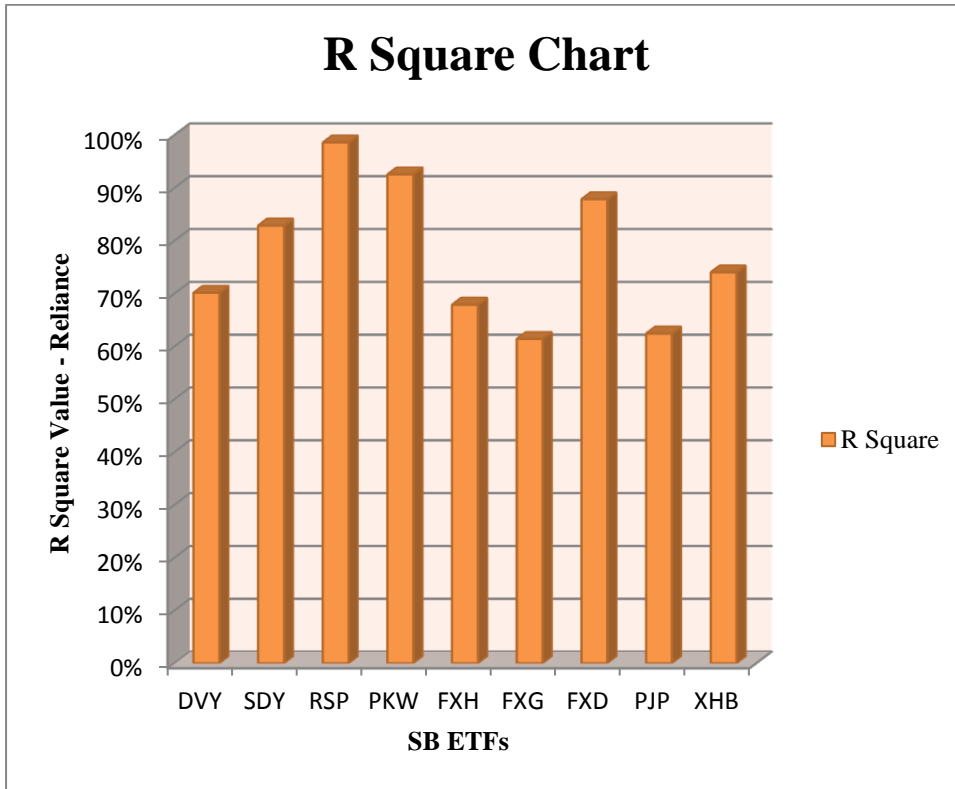
**Table 9: Regression Analysis Results (SB ETFs & Three Factor Model)**

Ticker	R Square	Significance F	Alpha	P Value	Beta wrt Mkt-RF	P Value	Beta wrt SMB	P Value	Beta wrt HML	P Value
DVY	70%	1.00898E-14	0.4816%	0.046563718	0.006365039	0.004998744	0.000262123	0.002115277	0.001844456	0.000638465
SDY	83%	1.85738E-21	0.1923%	0.319170612	0.007656116	8.85192E-20	4.21126E-05	0.965150053	0.000175984	0.861235682
RSP	99%	5.03283E-52	-0.0106%	0.880342187	0.010476736	3.92692E-49	0.000796146	0.026768554	0.000602182	0.105063974
PKW	93%	1.40256E-31	0.2897%	0.049121271	0.009257001	1.58437E-29	0.000225338	0.75627714	0.000936611	0.219670611
FXH	68%	7.59941E-14	0.9051%	0.006390652	0.006890907	5.47716E-10	0.004293744	0.009646548	0.004256546	0.013744748
FXG	61%	1.26113E-11	0.6527%	0.050505708	0.007465127	1.00658E-10	0.000344328	0.83426004	0.001206921	0.483403149
FXD	88%	1.27522E-25	-0.1009%	0.6939618	0.011559577	3.3769E-22	0.003200172	0.015312888	0.001679568	0.213923662
PJP	62%	5.9643E-12	1.3840%	0.000245081	0.007643077	5.02925E-10	0.001498131	0.401356879	0.006257726	0.001317776
XHB	74%	2.10277E-16	-0.1518%	0.758886456	0.012665744	2.3429E-12	0.006989233	0.006417654	0.001403768	0.588185204

First, Let us start by analysing the R Square (Correlation) and the Significance F, for the samples & Three Factor Model because this will show us the analysis carried out are in right track and the results are appropriate. Like it is mentioned earlier, the R Square will show the correlation percentage of the SB ETFs returns are likely based on the Three Factor Model. And the Significance F will show that the results are not happened by chance.

From the samples, 6 out of 9 SB ETFs have good correlation with the Three Factor Model, which is over 70%, and the rest have average correlation with the Three Factor Model, as it falls between 40 – 70%. Especially these two funds Guggenheim S&P 500 Equal Weighted ETF (RSP) and PowerShares BuyBack Achievers Portfolio (PKW) have correlation percentage of 99% and 93%, which shows that

99% and 93% movements of the SB ETF can be explained by movements in the Three Factor Model respectively. And even all the Significance F value shows that the results are not happened by chance as all the Significance F values are 0 and the variables are 99.9% statically significance. The R Square and Significance F results for all the SB ETFs have been shown in the charts below for better understanding and interpretation.



