



*The Science of Investing*



## Smart Portfolios

Smart Portfolios began as a builder and manager of custom trading algorithms for hedge fund, mutual fund and registered investment advisory firms. In 2004, the company learned of an exciting new theoretical framework for understanding markets, called Extreme Value Theory, which offered new mathematical algorithms applicable to asset allocation. Smart Portfolios seized on this opportunity and pioneered the application of Extreme Value Theory (EVT) by developing its Dynamic Portfolio Optimization™ asset allocation system. This asset allocation methodology gives Smart's financial engineers a better understanding of risk and diversification while providing a superior tool for forecasting returns. The mathematical algorithms taken from Extreme Value Theory represent a significant upgrade to the math used in traditional asset allocation models and create more accurate assessment and projection of risk-adjusted returns.

Smart Portfolios creates investment models that dynamically optimize portfolios based on current market activity, instead of relying on passive models that follow long-term historical trends. Historically, bull markets last an average of 18 years and bear markets 17 years. Common portfolio management models are based on the belief and hope that the long-term historical averages will prevail over time and they often use performance history averaged over a period of decades to establish the basis for their decisions. These mid-twentieth-century models were designed in an era when data was hard to come by and harder to process. In reality, the financial markets can be entirely different from one year to the next, and today we have extensive current market information and better tools (computers and algorithms) to process it. Smart's investment methodology follows a scientific process which accepts the fact that markets, securities, risk, return and correlation change constantly, as do the objectives and risk profiles of investors.

### *Advantages of Smart Portfolios™*

**Measures** downside risk and probability of extreme events.

**Adjusts** the portfolio's risk tolerance level to match current market conditions.

**Calculates** the changing relationship between two securities.

**Simulates** probable outcomes using advanced mathematics

**Optimizes** portfolios to maximize risk-adjusted returns

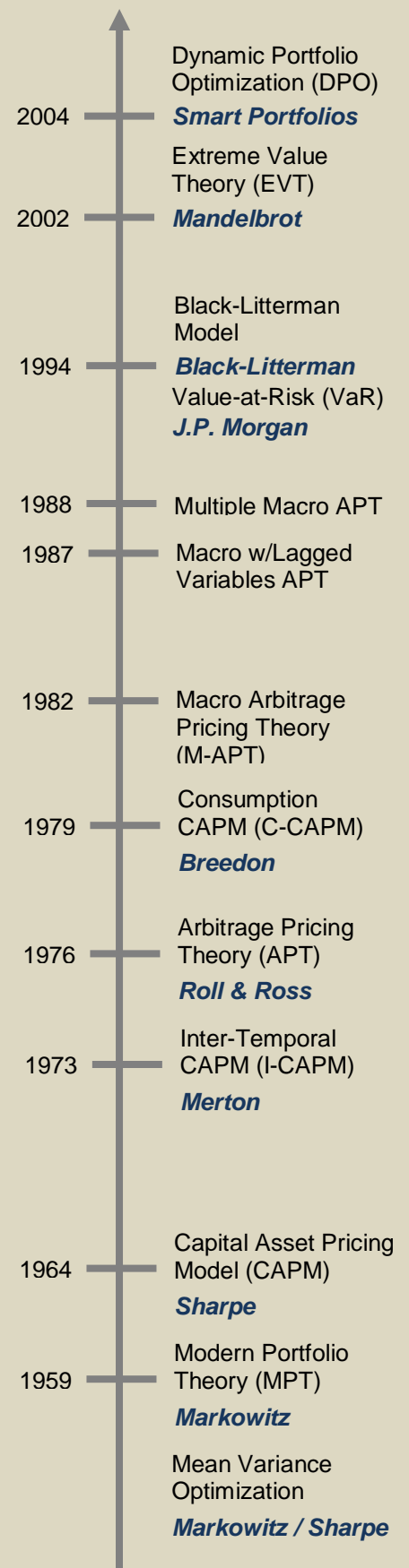
## Asset Allocation

Studies have shown that over 90% of the quarterly variation in returns<sup>1</sup> among different investment managers is due to allocation among different asset classes. Nevertheless, Wall Street spends enormous resources on individual security research while virtually ignoring the opportunity to improve returns through asset allocation. Why? Tradition, out-of-date Learning, belief that new theories don't add much if markets are efficient, (and, possibly, laziness) are all partial explanations.

