Understanding Modern Portfolio Construction

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Abstract: Over the last 75 years there have been great strides in modern finance, portfolio theory and asset allocation strategies. Despite this progress the process of portfolio construction remains grounded in many theoretical concepts that can result in inappropriate or unrealistic frameworks. In this paper we provide an overview of the development of these ideas, construct a general foundation for understanding portfolio construction and produce a framework for simplifying, systematizing and streamlining the process in an attempt to establish a realistic and suitable process for portfolio construction.

I. INTRODUCTION

This paper introduces the basic historical background upon which modern finance and asset allocation is implemented, provides a general understanding for portfolio construction and offers some ideas for improving the methodology for Modern Portfolio Construction (MPC).

This paper is organized in three sections. Section One discusses the historical background of Modern Portfolio Theory (MPT) and how its influence resulted in many of the ideas that dominate portfolio modeling today. Section Two discusses the general building blocks of portfolio construction and how one should begin to approach the process of asset allocation. Section Three builds on many of the positive developments in MPT and modern finance and helps develop a realistic and practical framework for Modern Portfolio Construction. We develop a general framework for understanding portfolio construction and conclude that a low fee, tax efficient Countercyclical Indexing™ strategy results in a rational and suitable approach to portfolio construction.

1. A Brief Review of Modern Portfolio Theory & Modern Finance

1952 marked the birth of Modern Portfolio Theory when Harry Markowitz (Markowitz, 1952) developed his methodology of mean-variance optimization (MVO).¹

Markowitz, widely recognized as the father of modern finance, established an approach by which asset allocators could quantify how best to efficiently allocate assets by measuring the degree of risk one takes in achieving a certain type of return.

Arguably, the most important development in the MPT framework (most notably Markowitz 1959) was the development of a cohesive language and process for portfolio construction. Several key concepts were derived from MPT including:

The importance of understanding covariance and diversification as well as the tendency for uncorrelated assets to create superior risk adjusted returns when combined in a portfolio by reducing the total portfolio variance.

The utilization of portfolio “risk” as standard deviation which helped develop mathematical models for understanding risk in a portfolio.

The development of the data driven concept of the Efficient Frontier which allows asset allocators to create a systematic method for portfolio selection and risk management.

MPT was a sufficient starting point for asset allocation models, but only laid the theoretical foundation. The two most important developments in Modern Finance that built on MPT included the Capital Asset Pricing Model (CAPM) and the Efficient Market Hypothesis which is often commingled with the Fama French Factor Models.

The Capital Asset Pricing Model (CAPM) was developed by Jack Treynor, William Sharpe, John Lintner and Jan Mossin in the 1960s.¹⁰ CAPM formalized a framework by which asset allocators could understand the relationship between asset returns and risk according to mean variance analysis. This mathematical model distinguished between two specific types of market risk: 1) systematic risk (i.e., undiversifiable risk), and; 2) non-systematic risk (i.e., diversifiable risk). This asset pricing model helped asset allocators distinguish between the returns generated from “the market” (i.e., beta), and any excess return (i.e., alpha). According to CAPM there are two ways to generate returns: 1) take the market return and; 2) beat the market. The development of MPT and CAPM popularized the idea of using a market cap weighted indexing portfolio as these methods emphasized the importance of a diversified market portfolio. This era coincided with the significant growth in both beta replicators (index funds) and excess return chasers (most active mutual funds).¹
In 1976 Stephen Ross expanded on CAPM when he introduced Arbitrage Pricing Theory (APT), which identified multiple sources of systematic risk.\textsuperscript{i} The crash of 1987 and the East Asian Currency Crisis increased focus on tail risk in portfolios and other sources of market risk while diminishing the credibility of ideas like the Efficient Market Hypothesis. These events resulted in greater research into market anomalies and challenged the overly simplistic single factor approach like CAPM. These tail risk events led to a widespread focus on Value at Risk models that use statistical properties to calculate the worst case scenarios across portfolios. This increased the focus on hedging strategies as well as the use of portfolio insurance such as options and futures contracts. This era coincided with the significant growth in hedging strategies and hedge funds specifically.