Following the Correlation and Significance F, now let us see the Alpha generating capability of the SB ETFs against this broad market return, size risk and value risk factors. And the results are surprising as you could have seen them in the table above. For the purpose of explanation the researcher have separately mentioned the Alpha generated by the SB ETFs on the monthly basis in the table below.

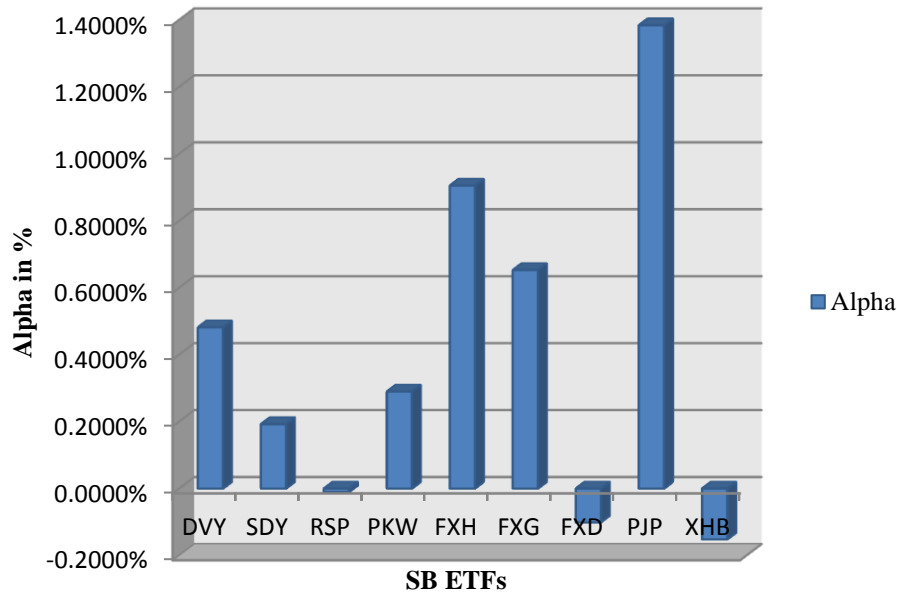
**Table 10: Monthly Alpha (SB ETFs)**

Name of the Smart Beta ETF	Ticker	Alpha	P Value
iShares Select Dividend ETF (by BlackRock)	<b>DVY</b>	0.4816%	0.046563718
SPDR S&P Dividend ETF (by STATE STREET)	<b>SDY</b>	0.1923%	0.319170612
Guggenheim S&P 500 Equal Weighted ETF	<b>RSP</b>	-0.0106%	0.880342187
PowerShares BuyBack Achievers Portfolio	<b>PKW</b>	0.2897%	0.049121271
First Trust Health Care AlphaDEX Fund	<b>FXH</b>	0.9051%	0.006390652
First Trust Consumers Staples AlphaDEX Fund	<b>FXG</b>	0.6527%	0.050505708
First Trust Consumers Discretionary AlphaDEX Fund	<b>FXD</b>	-0.1009%	0.6939618
PowerShares Dynamic Pharmaceuticals Portfolio	<b>PJP</b>	1.3840%	0.000245081
SPDR S&P Homebuilders ETF (by STATE STREET)	<b>XHB</b>	-0.1518%	0.758886456

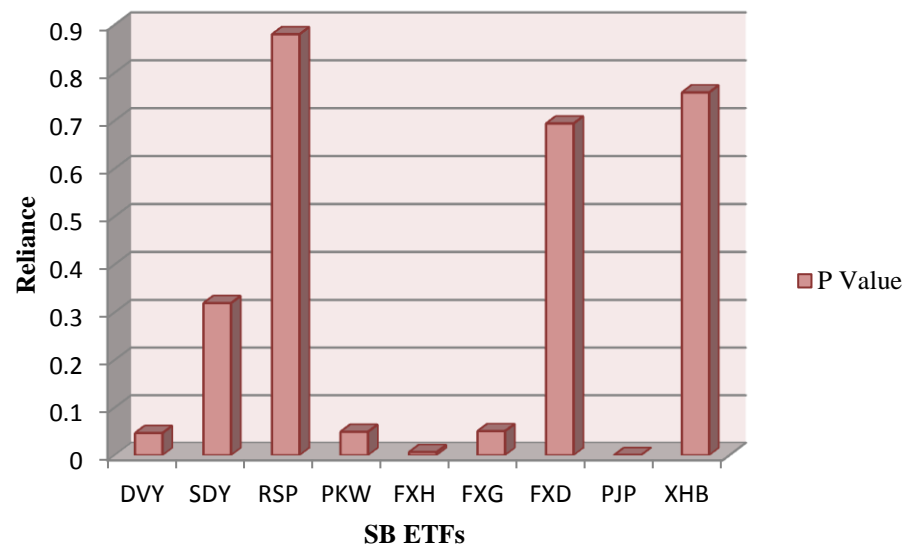
Much less to the researchers surprise, you can see that 6 out of 9 SB ETFs from the sample have successfully generated monthly Alphas (excess return) against the Three Factor Model, but the thing here is that, how this Alpha can be accepted or checked if they are correct? This can be done with the help of P Value because a P Value of 5% (or 0.05) there is only 5% chance that results you are seeing would have come up in a random distribution, so you can say with a 95% probability of being correct that the variable is having some effect, assuming your model is specified correctly.