For more than 50 years investment professionals have relied on a concept called Modern Portfolio Theory (MPT), developed circa 1952, that won its developers the Nobel Prize in Economics. MPT demonstrated that risk could be reduced and returns enhanced through asset diversification. The theory is applied to asset allocation via a methodology called Mean-Variance Optimization (MVO). MVO was a major advance in portfolio optimization, and is founded on four basic elements: measuring risk, forecasting returns, diversification and data management. These remain important today but they have all been upgraded. MVO makes unsupportable assumptions, such as that price changes are random, and lacks the significant advancements in technology and mathematics made in recent years. Extreme Value Theory represents a long-needed improvement to MPT.

## Extreme Value Theory

Extreme Value Theory substantially upgrades asset allocation's four factors (risk measurement, return forecasting, diversification, and data management) required for portfolio optimization by incorporating physics-based mathematics. One of these principles, called Generalized Auto-Regressive Conditional Heteroskedacity (GARCH), won Robert Engles and Clive Granger the 2003 Nobel Prize in Economics. GARCH replaces the antiquated method of managing a time-series of data based on long-term averages (mean-variance optimization) with a more sophisticated dynamic approach. The application of Extreme Value Theory was pioneered by Smart Portfolios™ in 2004 through its Dynamic Portfolio Optimization™ engine.



<sup>1</sup> Brinson, Beebower & Singer, *Financial Analyst Journal* 91, 94

## Dynamic Portfolio Optimization

Smart's Dynamic Portfolio Optimization (DPO) asset allocation system applies Extreme Value Theory, including GARCH and other advanced data management solutions, to make better assessments and projections of the risk-adjusted returns of competing investment opportunities. Comprehensive understanding of risk is DPO's foundation, allowing it to make better allocation decisions and achieve higher risk-adjusted returns. In addition, the DPO system incorporates an advanced diversification model to measure the dynamic changes in correlation during volatile markets, further reducing the possibility of large losses. The combination of upgraded asset allocation elements in the Dynamic Portfolio Optimization process makes it the most advanced asset allocation solution available today and is found only at Smart Portfolios™.

Smart Portfolios can apply the DPO engine to optimize portfolios of mutual funds or ETFs (Funds) to create stellar portfolios for investors who have different risk tolerances but the same goal of maximizing risk-adjusted returns.

<b>Theory:</b>	<b>Modern Portfolio</b>	<b>Extreme Value</b>
<b>Methodology:</b>	Mean Variance Optimization	Dynamic Portfolio Optimization
<b>Risk Measurement:</b>	Standard Deviation	Expected Shortfall w/Student-t
<b>Return Forecasting:</b>	Mean Variance	Monte-Carlo Modeling w/GARCH
<b>Diversification:</b>	Linear Correlation	Copula-based Dependency
<b>Data Distribution:</b>	RWR Normal Distribution	Heavy-Tailed Stable-t Distribution
<b>Model Features:</b>	Static: MVO Model	Dynamic: Generalized Auto-Regressive Conditional Heteroskedasticity (GARCH)

## Risk Management

One of the most effective means to shun risk is to avoid aggressive investments from the onset. Smart Portfolios™ utilizes fundamental analysis and its advanced risk metrics to screen a universe of mutual funds, indices, and ETF's as part of the investment selection process. These pre-screened universes are dynamically optimized using Smart Technology© to determine the best statistical level of portfolio risk thereby achieving lower than market risk (volatility) and above benchmark risk-adjusted returns. Smart Portfolios™ manages risk at each step in the investment selection process from the selection of individual securities to the complete portfolio design. Smart Portfolios advanced risk management tool, called Expected Shortfall, more accurately measure risk and is better able to see possible extreme events (outliers) that can adversely affect portfolio performance.

## Investment Strategy

Dynamic Portfolio Optimization™ is superior at determining risk, forecasting returns, and understanding the relationships between securities. DPO's dynamic modeling process places more value on current information, unlike static mean-variance models, while still respecting the significance of historical data using the 2002 Nobel award-winning GARCH methodology. DPO enables the investor to reap the benefits of timely information to achieve enhanced risk-adjusted returns. The DPO engine is designed to deliver fewer losses in down markets and better returns in up markets for superior risk-adjusted performance.