In 1992 Fama and French expanded on the Efficient Market Hypothesis with their seminal research that identified three factors - market risk, value and size - to explain market returns and helped build on APT as well as many of the weaknesses in CAPM.\textsuperscript{iv}

Fama and French expanded on this model in 2014 when they added two new factors to their three factor model. More recently researchers have added hundreds of different factors. As a whole, Factor Tilting has further expanded on a basic market cap weighted approach by adding an increased degree of diversification through strategic asset allocation. For instance, a market cap weighted stock portfolio might tilt to various

2. A Basic Framework for Understanding Modern Portfolio Construction

- Whether an asset allocator is an individual or an institution the process for asset allocation is roughly the same:
- Establish a well-defined set of financial goals.
- Develop an appropriate understanding of “risk” as it relates to one’s risk profile.\textsuperscript{2}
- Define the time horizon during which we are seeking to protect assets.
- Acquire the appropriate assets that will create a high probability of matching our risks, time horizons and financial goals.
- Maintain this portfolio in order to ensure that our portfolios are consistent with achieving our financial goals.

Before expanding on each of these topics in more detail we will construct a basic understanding of the financial markets within the context of the modern monetary system using a macro framework.

2.1 Thinking in a Macro Sense

This paper and its underlying concepts are all based on macro or aggregate thinking. Before we dive into the meat of this paper we will first clarify some of the issues regarding the common usage of some micro concepts that influence Modern Portfolio Theory and the Efficient Market Hypothesis. As Paul Samuelson once said, the market is “micro efficient”, but “macro inefficient”.\textsuperscript{viii} It’s helpful to think of the markets in a macro sense in order to avoid fallacies of composition. These fallacies include:

1. The false pursuit of alpha or “market beating” returns.
2. The dangers of relative returns and benchmarking.
3. Misunderstanding risk as the asset allocator perceives it as opposed to the way the asset manager sees it.
4. The false dichotomy of “active” and “passive” investing.

We will expand a bit on these fallacies in section 2.2 in order to provide further clarity for our ensuing discussion.

2.2 The Arithmetic of Asset Allocation in a Global Financial World

At the aggregate level there is a single portfolio of all outstanding financial assets.\textsuperscript{3}

This portfolio is highly dynamic, but in any given period these financial assets generate “the market” return. This means that the holders of these financial assets must, by definition, generate the post-tax and post-fee market return. The average asset allocator will therefore generate the top line return from all outstanding financial assets minus any taxes and fees paid. This means that, in the aggregate, no one “beats the market”.

Of course, some asset allocators must, by definition, outperform other asset allocators inside of this aggregate portfolio. This creates a conundrum for the intelligent asset allocator. Modern Portfolio Theory teaches us that diversification is the only free lunch in asset allocation and that beating the market is extremely difficult for sustained periods of time. And the arithmetic of asset allocation in a global financial world proves that no one beats the market in the aggregate. Therefore, the intelligent asset allocator must choose whether there is any relevance to the endeavor of trying to generate alpha or excess return. This paper will argue that this is a false pursuit for, at the aggregate level, there is no “alpha”, and there are only different types of beta.\textsuperscript{2}

The primary reason why the intelligent asset allocator should avoid the pursuit of excess return is that this is not an essential financial goal for most savers. While generating high risk adjusted returns would be a nice benefit of intelligent asset allocation

2.3 What is Portfolio Risk?

In order to fully understand why we allocate our savings across various financial assets it is important to understand what risk is and how it pertains to the
financial asset world. The idea of risk is a somewhat confusing and nebulous concept in modern finance. The traditional textbook definition of "risk" is beta, standard deviation or volatility. This is convenient for statistical purposes because it allows us to quantify risk when measuring various outcomes. This definition, while useful in many ways, also has its limitations. For instance:

1. Volatility isn’t always a bad thing. In fact, volatility with a positive skew is a good thing. No one complains about a portfolio allocation that rises 20% per year and falls 5% every once in a while, but this is a volatile position relative to many portfolios.

2. Negative skew can be a good thing in a portfolio. For instance, many forms of insurance have a natural negative skew and detract from returns, however, it would be strange to argue that this is always a bad idea even if you don’t have to use the insurance.

3. Asset allocators don’t live in a textbook world and don’t necessarily judge their portfolios by the academic concepts that drive the way many portfolio managers assess their portfolio performance. This can create inconsistency between the asset allocator’s perception of risk management and the asset manager’s perception of risk management.

For most asset allocators the “risk” of owning financial assets comes primarily from two factors:

- Purchasing power risk.
- Permanent loss risk.

Purchasing power risk is the potential that one’s savings does not keep pace with the rate of inflation. Permanent loss risk occurs when your savings is declining in value and one is forced to take a permanent loss for some reason (emergency, behavioral, short-termism, etc.). From these two basic understandings we can expand on the academic notion of risk as beta and apply a more realistic framework:

**FINANCIAL MARKET RISK** is the probability of a loss of purchasing power and/or permanent loss during an asset’s holding period.