From this point the researcher could say that iShares Select Dividend ETF (by BlackRock) (DVY), PowerShares BuyBack Achievers Portfolio (PKW), First Trust Health Care AlphaDEX Fund (FXH), First Trust Consumers Staples AlphaDEX Fund (FXG), and PowerShares Dynamic Pharmaceuticals Portfolio (PJP), these 5 out of 9 SB ETFs have proved the ability of SB ETFs to generate positive Alpha against this broad market return, size risk and value risk factors (or) Three Factor Model by generating Alphas of 0.48%, 0.28%, 0.90%, 0.65% and 1.4% on a monthly basis respectively with a probability of 95% and above as they all have P Values less than 0.05. The chart below shows the Alphas and P Value of SB ETFs for better understanding.

## Monthly Alpha of SB ETF

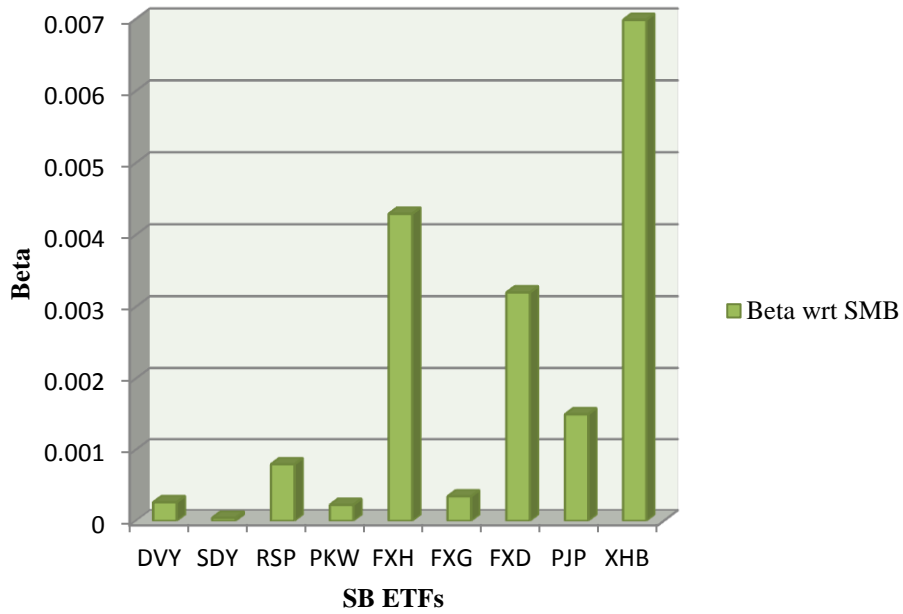