Money managers are categorized by their investment objectives into what is called "style box" analyses to compare and contrast their performances to other like-kind managers and indices. The index that represents a particular objective is called a "benchmark index." The returns of managers that drift away from the benchmarked index for their style box sector are not to have "tracking error." Tracking error is bad if you are an index fund or a manager that covertly mirrors an index (aka closet indexers). However, "Active" managers look to achieve tracking error so they can add-value (additional return) to the benchmarked index. The higher the added-value returns the higher the "Active Share Ratio." Smart Portfolios seeks managers with high active share ratios for active managers and low-tracking error for index funds.

## Diversification

Diversification is the cornerstone of investing because it allows the investor to reduce volatility (risk) and create a more consistent stream of returns. The driver behind diversification is the "dependency structure" among securities, most commonly referred to as correlation. If two securities are highly correlated the reduction of risk achieved by allocating to both of them is minimal because both securities will move in the same direction during up and down markets, if two securities have low or negative correlation then portfolio volatility is reduced because one security is going up while the other is moving less or in a different direction.

Calculating the dependency has historically been done using "linear correlation," which is the average relationship between two securities over a longer period of time. Correlation is a poor measurement of dependency because markets are dynamic and prices change daily, as do the risk and return characteristics of individual securities. The daily change in a security's price alters its relationship with other securities. This demands a tool that constantly adjusts for those dynamically changing relationships, and that tool or method, is called Copula Dependency. This is also an integral part of the Dynamic Portfolio Optimization™ engine.

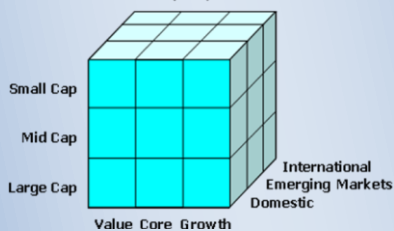
## Investment Sectors

Much attention is given to the importance of investing in multiple asset classes (stocks, bonds, real estate, alternatives, etc.), disparate investment strategies (value, core, growth), different sized companies (large cap, mid cap, small cap), and various financial marketplaces (domestic, emerging markets, international). With all the possible choices, how can anyone know where and when to invest? An investor ought to invest in multiple sectors to reap the rewards of diversification. This can require a large financial outlay to own assets in all sectors and asset classes. Fortunately, investors can gain access to most sectors cost effectively using mutual funds, exchange-traded funds, and closed-ended funds. Knowing which sectors are most advantageous to own and when to own them is what Smart Portfolios™ does best.

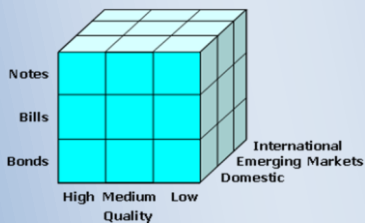
Traditional allocation models make a series of five 'bets', based on long-term averages, to estimate the optimal asset mix, using a top-down approach. The first bet is estimating how much investment should be made in each asset class (equity, fixed income, real estate, commodities, and cash & equivalents). The next three bets, known collectively as style box selection, focus on sectors as they relate to market capitalization (large cap, mid cap, small cap), strategy (value, core, growth), and country (domestic, emerging market, international). The final bet is choosing which security(s) to own for each targeted style box. This traditional approach is out-dated because of its reliance on long-term averages, poor risk analysis, and the subjective judgment of the financial professional.

Smart's Dynamic Portfolio Optimization follows a scientific, bottom-up process. The first step is to calculate the current and forecasted risk and return of an individual security using DPO's advanced mathematics. The second step is to dynamically measure the relationship (correlation) between pairs of securities. The final step is to rank the pairs to determine the optimal portfolio mix based on current market conditions.

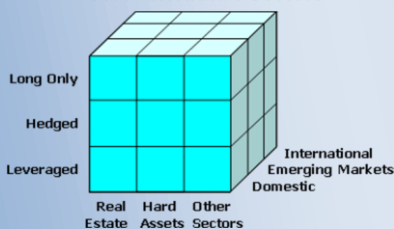
Core Equity Sectors



Core Fixed Income Sectors



Core Alternative Sectors



## ETF Features and Benefits

ETFs are baskets of securities designed to track various market indexes, and are traded on national stock exchanges. The advantages of ETFs—low cost, diversification, transparency, liquidity/price efficiency, and tax efficiency—allow us to manage the portfolio's risk and equity exposure with rigorous precision.