In order to visualize how one might protect against these risks in a portfolio it’s helpful to view this concept on a scale showing how our savings can be allocated across different assets against permanent loss risk might hold 100% cash; however, he/she would risk falling behind in purchasing power by the rate of inflation each year. Likewise, the asset allocator who only wanted to be protected against purchasing power risk would be 100% allocated to stocks since the stock market has a consistent track record of outperforming the rate of inflation in the long-term.

Stocks give the owner a claim on the profits that the underlying entity earns. This generally means that the owner holds assets that give him/her a claim on the cost of inflation (the cost of output) plus any profit premium. This will generally provide the holder with an inflation protected asset as corporations earn the rate of inflation plus the profit premium.

Bonds, on the other hand, are a more secure income stream attached to the viability of the issuing entity. While there is no guarantee of purchasing power protection high

**2.4 Where Do Profits Come From?**

To understand how we use various assets to achieve our financial goals, it helps to understand why certain assets obtain the cash flows they do. In order to achieve this, it is informative to understand where corporate profits come from, which requires a macroeconomic understanding of the world. When we buy claims against firms, we are buying a claim on a portion of their cash flows. Equities, for instance, provide the owner with a claim on profits. Corporate debt provides the owner with access to a fixed percentage of interest plus principal at maturity. But where do these cash flows come from? The monetary system is the sum of all the transactions that occur within it. So we know that profits come from a specific flow of funds. According to the Jerome Levy Forecasting Center we can derive profits from a simple equation

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\text{Profits} = \text{Investment} - \text{Household Savings} - \text{Government Savings} - \text{Foreign Savings} + \text{Dividends}
\]

In short, profits come from business spending, household spending, government spending, and foreign spending. This equation is expressed in Figure 2 as a percentage of gross national product since 1960:

![Figure 2 shows, as a percentage of GNP, the contributions to corporate profits from the government](image-url)
deficit, net investment, dividends paid ("business" is dividends plus net investment), personal saving, and the foreign sector. US households generally net save, and the foreign sector has been in a current account deficit for most of the last fifty years, so corporate profits have been driven mainly by net investment, dividends, and the government deficit.

The problem, from an asset allocation perspective, is that corporate profits are extremely cyclical and inconsistent. Figure 3 shows the year-over-year percentage change in profits:

The figure demonstrates that profits are volatile and unpredictable. This results in a good deal of uncertainty regarding the future expected value of the securities that are attached to these profits. And this brings us to the problem of trying to assess what drives financial instrument returns since they represent the market’s expectations as to the future expected value of these instruments.

3. Building on Recent Developments in Modern Finance

One of the dominant trends resulting from Modern Portfolio Theory is the tremendous growth in Exchange Traded Funds (ETFs) and index funds. These diversified products have become the fastest growing segments of the asset management business as evidence has mounted that lesser diversified and more active strategies do not fare well in comparison. This transition in the asset allocation world has coincided with a substantial change in the way portfolio construction occurs.

In an effort to rectify some of the shortcomings of MPT, the traditional market cap weighted portfolio representing the broader markets has been expanded on and challenged by approaches such as Factor Investing, Smart Beta, Risk Parity and others. The Great Financial Crisis exposed certain flaws in the market cap weighting approach leaving many asset allocators in search of an alternative. This next section will discuss the development of some of these ideas as well as the rationale for a Countercyclical Indexing strategy.

3.1 Assessing the Utility of the Global Financial Asset Portfolio

A tremendous amount of energy has been spent developing and identifying superior asset allocation models over the last 75 years. Despite this effort there remains a considerable disagreement about the ideal way to develop and maintain savings portfolios. Historically, this battle for portfolio optimality has fallen between two camps – the “active” and “passive” asset allocators. The active asset allocators argue that one should try to identify market inefficiencies and actively take advantage of the market’s errors while the passive asset allocator argues that the market is largely efficient and one should therefore accept what the market offers.

We have already shown why this dichotomy can be misleading when all asset allocators deviate from global cap weighting and have access to low cost index funds. Importantly, we should emphasize that it isn’t difficult to outperform “the market” because it is either efficient or inefficient. It is difficult to outperform due to the arithmetic of the financial markets and the resulting high costs of active management.