## P Value Chart - Alpha

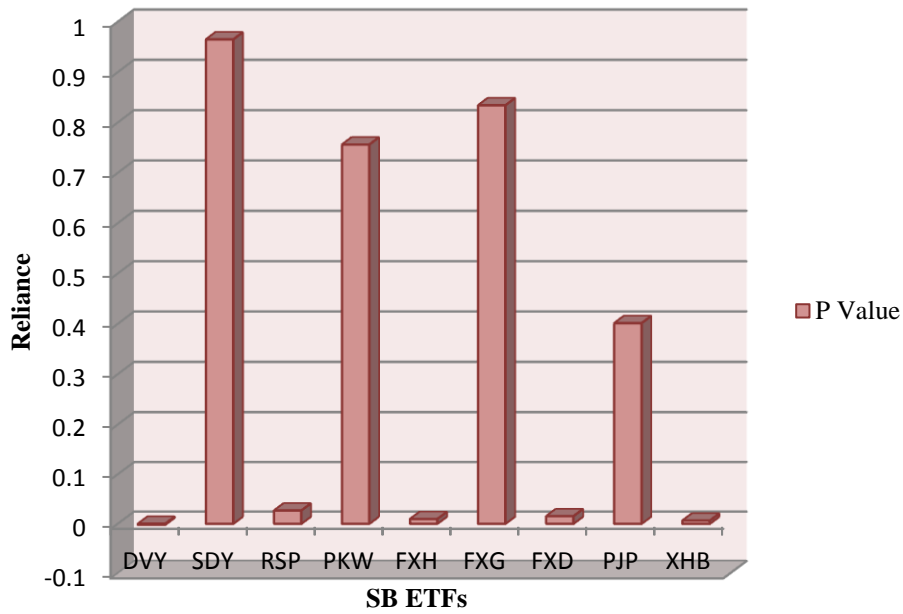


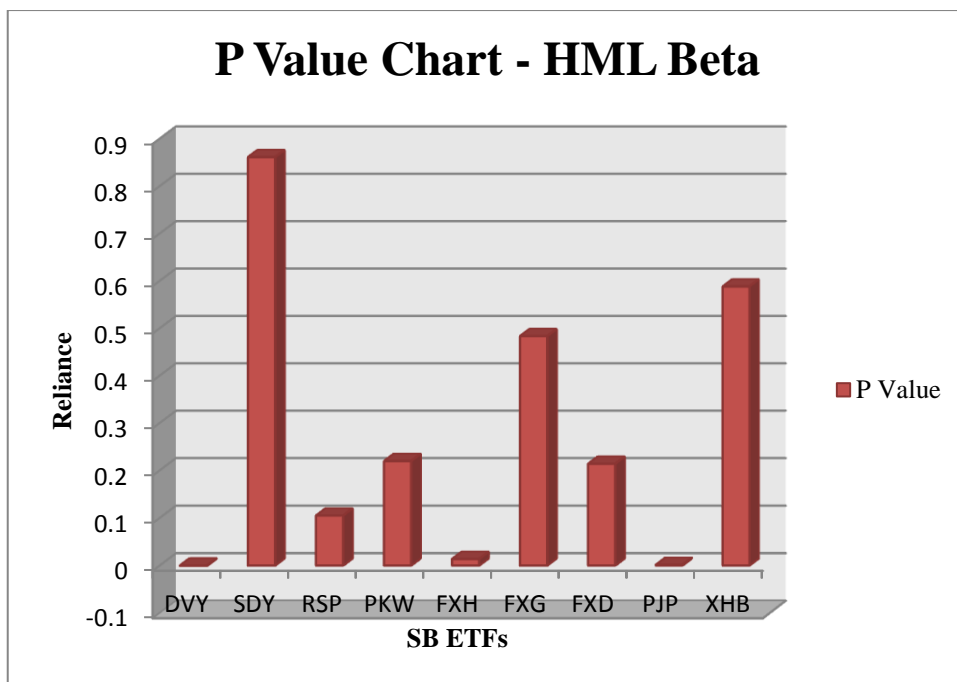
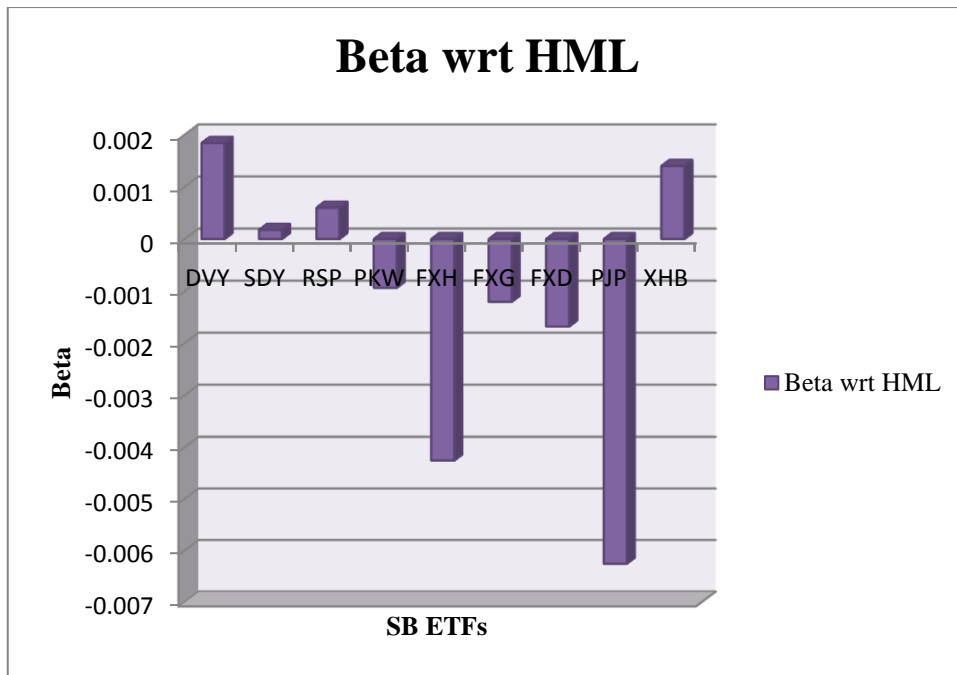
The next and final step to this regression analysis is to find out the sample SB ETFs exposure to the market, size and value factor. From the regression analysis table above, it can be clearly seen that SB ETF have no exposure towards the Size (SMB) and Value (HML) factors as most of the values are negative (which shows the negative exposure) or zero. Even the P Value of the size and value exposure could not say anything as they are negative value or the value very larger than 0.05 or simply not significant. This can be seen from the chart below which shows the SB ETFs exposure to the size and value factors and its P value.