### Transparency

Each ETF's "basket" of underlying securities is transparent and is published every day. An ETF either replicates its target index entirely or it invests in a representative sample of the stocks in the underlying index. With ETFs, you know what you own on a real-time basis.

### Low Cost

Most ETF investors pay low management and administrative fees that are lower than those of most actively managed mutual funds. According to Morningstar, the average expense ratio for equity mutual funds (both domestic and international) is 1.32%, while the average expense ratio for all exchange traded funds is .41%. This cost difference can have a significant impact on investor returns over the long term.

### Pricing Efficiency and Liquidity

Like stocks, ETFs trade throughout the day and their prices fluctuate accordingly. The pricing of an ETF closely tracks the price changes in its underlying securities. For most ETFs there is a highly liquid market, making it possible for investment managers to execute buy or sell orders as soon as market conditions change. The pricing of an ETF is efficient because ETFs offer shares through a creation and redemption process. In other words, the number of outstanding shares may be increased or decreased daily as necessary to reflect demand. This is known as an "in-kind" exchange.

### Diversification with Precision

Using ETFs, shareholders can invest in asset classes or sectors of the market with pinpoint precision. ETFs allow for the creation of fully diversified portfolios in which equity exposure and risk are easily measured and managed.

### Tax Efficiency

Due to passive management, low turnover and the unique "in kind" redemption process of ETFs, capital gains tax exposure is minimized. When redeemed, ETF shares are simply sold on the open market and the tax liability is usually based on the seller's original purchase price for the ETF. The ability to buy and sell on the open market avoids the problem that mutual fund shareholders experience when fellow shareholders redeem shares from a fund. In order to redeem those shares, the mutual fund may have to sell some of the securities it holds and realize a capital gain which is allocated to all shareholders. In addition, mutual funds are required to pay out all dividends and capital gains annually. So even if the portfolio has lost value that is unrealized, there is still a tax liability on the capital gains that does have to be realized.

## ETFs Generally Outperform Most Actively-Managed Mutual Funds

In any given year, only about one-third of actively-managed equity mutual funds match the performance of their benchmark indexes. Over time it is extremely difficult for active managers to produce alpha consistently. Add the higher fees for active management to the equation and the long-term performance results look even worse. Because ETFs are designed to simply track the performance of well-established indexes, investors are not subject to the risk of the "negative alpha" produced by most active managers.

## Portfolio Managers



**Bryce James**, President and CEO, has over thirty four years of hands-on investment experience, most recently as partner and founder of Shield Investment Advisors, a fixed-income fund of hedge funds. Prior to Shield, he was a Senior Vice President with Morgan Stanley. Mr. James spent most of his career as a portfolio manager. He specializes in building custom trading algorithms, financial content delivery systems and performance measurement software solutions.

From 1983 to 2000, Mr. James compiled a stellar record as a fee-based portfolio manager and consultant to corporations, trusts, retirement plans, ESOPs and high-net-worth individuals. He created the Investment-Consulting model for brokerage Drexel Burnham Lambert in 1984.

Mr. James holds a B.S. in Accounting, Finance and Marketing from Central Washington University and received a Certified Investment Management Analyst designation from the Wharton School, University of Pennsylvania, in 1992.



**Keith Campbell** Director of Research, is responsible for implementing Smart Portfolio's quantitative asset allocation models. His responsibilities include code development, research, portfolio management and trade execution. Mr. Campbell also oversees the firm's database management and creation of financial tools, models and provides client reports.

Mr. Campbell holds a Masters degree in Financial Engineering from the University of Michigan. Prior to joining Smart Portfolios, Mr. Campbell was Head of Portfolio Construction and founding member of Reign Capital Management, a Managed Futures Commodity Trading Advisor (CTA).

In total, Mr. Campbell has over thirteen years of financial industry experience. He also served as a quantitative systems developer for Rotella Capital Management, CTA, and as a credit risk analyst for Bank One. He also holds a BS in Industrial Engineering from Purdue University and began his career with 2 years of engineering/manufacturing with General Electric.