In order to build a better understanding of a logical portfolio construction starting point we will further explore the Global Financial Asset Portfolio (GFAP), the one true benchmark. After all, the asset allocator who assumes markets are efficient and wants to “take the market return” while avoiding any active deviations from global cap weighting would simply buy this aggregate portfolio in a simple low cost form. As William Sharpe noted in 2014, an ideal “market” index would reflect the current state of the GFAP:

I would like to see a very-low-cost index fund that buys proportionate shares of all the traded stocks and bonds in the world. Unfortunately, there are none at present.xxxii

Doeswijk, Lam and Swinkels (2014) provides a good approximation of what a comprehensive “index” or global “market” portfolio might look like:xxxiii

(Figure 5 – The Global Financial Asset Portfolio)

This paper updates the GFAP as of 2016 to note recent changes as well as some simplifications in the portfolio that make it more applicable in the real-world.

Specifically, we construct the portfolio using the two
dominant asset classes (stocks and bonds) and limit the portfolio only to financial assets so as to avoid unnecessary complications that can arise from the use of non-financial assets. Using data from World Exchanges and the BIS we find the current breakdown:

(Figure 6 - The Four Fund Global Financial Asset Portfolio)

This portfolio is particularly useful as a global benchmark for the following reasons:

1. It is a good approximation of the current global market cap weighted portfolio.
2. It can be easily implemented in a low fee and tax efficient manner using just 3 or 4 ETFs or Index Funds.
3. It removes asset class overlap and confusion by reducing the portfolio to financial assets.
4. Annual maintenance can be systematic and simple.

If we assume that the markets are efficient and that lower frictions will result in better returns, then an indexing strategy that reflects the GFAP should be highly useful. On the other hand, assessing this portfolio is illuminating because it highlights many of the rationalizations for a more active deviation from global cap weighting.

The gold standard for asset allocation benchmarks in recent decades has become the 60/40 balanced index. This low fee and tax efficient index reflects a broadly

3.2 Resolving the Problem of Inherent Procyclical Risk

The intelligent asset allocator will try to balance his/her exposure to permanent loss risk with the way he/she protects against the risk of rising power loss. The problem with these risk exposures is that they are not static. There will be times when the equity markets expose an asset allocator to low levels of permanent loss risk, and higher levels of permanent loss risk due to the equity market’s inherent tendency to be procyclical relative to other assets. This problem is compounded at times by the fact that any portfolio that is overweight equities is insufficiently hedged since the equity piece exposes the portfolio to a higher degree of permanent loss risk.

In order to understand this cause and effect it’s helpful to look at the underlying drivers of price and fundamentals in the financial markets. When the financial markets boom and bust across time these deviations tend to be the result of financial imbalances. For instance, when financial markets priced-in very high technology stock prices in the late 1990’s they were pulling future potential returns into the present while financing a higher portion of investment spending with new equity issuance. This creates what can be thought of as a price compression where future cash flows are being priced into the present. What happens as a result of this change is that the equity market, as a relative percentage of the cash and bond markets expands. These changes can be seen in the historical value of nonfinancial corporate net worth relative to GNP:

(Figure 7 – Nonfinancial Corporate Net Worth as % of GNP)

This data shows a high degree of mean reverting tendency. When compared with the value of outstanding bonds and cash, the degree of mean reversion becomes even more apparent. As you can see in Figure 8 the size of the relative market for stocks, bonds and cash tend to have a high degree of mean reversion as they boom and bust across time.

(Figure 8 - Relative Total Net Asset Allocation of Stocks, Bonds and Cash)

Conclusion & Implications for the Financial Industry

We have emphasized several key points in this paper including:

- The importance of maintaining a globally indexed savings portfolio.
- The importance of a low fee and tax efficient
approach.
• The superiority of index funds and ETFs relative to more active and lesser diversified alternatives.
• Properly understanding the concept of risk and applying it in an appropriate manner relative to your financial needs and goals.
• The avoidance of the pursuit of alpha as a financial goal and the limitations of the “active” vs “passive” discussion in a low fee macro indexing world.
• A proper understanding of duration as it relates to asset allocation and the problem of time within a portfolio.
• The value of a market cap weighted approach as well as the rationale for deviating from a market cap weighted approach.
• The rationale and value of a systematic Countercyclical Indexing asset allocation strategy.

We hope that this paper contributes positively to the advancement of Modern Portfolio Construction and builds on the already beneficial contributions made by so many great thinkers who have improved the ways we all allocate assets in the pursuit of a higher standard of living.

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