### Beta wrt SMB



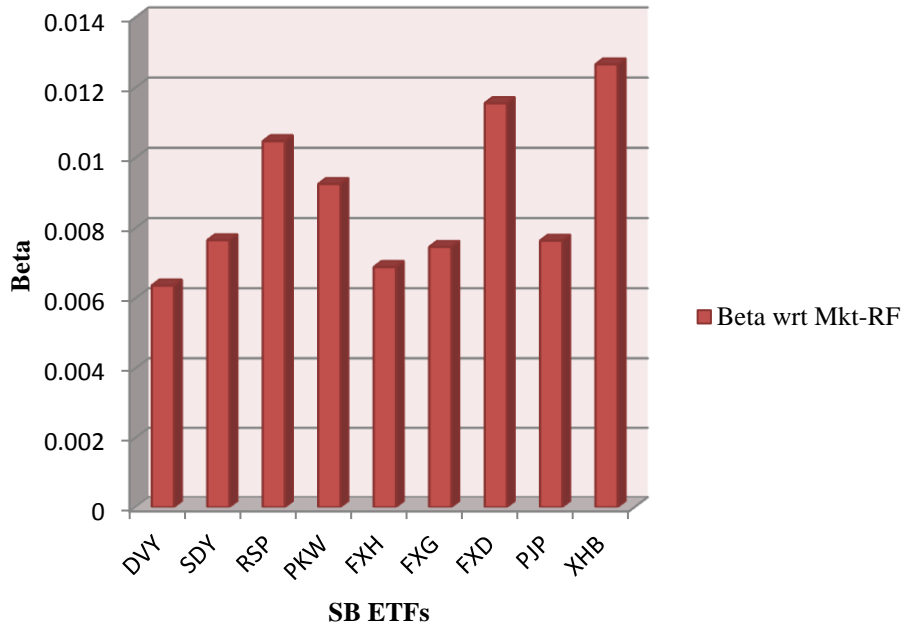
### P Value Chart - SMB Beta



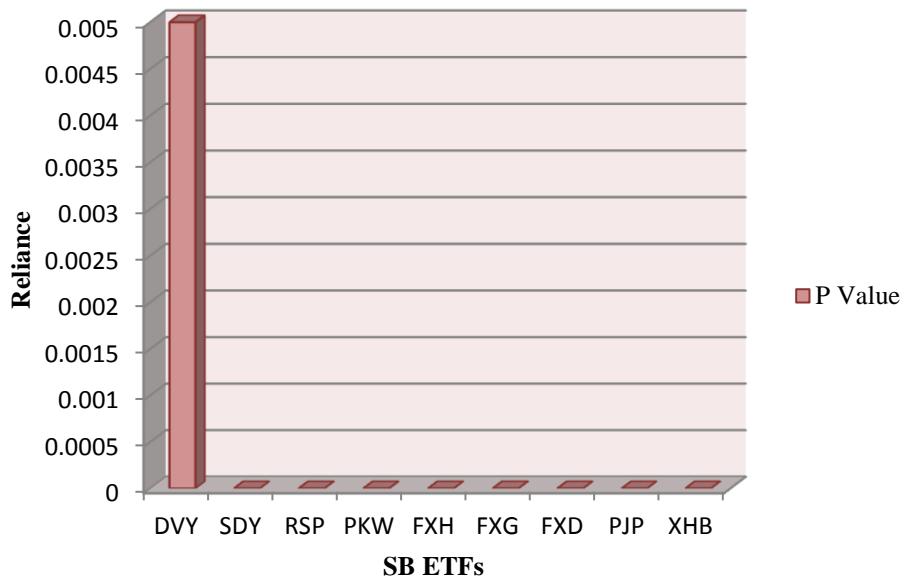


Now the only factor left is the exposure to the market factor (Mkt – RF) (Risk adjusted market return) and from the regression analysis table all that researcher could say is the numbers are really low which is very less than 1 which does not really fit in. So, much cannot be explained from this numbers but surprisingly all the P values are very low (almost 0) the researcher can say with a 99.99% probability and confidence that the results are of being correct that the variable is having some effect towards the market factor. Finally this explains us where do the Alpha came from and yes definitely its the market factor. The chart below shows the SB ETFs exposure to the market factor and its P value.

### Beta wrt Mkt-RF



### P Value Chart - Mkt-RF Beta



# 5. Conclusion:

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## 5.1 Introduction:

When it comes to new strategies, especially in the field of fund management and furthermore it is gaining huge popularity, there is no wonder if it been criticised seriously. SB ETFs are one among the seriously criticised strategic investment product, which indeed in a very short while of its introduction in the market gained tremendous popularity and response for its catchy name and offerings.

It has been marketed with plenty of promising statements like better value for money, be smart and invest smart, why going behind passive ETFs when you could make excess returns than the market itself with little higher fees than passive ETFs. Why paying higher fees to active managers when you could have returns like actively managed funds with fees less than half you paying for active management. On the other side the critics (may be active managers from the same fund management industry and others) started criticising that these SB ETFs are false marketed that they make excess return by beating its own benchmark, how a ETF could beat its benchmark? ETFs exposure to the factors in the name of SB ETFs will give additional risk and there are chances that their returns may diminish over the time. They are just another ETF but charges higher fees from the investors, just another money making technique, it's just a big scam. SB ETFs are nothing but 70% passive funds and 30% active funds which charges higher fees than paying fees for 70% passive and 30% active funds individually.

Though these SB ETFs are seriously criticised they never lost their popularity and it keeps on growing by size and volume in the equity market. And after 2008 financial crisis, one of the biggest economic downturn in the history after the great depression in the late 1930's people are really looking for some good investment strategy which can really add value to their investment with lesser fees than active management but active management like work but not exactly the same. SB ETFs was introduced in the early 2000 and many of them have emerged in the market in the following years. If it was just another scam it could not last in the market with this much greater success till date.

This made the researcher to develop a positive hypothesis and to prove the hypothesis and to answer the research questions. The researcher have selected some 9 SB ETFs and collected data from June 2010 to 2015, mentioned in detail in data collection and analysis part of this research. And made them undergo series of assessments with different methods and compared with the market standard S&P 500 to check whether they created any real value for the investors for investing in them. And the results were surprisingly good in favour of SB ETFs, as you could have seen them from the research analysis and discussion part of this research.

## 5.2 Research Conclusions:

Now summarising the results from the research analysis & discussion part of this research and simultaneously answering all research sub-questions and eventually proving the research hypothesis.

### Sub-Question 1: **Do SB ETFs outperform their benchmark and market by generating Alpha?**

As you have seen 8 out of 9 samples except First Trust Health Care AlphaDEX Fund (FXH) with StrataQuant Health Care Index as its benchmark index and this particular sample have not lost by big number (it's just 0.10%), have taken for the analysis has outperformed its respective benchmark index

starting with minimum of 0.47% excess return than its benchmark index (StrataQuant Consumer Discretionary Index) in the case of First Trust Consumers Discretionary AlphaDEX Fund (FXD). And with maximum of 7.49% excess return than its benchmark index (S&P Pharmaceuticals Select Index) in the case of PowerShares Dynamic Pharmaceuticals Portfolio (PJP). Simultaneously all the samples have beaten or outperformed the market (S&P 500 Index) with minimum excess return of 0.98% in the case of SPDR S&P Dividend ETF (by STATE STREET) (SDY) and maximum excess return of 20.56% in the case of PowerShares Dynamic Pharmaceuticals Portfolio (PJP). All the excess return mentioned was on an annualized basis for 5 years. If we see the difference in the average annual return between the sample SB ETFs and the S&P 500 Index is 6.38%, and that's 6.38% higher returns than the market standards. And even from the return based regression analysis we could see that 6 out of 9 SB ETFs from the samples have successfully generated monthly Alphas (excess return). Rest of them have generated negative Alpha on monthly basis but cannot be proved significantly that the values are true as they have less probability which can be seen from the P Values. And this answers the question that definitely and with high probability, SB ETFs have outperformed their benchmark Indices and the market standard (S&P 500 Index) by generating excess return or Alpha.

#### **Sub-Question 2: Are there greater risks in SB ETF funds?**

The researcher personally thinks that every investor should analyse and consider the importance of risk associated with their investment. Even in this research, the researcher has given major importance to the risk, volatility, fund movement and risk adjusted return of SB ETFs. Starting from SD (Standard Deviation), there is very little or no difference in SD of SB ETFs and their benchmark Indices, which shows that they are closely following their benchmarks and changes in benchmark definitely have some effects on SB ETFs, on an average there are 13 to 25% chances that returns of SB ETFs from the samples may vary from the average return of the same.

Whereas the market standard (S&P 500 Index) has a SD of 15%, and only with SD we cannot come to any conclusion. So, will precede to what Beta and Correlations says, on an average sample SB ETFs are 10% less volatile than their benchmark Indices as all the beta value are less than 1.

More surprisingly, there is no much of a difference between the beta values of SB ETFs with their benchmark Indices & SB ETFs with S&P 500 Index. There will be an impact on these funds when there is a fluctuation in the market.

Some changes in the market will have impacts up to 8% and 32% in two of the funds and rest of the funds from the samples will have lesser impact according to the beta values, would be 8% lesser volatile than the market on average. While analysing the SB ETFs movements, the Correlation Coefficient tells that all the SB ETFs are positively correlated with its benchmark Indices and market.

Some of the SB ETFs are in perfect positive correlation (+1) with its benchmarks. And this positive correlation states that all the SB ETFs in the samples moves in the same direction as their benchmark Indices and the market, i.e., when the benchmark Indices or the market appreciates the SB ETFs value appreciates and VIZ.

The most important part of this risk assessment is the Sharpe Ratio (measure of risk adjusted returns). The Shape ratio shows that all the SB ETFs in the samples have better risk adjusted return than their benchmark Indices. More surprisingly, 8 out of 9 SB ETFs have far better risk adjusted return than the market standard (S&P 500 Index). This shows that SB ETFs give better returns for the same amount of risk taken by their benchmark Indices and the market standard (S&P 500 Index). On summary SB ETFs are less volatile, better correlated and most importantly have great risk adjusted return. From all

the above the researcher could say with confidence that SB ETFs are less risky and better value investments than investing in the actual market.

### Sub-Question 3: **What plays the major factor in SB ETF funds?**

This question can be answered from the returns based regression analysis, as the analysis also shows the exposure of the SB ETFs to the various factors like market factor, size factor and value factor. This regression analysis was carried out based on the monthly returns of the SB ETFs for the time period starting from 1<sup>st</sup> of June 2010 till 31<sup>st</sup> of May 2015, the number of observations from this regression analysis carried out was 60. Unfortunately the correlation numbers for the size and value risk factors are very low and in most of the cases it was negative integers and the probability of these numbers can be real was so poor. Due to time constraint the analysis was carried out only for 5 years which gave less number of observations, this may be the reason that the size and value risk factor numbers are very less and negative. Fortunately the probability of market factor controlling these funds are really high as we have smaller P value for all the market factor values but the values are small, may be because of the same reason of less number of observations (only 60).

At this point the researcher could say from the samples, that market factor plays a major role in SB ETFs, this is not only because of the high probability the researcher have got for market factor, also because of the R Square and Significance F values which proves that this regression is highly significant and there is very less probability (0.01%) that this happened by chance.

### Sub-Question 4: **Do SB ETF funds justify their fees?**

According to Steverman (2014) and Pylypczak-Wasylyszyn et al., (2015) Expense ratio of an ordinary US non leveraged ETF would cost 0.5% in expense and on an average ETF has an expense ratio of 0.43% approximately. The table below shows the gross expense ratio of the sample ETFs and the numbers are taken from the fact sheets of the particular ETF and cross checked with the etfdb.com (database for ETFs). For the theoretical purpose the transaction costs have been excluded.

Note: all the costs applicable to per annum

**Table 11: Expense Ratio of SB ETFs from the Samples:**

Name of the Smart Beta ETF	Ticker	Expense Ratio	Expense per 100\$ Investment
iShares Select Dividend ETF (by BlackRock)	DVY	0.39%	39 cents
SPDR S&P Dividend ETF (by STATE STREET)	SDY	0.35%	35 cents
Guggenheim S&P 500 Equal Weighted ETF	RSP	0.40%	40 cents
PowerShares BuyBack Achievers Portfolio	PKW	0.68%	68 cents
First Trust Health Care AlphaDEX Fund	FXH	0.66%	66 cents
First Trust Consumers Staples AlphaDEX Fund	FXG	0.67%	67 cents
First Trust Consumers Discretionary AlphaDEX Fund	FXD	0.70%	70 cents
PowerShares Dynamic Pharmaceuticals Portfolio	PJP	0.58%	58 cents
SPDR S&P Homebuilders ETF (by STATE STREET)	XHB	0.35%	35 cents

On average ETFs charges 0.43% as a gross management fee, which is 43 cents per every 100\$ of investment for no alpha or excess return or out performance, just replicating its underlying Index. On average the SB ETFs from the samples charges 0.53% as a gross management fee, which is 53 cents

per every 100\$ of investment in additional you get Alpha (excess return by outperforming its benchmark and the market Index), better risk adjusted return just for 10 cents extra per every 100\$ investment. For better understanding let us take one example from the samples itself, PowerShares Dynamic Pharmaceuticals Portfolio (PJP) which has outperformed its benchmark index and market standard by 7.49% and 13.07% respectively on annualized basis for 5 constitutive years. And from the regression analysis it has the ability to generate 1.4% of Alpha on monthly basis, has far better risk adjusted return than its benchmark Index and the market and still charges only 0.58% in fees, that's just 58 cents per 100\$ and just 15 cents higher than the average ETFs cost. The researcher would say this is not expensive at all for the features the SB ETF posses. And the researcher would like to conclude that the SB ETFs from the samples strongly justify their fees.

And from all the above the researcher concludes that there is real value in investing in SB ETF funds which is also my answer to the overarching research question. And this research and the conclusion proves the thesis statement that SB ETF Funds are capable of generating Alpha by outperforming the market as they are using factors (market is also one of the factors) based investment strategy and the Alpha generated has justified their management fee and are less risky investments.

“As George Cooper, author of *The Origin of Financial Crisis* and a critic of index investing, put it: smart beta is “quite a healthy development, because it fractures and diversifies the investment community,” and mitigates the natural human tendency to herd around the hottest stocks” (John, 2015)

### **5.3 Drawbacks:**

In the methodology section the researcher has mentioned about limitations to this research. Here are some drawbacks. Sample Bias; there are plenty of SB ETFs available in the market some of them are really great and some of them are not. Even for this research the SB ETFs have been selected based on the market value, 20 SB ETFs with highest market value in order. This also one of the reasons other than their true performance, that the researcher got the favourable results. This can also be considered as one of the useful techniques to identify a good SB ETF based on their market value because underperforming SB ETFs cannot sustain in the market or increase by value. One more reason the researcher think as the reason for favourable results is the time period that chosen for this research, from 2010 right after the financial crisis and that's the same time the market started recovering. The real reason behind the selection this time period is the researcher wanted to convey the recent real performance of the SB ETFs.

### **5.4 Further Research & Business Opportunities:**

This research in particular has plenty of further research opportunities, like we can replicate this research for different time period say 2005 to 2010 can bring the truth about the performance of the SB ETFs during the economical down turns. This research can be carried out between SB ETFs and Actively managed funds to find out the better valued performer for the fee paid. This research can also be used in business; this research can be coded to create software which can help investors to indentify real value creating investment (individual or portfolio) because this analysis can give exposure to French & Fama Factors like market factor, size risk factor, value risk factor (more can be added) and these can reveal the true value creating ability of the selected investment to the investors, whereas other commonly used method, CAPM (Capital Asset Pricing Model) cannot give these exposures.

### **5.5 Final thought:**

Why your investment decision should be smarter like smart beta“Can I create an algorithm to be Warren Buffet? No,” says Baer Pettit, head of index strategy at MSCI. “But over time, can I do a lot of what he does systematically? Maybe. You can at least avoid the same thing that he avoided.” (John, 2015)

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# Appendix A:

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## Reflections:

### Introduction:

“Dream is not something you see in sleep, it is something that keeps you awake” Dr. A P J Abdul Kalam (Honourable, Ex-President of India)

Being a person from strong science background and likes to play around with machines, I have also developed my interest towards finance and financial markets. Fortunately my talents were recognised and started working as an executive: commercial and finance, in one of the industrial leaders in the field of boiler manufacturers in India. It was the time I got involved more in to finance and my interest in finance slowly transferred to passion and realised nothing could be so accurate than numbers. After gaining a decent experience in the organisation, I thought, I should take a step forward in my career, at that point of time I never thought that would be a long step. I was searching for a place where I could get a real essence of finance, especially in financial markets. Finally found that, Ireland is the place and DBS will be the school and am going to pursue my MBA in Finance here.

### My MBA programme:

I came here with one main expectation, exposure. The kind of exposure you will get only in Multi-cultural society. Not any less to surprise DBS has that environment and I utilized this opportunity to mingle with students from different culture and parts of the world. It boosted my confidence in me and made me a better in interactions and also helped me to develop my language skills.

I would like to say that this MBA programme has thought me lessons for my life, has developed my thinking capabilities to a wider prospective, and has thought me to see things from different dimensions. This all happened because of the curriculum. When I initially started my classed at DBS, I had this doubt weather I could able to coupe up with academics because I had almost lost touch with academics for the last three years though it is not such a huge gap and also that am new to this type of reflective learning method. The first thing which gave me hope is the syllabus it was interesting and I loved it, as it is mostly based upon current situations, and I personally think that if you love something you do, no matter what? You will do it. The second thing is the teachers, they all are very good and friendly and helped me to go through things with their guidance finding the students genuine interest.

The assignments given were brilliant and like I have already mentioned, it is all based on the current situations. The assignments were challenging at the very beginning and slowly with the guidance of my teachers I figured out what exactly is expected from me and what I could learn out of it. The assignments made me think boundlessly and I have increased my ability to think and see beyond things, the assignments and examinations had made me a better researcher who could thing in a very logical, ethical and functional way.

The extreme level of this was my dissertation; I was strong with one thing in my mind, if I do a dissertation that won't be just a dissertation with 20000 words for the sake of acquiring a MBA. I have decided that my dissertation will be something that I love most, my passion (of course! Financial markets), and it will reflect my interest, capabilities, knowledge and hard work.

## **Dissertation Formulation & Process:**

It all started in middle of the second term by that time all know is that I wanted to do my dissertation in financial markets, to be precise, in some of the investment strategy. I know that I need, some help from experts, and luckily Mr. Andrew Quinn (Lecturer Finance, DBS) noticed true my interest and started guiding me. I had lot of discussion with him regarding the financial markets especially the fund management industry. I have started my deep research along side with Mr. Andrew's advices and guidance, came up with this wonderful and very controversial investment strategy called Smart Beta as my area of research.

It is controversial that being an ETF and said to outperform the market and charges more fees but still successful. This made me to decide that am going to find out is there real value in this SB ETFs for the investors? Once I have started working on this I was gaining a tremendous knowledge and facts about this investment strategy as well as the equity market as a whole and the reading of these raised plenty of questions inside me which I have made my research sub questions.

But how am going to find out the real value of SB ETFs? I have gone through plenty of assessment techniques to measure the performance of a particular fund or portfolio and also analysed some of the empirical studied but none of them have explained about what I was exactly looking for. So I have started collecting bits and pieces from different researches papers and credible websites and compiled my own fully fledged assessment process for my research along with the help of my mentor.

## **Own Learning:**

At the end of this dissertation I felt like I have done two courses one is MBA in Finance and the other one is Portfolio Management and or Investment Strategy Analysis. This dissertation has showed me my ability and talent in Financial Analysis and how much I love doing it. I also learned that financial market is very dynamic field and predicting future is nearly impossible. Time, Strategy and correct decision making will fetch you gains and the losses will teach you how not to do it.

## **Action Plans:**

I believe that my dissertation will be recognised in the field of fund management or financial services, and with my ability to understand and analyse the complicated investment strategies should get me a job as financial analyst. Meanwhile I would continue my own research in this field and who knows, I may market my own fund in the field in near future.

# **Appendix B:**

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This Appendix B section consist of a CD-ROM (Compact Disk Read Only Memory) which is burnt with data related to SB ETFs and actual analysis part carried out in MS Excel and the content in the CD-ROM is listed below. This CD-ROM is handed over to the supervisor of this dissertation prior to the submission of this Dissertation.

## **Appendix B, CD-ROM Content:**

- 1) Appendix Content
- 2) SB ETF Fact Sheets
- 3) Benchmark Index Fact Sheets
- 4) SB ETF Price Data Spread Sheets
- 5) Benchmark Index Price Data Spread Sheets
- 6) SB ETF vs. Benchmark Index vs. S&P 500 Index Price Data Spread Sheets
- 7) Annualized Return, SD and Sharpe Ratio of SB ETF & Benchmark Index
- 8) Annualized Return, SD and Sharpe Ratio of SB ETF & S&P 500 Index
- 9) Beta and Correlation Coefficient of SB ETF & Benchmark Index
- 10) Beta and Correlation Coefficient of SB ETF & S&P 500 Index
- 11) French & Fama Three Factor Model Data
- 12) Return Based Regression Analysis with French & Fama Three Factor Model - Alpha